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DITCH KING & DITCH BOSS

Tractor Mounted Digger

Operation & Parts Manual



IMPORTANT

VERIFICATION OF WARRANTY REGISTRATION



DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with McConnel Limited within 7 days of delivery to the end user – failure to do so may affect the validity of the machine warranty.

To register machines go to the McConnel Limited web site at www.mcconnel.com, log onto 'Dealer Inside' and select the 'Machine Registration button' which can be found in the Service Section of the site. Confirm to the customer that the machine has been registered in the section below.

Should you experience any problems registering a machine in this manner please contact the McConnel Service Department on 01584 875848.

Registration Verification

Dealer Name:
Dealer Address:
Customer Name:
Date of Warranty Registration:/...../..... Dealer Signature:

NOTE TO CUSTOMER / OWNER

Please ensure that the above section above has been completed and signed by the selling dealer to verify that your machine has been registered with McConnel Limited.

IMPORTANT: During the initial 'bedding in' period of a new machine it is the customer's responsibility to regularly inspect all nuts, bolts and hose connections for tightness and re-tighten if required. New hydraulic connections occasionally weep small amounts of oil as the seals and joints settle in – where this occurs it can be cured by re-tightening the connection – *refer to torque settings chart below*. The tasks stated above should be performed on an hourly basis during the first day of work and at least daily thereafter as part of the machines general maintenance procedure.

TORQUE SETTINGS FOR HYDRAULIC FITTINGS

HYDRAULIC HOSE ENDS		
BSP	Setting	Metric
1/4"	18 Nm	19 mm
3/8"	31 Nm	22 mm
1/2"	49 Nm	27 mm
5/8"	60 Nm	30 mm
3/4"	80 Nm	32 mm
1"	125 Nm	41 mm
1.1/4"	190 Nm	50 mm
1.1/2"	250 Nm	55 mm
2"	420 Nm	70 mm

PORT ADAPTORS WITH BONDED SEALS		
BSP	Setting	Metric
1/4"	34 Nm	19 mm
3/8"	47 Nm	22 mm
1/2"	102 Nm	27 mm
5/8"	122 Nm	30 mm
3/4"	149 Nm	32 mm
1"	203 Nm	41 mm
1.1/4"	305 Nm	50 mm
1.1/2"	305 Nm	55 mm
2"	400 Nm	70 mm

EC DECLARATION OF CONFORMITY

*Conforming to EEC Machinery Directive 98/37/EC**

We,

McCONNEL LIMITED,

Temeside Works, Ludlow, Shropshire SY8 1JL.

Declare under our sole responsibility that:

The product (type) Ditch King / Ditch Boss – Tractor Mounted Backhoe.....

.....

Product Code DDKO.....

Serial No. & Date Type

Manufactured by the above company/*

.....

(* insert business name and full address if not stated above)

Complies with the required provisions of the Machinery Directive 98/37/EC, * previously Directive 89/392/EEC as amended by Directives 91/368/EEC, 93/44/EEC and 93/68/EEC.

The machinery directive is supported by;

- BS EN ISO 12100:2003 Safety of Machinery. This standard is made up of two parts; Part 1 Terminology, methodology, Part 2 Technical Specifications.
- BS EN 1050 Safety of machinery - Principles of risk assessment.
- and other national standards associated with its design and construction as listed in the Technical File.

The Machinery Directive is fully implemented into UK law by means of the Supply of Machinery (Safety) Regulations 1992 (SI 1992/3073) as amended by The Supply of Machinery (Safety) (Amendment) Regulations 1994 (SI 1994/2063).

Signed John Frank.....
on behalf of McCONNEL LIMITED *Responsible Person*

Status: Chief Design Engineer

Date: May 2005

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FOR NOTES

GENERAL INFORMATION

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

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

DEFINITIONS

The following definitions apply throughout this manual:

WARNING

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

CAUTION

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

NOTE

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

Left and Right-Hand

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

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

MACHINE SERIAL NUMBER	INSTALLATION DATE
MODEL DETAILS	
DEALERS NAME	
DEALERS TELEPHONE NUMBER	

INTRODUCTION

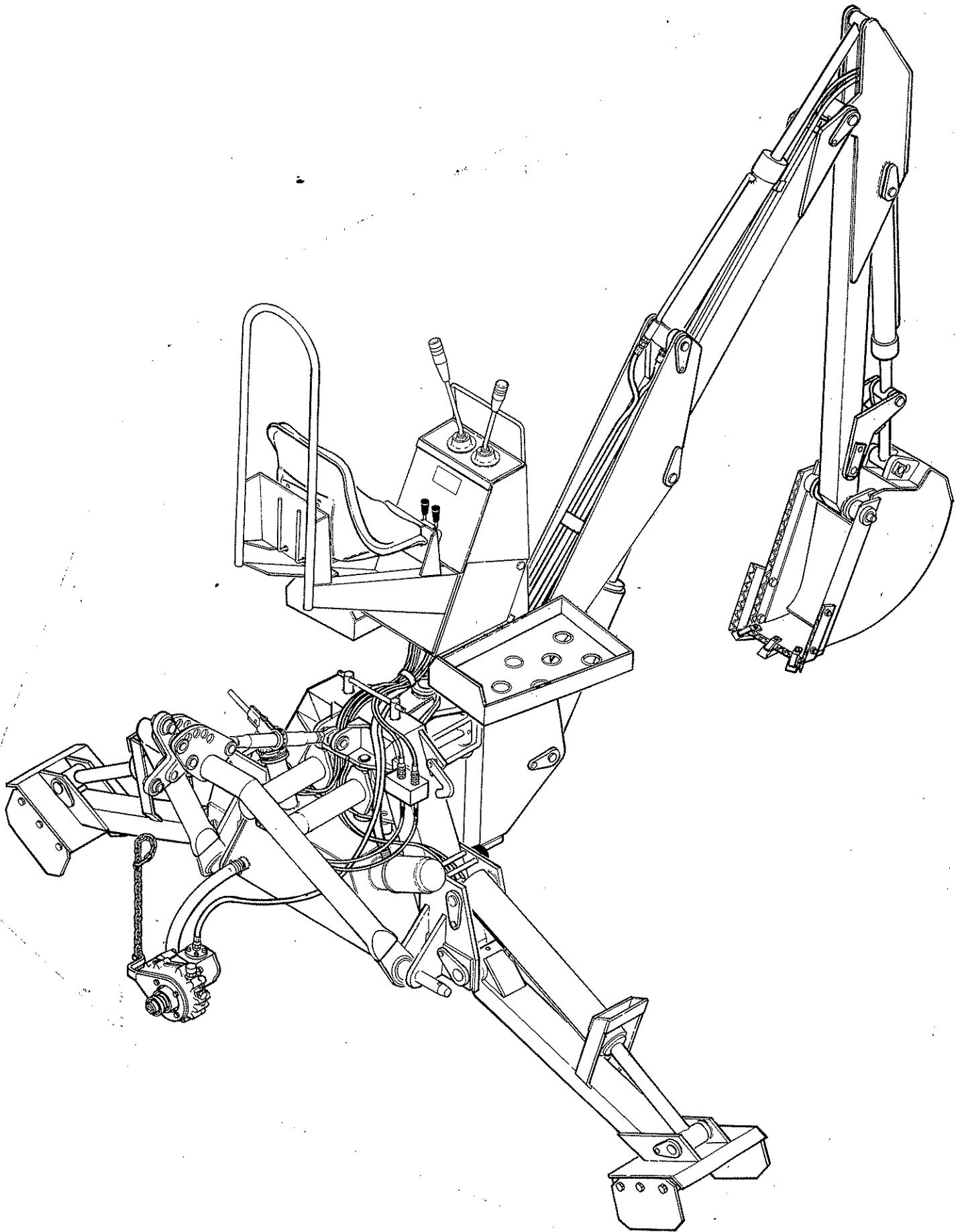
For all purposes the instruction book references to "Ditch King" can be taken to apply to both models unless otherwise stated.

The Ditch King can be supplied in two basic forms, either

- 1) Powered by tractors own hydraulics
- 2) Fully independent hydraulic powered by the tractor P.T.O. shaft.

In addition a comprehensive range of buckets and grabs are available which in conjunction with the basic options provides a specification that will fit a large selection of tractors and cope with a wide variation of farming requirements.

General view - DITCH KING



SAFETY PRECAUTIONS

DANGER



...

There are obvious and hidden potential hazards involved in the operation of this implement. Serious injury or death may occur unless care is taken to insure the safety of both the operator and any other persons in the area. **KEEP CLEAR**

The following is a list of some safeguards which should be followed. Serious injury or death may occur unless care is taken.

DANGER



...

This is a rear-mounted implement which removes weight from front wheels and can cause loss of steering with possible overturn. Add front end weight until 20% of tractor original weight is on front wheels when boom is in transport position for steering safety and prevention of bodily injury. Transport slowly on rough surface to prevent bouncing front wheels off surface with loss of steering and possible injury.

DANGER



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Always adjust tractor wheel widths for maximum stability.

WARNING



...

The operator and all support personnel should wear "Safety Shoes" and "Hard Hats" at all times.

WARNING



...

Never allow inexperienced or untrained personnel to operate the machine combination without supervision.

WARNING



...

Always read and understand the instruction manual first. If anything is unclear consult your dealer or Alamo direct.

WARNING



...

Always familiarise yourself with the controls in a clear area before commencing work.

DANGER



...

Always engage all transport devices fitted. See operator manual for details.

WARNING



...

Always familiarise yourself with the local highway regulations and abide by them at all times.

WARNING



...

Always use the correct pin in the tractors top hitch and use the special top hitch brackets where recommended.

DANGER



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The Backhoe changes the balance of the machine in transport. Be especially careful when transporting on slopes. Never turn uphill in transport except at very slow speed and a low rate of turn. Never transport or operate this machine on steep slopes. **BE CAREFUL**

WARNING



...

Always operate independent hydraulic machines at the recommended PTO speed. Never exceed the maximum permitted.

WARNING



...

When the bucket is swung to the side of the tractor it exerts a moment on the tractor causing the tractor to rock from side to side. Extreme care should be taken when operating on slopes. Bodily Harm or Death could result from tractor's tipping over.

WARNING



...

Avoid full reach and swinging a loaded bucket to the down hill side when operating on sidling ground.

WARNING



...

Never allow riders on the tractor. Never lift a person with the machine. **KEEP BYSTANDERS CLEAR**

WARNING



...

Inspect the entire machine periodically. Look for loose bolts, worn or broken parts, pinched hydraulic hoses, and leaky or loose fittings. Make sure all pins are secure. Serious injury may occur from not maintaining this machine in good working order.

DANGER



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Do not mount tractor when tractor is moving. Avoid serious injury or death from contact with the rotating tires. Mount and dismount the tractor only when it is completely stopped.

DANGER



...

Never grasp control levers when mounting the machine.

DANGER



...

Always take extreme care when working around overhead obstructions. When working close to overhead power lines consult your electric company for a safe code of operation.

DANGER



...











Always be sure of water, gas, sewer or electric line locations before operating the backhoe.

DANGER



...

Always take extreme care if it becomes necessary to operate the backhoe from a standing position.

- WARNING** ... Always lower legs and bucket to the ground and engage the slew lock when not in use.
- 
- DANGER** ... The Boom is designed only to position and operate the Bucket which is attached to it. Never attempt to lift, pull or push other objects with it. Serious injury could result from a structural failure when the Boom is used for purposes other than those for which it was designed.
- 
- DANGER** ... Never attach pulling devices to the rear of the backhoe for towing purposes as the unit can tip rearwards.
- 
- DANGER** ... Do not operate the machine with hydraulic oil leaking. Oil is expensive, and its presence could present a hazard. Do not check for leaks with your hand -use cardboard. High-pressure oil can penetrate the skin and cause **GANGRENE**. If oil does penetrate the skin, have it surgically removed at once by a surgeon knowledgeable in this procedure.
- 
- DANGER** ... Never become complacent and ignore any safety instructions.
- 
- WARNING** ... Always lower bucket and feet to the ground, and shut off the engine before dismounting from the unit.
- 
- WARNING** ... Always check all nuts, bolts, hoses and other fixings daily for tightness, security and damage. Repair immediately if required.
- 
- DANGER** ... Never interfere with factory set hydraulic calibrations as they are carefully calculated and any change could cause a breakage which may result in injury.
- 
- DANGER** ... Never walk or work under any raised boom or bucket. The Boom could fall and cause serious bodily injury or death. Always lower the boom and bucket flat on the ground or support the Boom and bucket on safety stands. Unload all hydraulic actuators prior to doing any maintenance. To do this, set the bucket on the ground, then kill the tractor engine. Push and pull the control levers in and out several times to remove pressure. Do not work under raised Boom or Bucket unless components are securely blocked up to prevent inadvertent dropping.
- 
- DANGER** ... Always read carefully and comply fully with the manufacturers
- 

instructions when handling oil, solvents, cleansers and any other chemical agent

DANGER



...

Always maintain the safety decals in good readable condition. If the decals become damaged or unreadable, reorder them immediately.

WARNING



...

Always store in a stable position with the slew lock and the lift ram tap engaged.

DANGER



...

In addition to the design and configuration of this implement, including Safety Signs and Safety Equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of the machine. Refer also to Safety Messages and operation instruction in each of the appropriate sections of the Tractor and Backhoe manuals. Pay close attention to the Safety Signs affixed to the Tractor and Backhoe.

Section 2

FITTING

Tractor Selection

Tractor lift capability.

The Ditch King weighs 700Kg (1540 lbs) in the tractor supply version and 750Kg (1650lbs) when in fully independent build.

The tractor selected should be capable of lifting and transporting the loads without exceeding the tractors all up weight, including front weights, as stipulated in the tractor manufacturers instruction manual.

Tractor relief valve setting

On both models the relief valve setting in the control valve is 2000PSI (140 Bar) therefore if operating from the tractor oil supply the tractors relief valve setting must be at least a little above this figure to give satisfactory operation.

Where the Ditch Kings hydraulics are fully independent the tractor relief valve setting is not a factor to consider.

Oil Flow

The best digger operation is obtained at 4.5gpm 20l/p.m oil flow. The tractor selected should be capable of producing this oil flow rate without excessive engine speed.

Linkage isolation

Although it may be possible to operate the tractor supply model without linkage isolation, a severe strain would be put upon the attachment yoke and pins. Most modern tractors are equipped with a ready means of providing linkage isolation, through a conveniently operated valve. For tractors without this facility a linkage isolation valve is necessary and is available from F.W. McConnel. Linkage isolation is not required on the fully independent machine and the tractors hydraulic controls should be neutralized.

CHECK CHAINS/STABILIZER BARS

IT IS ESSENTIAL THAT ADJUSTABLE CHECK CHAIN AND/OR STABILIZER BARS ARE AVAILABLE AND THEY ARE IN GOOD CONDITION.

Tractor Preparation

Ballast

For increased stability wheels should be spaced out as far as is practicable and additional front end weight added to the tractor

Draft Control

Wherever possible the top link should be attached to a fixed or "dead pin" position on the tractor. The draft control rocker should be locked and/or the tractor hydraulic controls should be positioned to zero draft/minimum response to prevent as far as possible the operation of the draft control mechanism while working.

On certain tractors where there is no provision for locking or neutralizing the top hitch point F.W. McConnel have designed special brackets which when fitted provide alternative top hitch mounting points. Check with your dealer if in doubt.

Tractor	Bracket Part No.	Refer to the following sheet for fitting.
FORD 3000,3600,3610,333	71 15 370	I.S. 139
MASSEY FERGUSON 65,135,240,550,20,35. MASSEY FERGUSON 148,158,165,175,178,185,188, 250,265,275,285,290,565,575, 590,595,675,690,698,699,1080.	71 15 372 71 15 375	I.S. 135 I.S. 136
CASE/D BROWN 990,995,996,1200,1210,1212, 1410,1412,1290,1390,1490, 1690	71 15 374	I.S. 133
LEYLAND/NUFFIELD/ 245,253,255,260,270,272,282, 344,384,472,482 MARSHALL 802 LEYLAND/NUFFIELD 2 SPEED P.T.O. MARSHALL 804	68 02 283 plus associated clamps, bolts fittings etc. 68.02.286 plus associated clamps, bolts, fittings etc.	See Tractor Fittings Book. See Tractor fittings book.

Draft control mechanisms which rely on bottom link sensing do not affect the fitting or operation of a Ditch King therefore no special tractor modifications are required.

Tractor Drop Arms

Adjust the tractor drop arms so that the ball ends are both the same height from the ground. Because of the great variation in makes and models of tractors no figures can be given but the draft links should be adjusted as low as possible whilst still maintaining adequate thread engagement.

John Deere .

The John Deere utilises a 'closed centre' hydraulic principle and because of this it is considered unsuitable to operate a Ditch King from the tractor supply. The fully independent model is therefore recommended for these tractors.

European build tractors .

The tractors top link pin is a loose fit in a Cat II link end. Use sleeve 71 15 222. In some circumstances grind 1/32" off the ball width to enable the link to be fitted in the tractor casing.

U.S.A. build tractors.

Use Pin 71 15 165 and bushes 71 15 164 for top hitch mounting refer to instruction supplement 138.

Tractor Oil

For machines working off the tractors own hydraulic supply check that the oil is in good condition and change if necessary according to the tractor manufacturers specifications.

Initial Fitting of Ditch King to Tractor

The Ditch King will be delivered with the arms folded and secured by packing stays, the yoke wired up and the ratchet top link wired on separately.

Fitting to the tractor can easily be carried out by a single person.

- 1) Independent only - Fill hydraulic tank with 7 galls of oil slected from the following table.

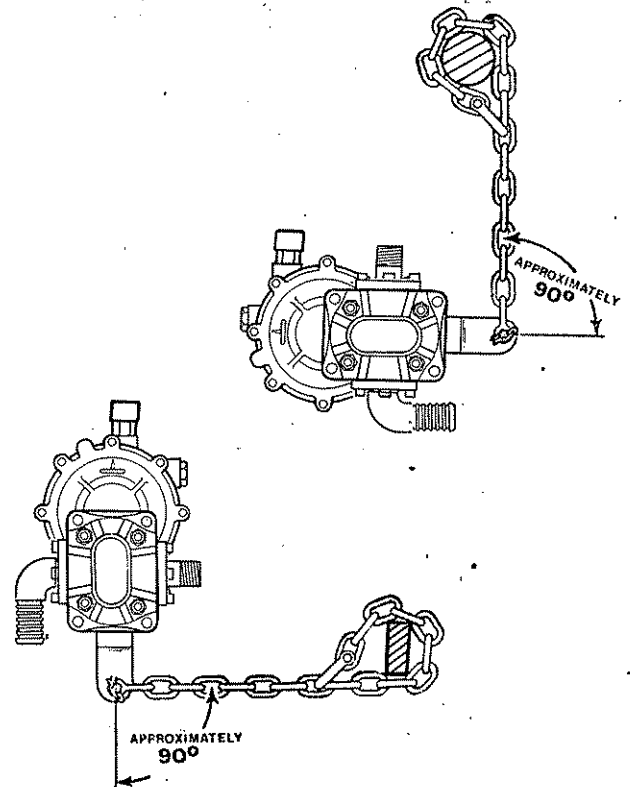
Supplier	Cold or temperate climate	Hot climate.
Castrol	Agricastrol hydraulic oil Hy-spin AWS32	Hy-spin AWS68
Shell	Tellus 27	Tellus 33
Mobil	D.T.E. 25	D.T.E.26
Esso	Nuto 'H' or 'A' 32	Nuto 'H' or 'A' 68

- 2) With tractor linkage in position control and with the draft links fully lowered reverse the tractor up to the digger and:-

Independent Only

Check that the P.T.O. gearbox contains oil. Its capacity is 1/4 pint (150mls) of EP90 gear oil. Fit the gearbox pump unit to the tractors P.T.O. shaft ensuring that the spring loaded locking collar is fully engaged. The gearbox may be mounted vertically or on its side. In either position chosen, the breather must be positioned at the top and for this reason the sight level plug and the breather assembly can be interchanged.

Secure the torque chain so that the angle is approximately 90° to the torque arm and is in lateral alignment. A suitable anchor- age point for the torque chain is around the bottom of the drop arm or draft link.

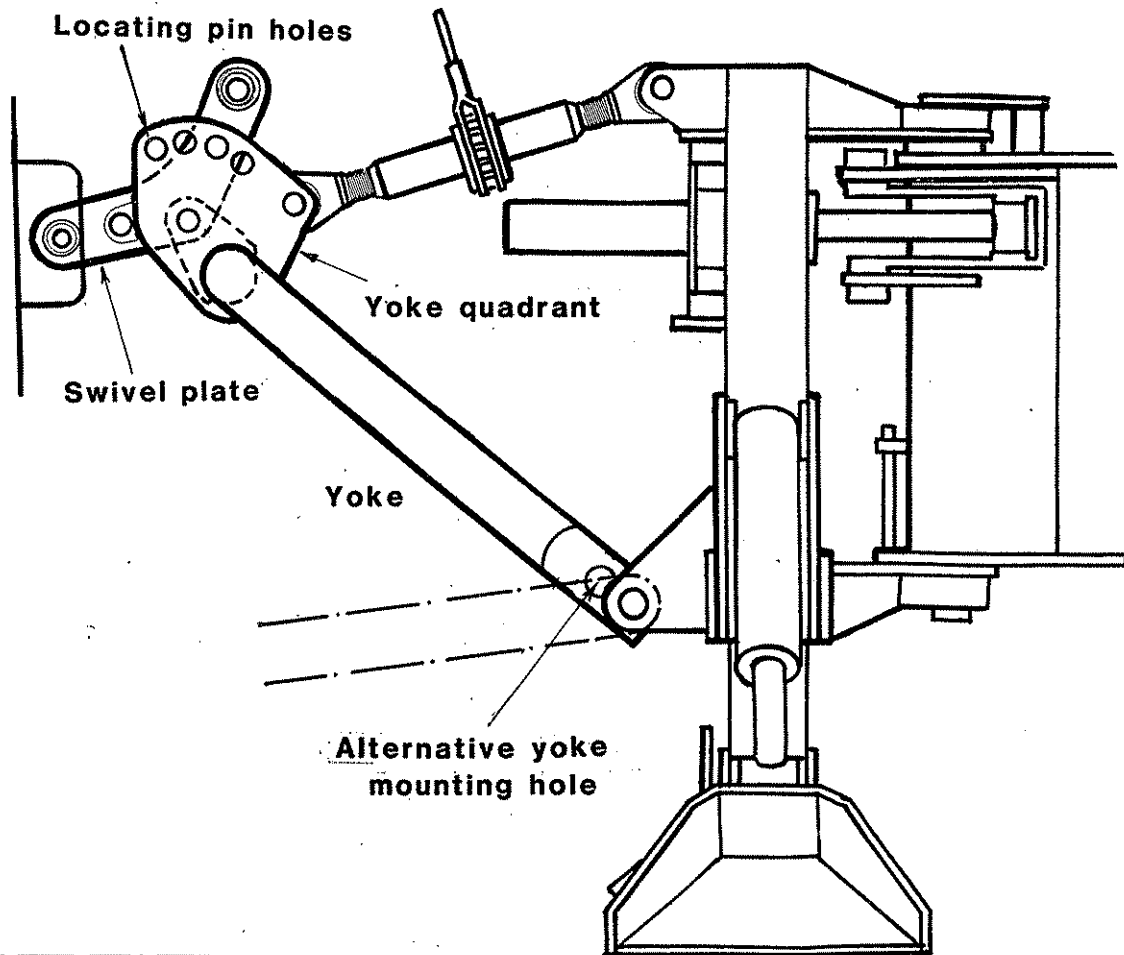


CAUTION:

The torque arm should not be allowed to rest against the drawbar otherwise damage may be caused to the drive splines of the tractor P.T.O shaft as well as the internal splines of the gearbox.

Tractor Supply.

If tractor is fitted with auxilliary valve couple up the supply and return hoses to the connections. If not couple up supply to the trailer pipe connection and return to either the gearbox or transmission casing according to tractor manufacturers instructions.



WARNING

To carry out some instructions during fitting to the tractor it will be necessary for the hydraulics to be operational. When each of these instructions is completed always switch off the tractor before continuing with the fitting procedure.

3) Start tractor and, for:-

Independent - Engage P.T.O. drive and allow the pump to work under a no load condition i.e., with operating controls in neutral for several minutes with tractor engine at high idle.

Tractor supply - Switch on external oil supply and allow to circulate for a few minutes.

- 4) Release the leg latches. Operate both legs simultaneously and lower feet until the draft link jaws are raised level with the link ball ends.
- 5) Reverse tractor and connect the draft links. It may be necessary to reverse the draft link pins.
- 6) Unscrew the lift ram tap and remove the packing straps from the main arm and discard.
- 7) Select Lift-down and by pushing down with the main arm, pivot the main frame about the bottom link pins until it is upright.

- 8) Using the leg controls simultaneously select down. In this manner raise the main frame until the underside is approximately 15" clear of the ground.
- 9) Release the yoke, allow it to swing forward gently until it rests against the rear of the tractor.
- 10) Check the top hitch fitting in Cat I - Cat II double ended yoke swivel plate; it may be necessary to reverse it. Note - It is turned round and not turned over.
- 11) Disconnect the swing lock and use the swing rams if necessary to centralise the yoke swivel plate between the tractor top link jaws. Fit top hitch pin. Do not fit swivel plate locating pin at this stage. It may be found on certain tractors with either short draft links or low top hitch points that the swivel plate will not fit between the tractor top link mounting jaws. In these cases the yoke should be pinned through the alternative mounting hole in the yoke leg as indicated on the diagram.
- 12) Check that the machine is approx. upright. Offer up and fit the ratchet link between the central lugs on the main frame and the rearmost hole in the yoke quadrant. On some tractors it may be found that the top link at its shortest is too long. In this instance fit the link between the alternative offset lugs on the main frame and the yoke cross bar. Only use these alternative mounting points if absolutely necessary.
- 13) Operate the leg rams simultaneously and bring the locating hole in the yoke swivel plate in line with the nearest one in the yoke quadrant. Fit the locating pin.
- 14) If necessary adjust the top link to bring the machine level.
- 15) Remove the dipper arm packing strap and discard. Raise the main arm allowing the dipper to pivot around; extend the reach ram and connect up the rod end.
- 16) Raise the legs and with the tractor standing on level ground centralise the machine by check chains or stabilizer bar adjustment. Tighten up to prevent sidesway.
- 17) Operate machine throughout its work cycle to purge all air from the system. Check that no hoses are being trapped, frayed, kinked or stretched in any way.
- 18) Ensure all transport locks are in place before proceeding to the work site.

Removal from Tractor

- 1) Select a firm level site for parking the machine.
- 2) Lower the feet to the ground to take the weight off the linkage and support at this height with chocs under the frame to prevent any sinkage.
- 3) With the arms directly to the rear extend the reach arm about half way and lower the bucket to the ground.
- 4) Check that the slew lock pin is engaged and the lift ram tap is screwed in.
- 5) Either, - for independent hydraulics, disengage the tractors P.T.O. and remove the pump and gearbox or, for tractor supply models, de-select the tractors external hydraulic supply and disconnect the supply and return hoses and blank.
- 6) Disconnect stabilizer bars or loosen check chains as applicable.
- 7) Disconnect the yoke swivel plate from the tractors top hitch point: Remove the tractor draft links and drive forward.

Storage

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

If the machine has to be stored outside tie a piece of canvas or tarpaulin over the control assembly - do not use a plastic bag - this could lead to rapid corrosion.

In addition the seat can be pivoted forward to cover the operating levers.

Use hoses to suspend pump and gearbox clear of the ground.

Subsequent attachment

With the machine parked at the correct height subsequent attachment is merely a matter of reversing the tractor and coupling up.

Section 3

OPERATION

SAFETY

Before commencing operation read this manual carefully paying particular attention to aspects relating to safety. THEY ARE THERE FOR YOUR OWN GOOD.

Machine Controls.

The main controls of the the Ditch King i.e., for lift, bucket, reach and slew are operated by two joystick control levers each lever controlling a pair of functions either individually or in unison. The lever knobs are colour coded according to function, green and yellow, control lift and bucket operation, black and red the reach and slew.

The secondary controls which protrude through the front of the control console consist of two levers each of which individually controls its respective hydraulic leg.

Tractor Setting

Position machine on site and lower legs to the ground. Leave "Position Control" or quadrant lever in the lowered position and select zero or minimum draft.

In an open space practise with the machine until familiar with the controls and the machine can be operated fluently.

Independent.

Engage P.T.O drive and set tractor engine rpm. to give approximately 300rpm at the P.T.O. shaft. As the operator becomes familiar with the machine operation this figure can safely be increased to a maximum of 360 rpm. Do not exceed this figure.

Tractor Supply

The tractor engine should be run at no higher a speed than is necessary to provide the digger with the 4 Gpm of hydraulic oil flow which is sufficient for operation. Increasing the flow does not increase machine performance but merely causes the oil to overheat thus decreasing its working life.

Machine Sideways levelling

At all times keep all four wheels of the tractor on the ground for maximum stability and to keep loads on the linkage to a minimum. Levelling is limited by the amount of free movement in the tractors linkage and is achieved by use of the hydraulic legs. It may be necessary to first loosen and then retighten the check chains to carry out this adjustment.

On some tractors facility is provided for the drop links to operate in a floating position. If available the Ditch King should be operated in this mode. Where this facility is not available it must be born in mind the tractor drop links are not normally expected to cope with compression loads and, therefore, for tractors fitted with lighter, rod type drop links it is a wise precaution, to prevent possible damage, to operate the Ditch King with one drop link removed completely. When operating witheither floating drop links or with one drop link removed it can be expected that the machine will lean to one side during transport.

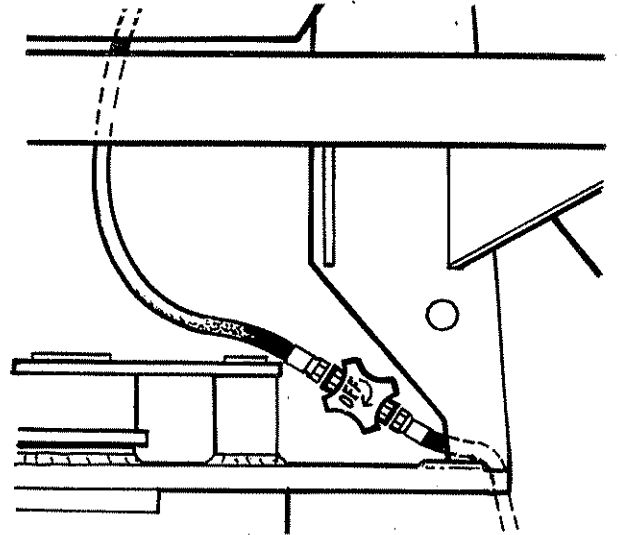
Transport.

The Ditch King is fitted with three separate transport locks which will, when engaged, prevent any movement of the arms caused either by creep or by inadvertent operation of the control handles.

The locks should be engaged at all times during machine transport, particularly on the highway and also, with the exception of the leg latches, when the machine has been parked and removed from the tractor.

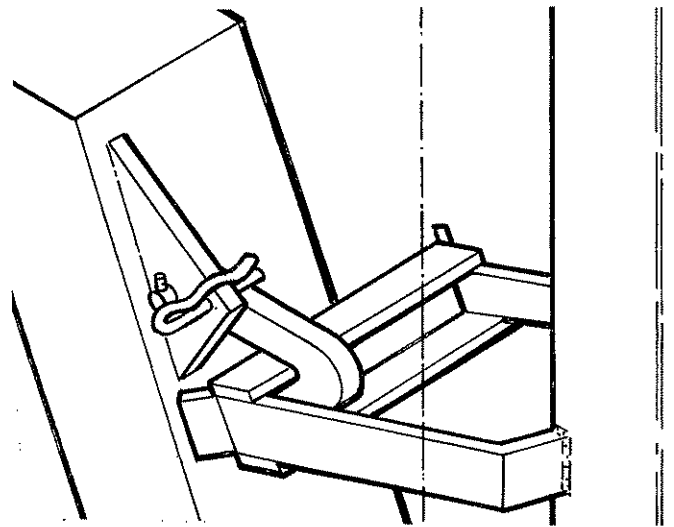
Lift ram tap

Located on the left hand side of the control console just below the foot plate the locking tap is inserted into the hydraulic supply to the base end of the lift ram for the Ditch King and to the gland end of the lift ram for the Ditch Boss. The tap should be fully screwed in to prevent the arm from creeping or falling to the floor if the lever is accidentally touched.



Leg Latches

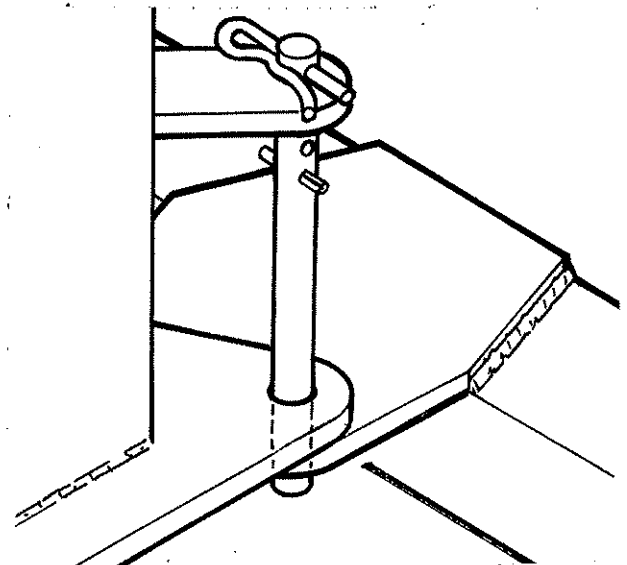
Located towards the shoulders of the main frame the latches are merely two metal hooks which when in place hook over the steps on the hydraulic legs and secure them in the vertical position. The 'R' clip, which is fitted through a hole in the latch mounting lug either holds the latch down when in transport or up when working.



Slew Lock

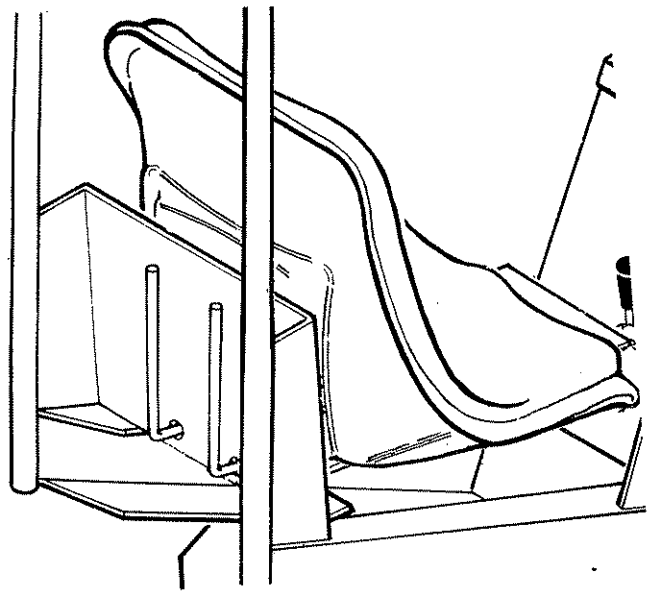
Consists of a vertical pin which, when engaged connects the slew column to the main frame and locks it in the rearward position thus preventing accidental slewing or "creeping" of the column.

To engage, centralise the slew column, remove the 'R' clip from the locking pin and allow it to locate in the hole in the main frame. To disengage the locking pin is held up and secured by repositioning the 'R' clip through the hole directly above the spring cotter.



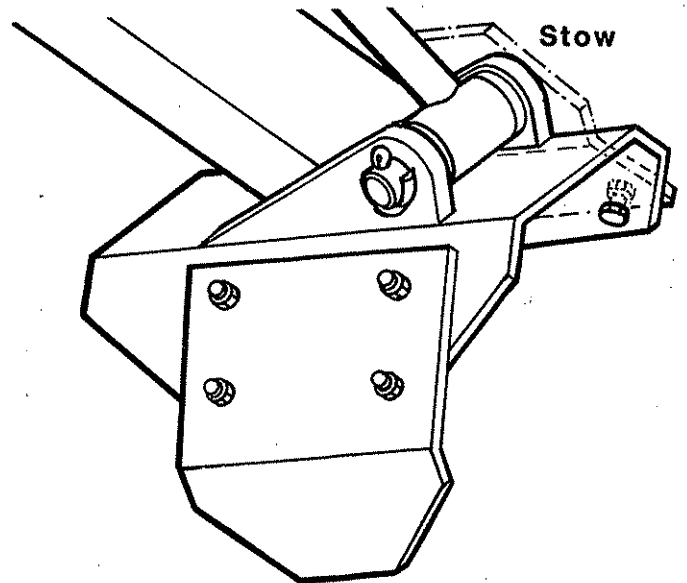
Leg Ram Remote Control

When commencing work on sloping ground provision is made by two rods situated behind the digger seat to operate the leg rams by remote control from the tractor seat. This allows the operator to lower the legs down to the work position whilst still in the cab thus minimising the mounting and dismounting of the tractor. Should the levers be out of reach it is permissible to bend the actuating rods towards the tractor until this problem is overcome.



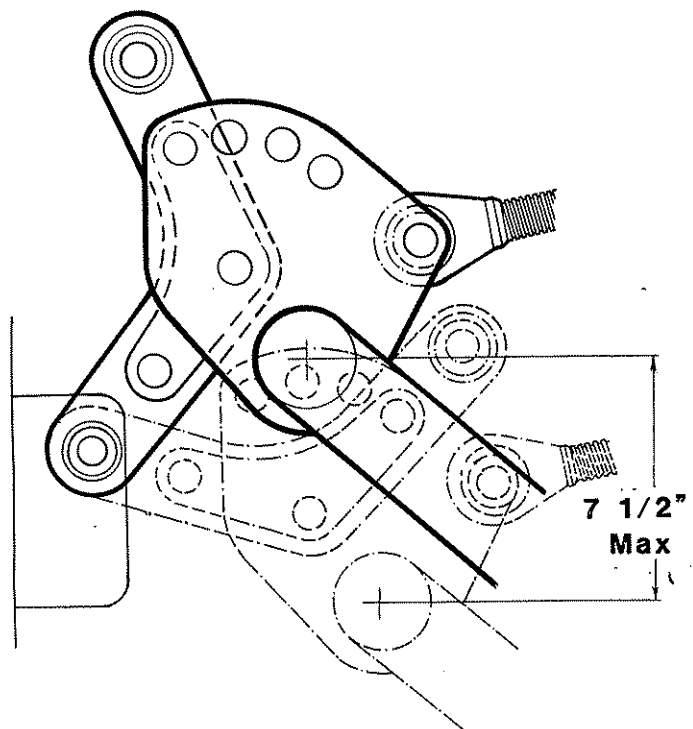
Foot Sprags

Supplied as standard equipment and stowed upside down on the tractor side of the foot the sprags can be bolted in position on the rear of the foot to provide additional anchorage for the machine. This is especially useful when trenching directly to the rear when the action of the bucket will tend to drag the tractor and machine backwards.



Working Level

The fitting geometry of the yoke quadrant and swivel plate on certain tractors will allow the operating height of the machine to be raised or lowered giving up to a maximum of 7 1/2 inches of extra height or depth. This is achieved by removing the swivel plate locating pin and, by operating the legs simultaneously, bring the locating hole in line with an alternative hole in the yoke quadrant. Replace the locating pin and if necessary adjust the top ratchet link to level the machine. In this way the height of the digger frame can be raised or lowered in relation to the tractor's top hitch. This adjustment is a spin-off from the fitting design geometry and the amount of adjustment is variable depending on the tractor. On some tractors where it is found that there is only one possible fitting position there will not be any height adjustment possible.



Ratchet top link.

The ratchet top link can be used as an operational adjustment to level the machine frame fore and aft when working on sloping ground.

WARNING

The threaded link ends have a ringed groove cut into the thread about 62mm (2 1/2") from the end. To ensure adequate thread engagement during operation do not expose these grooves.

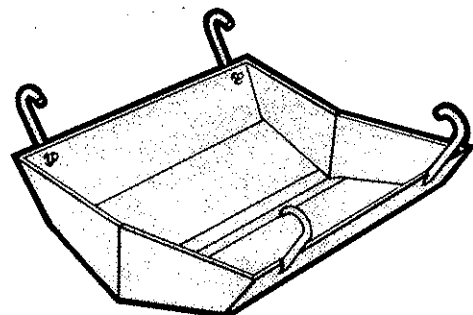
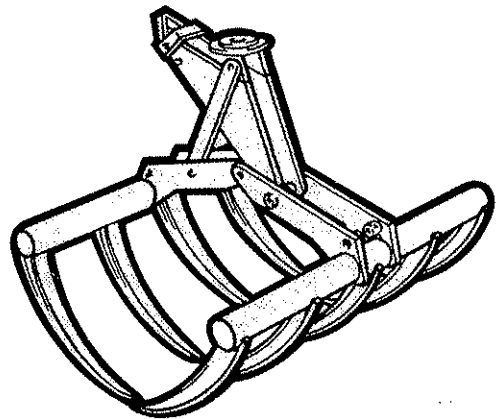
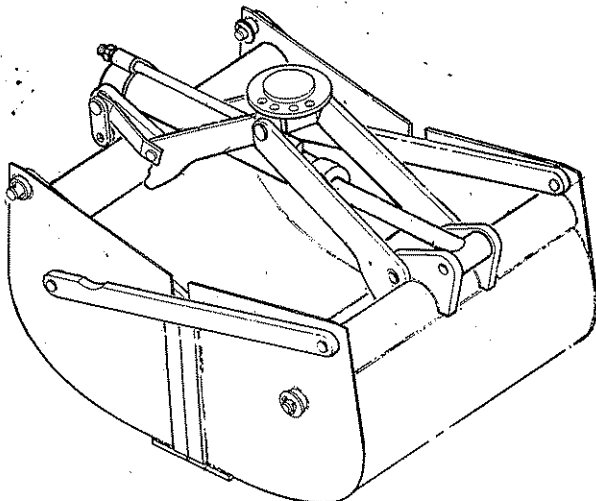
Grab Loading (Optional extra - Ditch King only)

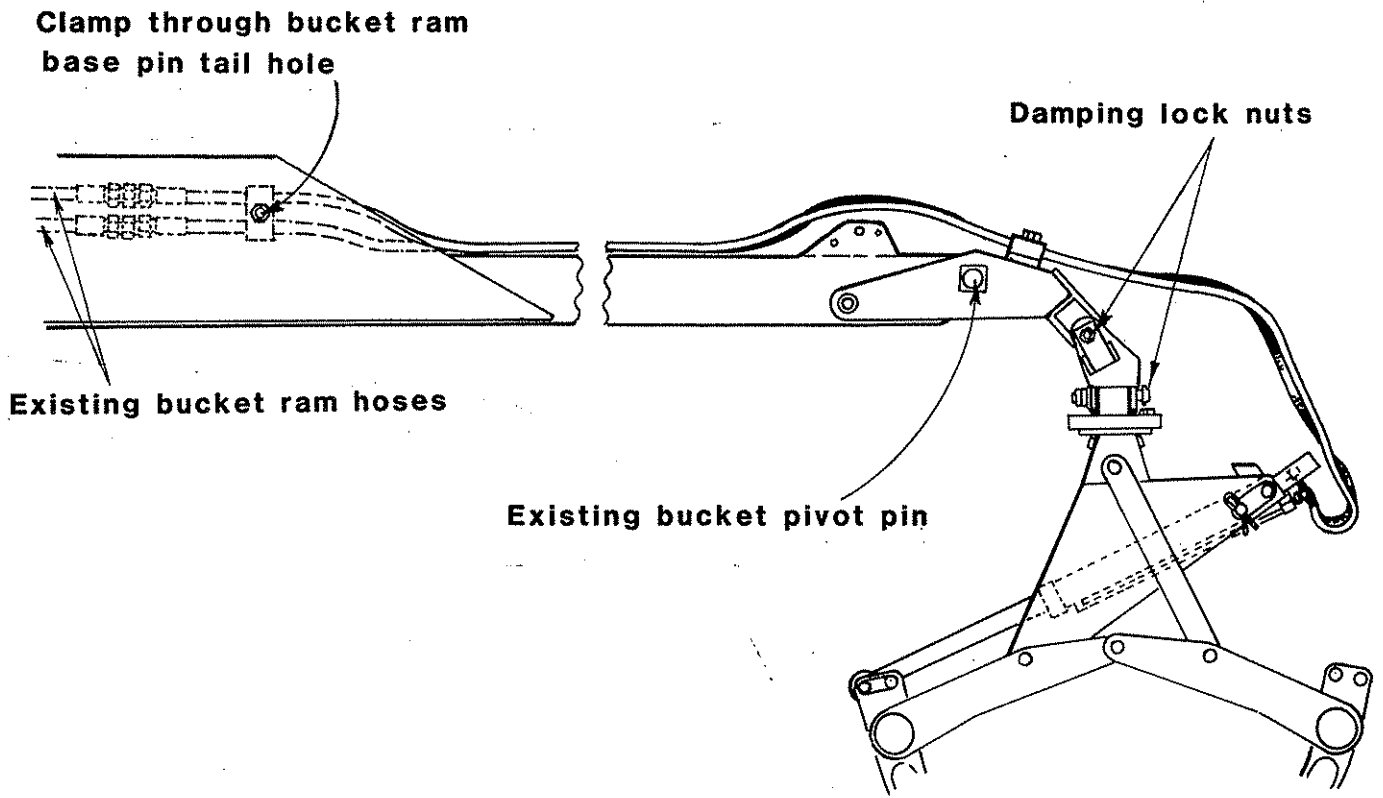
There are two types of grab currently available for the Ditch King which are capable of loading between a height of 9ft and a depth of 11ft.

A tined manure grab which, in addition, can be fitted with slurry plates as an optional extra.

An enclosed bulk grab of 6 cu.ft (0.17 cu.metre) capacity which is suitable for lime or other ballast.

The grab is suspended by a knuckle which incorporates friction dampers in both planes to prevent excessive swinging. Damping is increased by tightening the locknuts. Do not allow oil or grease to penetrate the friction sleeves. The swivel rings are equipped with a rotation limiting device so that the hoses are not damaged by twisting and in addition the grab can be held in one of four fixed positions by locating a pin through the swivel plate which engages with a series of holes in the head plate of the grab suspension frame.





Fitting

Remove the bucket, radius arm and slave link from the Ditch King.

The dipper arm extension is fitted using the pin supplied and the existing bucket pivot pin.

Fit the knuckle/damper assembly to the head of the grab and secure with the clamp

To ensure the grab is fitted in the correct position the grab ram should be in line with the dipper, with the base end outboard as shown.

Position the dipper arm boss as closely as possible in alignment above the knuckle.

Stop the tractor engine to minimise oil loss. Disconnect and remove the bucket ram.

Connect the hoses to the existing bucket hoses and the grab ram as shown in diagram. Fit the friction sleeves into the dipper boss and lower into the jaws of the knuckle and attach using the tapered pins, nuts, bolts and washers.

Clamp hoses in position on top of the dipper extension and through the bucket ram base pin tail hole.

Check the arc of rotation to ensure the base end of the grab ram cannot get directly beneath the dipper arm.

Check the full range of machine movement for adequate clearance around the tractor cab.

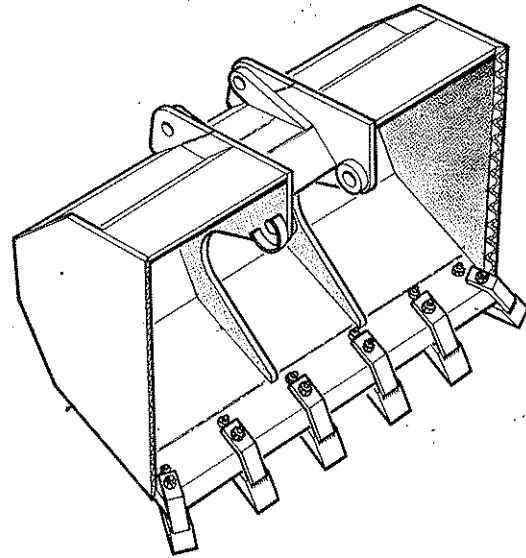
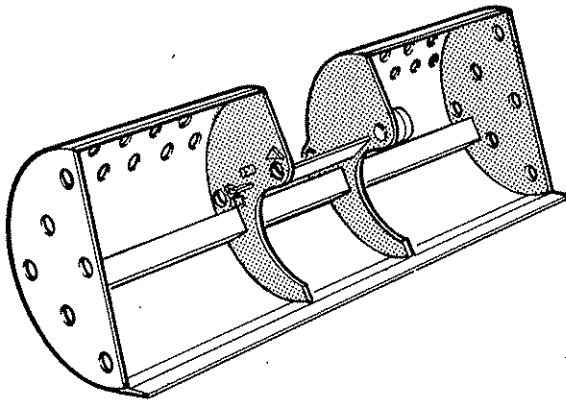
For manure grabs check that the rod end of the grab ram is in the outer hole of the tine frame.

Buckets.

There are four ranges of bucket currently available for use with the Ditch King.

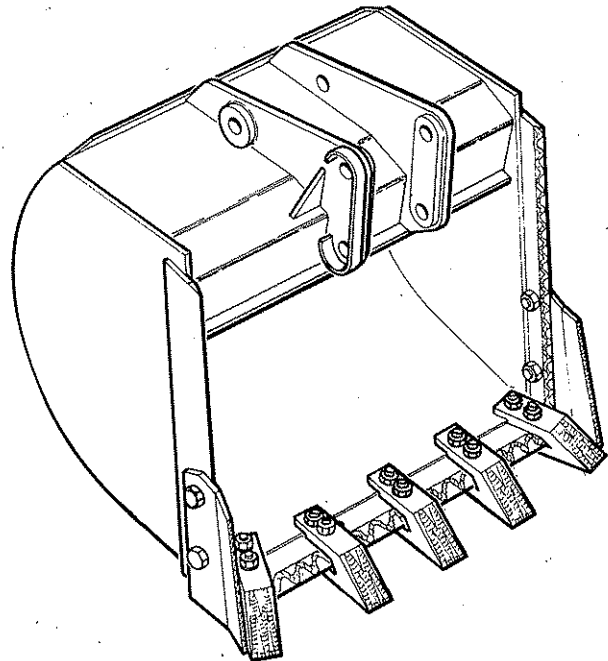
i) Ditching Bucket

Two types of ditching bucket are available and can be classified as ditch digging and ditch cleaning models. The basic difference is that the ditch digging bucket is fitted with teeth while the ditch cleaning bucket has an unobstructed leading edge and a perforated back for water drainage.



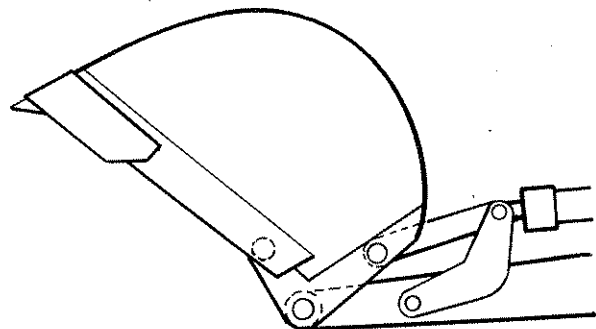
ii) Excavating Bucket

Classified as heavy duty digging buckets with hard faced reinforced teeth. These buckets have alternative mounting pivots for 'square-hole' action although some loss of power must be expected when used in this geometry.



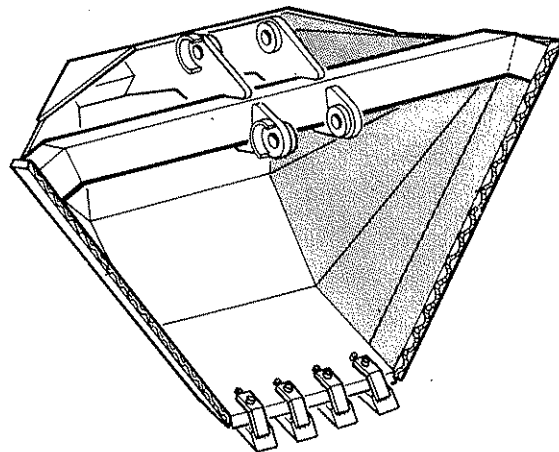
Square hole geometry

Where it is desired to form a vertical face as in the digging of a straight sided pit, the bucket may be hinged in the upper pivot position to give square hole action. Slight loss of power must be expected from this geometry as well as a limitation to the fully closed position of the bucket.



iii) 'Vee' Bucket

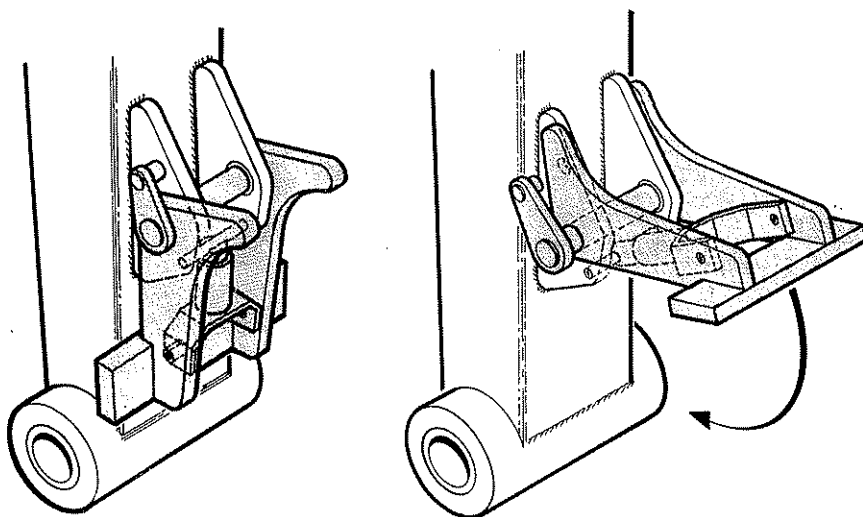
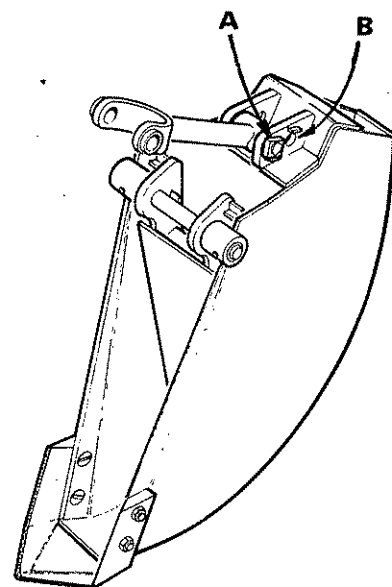
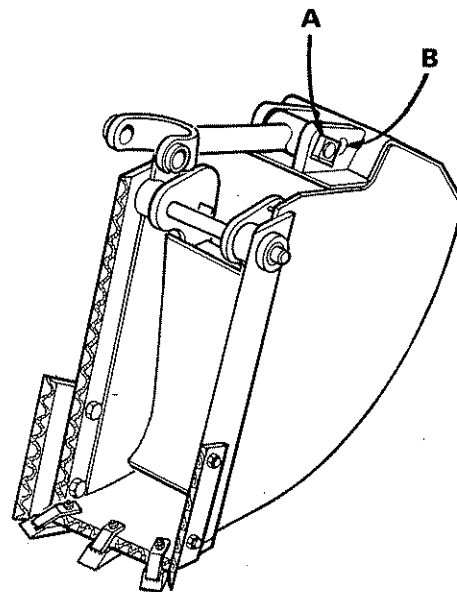
This bucket can be used for cutting a new ditch in light sandy soils. When operating a 'vee' bucket both sides as well as the bottom cutting edge are continuously in work as the ditch deepens and for this reason the power requirement is greater than for normal operation with a bucket having vertical sides.



iv) Trenching Ejector Bucket

The bucket has two positions in which the slave link can be mounted. Used in position 'A' the bucket closes to a greater angle for loading purposes. Position 'B' should be used for normal trenching where the spoil is placed alongside the trench.

If difficulty is found in mounting the ejector latch to the back of the dipper arm, do not fully engage the mounting pin. This allows the latch to be swung outwards and the sprung plunger to be located against the dowel. The latch can now be swung back into position and the mounting pin fully engaged and secured. Install the bucket on the end of the dipper arm using the special pins supplied with the bucket. Also use the special slave link supplied in place of the standard link.



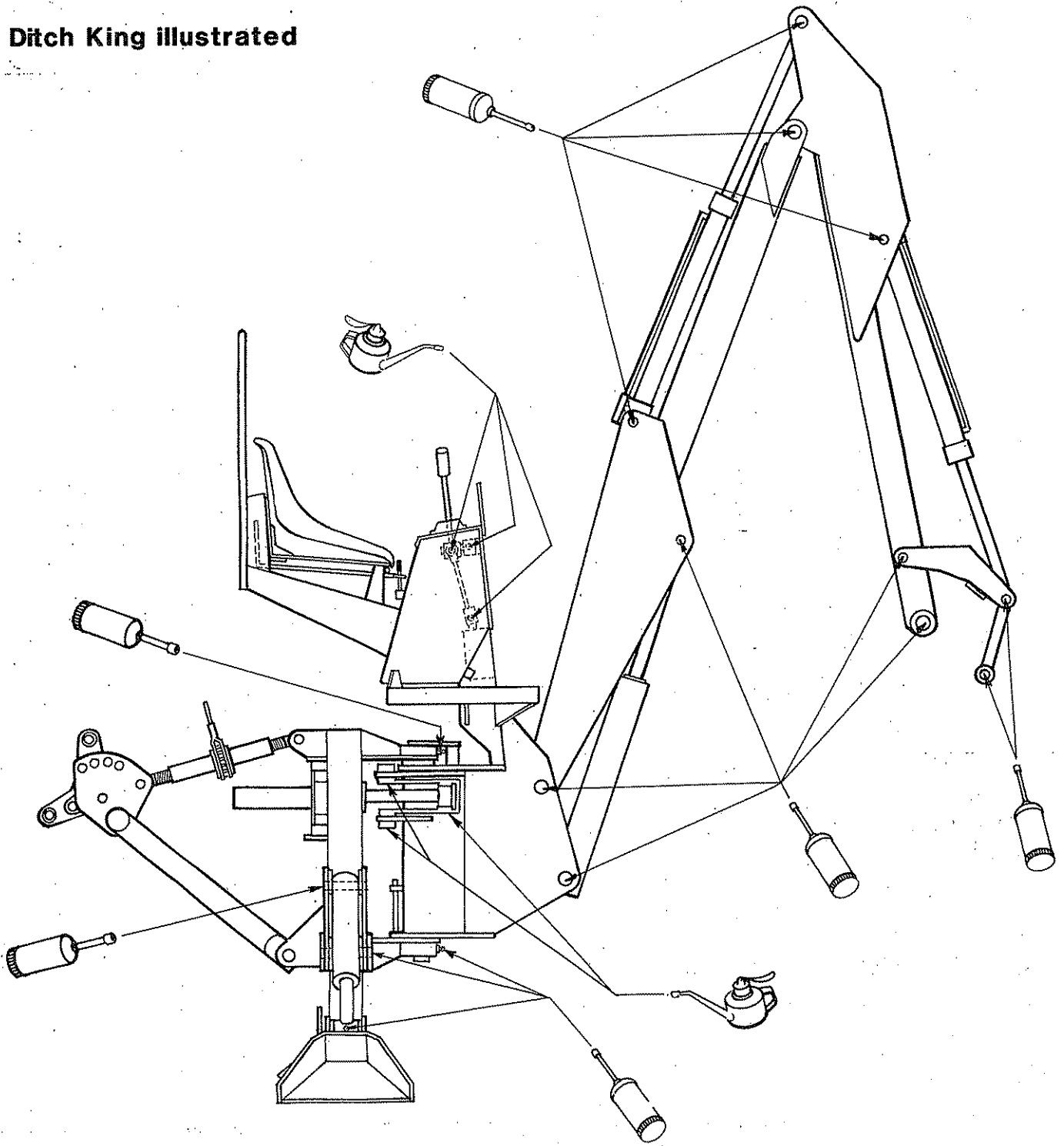
Bucket attachment

All buckets other than ejector buckets use the same two pivot pins to attach to the dipper arm and slave link. To fit, place bucket on ground and lower dipper arm end into position between the pivot plates and fit bucket pivot pin. Lift bucket clear of ground, adjust stroke of bucket ram and fit the slave link pivot pin. Ensure that the flats on both pin heads rest against the welded abutment to prevent the pins from turning within the bucket and secure with linch pins.

Section 4

MAINTENANCE

Ditch King illustrated



**grease
daily**



Independent Supply

The capacity of the oil reservoir when filled to its correct level halfway up the sight tube is 32 litres (7 gallons). Do not overfill.

Within the reservoir is a suction strainer which should be cleaned annually. The cover plate must be removed to gain access and should be re-jointed by a silicone based non-hardening gasket compound when re-fitting. The strainer does not have a by-pass thus the pump is completely protected from dirt. A choked suction element will cause poor operation, i.e., spongy and intermittent movement of the arms. Some pump noise may be noticed particularly with cold oil. If at any time these symptoms develop, the strainer should be removed and washed, preferably in clean diesel fuel.

A return line canister type filter is directly attached to the top of the reservoir. It is recommended that this filter is changed after the first fifty hours use and thereafter, annually.

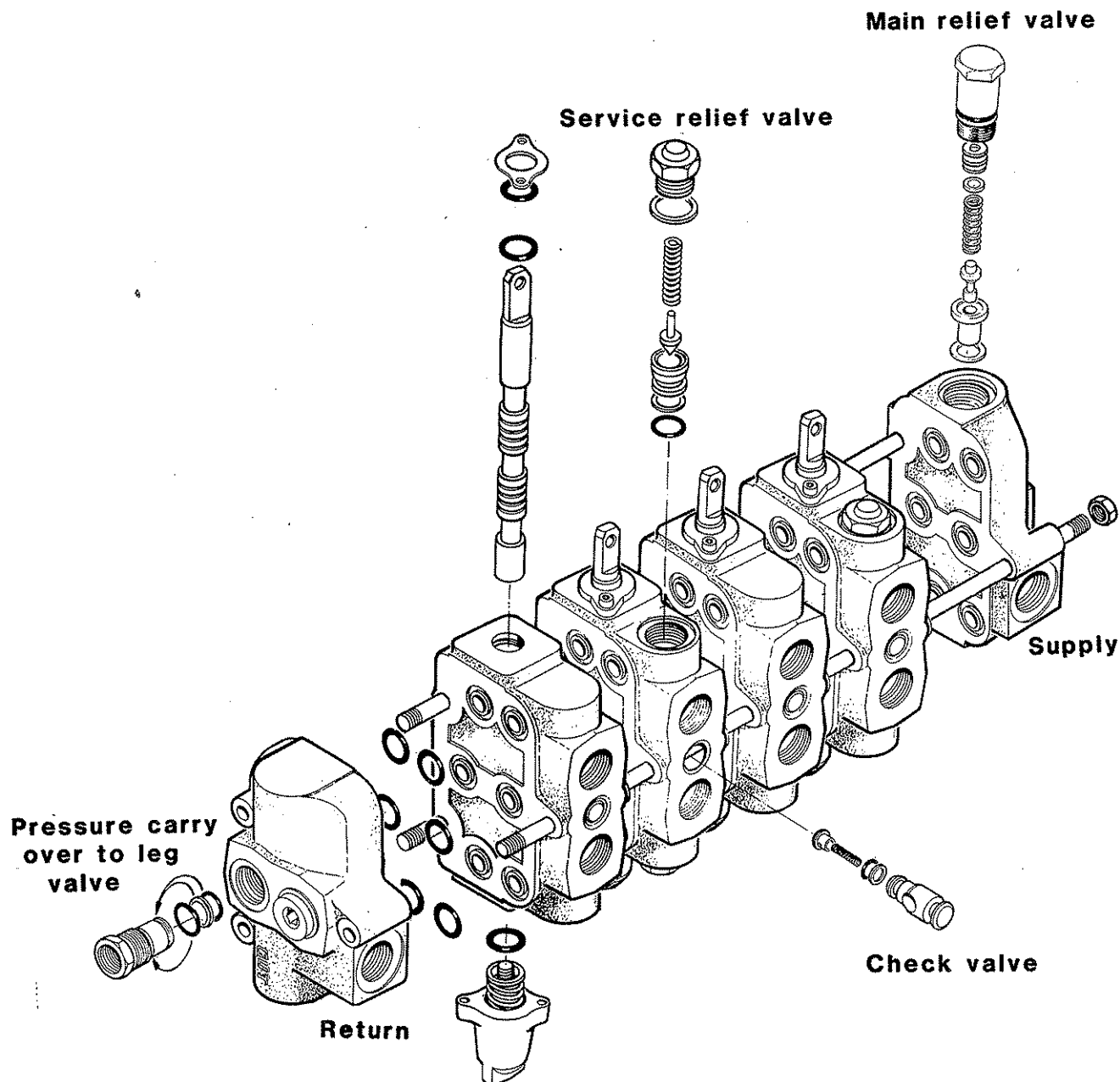
The wide range of temperature change that occurs within the reservoir causes condensation to form. Provision is made at the base of the reservoir to drain off any accumulated water and sediment. Moisture that becomes emulsified in the oil cannot be trapped by the filter, and eventually the oil itself breaks down through use, oxidation and condensation. It is recommended therefore, that the oil in the reservoir is changed at 1000 hour intervals or every two years, whichever occurs first.

Tractor supply

For machines operating off the tractor supply system, 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 supplied by the tractor manufacturer. Oil filtration is taken care of by the tractor's own filtration system. The manufacturer's recommendations should be followed.

Oil contamination can be reduced further by:-

- i) Carrying out all hydraulic servicing in clean dust free surroundings.
- ii) Cleaning off around tractor filler or reservoir cap before removal.
- iii) Using clean containers.



Main Armhead Control Valve

The valvoil control valve operates on an open-centre principle, each of the four banks are double acting and are controlled by rocking levers enabling two services to be operated simultaneously from one lever movement. The complete system is protected by a main relief valve and further protection to the individual services from locked line pressures is given by service relief valves.

Servicing and overhaul of the valvoil valve is restricted to the renewal of 'O' rings and seals, or the replacement of a complete section. The spools are differently designed specifically for their individual functions and cannot therefore be interchanged.

Before commencing any servicing of the valve the tractor engine should be turned off.

Access is gained to either remove the valve, or carry out any maintenance in situ by tilting the console fully about its mounting pivot bolts and securing in position.

Servicing of the valve is dealt with in six parts:-

Section renewal

To replace a valve section or the 'O' rings between them, it is necessary to remove the complete valve assembly from the machine. Mark each section to identify for correct re-assembly before releasing the tie rod nuts. Ensure all section faces are clean and 'O' rings correctly positioned in their grooves, held in place by a light smear of grease.

The plugs located between the service ports which are check valve housings should not be disturbed. One of the assembly tie-rods passes through them.

Replace the three nuts of the tie-rods finger tight and then place the valve assembly horizontally on a flat surface to align the sections before finally tightening the nuts evenly to a torque of 25 lbs/ft. Uneven or overtightening will cause distortion and the spools to stick when at operating temperature.

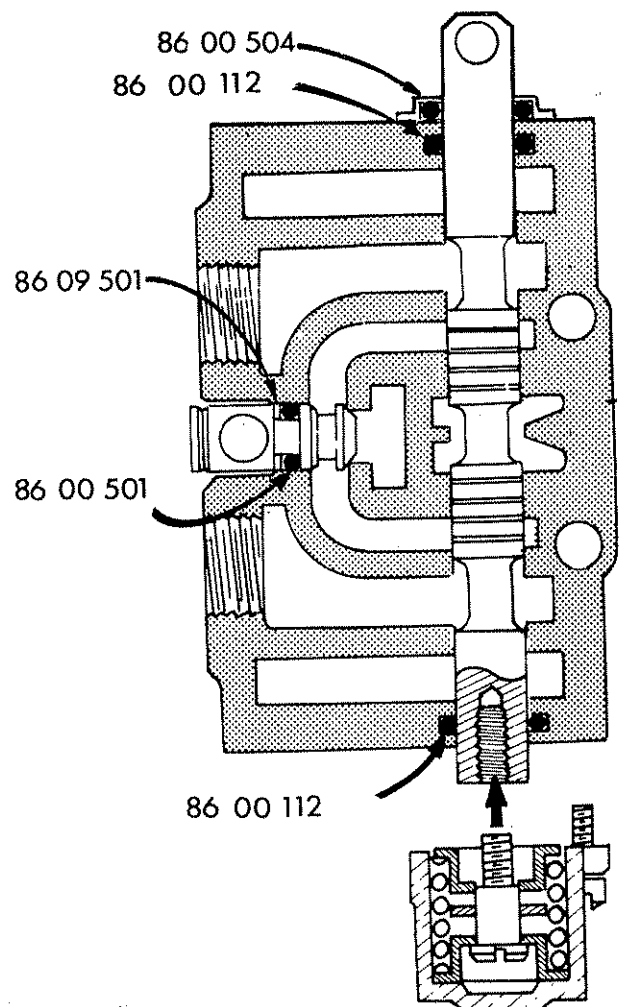
Servicing valve sections

Renewal of the spool 'O' rings can be conveniently carried out with the valve in position in the console. Grooves within the spool bore house the 'O' rings which are easily damaged unless the following method is adopted when renewing.

- i) Remove the two screws which hold the spring housing.
- ii) Undo the retaining screw that holds the spring to the spool.
- iii) Release the operating rod from the top of the spool and after removing the two screws, lift off the wiper seal with its housing.
- iv) Gently rotate and move the spool towards the lever end just sufficiently to expose the 'O' ring at the spring end. Remove the 'O' ring. Do not replace it at this stage.

Note: If the spool is moved too far it can chop fragments off the 'O' ring at the lever end which can then circulate inside the valve block and cause further trouble.

- v) Move the spool down through the spring end to expose the 'O' ring within the bore at the top. Remove and renew this 'O' ring.
- vi) Gently rotate and move the spool towards the lever end until the lower groove is again exposed. Fit a new 'O' ring and move the spool back into a central position.
- vii) Re-assemble the wiper seal/housing and refit operating rod.
- viii) Replace centring spring assembly, remove all traces of oil from the central retaining screw threads and smear with 'Loctite screw-lock' before replacing screws. Refit the spring housing.
- ix) Check spool action for full travel without binding.



Main Relief Valve

The main relief valve is pressure set at the factory and is non-adjustable.

Servicing is restricted to dismantling, cleaning and replacing the 'O' ring and this can be carried out without disturbing the pressure setting.

A sticking relief valve will probably cause overheating and/or loss of power. To gain access, undo the large hexagon housing - the relief valve components can now be withdrawn. If difficulty is experienced in extracting the seat, remove the blanking plug from the opposite end of the gallery and drive out with a soft brass drift. Take care not to damage the sealing washer positioned between the seat and the locating shoulder in the valve section.

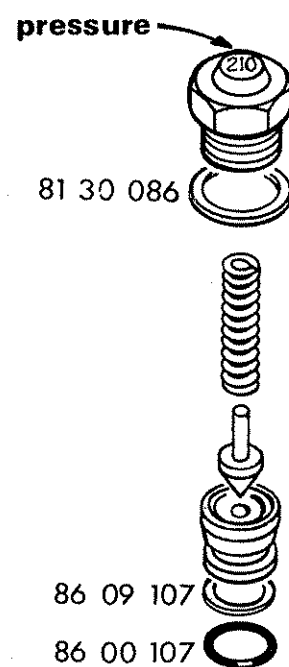
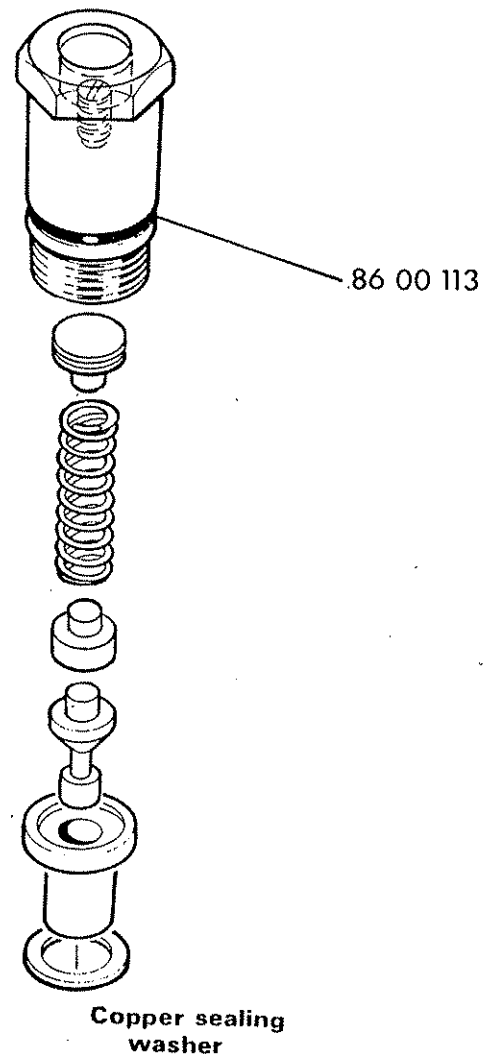
Blow out the valve with compressed air and examine the components for damage. These components are specially hardened steel and should only display a seating witness - any further damage will require the complete valve to be replaced.

CAUTION: Under no circumstances be tempted to add shims into the valve housing in a misguided attempt to increase the power of the machine. This could damage the tractor, the loader and may cause personal injury.

On replacing the valve, and plug, if removed always use new 'O' rings

Service relief valves

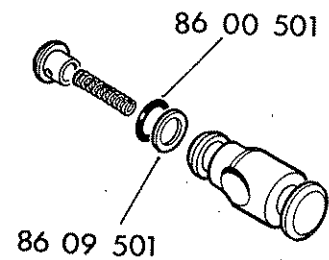
Sometimes referred to as locked line relief valves; service relief valves limit the pressure in individual services which can be caused by external load conditions. The valve is dismantled by removing the pressure cap, the poppet needle and spring can now be withdrawn. To remove the valve seat, it will be necessary to remove the port union adjacent to the valve. Around the base of the seat is an 'O' ring and back-up ring which retain the seat in position. Use a lever through the port to pry the seat from its housing. No adjustment is possible. The valve is calibrated by the measured depth of the bore within the pressure cap. The pressure reading is stamped on the top of the cap. Under no circumstances should any attempt be made to shim up the pressure spring. Very serious damage to the machine could result as well as possible risk of personal injury.



Check Valves

A spring loaded check valve is located in each spool section between the service ports. This valve prevents interaction of services and momentary load drop on selection.

Malfunctioning is most unlikely, but contaminant can prevent free movement or re-seating. To remove the check valve it will be necessary to dismantle the tie rod that passes through the valve body which can now be withdrawn, revealing the spring and poppet. Wash free of contaminant and check for free movement of the poppet within its housing. Examine the poppet face for damage and renew if necessary. Re-assemble in the reverse order using a new 'O' ring part no. 86 00 501 and back up ring part no. 86 09 501 coated with a light smear of grease on the valve body. Finally tighten the nuts on the tie rod to a 25 lbs/ft torque. Do not overtighten, which could cause binding of the main spools of the valve assembly.



Hydraulic pump

The Ditch King is fitted with an independent pump driven through a gearbox mounted onto the tractor p.t.o. shaft. The pump is a gear type of 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°. These clips should be checked frequently during the first few hours of work to avoid possibility of drawing in air.

Pump servicing is limited to replacing seals, gaskets and 'O' 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 assembly.

When re-assembling, lubricate all components with clean oil and tighten down the securing tie bolts in a diagonal sequence to pull the pump squarely together, finally tightening to a torque load of 6.5 Kg/m (47 lbs/ft). Check for freedom of rotation. The gears should be rotated whilst the bolts are being tightened and should turn under a hand load applied on a 6" radius arm. If tight, the 'O' rings and/or anti-extrusion rings have been trapped and the unit must be dismantled to rectify this.

After installation, the serviced pump should be run for several minutes under '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.

In the event of shaft seal failure it should not be necessary to dismantle the pump for renewal. The shaft seal part no. is 86 29 135. The overhaul seal kit is part no. 86 99 176.

Generally, it is unwise to replace major components within the pump as 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. Factory reconditioned units are available within our service exchange scheme.

Replacing damaged or worn spool 'O' rings.

Servicing of the leg control valve can be carried out in situ. Before commencing switch off the tractor engine. Access is gained by removing the console front cover and tilting the console fully about its pivot bolt. Secure firmly in position to prevent any likelihood of it falling back and causing injury.

Extract the lever pivot pin and remove the lever pivot box.

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

Pull the spool through the block from the cable end until 'O' ring marked 'A' is accessible.

Remove the 'O' ring from its groove using a smooth edged hook.

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

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

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

Fit new 'O' ring in groove 'A'

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

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

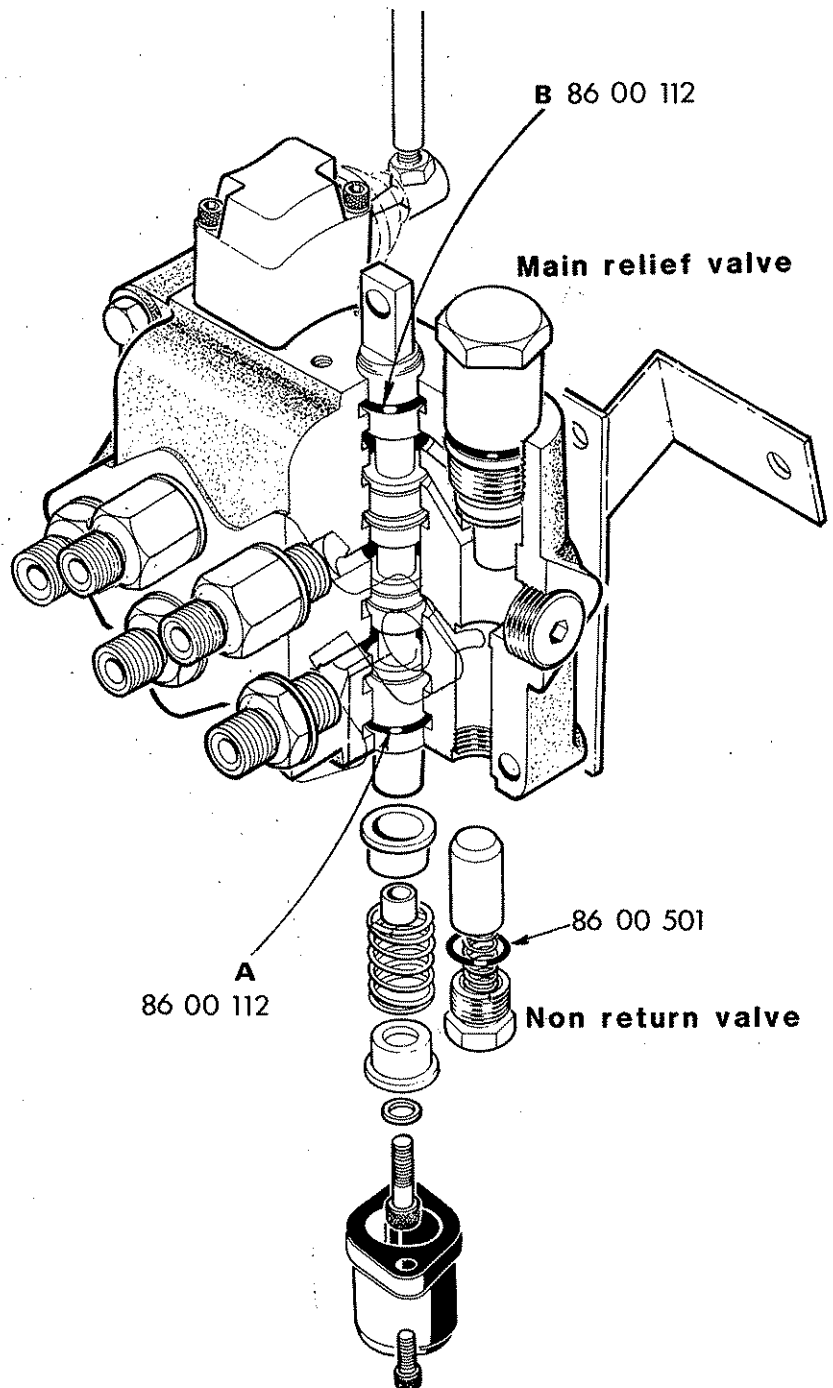
Reassemble the lever pivot box, lever and handle to the valve.

Relief Valve.

The leg relief valve is calibrated to 1700 PSI (117 Bar). It is similar in construction to the relief valve in the main armhead control valve. For diagram and service instructions refer to page 22.

Non Return Valve

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



Hydraulic rams.

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.

Lift, Leg, Reach, Bucket and Grab rams.

- i) Replace gland seals

Unscrew the gland nut using either a peg or a 'C' spanner and withdraw the complete rod assembly. Slacken the piston grub screw, unscrew the piston and slide off the gland housing.

Lubricate all new seals prior to assembly.

Replace seals as necessary and ensure they are re-assembled in the position and attitude from which they were removed.

Renew the 'O' ring on the piston rod.

Reassemble the gland housing complete with seals onto the piston rod taking care when easing the gland wiper seal over the piston rod shoulder. Refit the piston assembly and centre pop the grub screw to hold securely in position.

- ii) Replace Piston seals.

Unscrew the gland nut and withdraw the complete rod assembly. It is not necessary to remove the piston from the rod to carry out piston seal replacement.

Remove split members of the piston seal and then, using a soft lever which will not scratch the piston lift the remaining seal components from the piston.

Replace with new seals in the reverse order

Lubricate all new seals prior to assembly.

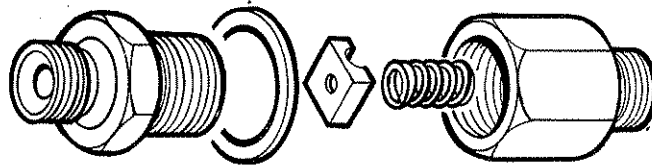
Note: Where anti-extrusion rings are used they should always be placed behind the 'O' ring or pressure seal.

iii) Ram one way restrictors

One way restrictors are located in the following ram connection positions

- Lift Ram - base and gland.
- Reach ram - base and gland.
- Leg Ram - base
- Bucket Ram - gland.

Restrictor assemblies are calibrated for correct speed of operation. The restricted hole should not be enlarged or the restrictor assemblies interchanged on or between rams.



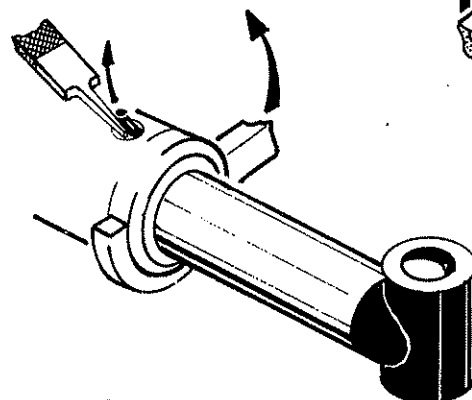
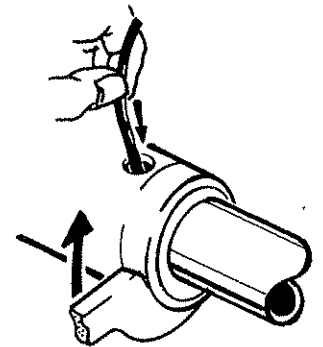
Servicing should be unnecessary other than cleaning. Should erratic operation still occur after cleaning, the flat face of the restrictor should be examined for damage and replaced if necessary. Thoroughly clean all components before re-assembly and ensure that the restrictor disc is properly seated on the spring.

Slew Rams.

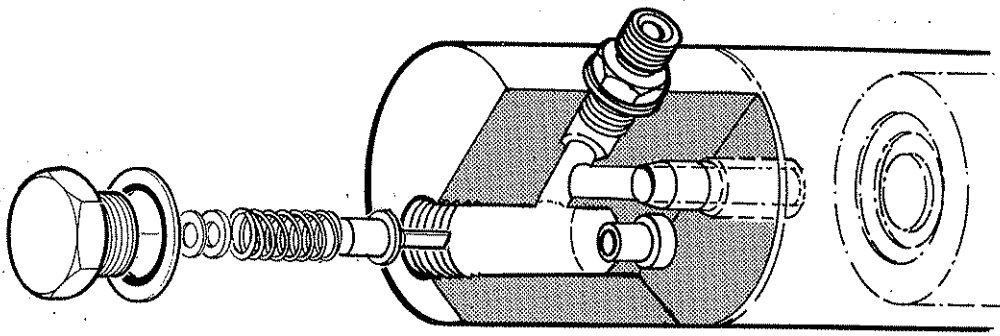
These are all single acting rams. To dismantle, grip the cylinder in a bench vice and rotate the gland housing to expose the tail of the locking wire. Pry up with a file tang or similar tool and counter rotate the housing to wind the wire completely out of its groove. The gland housing can now be withdrawn complete with the rod.

Examine the seals and replace as necessary remembering to lubricate all new seals before re-assembly. Make sure they are replaced in the same position and attitude from which they were removed.

ASSEMBLING



DISMANTLING



Cushion Relief valves.

Incorporated in the rear of the slewing rams are cushion relief valves. It is not necessary to disturb these when servicing the ram seals. These cushion valves protect the machine from shock overloads. Failure of the valve to operate effectively will result in the slew column stopping violently at the end of its travel. In all probability dirt in the oil will either have caused the cushion valve to stick open or prevented the plate in the end of the ram rod from seating properly on the tube in the base of the ram thus allowing the oil to partially by-pass the cushion valve altogether. The valve should be dismantled, the needle removed and cleaned and the ram blown out with an airline. Examine the needle for damage and buff up with a fine emery cloth, if damage is irreparable the needle and spring carrier assembly must be replaced as one unit.

The cushion valves are shim calibrated to 3500 PSI (238 Bar) If the needle/carrier is replaced check pressure setting with the aid of a gauge and adjust to this figure by adding or deducting shims in the valve cap.

Gearbox

Known as the model BF2/B the gearbox has a ratio of 3.9:1. The gearbox when fitted with its pump assembly and despatched with the digger will be full of oil. However, when despatched as a spare from the factory it should be filled with 150 mls (approx. 1/4 pint) of E.P.90 gear oil before use. It is always a precaution to check the oil level before use.

Dependent on whether the gearbox is to be mounted horizontally or vertically both the level and breather plugs which have the same thread size can be interchanged. The breather plug should always be uppermost.

The torque arm should be bolted firmly to the back of the gearbox and the torque chain attached to it and wrapped around a suitable point i.e. the draft arm so that the chain lies at approximately 90° to the torque arm. The location will depend on the mounting position of the gearbox. Additionally the torque arm which is cranked may be reversed on the gearbox to allow for better chain alignment. Excessive side thrust will apply further load and shorten bearing life.

In the final assembly great care should be observed that when the machine is raised on the draft links to the fullest extent, the chain does not tighten up and apply load to the torque arm which can break the gearbox.

Routine maintenance of the gearbox will primarily consist of making a check on the oil level which should be visible through the transparent plug. The complete assembly should be kept clean especially in the input shaft area. An accumulation of dust and grit can have an abrasive effect on the shaft seal and cause leaks. The oil should be changed annually. Shaft seal part no. 86 29 134 and the overhaul seal kit part no. 86 99 178.

Slew Cross port Relief Valve.

Bolted to the top left hand, front face of the main frame its function is to prevent shock loads building up in the slewing system when the control lever is released, by limiting the pressure build up caused by the continued movement of the arm resulting from its own inertia.

The valve consists of two interconnected but opposed relief valves pre set to 3000 PSI (210Bar). These are factory calibrated settings and should not be altered.

Releasing the slewing lever while traversing with a laden bucket or grab abruptly closes off the oil flow. The continued momentum however will raise the pressure in the now 'locked line' to the point where the relief valve is activated allowing oil to pass through into the ram that is being extended. In this way a cushion effect is provided when coming to a stop and both rams are kept fully charged with oil preventing sloppiness in the slew action.

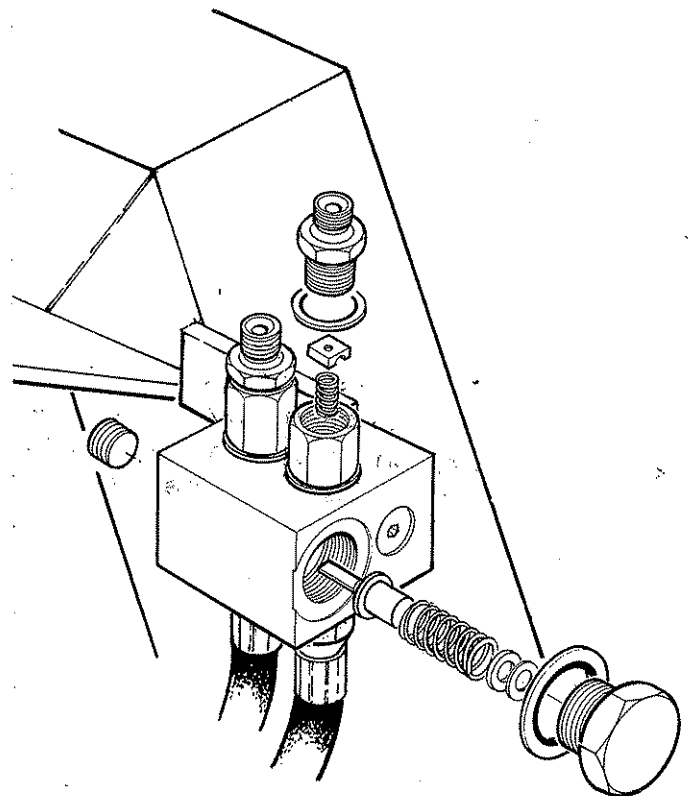
Servicing of the slew valve is easily executed in situ, all work being carried out with the arm to the rear and the bucket resting firmly on the ground.

A malfunction of the slew cross port relief valve can be suspected if any creep of the slewing column occurs or if a much more severe stopping jolt than usual takes place when the control lever is released. These symptoms may be caused by the needle in one of the relief valves either sticking open, when creep occurs, or conversely, sticking closed, causing a severe jolt.

The relief valve requiring attention is located under the large hexagon on the opposite end of the slew block to the ram that is compressed when viewed from the operator viewpoint, i.e., if trouble occurs when slewing to the left then the suspect relief valve is located under the hexagon cap on the right hand end of the slew cross port relief valve.

The relief valve should be dismantled, the needle removed and cleaned and the block blown out with an air line. If severe jolting is the symptom and the relief valve needle is stuck in the block the blank plug on the opposite end of the gallery should be removed and the needle freed using a soft metal drift. Examine the relief valve needle for any damage and if necessary buff up with a fine emery cloth. If damage is irreparable it must be replaced, please note that it is unnecessary to attempt to release the needle from its spring carrier as they are mated parts and are supplied as one unit. Clean each component thoroughly before re-assembly.

Should alternative relief valves with protruding housings be fitted these may be serviced as their main control valve counterparts shown on page 22.



If the slewing column works in one direction only or even if its noticeably faster in one direction than the other the fault may be occurring in the one way restrictor in the hose connection assemblies on the top of the valve.

Faulty slewing to the left would indicate a fault in the restrictor in the left hand end of the slew block and vice versa.

The restrictor must be dismantled and cleaned and in the case of over fast slewing, the flat face of the restrictor examined for damage and replaced if necessary. Thoroughly clean all components on reassembly and ensure that the restrictor disc is properly seated on the spring.

Note:- The hole sizes in the restrictors have been carefully calibrated and should not be interfered with in any way.

Hoses

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

Hose replacement

- a) Replace one hose at a time to avoid the risk of wrong connections
- b) When the hose is screwed to an additional fitting or union, use a second spanner on the union to avoid breaking both seals.
- c) Do not use jointing compound on the threads.
- d) Avoid twisting the hose. Adjust the hose line to ensure freedom from rubbing or trapping before tightening hose end connections.

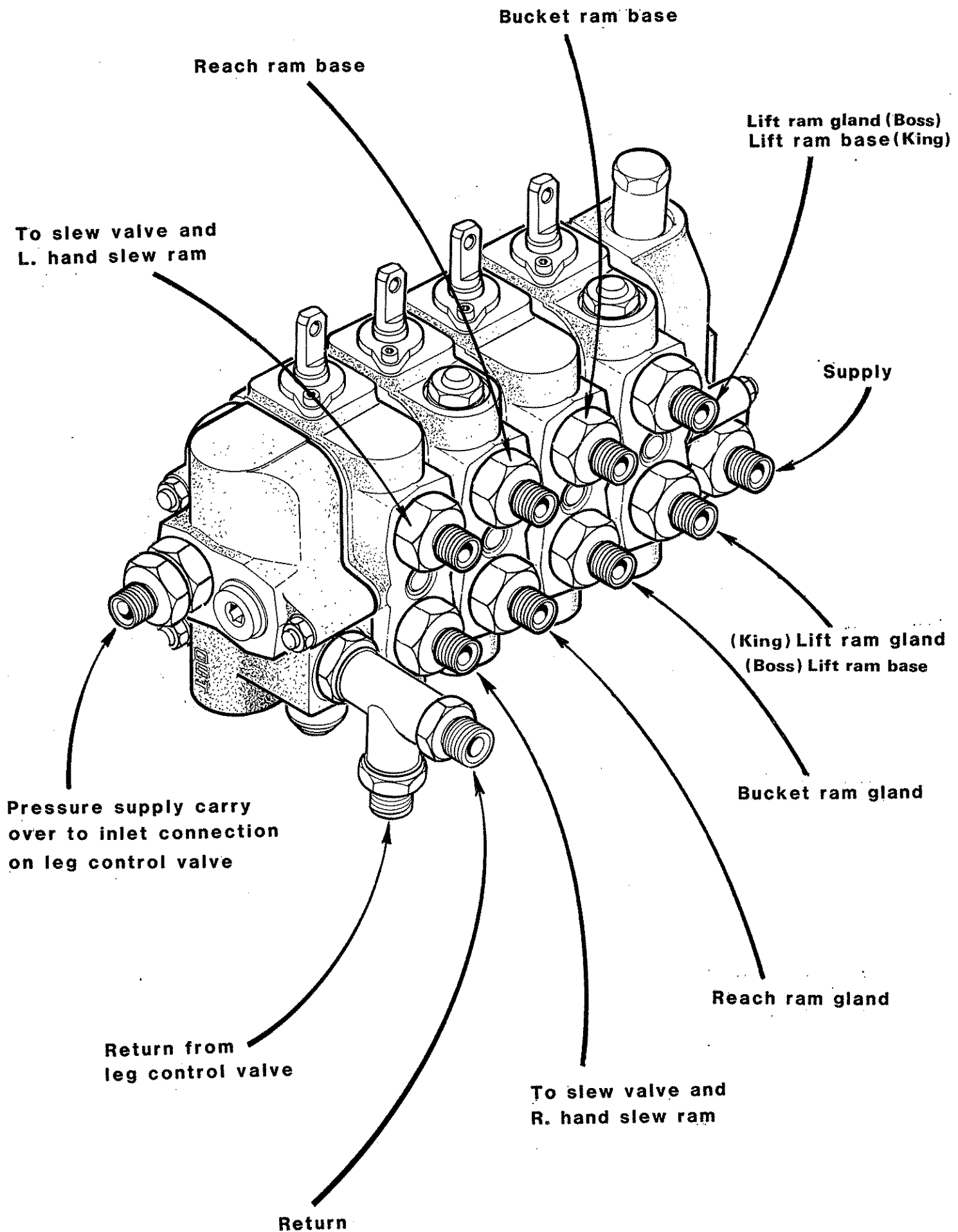
Hose Warranty

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

The routing of hoses may appear to be random but the position of each individual hose is carefully worked out to avoid any chafeing, pinching, kinking or stretching during operation. If replacing a hose it should be positioned exactly as its predecessor. If major re-hosing is necessary study the routing carefully and make sketches to ensure that the hoses are replaced in exactly the same position.

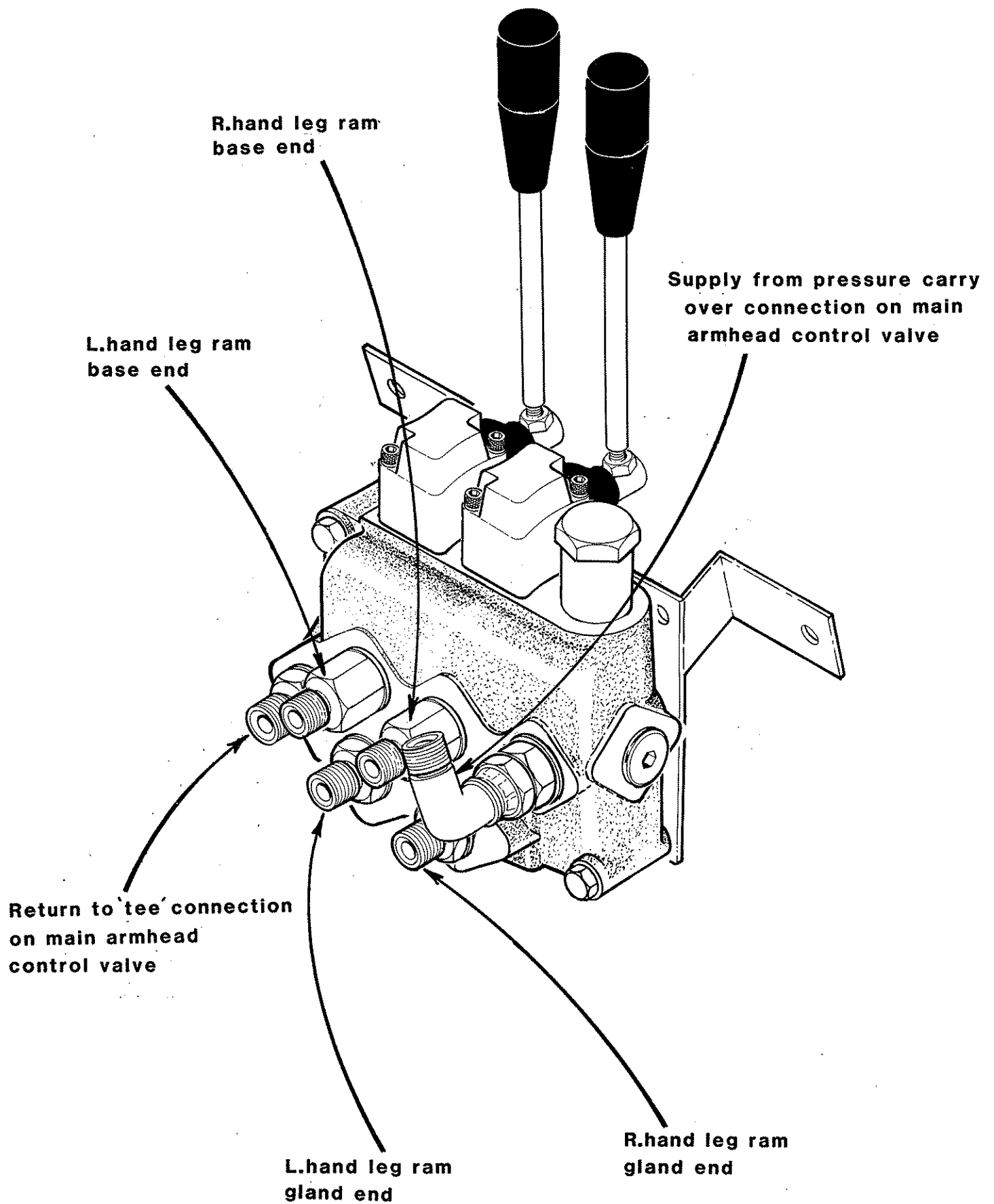
HOSE CONNECTIONS

Main armhead control valve



Refer page – “General information” para. – “Definitions” re- R. and L. hand

HOSE CONNECTIONS Leg control valve



Refer to page – “General information” para. “Definitions” re R. and L. hand

SPARE PARTS MANUAL



USE ONLY McCONEIL SPARE PARTS

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

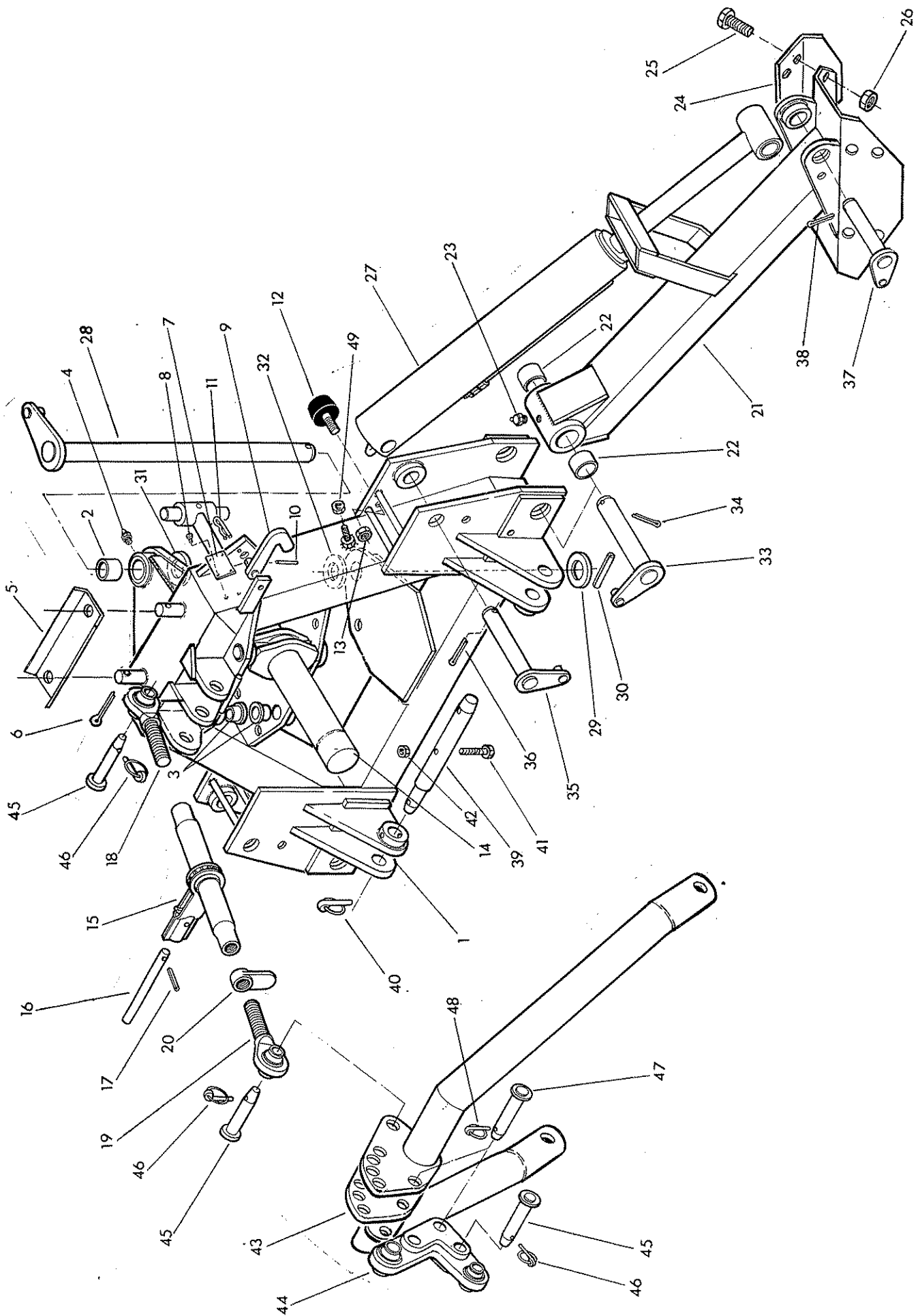
Always quote machine type and serial number as well as the part number.

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

THE DOT SYSTEM

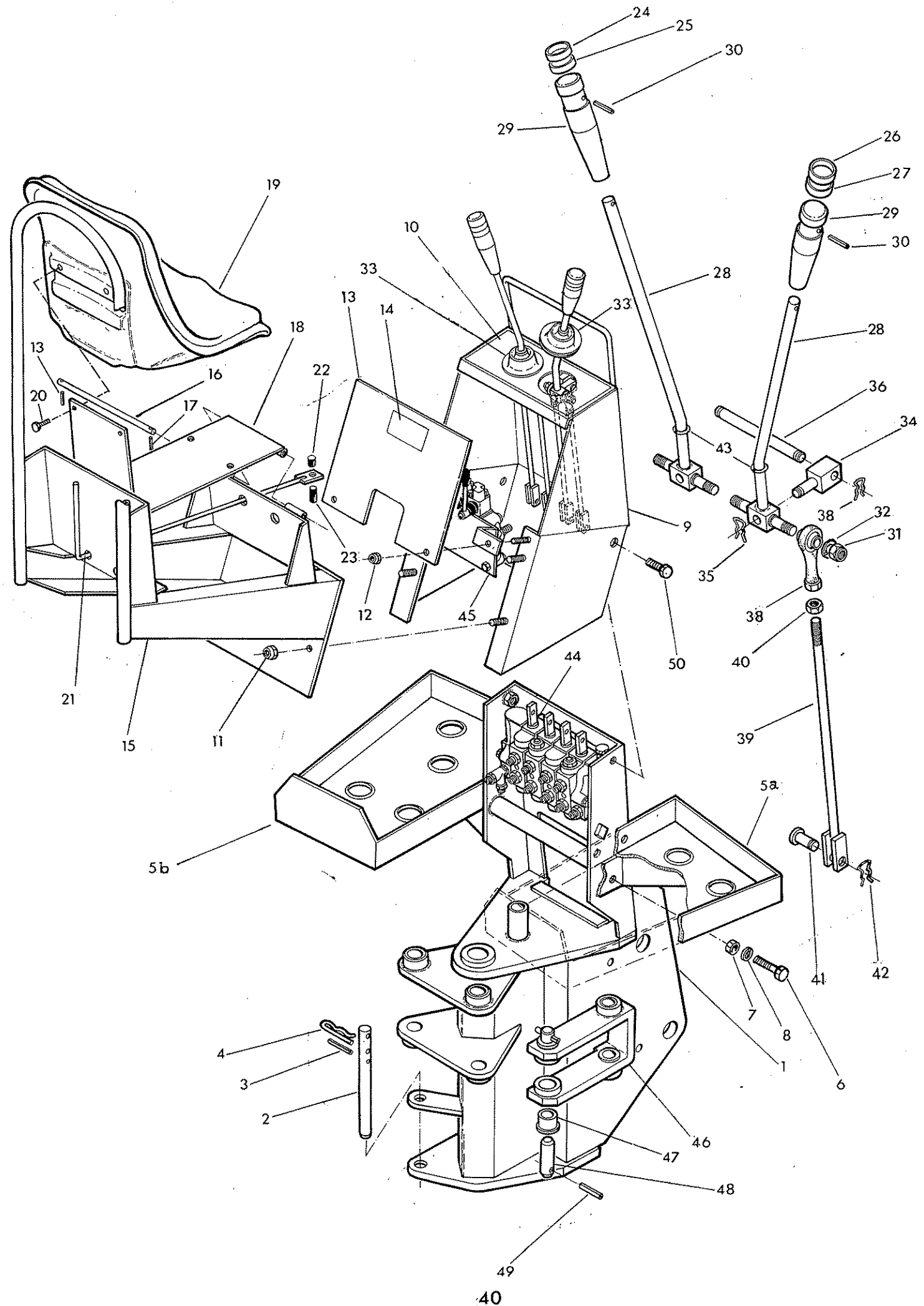
Many spares are supplied as Assemblies or as Sub-assemblies and, to help the customer determine the composition of an Assembly, the Dot System is used. The Main Assembly will not show a dot preceding its description and is printed in BLOCK CAPITALS. Subsequent listed parts are preceded by one or more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

MAIN FRAME & YOKE



Ref	Part No.	Qty	Description
	71 18 250		DITCH KING
1	71 18 285	1	.Main Frame c/w bushes, greasers etc
2	72 16 001	2	..Steel bush - King pin
3	71 02 173	4	.. Bush - slew link
4	09 01 121	2	..Greaser
5	71 18 035	1	..Hose guide
6	95 01 405	2	..Split pin
7	71 18 003	1	..Serial plate.
8	71 03 230	4	..Drive screws
9	71 18 055	2	..Leg latch c/w spring dowel.
10	04 25 325	1	...Spring dowel
11	04 31 105	2	..Spring cotter
12	71 18 145	2	..Slewing buffer c/w nut.
13	91 43 005	1	...Self locking nut
14	71 18 260	2	.Slew ram assembly
	71 15 276	1	.Ratchet link assembly compr:-
	71 15 350	1	..Tube ratchet c/w handle
15	71 15 353	1	...Ratchet
16	71 15 217	1	...Handle c/w spring dowel.
17	04 21 820	1	....Spring dowel
18	71 15 206	1	..Category II end Right Hand threaded.
19	71 15 207	1	..Category II end Left hand threaded
20	71 15 153	1	..Locking collar.
21	71 18 259	2	.Leg c/w bushes, greaser and sprag etc.
22	72 13 023	2	..Steel bush
23	09 01 121	1	..Greaser
24	71 18 058	2	.Foot sprag
25	93 13 087	4	.Setscrew
26	91 43 007	4	.Self locking nut
27	71 18 271	2	.Leg ram assembly
28	71 18 063	1	.King pin c/w thrust washer & spring dowel.
29	71 18 064	1	..Thrust spacer
30	04 22 640	1	..Spring dowel
31	71 18 064	1	.Thrust spacer
32	71 15 186	1	.Thrust washer.
33	71 18 081	2	..Leg pivot pin c/w split pin
34	95 01 507	1	..Split pin
35	71 18 082	2	.Leg ram base pin c/w split pin
36	95 01 507	1	..Split pin
37	71 18 080	2	.Leg ram rod pin c/w split pin
38	95 01 507	1	..Split pin
39	71 18 090	2	.Linkage pin c/w linch pin
40	04 31 217	1	..Linch pin
41	02 11 203	1	.. Bolt
42	01 41 003	1	.. Self locking nut
43	71 18 303	1	. Yoke
44	71 18 302	1	. Swivel plate
45	71 18 112	3	. Pin c/w linch pin
46	04 31 217	1	.. Linch pin
47	71 18 104	1	. Pin c/w linch pin
48	04 31 217	1	.. Linch pin
49	91 43 005	2	. Self locking nut
50			

SLEW COLUMN & CONTROL CONSOLE

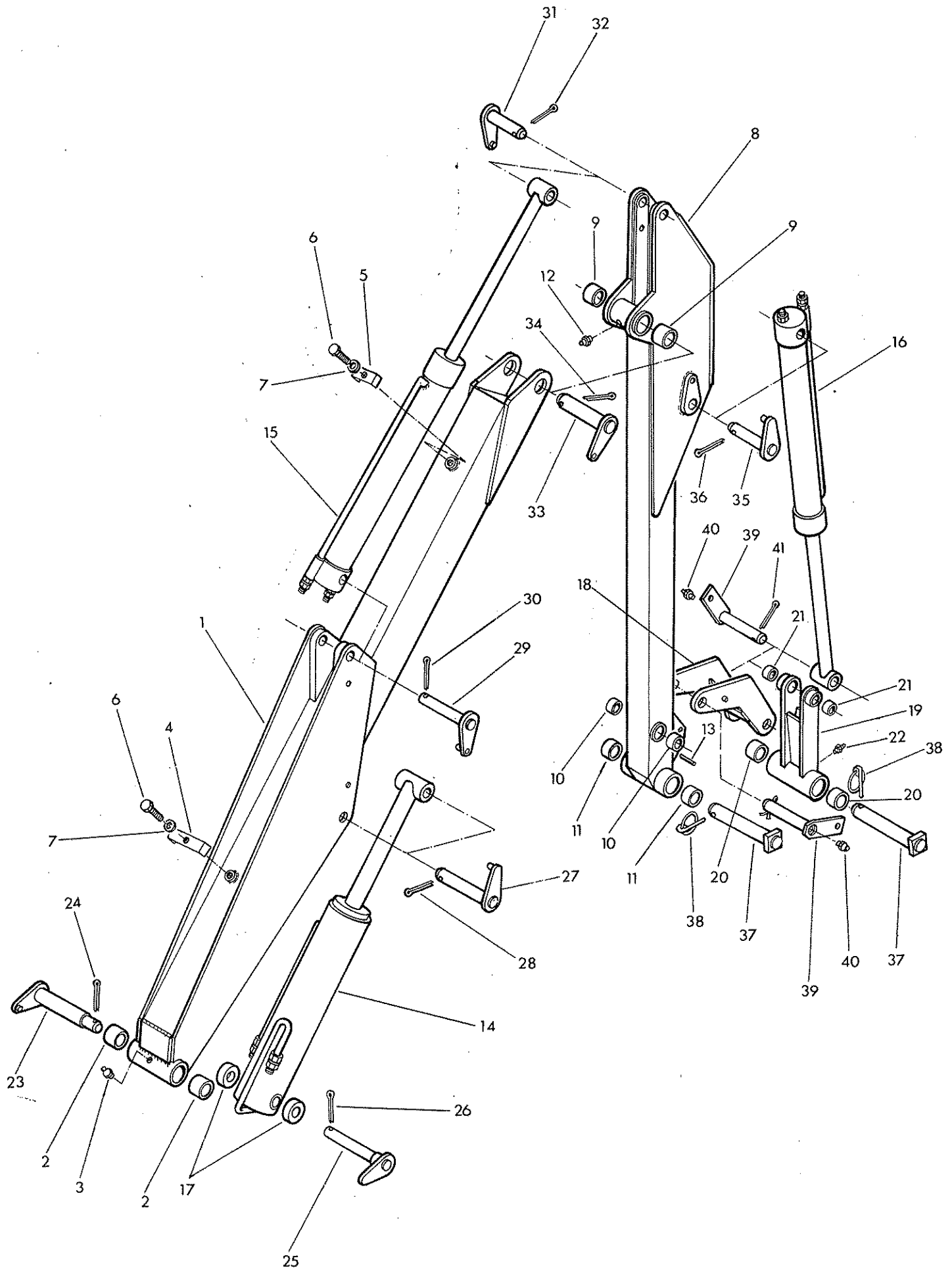


Ref	Part No.	Qty	Description
	71 18 250		DITCH KING - tractor supply - continued.
	71 18 251		DITCH KING - independent - continued.
1	71 18 267	1	..Slew column c/w slew lock peg, fool rest, nuts etc.
2	71 18 053	1	..Slew lock peg c/w dowel & cotter.
3	04 25 325	1	...Spring dowel
4	04 31 105	1	... Spring cotter.
5a	71 18 125	1	..Foot rest L. Hand
5b	71 18 150	1	..Footrest R. Hand
6	93 13 056	6	..Setscrew
7	91 13 006	6	..Plain nut
8	91 00 206	6	..Spring washer
	71 18 314	1	..Seat console assembly compr:-
9	71 18 305	1	..Console c/w instruction labels & nuts.
10	71 18 280	1	...Label - main control valve.
11	91 43 006	4	...Self locking nut
12	91 43 004	2	...Self locking nut
13	71 18 067	1	..Console front cover c/w label
14	71 18 279	1	...Label - leg valve.
15	71 18 296	1	..Seat mounting c/w pin.
16	71 18 061	1	...Seat base pin c/w spring dowel.
17	04 25 420	2	...Spring dowel
18	71 18 300	1	..Seat base plate
19	71 06 352	1	..Seat c/w screws.
20	71 06 101	4	...Screw
21	71 18 075	2	..Leg ram remote control rod.
22	71 18 114	2	..Rod spacer - upper
23	71 18 113	2	..Rod spacer - lower
	71 18 076	1	..Lever assembly - Lift and bucket.
24	81 14 060	1	...Ring - yellow
25	81 14 061	1	...Ring - green
	71 18 077	1	..Lever assembly Reach & Slew
26	81 14 062	1	...Ring - Red
27	81 14 063	1	...Ring - Black

Items 28 to 32 inclusive are common to both lever assemblies.

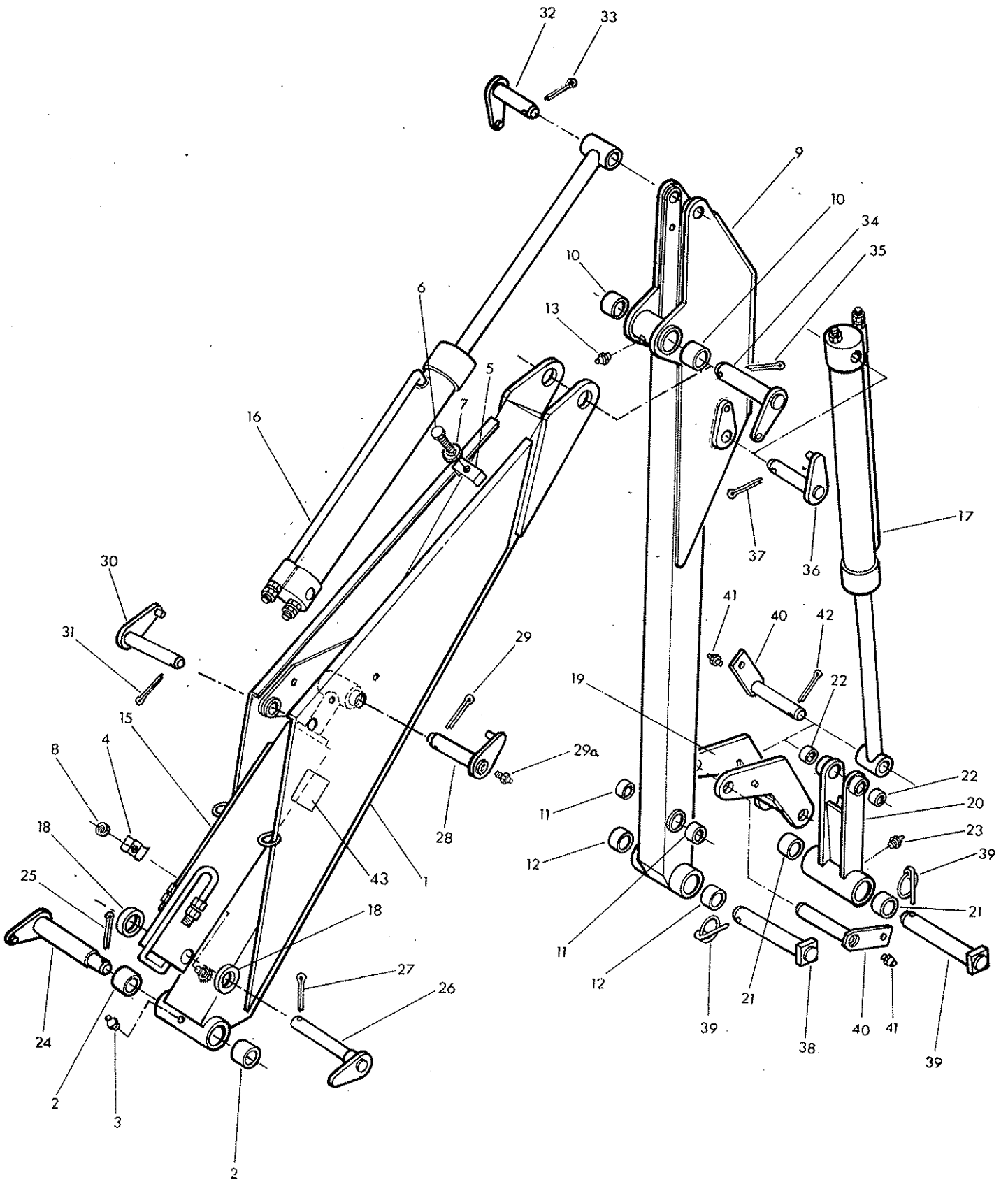
28	71 18 071	1	...Handle
29	81 14 053	1	...Lever knob.
30	04 20 812	1	...Spring dowel
31	91 13 004	2	...Plain nut
32	91 00 204	2	...Spring Washer
33	81 14 028	2	..Lever boot
34	71 18 070	2	..Lever pivot yoke c/w plain ring.
35	71 18 001	1	...Plain circlip ring.
36	71 18 069	1	..Spindle c/w plain rings.
37	71 18 001	2	...Plain circlip ring.
38	71 18 002	4	..Lever ball joint
39	71 18 073	4	..Valve control rod c/w nut
40	91 13 004	1	...Plain nut
41	71 18 074	4	..Clevis pin c/w plain ring.
42	71 18 001	1	...Plain circlip ring.
43	04 05 108	2	..Lever boot retaining ring.
44	71 18 313	1	..Main control valve assy
45	71 18 309	1	..Leg control valve assy
46	71 02 172	2	..Slew link c/w bushes.
47	71 02 173	4	..Bush
48	71 02 174	4	..Slew link pivot pin c/w spring dowel.
49	04 22 528	1	..Spring dowel
50	93 13 067	2	..Setscrew

ARMHEAD ASSEMBLY (Ditch King only)



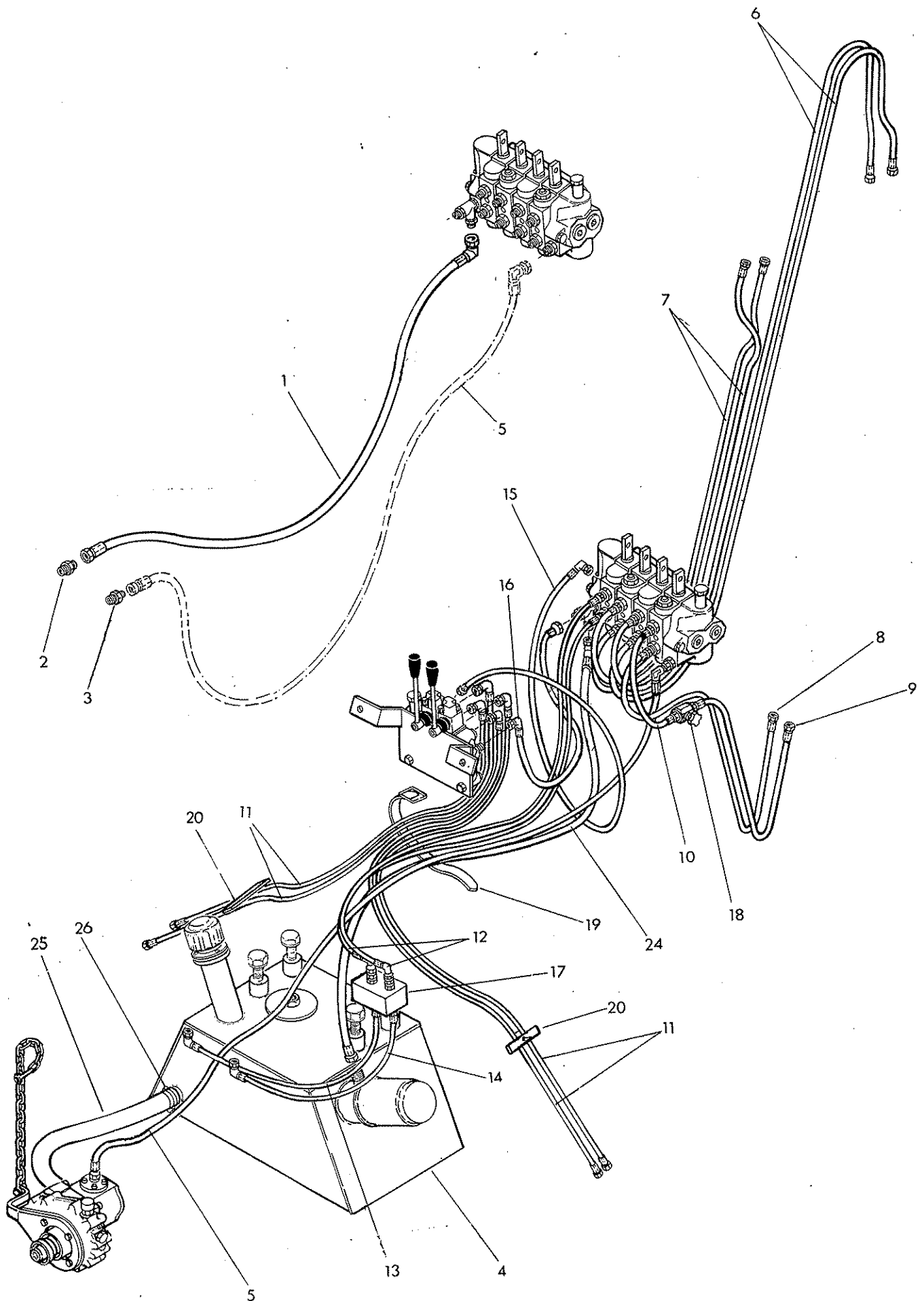
Ref	Part No.	Qty	Description
	71 18 250		DITCH KING - TRACTOR SUPPLY - Continued.
	71 18 251		DITCH KING - INDEPENDENT continued.
1	71 18 290	1	.Main Arm c/w bush and greaser.
2	72 13 023	2	..Bush
3	09 01 124	1	..Greaser
4	71 18 115	1	..Hose clamp - large
5	71 35 092	1	..Hose clamp - small
6	93 13 045	2	..Setscrew
7	91 00 205	2	..Spring washer
8	71 18 292	1	.Dipper Arm c/w bushes greaser etc.
9	72 13 023	2	..Bush
10	71 01 083	2	..Bush
11	71 01 134	2	..Bush
12	09 01 121	1	..Greaser
13	04 21 832	1	..Spring dowel
14	71 18 270	1	.Lift ram assembly
15	71 18 278	1	.Reach ram assembly
16	71 18 277	1	.Bucket ram assembly
17	71 18 079	2	.Lift ram spacer
18	71 05 369	1	.Radius arm.
19	71 06 312	1	.Slave link c/w bushes & greaser
20	71 01 134	2	..Bush
21	71 01 083	2	..Bush
22	09 01 121	1	..Greaser
23	71 18 083	1	.Main arm pivot pin c/w split pin
24	95 01 507	1	..Split pin
25	71 18 084	1	.Lift ram base pin c/w split pin
26	95 01 507	1	..Split pin
27	71 18 166	1	.Lift ram rod pin c/w split pin
28	95 01 507	1	..Split pin
29	71 18 086	1	.Reach ram base pin c/w split pin
30	95 01 406	1	..Split pin
31	71 18 087	1	.Reach ram rod pin c/w split pin
32	95 01 406	1	..Split pin
33	71 18 081	1	.Dipper pivot pin c/w split pin
34	95 01 507	1	..Split pin
35	71 18 089	1	.Bucket ram base pin c/w split pin
36	95 01 406	1	..Split pin
37	72 17 010	2	.Bucket pivot pin c/w linch pin
38	04 31 217	1	..Linch pin
39	71 05 090	2	.Radius arm pin c/w split pin & greaser.
40	09 01 121	1	..Greaser
41	05 03 165	1	..Split pin

ARM ASSEMBLIES (Ditch Boss only)



Ref	Part No.	Qty	Description
	71 18 252		DITCH BOSS - TRACTOR SUPPLY - Continued.
	71 18 253		DITCH BOSS - INDEPENDENT - Continued.
1	71 18 315	1	..Main Arm c/w bush and greaser
2	72 13 023	2	..Bush
3	09 01 121	1	..Greaser
4	71 18 122	1	..Hose clamp
5	71 35 092	1	..Hose clamp
6	93 13 045	1	..Setscrew
7	91 00 205	1	..Spring washer
8	91 43 004	1	..Self locking nut
9	71 18 292	1	..Dipper Arm c/w bushes greaser etc.
10	72 13 023	2	..Bush
11	71 01 083	2	..Bush
12	71 01 134	2	..Bush
13	09 01 121	1	..Greaser
14	04 21 832	1	..Spring dowel
15	71 18 270	2	..Lift ram assembly
16	71 18 278	1	..Reach ram assembly
17	71 18 277	1	..Bucket ram assembly
18	71 18 079	2	..Lift ram spacer.
19	71 05 369	1	..Radius arm.
20	71 06 312	1	..Slave link c/w bushes and greaser.
21	71 01 134	2	..Bush
22	71 01 083	2	..Bush
23	09 01 121	1	..Greaser
24	71 18 083	1	..Main arm pivot pin c/w split pin.
25	95 01 507	1	..Split pin
26	71 18 084	1	..Lift ram base pin c/w split pin
27	95 01 507	1	..Split pin
28	71 18 085	1	..Lift ram rod pin c/w split pin
29	95 01 507	1	..Split pin
29a	09 01 121	1	..Greaser
30	71 18 086	1	..Reach ram base pin c/w split pin
31	95 01 406	1	..Split pin
32	71 18 087	1	..Reach ram rod pin c/w split pin
33	95 01 406	1	..Split pin
34	71 18 081	1	..Dipper pivot pin c/w split pin
35	95 01 507	1	..Split pin
36	71 18 089	1	..Bucket ram base pin c/w split pin
37	95 01 406	1	..Split pin
38	72 17 010	2	..Bucket pivot pin c/w linch pin
39	04 31 217	1	..Linch pin
40	71 05 090	2	..Radius arm pin c/w split pin & greaser
41	09 01 121	1	..Greaser
42	05 03 165	1	..Split pin
43	71 18 148	1	..Label

HOSE INSTALLATION (Ditch King only)



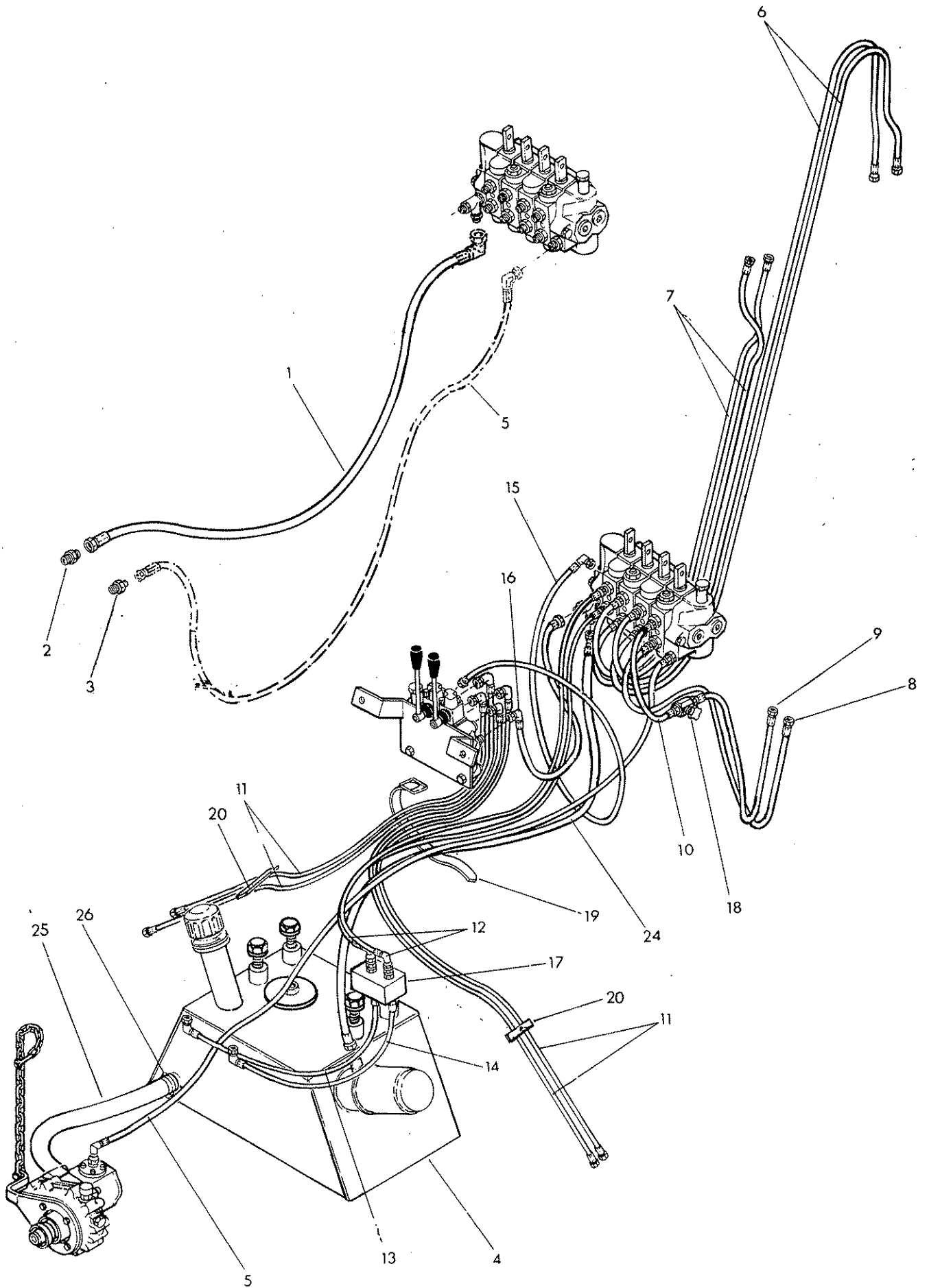
Ref	Part No.	Qty	Description
	71 18 250		DITCH KING - Tractor supply - continued
1	85 32 014		.Hose 1/2 BSP St - 90° x 80" long - return.
2	85 81 110		.Union
3	60 00 112		.Union
	71 18 251		DITCH KING - INDEPENDENT - continued.
4	71 18 256		.Independent hydraulic kit (see pages 50 - 55)

The following items are common to both ditch king models.

5	85 31 323	1	.Hose 3/8 BSP 90° St x 80" long - supply.
6	85 11 293	2	.Hose 3/8 BSP St-St x 120 long - Bucket.
7	85 11 283	2	.Hose 3/8 BSP St -St x 64" long - Reach
8	85 11 273	1	.Hose 3/8 BSP St-St x 40 long - Lift gland.
9	85 11 303	1	.Hose 3/8 BSP St-St x 29 " long - Lift base
10	85 11 313	1	.Hose 3/8 BSP St-St x 9" long - Lift ram tap.
11	85 35 112	4	.Hose 1/4 BSP 90°-St x 66" long - Leg.
12	85 35 082	2	.Hose 1/4 BSP St-90° x 34" long - slew valve.
13	85 35 092	1	.Hose 1/4 BSP St-90° x 22" long slew right.
14	85 35 102	1	.Hose 1/4 BSP St 90° x 17" long slew left.
15	85 31 343	1	.Hose 3/8 BSP St-90° x 36" long - Pressure carry over
16	85 30 013	1	.Hose 3/8 BSP St -90° x 19" long - leg valve return.
17	71 18 264	1	.Slew cross port relief valve (see page 56)
18	81 30 109	1	.Lift Ram tap.
19	71 06 187	1	.Hose tie strap.
20	71 18 156	2	.Hose Clip

24	85 32 024	Hose Return to tank)
25	85 00 824	Hose - Suction	) Ref only.
26	09 04 106	Hose clip 1" bore)

HOSE INSTALLATION (Ditch Boss only)

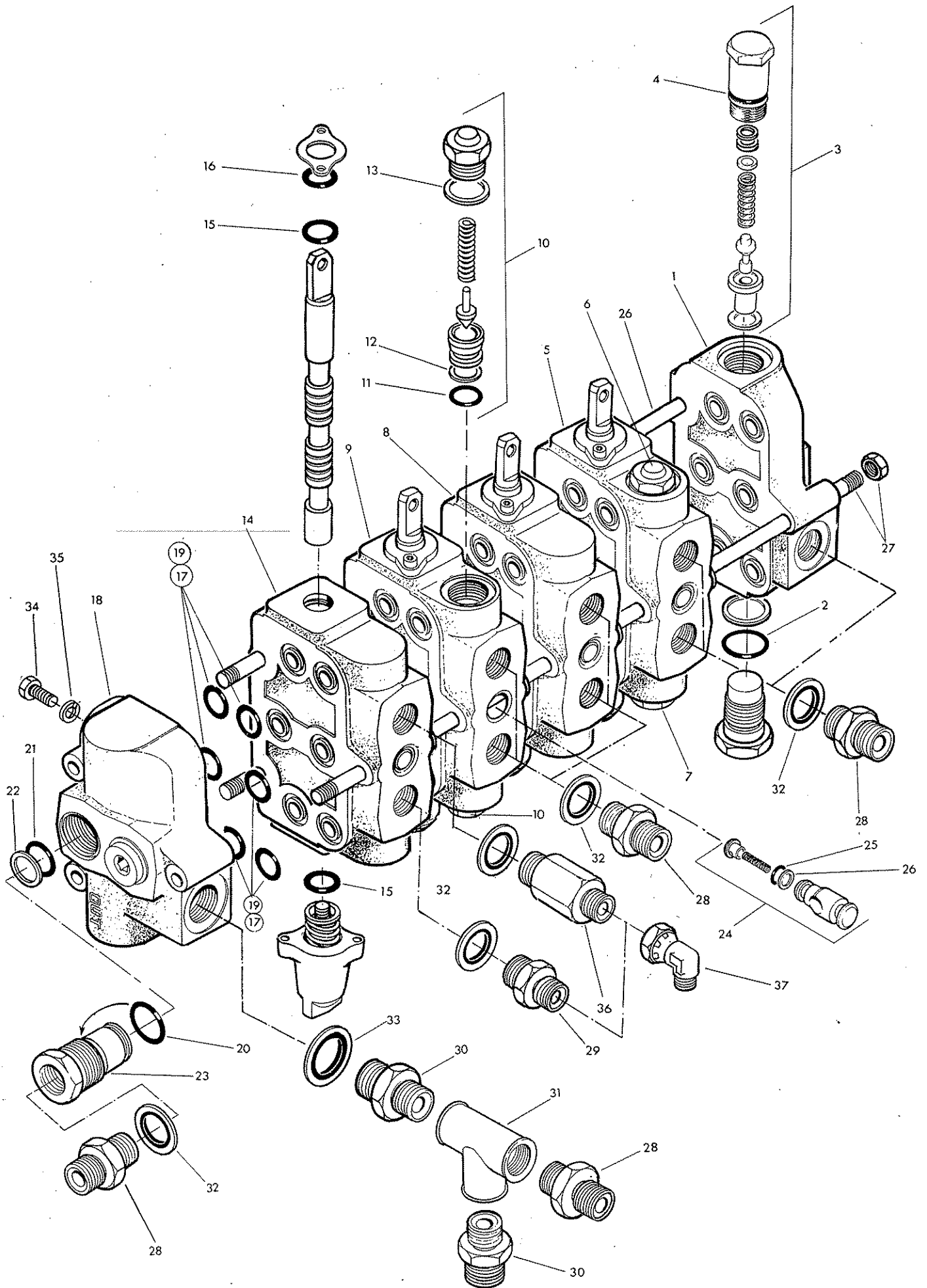


Ref	Part No.	Qty	Description
	71 18 252		DITCH BOSS- Tractor supply - continued
1	85 32 014		.Hose 1/2 BSP St - 90° x 80" long - return.
2	85 81 110		.Union
3	60 00 112		.Union
	71 18 253		DITCH BOSS- INDEPENDENT - continued.
4	71 18 256		.Independent hydraulic kit (see pages 50 - 55)

The following items are common to both ditch king models.

5	85 31 323	1	.Hose 3/8 BSP 90° St x 80" long - supply.
6	85 11 323	2	.Hose 3/8 BSP St-St x 115 long - Bucket.
7	85 41 263	2	.Hose 3/8 BSP St -135° x 64" long - Reach
8	85 41 243	1	.Hose 3/8 BSP St-135° x 39" long - Lift base
9	85 41 253	1	.Hose 3/8 BSP St-135° x 28" long - Lift gland.
10	85 11 313	1	.Hose 3/8 BSP St-St x 9" long - Lift ram tap.
11	85 35 112	4	.Hose 1/4 BSP 90°-St x 66" long - Leg.
12	85 35 082	2	.Hose 1/4 BSP St-90° x 34" long - slew valve.
13	85 35 092	1	.Hose 1/4 BSP St-90° x 22" long slew right.
14	85 35 102	1	.Hose 1/4 BSP St 90° x 17" long slew left.
15	85 31 343	1	.Hose 3/8 BSP St-90° x 36" long - Pressure carry over
16	85 30 013	1	.Hose 3/8 BSP St -90° x 19" long - leg valve return.
17	71 18 264	1	.Slew cross port relief valve (page 56)
18	81 30 109	1	.Lift Ram tap.
19	71 06 187	1	.Hose tie strap.
20	71 18 156	2	.Hose Clip
24	85 32 024		Hose Return to tank)
25	85 00 824		Hose - Suction) Ref only.
26	09 04 106		Hose clip 1" bore)

MAIN ARMHEAD CONTROL VALVE

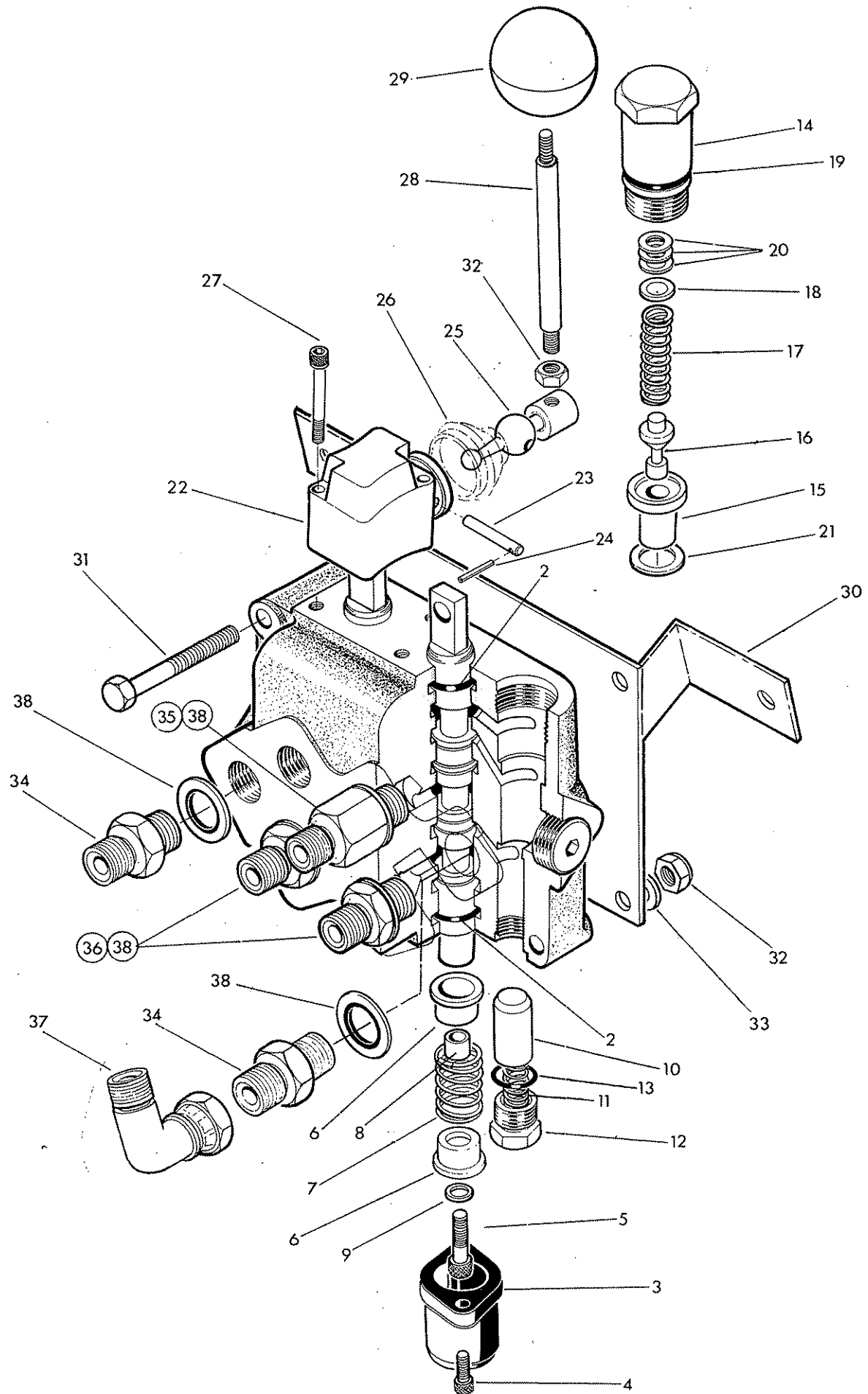


Ref i	Part No.	Qty	Description
	71 18 313		ARMHEAD CONTROL VALVE ASSEMBLY
	81 28 281		.Control valve compr:-
1	81 28 045	1	..Inlet section c/w Main Relief valve & 'O' ring.
2	86 00 113	1	... 'O' ring.
3	81 30 023	1	...Main relief valve c/w 'O' ring 2000PSI (140Bar)
4	86 00 113	1	.... 'O' ring.
5	81 28 037	1	...Service section - lift c/w locked line relief valves.
6	81 28 038	1	...Locked line relief valve 2300 PSI (160Bar)
7	81 28 039	1	...Locked line relief valve 2500 PSI (175Bar)
8	81 28 047	1	..Service section - bucket.
9	81 28 040	1	..Service section - reach c/w locked line relief valves.
10	81 28 022	2	...Locked line relief valve 3000PSI (210Bar)
11	86 00 107	1	.... 'O' ring.
12	86 09 107	1	....Back up ring.
13	81 30 086	1	....Copper sealing washer.
14	81 28 046	1	..Service section - slew
Items, 15, 16, & 17 are common to all service sections.			
15	86 00 112	2	...Spool 'O' ring.
16	86 00 504	1	...Wiper 'O' ring.
17	86 00 503	6	...Intersection 'O' ring.
18	81 28 042	1	..Outlet section c/w 'O' rings, and pressure carry over
19	86 00 503	6	... 'O' ring.
20	86 00 506	1	... 'O' ring.
21	86 00 504	1	... 'O' ring.
22	86 09 504	1	...Anti extrusion ring.
23	81 28 043	1	...Pressure carry over adaptor.
24	81 28 023	4	..Check valve c/w rings.
25	86 00 501	1	... 'O' ring.
26	86 09 501	1	...Back-up ring.
27	81 28 041	1	..Valve tie rod kit c/w nuts.
28	60 00 113	9	.Union
29	85 81 145	1	.Union
30	60 00 112	2	.Union
* 31	85 81 073	1	.'T' piece
32	86 50 103	10	.Bonded seal
33	86 50 104	1	.Bonded seal
34	93 13 034	4	.Setscrew
35	91 00 204	4	.Spring washer.
36	85 81 146	1	.Union
37	85 81 190	2	.Swivel elbow

* Assembly note

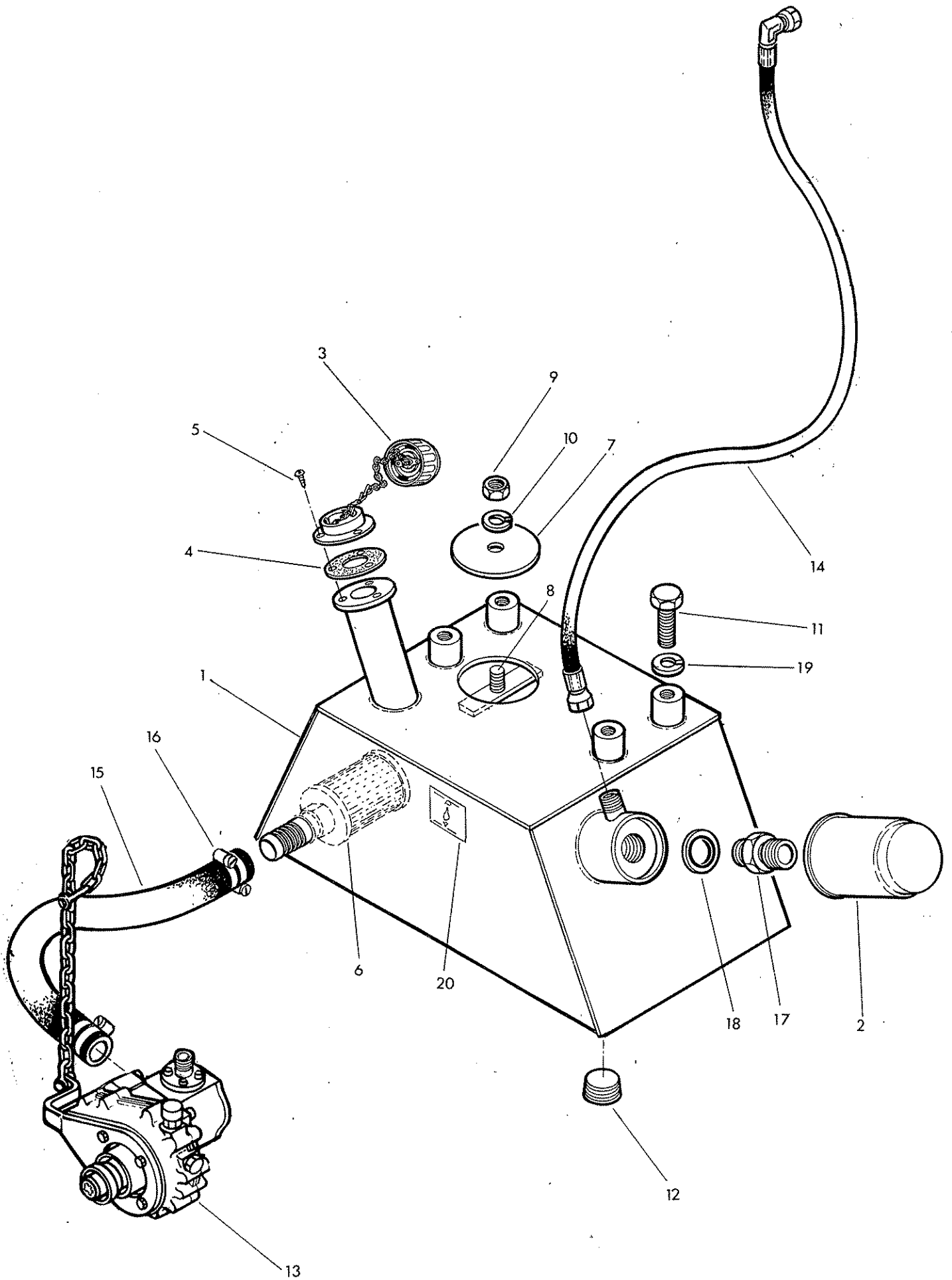
Assemble unions onto 'T' piece using either PTFE jointing tape or Permabond A121 or other similar thread sealing compound.

LEG CONTROL VALVE



Ref	Part No.	Qty	Description
	71 18 309		LEG CONTROL VALVE ASSEMBLY
1	81 30 343		.Leg control valve compr:-
2	86 00 112	4	..Spool 'O' ring
3	81 30 002	2	..Centring spring cover
4	93 43 022	4	..Capscrew - socket headed
5	93 83 043	2	..Setscrew
6	81 30 003	4	..Centring spring cup
7	81 30 004	2	..Centring spring
8	81 30 005	2	..Distance piece
9	81 30 020	2	..Washer.
	81 30 022	1	..Non return valve compr:-
10	81 30 006	1	...Supply check valve.
11	81 30 007	1	...Spring.
12	81 30 008	1	...Plug
13	86 00 501	1	...'O' ring.
	81 30 023	1	..Relief valve assembly 1700 PSI (117 Bar)
14	81 30 045	1	...Relief valve body
15	81 30 016	1	...Relief valve seat housing.
16	81 30 015	1	...Relief valve needle
17	81 30 011	1	...Relief valve spring.
18	81 30 044	1	...Washer
19	86 00 113	1	...'O' ring.
20	81 30 043	As reqd	...Shim
21	81 30 017	1	...Sealing washer.
	81 30 065	2	..Lever pivot box comprising:-
22	81 30 107	1	...Lever pivot box
23	81 30 009	1	...Lever pivot spindle
24	81 30 021	1	...Spring dowel.
25	81 30 019	1	...Lever
26	81 30 016	1	...Lever weather gaiter
27	92 43 072	4	..Capscrew - socket headed
28	71 18 149	2	.Handle
29	09 03 121	2	.Knob
30	71 18 308	1	.Valve mounting bracket
31	92 13 114	3	.Bolt
32	91 13 004	5	.Hexagon nut
33	91 00 204	3	.Spring washer
34	60 00 113	2	.Union
35	85 81 146	2	.Union
36	85 81 145	2	.Union
37	85 81 117	1	.Swivel elbow
38	86 50 103	6	.Bonded seal

INDEPENDENT HYDRAULIC KIT



Ref	Part No.	Qty	Description
	71 18 256		INDEPENDENT HYDRAULIC KIT
	71 18 312	1	.Tank assembly compr:-
1	71 18 311	1	..Tank
2	84 01 045	1	..Filter
	84 01 014	1	..Filler/breather assembly
3	84 01 015	1	...Filler cap and neck
4	84 01 017	1	...Gasket
5	03 00 082	3	...Screw - self tapping
6	84 01 044	1	..Strainer
7	71 14 122	1	..Inspection cover
8	71 14 123	1	..Clamp
9	91 13 004	1	..Plain nut
10	91 00 204	1	..Spring washer
11	93 13 055	4	..Setscrew
* 12	85 81 203	1	..Drain plug
13	80 13 336	1	.Pump and gearbox
14	85 32 024	1	.Hose 1/2" BSP St-90° x 32" long - return
15	85 00 824	1	.Hose 1" bore 24" long.
16	09 04 106	4	.Hose clip 1" hose.
17	85 81 174	1	.Union
18	86 50 104	1	.Bonded seal
19	91 00 205	4	.Spring washer
20	71 18 147	1	.Label

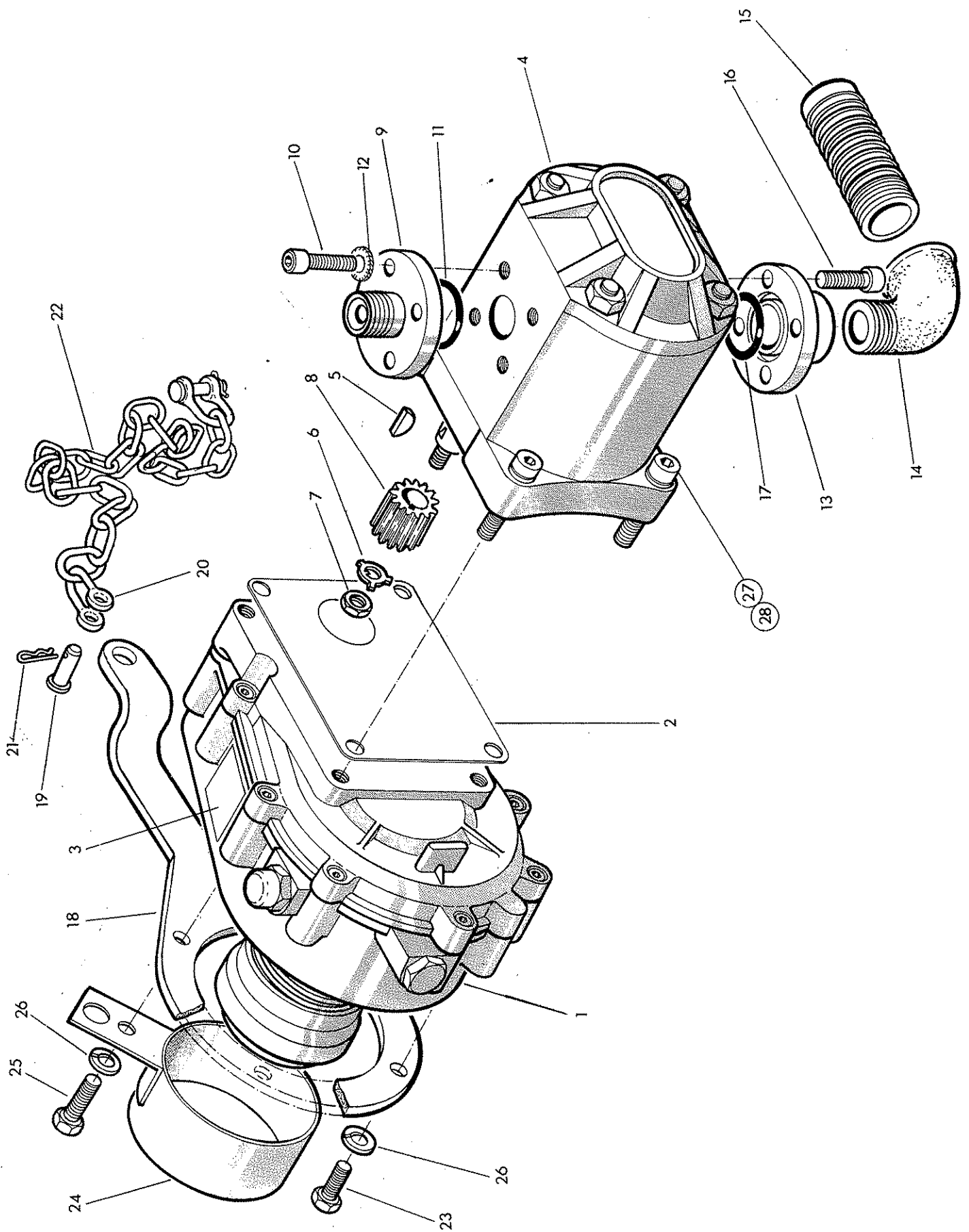
■ Assembly Note.

Joint between cover and tank should be sealed with 'Hermatite' liquid gasket or a similar silicone gasket sealing compound.

* Assembly Note.

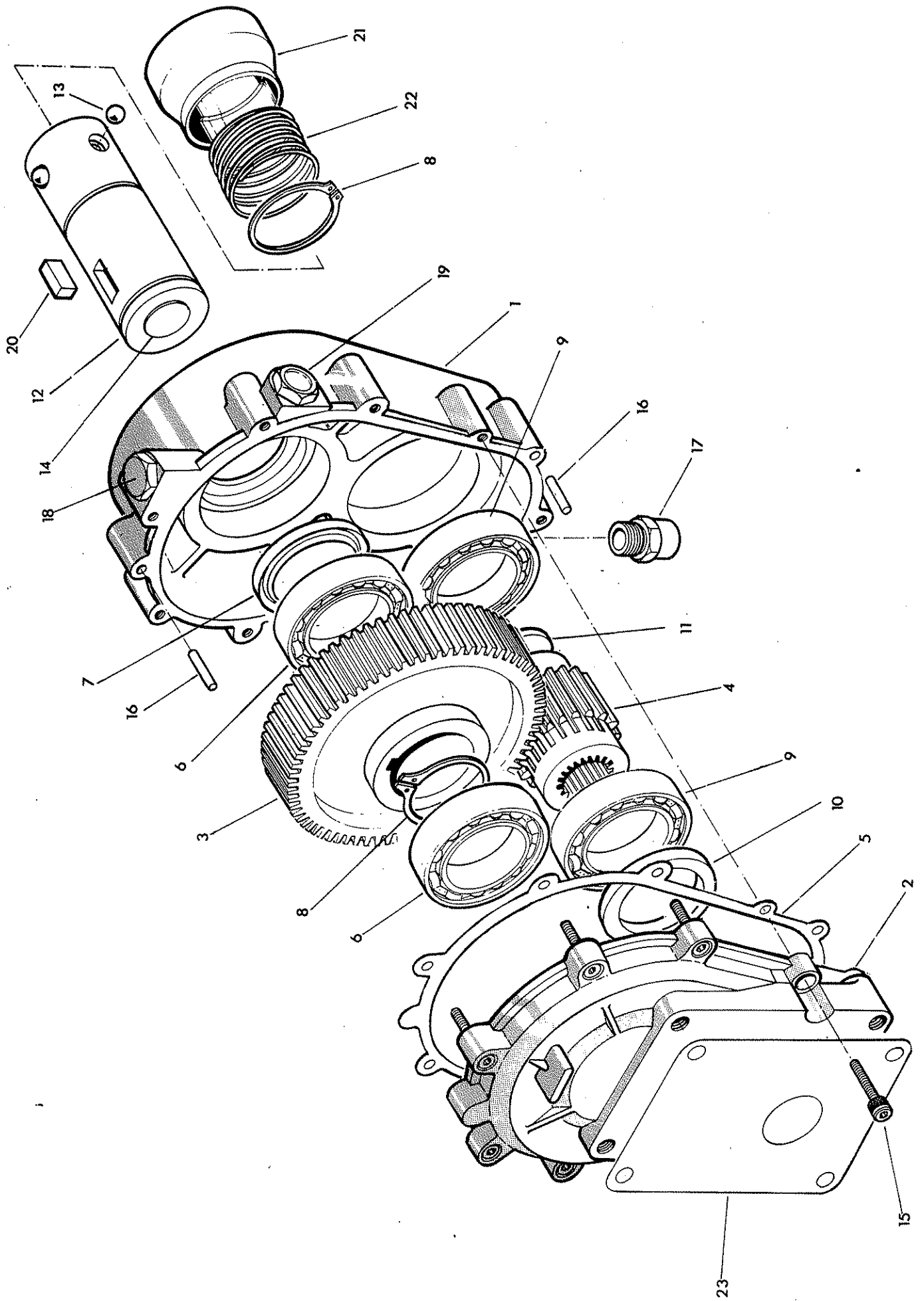
Drain plug should be installed using either PTFE jointing tape or 'Permabond A121' or a similar thread sealing compound.

PUMP & GEARBOX ASSEMBLY



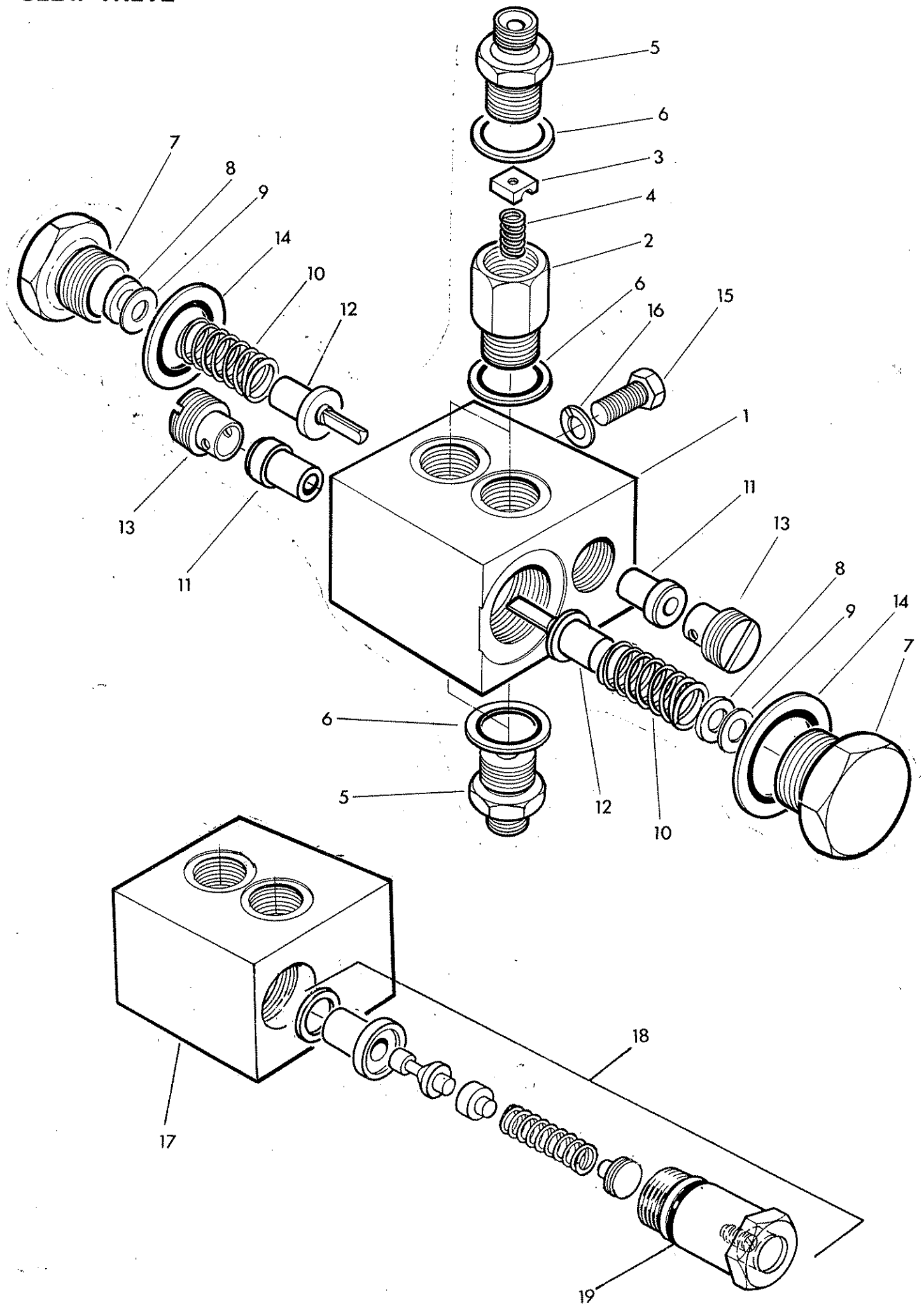
Ref	Part No	Qty	Description
	80 13 336		PUMP AND GEARBOX ASSEMBLY
	80 13 326	1	. Pump and gearbox compr:-
	80 13 324	1	.. Brevini Gearbox c/w gasket etc.
1	80 13 325	1	... Gearbox
2	82 01 132	1	... Gasket pump face
3	80 13 052	1	... Instruction lable.
	82 01 659	1	.. Cassapa pump assembly compr:-
4	82 01 455	1	... Pump c/w key, coupling washer, nut etc.
5	82 01 133	1	.... Woodruff key
6	82 01 134	1	.... Tab washer
7	82 01 135	1	.... Special hexagon thin nut
8	82 01 131	1	.... Pump drive coupling.
9	80 05 043	1	... Pressure connection c/w screws, 'O' ring & washer
10	93 43 044	4	.... Capscrew
11	86 00 405	1	.... 'O' ring.
12	01 00 302	4	.... Shakeproof washer
	80 05 044	1	... Suction connection assembly.
13	80 05 036	1	.... Connection base
14	85 81 168	1	.... Elbow
15	80 05 037	1	.... Low pressure connection.
16	93 43 044	4	.... Capscrew
17	85 00 405	1	.... 'O' ring.
	80 05 034	1	. Torque arm c/w chain, shackle etc
18	80 05 033	1	.. Torque arm
	60 00 087	2	.. Shackle assembly compr:-
19	60 00 089	1	... Shackle pin
20	60 00 088	1	... Shackle.
21	04 31 105	1	... Spring cotter
22	09 02 330	1	... Chain
23	93 13 055	3	. Setscrew
24	80 13 268	1	. P.T.O. guard.
25	93 13 065	1	. Setscrew
26	91 00 205	4	. Spring washer
27	92 43 074	4	. Capscrew - socket headed
28	91 00 204	4	. Spring washer

GEARBOX



Ref	Part No	Qty	Description
	80 13 325		GEARBOX
1	80 13 074	1	.Gearbox casing
2	80 13 074	1	.Gearbox lid
3	80 13 078	1	.Gear
4	80 13 072	1	.Pinion
5	80 13 053	1	.Gasket
6	06 00 048	2	.Bearing
7	86 29 134	1	.Seal
8	04 01 250	2	.External circlip
9	06 00 051	2	.Bearing
10	86 29 142	1	.Seal
11	80 13 077	1	.Expansion plug
12	80 13 075	1	.Shaft
13	09 05 116	3	.Steel ball
14	80 13 067	1	.Expansion plug
15	93 43 053	8	.Capscrew
16	80 13 076	2	.Dowel
17	80 13 068	1	.Breather plug
18	80 13 070	1	.Drain plug
19	80 13 069	1	.Oil level plug
20	80 13 079	1	.Key
21	80 13 030	1	.Ball retainer
22	80 13 032	1	.Ball retaining spring
23	82 01 132	1	Gasket - Pumpface ref. only

SLEW VALVE



Ref	Part No.	Qty	Description.
	71 18 264		SLEW CROSS PORT RELIEF VALVE.
1	71 18 265	1	.Slew cross port block.
2	85 81 208	2	.Restrictor adaptor.
3	81 23 041	2	.Restrictor disc
4	81 16 011	2	.Restrictor spring.
5	85 81 145	4	.Union
6	86 50 103	6	.Bonded seal
7	71 18 036	2	.Relief valve cap.
* 8	01 00 102	As reqd	.Bright washer
* 9	60 01 232	As reqd	. Shim
10	81 10 003	2	.Relief valve spring.
■ 11	81 25 048	2	.Drill bush
12	81 25 041	2	.Relief valve needle assembly
13	71 18 124	2	.Plug
14	86 50 106	2	.Bonded seal
15	93 13 044	1	.Setscrew
16	91 00 204	1	.Spring washer

* Using accurate pressure guage, shim relief valves to 210 Bar (3000PSI)

■ Assemble bushes into block using 'Permabond A115'

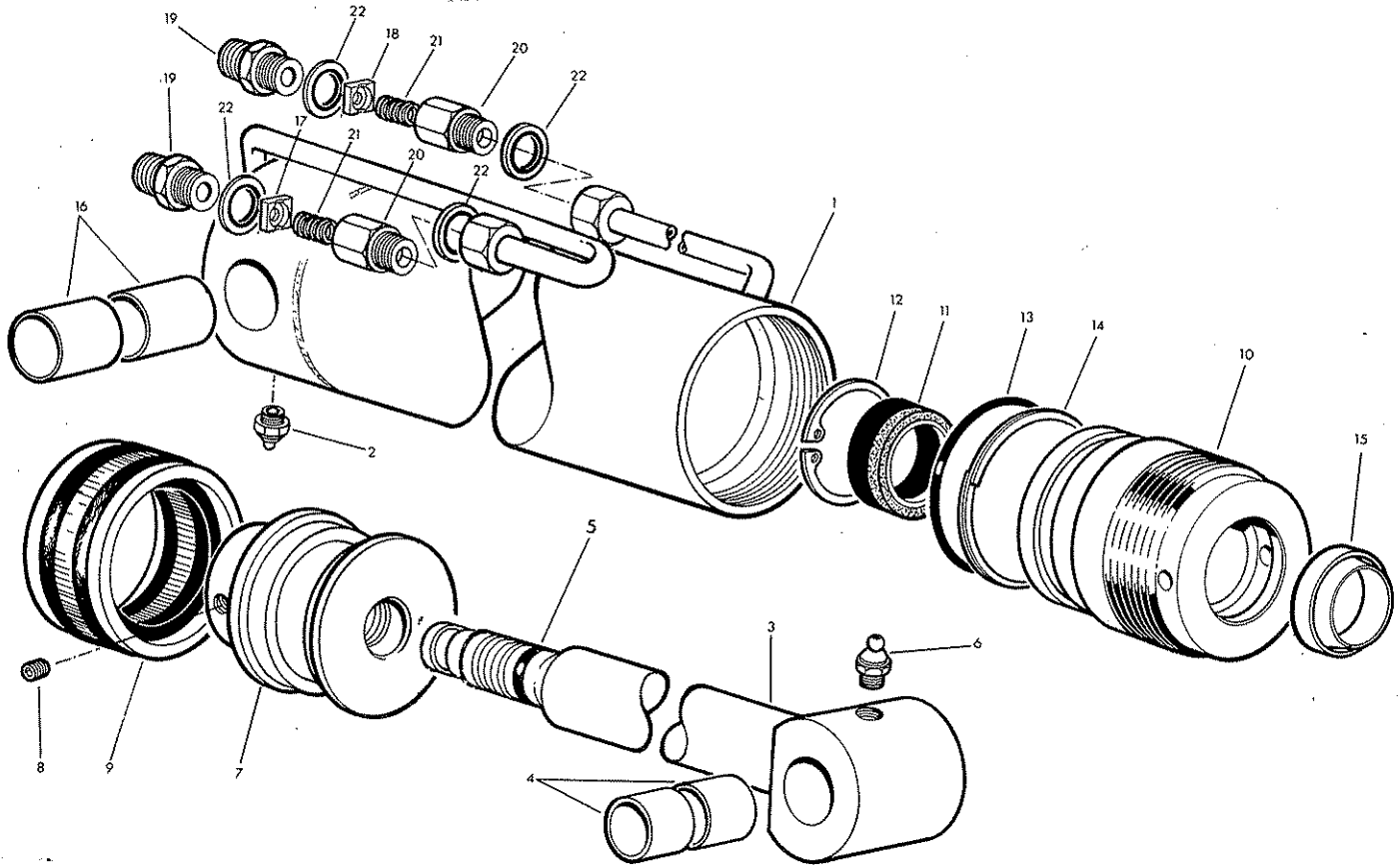
An alternative slew cross port relief valve may be supplied.

The complete assembly is interchangeable and thus retains the same part No.

The parts that differ from the above assembly are shown below.

17	71-18-347	1	Slew cross port block
18	81-30-145	2	Relief valve assembly
19	86-00-113	1	Relief valve 'O' ring

LIFT RAM ASSEMBLY (Ditch King only)



Ref	Part No.	Qty	Description
	71 18 270		LIFT RAM ASSEMBLY
	71 18 275	1	..Ram basic compr:-
1	71 18 276	1	.. Ram cylinder c/w greaser.
2	09 01 125	1	...Greaser
* 3	71 35 304	1	..Ram rod c/w bush, 'O' ring and greaser
4	60 12 032	2	...Bush
5	86 00 119	1	...'O' ring.
6	09 01 121	1	...Greaser
* 7	71 35 004	1	..Piston c/w seal and grub screw
8	93 00 110	1	...Grub screw
9	86 38 740	1	...Piston seal
10	71 35 282	1	..Gland housing c/w seals etc
11	86 22 127	1	...Gland seal.
12	04 11 132	1	...Internal circlip
13	87 00 740	1	...'O' ring.
14	87 09 740	1	...Anti extrusion ring
15	86 29 147	1	...Wiper seal.
16	71 01 134	2	..Bush - ram base.
17	81 23 044	1	..Restrictor disc - base.
18	81 23 046	1	..Restrictor disc - gland.
19	85 81 209	2	..Union
20	85 81 208	2	..Restrictor adaptor.
21	81 16 011	2	..Restrictor spring
22	86 50 103	4	..Bonded seal

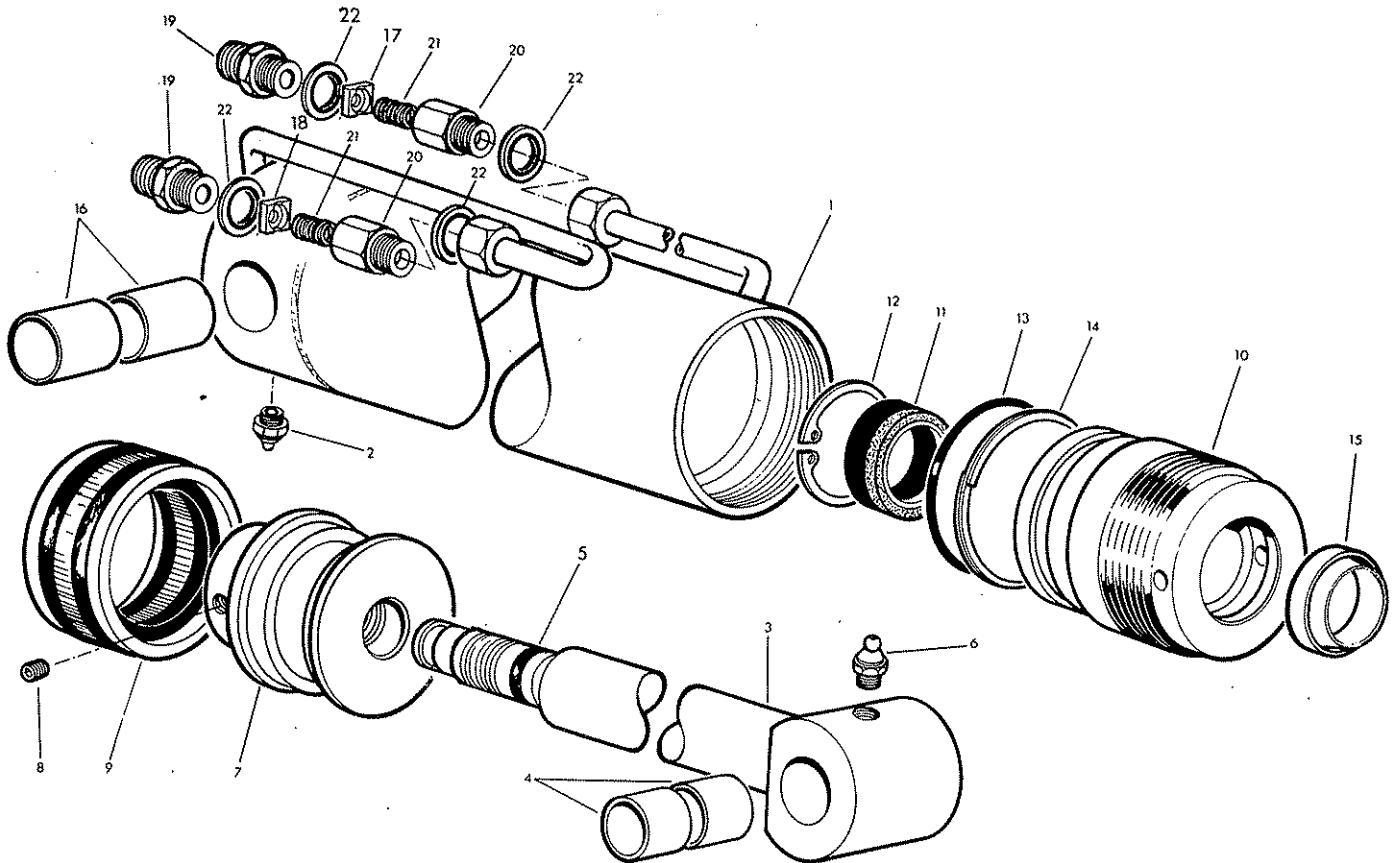
86 99 187

SEAL KIT

* when replacing a piston or a piston rod on machines prior to serial No a complete piston/ piston rod assembly is necessary, Part No 71 35 105.

Assembly note. Piston is assembled onto piston rod using ' Permabond A 113 or other similar thread locking compound.

LIFT RAM ASSEMBLY (Ditch Boss only)



Ref	Part No.	Qty	Description
	71 18 329		LIFT RAM ASSEMBLY
	71 18 275	1	..Ram basic compr:-
1	71 18 276	1	.. Ram cylinder c/w greaser.
2	09 01 125	1	...Greaser
* 3	71 35 304	1	..Ram rod c/w bush, 'O' ring and greaser
4	60 12 032	2	...Bush
5	86 00 119	1	... 'O' ring.
6	09 01 121	1	...Greaser
* 7	71 35 004	1	..Piston c/w seal and grub screw
8	93 00 110	1	...Grub screw
9	86 38 740	1	...Piston seal
10	71 35 282	1	..Gland housing c/w seals etc
11	86 22 127	1	...Gland seal.
12	04 11 132	1	...Internal circlip
13	87 00 740	1	... 'O' ring.
14	87 09 740	1	...Anti extrusion ring
15	86 29 147	1	...Wiper seal.
16	71 01 134	2	..Bush - ram base.
17	81 23 044	1	..Restrictor disc - gland.
18	81 23 046	1	..Restrictor disc - base.
19	85 81 209	2	..Union
20	85 81 208	2	..Restrictor adaptor.
21	81 16 011	2	..Restrictor spring
22	86 50 103	4	..Bonded seal

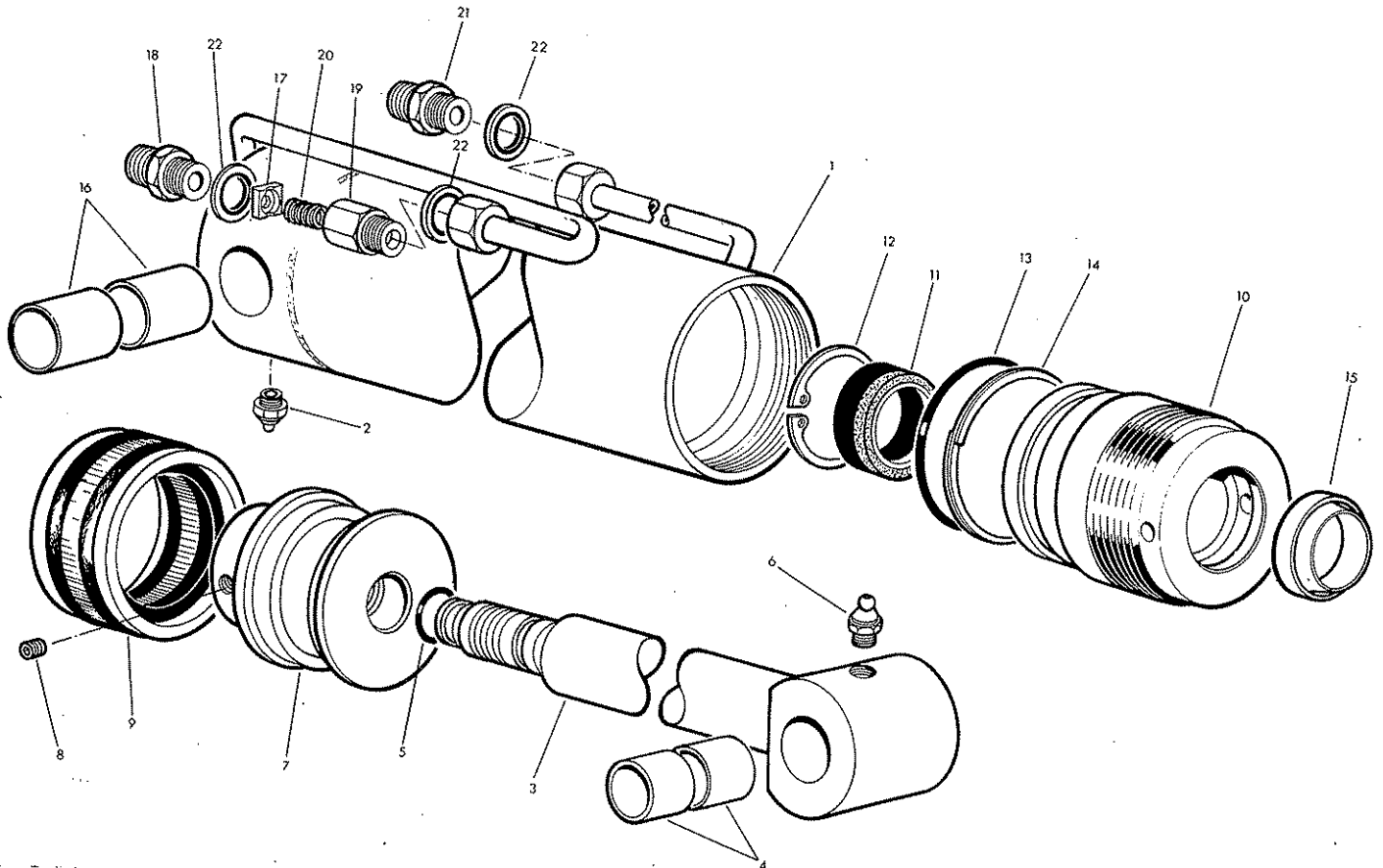
86 99 187

SEAL KIT

* when replacing a piston or a piston rod on machines prior to serial No. 00 DB 90 a complete piston/ piston rod assembly is necessary, Part No 71 35 105.

Assembly note. Piston is assembled onto piston rod using ' Permabond A 113 or other similar thread locking compound.

LEG RAM ASSEMBLY



Ref	Part No.	Qty	Description.
	71 18 271		LEG RAM ASSEMBLY
	71 18 275	1	..Ram basic compr:-
1	71 18 276	1	..Ram cylinder c/w greaser.
2	09 01 125	1	...Greaser
* 3	71 35 304	1	..Ram rod c/w bush, 'O' ring and greaser.
4	60 12 032	2	...Bush
5	86 00 119	1	...'O' ring.
6	09 01 121	1	...Greaser
* 7	71 35 004	1	..Piston c/w seal and grub screw
8	93 00 110	1	...Grub screw
9	86 38 740	1	...Piston seal
10	71 35 282	1	..Gland housing c/w seals etc.
11	86 22 127	1	...Gland seal.
12	04 11 132	1	...Internal circlip.
13	87 00 740	1	...'O' ring.
14	87 09 740	1	...Anti extrusion ring.
15	86 29 147	1	...Wiper seal.
16	71 01 134	2	..Bush - ram base.
17	81 23 043	1	..Restrictor disc.
18	85 81 145	1	..Union
19	85 81 208	1	..Restrictor adaptor
20	81 16 011	1	..Restrictor spring.
21	81 30 067	1	..Restrictor union
22	86 50 103	3	..Bonded seal

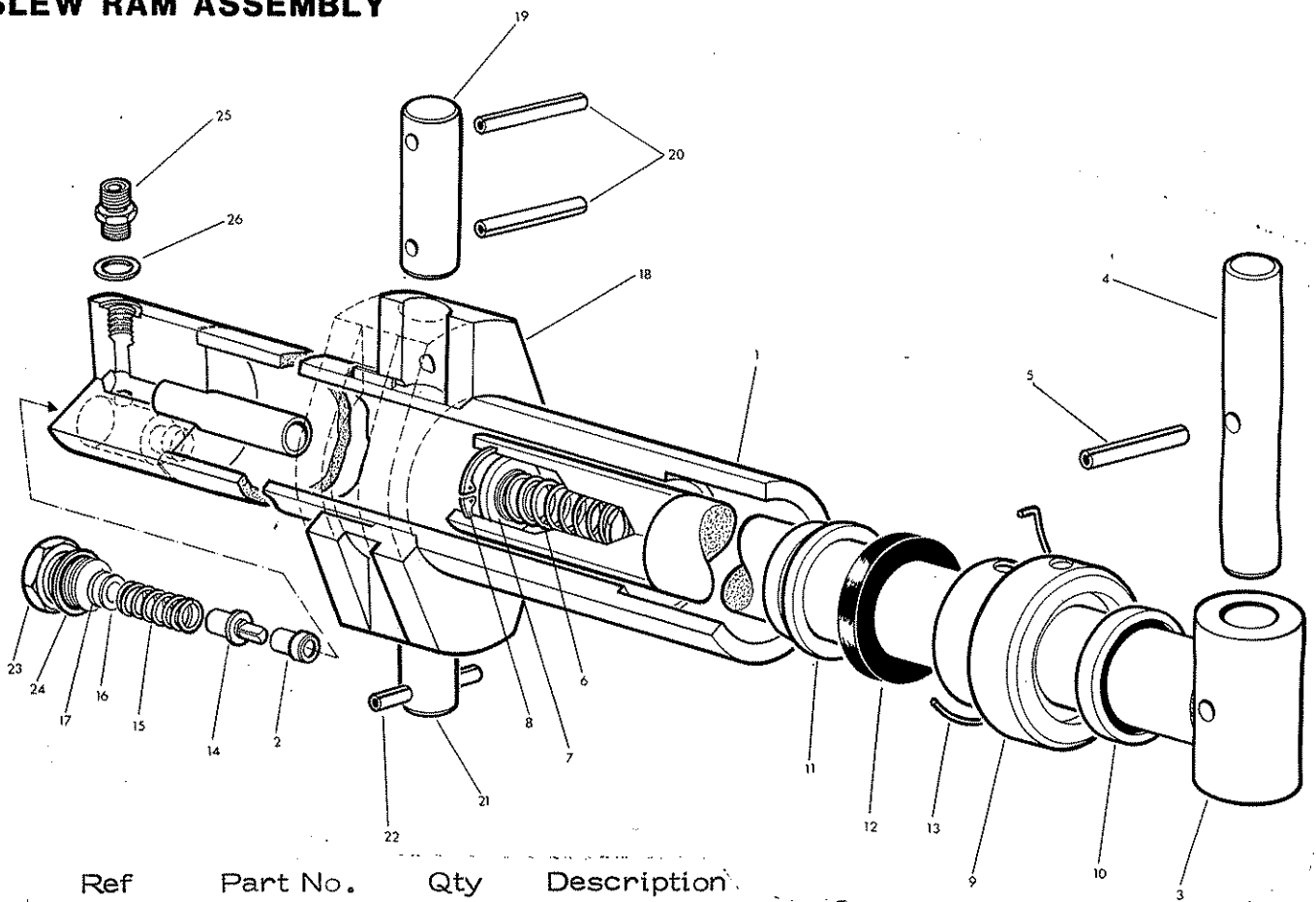
86 99 187

SEAL KIT

* when replacing a piston or a piston rod on machines prior to serial No a complete piston/ piston rod assembly is necessary, Part No 71 35 105.

Assembly note. Piston is assembled onto piston rod using 'PermaBond A 113 or other similar thread locking compound.

SLEW RAM ASSEMBLY

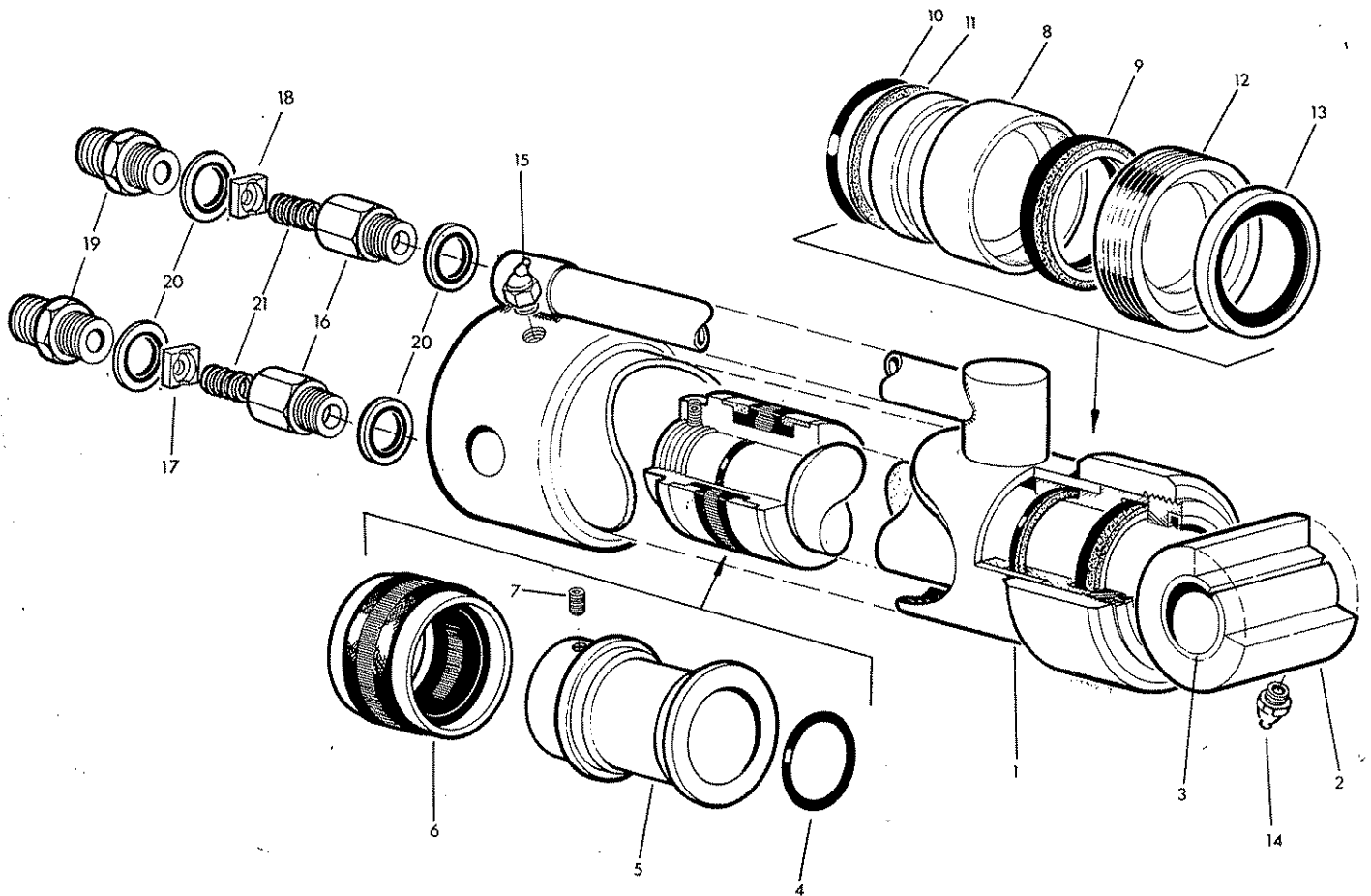


Ref	Part No.	Qty	Description
	71 18 260		SLEW RAM ASSEMBLY
* 1	71 18 261	1	.Ram cylinder barrel c/w drill bush
* 2	81 25 048	1	..Drill bush
3	71 15 298	1	.Ram rod assembly compr:-
4	71 02 176	1	..Rod pivot pin c/w spring dowel.
5	04 22 528	1	...Spring dowel
6	71 03 078	1	..Spring.
7	71 15 043	1	..Spring seat.
8	04 11 230	1	..Internal circlip.
9	71 18 012	1	.Head bush c/w wiper
10	86 29 152	1	..Wiper seal.
11	71 01 031	1	.Insert
12	86 12 132	1	.Gland seal.
13	71 01 030	1	.Locking wire.
14	81 25 041	1	.Relief valve needle assembly
15	81 10 003	1	.Relief valve spring
16	60 01 232	As reqd	.Shim
17	01 00 102	As reqd	.Bright washer
18	71 18 263	1	.Slew ram trunnion c/w pins
19	71 18 013	1	.Pivot pin, upper c/w spring dowel
20	04 22 528	2	..Spring dowel
21	71 02 177	1	.Pivot pin lower c/w spring dowel.
22	04 22 528	2	..Spring dowel
23	81 03 001	1	.Plug
24	86 50 104	1	.Bonded seal
25	80 02 177	1	.Union
26	86 50 102	1	.Bonded seal
	86 99 179		SEAL KIT

* Assembly Note.

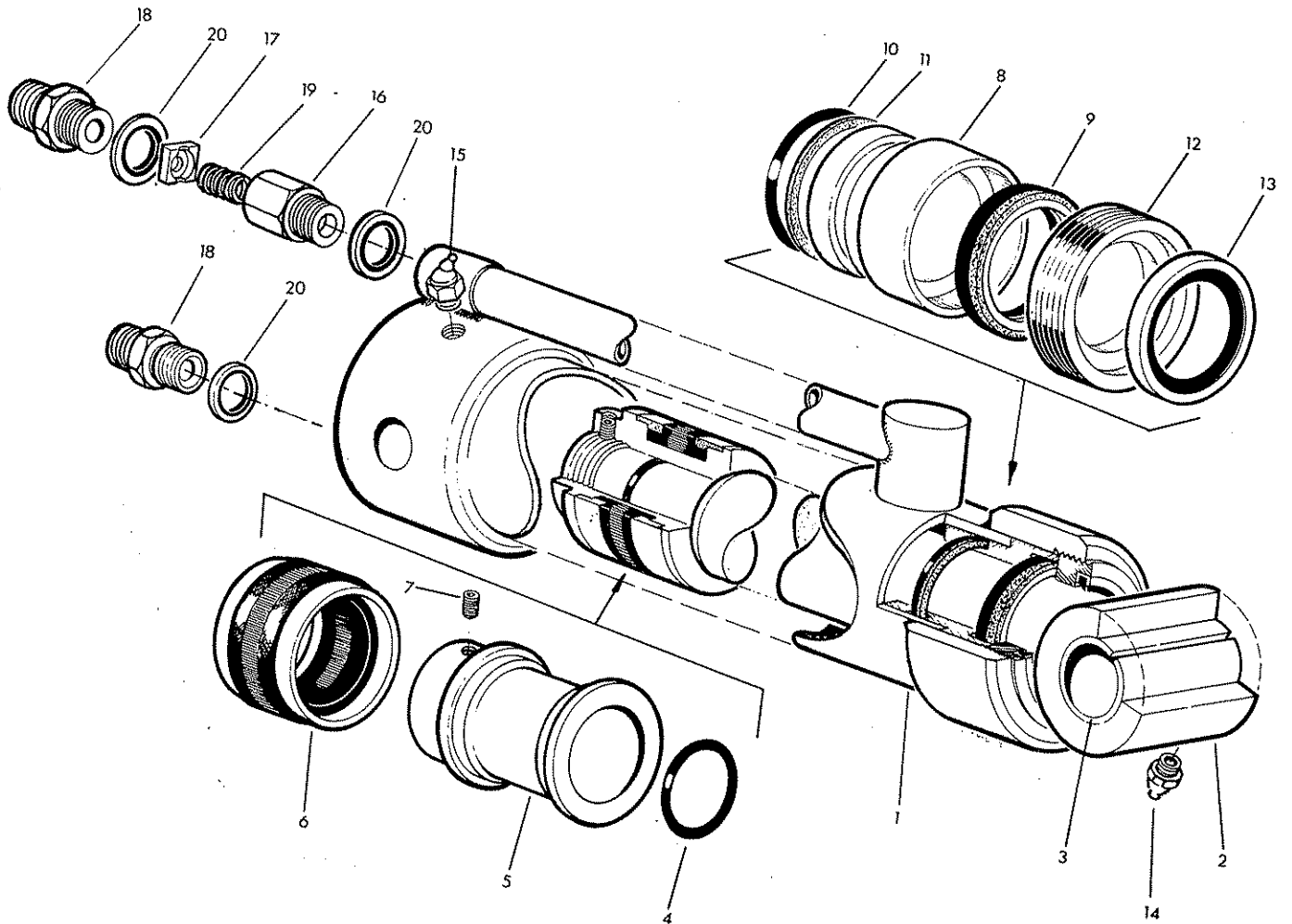
Item 2 is assembled into item 1 using 'Permabond A115' or similar.

REACH RAM ASSEMBLY



Ref	Part No.	Qty	Description
	71 18 278		REACH RAM ASSEMBLY
	71 03 303	1	.Ram basic comprising
1	71 03 304	1	..Ram cylinder.
2	71 01 095	1	..Ram rod c/w bush 'O' ring.
3	71 05 050	1	...Bush
4	86 00 119	1	... 'O' ring.
5	71 01 165	1	..Piston c/w seal & grub screw.
6	86 36 131	1	...Piston seal.
7	93 00 110	1	... Grub screw
8	71 01 099	1	..Gland housing c/w seal and 'O' ring.
9	86 22 127	1	...Gland seal.
10	86 00 304	1	... 'O' ring.
11	86 09 304	1	...Anti extrusion ring.
12	71.01 100	1	..Gland nut c/w wiper
13	86 40 328	1	..Piston rod wiper
14	09 01 121	1	.. Greaser
15	09 01 124	1	..Greaser
16	85 81 208	2	.Restrictor adaptor.
17	81 23 045	1	.Restrictor disc - base.
18	81 23 043	1	.Restrictor disc - gland.
19	85 81 209	2	.Union
20	86 50 103	4	.Bonded seal
21	81 16 011	2	.Spring.
	86 99 102		SEAL KIT.

BUCKET RAM ASSEMBLY

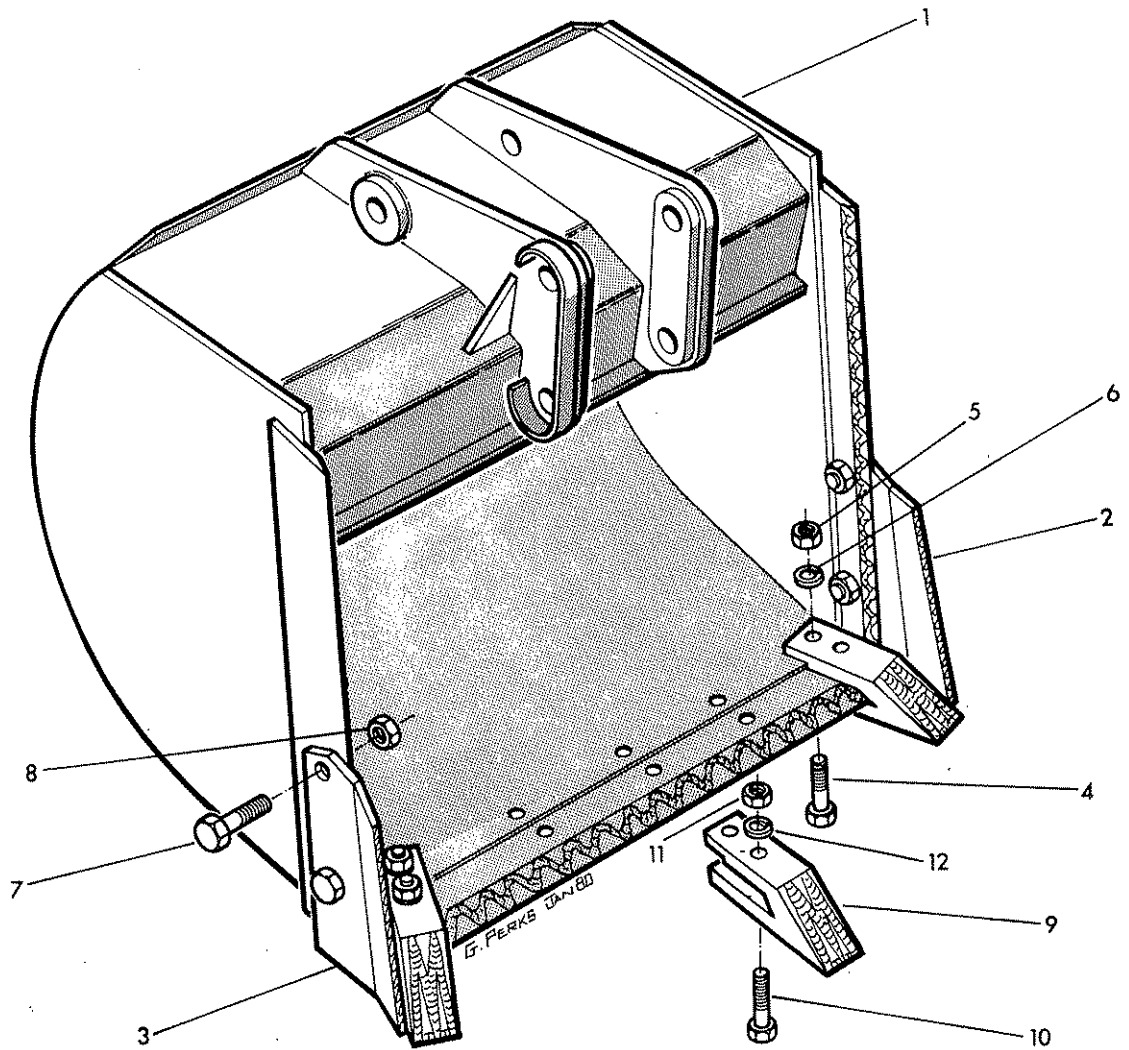


Ref	Part No.	Qty	Description
	71 18 277		BUCKET RAM ASSEMBLY
	71 03 303		.Ram basic comprising:-
1	71 03 304	1	..Ram cylinder.
2	71 01 095	1	..Ram, rod c/w bush 'O' ring.
3	71 05 050	1	...Bush
4	86 00 119	1	... 'O' ring.
5	71 01 165	1	..Piston c/w seal & grub screw.
6	86 36 131	1	...Piston seal.
7	93 00 110	1	...Grub screw
8	71 01 099	1	..Gland housing c/w seal and 'O' ring.
9	86 22 127	1	...Gland seal.
10	86 00 304	1	... 'O' ring.
11	86 09 304	1	...Anti extrusion ring.
12	71 01 100	1	..Gland nut c/w wiper
13	86 40 328	1	...Piston rod wiper.
14	09 01 121	1	..Greaser
15	09 01 124	1	..Greaser
16	85 81 208	1	.Restrictor adaptor.
17	81 23 046	1	.Restrictor disc - gland.
18	85 81 209	2	.Union
19	81 16 011	1	.Spring.
20	86 50 103	3	.Bonded seal

86 99 102

SEAL KIT

HEAVY DUTY DIGGING BUCKETS



Ref	Part No.	Qty		Description
		450 mm	600 mm	

1	72 17 251			600 mm DIGGING BUCKET
	72 17 252		1	.Bucket
	72 17 250			400 mm DIGGING BUCKET
	72 17 253	1		.Bucket not illustrated

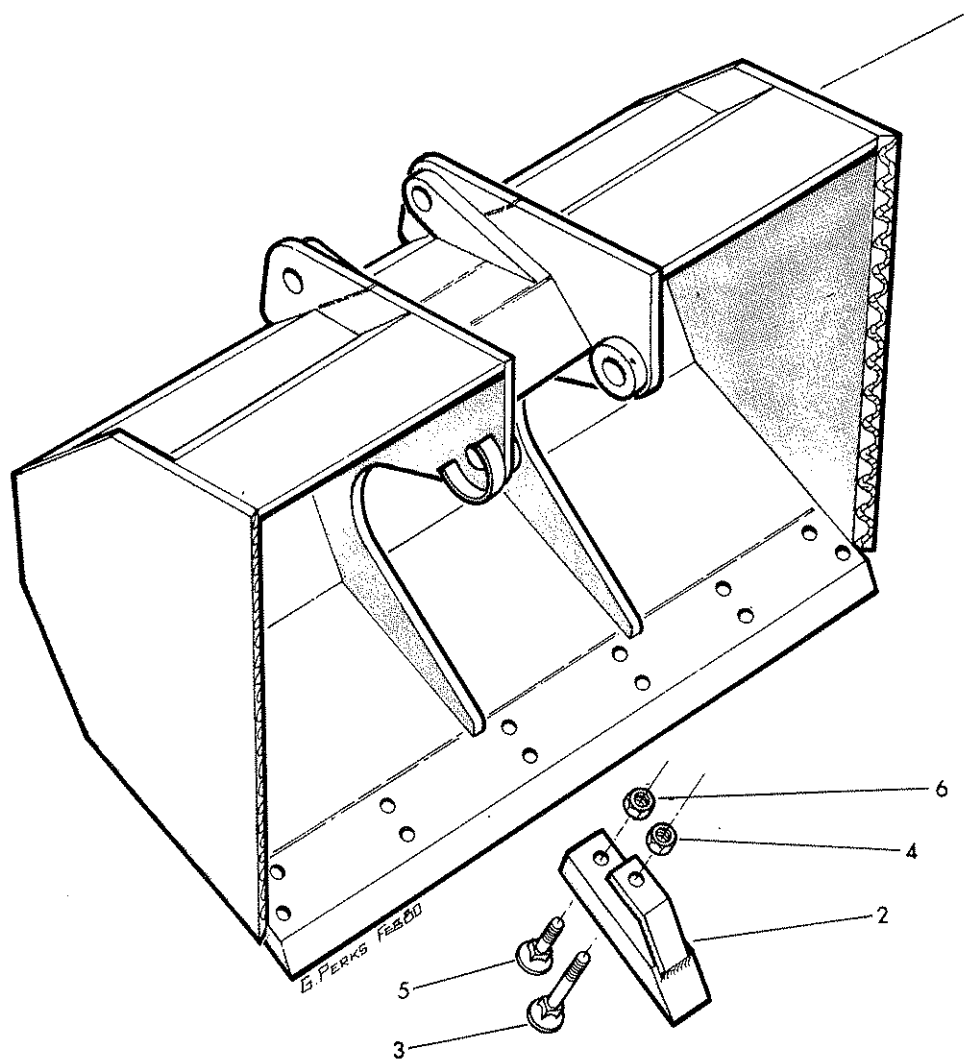
The following items are common to both bucket assemblies :-

2	72 17 259	1	1	.Side tine left hand c/w nuts, bolts etc.
3	72 17 258	1	1	.Side tine right hand c/w nuts, bolts etc.

Items 4 - 8 (inclusive) are common to both side tines.

4	92 13 085	2	2	..Bolt
5	91 13 005	2	2	..Hexagon nut
6	91 00 205	2	2	..Spring washer
7	02 11 124	2	2	..Bolt
8	01 41 004	2	2	..Self-locking nut
9	72 17 300	2	3	.Bucket tine c/w nuts, bolts etc.
10	92 13 085	2	2	..Bolt
11	91 13 005	2	2	..Hexagon nut
12	91 00 205	2	2	..Spring washer

DITCHING BUCKETS



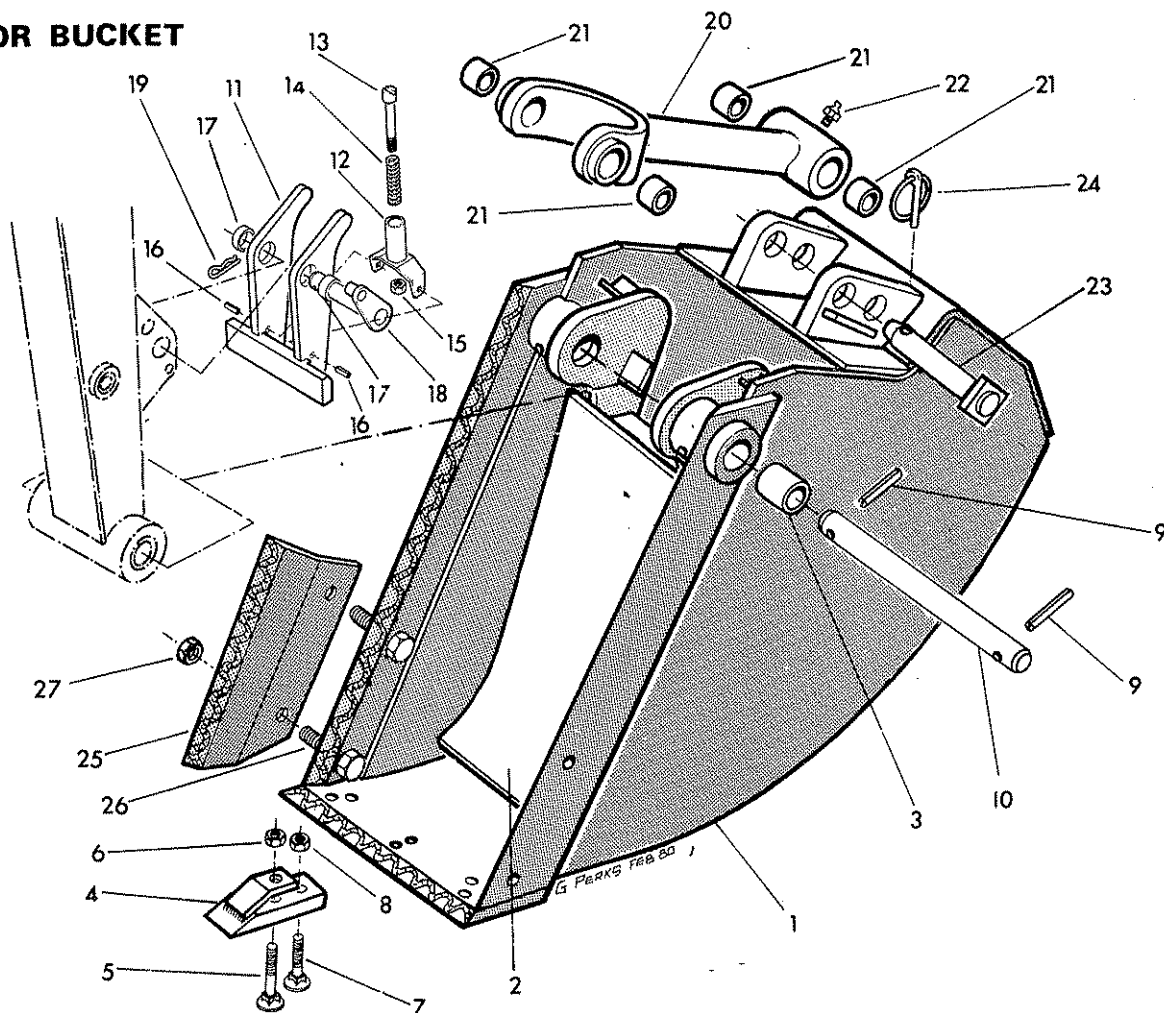
Ref	Part No	Qty	Qty	Description
		1 m	800 mm	

	72 17 261			1 METRE DITCHING BUCKET
	72 17 263	1		.Bucket (not illustrated)
	72 17 260			800 mm DITCHING BUCKET
1	72 17 262		1	.Bucket

The following items are common to both bucket assemblies:-

2	60 12 073	8	6	.Tine assembly
3	60 12 074	1	.1	..Tine bolt long c/w nut
4	01 12 004	1	1	...Hexagon nut
5	60 12 034	1	1	..Tine bolt short c/w nut
6	01 12 004	1	1	...Hexagon nut

300m.m. EJECTOR BUCKET

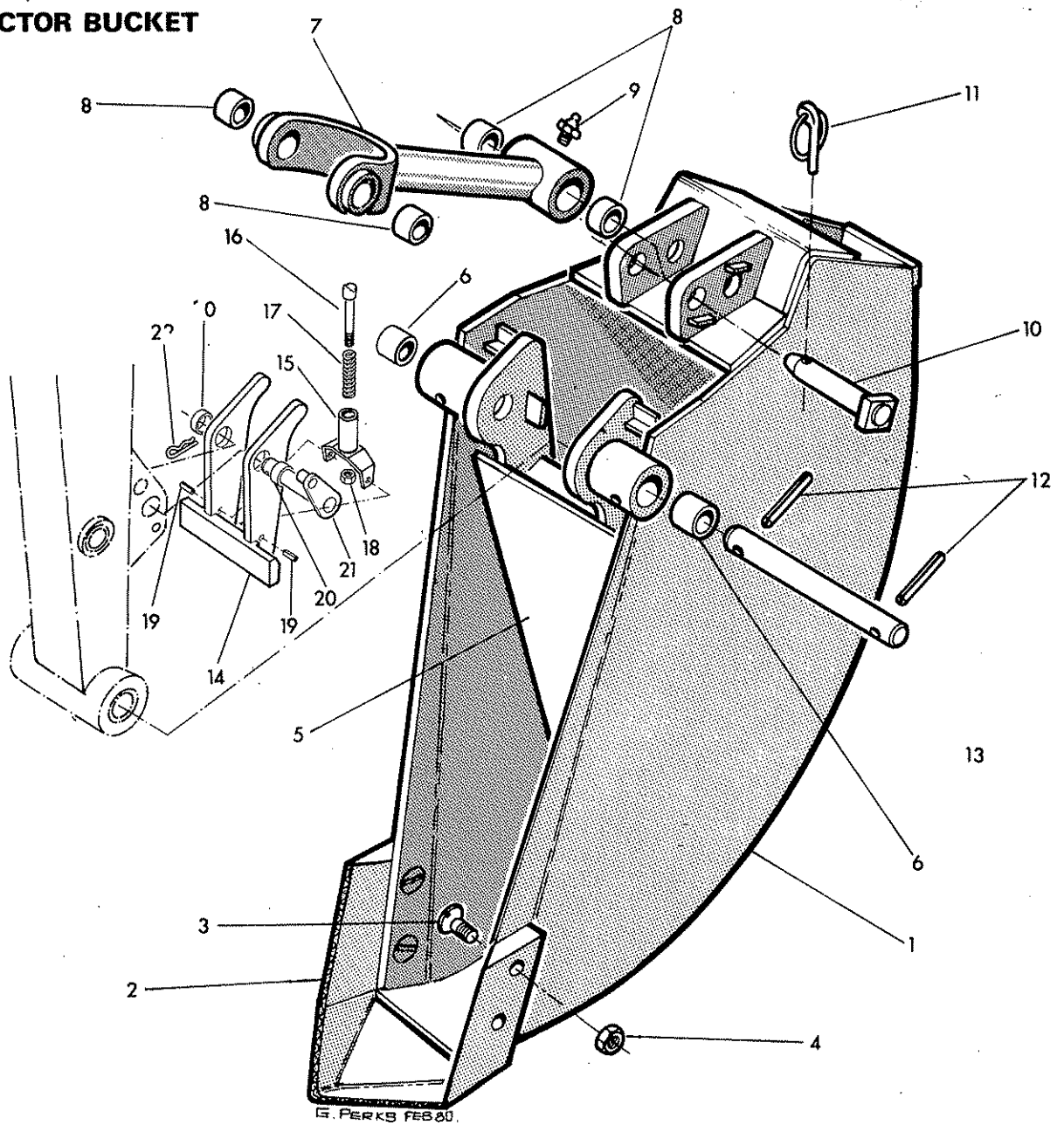


Ref	Part No.	Qty	Description
	72 17 281		300 mm EJECTOR BUCKET
1	72 17 306	1	.Bucket
2	72 17 308	1	.Ejector
3	60 12 032	2	.Bucket pivot bush
	60 12 073	3	.Tine assembly
4	60 12 033	1	..Tine
5	60 12 074	1	..Tine bolt long c/w nut
6	01 12 004	1	...Hexagon nut
7	60 12 034	1	..Tine bolt short c/w nut
8	01 12 004	1	...Hexagon nut
9	04 42 632	2	.Spirol pin
10	73 12 033	1	.Bucket pivot pin
	72 17 020	1	.Latch assembly comprising :-
11	72 17 030	1	..Latch rocker
	72 17 031	1	..Cartridge assembly comprising :-
12	72 17 032	1	...Cartridge fork
13	72 17 034	1	...Plunger
14	60 00 110	1	...Spring
15	01 11 003	1	...Hexagon nut
16	04 21 812	2	..Roll pin
17	72 17 035	2	..Bush
18	72 17 036	1	..Latch pin c/w spring cotter
19	04 31 105	1	...Spring cotter
20	72 17 289	1	.Special slave link c/w bushes and greaser
21	70 17 037	4	..Bush
22	09 01 121	1	..Greaser
23	72 17 019	1	.Ram rod pivot pin c/w linch pin
24	04 31 217	1	..Linch pin

OPTIONAL EXTRA

25	70 12 072	2	CHEEK PLATES c/w nuts and bolts
26	02 11 134	4	.Bolt
27	01 41 004	4	.Self-locking nut

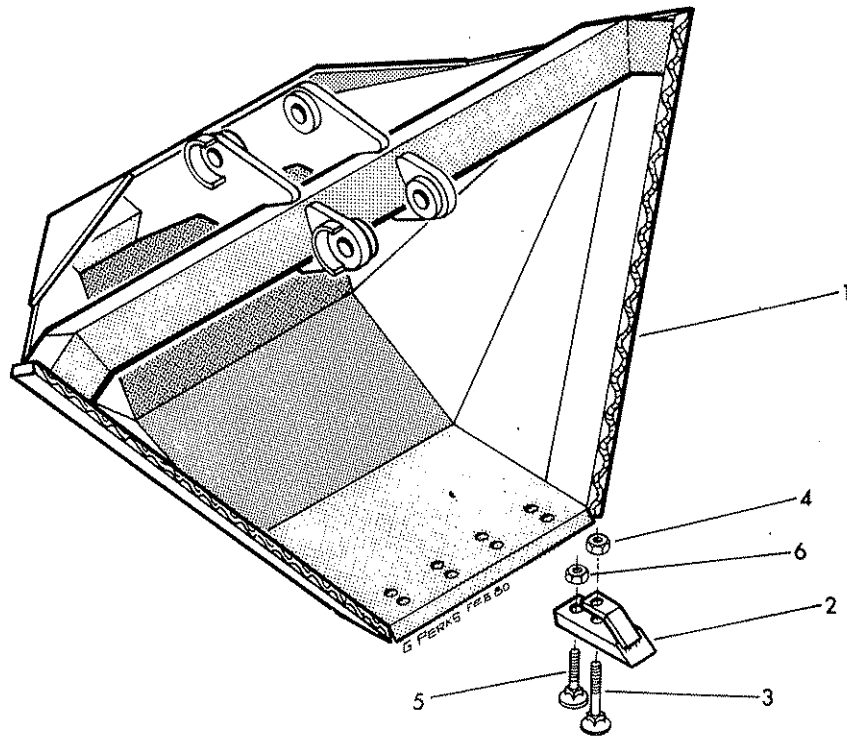
140m.m. EJECTOR BUCKET



G. PERKS FEB 80.

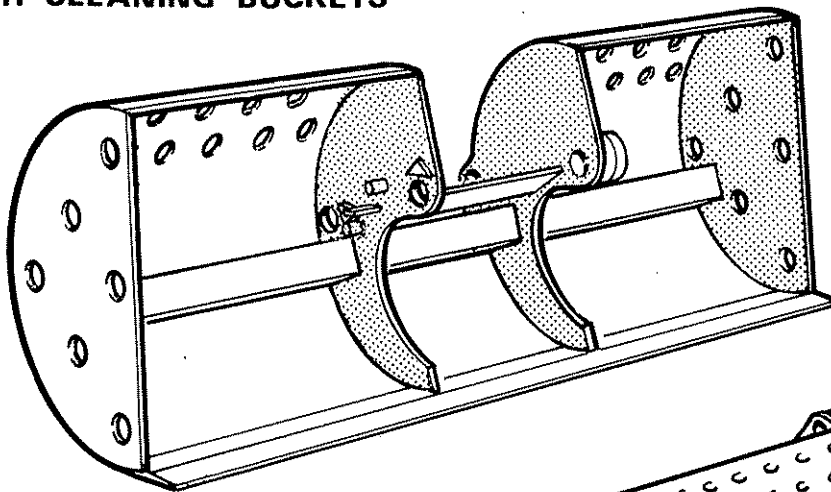
Ref	Part No.	Qty	Description
	72 17 280		140 mm EJECTOR BUCKET
1	72 17 277	1	.Bucket
2	70 12 263	1	.Bucket shoe
3	70 12 030	4	.Special shoe screw
4	01 32 004	4	.Hexagon thin nut
5	72 17 278	1	.Ejector
6	73 12 021	2	.Bucket pivot bush
7	72 17 289	1	.Special slave link c/w bushes and greaser
8	70 12 037	4	..Bush
9	09 01 121	1	..Greaser
10	72 17 019	1	.Ram rod pivot pin c/w linch pins
11	04 31 217	1	..Linch pin
12	04 42 632	2	.Spirol pin
13	73 12 020	1	.Bucket pivot pin
	72 17 020	1	.Latch assembly comprising :-
14	72 17 030	1	..Latch rocker
	72 17 031	1	..Cartridge assembly comprising :-
15	72 17 032	1	...Cartridge fork
16	72 17 034	1	...Plunger
17	60 00 110	1	...Spring
18	01 11 003	1	...Hexagon nut
19	04 21 812	2	..Roll pin
20	72 17 035	2	..Bush
21	72 17 036	1	..Latch pin c/w spring cotter
22	04 31 105	1	...Spring cotter

WIDE 'V' BUCKET



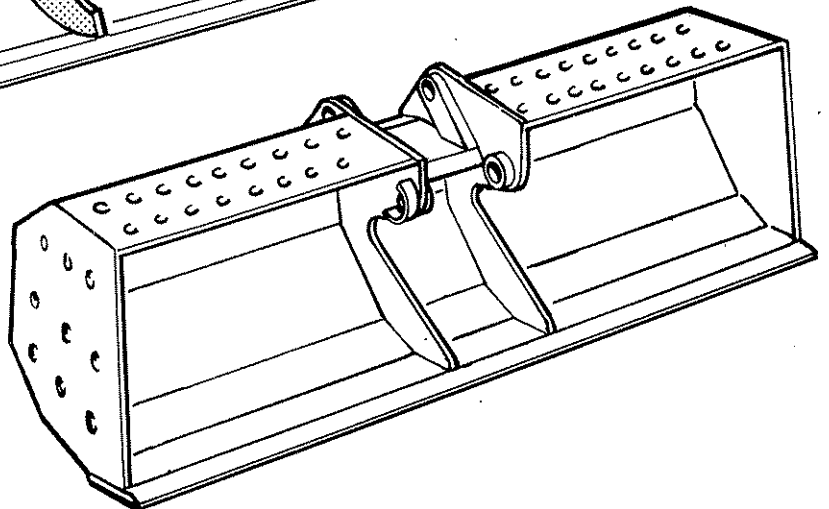
Ref	Part No	Qty	Description
	72 17 290		1240 'V' BUCKET
1	72 17 291	1	.Bucket
2	60 12 073	4	.Tine Assemblies
3	60 12 074	1	..Tine bolt long c/w nut
4	01 12 004	1	...Hexagon nut
5	60 12 034	1	..Tine bolt short c/w nut
6	01 12 004	1	...Hexagon nut

DITCH CLEANING BUCKETS

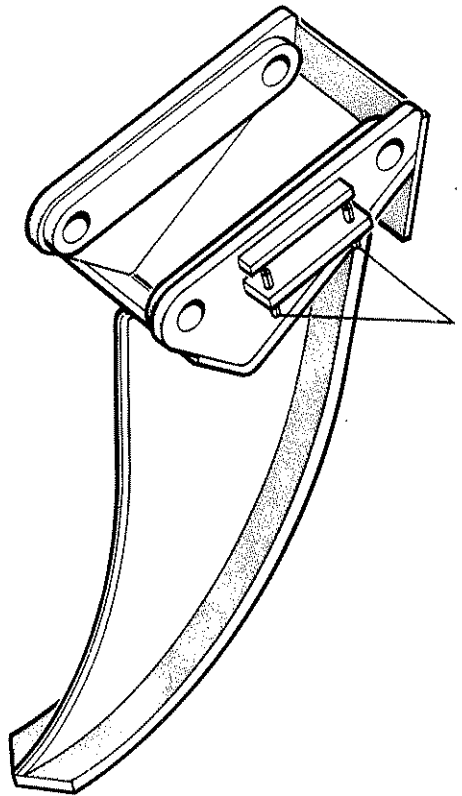


72 17 270
1.5 METRE DITCH
CLEANING BUCKET

73 12 320
1.2 METRE DITCH
CLEANING BUCKET

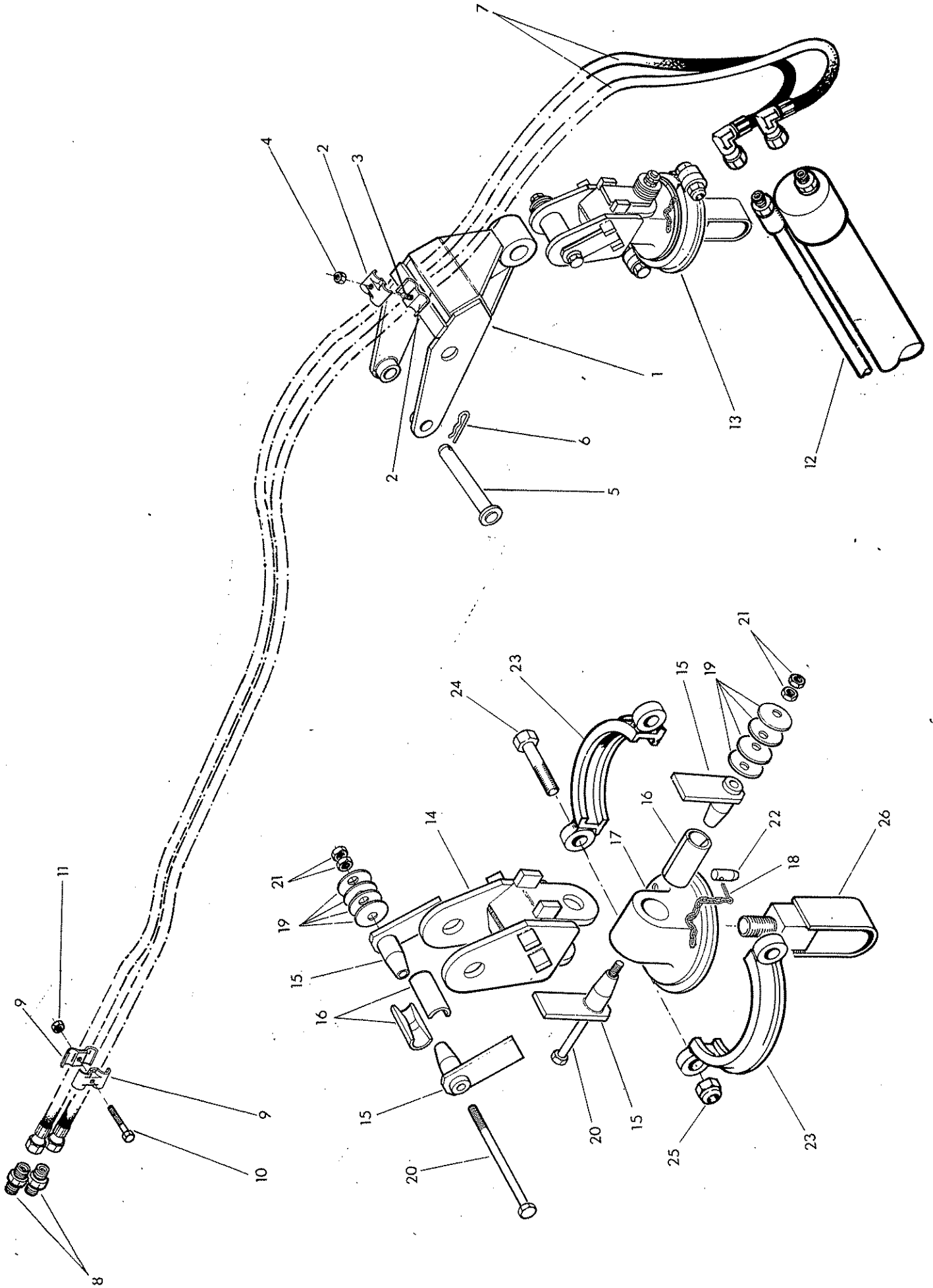


PICK TINE



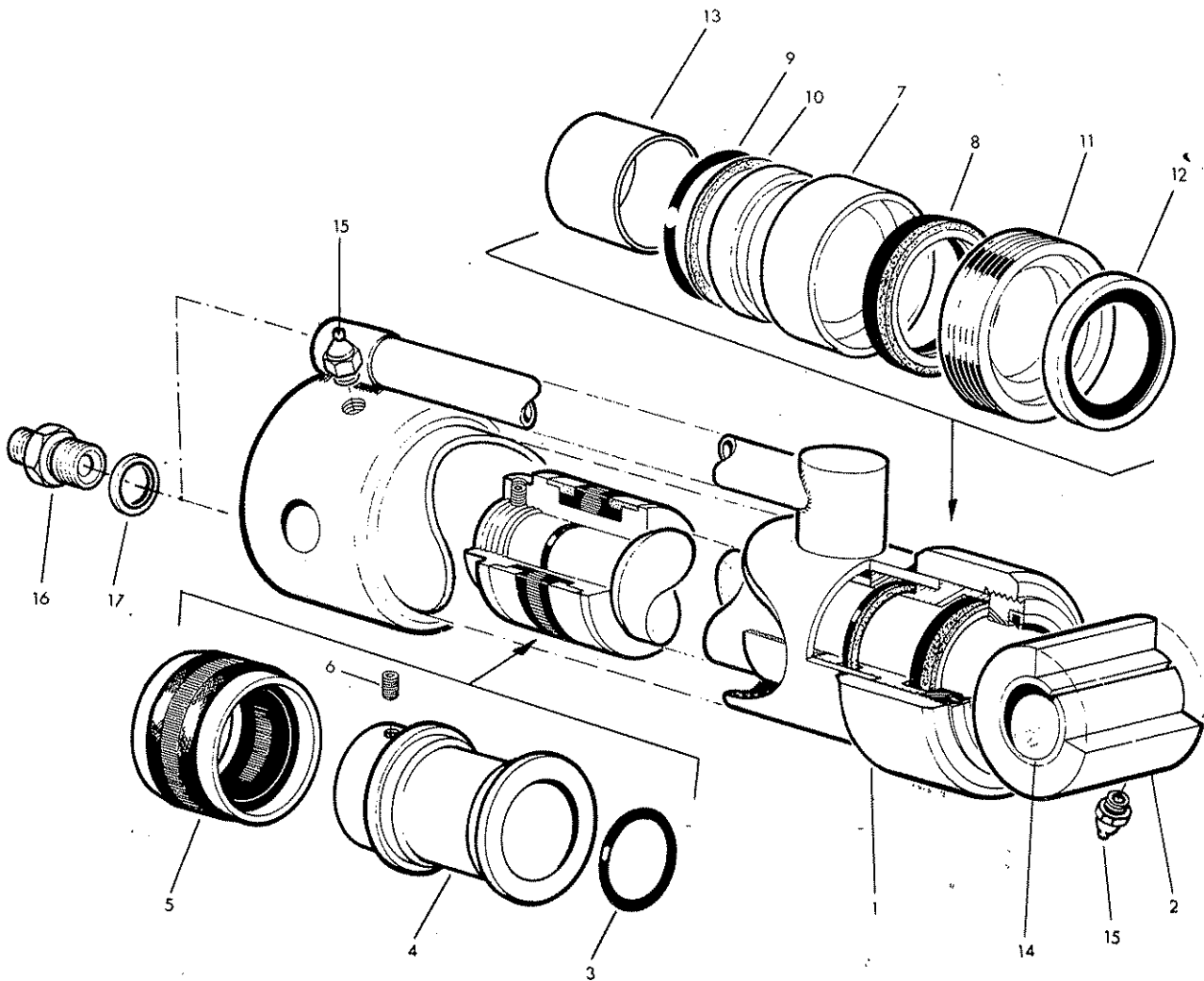
<u>Ref</u>	<u>Part No.</u>	<u>Qty</u>	<u>Description</u>
	73 12 315		PICK TINE ASSEMBLY
1	04 22 732	2	.Spring dowel

GRAB MOUNTING KIT (Optional extra Ditch King only)



Ref	Part No.	Qty	Description
	71 18 320		GRAB MOUNTING KIT
1	71 18 321	1	. Grab mounting bracket c/w hose clips
2	60 12 026	2	..Hose clip
3	92 13 085	1	..Bolt
4	91 43 005	1	..Self locking nut
5	71 06 086	1	.Mounting pin c/w spring cotter.
6	04 31 105	1	..Spring cotter
7	85 31 293	2	.Hose 3/8 BSP S-F 90 ⁰ -F x 90" long.
8	60 00 113	2	.Union
9	60 12 026	2	.Hose clip
10	92 13 105	1	.Bolt
11	91 43 005	1	.Self locking nut
12	70 16 279	1	.Grab ram
13	70 16 278	1	.Swivel assembly compr:-
14	70 16 281	1	..Swivel jaw
15	70 16 052	4	..Friction pin
16	70 16 053	2	..Damping bush
17	70 16 282	1	..Swivel plate c/w split pin
18	05 03 083	1	...Split pin
19	70 14 021	1	..Spring disc.
20	02 11 486	2	..Bolt
21	01 31 006	4	..Thin hexagon nut
22	71 05 076	1	..Locating pin
23	71 05 326	2	..Swivel clamp half
24	02 11 186	2	..Bolt
25	01 51 006	2	..Self locking nut
26	73 12 073	1	..GCM safety strap.

GRAB RAM (Ditch King only)

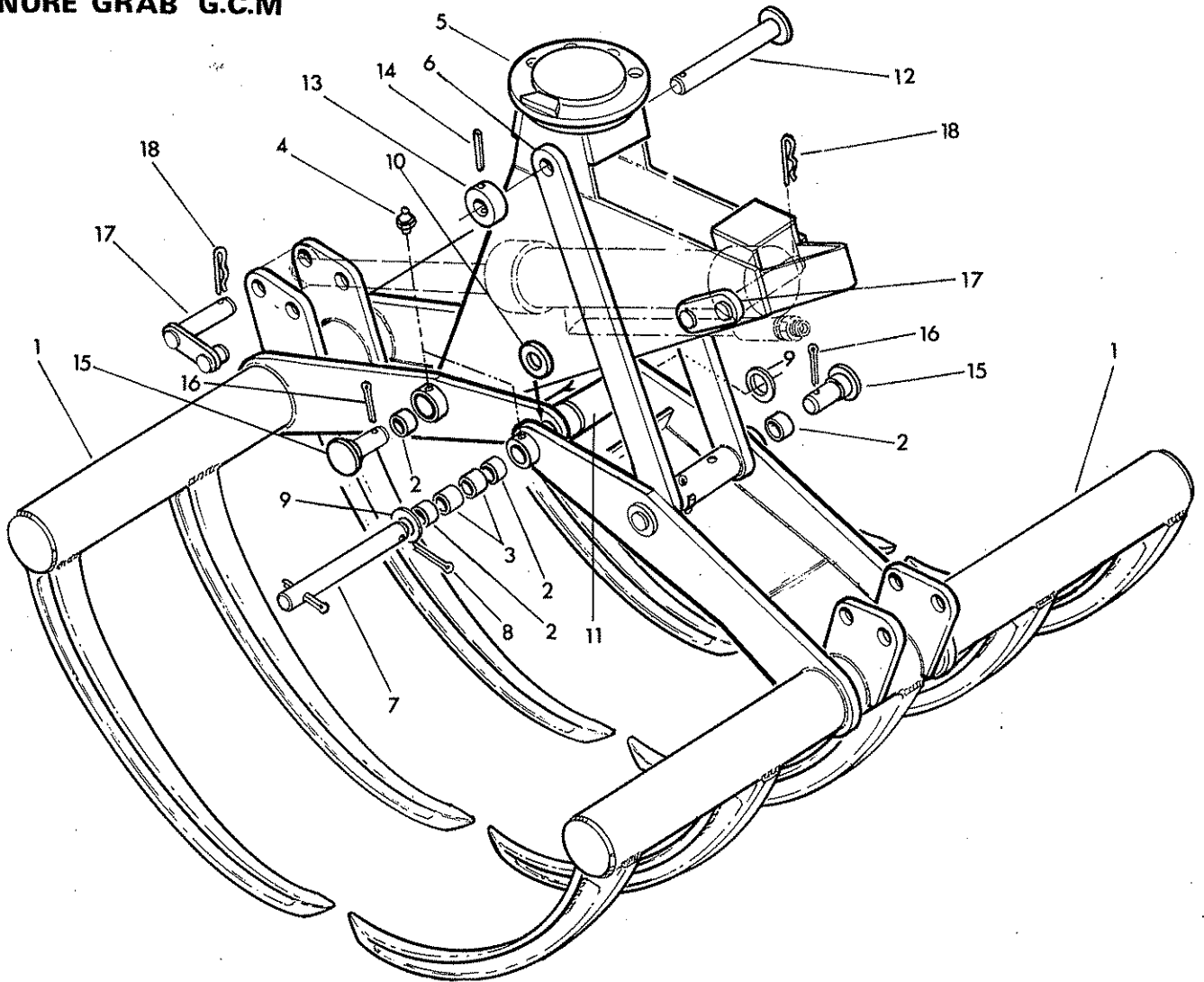


Ref	Part No.	Qty	Description
	70 16 279		GRAB RAM ASSEMBLY COMPLETE COMPR:-
	70 16 280	1	.Ram Assembly
1	72 12 272	1	..Ram cylinder
2	72 12 004	1	..Piston rod.
3	86 00 119	1	..'O' ring.
4	71 01 165	1	..Piston c/w seal and grub screw
5	86 36 131	1	..Piston seal.
6	93 00 110	1	..Grub screw
7	71 01 099	1	..Gland seal housing c/w seals and 'O' ring etc.
8	86 22 127	1	..Gland seal.
9	86 00 304	1	...'O' ring.
10	86 09 304	1	...Anti extrusion ring.
11	71 01 100	1	..Gland nut c/w wiper
12	86 40 328	1	...Piston rod wiper
13	71 06 196	1	..Piston rod spacer
14	71 05 050	1	.Bush
15	09 01 121	2	.Greaser
16	60 00 113	2	.Union
17	86 50 103	2	.Bonded seal

86 99 102

RAM SEAL KIT

MANURE GRAB G.C.M

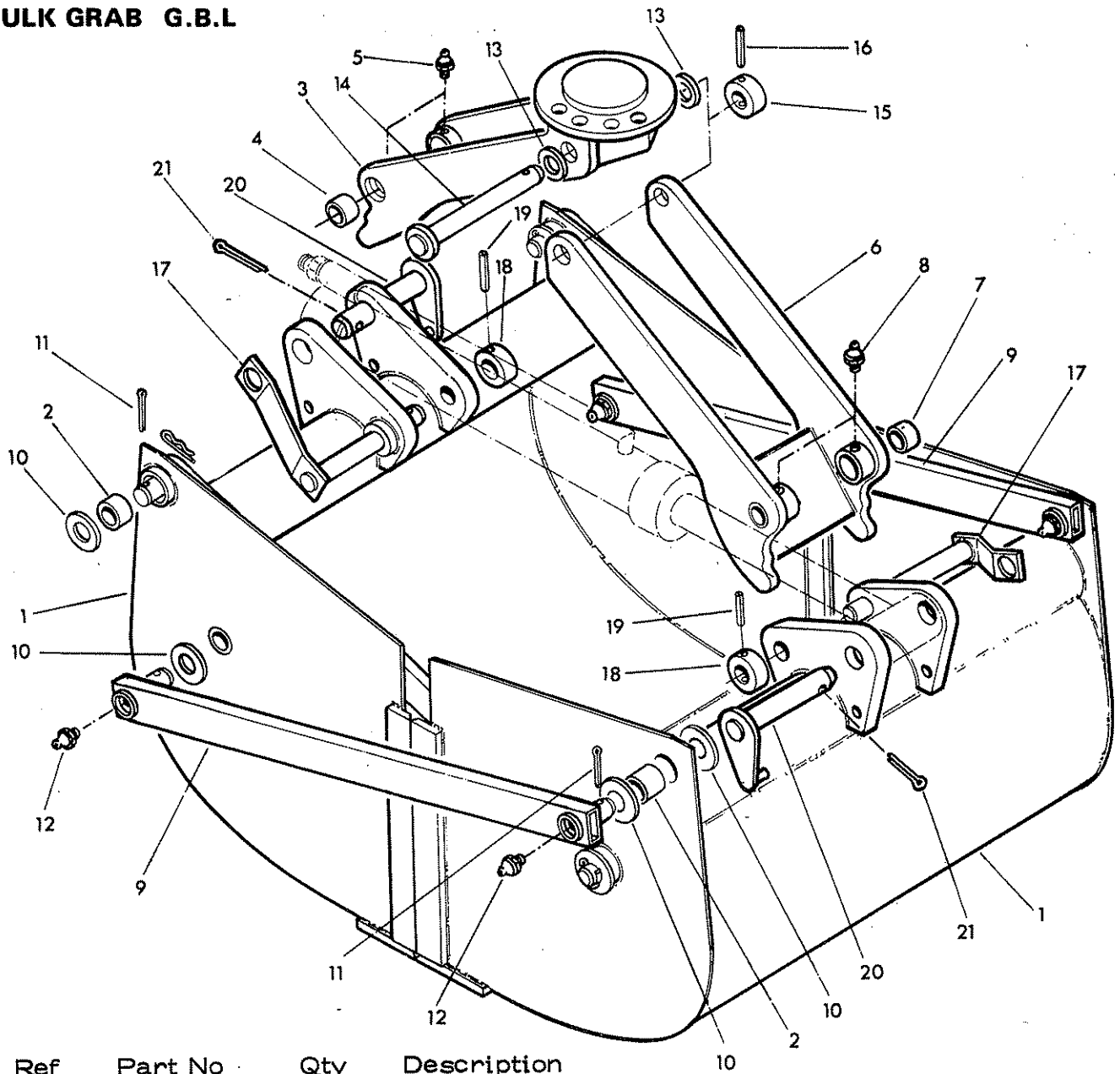


Ref	Part No	Qty	Description
	70 16 320		MANURE GRAB ASSEMBLY G.C.M.
1	70 16 321		.Grab half c/w bushes & greasers
2	71 01 134	1	..Bush
3	60 12 032	3	..Bush
4	09 01 121	4	..Greaser
5	72 14 302	1	.Suspension frame
6	70 16 322	1	.Suspension link
7	70 16 055		.Joint pin c/w split pin & washer
8	05 03 165	2	..Split pin
9	70 16 041	2	..Washer
10	70 16 056	2	.Spacer
11	70 16 058	1	.Spacer
12	70 16 057	1	.Suspension link pin c/w collar & dowel
13	72 14 068	1	..Collar
14	04 21 628	1	..Spring dowel
15	70 16 059	4	.Pivot pin c/w Split pin
16	05 03 165	1	..Split pin
17	72 14 071	2	.Ram pin
18	04 31 105	2	.Spring cotter

OPTIONAL EXTRA

70 14 287	2	Slurry plate c/w hook & spring cotter
70 14 071	2	Attachment hook
04 31 105	2	Spring cotter

BULK GRAB G.B.L



Ref	Part No	Qty	Description
	70 16 310		BULK GRAB ASSEMBLY G. B. L.
1	70 16 311	2	.Grab half c/w bushes
2	60 12 032	4	..Bush
3	70 16 303	1	.Suspension link fixed c/w bushes & greasers
4	60 12 032	2	..Bush
5	09 01 121	2	..Greaser
6	70 16 305	1	.Suspension link c/w bushes & greasers
7	60 12 032	2	..Bush
8	09 01 121	2	..Greaser
9	70 16 039	4	.Cross link c/w washers, split pin etc
10	70 16 041	4	..Washer
11	05 03 206	2	..Split pin
12	09 01 121	2	..Greaser
13	70 16 044	2	.Spacer
14	70 16 045	1	.Suspension link pin c/w collar & spring dowel
15	70 16 046	1	.Collar
16	04 21 628	1	..Spring dowel
17	70 16 047	2	.Suspension link pin lower c/w collar & spring dowel
18	70 16 049	1	..Collar
19	04 21 632	1	..Spring dowel
20	70 16 054	2	.Ram locating pin c/w split pin
21	05 03 165	1	..Split pin



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