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HY REACH SUPER-E

Operation & Spare parts Manual

McCONNEL

The dependable farm workers.

Read the book first

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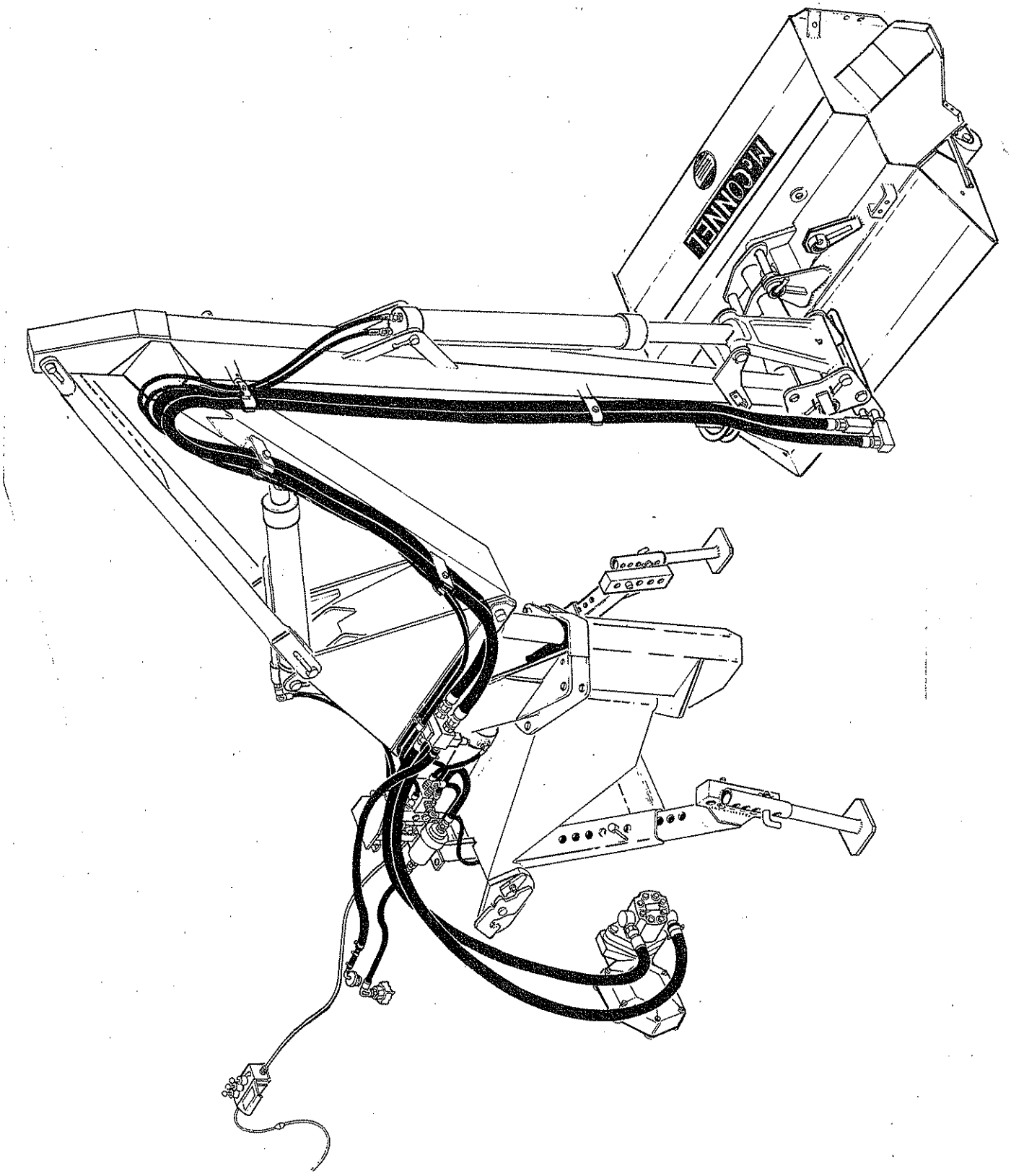
HY-REACH SUPER-E



SECTION 1
FITTING INSTRUCTIONS

1. General Information

The Hy-Reach Super 'E' can be supplied in two forms; with independent hydraulic reservoir and tandem pump, or with a single pump utilising the tractors hydraulic supply.

The independent system is recommended when the tractor supply system is unsuitable for reasons such as inherent overheating problems, residual back pressure created by pressure return systems, inadequate reservoir capacities or by 'closed centre' hydraulics. Also when the required flow and pressure requirements are inadequate.

Again the independent system is recommended particularly for contractors when long hours of heavy duty work can be expected. It will also be beneficial if it is likely that the machine will be frequently switched from one tractor to another such as is likely with a syndicate owned machine, resulting in the mixing of different types of hydraulic oil which may prove incompatible in the tractors system.

When the tractors own hydraulic system is suitable, or when the machine is not likely to be switched frequently from one tractor to another then the basic machine with integral tractor supply is adequate for all hedge maintenance work.

Choice of flail head should be influenced by the type of work that the machine will be expected to carry out.

The Multicut head supplied in 1 metre and 1.2 metre sizes is suitable for all average sized hedgerows which are regularly maintained.

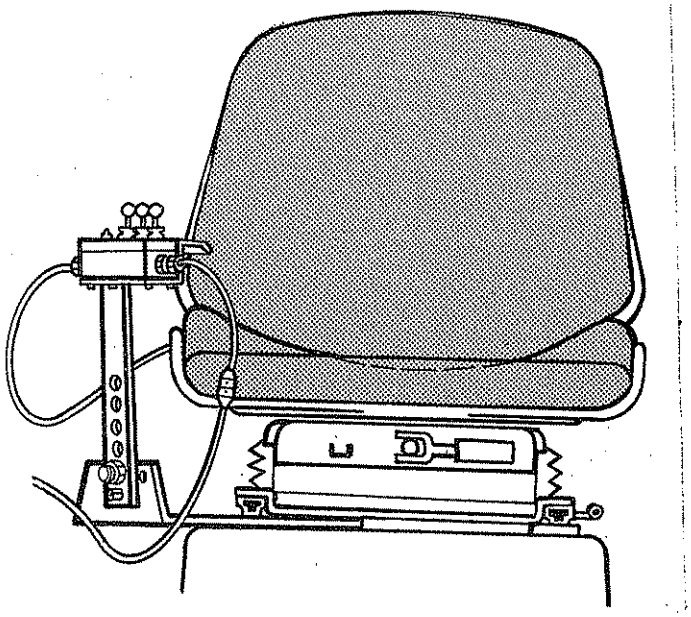
The Toughcut head should be specified where it is expected that the machine will be continuously working in really heavy growth.
The Toughcut is supplied in 1 metre size only.

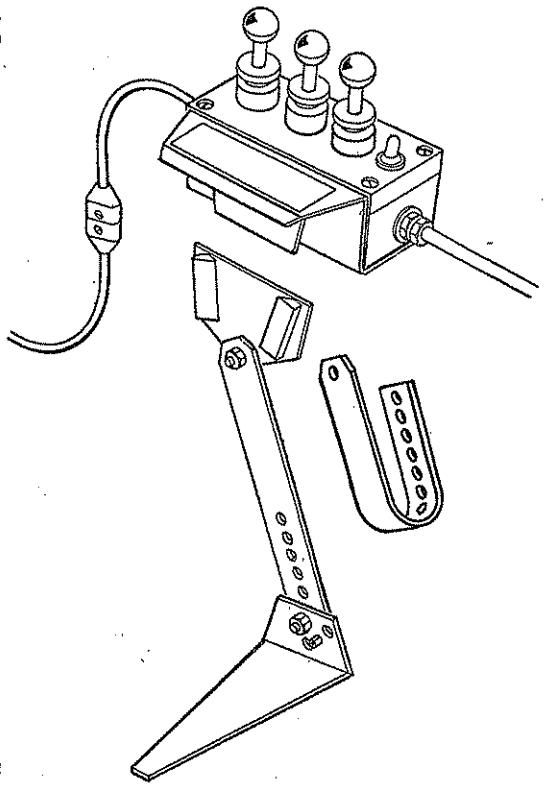
7. Installation of cab controls

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 silent 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 preferably at the fuse box or the ignition switch where it can be switched off with the tractor's ignition key.

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

The installation of the control box within the cab should be carried out before mounting the machine on the tractor. As a precaution the electric wire which clips to the Rotor Control Valve solenoid should not be connected until attachment of the machine is complete.

8. Tractor hydraulic supply

Power for the movement of the armhead is obtained from the integral hydraulic tractor pump which should have a minimum relief valve setting of 2500 psi and minimum delivery of 1½ galls per minute. (6.8 litres per minute at 175 bars).

A PS/F pump bolted to a high ratio gearbox is mounted to the tractor pto shaft. This pump is used to drive the hydraulic motor for operation of the flail. The length of torque chain supplied with the gearbox should be adjusted to give an approximate angle of 90° on a line through the pto shaft. Note that the pump connections can be unbolted and rotated to suit individual requirements. It is essential that clearance is maintained between the Hy-Reach body and the pump/gearbox assembly.

9. Hydraulic Fittings

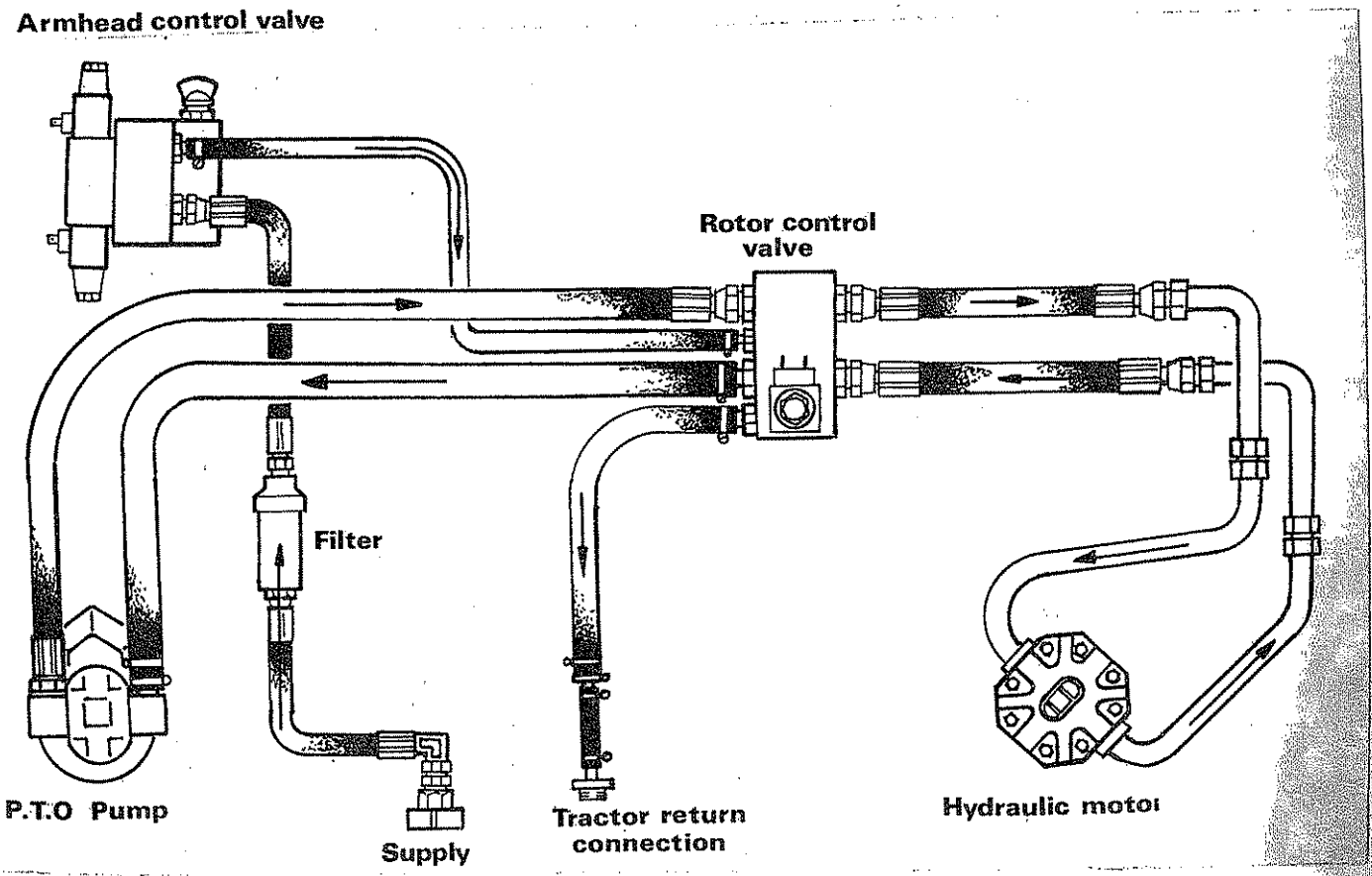
a) To protect the new machine, drain, flush and refill the hydraulic system on older tractors.

b) A male half self-sealing coupling should be fitted to the auxiliary service port or trailer pipe connection.

c) Install the correct tractor return connection. On some tractors this will mean replacing the gearbox filler plug or the transmission filler plug depending on the model. On others, a return tapping is provided.

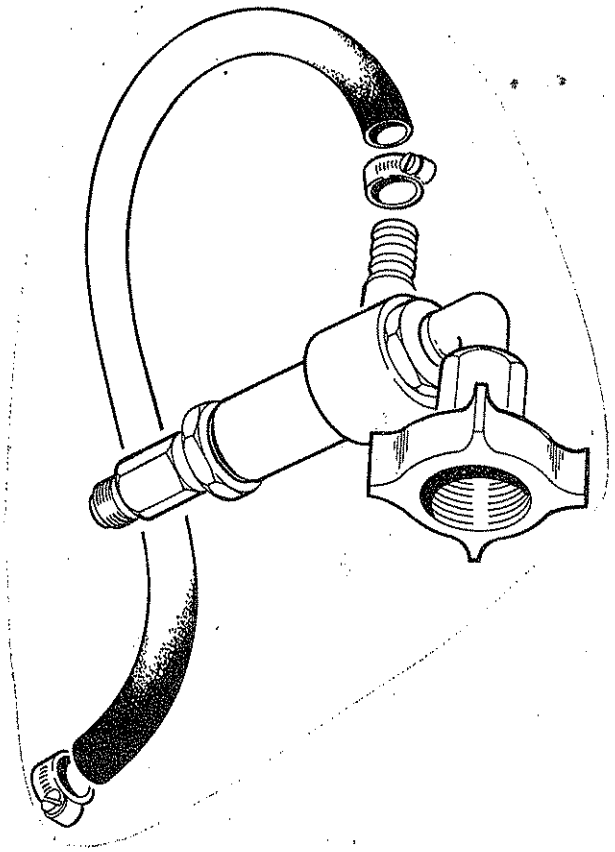
d) In all cases, back pressure of the return oil flow must be kept to a minimum. The use of self-sealing couplings in the return line which can substantially increase back pressure, should be avoided. There is always the danger of the coupling being incorrectly connected resulting in a locked line when the tractor auxiliary service is operated. This can lead to a burst filter housing and/or damaged pto pump shaft seal.

e) All hoses should be carefully routed to avoid sharp bends and kinks and the hose lengths should be kept to a minimum.



10. Flow control valve

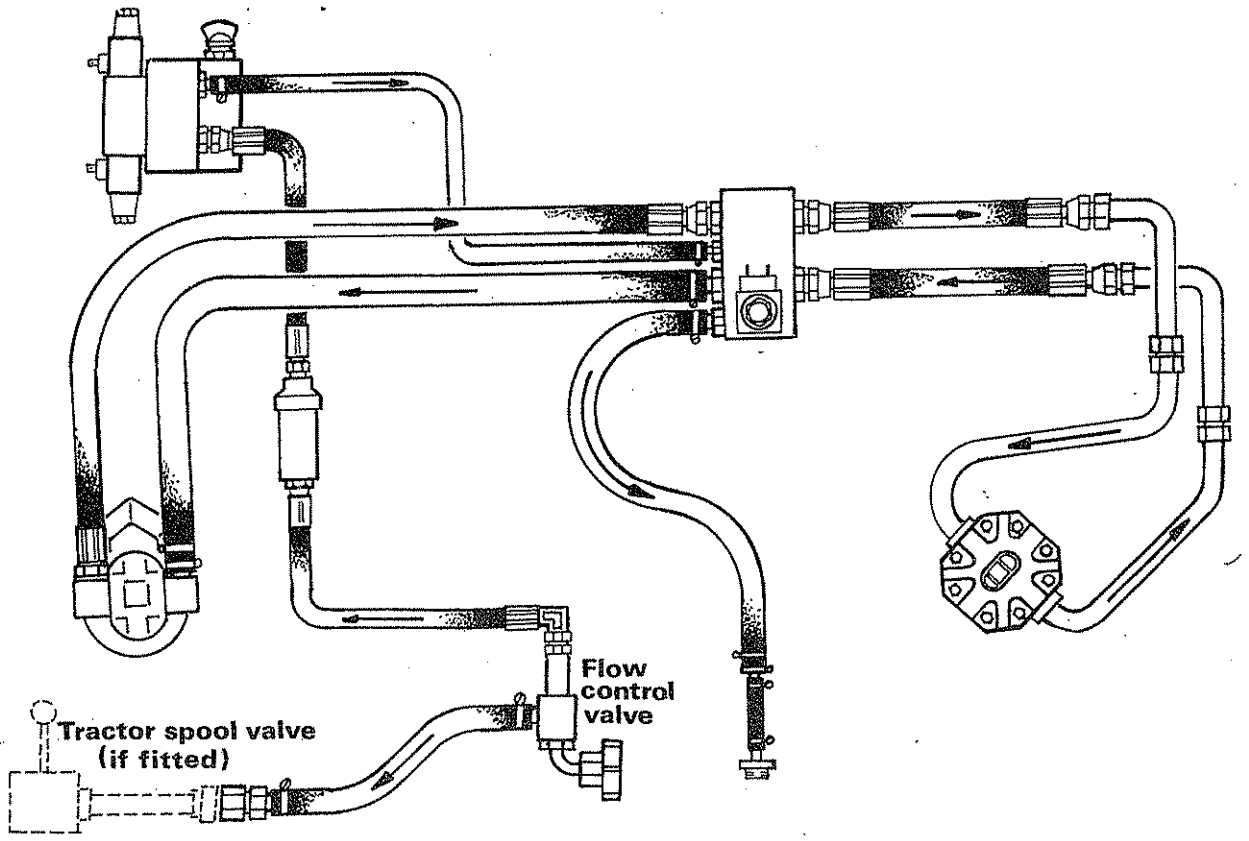
Where hydraulic flows are in excess of 6 gpm (27 litres) at 450 rpm on the pto shaft, the fitting of a flow control valve is strongly recommended to prevent back pressures causing damage to the pump and motor shaft seals. Back pressure is reduced to a minimum at the ideal supply of 2½ to 3 gpm (11½ to 14 litres) at the operating speed. As oil flows increase, difficulty will also be experienced in maintaining precise control of the armhead; reducing the flow by cutting the tractors engine speed will also reduce the power from the PTO pump and is therefore an unsatisfactory solution.



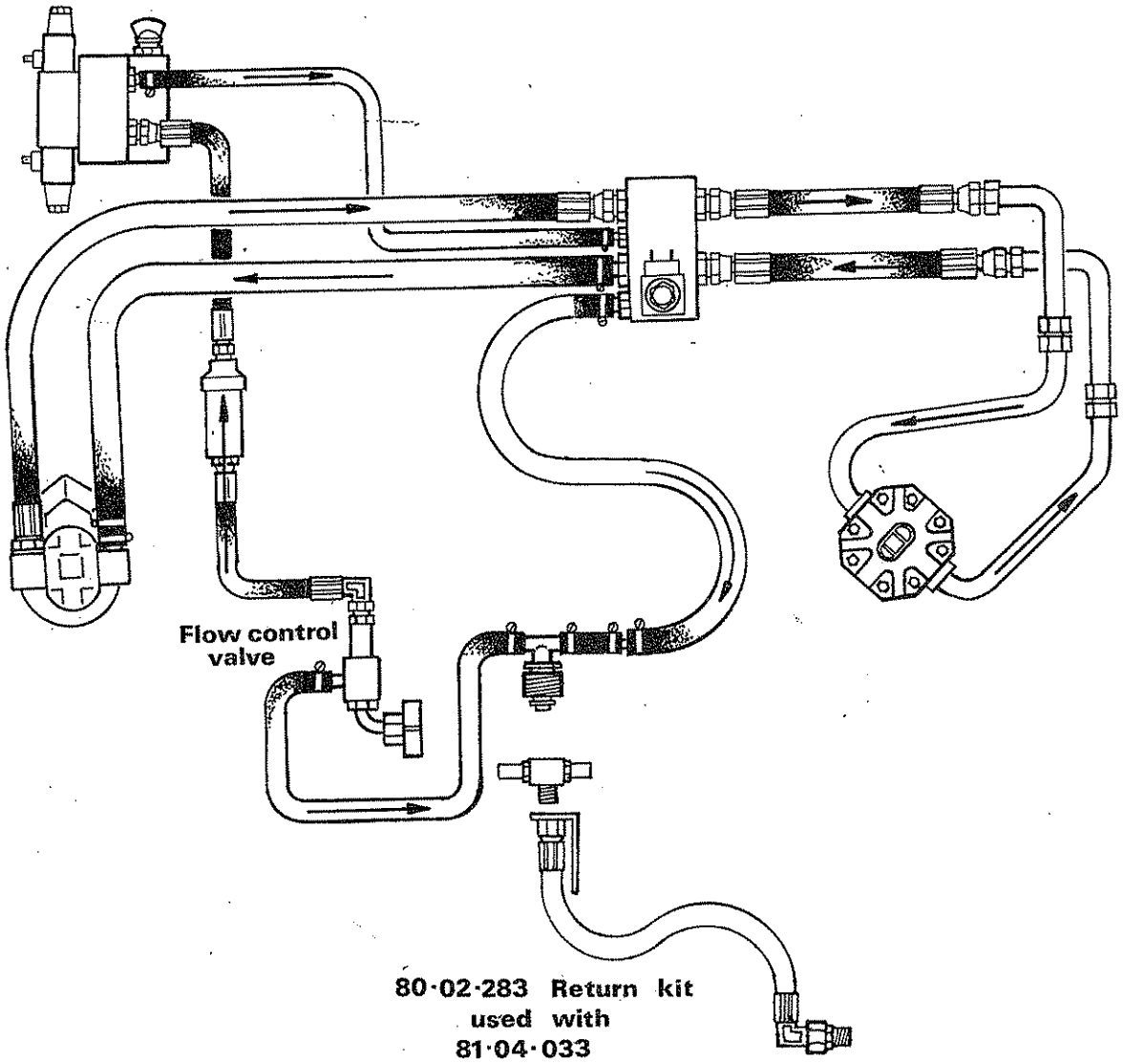
The flow control valve is factory calibrated to pass approx 3 gpm (14 litres) to the armhead control valve irrespective of engine speed, the excess oil being returned directly to the tractors reservoir via a 'T' piece or through the return section of the tractors spool valve.

CAUTION

Flow from rotor control valve is returned to the tractor's filler cap. Do not use a self-seal coupling.



Hydraulic circuit layout for International Harvester tractors with high flow rates.



Complete kit utilising 'T' piece for return to tractor's reservoir:-

IH 614, 634, Part No. 81 04 032.

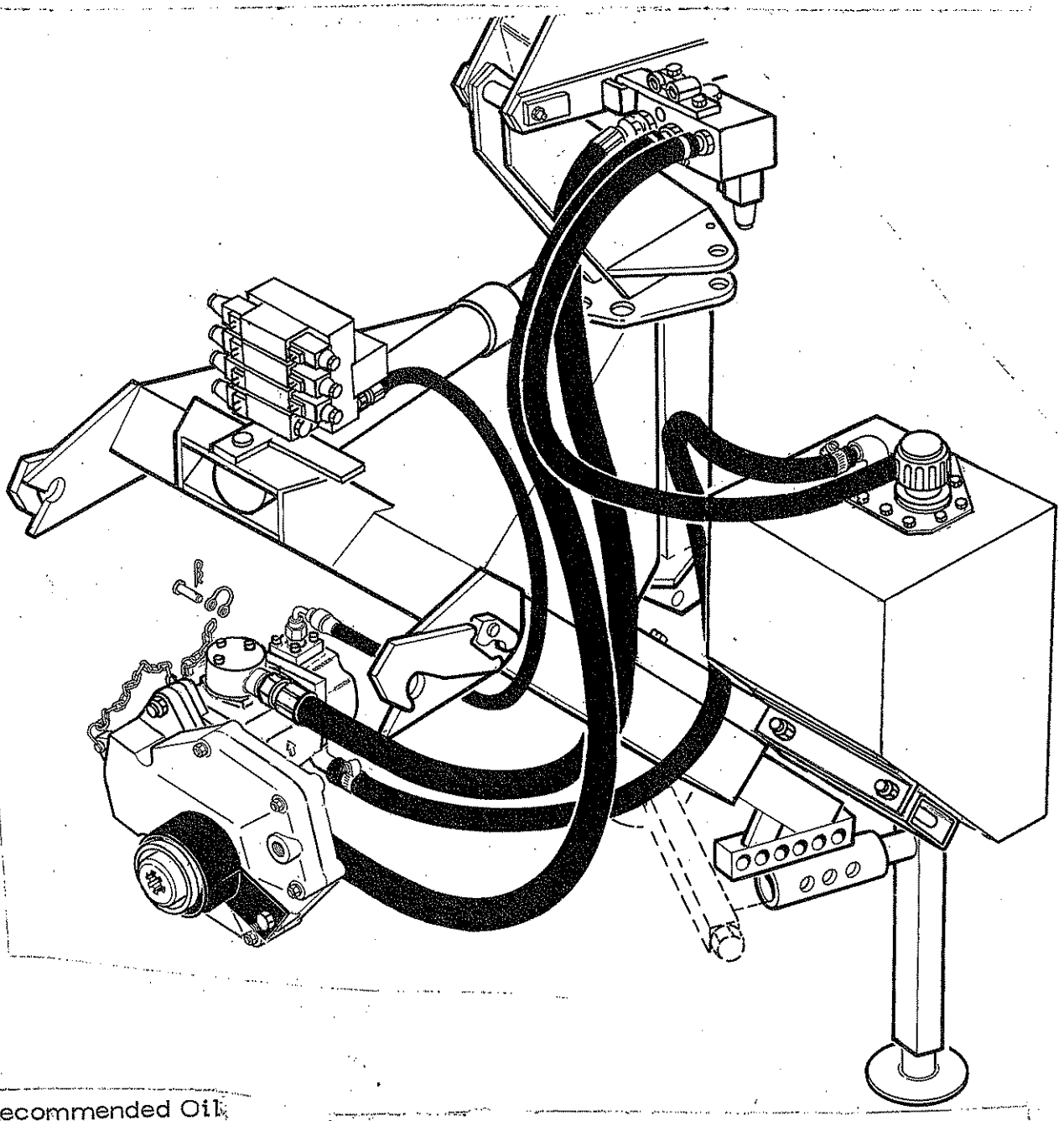
For International Harvester 2400, 2500, 454, 474, 574, 674 and '8' series use kit part no. 81 04 033.

Also required will be hose kit part no. 80 02 283 which enables the oil to return to the tractor's transmission, below and in front of the right hand side of the rear axle. It will be necessary to drain the transmission to allow the union to be fitted. When the machine is removed from the tractor the return hose may be protected by fitting the 'stepped' low pressure union sealed with a plastic cap.

The metal spigot or stay provided with the kit is trapped between the union hexagons and can be clipped up to any suitable point to support the hose.

11. Independent Hydraulic System

This system differs from the tractor hydraulic supply in that an 11 gallon (50 litre) reservoir is mounted directly to the machine frame. Within the reservoir is a 10 micron filter. A tandem pump assembly mounted to a high ratio gearbox powers the armhead from the small pump 2.8 gpm (10.5 l/min) while the flail motor is driven by the larger pump at 22 gpm (100 litres/min) both at 540 rpm at the pto shaft. Completing the equipment are screw jack legs and the extra hoses necessary for installation.



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

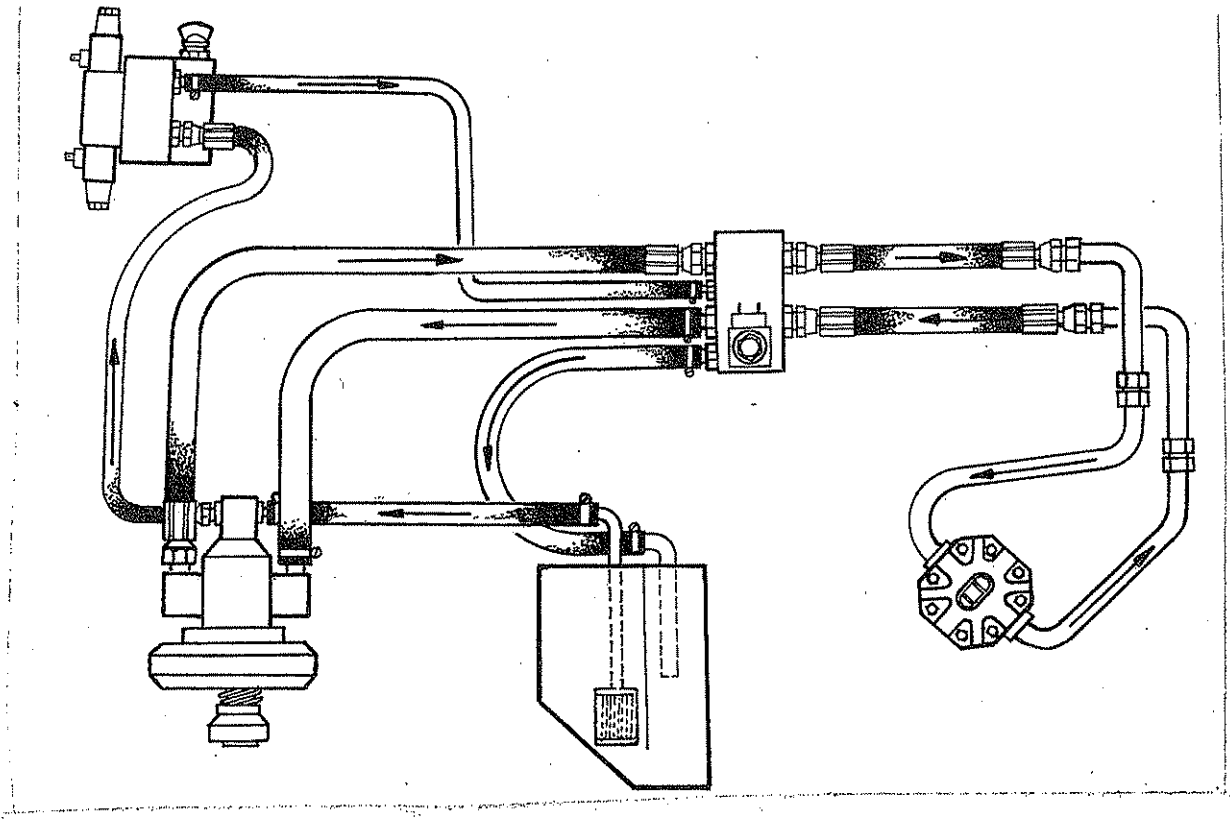
Fill tank until the oil level completely covers the domed projection in the bottom of the strainer basket with a light hydraulic oil as recommended in the chart.

Check that all hose clips and connections are tight.

Start tractor, engage PTO and allow the system to prime for approximately one minute.

Operate the armhead and flail ensuring that everything is functioning correctly. Check the hose runs for pinching, straining, chafing and kinking.

Check again the oil level in tank and top up as necessary



MAINTENANCE

The suction filter in the tank should be changed each year. The oil tank cover plate is removed to give access and should be re-jointed with a gasket compound when re-fitting. The filter does not have a by-pass thus giving complete protection from dirt to the pump and system, blockage of the filter will cause poor system operation, ie. spongy or intermittent operation of the arms or the flail drive, some pump noise may be noticed particularly with cold oil; if these symptoms develop the filter element must be replaced.

Screw jack legs

These are used in place of the pinned legs of the basic machine to facilitate mounting to the tractor. Once the weight of the machine is taken by the tractor mounting brackets the jack leg is removed and re-positioned in the back of its housing parallel to the ground.

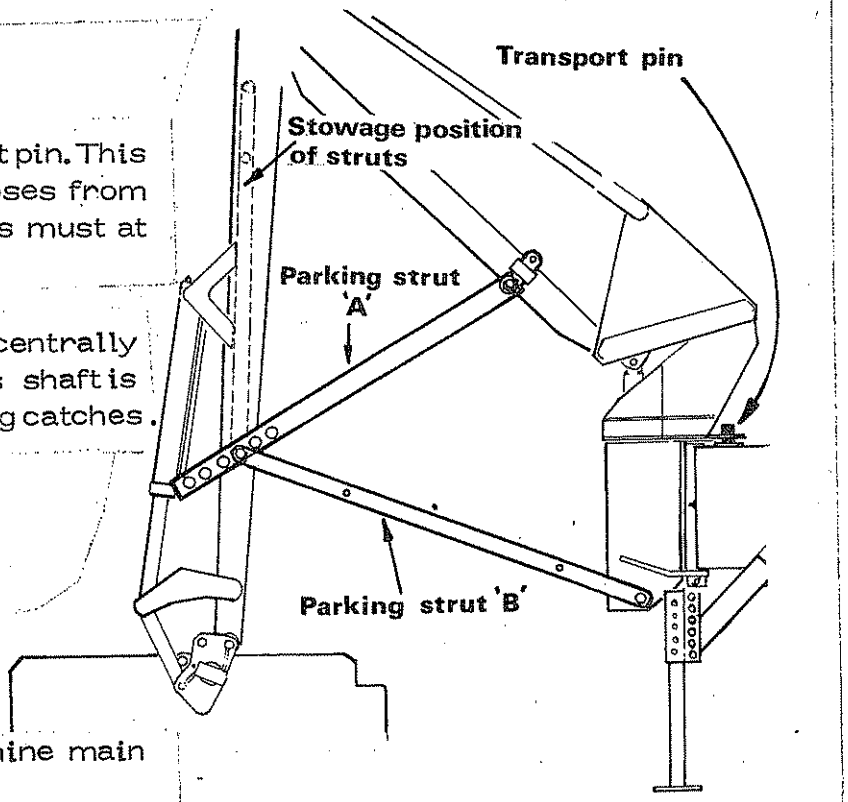
Unlike the basic machine requirement, it is not necessary to remove the telescopic leg member from the frame and turn through 180° when hitching on and off, although the precaution of only extending this member a maximum of 2" (50 mm) from the fully closed position still applies. (See page 15).

12. ATTACHMENT TO TRACTOR

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

2. Fit tractor fittings onto the tractor as detailed on the sheet accompanying the fittings.

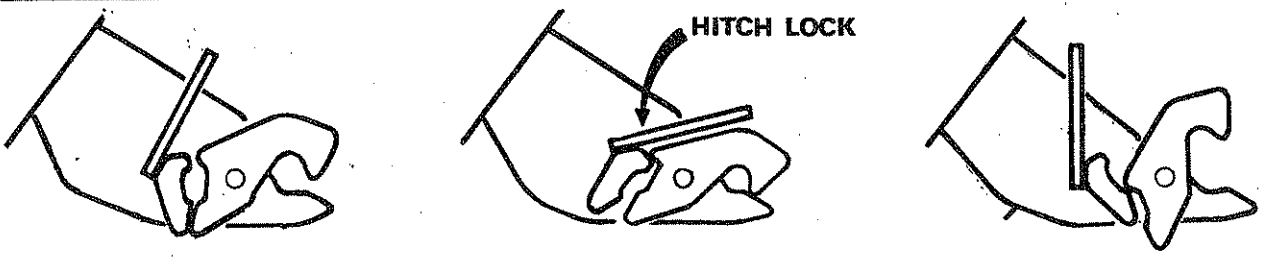
3. Remove and discard the transport pin. This pin is only used for shipping purposes from the factory. The two parking struts must at this stage be left in position.



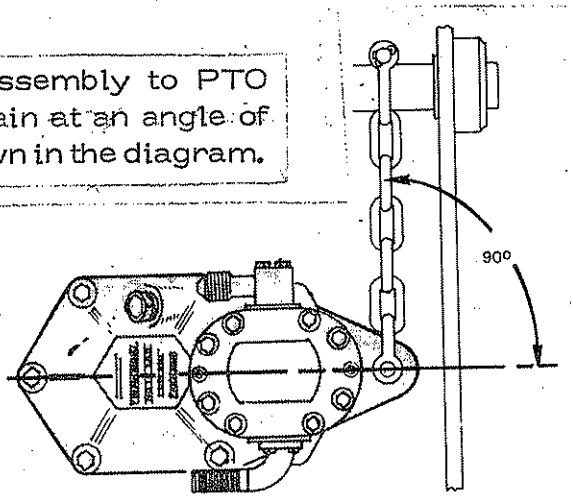
4. Reverse the tractor squarely and centrally to the machine until the cross shaft is approximately 18" from the locking catches.

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

LOCKING-CATCH POSITIONS



6. 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.

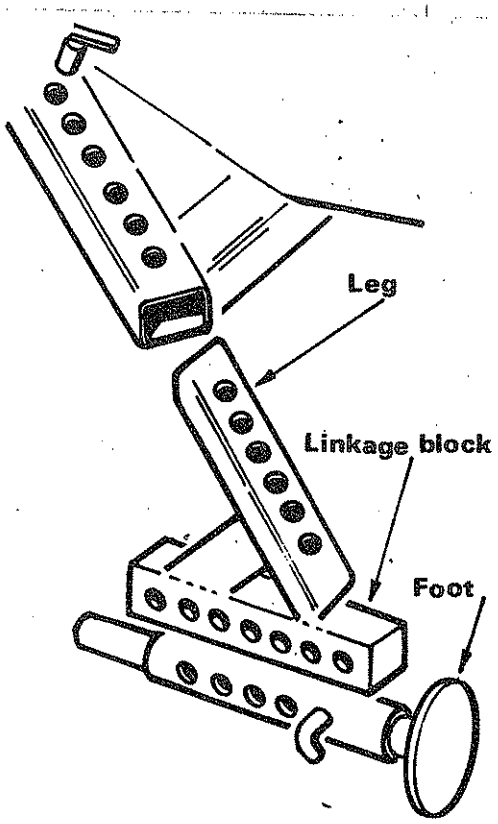


7. The hoses supplied with the pto driven pump are of sufficient length to allow fitting to the tractor before the machine is mounted. Two hose clips are provided at either end of the large bore suction hose and these should be positioned so that their worm drive barrels are opposed at 180° to reduce 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.

8. Remove the protective blanks from the return hose and fit to the return connection on the tractor. Connect up the supply, making sure that the self-seal coupling is fully engaged.

9. Isolate tractor linkage, ensure PTO shaft is out of engagement, select oil supply to the machine and allow the oil to circulate for about two minutes to prime the machine. For initial installation a 1" male/male union is supplied for joining together the two flail hoses to prevent oil loss.

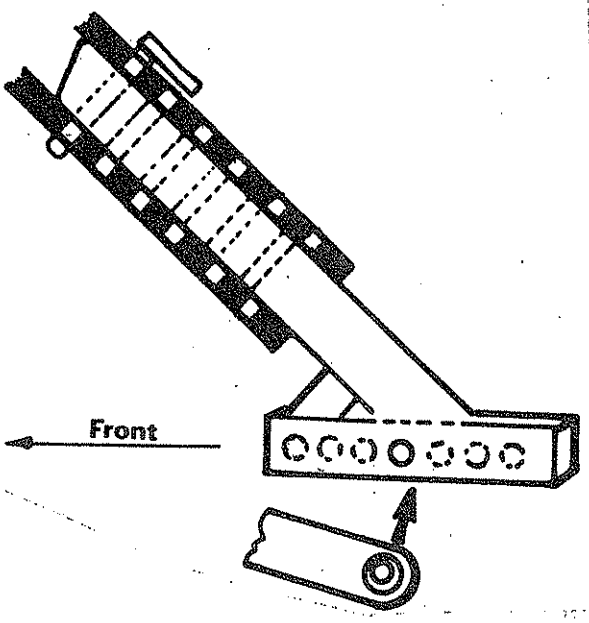
10. Remove and stow the parking strut 'A' leaving parking strut 'B' in position. With the machine in park position and by simultaneous use of the lift and reach rams, the machine can be tilted up or down to bring the locking catches level with the cross-shaft.



11. Reverse the tractor and engage the locking catches on the outer ends of the cross shaft.

12. Using the reach and lift ram press down on the end of the boom to transfer the weight of the machine from the feet to the hitch locks. Raise the feet to their full height and replace the pin. Remove the leg pin, withdraw the leg from the frame, turn it through 180° and replace. Refit the leg pin in the top hole of both the frame and leg. The linkage block should now be horizontal.

13. Using the lift ram adjust the main body of the machine until it is just above the horizontal.



14. Fit the linkage pin in the nearest hole of the linkage block that is forward of the draft link ends. Hole alignment is achieved by removing the leg pin and extending the leg from the frame until the draft link can be fitted and the leg pin re-engaged.

CAUTION.

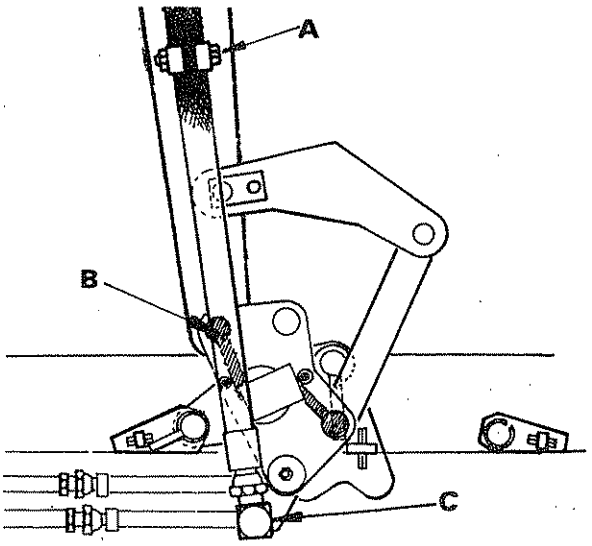
The leg needs the maximum amount of support within the frame when in the working position. Do not extend it further than 2" from the fully closed position. Use the next hole in the linkage block instead.

15. Remove the parking strap 'B' 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.

16. Reverse the machine up to the flail head and position flail mounting jaws on the forward extension between the central mounting lug and the secondary lug that is nearest the hydraulic motor.

17. Disconnect the slave link from the forward extension and fit the flail mounting pin through the main central lug and the mounting jaws on the forward extension. Reconnect the slave link. Fit the remaining mounting pin through the secondary lug. Lock the mounting pins in position with the roll pins.

18. Raise the flail and angle the flail head until the hose clamp nearest the boom end 'A' the forward extension pivot pin 'B' and the 90^{O} elbows 'C' are in line.



View of rear showing hose run in right hand working position

19 Disconnect the two flail hoses that are joined together by the 1" male/male union and connect the hoses to the 90^{O} elbows on the flail head. For upward cutting, the hose/rigid pipe run from the connection marked MP on the rotor control valve should be fitted to the lower connection on the hydraulic motor.

It should be noted that for changing over from upwards to downwards cutting the hose connections should be swapped at the rotor control valve. The cross-over of the hoses is most easily carried out at the dipper arm pivot point, passing the outer hose (from the Flail end) beneath the other.

20. Loosen off all the hose clamps which position the hoses against the armhead and carefully operate the machine through its full range of movement while checking that the hoses are not strained, pinched, chafed or kinked. Retension hose clamps after making any adjustments to hose positions.

SECTION 2

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 ie in a clockwise direction. Operation of the lift control switch 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 control switch is operated.

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

Select external services on tractor supply to allow the oil to flow around the priming circuit. Bring tractor engine to idling speed and engage the PTO. Increase engine revolutions to approximately 1000 RPM to avoid stalling when the starting load is applied on the rotor. Switch on the stop/start lever on the electric control box to start the rotor. A significant delay of several seconds will be noticed before the flail begins to rotate. This delay is perfectly normal and start times will be reduced as the oil warms to operating temperature. Gradually increase engine RPM to the 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. The recommended rotor speed is 2300 RPM.

a) Multicut Rotor
The hydraulic motor fitted as initial equipment, part number 83 01 257 requires a pump flow of 16.7 gpm at 400 RPM on the PTO shaft to give a rotor speed of 2300 rpm.

For the average tractor, this means running the engine at about two thirds of the rated pto speed.
ie
Where 2100 engine RPM = 540 pto then run engine at 1600 RPM
Where 1900 engine RPM = 540 pto then run engine at 1400RPM

b) Touchcut Mk II
The Toughcut rotor whichis generally subjected to heavier duty work requires more power and so the hydraulic motor fitted as initial equipment part number 83 01 258 requires a pump flow of 20 GPM at 480 RPM on the PTO shaft to give a rotor speed of 2300 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.

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 over-loading. It is obviously better to make a second pass or more in heavy work to avoid undue strain.

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.

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 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.

8. Breakaway action

When an obstruction by the flail head is met and the tractor continues to move forward the arm is forced back and at the same time is also lifted. 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

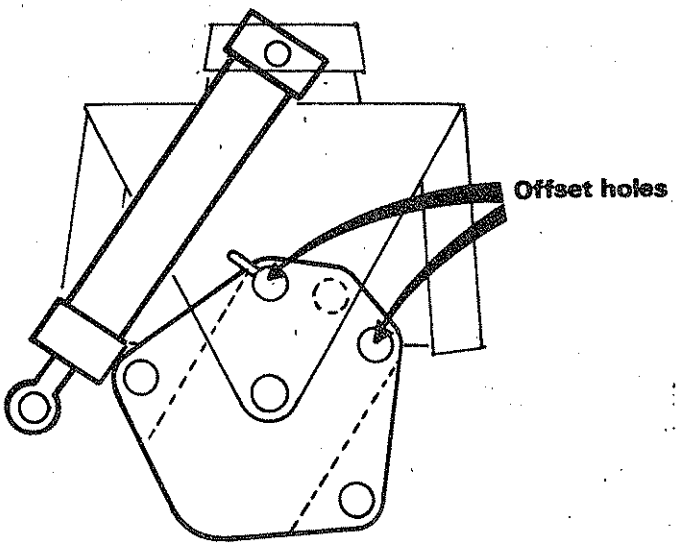
The armhead is positioned to the rear of the tractor for travelling or when parking the machine before removal. When the white tap on the armhead valve is fully open both the gland and base ends of the breakaway ram are connected to the base end of the lift ram. When the lift control switch is operated, 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 switch 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. Machine Limitation

Bear in mind that the Multicut hedging flail is a maintenance tool designed to deal with a maximum of two to three years growth. Larger growth up to 3" diameter may be tackled occasionally by taking care, being patient and making several passes.

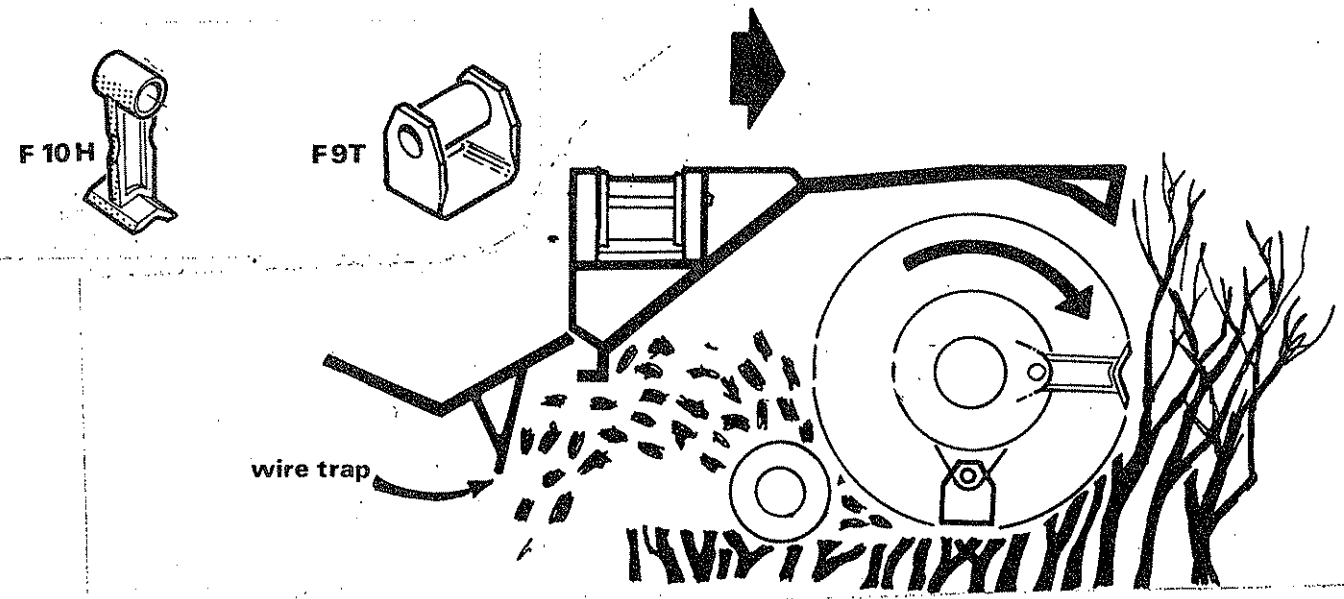
For continuous heavy growth the Toughcut flail should be used. Badly neglected hedges should be tackled with a sawhead and heavy timber felled with a chain-saw.

12. Downward cutting

The flail head is normally assembled at the factory for the flails to cut downwards with the hedger hood complete with integral wire trap mounted on the rear of the flail head. It is recommended in the interests of increased safety that the flail is operated in this configuration especially when working on the highway.

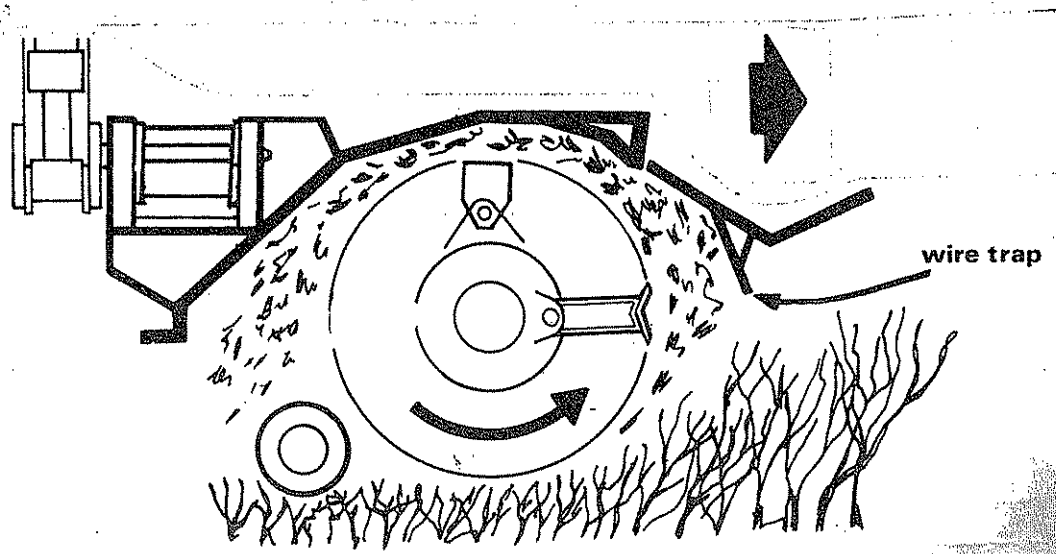
Cutting downwards is safer because it minimizes the risk of flying debris by throwing the cut chips into the bottom of the hedge. This limits the area of mess and requires very little tidying-up time afterwards.

Current hedger flails are the F10H for the Multicut and the F9T for the Toughcut.



13. Upward cutting

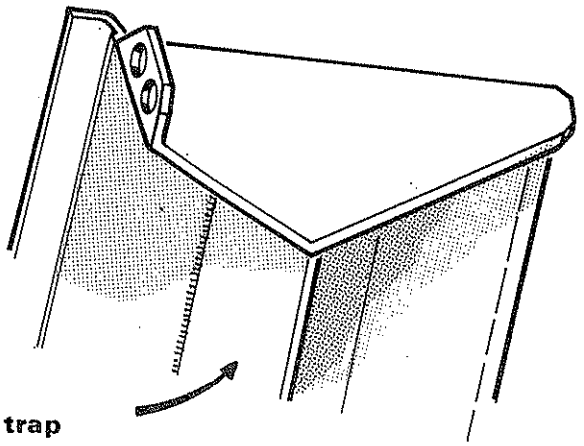
Should the finish become important through operator preference or necessity eg. when a clean cut in a light hedge is required to prevent frost from entering the cut stems and causing 'die back' the rotation can be reversed to enable the flails to cut upwards by interchanging the hoses to the hydraulic motor at the rotor control valve connections. The hedgecutting cowl is also removed from the rear and refitted to the front of the flail head. Upward cutting produces a smooth shearing action for a clean cut whilst cutting downwards has a chopping effect. If attempting to cut upwards 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.



14 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.



Wire trap

15. Light hedging cowl (optional extra)

When cutting upwards in a light hedge flying debris may cause a problem especially on the highway. A specially designed light hedging cowl Part Number 73 14 423 for the 1.2 metre and 73 14 424 for the 1 metre flail head is available which will minimize the danger to passers by and reduce the spread of cut material. The light hedging cowl is bolted to the front of the flail head in place of the standard hedger cowl. The supporting struts are not required.

16. 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.

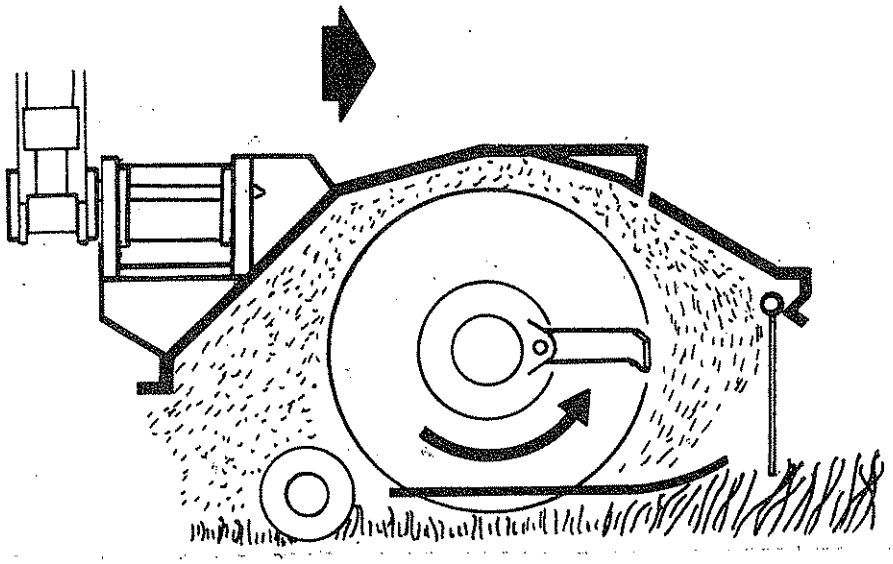
17. Changing rotation

Extend armhead, lower to ground and stop tractor engine.
Release the two flail hoses from their mounting brackets up the main arm.
Prepare for spillage and interchange the hoses at the rotor control valve at the connections marked MP and MR. (Motor Pressure and Motor Return).
Relocate the hoses in the mounting brackets, the cross over point being done at the main/reach arm pivot passing the outer hose from the flail end beneath the other.

To ascertain direction of rotation without running the machine, the hose line connection from MP runs to the lower connection on the hydraulic motor for upward cutting.

18. Grass cutting

The flail should rotate upwards for grass cutting. Upward rotation of the flails creates a vacuuming effect which 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 onto the ground at the rear.



WARNING

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

19. Grass roller adjustment

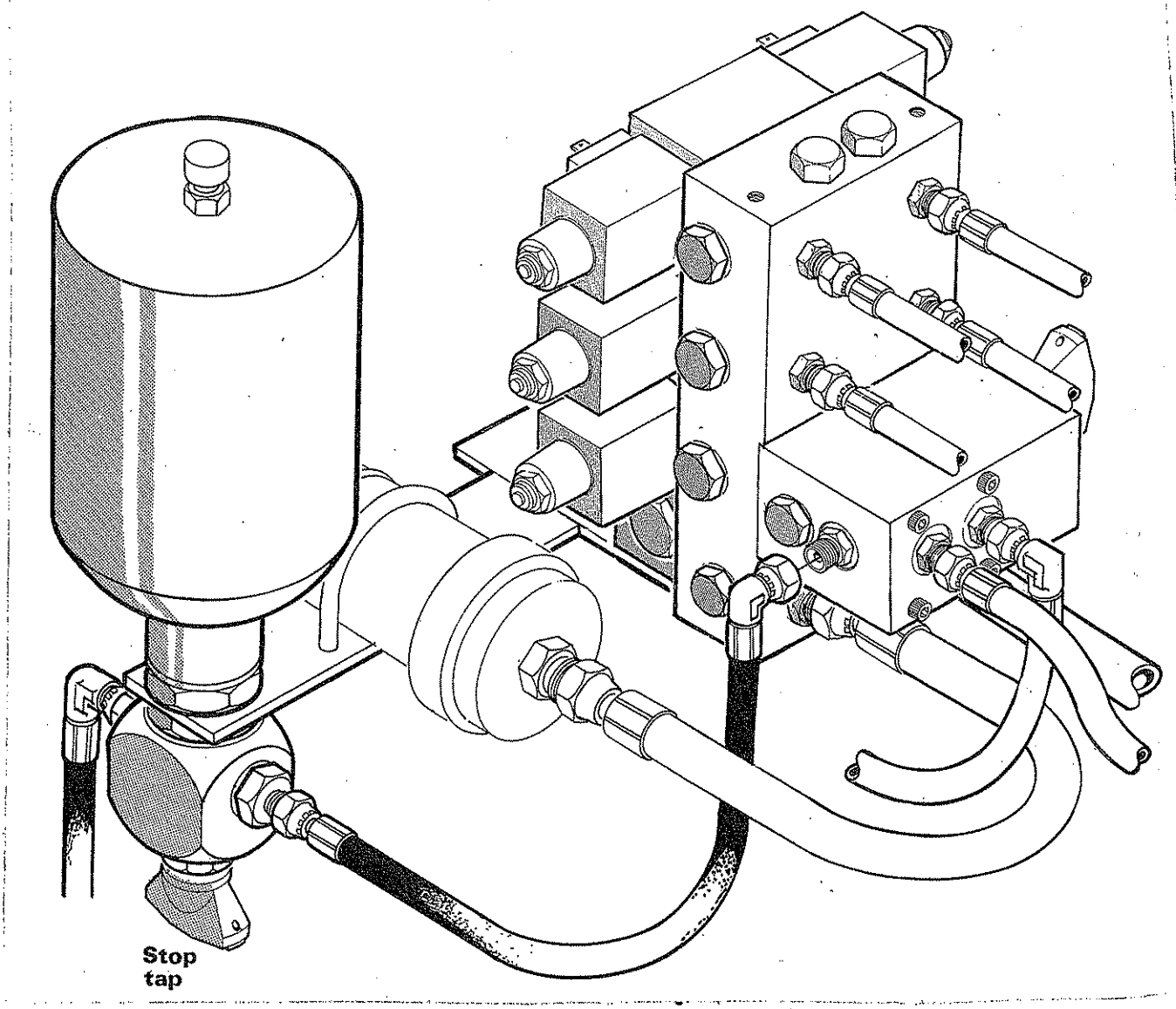
When flailing grass, the roller should be set lower than the flails to prevent them from 'scalping' the ground.

20. Float kit (optional extra)

Grass flailing can be a slow tedious task requiring a high degree of operator concentration especially when working on rough or undulating ground.

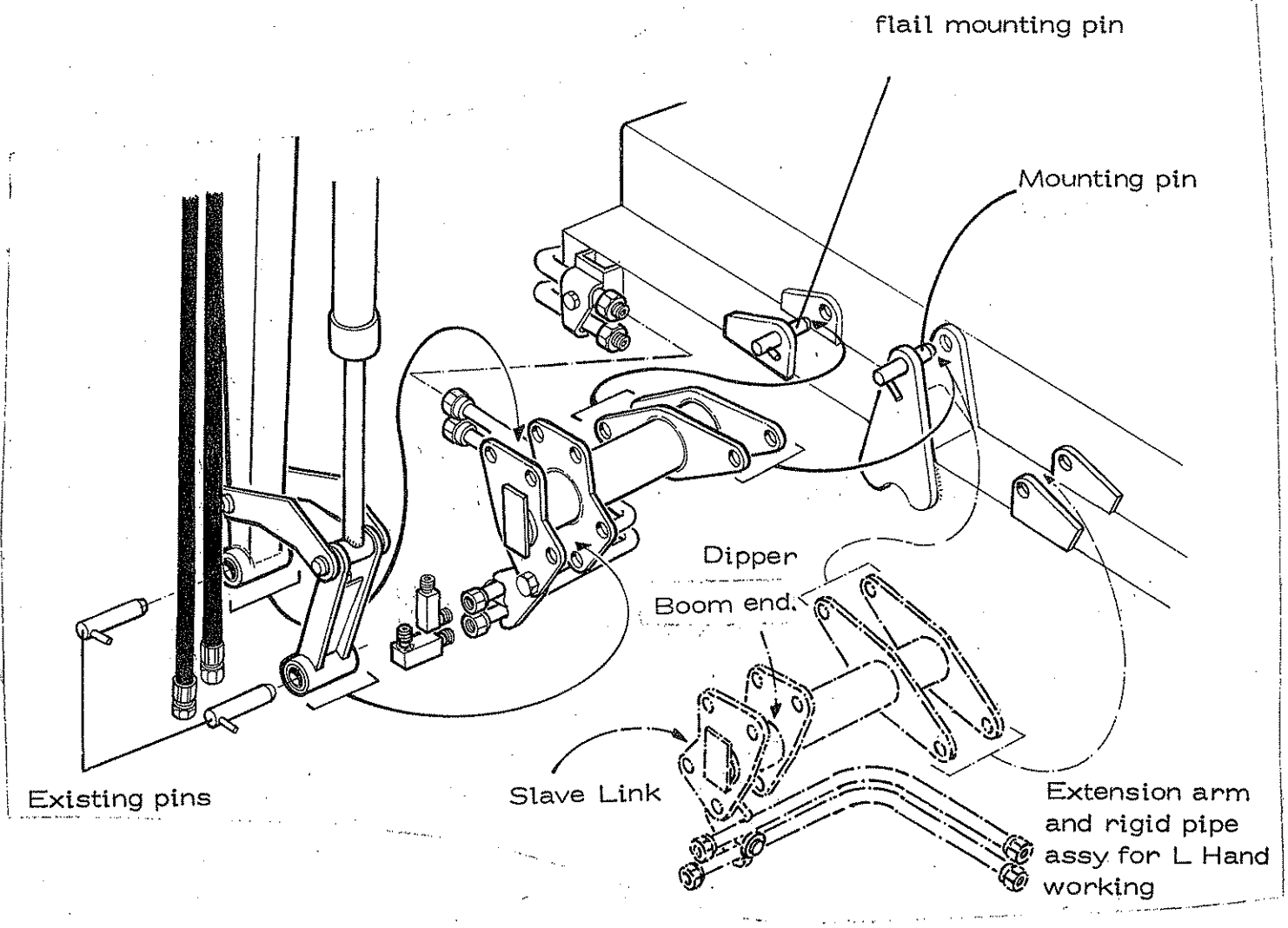
A hydraulic float kit is available which is mounted on the bracket that supports the in-line filter. In work, with the stop tap open the flail runs along the ground and automatically lifts and rides over any bumps. Any shock loads are absorbed by the accumulator which is pre-charged with nitrogen to 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.



21. Forward extension kit (optional extra)

For grass flailing only, an extension kit is available that places the flail head half metre further forward when in the working position for increased operator vision and comfort.



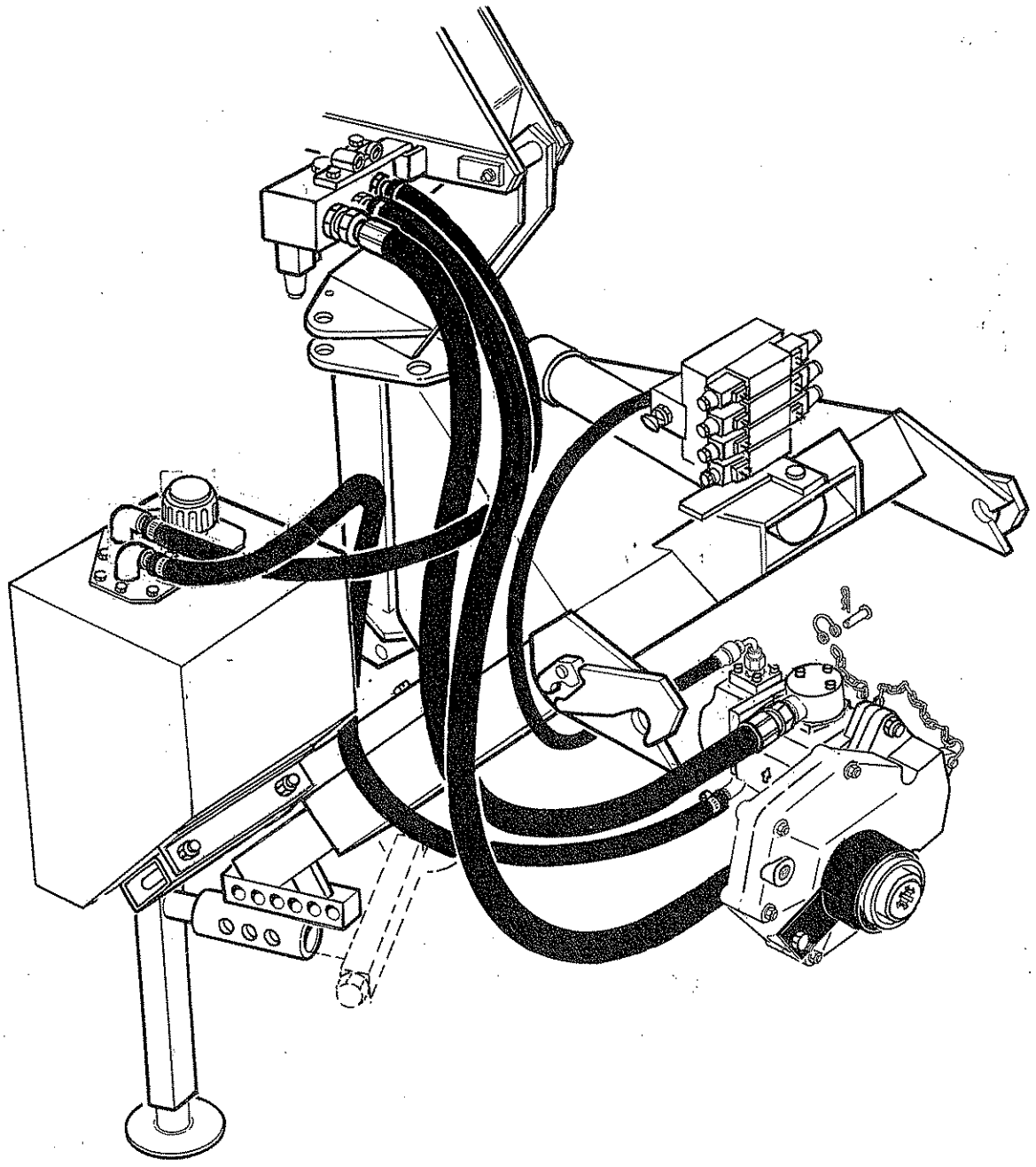
The kit consists of an extension arm and two rigid metal pipes and is assembled in the same way as the standard model.

Kit No. 71 09 301	for 1.2 metre flail head comprising:-	
	1 off 71 09 300	Forward extension arm
	2 off 71 09 129	Rigid pipe
Kit No. 71 09 302	for 1 metre flail head comprising:-	
	1 off 71 09 300	Forward extension arm
	2 off 71 09 130	Rigid pipe

22. Conversion to left hand operation (Independent Reservoir System)

Provision is made to enable the flail head to be operated on either side of the tractor. The machine is normally despatched from the factory for operation on the right hand side, the reservoir being attached to the left hand side of the machine and all the hose connections on the tandem pump assembly being directed to the left.

For left hand working the tank should be mounted on the right and the hose connections on the pumps moved through 180° and directed to the right. In both cases the pressure connections should be on the top. Conversion from right to left hand working is similar in all other respects to the tractor supply system. (See page 26)



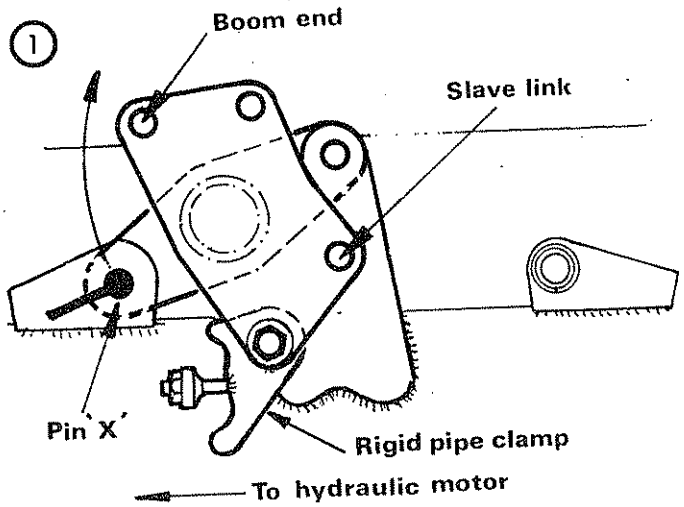
23. Conversion from right to left hand operation (Tractor supply)

The Hy-Reach is normally despatched from the factory with the flail head positioned 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.

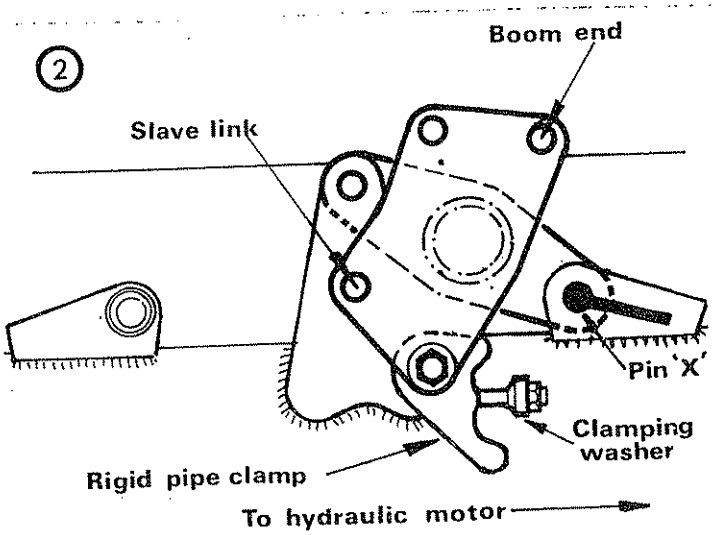
The flail head can be mounted for left hand working in which case it will be necessary to obtain supply and return rigid pipes for the hydraulic motor.

Work should be carried out on firm level ground with the machine in the 'park' position.

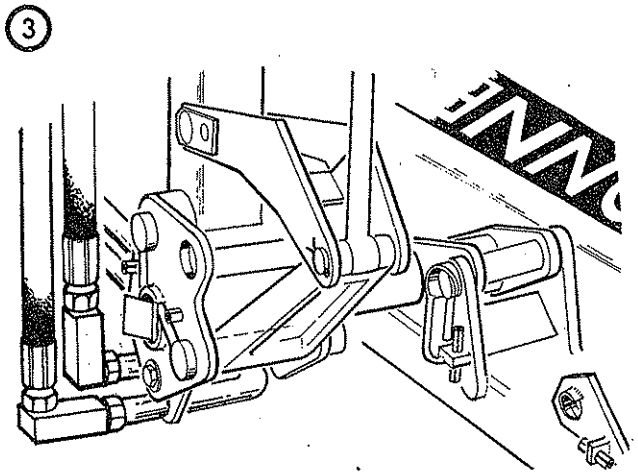
1. Disconnect the flail hoses at the 90° elbows ensuring that you have a suitable receptacle to catch the oil. Connect the hose ends with a 1" BSP M - M union.
2. Dismantle the rigid pipe clamp on the forward extension and uncouple the rigid pipes from the flail motor rigid pipe assemblies.
3. Remove the flail motor cover.
4. Remove and store existing flail motor rigid pipes.
5. Remove and reassemble the flail motor and drive coupling assembly on the other end of the flail head.
6. Fit new rigid pipes onto the flail motor and replace the flail motor cover.
7. Disconnect the boom and slave link from the forward extension and lower boom end to the ground.
8. Remove pin 'X', swing the forward extension over and secure in the opposite lug.
9. 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 reassemble the hoses ensuring there is enough free hose at the pivots to allow the machine to operate throughout its entire range of movement without straining the hoses.
10. Remove breakaway ram rod end pin. Retract breakaway ram by screwing in the white tap on the armhead control valve and operating 'lift' on the electric switch box. 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 circuit. Reconnect rod end between the lugs on the pillar.
11. Turn the entire flail head through 180° to face in the opposite direction.
12. Lower the boom boss end and slave link into the forward extension using the locations shown in Fig 2.
13. Connect the rigid pipes complete with elbows to the motor rigid pipes. The pipe with the elbow extending furthest rearward is fitted in the lower position.
14. Raise the flail, and angle until the hose clamp nearest the boss end 'A', the forward extension pivot pin 'B' and the 90° elbows 'C' are in line. See Fig 6.
15. Slacken the 90° elbows, separate the flail hose ends and connect to the 90° elbows ensuring the hose run passes over the forward extension pivot pin. Tighten the 90° elbows fully without disturbing the hose positions.
16. Refit the rigid pipe clamp by bolting through the hole shown with the washer on the outside and spacer on the inside of the forward extension plate, see Fig 2.
17. Using special clamping washer secure rigid pipes in position.
18. Check rotation of the rotor; for upward cutting the hose run from the connection marked M.P. on the rotor control valve should be connected to the lower pipe on the hydraulic motor.
19. When work is completed operate machine carefully through its entire range of movement and re-check hoses for pinching, straining, kinking, or chafing.



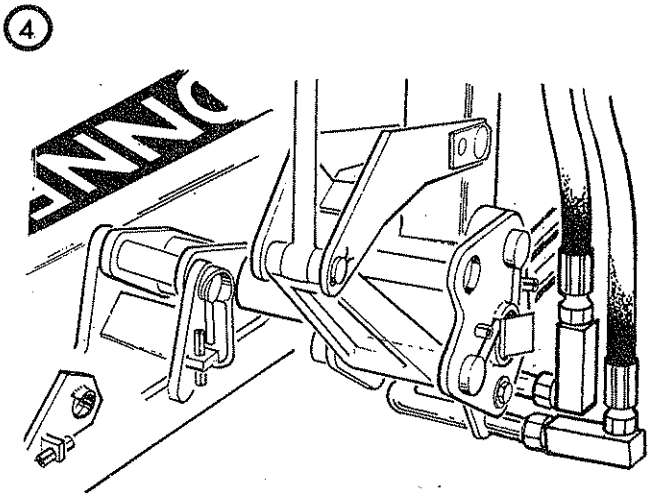
Rear of flail with forward extension in right hand working position



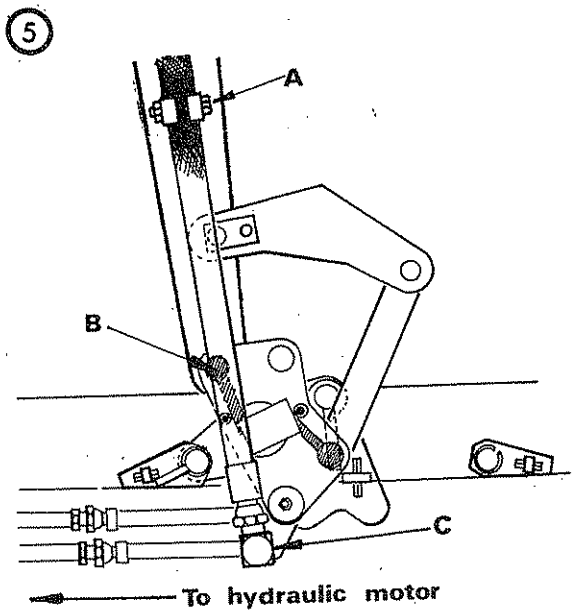
Rear of flail with forward extension in left hand working position



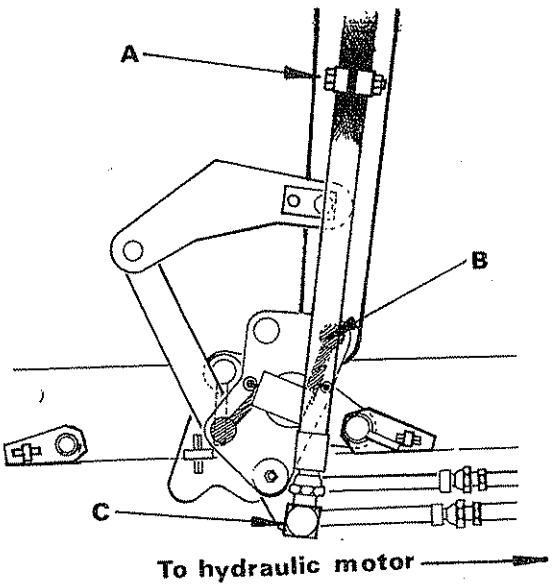
General view of flail attachment in R.Hand working position



General view of flail attachment in L.Hand working position



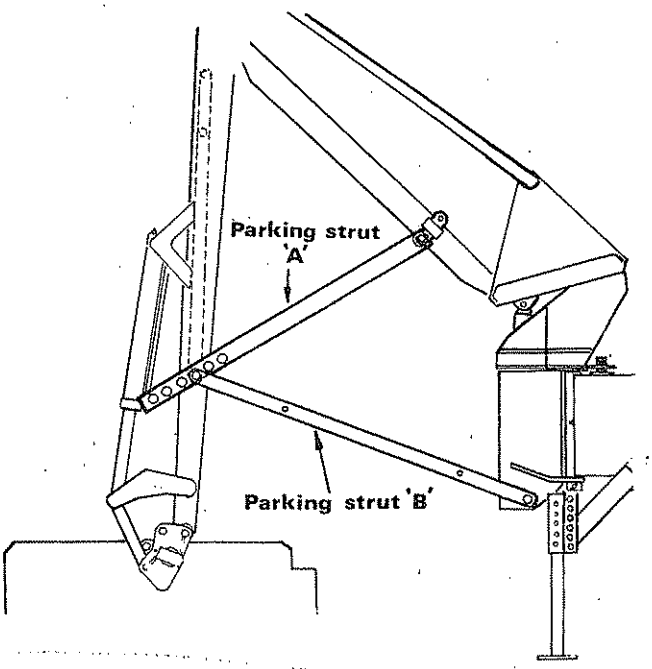
View of rear showing hose run in right hand working position



View of rear showing hose run in left hand working position

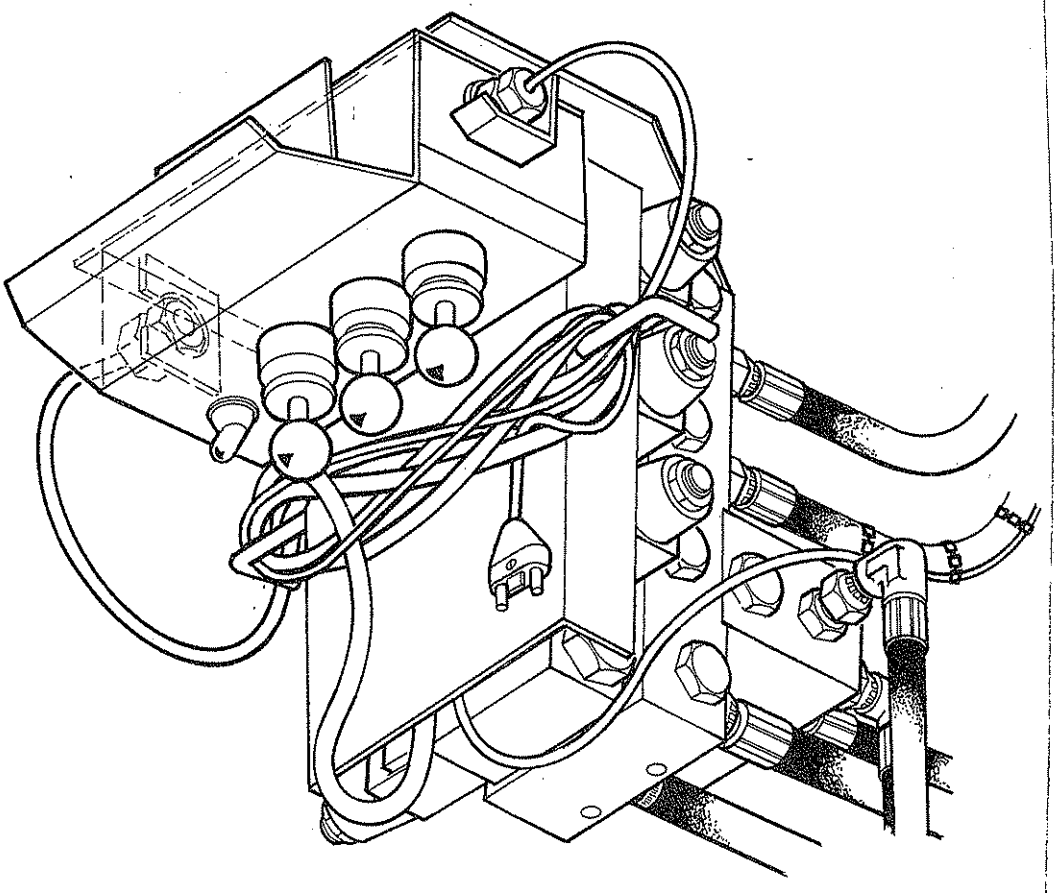
24. REMOVAL FROM TRACTOR

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. Instal the parking strut 'B' and by operation of the lift and reach circuits the weight can be taken off the draft links which are then disconnected. Remove the sliding leg member from the frame, turn through 180° and replace; refit pin. Extend the foot to the ground and secure. Again operate reach and lift ram circuits to transfer weight to the feet and open the hitch lock to the release position. Drive tractor forward about 18" fit parking strut 'A' before disconnecting the hydraulic supply. Disconnect torque chain and release the pto pump by retraction of the retaining collar.

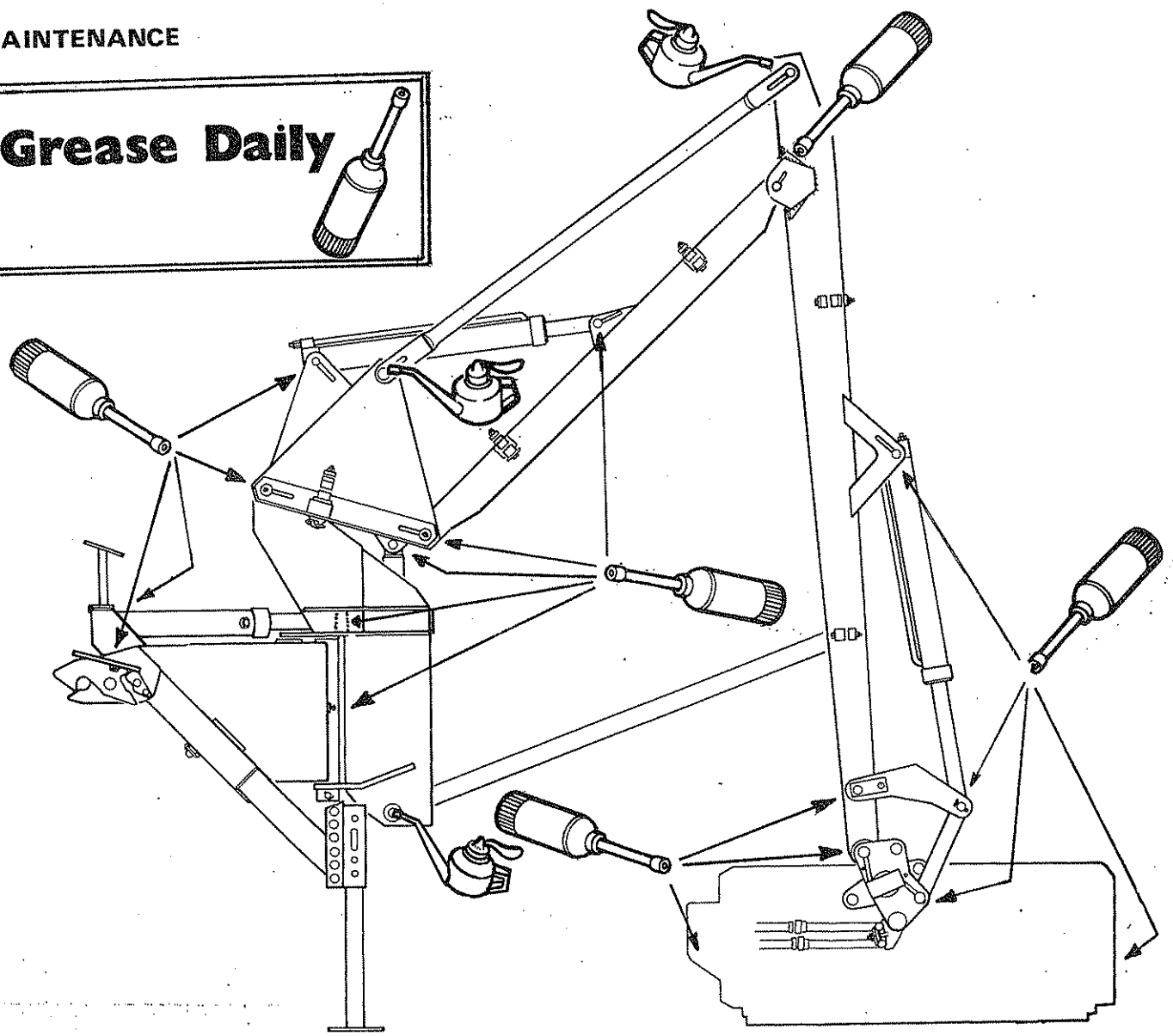


Control box

Disconnect electrical plug within cab and unhook the control box from its mounting. Coil the cables around the storage spigots on the armhead valve and turn the box upside down and lift into place in the cradle brackets beneath the protective shroud.



MAINTENANCE



1. 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.
Apply oil weekly to the reach link 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. 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. In-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.

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.

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

3. Hydraulic Supply

Check daily the tractor's hydraulic oil level and keep to the full mark. Use a 20/30 Multigrade or Universal type oil, or the oil specified by the tractor manufacturer. Avoid using a high detergent oil. Contamination of the oil by dirt will cause premature wear of hydraulic components.

Reduce contamination by:-

a) Carrying out all hydraulic maintenance & servicing in clean, dust-free surroundings.

b) Cleaning off around reservoir filler cap before removal.

c) Using clean containers.

d) Regular servicing of the filters.

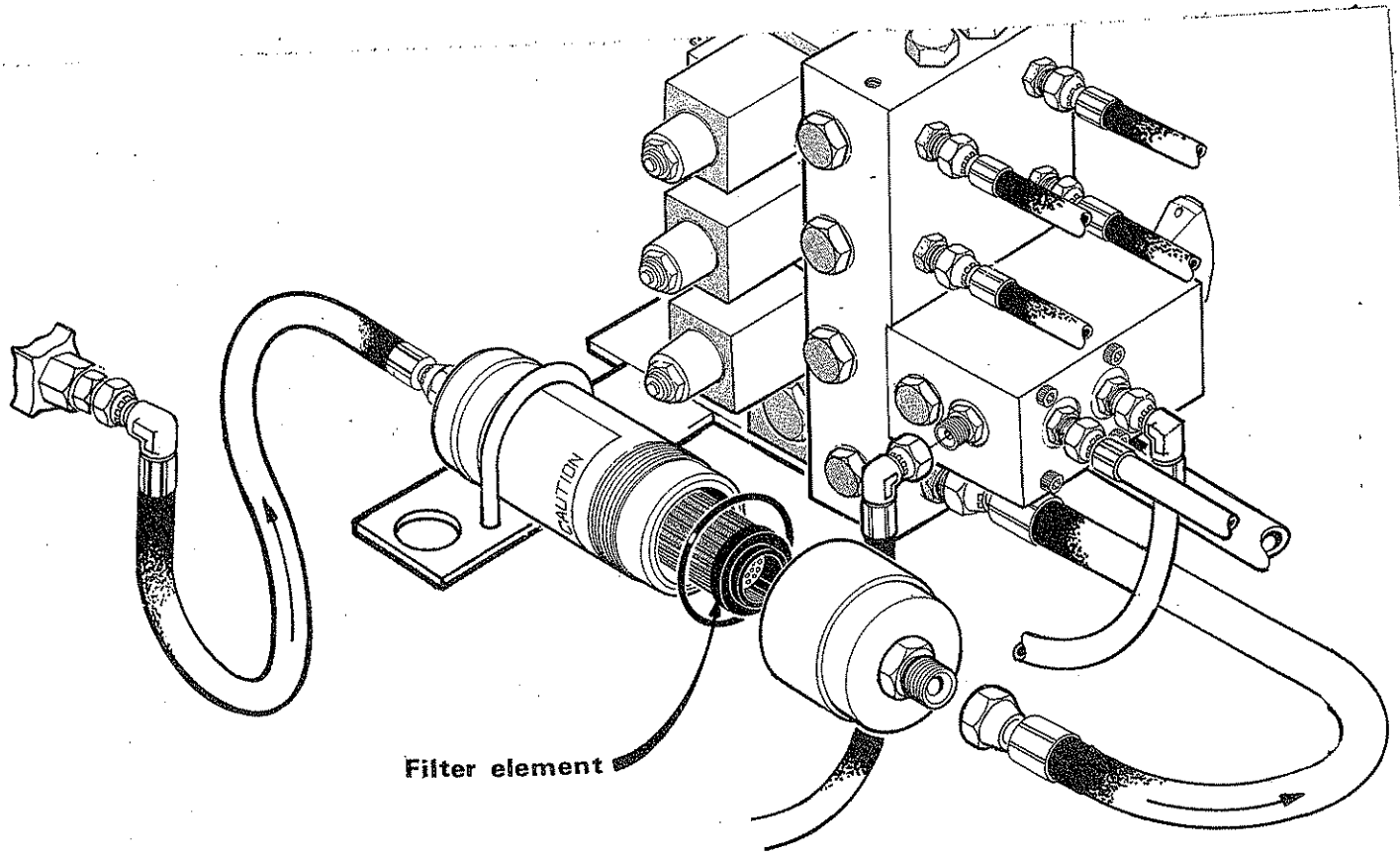
4. Oil Filter (Tractor hydraulic supply)

The pressure line filter has no by-pass therefore the effect of filter blockage will be to increase the working pressure of the tractor pump. A special high strength filter element of 10 micron rating is used which will not collapse or disintegrate even when it is badly choked.

Filter blockage will increase oil heating and will eventually cause the tractor's relief valve to operate whenever the arms are moved.

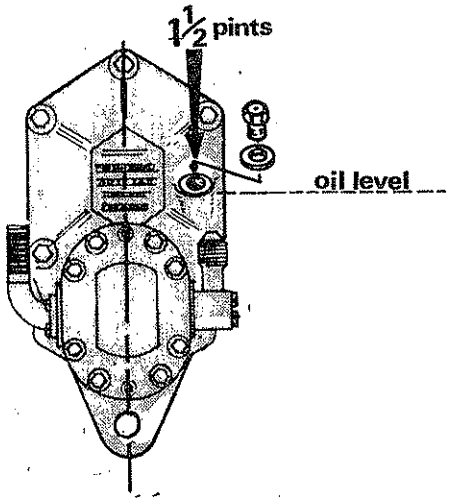
To service the filter the cap can be unscrewed and the element pulled off the spigot. Wipe clean the inside of the casing before installing a new element. Do not attempt to wash out the old element and replace. The '0' ring inside the filter cap is expected to have a long life and a spare will not normally be supplied with the replacement element.

It is recommended that the filter element is changed once a year or at any time that a fall off in work performance is noticed.



Filter element

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



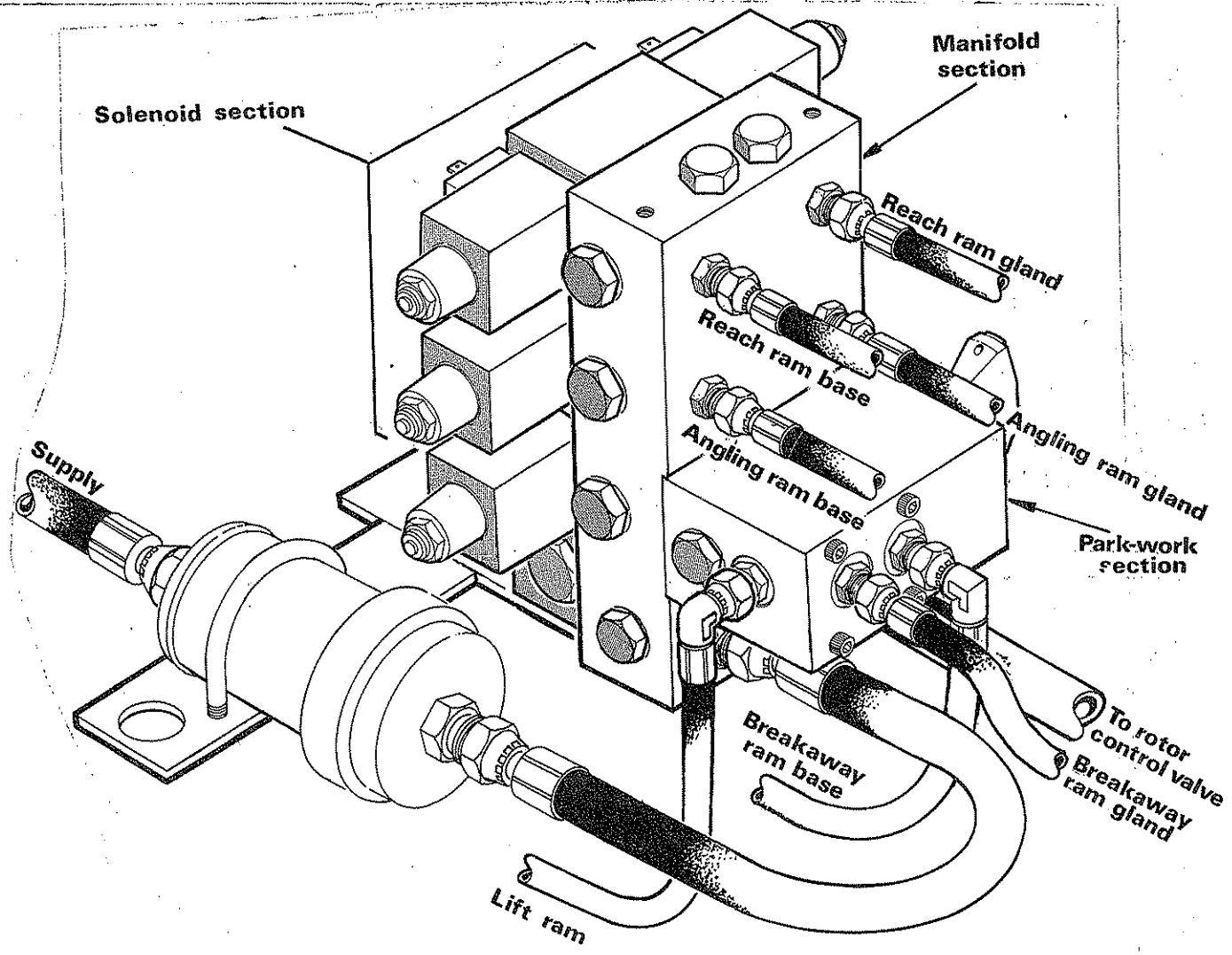
The oil level should be checked when carrying out routine maintenance on the machine and preferably when the machine has been at rest for some time. If the gearbox is mounted horizontally release the torque chain to allow the filler/level plug to adopt a vertical position.

If it appears that the gearbox is overfilled, then leakage from the hydraulic pump can be suspected.

A leaking pump shaft seal can result in the gearbox filling right up and forcing oil past the PTO shaft seal.

6. Armhead control valve assembly

This valve assembly consists of three separate sections bolted together and comprise the solenoid operated valves, a manifold block and the block that selects the transport or work position of the armhead.



6.a. 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 valves are double-acting on the lift, reach and angle 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 12v bulb wired across the terminals will show whether the fault is an electrical one.

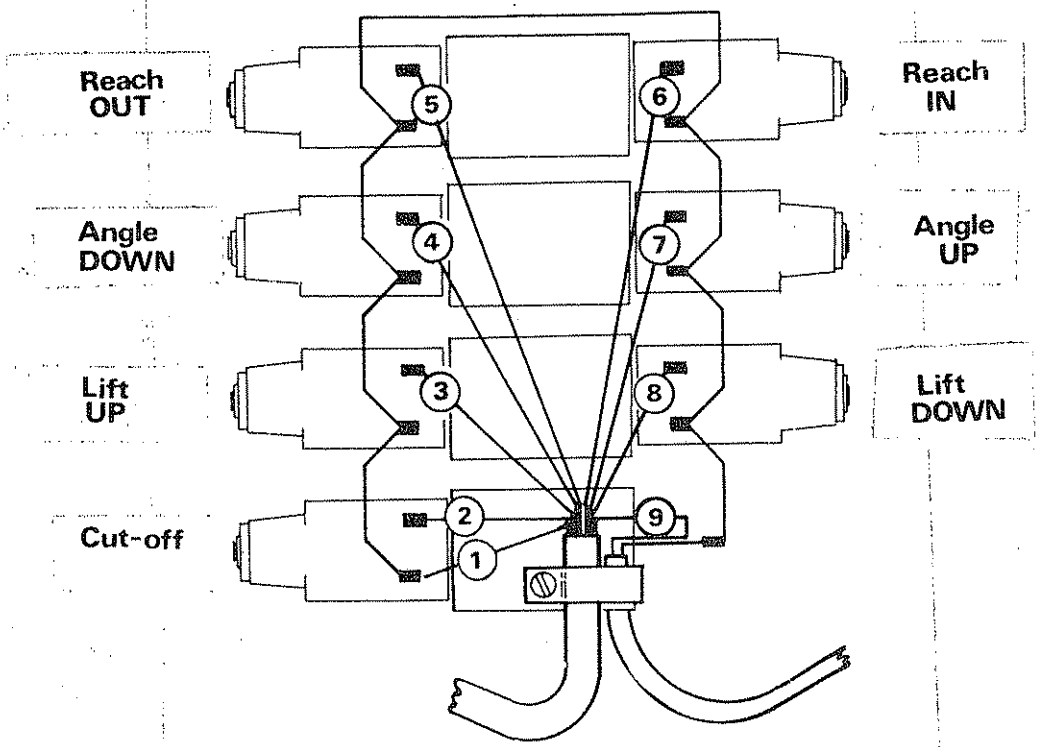
Note: Sparking the leads could blow the fuse within the control box.

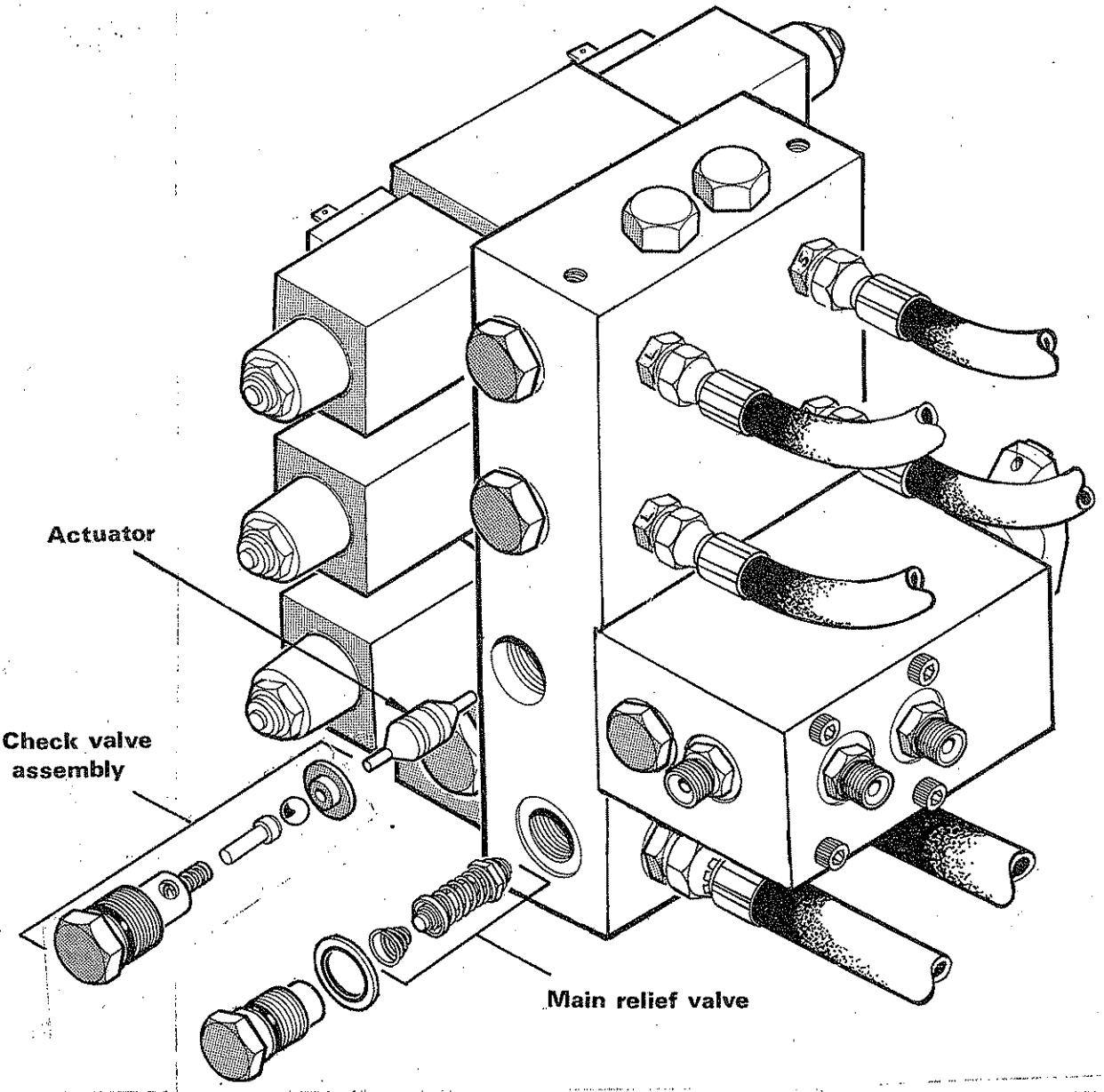
For spares purposes, the valve bodies and spools are supplied as matched components only. Solenoids can also be individually replaced. To release the solenoid from the valve-block undo the lock nut and slide the solenoid off the armature tube which is screwed into the block. If the armature tube is also 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 earth 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.





6 b. Manifold block

This contains the main relief valve and pilot operated ball check valves. The main relief valve is pre-calibrated to 2500 psi (175 Bar) and is non-adjustable.

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.

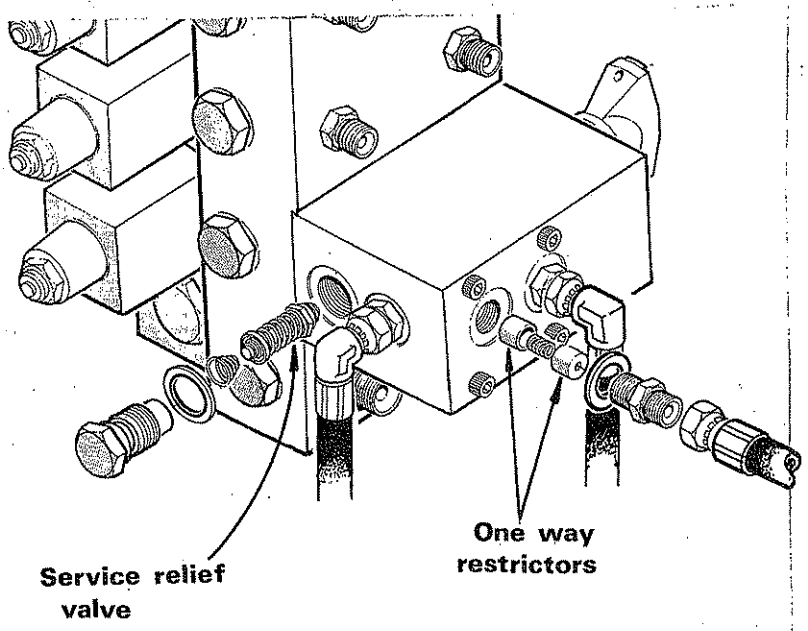
Hoses to the reach and angling rams are connected at special restrictor unions to control speed of arm movement. For identification, restrictor stamped 'S' on its hexagon has an internal drilled diameter of 1.15 mm while the restrictor stamped 'L' has a diameter of 1.4 mm. The restrictors should not be interchangeable in the block.

'Creep' of angle or reach ram 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.

6c. Work/Transport block

The lift ram hose is connected via this block and a service relief valve pre-set to 3000 psi (210 Bar) 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.

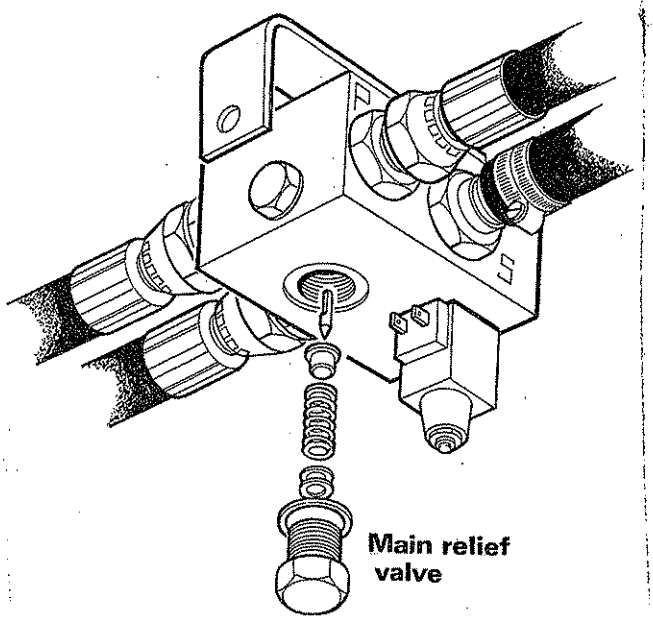


Creep of the lift ram can be caused as for the reach and angling rams, (see Manifold Block) plus the tap not fully closed, dirt in the service relief valve, or the service relief valve not seating properly in the block.

7. Rotor control valve

Oil from the armhead control valve is fed into the flail circuit at the rotor control valve to mix with the main flow from the 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 solenoid operated to control the stop/start action of the rotor through a by-pass ball valve which is also 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 assembly fitted directly into the body and shimmed on assembly to 2500 psi (175 Bar).



Any electrical failure to the rotor valve solenoid will result in the by-pass ball valve opening which will divert the oil from going to the hydraulic motor.

8. Electric control box

This control box mounted in the tractor cab contains six micro switches in three switch blocks with spring centred operating levers, also a two position toggle switch.

Diodes which are connected between each switch terminal prevent 'feed back' of current from one switch to another through the cut-off solenoid.

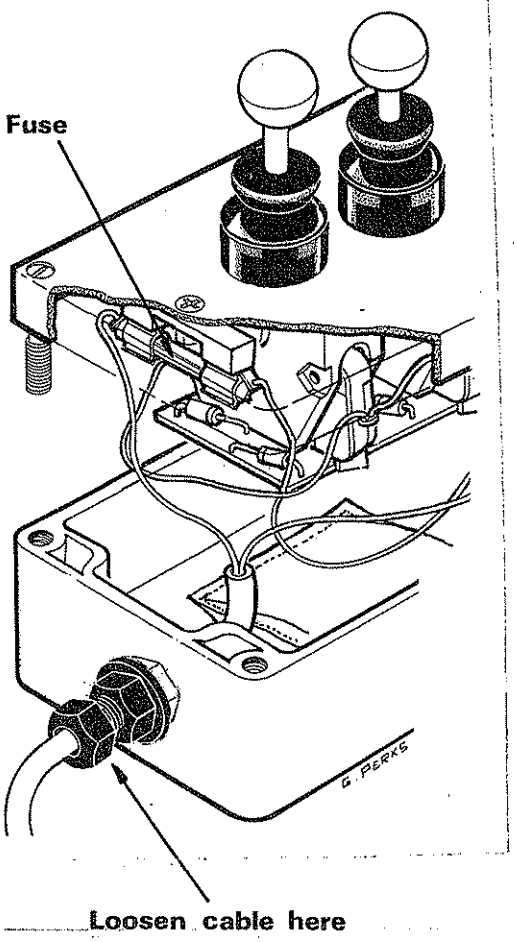
It is necessary to make sure that the brown lead in the supply cable is connected to the 'Positive" side of the tractor's electrical system. A 'Negative' connection prevents operation of the cut-off although no electrical damage would be done.

The toggle switch provides electrical power to the rotor valve solenoid for operating the flail.

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, remembering that the cut-off solenoid pin must also be operated at the same time. A 12 volt bulb wired across the terminals will determine whether electrical current is reaching the solenoid. Attempting to 'spark' the lead will result in blowing a fuse.

The electrical system is protected by a 10 amp fuse. To gain access, the four holding screws in the lid should be released and the two cables, inlet and outlet, loosened sufficiently for the lid to be raised. Ensure the rubber lid sealing gasket is in position when re-assembling and that both cable gland nuts are retightened.

Within the control box is a small fabric sachet containing moisture absorbent crystals. While servicing the control box it could be beneficial to place the sachet over low heat, a radiator or similar, to completely dry it out before replacement.



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.

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 rectifiy 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.

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

Any motor ordered as a service replacement will be supplied complete with the motor half of the drive coupling already installed.

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.

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.

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.

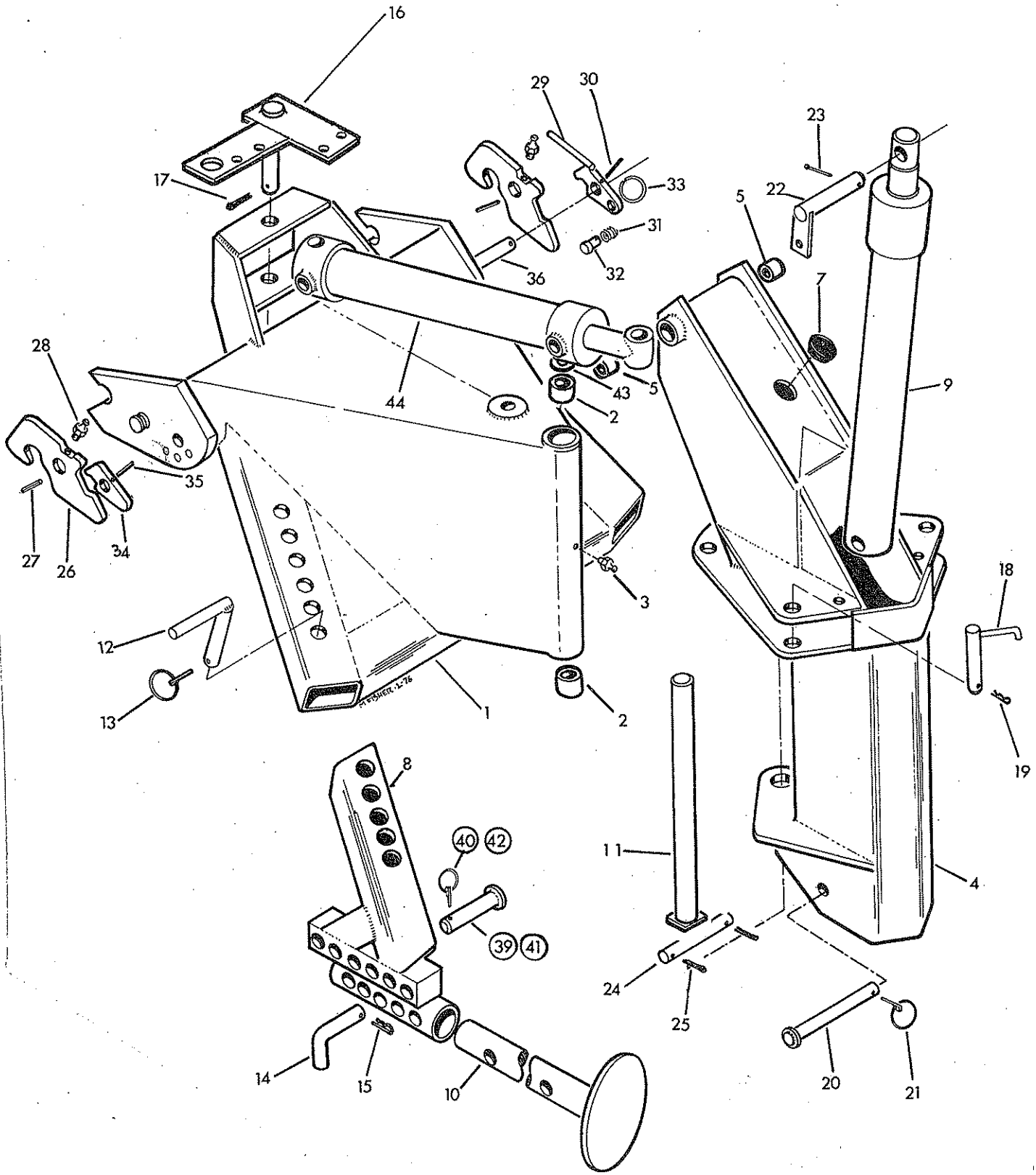
Always quote machine type and serial number as well as the part number.

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

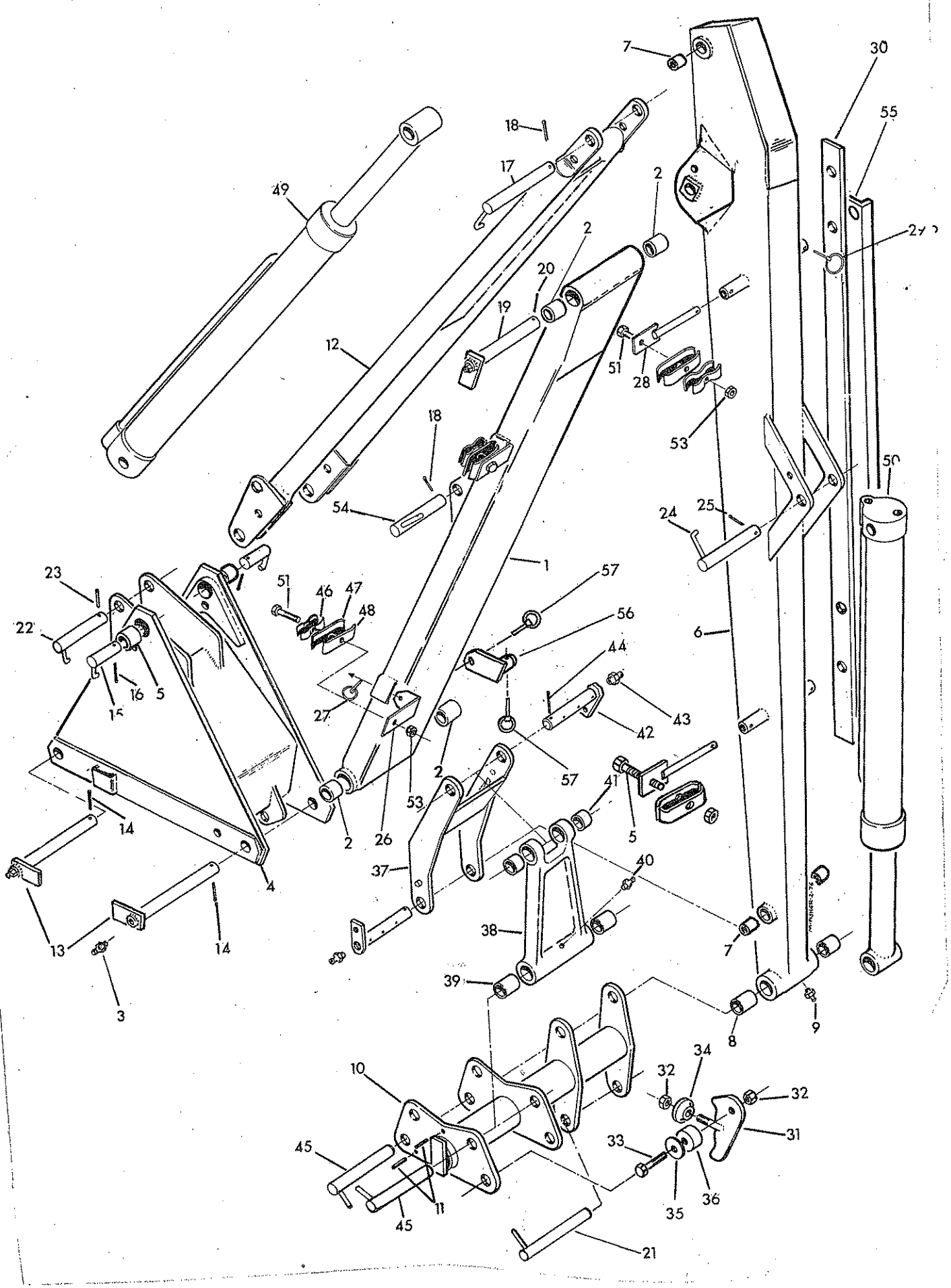
Many spares are supplied as Assemblies or as Sub-assemblies and, to help the customer determine the composition of an Assembly, the Dot System is used. The Main Assembly will not show a dot preceding its description and is printed in BLOCK CAPITALS. Subsequent listed parts are preceded by one or more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



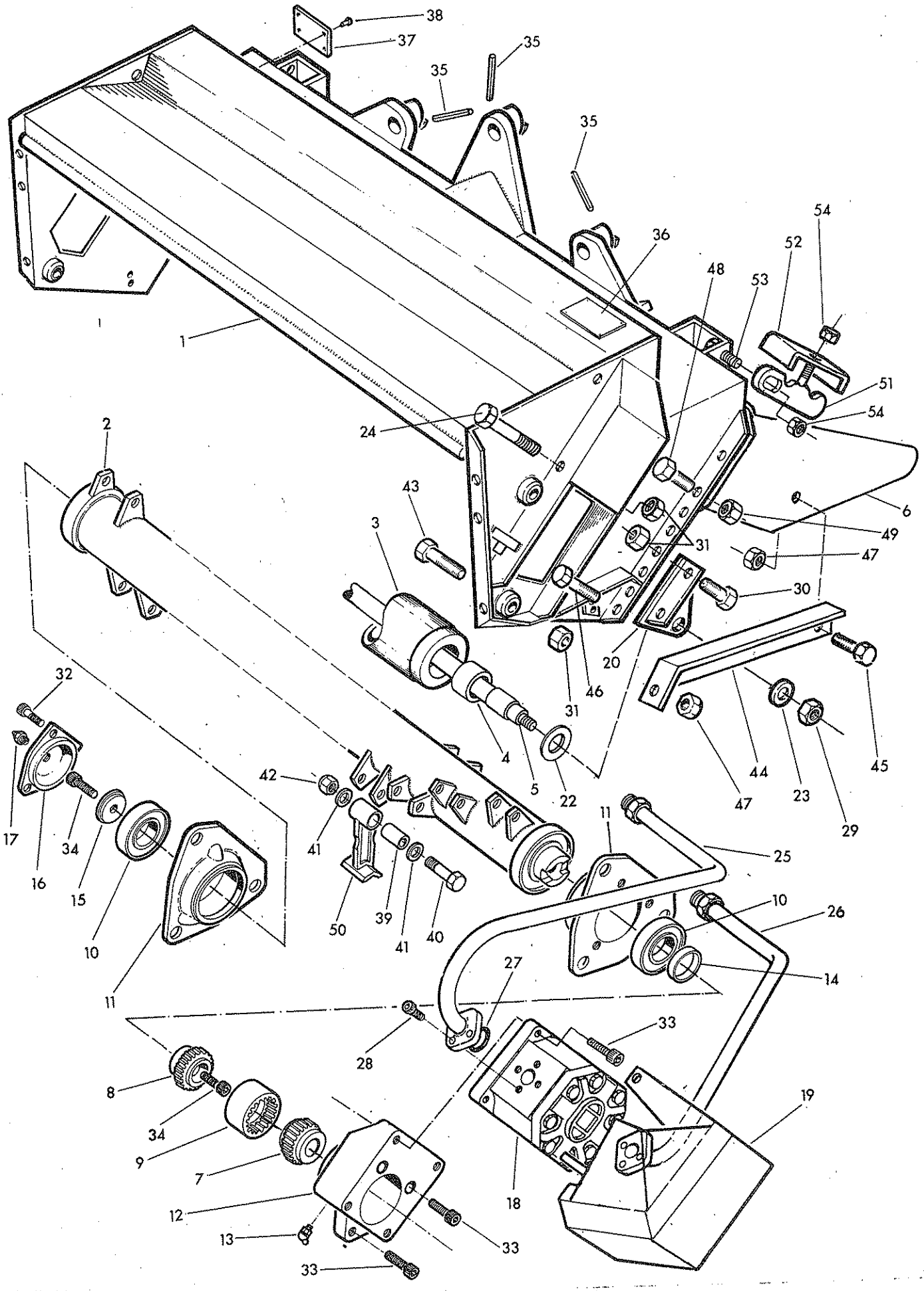
Ref	Part No.	Qty.	Description
	71 09 252		HY REACH SUPER 'E' GENERAL ASSEMBLY
1	71 09 294	1	.Main Frame c/w bushes
2	60 01 003	2	..Bush
3	09 01 121	1	..1/8" BSP Greaser
4	71 09 257	1	.Pillar c/w bushes
5	71 01 134	2	..Bush
7	71 09 090	1	..Bung
8	71 09 295	1	.Welded Leg Assembly left hand
	71 09 296	1	.Welded Leg Assembly right hand
9	71 09 263	1	.Lift Ram
10	71 09 030	2	.Stand 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
39	71 06 085	2	.Linkage pin category I
40	04 31 217	1	..Linch pin
41	68 03 012	2	.Linkage pin category II
42	04 31 217	1	..Linch pin
43	60 01 136	1	.Thrust washer
44	71 09 274	1	.Breakaway ram assembly

MAIN ARM ASSEMBLY



Ref	Part No.	Qty	Description
	71 09 252		HY-REACH SUPER 'E' GENERAL ASSEMBLY contd
1	71 09 277	1	.Main arm c/w bushes
2	71 01 134	4	..Bush
3	09 01 121	3	.Greaser 1/8" BSP
4	71 09 267	1	.Rocker welded assembly
5	71 01 083	2	..Bush
6	71 09 281	1	.Boom welded assembly c/w bushes etc.
7	71 01 083	4	..Bush
8	71 01 134	2	..Bush
9	09 01 121	1	..Greaser 1/8" BSP
10	71 09 270	1	.Forward extension
11	04 22 620	2	..Spring dowel 3/8" x 1¼"
12	71 09 279	1	.Tension link welded assembly
13	71 09 066	2	.Pivot pin rocker c/w split pin
14	05 03 166	1	..Split pin
15	71 09 067	2	.Tension link pin c/w split pin
16	05 03 126	1	..Split pin
17	71 09 095	1	.Tension link pin outer c/w split pin
18	05 03 126	1	..Split pin
19	71 09 066	1	.Boom pivot pin c/w split pin
20	05 03 166	1	..Split pin
21	71 09 070	1	.Special flail mounting pin
22	71 09 071	1	.Reach ram base pin c/w split pin
23	05 03 126	1	..Split pin
24	71 09 071	1	.Angling ram base pin
25	05 03 126	1	..Split pin
26	71 09 073	2	.Hose bracket c/w linch pin
27	04 31 217	1	..Linch pin
28	71 09 074	2	.Hose support pins
29	04 31 217	1	..Linch pin
30	71 09 102	1	.Stand strap
31	71 09 079	1	.Pipe clamp bracket assembly
32	91 00 002	2	..M10 'Conelok' nut
33	92 13 135	1	..M10 x 65 hexagon bolt
34	71 09 080	1	..Clamp washer
35	71 09 081	1	..Special washer
36	71 09 083	1	..Distance piece
37	71 06 367	1	.Radius arm
38	71 06 312	1	.Slave link c/w bushes
39	71 01 134	2	..Bush
40	09 01 121	1	..1/8" BSP Greaser
41	71 01 083	2	..Bush
42	71 05 090	2	.Radius arm pin c/w split pin and greaser
43	09 01 121	1	..1/8" BSP greaser
44	05 03 165	1	..Split pin
45	71 06 138	3	.Pivot pin
46	60 12 026	6	.Pipe clamp
47	73 13 130	4	.Hose clip
48	71 09 084	4	.Hose clip lower
49	71 09 275	1	.Reach ram assembly
50	71 09 276	1	.Angling ram assembly
51	92 13 185	3	.M10 x 90 bolt
52	92 13 145	1	.M10 x 70 bolt
53	91 00 002	4	.'Conelok' nut M10
54	71 09 062	1	.Reach ram rod pin c/w split pin
55	71 09 311	1	.Parking strap
56	71 09 133	1	.Park stay bracket c/w linch pins
57	04 31 217	2	..Linch pin

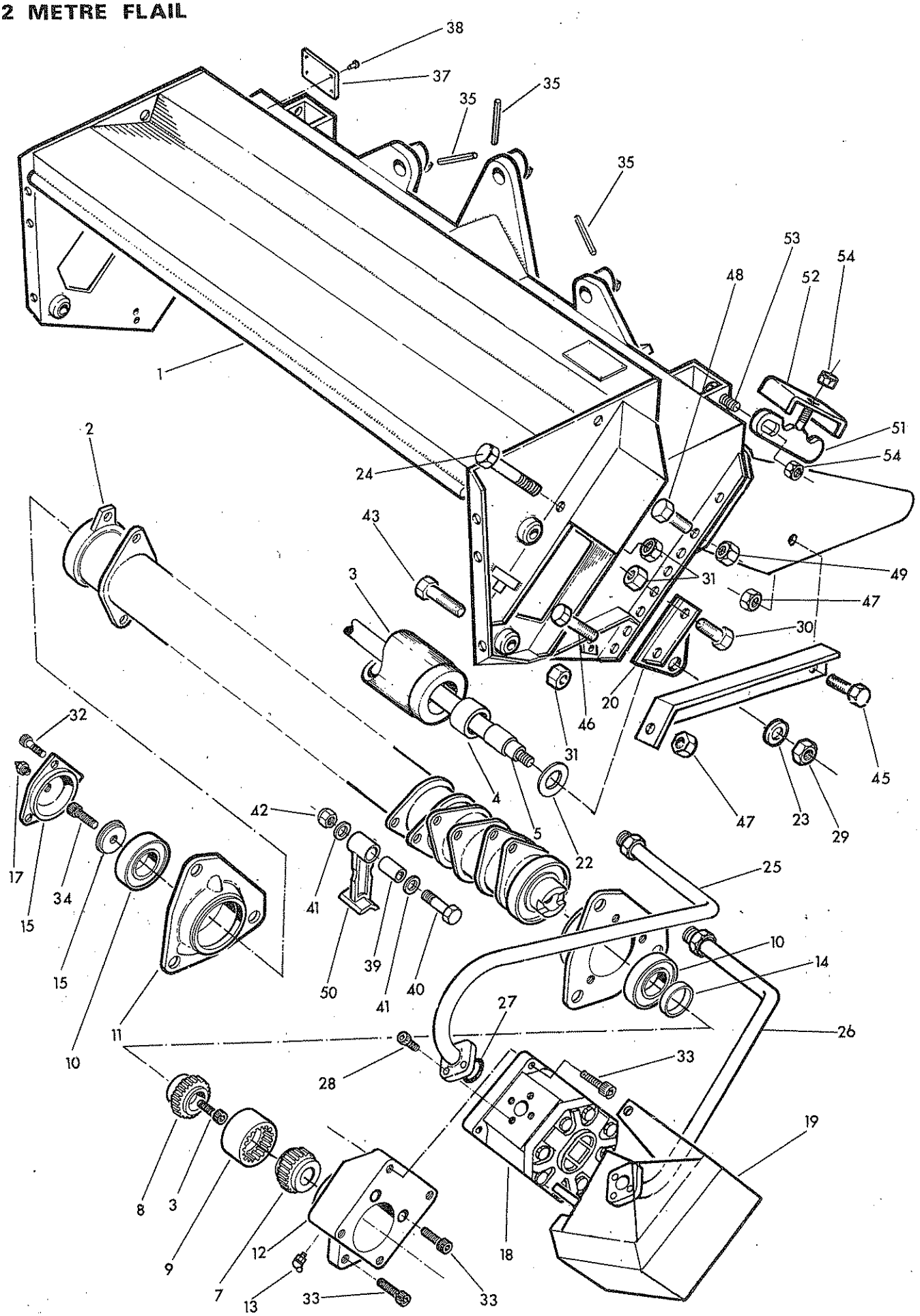
1 METRE HEDGE FLAIL



Ref	Part No.	Qty	Description
	73 14 384		1 METRE (39") MULTICUT HEDGE FLAIL
1	73 14 338	1	.Main casing
2	73 14 373	1	.Rotor
3	73 14 430	1	.Roller c/w bush
4	72 13 023	2	..Bush
5	73 14 432	1	.Roller tie-rod
6	73 14 326	1	.Hedge hood
	73 14 206	1	.Coupling assembly
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 6311-2Z
11	73 14 368	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 14 425	1	.Motor assembly c/w coupling half
19	73 14 422	1	.Motor cover
20	73 14 195	1	.Roller bracket LH
21	73 14 196	1	.Roller bracket RH (not illustrated)
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 standard build with motor mounted on LH end of flail rotor. — All complete with '0' ring.
26	73 14 420	1	.Rigid pipe lower — For standard build with motor mounted on LH end of flail rotor. — All complete with '0' ring.
	73 14 419	1	.Rigid pipe upper — For LH build with motor mounted on the RH end of the Flail rotor. — All complete with '0' ring.
	73 14 421	1	.Rigid pipe lower — For LH build with motor mounted on the RH end of the Flail rotor. — All complete with '0' ring.
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	93 13 067	2	.Setscrew M16 x 30
31	91 00 001	8	.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 14 088	1	.Flail speed sticker
37	73 14 087	1	.Serial plate
38	28 00 020	4	.Pop rivet 1/8" diameter
39	73 14 209	20	.Flail pivot bush
40	73 14 201	20	.Special flail bolt
41	01 00 206	40	.Spring washer 5/8" diameter
42	10 79 091	20	.Hexagon nut self-locking 5/8" UNF
43	73 14 146	6	.Bolt M16 x 50
	73 14 361	1	.Strut RH complete with nuts & bolts (not illustrated)
44	73 14 362	1	.Strut LH complete with nuts and bolts
45	93 13 067	1	..Setscrew M16 x 30
46	93 13 087	1	..Setscrew M16 x 40
47	91 00 001	2	..Hexagon nut self-locking M16
48	93 13 067	4	.Setscrew M16 x 30
49	91 00 001	5	.Hexagon nut self-locking M16
50	73 14 366	20	.F10H Hedger flail
51	73 14 219	1	.Pipe clamp assembly c/w screws, nuts and clamp
52	73 14 158	1	..Clamp
53	93 13 065	1	..Setscrew M10 x 30
54	91 00 002	2	..Hexagon nut self-locking M10
	86 99 166		SEAL KIT for Casappa Motor
			OPTIONAL EXTRA
	73 14 424	1	.Light hedger hood (not illustrated)

For variable spares requirements see page 77

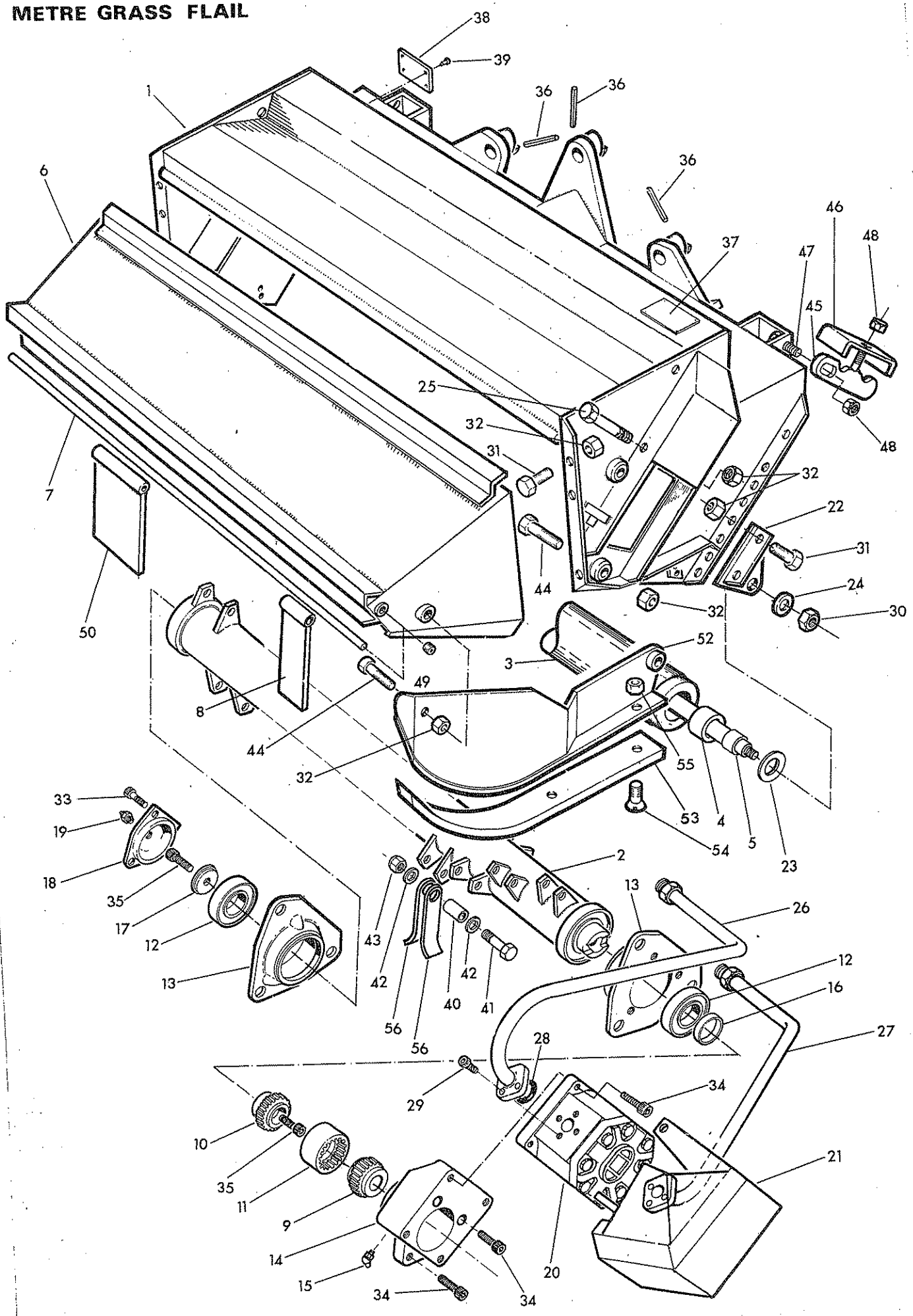
1·2 METRE FLAIL



Ref	Part No.	Qty	Description	
			1.2 METRE (48") MULTICUT HEDGE FLAIL	
1	73 14 305	1	.Main casing	
2	73 14 428	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 assembly	
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 6311-2Z	
11	73 14 368	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 14 425	1	.Motor assembly c/w coupling half	
19	73 14 422	1	.Motor cover	
20	73 14 195	1	.Roller bracket left hand	
21	73 14 196	1	.Roller bracket right hand	(not illustrated)
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 standard build with motor	All complete with '0' ring.
26	73 14 420	1	.Rigid pipe lower — mounted on LH end of flail rotor.	
	73 14 419	1	.Rigid pipe upper — For LH build with motor mounted	
	73 14 421	1	.Rigid pipe lower — on the RH end of the Flail rotor.	
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	93 13 067	2	.Setscrew M16 x 30	
31	91 00 001	8	.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 14 088	1	.Flail speed sticker	
37	73 14 087	1	.Serial plate	
38	28 00 020	4	.Pop rivet 1/8" diameter	
39	73 14 223	24	.Flail pivot bush	
40	73 14 222	24	.Special flail bolt	
41	01 00 206	48	.Spring washer 5/8" diameter	
42	10 79 091	24	.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 and bolts	(not illustrated)
44	73 14 362	1	.Strut LH c/w nuts and bolts	
45	93 13 067	1	..Setscrew M16 x 30	
46	93 13 087	1	..Setscrew M16 x 40	
47	91 00 001	2	..Hexagon nut self-locking M16	
48	93 13 067	4	.Setscrew M16 x 30	
49	91 00 001	5	.Hexagon nut self-locking M16	
50	73 14 366	24	.F10H Hedger flail	
51	73 14 219	1	.Pipe clamp assembly c/w screws, nuts and clamp	
52	73 14 158	1	..Clamp	
53	93 13 065	1	..Setscrew M10 x 30	
54	91 00 002	2	..Hexagon nut self-locking M10	
	86 99 166		SEAL KIT for Casappa Motor	
			OPTIONAL EXTRA	
	73 14 423	1	.Light hedger hood	(not illustrated).

For variable spares requirements see page 77

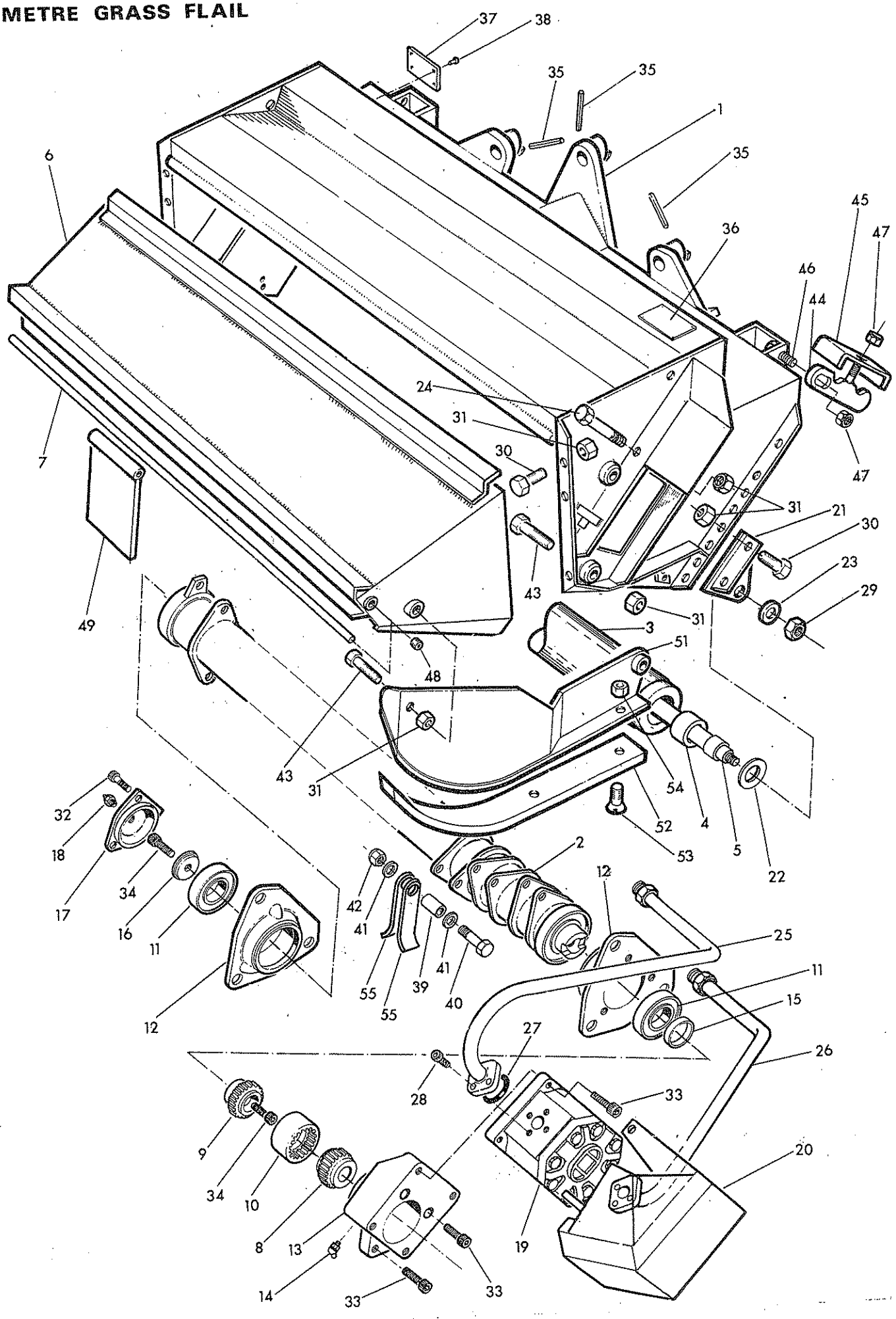
1 METRE GRASS FLAIL



Ref	Part No.	Qty	Description
	73 14 385		1 METRE (39") MULTICUT GRASS FLAIL
1	73 14 338	1	.Main casing
2	73 14 373	1	.Rotor
3	73 14 430	1	.Roller c/w bush
4	72 13 023	2	..Bush
5	73 14 432	1	.Roller tie rod
6	73 14 341	1	.Grass hood
7	73 14 166	1	.Flap bar
8	73 14 167	2	.Flap narrow
	73 14 206	1	.Coupling assembly
9	73 14 204	1	..Coupling motor half
10	73 14 203	1	..Coupling rotor half
11	73 14 205	1	..Coupling sleeve
12	06 00 018	2	.Ball bearing 6311-2Z
13	73 14 368	2	.Bearing housing
14	73 14 369	1	.Spacer block c/w greaser
15	09 01 125	1	.Greaser 1/8" BSP 35°
16	73 14 214	1	.Coupling spacer
17	73 14 211	1	.Clamp washer
18	73 14 370	1	.Rotor and cover c/w greaser
19	09 01 121	1	..Greaser 1/8" BSP straight
20	73 14 425	1	.Motor assembly c/w coupling half
21	73 14 422	1	.Motor cover
22	73 14 195	1	.Roller bracket LH
	73 14 196	1	.Roller bracket RH (not illustrated)
23	60 01 136	2	.Thrust washer
24	91 00 108	2	.Washer Ø20
25	92 13 347	1	.Bolt M16 x 170
26	73 14 418	1	.Rigid pipe upper — For standard build with motor mounted on LH end of flail rotor.
27	73 14 420	1	.Rigid pipe lower — For standard 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 complete with '0' ring.
28	86 00 121	1	..'0' ring
29	93 43 055	6	.Capscrew M10 x 25
30	91 00 005	2	.Hexagon nut M20
31	93 13 067	8	.Setscrew M16 x 30
32	91 00 001	19	.Hexagon nut self-locking M16
33	93 13 055	3	.Setscrew M10 x 25
34	93 00 104	7	.Capscrew M10 x 40
35	73 14 221	2	.Self-locking capscrew M12 x 50
36	04 22 648	3	.Spring dowel 3/8" dia. x 3" long
37	73 14 088	1	.Flail speed sticker
38	73 14 087	1	.Serial plate
39	28 00 020	4	.Pop rivet 1/8" diameter
40	73 14 209	20	.Flail pivot bush
41	73 14 210	20	.Special flail bolt
42	01 00 206	40	.Spring washer 5/8" diameter
43	10 79 091	20	.Hexagon nut self-locking 5/8" UNF
44	73 14 146	10	.Bolt M16 x 50
45	73 14 219	1	.Pipe clamp assembly c/w screws, nuts and clamp
46	73 14 158	1	..Clamp
47	93 13 065	1	..Setscrew M10 x 30
48	91 00 002	2	..Hexagon nut self-locking M10
49	85 82 041	2	.Hexagon plug 1/8" BSP
50	73 14 125	5	.Flap
51	73 14 320	1	.Skid Right Hand (not illustrated)
52	73 14 319	1	.Skid Left Hand
53	73 14 323	2	.Replaceable skid
54	93 33 065	6	.Setscrew countersunk M10 x 30
55	91 00 002	6	.Hexagon nut self-locking M10
56	73 14 390	40	.Grass flail F10G
	86 99 166		SEAL KIT for Casappa Motor

For variable spares requirements see page 77

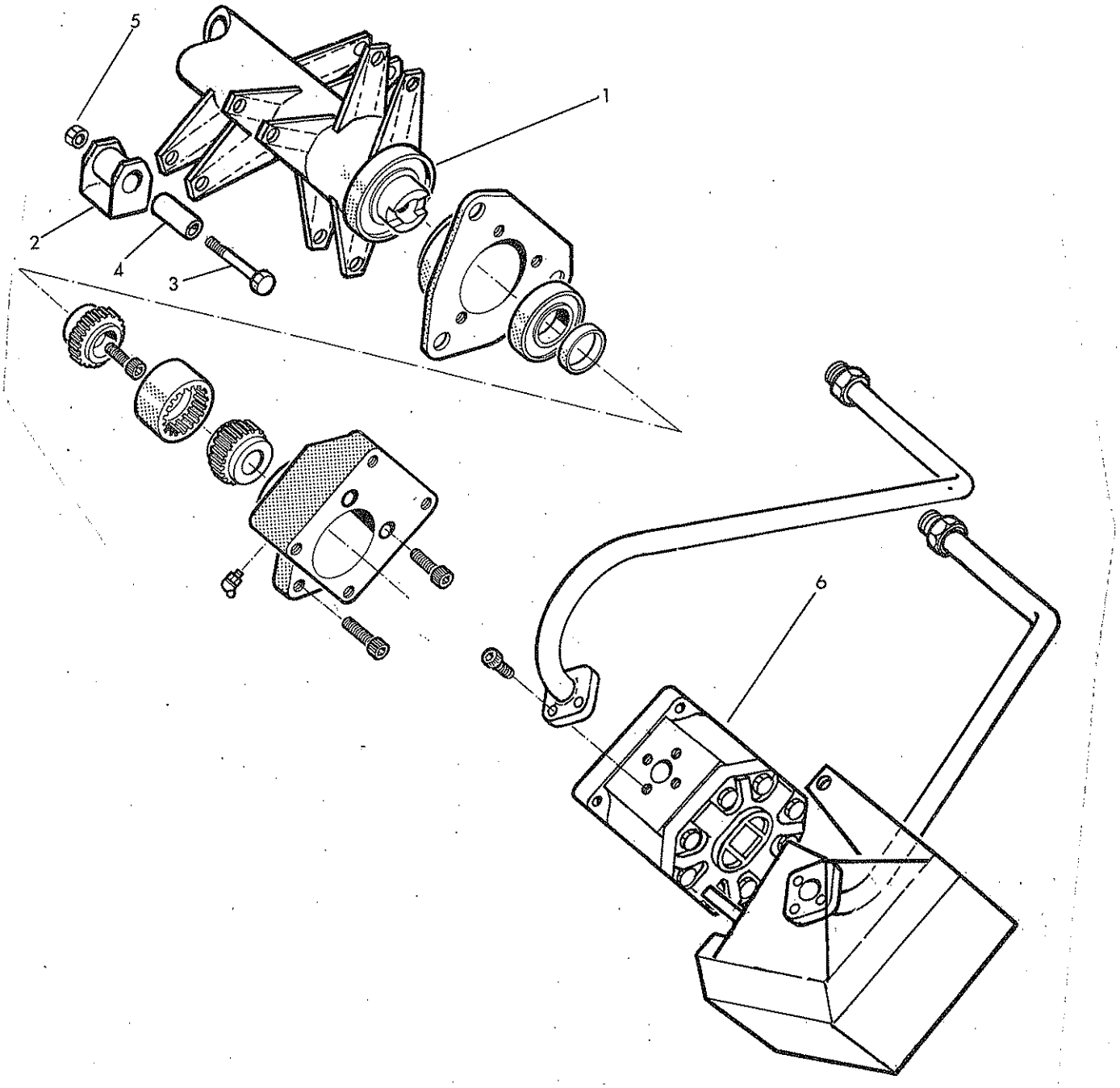
1·2 METRE GRASS FLAIL



Ref	Part No.	Qty	Description
	73 14 381		1.2 METRE (48") MULTICUT GRASS FLAIL
1	73 14 305	1	.Main casing
2	73 14 428	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 6311-2Z
12	73 14 368	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 14 425	1	.Motor assembly c/w coupling half
20	73 14 422	1	.Motor cover
21	73 14 195	1	.Roller bracket LH
	73 14 196	1	.Roller bracket RH (not illustrated)
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 standard build with motor mounted on LH end of flail rotor — All complete with '0' ring.
26	73 14 420	1	.Rigid pipe lower — For standard build with motor mounted on LH end of flail rotor — All complete with '0' ring.
	73 14 419	1	.Rigid pipe upper — For LH build with motor mounted on the RH end of the flail rotor. — All complete with '0' ring.
	73 14 421	1	.Rigid pipe lower — For LH build with motor mounted on the RH end of the flail rotor. — All complete with '0' ring.
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	93 13 067	8	.Setscrew M16 x 30
31	91 00 001	19	.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 14 088	1	.Flail speed sticker
37	73 14 087	1	.Serial plate
38	28 00 020	4	.Pop rivet 1/8" diameter
39	73 14 223	24	.Flail pivot
40	73 14 222	24	.Special flail bolt
41	01 00 206	48	.Spring washer 5/8" diameter
42	10 79 091	24	.Hexagon nut self-locking 5/8" UNF
43	73 14 146	10	.Bolt M16 x 50
44	73 14 219	1	.Pipe clamp assembly c/w screws, nuts and clamp
45	73 14 158	1	..Clamp
46	93 13 065	1	..Setscrew M10 x 30
47	91 00 002	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 illustrated)
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 00 002	6	.Hexagon nut self-locking M10
55	73 14 390	48	.Grass flail F10G
	86 99 166		SEAL KIT for Casappa Motor

For variable spares requirements see page 77

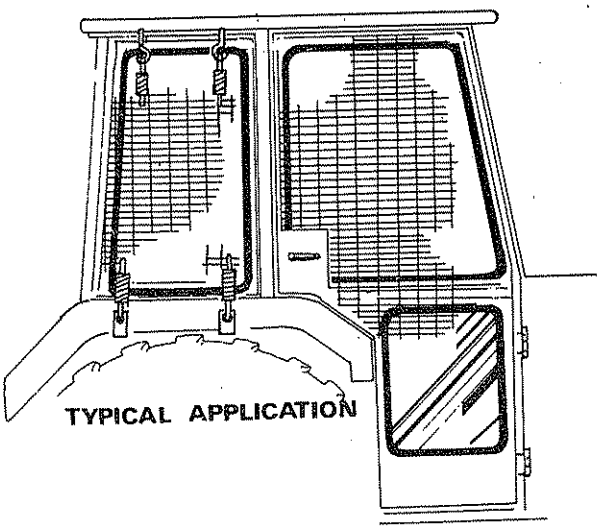
TOUGHCUT FLAIL

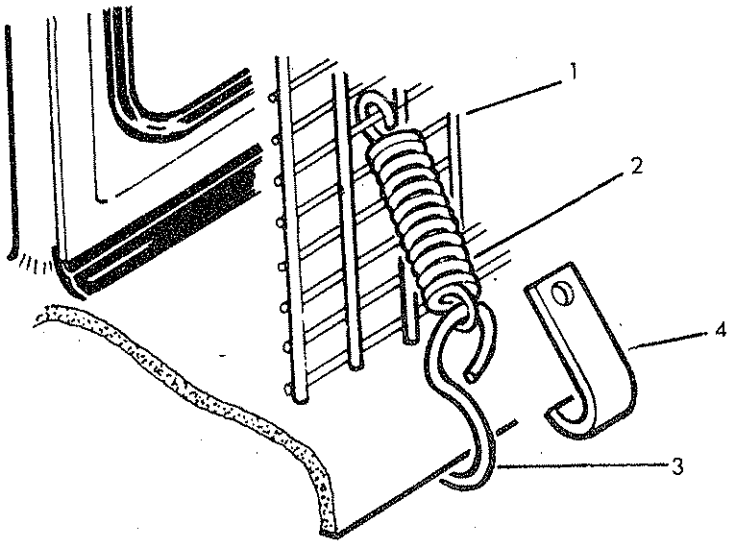


The parts list for the Toughcut flail Mk II is identical to the 1 metre Multicut hedger flail with the following exceptions.

Ref	Part No.	Qty	Description
	73 14 386		TOUGHCUT FLAIL
1	73 14 414	1	.Rotor
2	73 14 119	12	.Toughcut flail
3	73 14 200	12	.Special bolt 5/8" UNF
4	73 14 120	12	.Bush
5	10 79 091	12	.'Conelok' nut 5/8" UNF
6	73 14 426	1	.Motor c/w coupling half

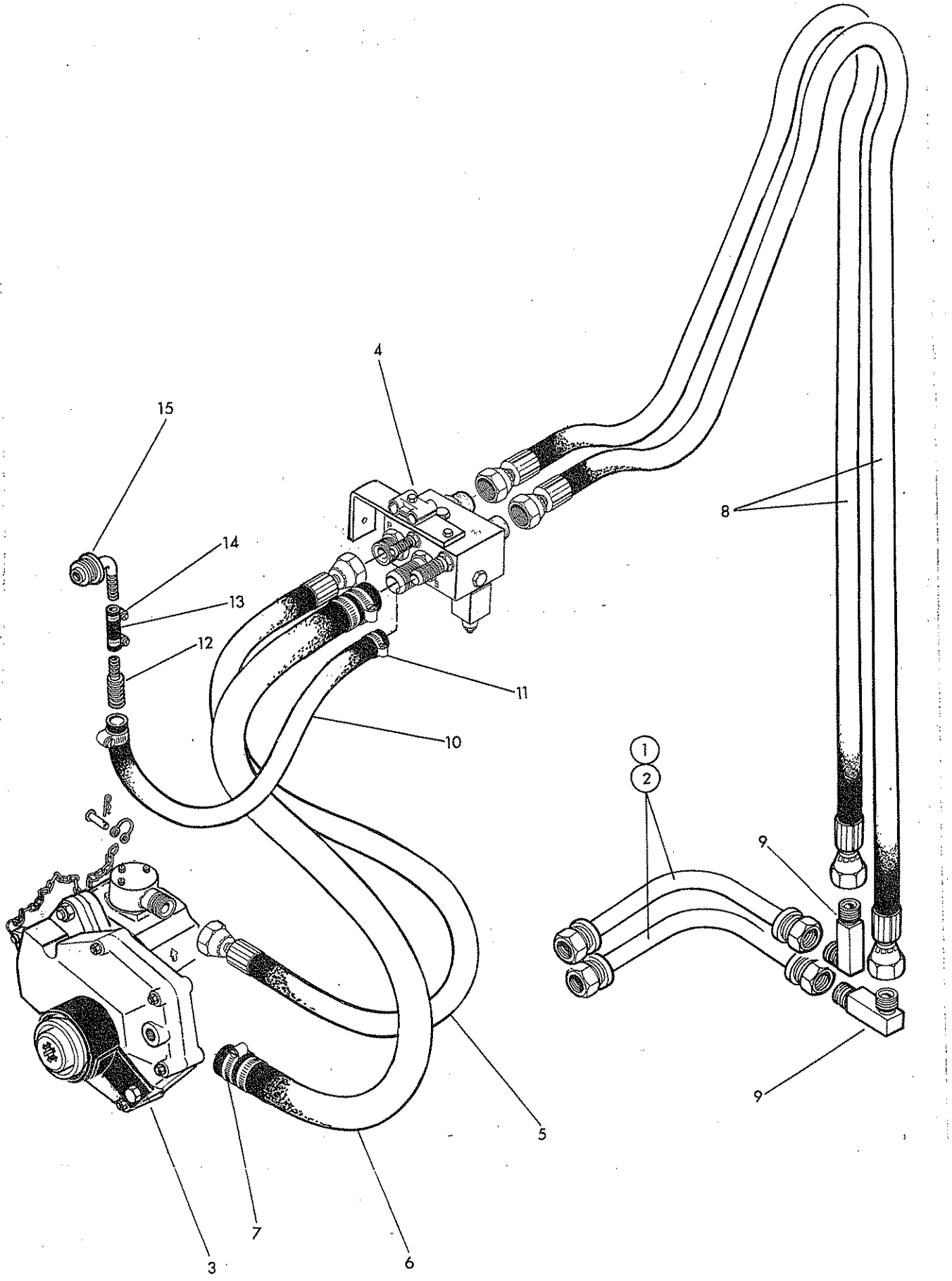
CAB GUARD





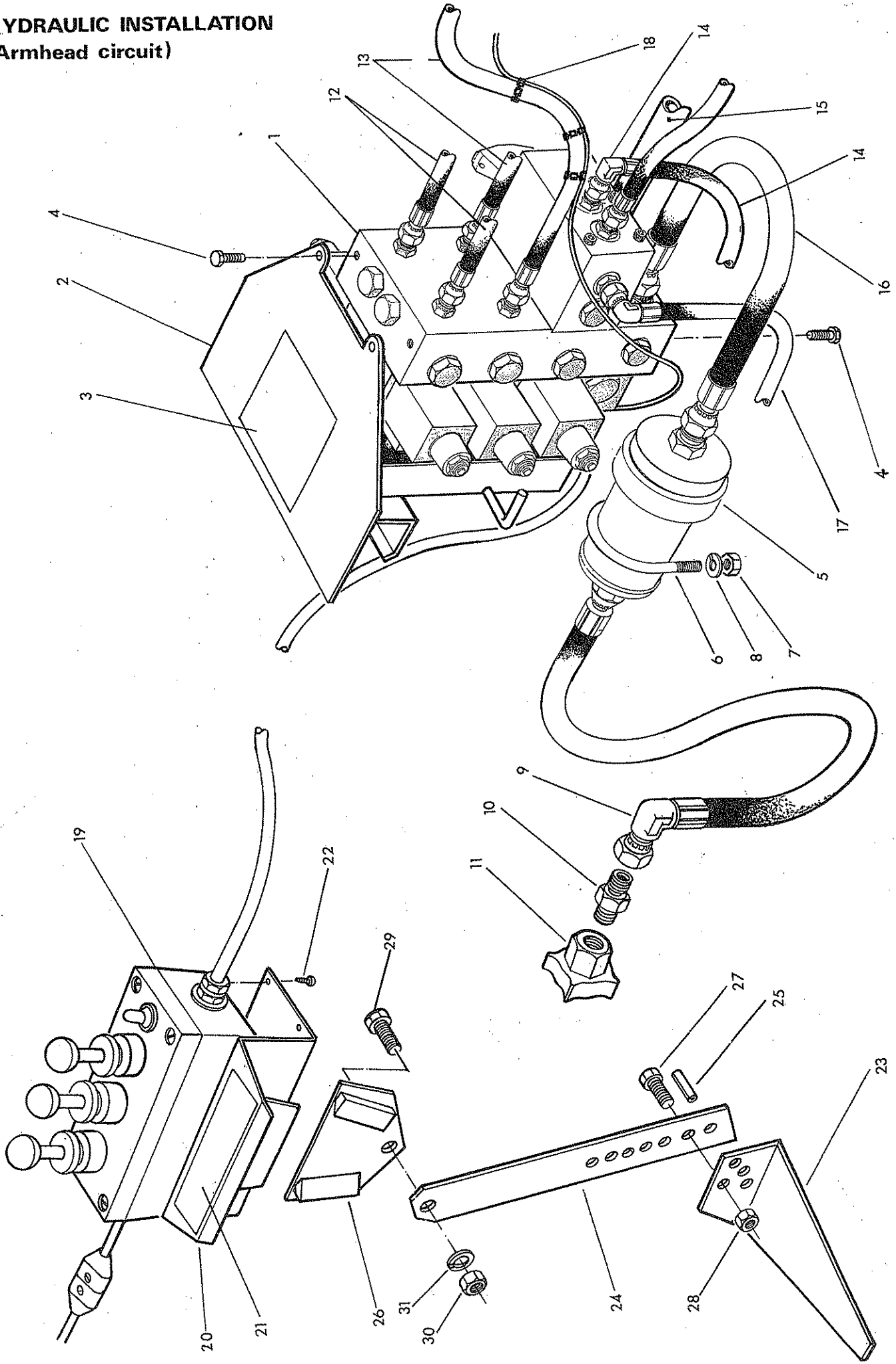
Ref	Part No	Qty	Description
	73 13 324	1	CAB GUARD KIT comprising:-
1	73 13 049	1	.Guard panel large
1	73 13 050	1	.Guard panel small
2	60 01 064	12	.Spring
3	60 01 065	6	.Hook
4	73 13 051	6	.Hook

HYDRAULIC INSTALLATION (Flail circuit)



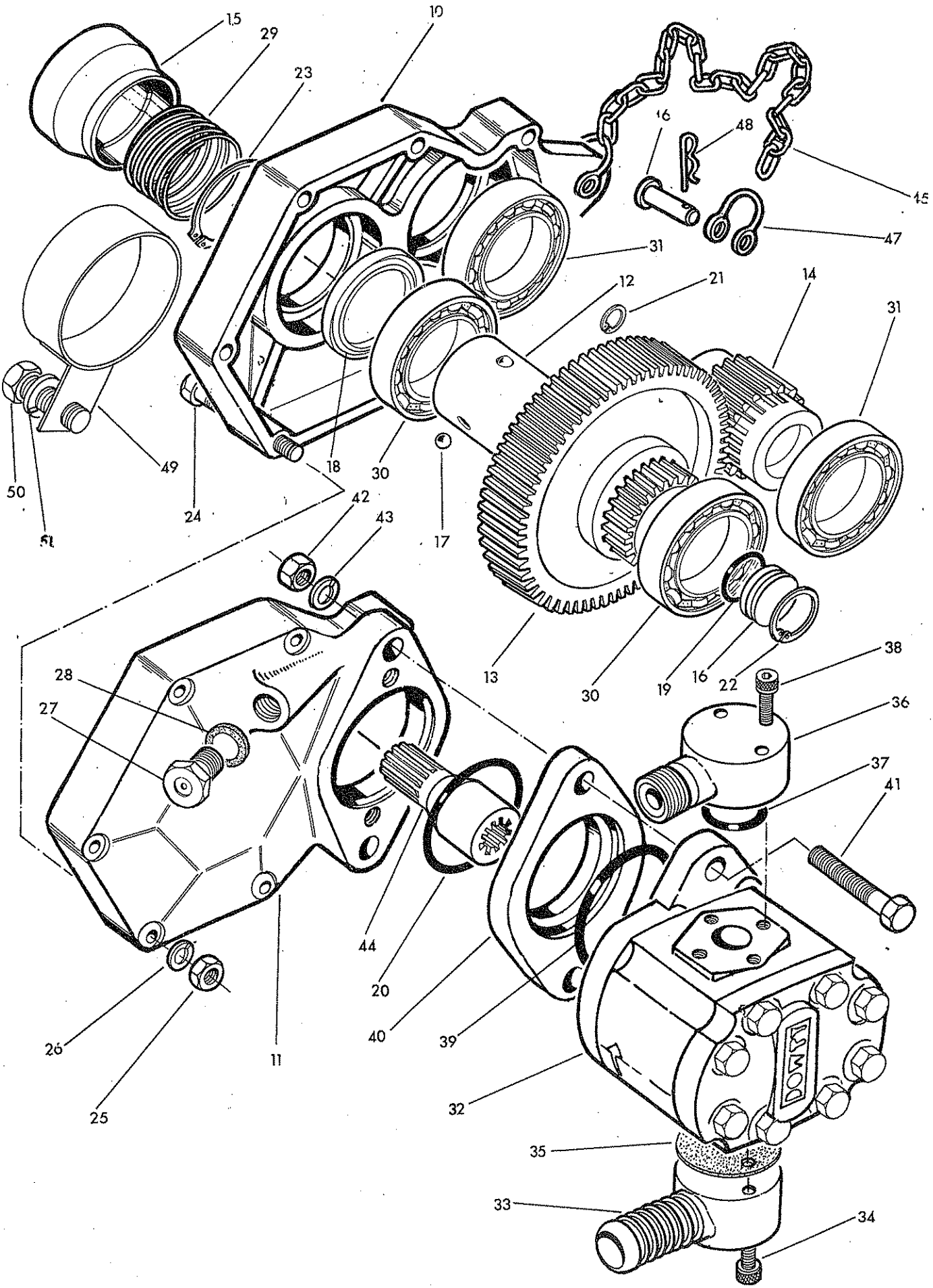
Ref	Part No.	Qty	Description
			HYDRAULIC INSTALLATION FOR HY-REACH SUPER 'E'
	80 17 353		1 METRE MULTICUT GRASS
	80 17 352		1 METRE MULTICUT HEDGE
	80 17 354		1 METRE TOUGHCUT
1	71 09 128	2	.Rigid pipe
	80 17 351		1.2 METRE MULTICUT GRASS
	80 17 350		1.2 METRE MULTICUT HEDGE
2	71 09 127	2	.Rigid pipe
			The following items are common to all hydraulic installations.
3	80 13 295	1	.PSF Pump/High Ratio gearbox (see page 58)
4	81 25 305	1	.Rotor control valve assembly (see page 64)
5	85 01 059	1	.Hose 1" BSP SF - SF 78" long
6	85 01 039	1	.Hose 1¼" Bore suction 78" long
7	09 04 108	4	.Hose clip (1¼" bore hose)
8	85 01 089	2	.Hose 1" BSP SF -SF 118" long
9	71 09 126	2	.Elbow
10	85 00 859	1	.Hose 1" bore 59"
11	09 04 106	2	.Hose clip (1" bore hose)
12	81 21 063	1	.Return adaptor
13	85 01 083	1	.Hose 5/8" bore x 6" long
14	09 04 204	2	.Hose clip (5/8" bore hose)
15	to suit	1	.Return connection

HYDRAULIC INSTALLATION
(Armhead circuit)



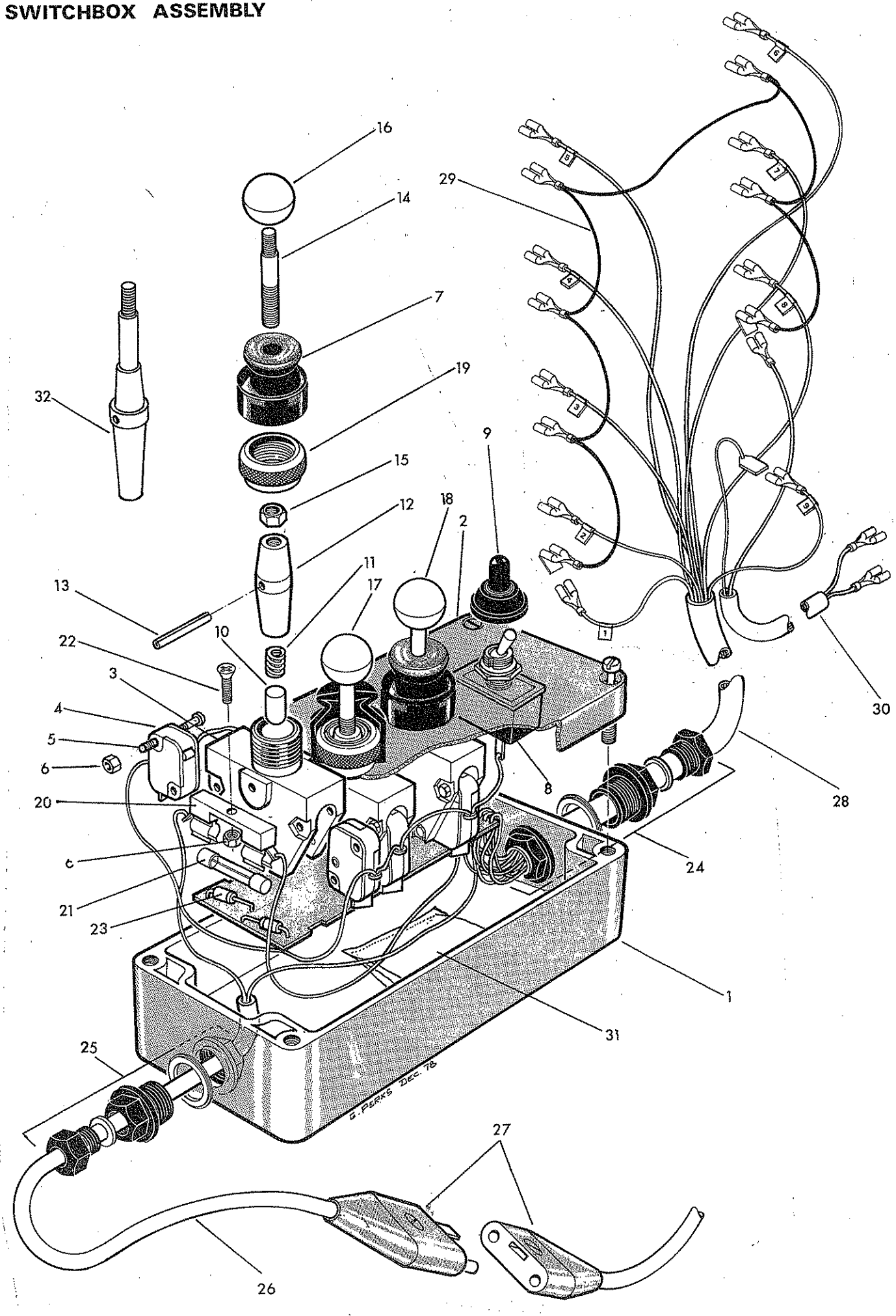
Ref	Part No.	Qty	Description
HYDRAULIC INSTALLATION FOR HY-REACH SUPER 'E' CONTINUED			
	80 17 353		1 METRE MULTICUT GRASS
	80 17 352		1 METRE MULTICUT HEDGE
	80 17 354		1 METRE TOUGHCUT
	80 17 351		1.2 METRE MULTICUT GRASS
	80 17 350		1.2 METRE MULTICUT HEDGE
1	81 30 300	1	.Armhead control valve (see page 62).
2	71 09 318	1	.Solenoid protection cover c/w label
3	71 09 143	1	..Solenoid instruction label
4	93 13 034	4	.Set screw M8 x 16
5	84 01 027	1	.Filter assembly (see page 68)
6	84 01 030	1	.Filter clamp c/w nuts and washers.
7	91 13 004	2	..Hexagon nut M8
8	91 00 204	2	..Spring washer Ø8
9	85 31 214	1	.Hose 3/8" BSP SF - 90° F 36" long
10	60 00 113	1	.Adaptor 3/8" BSP M-M
11	85 90 023	1	.Self seal coupling female half
12	85 36 042	2	.Hose ¼" BSP SF - 90° F 40" long
13	85 16 042	2	.Hose ¼" BSP SF - SF 153" long
14	85 36 052	2	.Hose ¼" BSP SF - 90° F 15" long
15	85 01 090	1	.Hose 5/8" bore 44" long
16	85 11 253	1	.Hose 3/8" BSP SF - SF 18" long
17	85 36 022	1	.Hose ¼" BSP SF - 90° F 70" long
18	71 02 208	as req'd	.Plastic hose strap
19	84 02 265	1	.Switch box assembly (see page 60)
20	84 02 260	1	.Switch box mounting bracket c/w label
21	84 02 049	1	..label
22	28 00 203	4	.Self tapping screw No. 10 x ½" long
	71 09 319	1	.Universal socket & pillar compr:-
23	71 09 320	1	..Sandwich plate
24	71 09 146	1	..Pillar c/w spring dowel
25	04 22 816	1	...Spring dowel
26	71 09 147	1	..Socket
27	93 13 066	1	..Setscrew M12 x 30
28	91 13 006	1	..Hexagon nut M12
29	03 11 086	1	..Setscrew 5/8" UNF x 1" long
30	01 11 006	1	..Hexagon nut 5/8" UNF
31	01 00 206	1	..Spring washer 5/8" dia

PUMP & GEARBOX ASSEMBLY



Ref	Part No	Qty	Description
	80 13 295	1	PSF PUMP/HIGH RATIO GEARBOX ASSEMBLY
	80 13 290	1	. High Ratio Gearbox comprising:-
10	80 13 291	1	.. Case Input Side
11	80 13 292	1	.. Case Out Put Side
12	80 13 263	1	.. Take off Shaft
13	80 13 294	1	.. Gear, 77 teeth
14	80 13 293	1	.. Gear 18 teeth
15	80 13 030	1	.. Ball Retainer
16	80 13 031	1	.. Bung
17	09 05 116	3	.. 1/2" dia. Ball
18	86 29 116	1	.. Oil Seal
19	86 00 409	1	.. '0' Ring
20	86 00 435	1	.. '0' Ring
21	04 16 112	1	.. Circlip 3/4" Internal
22	04 16 124	1	.. Circlip 1.1/2" Internal
23	04 06 250	1	.. M50 External Circlip
24	02 11 242	7	.. 5/16 UNF Hexagon Bolt
25	01 11 002	7	.. 5/16 UNF Hexagon Nut
26	01 00 002	7	.. Spring Washer
27	80 13 033	1	.. Breather Valve
28	01 00 903	1	.. Fibre Washer
29	80 13 032	1	.. Ball Retaining Spring
30	06 03 650	2	.. Bearing
31	06 04 640	2	.. Bearing
	82 01 478	1	. Dowty Pump c/w connections comprising:-
32	82 01 475	1	.. Dowty Pump
33	80 13 022	1	.. Inlet Connection c/w Screw
34	02 42 202	2	... Screw (5/16" UNC Socket Cap)
35	80 13 023	1	.. Inlet Gasket
36	80 13 038	1	.. Outlet Connection c/w Screw & '0' Ring
37	86 00 121	1	... '0' Ring
38	02 42 162	4	... Screw (5/16 UNC Socket Cap)
39	86 00 436	1	. '0' Ring
40	80 13 025	1	. Adaptor Flange c/w Bolts & Nuts etc.
41	02 11 225	2	.. 1/2" UNF x 2¾" Long Hex. Bolt
42	01 11 005	2	.. 1/2" UNF Nut
43	01 00 205	2	.. Spring Washer
44	80 13 028	1	. Splined Adaptor
45	09 02 330	1	. Chain
	60 00 087	2	. Shackle Assembly each comp:-
46	60 00 089	1	.. Shackle Pin
47	60 00 088	1	.. Shackle
48	04 31 105	1	.. Spring Cotter
49	80 13 266	1	.P.T.O. GUARD
50	03 11 066	1	..Screw 5/8" UNF x ¾" long
51	01 00 206	1	..Spring washer 5/8" diameter

SWITCHBOX ASSEMBLY

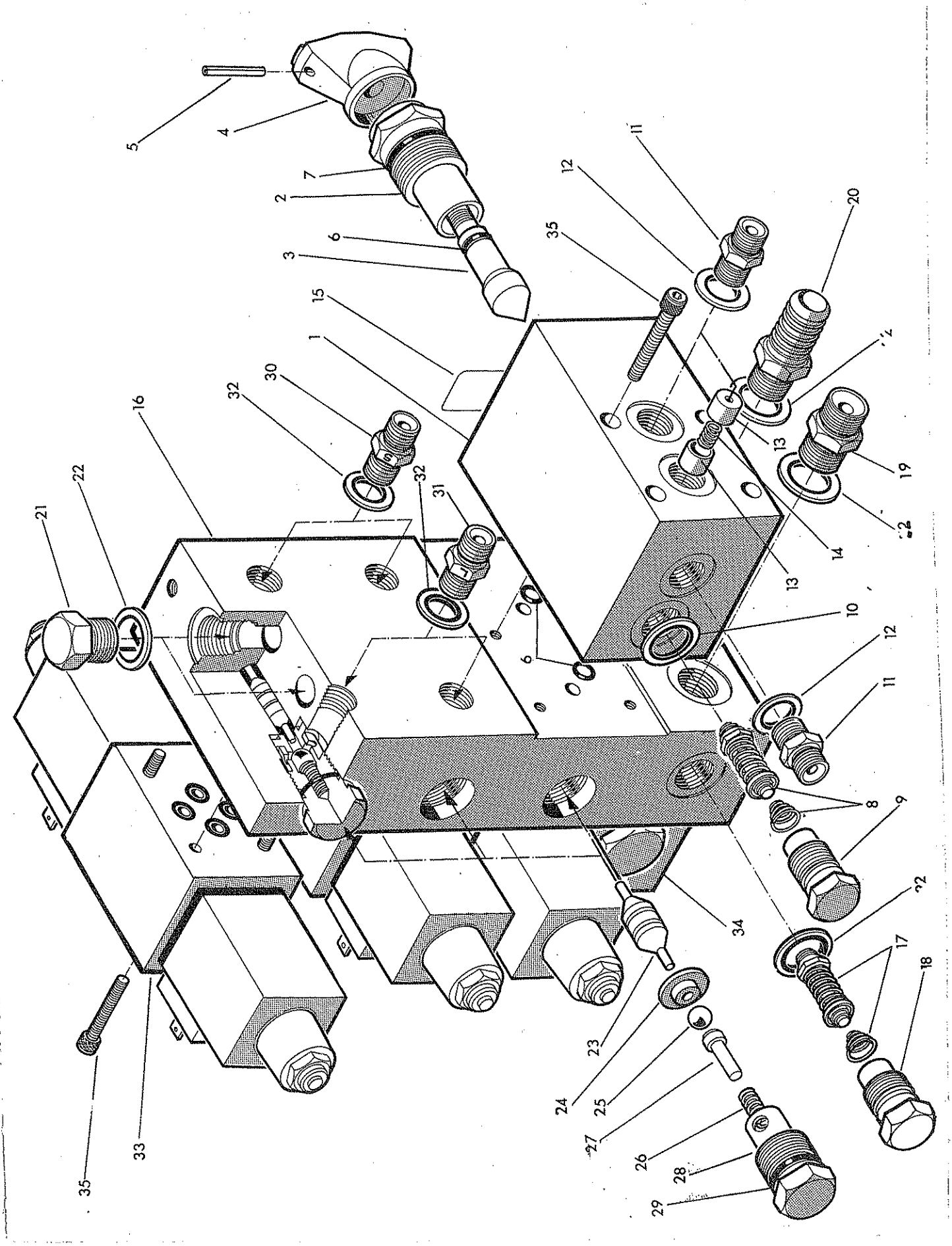


Ref	Part No.	Qty	Description
	84 02 265		SWITCH BOX ASSEMBLY
	84 02 261	1	.Box assembly
1	84 02 263	1	..Box body
2	84 02 262	1	..Box lid c/w screws
3	84 02 020	3	.Switch housing
4	84 02 021	6	.Micro switch
5	93 00 108	12	.Posidrive screw M3 x 20
6	91 00 013	13	.Hexagon plain nut M3
7	84 02 022	3	.Switch lever boot
8	84 02 023	1	.Toggle switch
9	84 02 024	1	.Toggle switch cover
10	84 02 052	3	.Detent button
11	84 02 041	3	.Spring
*12	84 02 039	3	.Switch barrel
13	04 25 325	3	.Spring dowel
*14	84 02 038	3	.Lever
*15	91 00 014	3	.Hexagon plain nut M5
16	84 02 026	1	.Knob - Red
17	84 02 027	1	.Knob - Green
18	84 02 028	1	.Knob - Yellow
19	84 02 051	3	.Bezel ring
20	84 02 036	1	.Fuse holder
21	84 02 037	1	.Fuse (10 amp)
22	93 00 109	1	.Posidrive screw c/sunk M3 x 10
23	84 02 025	6	.Diode
24	84 02 029	1	.Gland assy large
25	84 02 042	1	.Gland assy small
26	84 02 054	1	.Power supply cable c/w plug/socket
27	84 02 062	1	..Plug/socket
	84 02 264	1	.Wiring harness assy
28	84 02 057	1	..Main harness
29	84 02 058	1	..Common link harness
30	84 02 053	1	..Rotor control harness
31	84 02 067	1	. Desiccant bag

* From machine serial No. 23 HE 15 items 12, 14 and 15 will be deleted and replaced by

Ref	Part No.	Qty	Description
32	84 02 039	3	.Switch barrel

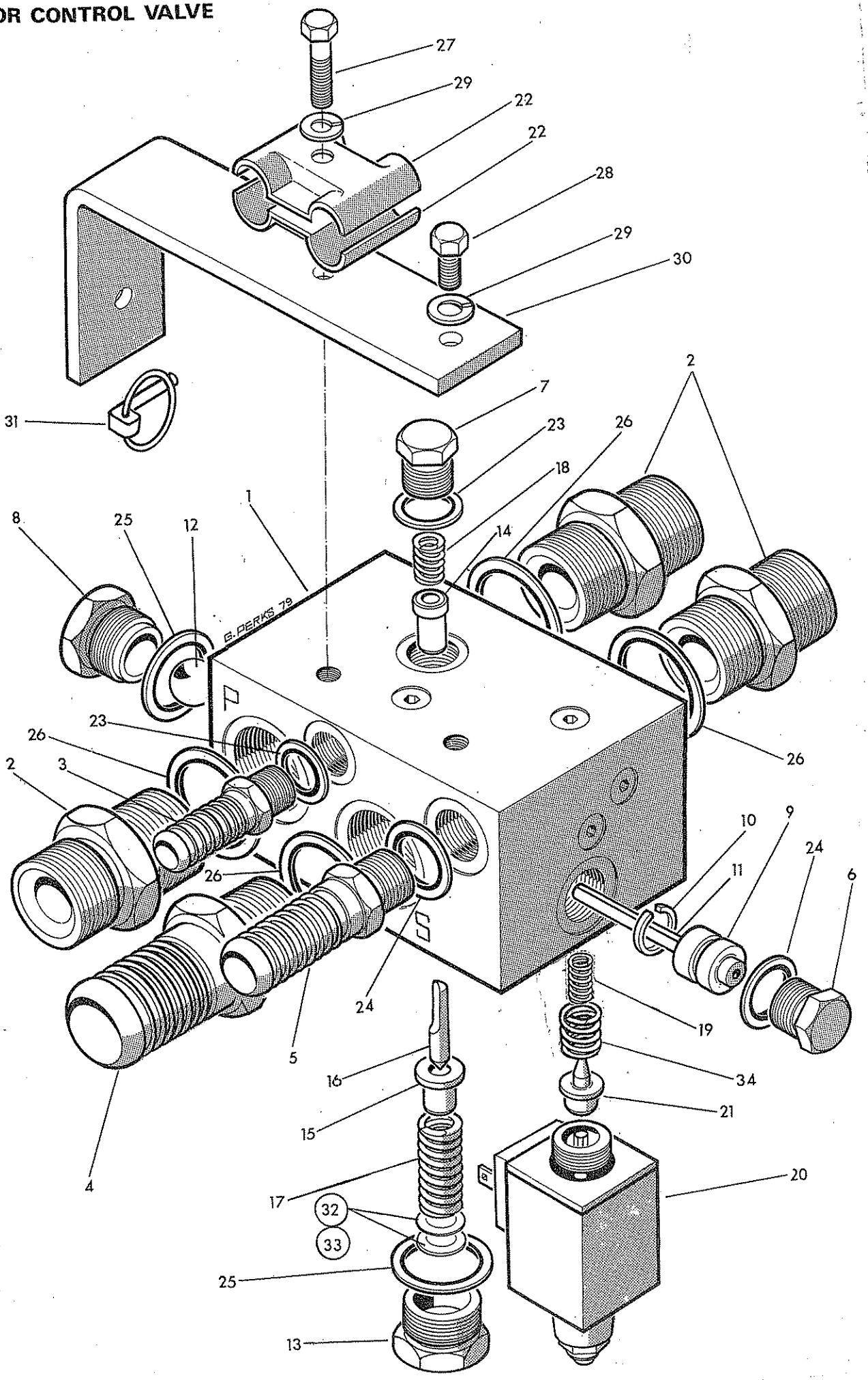
ARMHEAD CONTROL VALVE ASSEMBLY



Ref	Part No.	Qty	Description
	81 30 300		ARMHEAD VALVE ASSEMBLY
	81 30 305	1	.Park work assembly comprising:-
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
6	87 00 510	3	..'O' ring
7	86 00 402	1	..'O' ring
8	81 30 030	1	..Relief valve c/w spring
9	81 30 031	1	..Relief valve cap
10	86 50 103	1	..Bonded seal 3/8" BSP
11	80 02 177	3	..Union 1/4" BSP M - M
12	86 50 102	3	..Bonded seal 1/4" BSP
13	81 30 039	2	..Restrictor piston
14	81 14 045	1	..Spring
15	71 09 141	1	..Instruction label
16	81 30 303	1	.Manifold block
17	81 30 029	1	.Relief valve c/w spring
18	81 30 032	1	.Relief valve cap
19	60 00 113	1	.Union 3/8" BSP M - M
20	81 25 008	1	.Return connection
21	80 03 001	2	.Plug 3/8" BSP
22	86 50 103	5	.Bonded seal 3/8" BSP
23	81 30 026	5	.Actuator
24	81 30 024	5	.Check valve seat
25	09 05 509	5	.Steel ball M9Ø
26	81 14 045	5	.Spring
27	81 30 040	5	.Spring guide
28	81 30 025	5	.Check valve cap
29	87 00 644	5	.'O' ring
30	81 30 037	2	.Restrictor
31	81 30 038	2	.Restrictor
32	86 50 102	4	.Bonded seal ¼" BSP
33	81 30 301	3	.Double solenoid valve
34	81 30 302	1	.Single solenoid valve
35	92 43 082	20	.Setscrew socket head M5 x 40

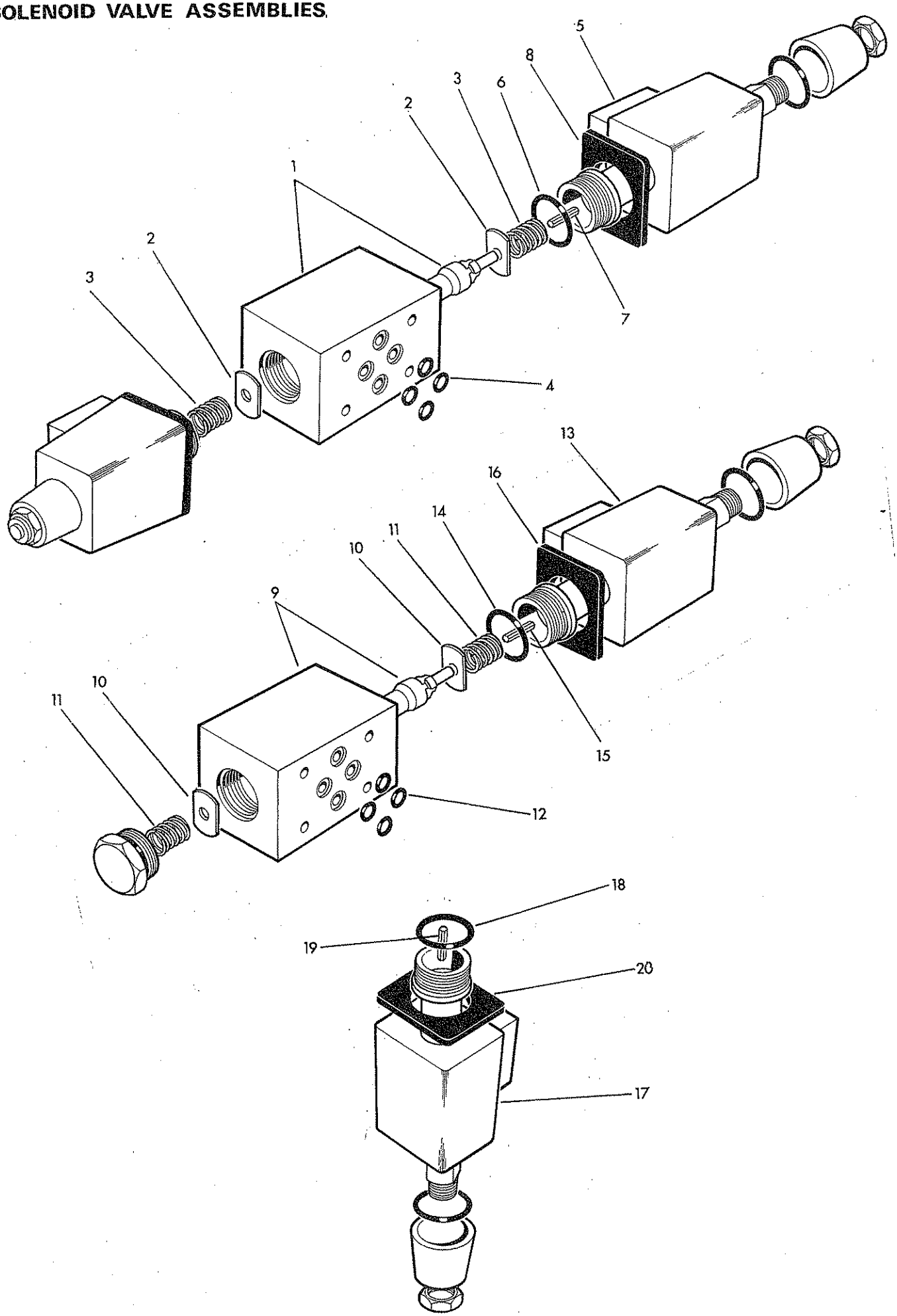
See page 66

ROTOR CONTROL VALVE



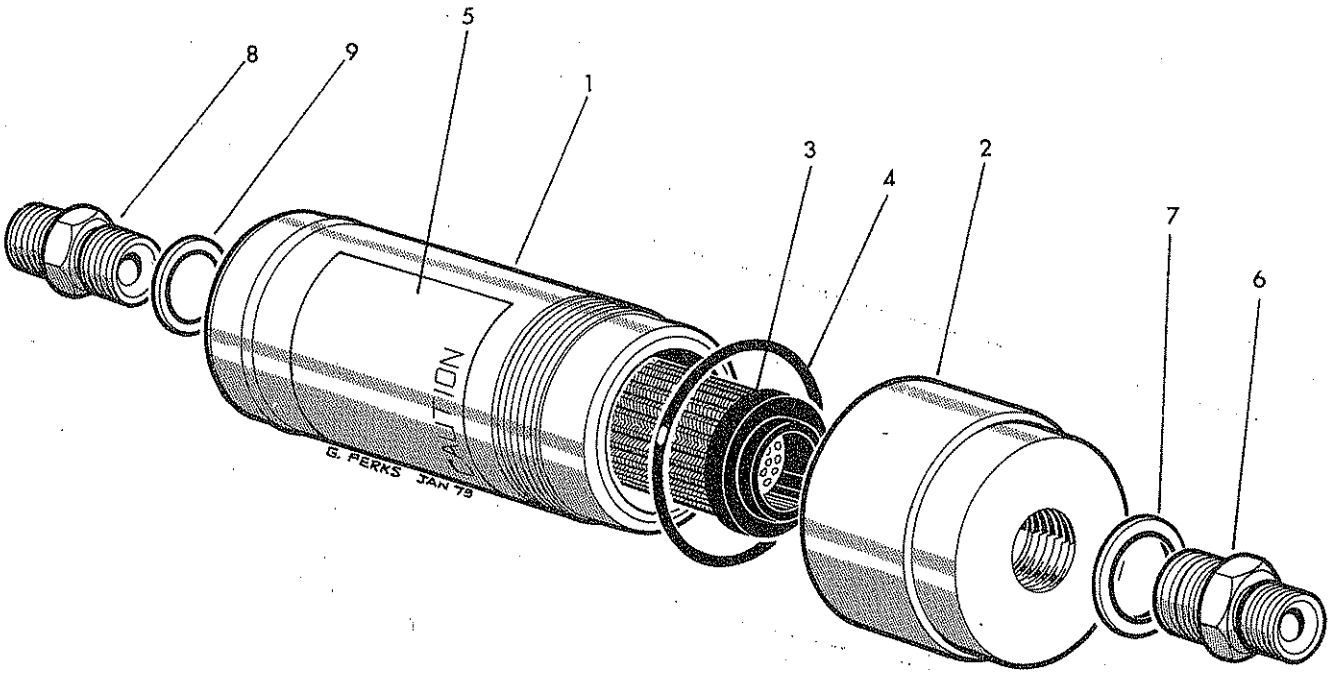
Ref	Part No.	Qty	Description
	81 25 305		ROTOR CONTROL VALVE
1	81 25 306	1	.Valve body
2	81 21 052	3	.Union 1" BSP M-M
3	81 25 008	1	.Return connection
4	81 21 051	1	.Return connection
5	81 27 059	1	.Return connection
6	81 03 001	1	.Blank ½" BSP
7	80 03 001	1	.Blank 3/8" BSP
8	81 25 033	1	.Plug ¾" BSP
9	81 25 030	1	.By-Pass Piston c/w ring and spring dowel
10	81 25 034	1	..Piston ring
11	04 21 844	1	..Spring dowel ¼" dia. x 2¾" long
12	09 05 124	1	.Steel ball ¾" diameter
13	81 25 031	1	.Relief valve cap
14	81 09 004	1	.Bush
15	81 09 006	1	.Spring register
16	81 09 005	1	.Needle
17	81 10 003	1	.Spring
18	81 14 024	1	.Spring
19	81 16 011	1	.Spring
20	84 02 060	1	.Solenoid See page 66
21	81 25 032	1	.Needle By-Pass
22	60 12 026	2	.Hose clamp
23	86 50 103	2	.Bonded seal 3/8" BSP
24	86 50 104	2	.Bonded seal ½" BSP
25	86 50 106	2	.Bonded seal ¾" BSP
26	86 50 108	4	.Bonded seal 1" BSP
27	92 13 075	1	.Bolt M10 x 35
28	93 13 035	1	.Set screw M10 x 16
29	91 00 205	2	.Spring washer M10Ø
30	71 09 142	1	.Mounting bracket c/w linch pin
31	04 31 217	1	..Linch pin
32	01 00 102	As req'd	.Bright washer 5/16" diameter
33	60 01 232	"	.0.4 mm shim washer
34	81 14 024	1	.Spring

SOLENOID VALVE ASSEMBLIES



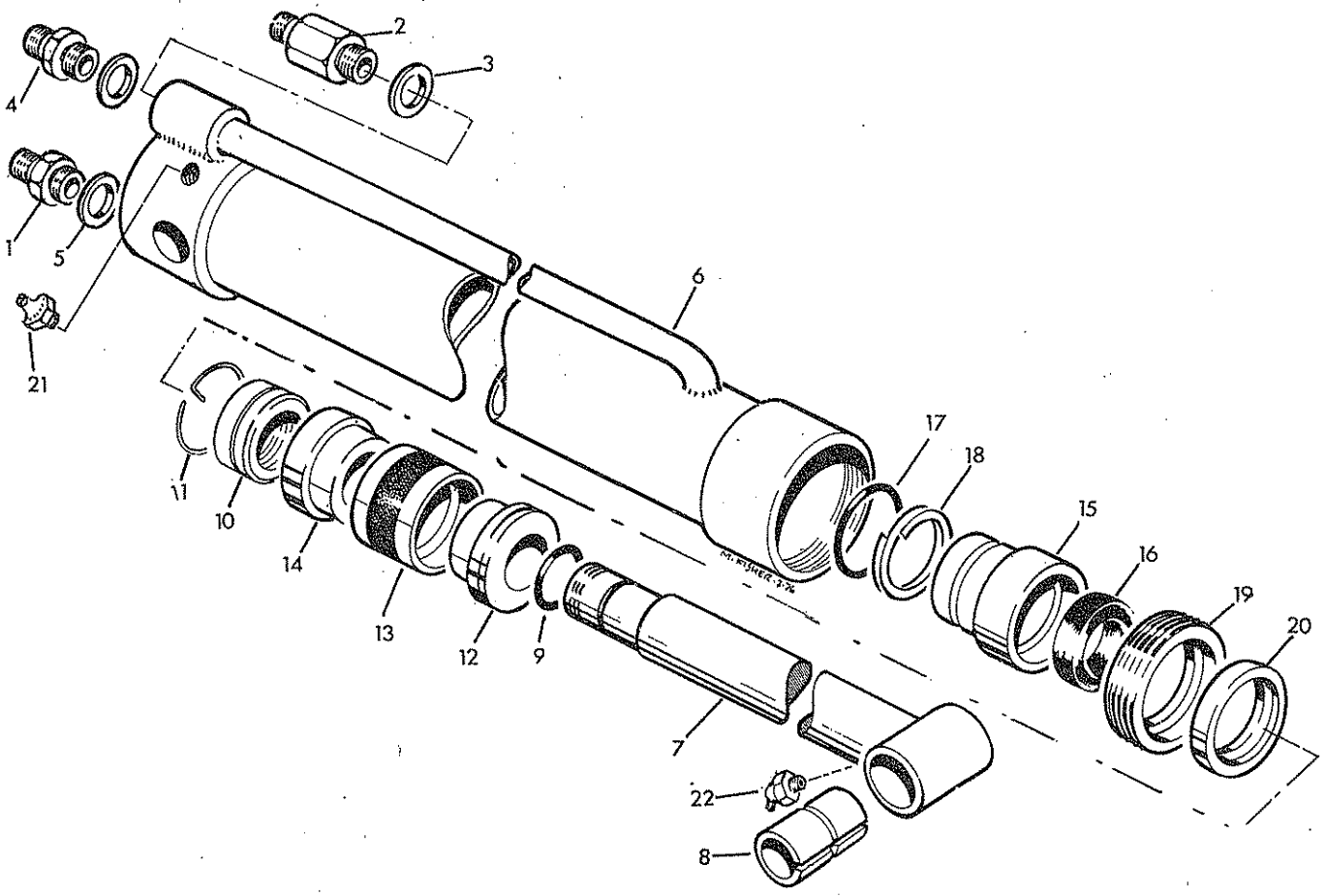
Ref	Part No.	Qty	Description
	81 30 300		ARMHEAD CONTROL VALVE
	81 30 301	3	.Double solenoid valve
1	84 02 072		..Block c/w spool
2	84 02 069	2	..Washer
3	84 02 070	2	..Spring
4	87 00 510	4	..'O' ring
	84 02 060	2	..Solenoid comprising:-
5	84 02 068	1	...Coil
6	86 00 507	1	...'O' ring
7	84 02 061	1	...Push rod
8	84 02 071	1	...Gasket
	81 30 302	1	.Single solenoid valve
9	84 02 073		..Block c/w spool
10	84 02 069	2	..Washer
11	84 02 070	2	..Spring
12	87 00 510	4	..'O' ring
	84 02 060	1	..Solenoid comprising:-
13	84 02 068	1	...Coil
14	86 00 507	1	...'O' ring
15	84 02 061	1	...Push rod
16	84 02 071	1	...Gasket
	81 25 305		ROTOR CONTROL VALVE
	84 02 060	1	.Solenoid
17	84 02 068	1	..Coil
18	86 00 507	1	..'O' ring
19	84 02 061	1	..Push rod
20	84 02 071	1	..Gasket

FILTER ASSEMBLY



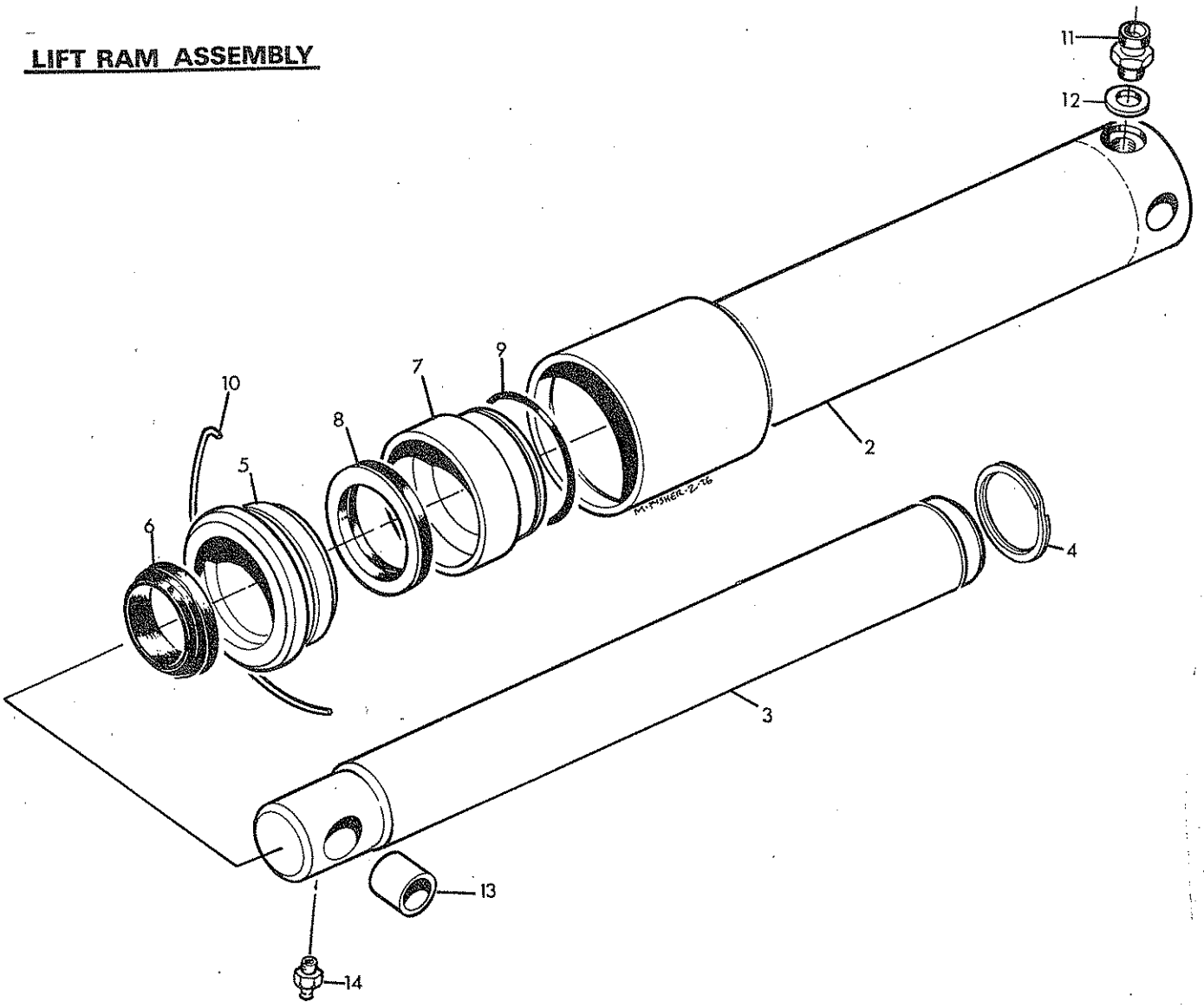
Ref	Part No.	Qty	Description
	84 01 027		FILTER ASSEMBLY c/w Unions
	84 01 020	1	.Filter comprising:-
1	84 01 019	1	..Filter body
2	84 01 021	1	..Filter cap
3	84 01 018	1	..Filter element
4	86 00 306	1	..'O' ring
5	84 01 025	1	..Instruction label
6	60 00 112	1	.Union ½"BSP - 3/8" BSP
7	86 50 104	1	.Bonded seal ½" BSP
8	60 00 113	1	.Union 3/8"BSP - 3/8" BSP
9	86 50 103	1	.Bonded seal 3/8" BSP

REACH RAM and ANGLING RAM ASSEMBLIES



Ref	Part No	Qty	Description
	71 09 275	1	REACH RAM ASSEMBLY
1	85 81 145	1	.3/8" BSP - ¼" Union
2	85 81 146	1	.3/8" BSP - ¼" BSP long union
3	86 50 103	2	.3/8" BSP bonded seal
	71 09 276	1	ANGLING RAM ASSEMBLY
4	85 81 145	2	.3/8" BSP - ¼" BSP union
5	86 50 103	2	.3/8" BSP bonded seal
The following parts are common to both ram assemblies:-			
	71 09 292	1	.Long stroke ram assembly
6	71 03 304	1	..Long stroke ram cylinder
7	71 01 095	1	..Piston rod assembly
8	71 05 050	1	...Bush rod end
9	86 00 119	1	...Piston rod '0' ring
10	71 01 096	1	..Piston nut
11	71 01 152	1	...Ram nut locking ring
12	71 01 097	1	..Piston inner assembly
13	86 35 131	1	...Piston seal
14	71 01 098	1	...Piston outer
15	71 01 099	1	..Gland housing assembly
16	86 22 127	1	...Gland seal
17	86 00 304	1	...Gland '0' ring
18	86 09 304	1	...Anti-extrusion ring
19	71 01 100	1	..Gland nut assembly
20	86 40 328	1	...Piston rod wiper
21	09 01 121	1	..1/8" BSP straight greaser
22	09 01 123	1	..1/8" BSP 90° greaser
	86 99 102		SEAL KIT

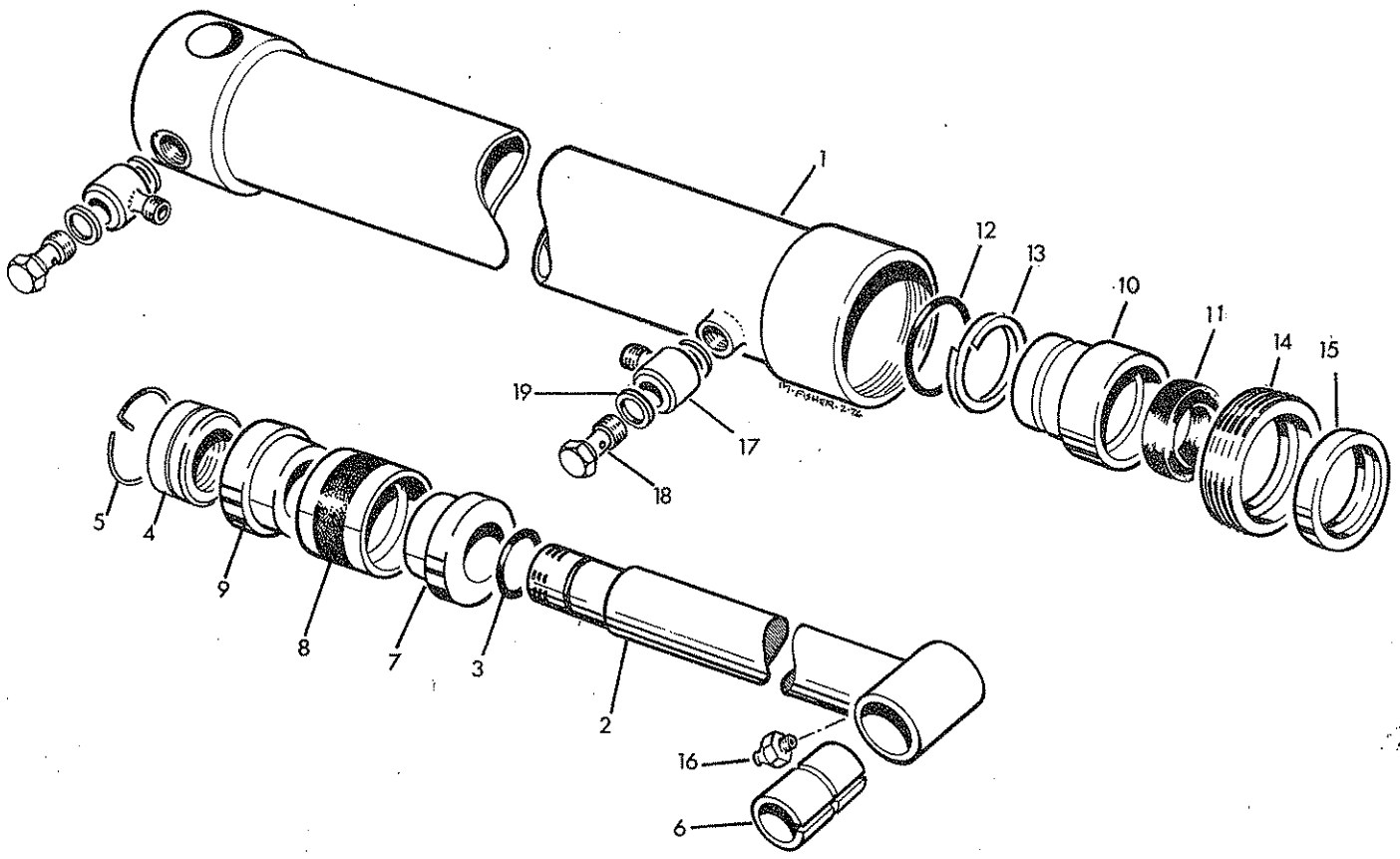
LIFT RAM ASSEMBLY



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.

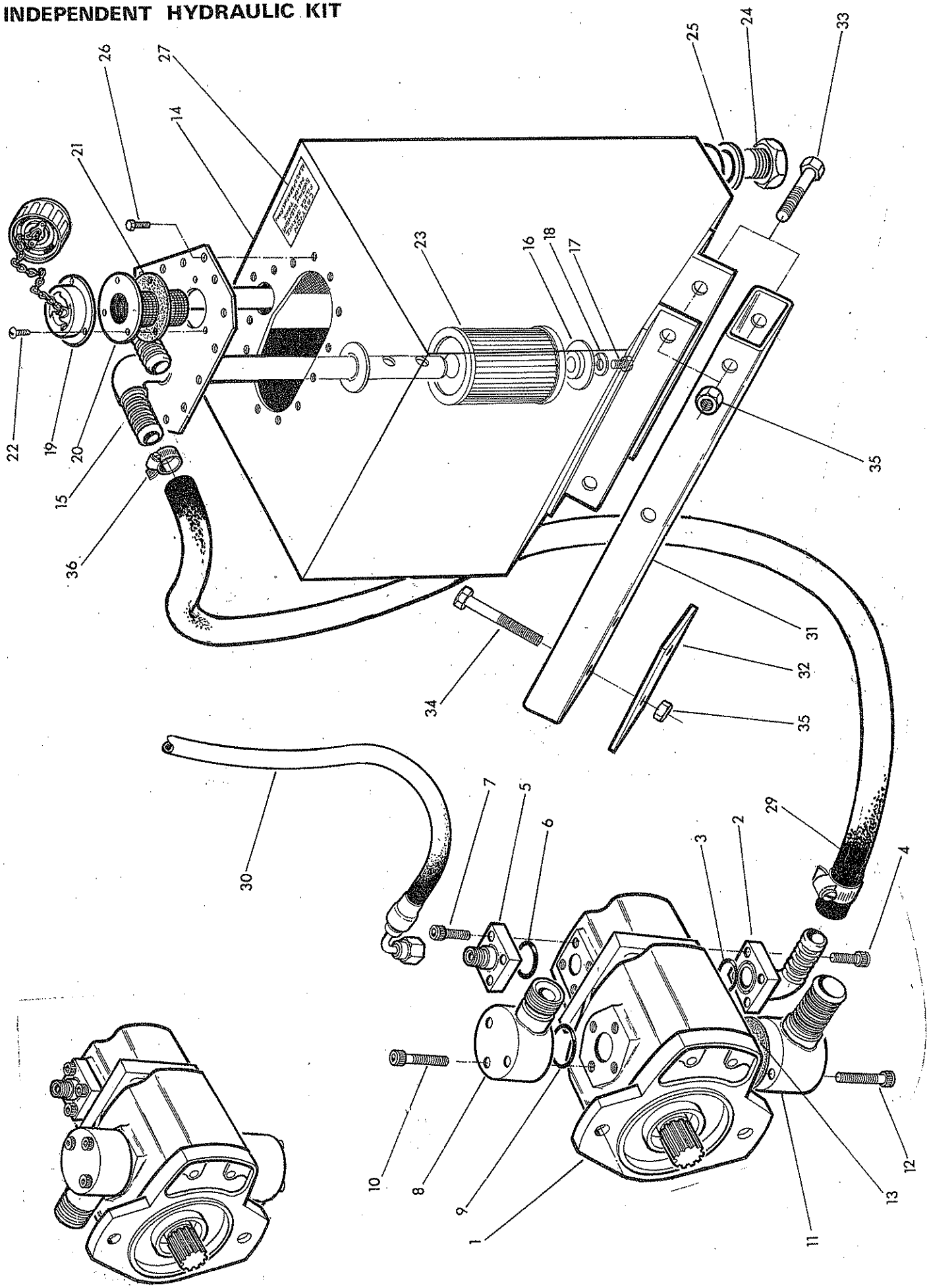
BREAKAWAY RAM ASSEMBLY



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 01 096	1	...Piston nut
5	71 01 152	1	...Ram nut locking ring
6	71 05 050	1	...Bush
7	71 01 097	1	..Piston inner assembly
8	86 35 131	1	...Piston seal
9	71 01 098	1	...Piston outer
10	71 01 099	1	..Gland housing assembly
11	86 22 127	1	...Gland seal
12	86 00 304	1	...Gland '0' ring
13	86 09 304	1	...Anti-extrusion ring
14	71 01 100	1	..Gland nut assembly
15	86 40 328	1	...Piston rod wiper
16	09 01 121	1	.1/8" BSP greaser
17	85 81 147	2	.Banjo union
18	60 01 127	2	.Banjo bolt
19	86 50 103	4	.3/8" BSP bonded seal

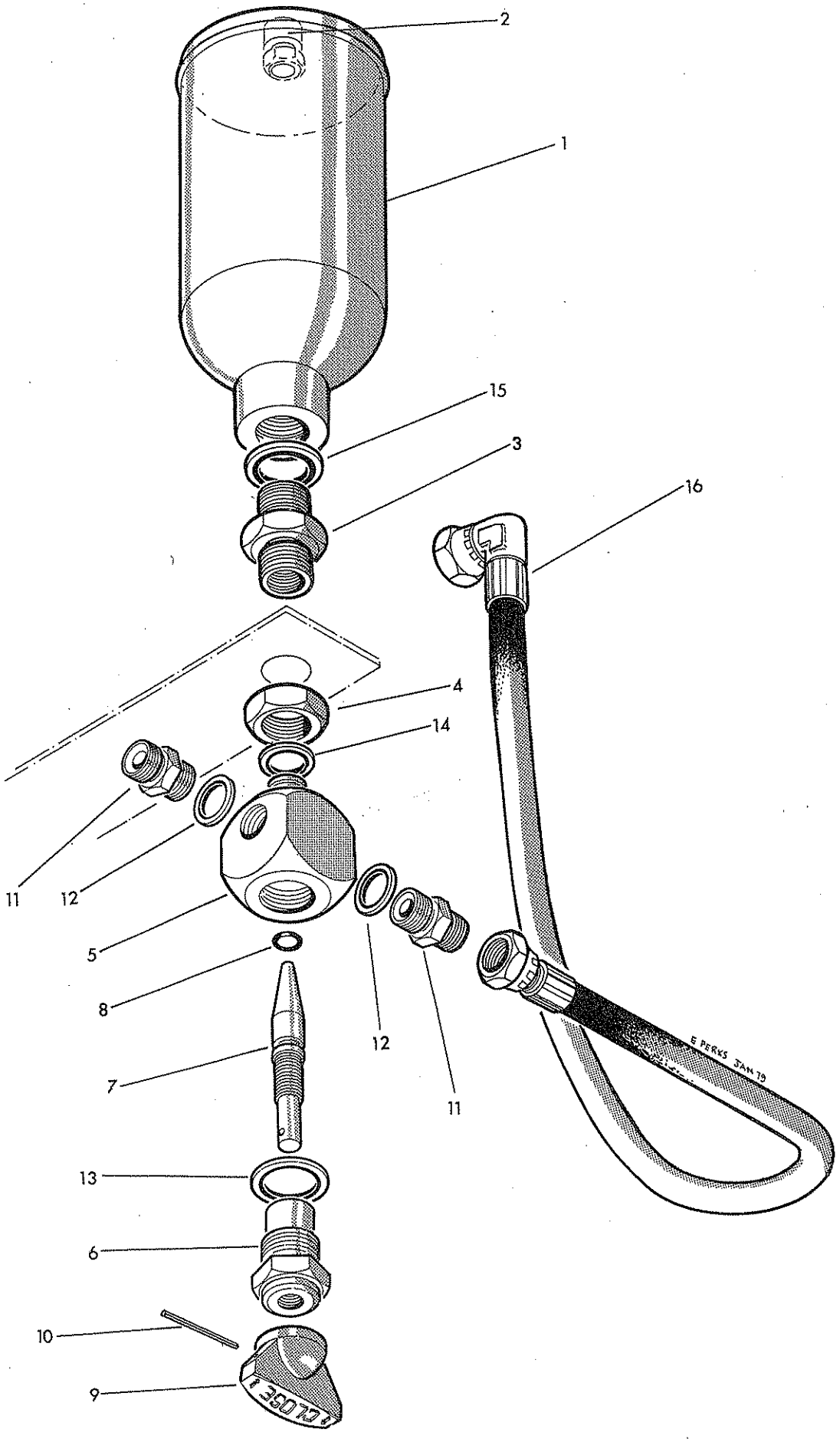
86 99 102 SEAL KIT

INDEPENDENT HYDRAULIC KIT



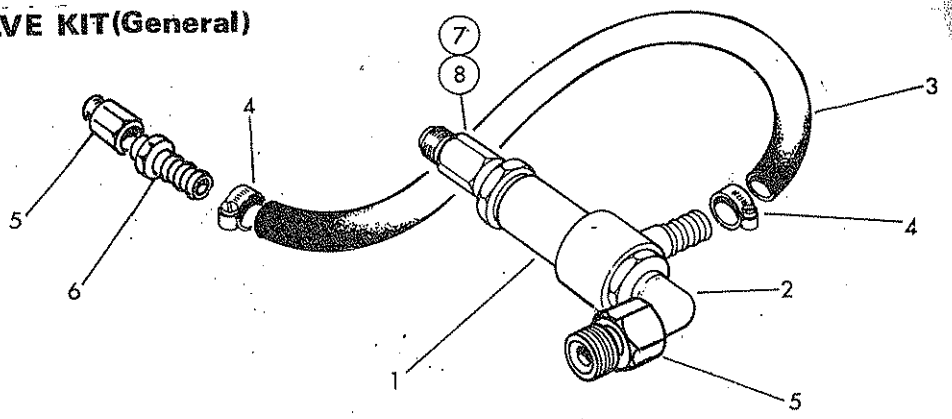
Ref	Part No	Qty	Description
	71 09 316		INDEPENDENT HYDRAULIC KIT RIGHT HAND
	82 01 501	1	.Pump assembly (as shown exploded)
	71 09 317		INDEPENDENT HYDRAULIC KIT LEFT HAND
	82 01 502	1	.Pump assembly (as shown inset)
	The following items are common to both independent hydraulic kits:-		
1	82 01 500	1	..Tandem pump assembly
2	80 05 035	1	..Suction union c/w screws and '0' ring
3	86 00 405	1	...'0' ring
4	03 42 062	4	...Capscrew 5/16" UNC x 3/4" long
5	80 05 027	1	..Pressure connection c/w screws and '0' ring
6	86 00 405	1	...'0' ring
7	03 42 062	3	...Capscrew 5/16" UNC x 3/4" long
8	80 05 029	1	..Pressure connection c/w screws and '0' ring
9	86 00 121	1	...'0' ring
10	02 42 162	3	...Capscrew 5/16" UNC x 2" long
11	80 13 022	1	..Suction connection c/w screws
12	02 42 202	2	...Capscrew 5/16" UNC x 2½" long
13	80 13 023	1	..Gasket
	71 09 312	1	.Oil tank assembly
14	71 09 282	1	..Oil tank
15	71 09 313	1	..Oil tank lid assembly
16	71 09 139	1	...Filter retaining cap
17	93 13 065	1	...Filter retaining screw M10Ø 30
18	91 00 205	1	...Spring washer M10Ø
	84 01 014	1	..Filler cap assembly
19	84 01 015	1	...Filler cap and neck
20	84 01 016	1	...Strainer basket
21	84 01 017	1	...Gasket
22	03 00 032	3	...Screws, self tapping, 3/16" dia. x 1/2" long
23	71 03 102	1	..Filter element
24	85 81 159	1	..Blank plug 1" BSP
25	86 50 108	1	..Bonded seal 1" BSP
26	93 13 023	7	..Setscrew M6 x 12
27	84 01 026	1	..Instruction label
28	71 09 315	2	.Screw jack leg (not illustrated)
29	85 00 866	1	.Hose rubber 66" long
30	85 31 233	1	.Hose double braid 75" long
31	71 09 292	1	.Tank mounting bracket
32	71 09 125	1	.Clamp plate
33	02 11 446	2	.Bolt 5/8" UNF x 5½" long
34	02 11 566	2	.Bolt 5/8" UNF x 7" long
35	01 41 006	4	.Nut, Clevelok 5/8" UNF
36	09 04 106	2	.Hose clip 5/8" diameter

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 36 052	1	.Hose ¼" BSP Straight Female - 90° F

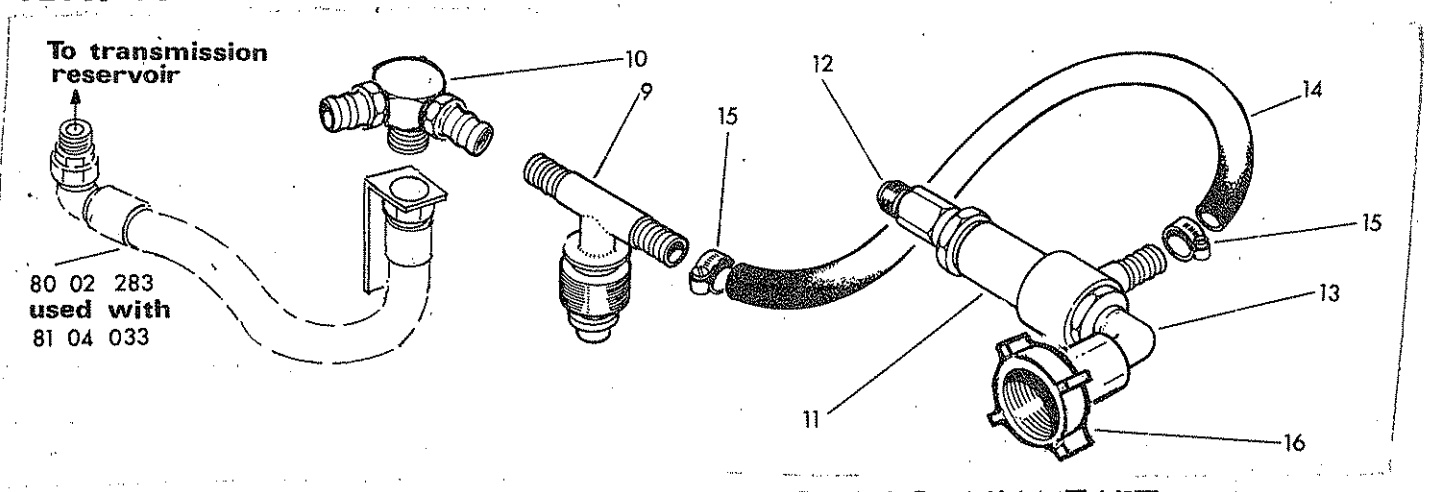
FLOW CONTROL VALVE KIT(General)



Ref	Part No	Qty	Description
	80 02 291		FLOW CONTROL VALVE KIT
1	81 04 011	1	.Flow control valve
□2	85 81 043	1	.Elbow 3/8" BSP M - F
3	85 01 085	1	.Hose 5/8" bore x 30"long
4	09 04 204	2	.Hose clip
5	85 81 142	2	.Union 3/8" BSP - ½" BSP M - F
6	81 08 022	1	.Return union
7	72 13 003	1	.JIC end fitting
*8	70 14 020	1	.BSP end fitting

□ Elbow assembled onto flow control valve using jointing tape.
*BSP end fitting used on Hy-Reach

FLOW CONTROL VALVE KIT for I.H.



	81 04 032		FLOW CONTROL VALVE KIT
9	80 02 041	1	.Tractor return connection
	81 04 033		FLOW CONTROL VALVE KIT
10	80 02 088	1	.Tractor return connection

The following items are common to both 81 04 032 + 81 04 033

11	81 04 011	1	.Flow control valve
12	70 14 020	1	.BSP end fitting
*13	85 81 043	1	Elbow 3/8" BSP M - F
14	85 95 020	1	.Hose 5/8" bore x 20" long
15	09 04 204	2	.Hose clip
16	85 90 023	1	.Female half s/s coupling

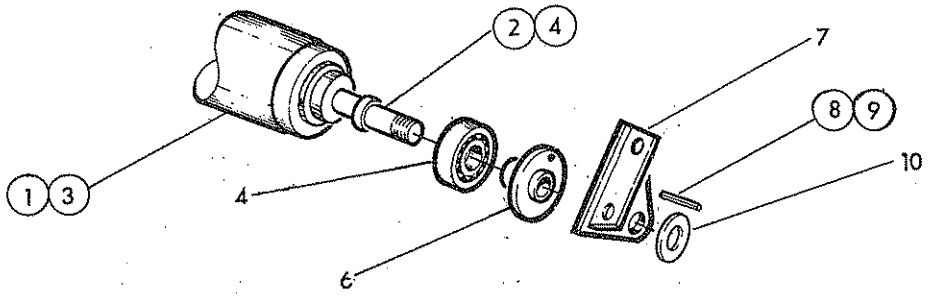
*Elbow assembled onto Flow control valve using jointing tape.

VARIABLE SPARES REQUIREMENTS

From Sept'ber 1979 modification to the Roller Assemblies and to the 1.2 metre Rotor were introduced.

For spares purposes the earlier assemblies are listed below:-

ROLLERS



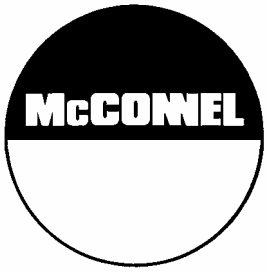
Ref	Part No.	Qty	Description	
	73 14 385		1METRE MULTICUT GRASS FLAIL	
	73 14 324		1METRE MULTICUT HEDGE FLAIL	
	73 14 386		1METRE MK II TOUGHCUT FLAIL	
1	73 14 165		.Roller	
2	73 14 190		.Roller tie rod	
	73 14 381		1.2 METRE MULTICUT GRASS FLAIL	
	73 14 380		1.2 METRE MULTICUT HEDGE FLAIL	
3	73 14 114		.Roller	
4	73 14 191		.Roller tie rod	
	The following items are common to all assemblies:-			
5	06 00 002		.Roller bearing DN 2125	
6	73 14 192		.Bearing spigot	
7	73 14 195		.Roller bracket L.H. complete with spring dowel	
8	04 21 810		..Spring dowel	
	73 14 196		.Roller bracket R.H. complete with spring dowel	Not
9	04 21 810		..Spring dowel	illustrated
10	73 14 194		.Special washer	

ROTOR

Should a new Rotor be required the modified version will be sent; it is necessary to also order twenty-four new Flail Pivot Bushes, and twenty-four special flail bolts. For Part Nos. see page 47

For associated spares to fit the earlier Rotor - see below:-

Ref	Part No.	Qty	Description
	73 14 381		1.2 METRE MULTICUT GRASS FLAIL
	73 14 380		1.2 METRE MULTICUT HEDGE FLAIL
	73 14 209	24	.Flail pivot bush
	73 14 201	24	.Special flail bolt



McConnel Limited, Temeside Works, Ludlow, Shropshire SY8 1JL. England.
Telephone: 01584 873131. Facsimile: 01584 876463. www.mcconnel.com