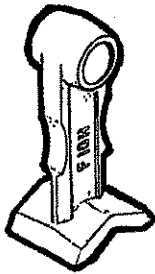




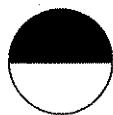
**McCONEL**



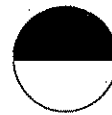
# **Operator Manual**

**PA**  
**5, 6 & 7000**  
**series**

*All models*



**McCONEL**



# IMPORTANT

## VERIFICATION OF WARRANTY REGISTRATION



### DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with McConnel Limited before 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.mccommel.com](http://www.mccommel.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.

**CAUTION: DO NOT OVER TORQUE HYDRAULIC FITTINGS AND HOSES**

#### 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

# WARRANTY POLICY

## WARRANTY REGISTRATION

All machines must be registered, by the selling dealer with McConnell Ltd, before delivery to the end user. On receipt of the goods it is the buyer's responsibility to check that the Verification of Warranty Registration in the Operator's Manual has been completed by the selling dealer.

### 1. LIMITED WARRANTIES

- 1.01. All machines supplied by McConnell Limited are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months, unless a different period is specified.
- 1.02. All spare parts supplied by McConnell Limited are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 6 months.
- 1.03. The manufacturer will replace or repair for the purchaser any part or parts found, upon examination at its factory, to be defective under normal use and service due to defects in material or workmanship. Returned parts must be complete and unexamined.
- 1.04. This warranty does not apply to any part of the goods, which has been subjected to improper or abnormal use, negligence, alteration, modification, fitment of non-genuine parts, accident damage, or damage resulting from contact with overhead power lines, damage caused by foreign objects (e.g. stones, iron, material other than vegetation), failure due to lack of maintenance, use of incorrect oil or lubricants, contamination of the oil, or which has served its normal life. This warranty does not apply to any expendable items such as blades, flails, flap kits, skids, soil engaging parts, shields, guards, wear pads or pneumatic tyres.
- 1.05. Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.
- 1.06. Warranty on hoses is limited to 12 months and does not include hoses which have suffered external damage. Only complete hoses may be returned under warranty, any which have been cut or repaired will be rejected.
- 1.07. Machines must be repaired immediately a problem arises. Continued use of the machine after a problem has occurred can result in further component failures, for which McConnell Ltd cannot be held liable, and may have safety implications.
- 1.08. Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of McConnell Ltd.
- 1.09. For machine warranty periods in excess of 12 months the following additional exclusions shall apply:
  - 1) Hoses, external seals, exposed pipes and hydraulic tank breathers.
  - 2) Filters.
  - 3) Rubber mountings.
  - 4) External electric wiring.

**N.B. Warranty cover will be invalid if any non-genuine parts have been fitted or used. Use of non-genuine parts may seriously affect the machine's performance and safety. McConnell Ltd. cannot be held responsible for any failures or safety implications that arise due to the use of non-genuine parts.**

## **2. REMEDIES AND PROCEDURES**

- 2.01. The warranty is not effective unless the Selling Dealer registers the machine, via the McConnel web site and confirms the registration to the purchaser by completing the Verification of Warranty Registration in the operator's manual.
- 2.02. Any fault must be reported to an authorised McConnel dealer as soon as it occurs. Continued use of a machine, after a fault has occurred, can result in further component failure for which McConnel Ltd cannot be held liable.
- 2.03. Repairs should be undertaken within two days of the failure. Claims submitted for repairs undertaken more than 2 weeks after a failure has occurred, or 2 days after the parts were supplied will be rejected, unless the delay has been authorised by McConnel Ltd.
- 2.04. All claims must be submitted, by an authorised McConnel Service Dealer, within 30 days of the date of repair.
- 2.05. Following examination of the claim and parts the manufacture will pay, at their discretion, for any valid claim the cost of any parts and an appropriate labour allowance if applicable.
- 2.06. The submission of a claim is not a guarantee of payment.
- 2.07. Any decision reached by McConnel Ltd. is final.

## **3. LIMITATION OF LIABILITY**

- 3.01. The manufacturer disclaims any express (except as set forth herein) and implied warranties with respect to the goods including, but not limited to, merchantability and fitness for a particular purpose.
- 3.02. The manufacturer makes no warranty as to the design, capability, capacity or suitability for use of the goods.
- 3.03. Except as provided herein, the manufacturer shall have no liability or responsibility to the purchaser or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by the goods including, but not limited to, any indirect, special, consequential, or incidental damages resulting from the use or operation of the goods or any breach of this warranty. Notwithstanding the above limitations and warranties, the manufacturer's liability hereunder for damages incurred by the purchaser or others shall not exceed the price of the goods.
- 3.04. No action arising out of any claimed breach of this warranty or transactions under this warranty may be brought more than one (1) year after the cause of the action has occurred.

## **4. MISCELLANEOUS**

- 4.01. The manufacturer may waive compliance with any of the terms of this limited warranty, but no waiver of any terms shall be deemed to be a waiver of any other term.
- 4.02. If any provision of this limited warranty shall violate any applicable law and is held to be unenforceable, then the invalidity of such provision shall not invalidate any other provisions herein.
- 4.03. Applicable law may provide rights and benefits to the purchaser in addition to those provided herein.



EC DECLARATION OF CONFORMITY

*Conforming to EEC Directive 89/392/EEC*

We,

**McCONNEL LIMITED**, Temeside Works, Ludlow,  
Shropshire SY8 1JL.

*declare under our sole responsibility that*

the product (type) .. *AXLE MOUNTED ARM FLAIL MOWER* .....

Product Code .. *PM 50 / 60 / 70* .....

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 Directive 89/392/EEC,  
and AMD 91/368/EEC, AMD 93/44/EEC, AMD 93/68/EEC and  
conforms with European Norm. BS EN 292.

**Part 1:1991 Safety of Machinery – Terminology, methodology.**  
**Part 2:1991 Safety of Machinery – Technical Specifications.**

and other national standards associated with its design and  
construction as listed in the Technical File.

Signed .. *Adrian Longstaff* ..  
*on behalf of McCONNEL LIMITED* .....

*Responsible Person*

Status .. *Director of Engineering* .. Date *24<sup>th</sup> January 2001* ..

## **READ THE BOOK FIRST**

**It might save hours and pounds later**

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

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

### **NOISE**

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

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

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

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

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# GENERAL INFORMATION

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

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

## DEFINITION

The following definitions apply throughout this manual:

### WARNING

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

### CAUTION

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

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

## LEFT AND RIGHT-HAND

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

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

## **DELIVERY**

The machine may be despatched in a partially dismantled state and will certainly be fitted with packing straps to ensure stability during transport.

Prior to attachment to the tractor the machine must be unpacked/re assembled into a position where it is standing on its legs/feet with the arms and head in a stable position with the head on the ground.

**When doing this always carefully observe the following :-**

Study carefully and note any dismantled or disconnected components.

Study the transport straps and determine what will happen if they are cut

Read the instruction book first to familiarise yourself with the machine.

Be aware that components are heavy and may cause injury if they fall onto or crash into any part of the body

Use overhead lifting equipment. Do not risk injury by lifting awkward or heavy objects.

**Never struggle alone - ALWAYS SEEK ASSISTANCE.**

Proceed one step at a time and ensure that the machine is stable and supported before moving on to the next operation.

If the machine requires tractor power to carry out the necessary work e.g. extending rams on electric machines, always operate these controls from within the cab and ensure the engine is switched off before leaving the tractor seat.

**Always proceed with extreme caution, think carefully about the consequences of the next action and always remain aware of human vulnerability when working with heavy machinery.**

# FEATURES

## ALL MODELS

- Axle mounted
- Right or left hand cut
- Hedge or grass
- Choice of cable, multiswitch, monolever or proportional controls
- Upward or downward flail rotation
- Fully independent hydraulic 60 Hp at PTO
- Operator guard
- 48 gallon (220 litre) hydraulic reservoir
- Independent reversible rotor ON/OFF valve
- Hydraulic breakaway
- Auto Head Control - option
- Head float - option
- Head angle float - option

## PA5000/6000

- 1.2m or 1.6m flail head

## PA5000M/6000M

- 1.25m forward extension
- 1.2m flail head

## PA5000T

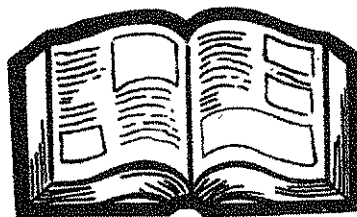
- 1.05m telescopic extension
- 1.2m flail head

## PA7000T

- 1.35m telescopic extension
- 1.2m flail head



## **SAFETY INFORMATION**



This machine has the potential to be extremely dangerous, in the wrong hands it can kill or maim. It is therefore imperative that the owner, and the operator of this machine, read the following section to ensure that they are both fully aware of the dangers that do, or may exist, and their responsibilities surrounding its use.

The operator of this machine is responsible not only for their own safety but equally for the safety of others who may come into the close proximity of the machine, as the owner you are responsible for both.

### **POTENTIAL SIGNIFICANT DANGERS ASSOCIATED WITH THE USE OF THIS MACHINE:**

- *Being hit by debris thrown by rotating components.*
- *Being hit by machine parts ejected through damage during use.*
- *Being caught on a rotating power take-off (PTO) shaft.*
- *Being caught in other moving parts i.e.: belts, pulleys and cutting heads.*
- *Electrocution from Overhead Power Lines (by contact with or 'flashover' from).*
- *Being hit by cutting heads or machine arms as they move.*
- *Becoming trapped between tractor and machine when hitching or unhitching.*
- *Tractor overbalancing when machine arm is extended.*
- *Injection of high-pressure oil from hydraulic hoses or couplings.*
- *Machine overbalancing when freestanding (out of use).*
- *Road traffic accidents due to collision or debris on the road.*

## **BEFORE USING THIS MACHINE YOU MUST:**

- *Ensure you read all sections of the operator handbook.*
- *Ensure the operator is, or has been, properly trained to use the machine.*
- *Ensure the operator has been issued with and reads the operator handbook.*
- *Ensure the operator understands and follows the instructions in operator handbook.*
- *Ensure the tractor front, rear and side(s) are fitted with metal mesh or polycarbonate guards of suitable size and strength to protect the operator against thrown debris or parts.*
- *Ensure tractor guards are fitted correctly, are undamaged and kept properly maintained.*
- *Ensure that all machine guards are in position, are undamaged, and are kept maintained in accordance with the manufacturer's recommendations.*
- *Ensure flails and their fixings are of a type recommended by the manufacturer, are securely attached and that none are missing or damaged.*
- *Ensure hydraulic pipes are carefully and correctly routed to avoid damage by chaffing, stretching or pinching and that they are held in place with the correct fittings.*
- *Always follow the manufacturer's instructions for attachment and removal of the machine from the tractor.*
- *Check that the machine fittings and couplings are in good condition.*
- *Ensure the tractor meets the minimum weight recommendations of the machine manufacturer and that ballast is used as necessary.*
- *Always inspect the work area thoroughly before starting to note obstacles and remove wire, bottles, cans and other debris.*
- *Use clear suitably sized warning signs to alert others to the nature of the machine working within that area. Signs should be placed at both ends of the work site. (It is recommended that signs used are of a size and type specified by the Department of Transport and positioned in accordance with their and the Local Highways Authority guidelines).*
- *Ensure the operator is protected from noise. Ear defenders should be worn and tractor cab doors and windows must be kept closed. Machine controls should be routed through proprietary openings in the cab to enable all windows to be shut fully.*
- *Always work at a safe speed taking account of the conditions i.e.: terrain, highway proximity and obstacles around and above the machine.*
- *Extra special attention should be applied to Overhead Power Lines. Some of our machines are capable of reach in excess of 8 metres (26 feet) this means they have the potential to well exceed, by possibly 3 metres (9' 9"), the lowest legal minimum height of 5.2 metres from the ground for 11,000 and 33,000 volt power lines. It cannot be stressed enough the dangers that surround this capability, it is therefore vital that the operator is fully aware of the maximum height and reach of the machine, and that they are fully conversant with all aspects regarding the safe minimum distances that apply when working with machines in close proximity to Power Lines. (Further information on this subject can be obtained from the Health & Safety Executive or your Local Power Company).*
- *Always disengage the machine, kill the tractor engine, remove and pocket the key before dismounting for any reason.*

- *Always clear up all debris left at the work area, it may cause hazard to others.*
- *Always ensure when you remove your machine from the tractor that it is left in a safe and stable position using the stands and props provided and secured if necessary.*

## **WHEN NOT TO USE THIS MACHINE:**

- *Never attempt to use this machine if you have not been trained to do so.*
- *Never uses a machine until you have read and understood the operator handbook, are familiar with, and practiced the controls.*
- *Never use a machine that is poorly maintained.*
- *Never use a machine if guards are missing or damaged.*
- *Never use a machine on which the hydraulic system shows signs of wear or damage.*
- *Never fit, or use, a machine on a tractor that does not meet the manufacturer's minimum specification level.*
- *Never use a machine fitted to a tractor that does not have suitable front, rear and side(s) cab guarding made of metal mesh or polycarbonate.*
- *Never use the machine if the tractor cab guarding is damaged, deteriorating or badly fitted.*
- *Never turn a machine cutting head to an angle that causes debris to be ejected towards the cab.*
- *Never start or continue to work a machine if people are nearby or approaching - Stop and wait until they are at a safe distance before continuing.*
- *Never attempt to use a machine on materials in excess of its capability.*
- *Never use a machine to perform a task it has not been designed to do.*
- *Never operate the tractor or machine controls from any position other than from the driving seat, especially whilst hitching or unhitching the machine.*
- *Never carry out maintenance of a machine or a tractor whilst the engine is running – the engine should be switched off, the key removed and pocketed.*
- *Never leave a machine unattended in a raised position – it should be lowered to the ground in a safe position on a level firm site.*
- *Never leave a tractor with the key in or the engine running.*
- *Never carry out maintenance on any part or component of a machine that is raised unless that part or component has been properly substantially braced or supported.*
- *Never attempt to detect a hydraulic leak with your hand – use a piece of cardboard.*
- *Never allow children near to, or play on, a tractor or machine under any circumstances.*

## ADDITIONAL SAFETY ADVICE

### TRAINING

Operators need to be competent and fully capable of operating this machine in a safe and efficient way prior to attempting to use it in any public place. We advise therefore that the prospective operator make use of relevant training courses available such as those run by the Agricultural Training Board, Agricultural Colleges, Dealers and McConnel.

### WORKING IN PUBLIC PLACES

When working in public places such as roadsides, consideration should be paid to others in the vicinity. Stop the machine immediately when pedestrians, cyclists and horse riders etc. pass. Restart only when they are at a distance that causes no risk to their safety.

### WARNING SIGNS

It is advisable that any working area be covered by suitable warning signs and statutory in public places. Signs should be highly visible and well placed in order to give clear advanced warning of the hazard. Contact the Department of Transport or your Local Highways Authority to obtain detailed information on this subject. The latter should be contacted prior to working on the public highway advising them of the time and location of the intended work asking what is required by way of signs and procedure. – *'Non-authorized placement of road signs may create offences under the Highways Act'*.

### SUGGESTED WARNING SIGNS REQUIRED

*"Road works ahead" warning sign with a supplementary "Hedge cutting" plate. "For 1 mile" or appropriate shorter distance may be added to the plate.*

*"Road narrows" warning sign with supplementary "Single file traffic" plate.*

*White on blue "Keep right" arrow sign on rear of machine.*

### USE OF WARNING SIGNS

- *On two way roads one set of signs is needed facing traffic in each direction.*
- *Work should be within 1 mile of the signs.*
- *Work only when visibility is good and at times of low risk e.g.: NOT during 'rush-hour'.*
- *Vehicles should have an amber flashing beacon.*
- *Ideally, vehicles should be conspicuously coloured.*
- *Debris should be removed from the road and path as soon as practicable, and at regular intervals, wearing high visibility clothing and before removing the hazard warning signs.*
- *Collect all road signs promptly when the job is completed.*

---

Although the information given here covers a wide range of safety subjects it is impossible to predict every eventuality that can occur under differing circumstances whilst operating this machine. No advice given here can replace 'good common sense' and 'total awareness' at all times but will go a long way towards the safe use of your McConnel machine.

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# FITTING

## TRACTOR REQUIREMENTS

MINIMUM TRACTOR WEIGHTS INCLUDING BALLAST WEIGHT IF NECESSARY

PA5000 range 4000Kg

PA6000/7000 range 4500Kg

## MIN HP REQUIREMENTS

PA5000 range 70 Hp

PA6000/7000 75 Hp

## LINKAGE

Category II

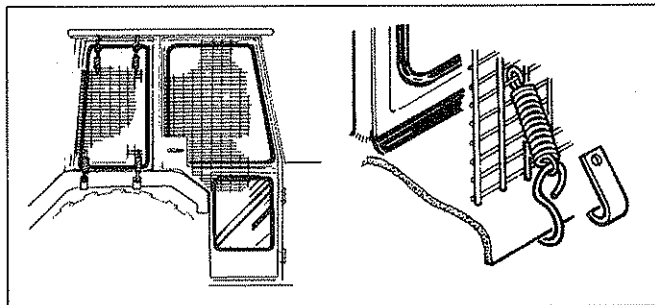
## PTO SHAFT

Tractor must be equipped with a live drive independent P.T.O. to enable forward motion to be stopped while the flail head continues to operate.



## TRACTOR PREPARATION

**Fitting Tractor Guard:** Use tractor with safety glass windows if possible and fit Operator guard (*part no. 73 13 324*) using the hooks provided. Shape mesh to cover all vulnerable areas. Remember the driver must be looking through mesh and/or polycarbonate glazing when viewing the flail head in any working position - unless the tractor/cab manufacturer can demonstrate that the penetration resistance is equivalent to, or higher than, that provided by mesh/polycarbonate glazing. If the tractor has a roll bar only, a frame must be made to carry both mesh and polycarbonate glazing.



**Wheel Width:** Set wheel widths as wide as possible.

**Lift Links:** Adjust lift links until they are equal length.

**Tractor Ballast:** It is imperative when attaching 'third-party' equipment to a tractor that the maximum possible stability of the machine and tractor combination is achieved – this can be accomplished by the utilisation of 'ballast' in order to counter-balance the additional equipment added.

**Front weights** may be required to place 15% of total outfit weight on the front axle for stable transport on the road and to reduce 'crabbing' due to the drag of the cutting unit when working on the ground.

**Rear weights** may be required to maintain a reasonable amount of rear axle load on the opposite wheel from the arms when in work; for normal off-ground work i.e. hedge cutting this should be 20% of rear axle weight or more for adequate control, and for ground work i.e. verge mowing with experienced operators, this can be reduced to 10%.

All factors must be addressed in order to match the type and nature of the equipment added to the circumstances under which it will be used – in the instance of Power Arm Hedgecutters it must be remembered that the machines centre of gravity during work will be constantly moving and will differ from that during transport mode, therefore balance becomes critical.

### Factors that effect stability:

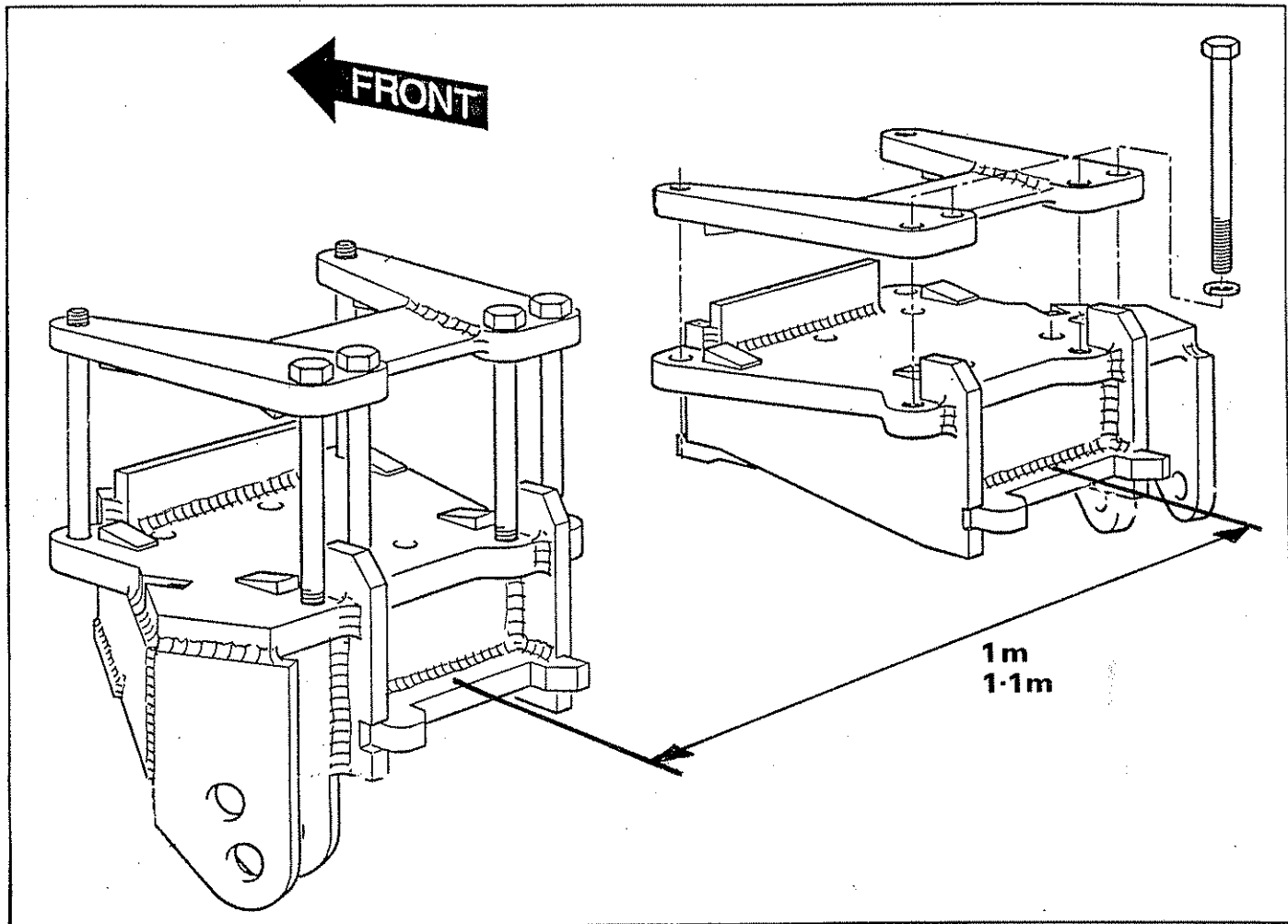
- *Centre of gravity of the tractor/machine combination.*
- *Geometric conditions, e.g. position of the cutting head and ballast.*
- *Weight, track width and wheelbase of the tractor.*
- *Acceleration, braking, turning and the relative position of the cutting head during these operations.*
- *Ground conditions, e.g. slope, grip, load capability of the soil/surface.*
- *Rigidity of implement mounting.*

### Suggestions to increase stability:

- *Increasing rear wheel track; a tractor with a wider wheel track is more stable.*
- *Ballasting the wheel; it is preferable to use external weights but liquid can be added to around 75% of the tyre volume – water with anti-freeze or the heavier Calcium Chloride alternative can be used.*
- *Addition of weights – care should be taken in selecting the location of the weights to ensure they are added to a position that offers the greatest advantage.*
- *Front axle locking; a ram can be used to 'lock' the front axle in work only – locking the axle moves the 'balance line' and can be used to transfer weight to the front axle from the rear (check with tractor manufacturer).*

The advice above is offered as a guide for stability only and is not a guide to tractor strength - it is therefore recommended that you consult your tractor manufacturer or local dealer to obtain specific advice on this subject, additionally advice should be sought from a tyre specialist with regard to tyre pressures and ratings suitable for the type and nature of the machine you intend to fit.

## FITTING AXLE BRACKET/CATCH ASSEMBLIES.



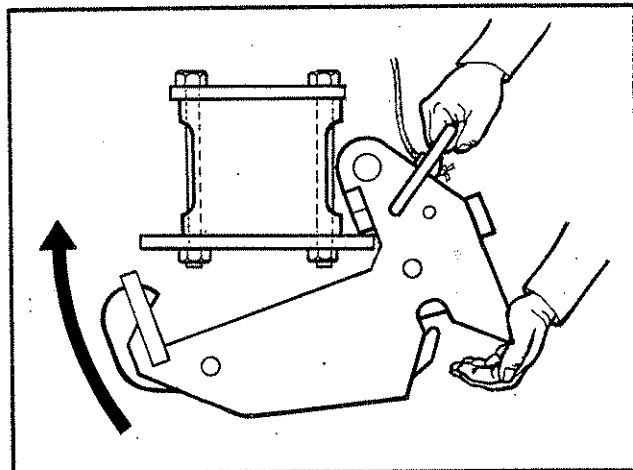
Bolt axle plates to the tractors axle either 1m or 1.1m apart. It may be necessary to remove the tractors check chain and/or assister ram brackets. If so the axle plate will include replacement brackets for these functions.

Follow exactly the instructions in the separate axle bracket fitting sheet for your specific tractor. If you have not received it obtain one from your dealer before commencing.

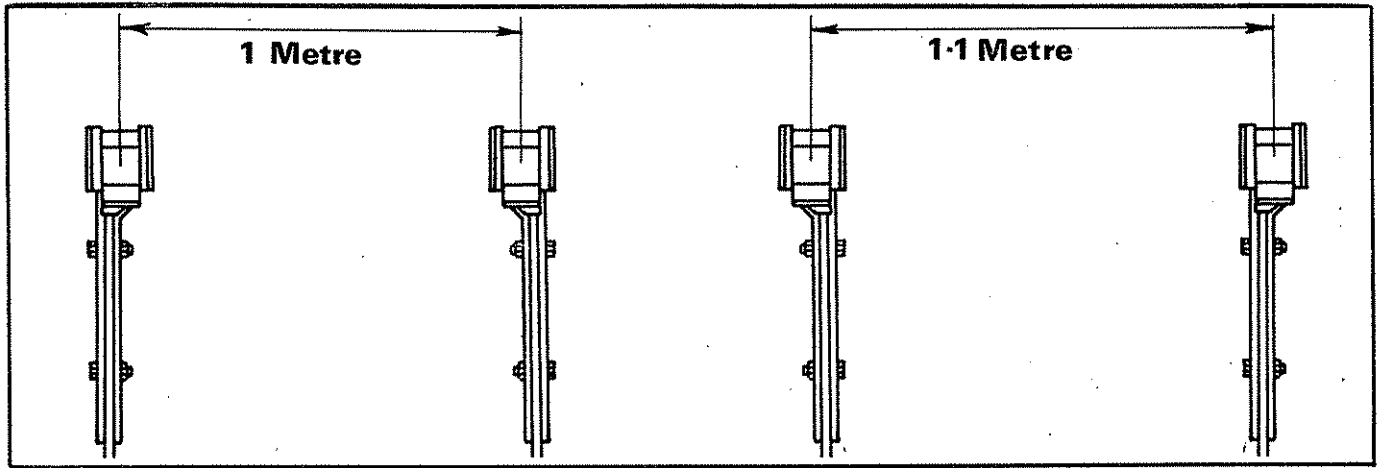
Replace assister ram/s if fitted.

Hook the catch assemblies onto the rear of the axle plates. Push firmly against the plate and vigorously pivot the catch forward and up until the spring loaded hook snaps into position.

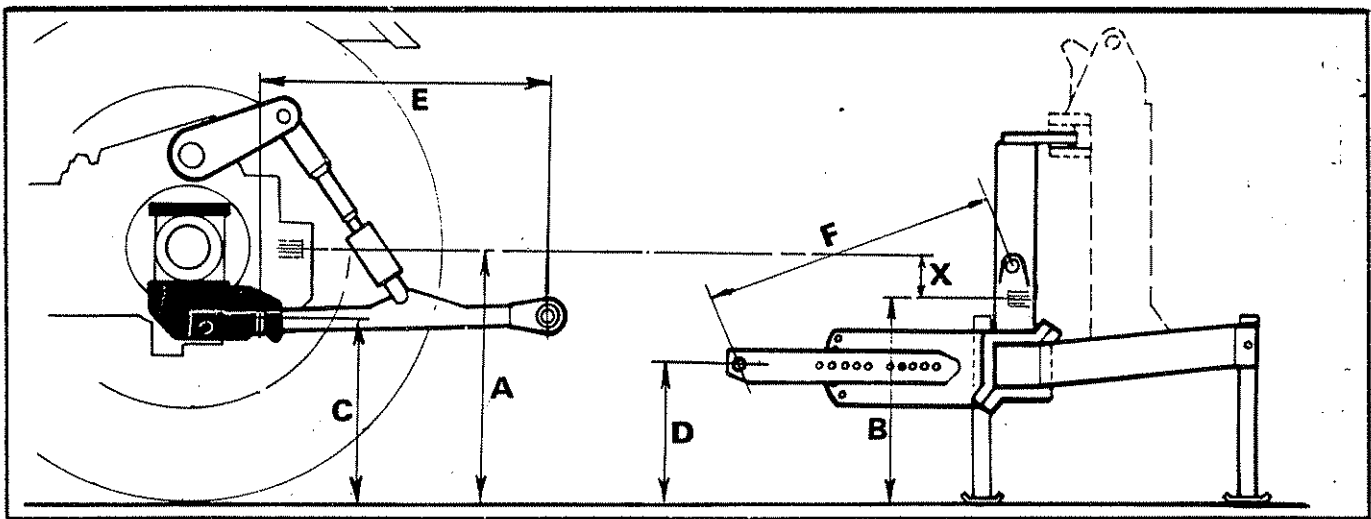
Pass the release cords into the cab.



# MACHINE PREPARATION



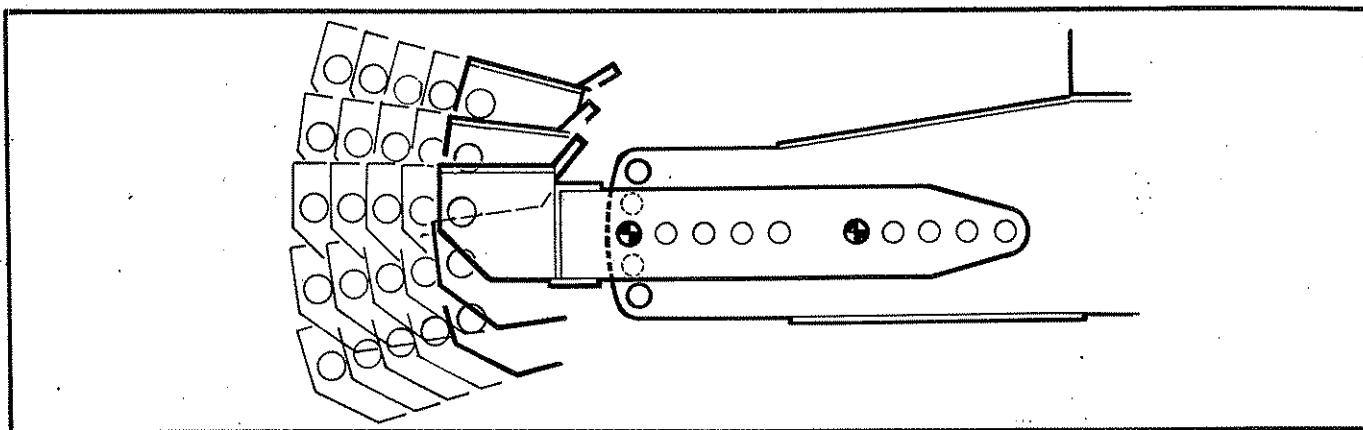
Position latch arms to match the width of the catches on the tractor.



With frame vertical

Measure dimensions A and B. Subtract B from A to leave measurement 'X'.

Measure dimension 'C'



Select mounting holes to position latch arms so that dimension D equals dimension C minus measurement X and also when the draft link is horizontal and the rocking draft pin is in the upright position dimensions E and F are equal.

## OIL REQUIREMENTS

### TANK

Fill the reservoir to the centre of the sight tube. The capacity is approximately 48 galls imp (220 litres).

### DO NOT OVERFILL

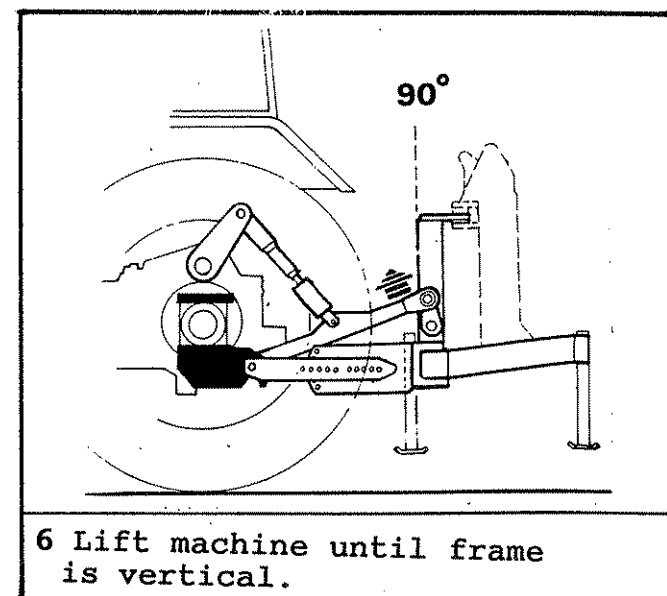
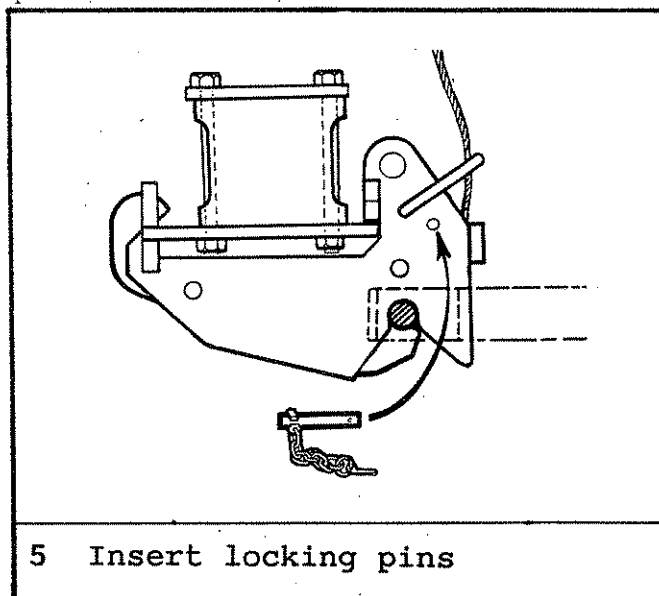
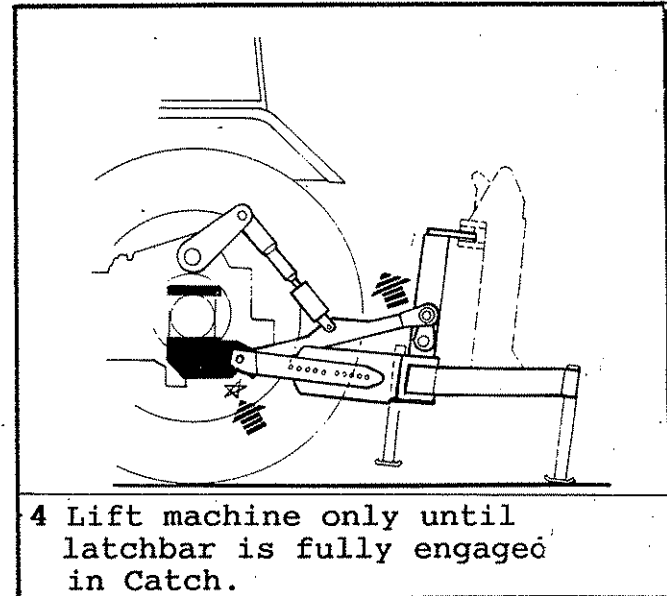
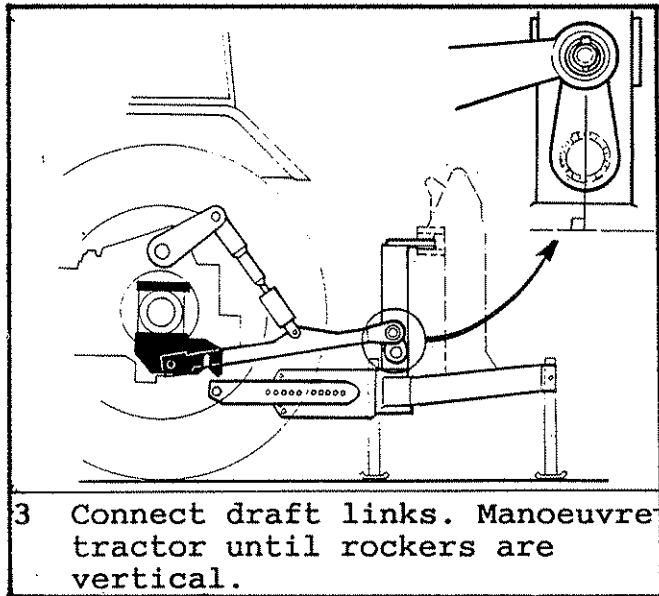
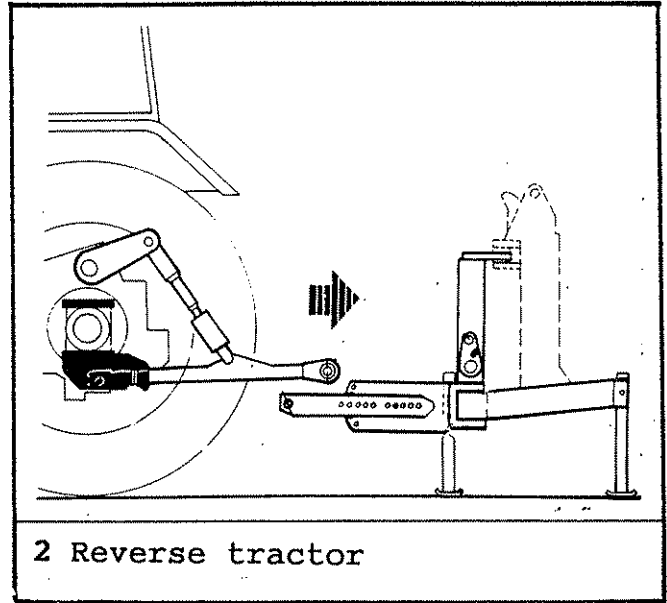
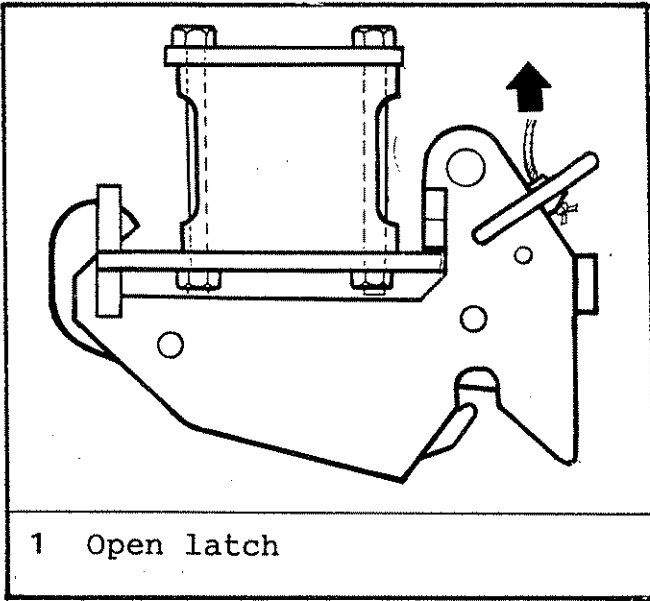
Supplier	Cold or temperate climate	Hot climate
Castrol	Agricastrol hydraulic oil Hy-spin AWS 46	Hy-spin AWS68
Shell	Tellus 46	Tellus 68
Mobil	D.T.E. 25	D.T.E.26
Esso	Nuto 'H' or 'A' 46	Nuto 'H' or 'A' 68
Texaco	Rando HD 46	Rando D 68
Gulf	Hydrasil 46	Hydrasil 68
B.P.	Energol HLP 46	Energol HLP 68
Dalton	Silkolene Dove 46 or Derwent 46	Silkolene Dove 68 or Derwent 68
Elf	Hydrelf 46	Hydrelf 68

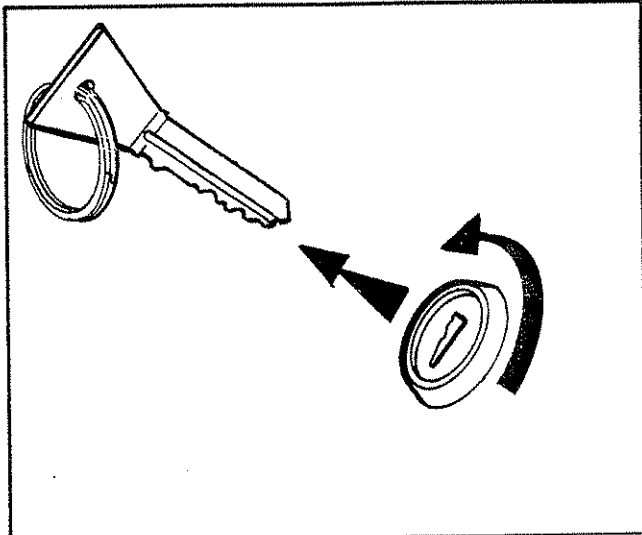
### GEARBOX

Check the gearbox oil level. On level ground gearbox should be filled until oil dribbles out of the level plug. Top up if required with EP90 oil.

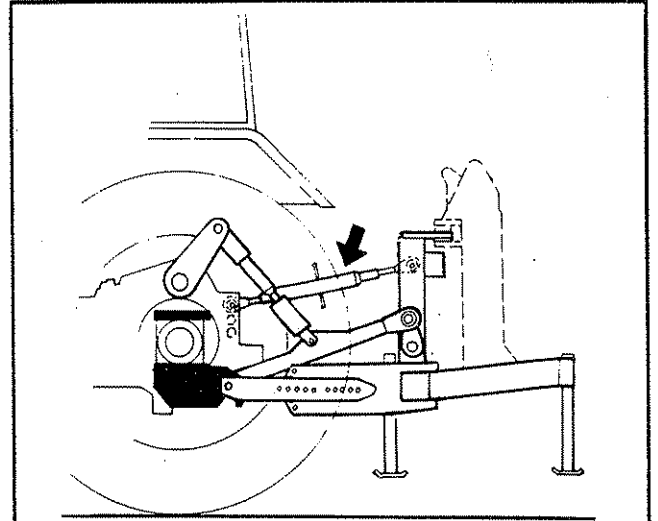
# ATTACHMENT TO TRACTOR

Machine must stand on its legs with arms and head to the rear and with head on the ground.

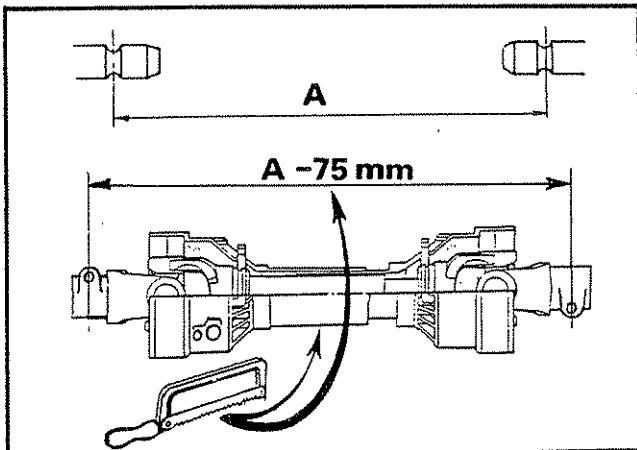




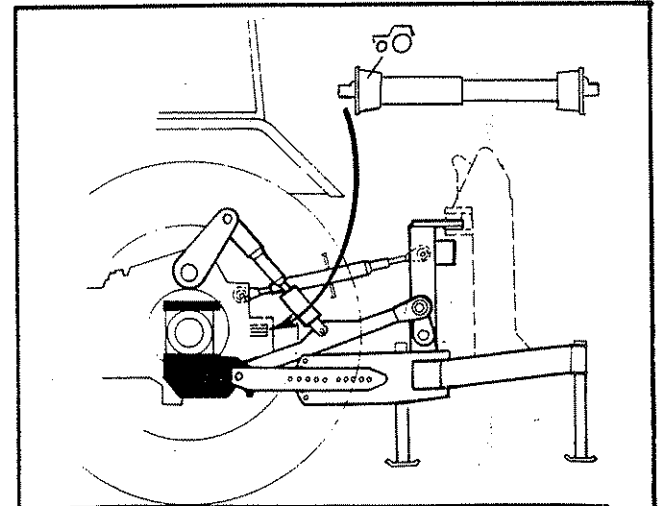
7 Switch off tractor



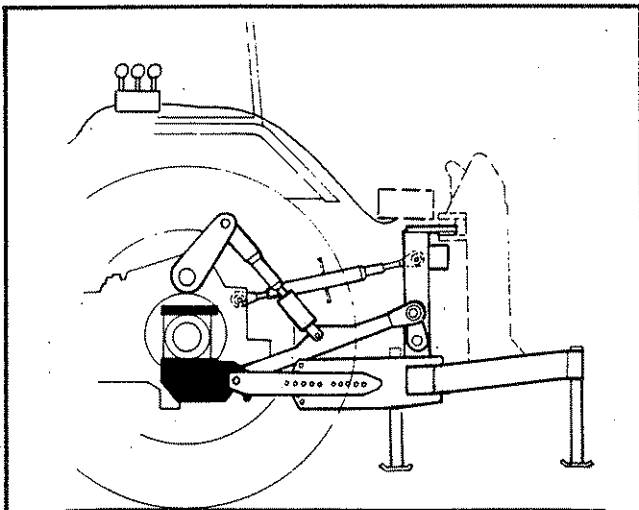
8 Fit top link. See instruction Supplement 202 included in delivery pack.



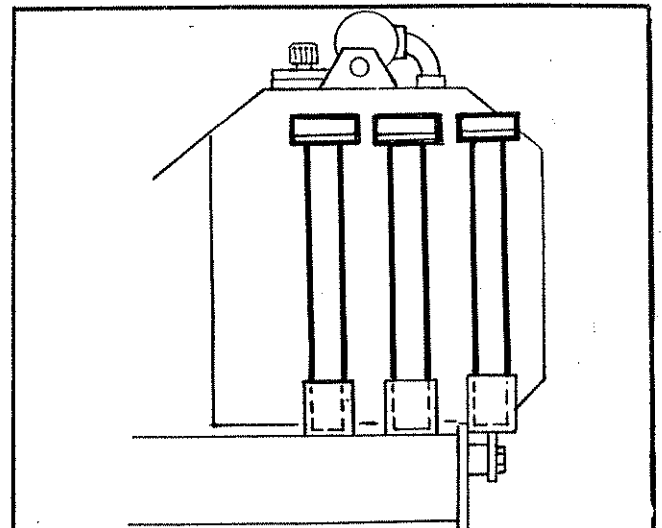
9 Measure 'A'  
Cut PTO shaft, equal amounts off both halves, to measure A minus 75mm. When fully closed



10 Fit PTO shaft and attach torque chain



11 Fit controls in cab. See page 16



12 Stow legs.

## FITTING CONTROL UNIT IN CAB

### Electric control

A mounting pillar is supplied to which the control unit is bolted. The pillar is bolted to the tractor ensuring that no structural member of the cab or roll bar is drilled and it can be bent or twisted to achieve a comfortable working position.

An angled bracket is supplied to provide a mounting location for the cable operated Flail rotor on/off valve

The supply cable with the disconnected plug should be connected to the tractors electrical system preferably at the fuse box or the ignition switch where it can be switched off with the tractors isolation key.

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

### Cable control

Angled brackets are supplied to provide a mounting location for the control box

This bracket may be bolted to the mudwing or cab cladding in a convenient location ensuring that no structural member of the cab or roll bar is drilled.

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

If so wished an "in line" installation is possible by unbolting the cable ends from the pivot boxes and rotating through 180 degrees before re-assembling.

When the control unit is removed from the cab ensure the rubber edge strip is fitted to the mounting bracket to cover any possible sharp edges.

## **RUNNING UP PROCEDURE**

Ensure that the rotor control valve is in "STOP" position, start tractor, engage P.T.O. allow the oil to circulate through the return line filter for about 5 minutes without operation of the armhead control lever.

Operate the armhead levers through their complete range ensuring that all movements are functioning correctly.

Place the flail head at a safe attitude and move the rotor control to "START" position. After initial fluctuation the rotor should settle to a steady speed. Increase P.T.O. speed to approximately 360 rpm. and run for a further five minutes before disengaging and stopping tractor.

### **Caution**

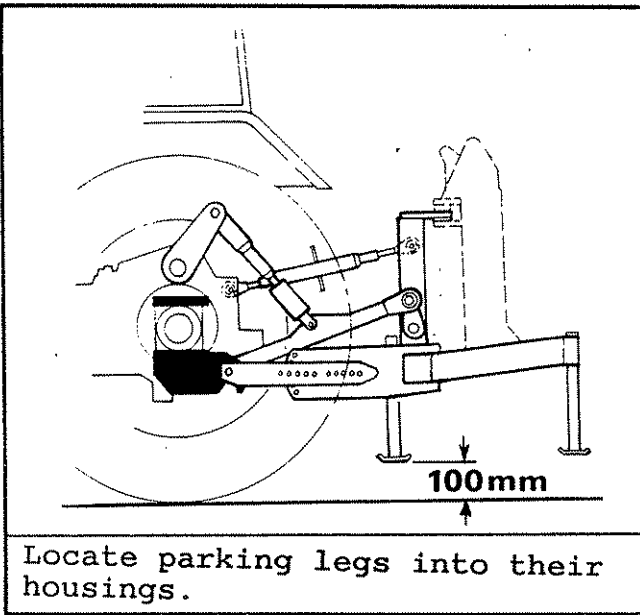
Do not allow the pump to continue working if the cutter does not operate. Overheating and serious damage to the pump can be caused in a very short time.

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



## REMOVAL FROM TRACTOR

Select a firm level site



Place flail head on the ground directly to the rear at approximately half reach.

Disengage P.T.O.

Extract latch security pins.

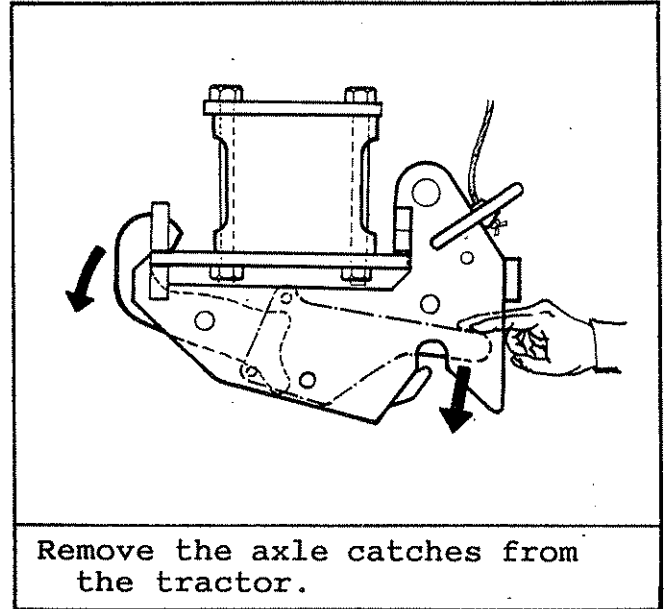
Take machine's weight on draft link sufficiently to allow the top link to be disconnected.

Open catches and lower the machine.

Disconnect draft links and remove the P.T.O. shaft.

Remove control units from the cab and stow clear of the ground.

Drive tractor away.



Replace the check chains/stabiliser bars.

The axle plates can remain permanently in position.

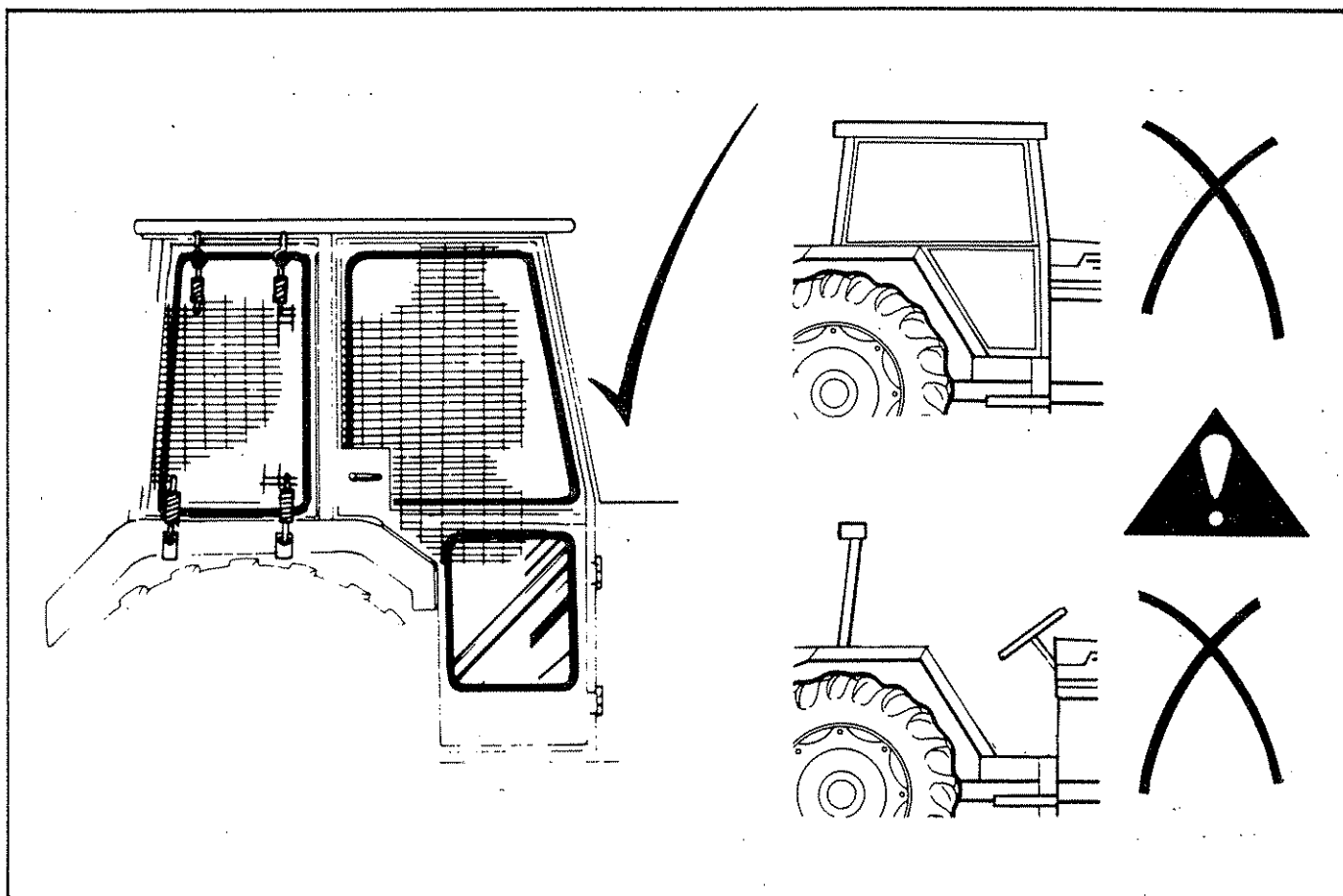
## STORAGE

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

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

# OPERATION

## OPERATOR GUARD



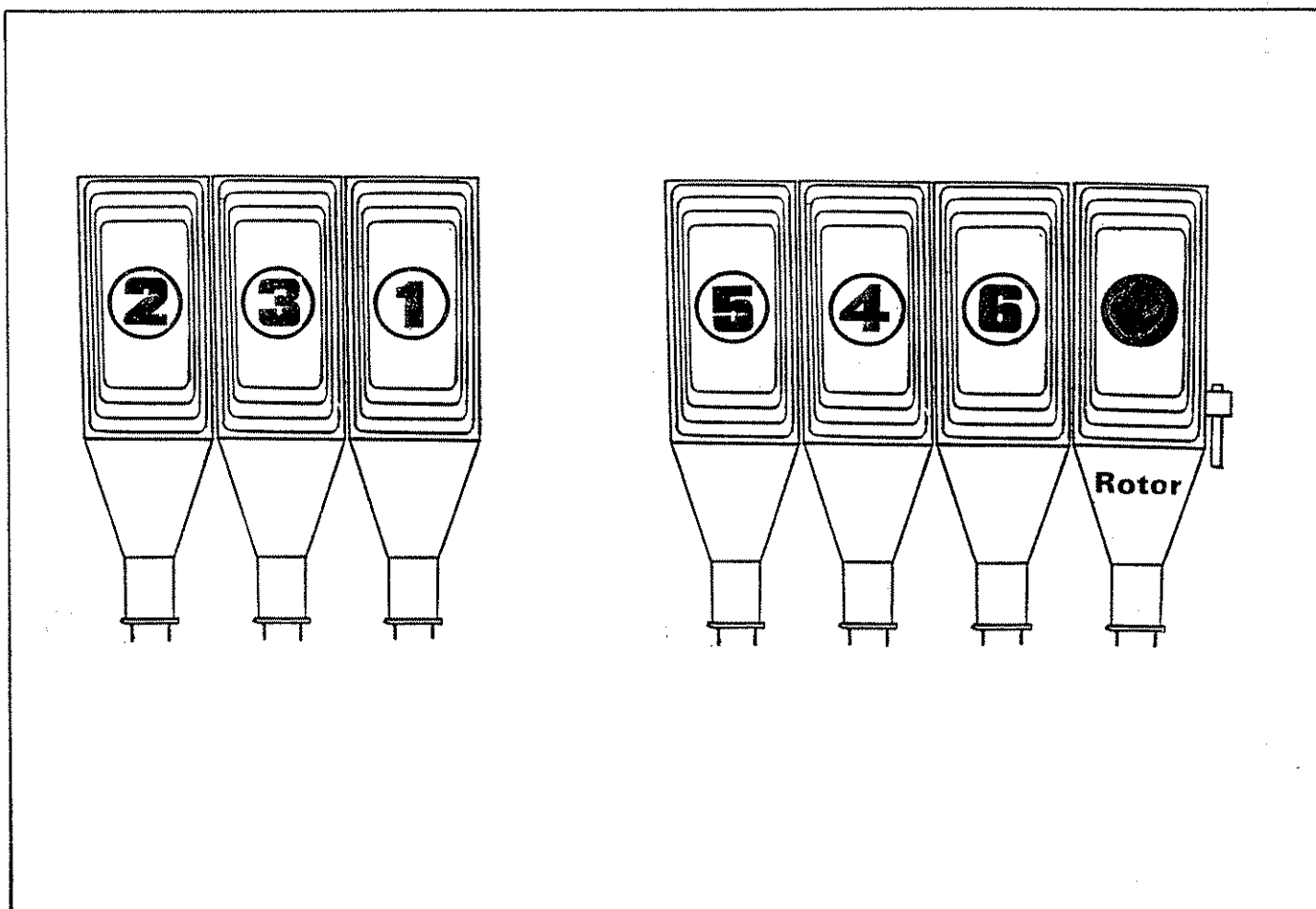
## PREPARATION

Read the book first

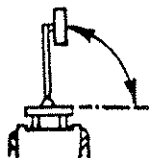
Practise in an open space without rotor running until familiar with controls.

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

ARM CONTROLS - Cable controlled machines only



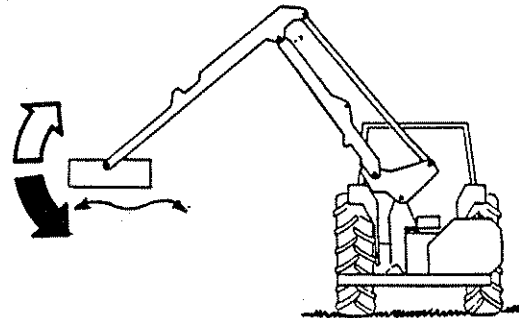
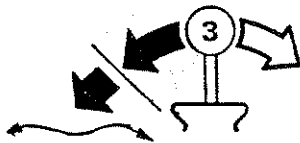
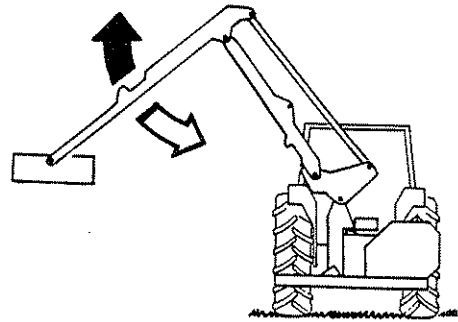
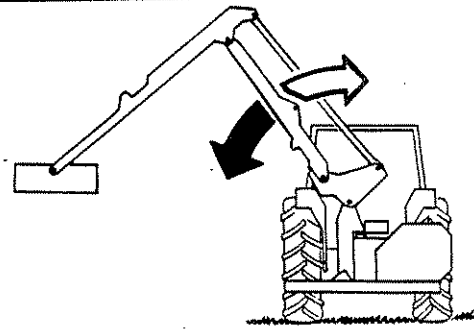
**6**



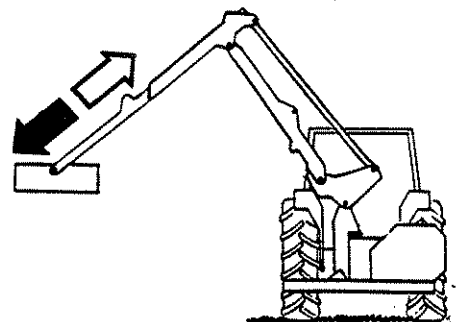
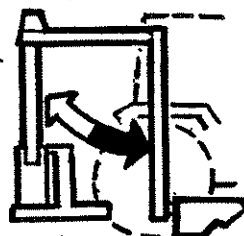
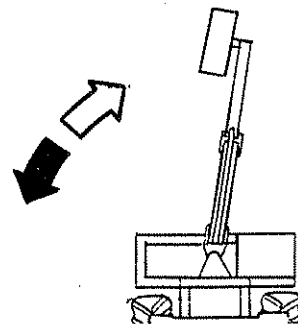
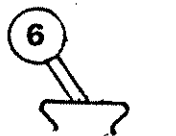
Slew - allows slew workin



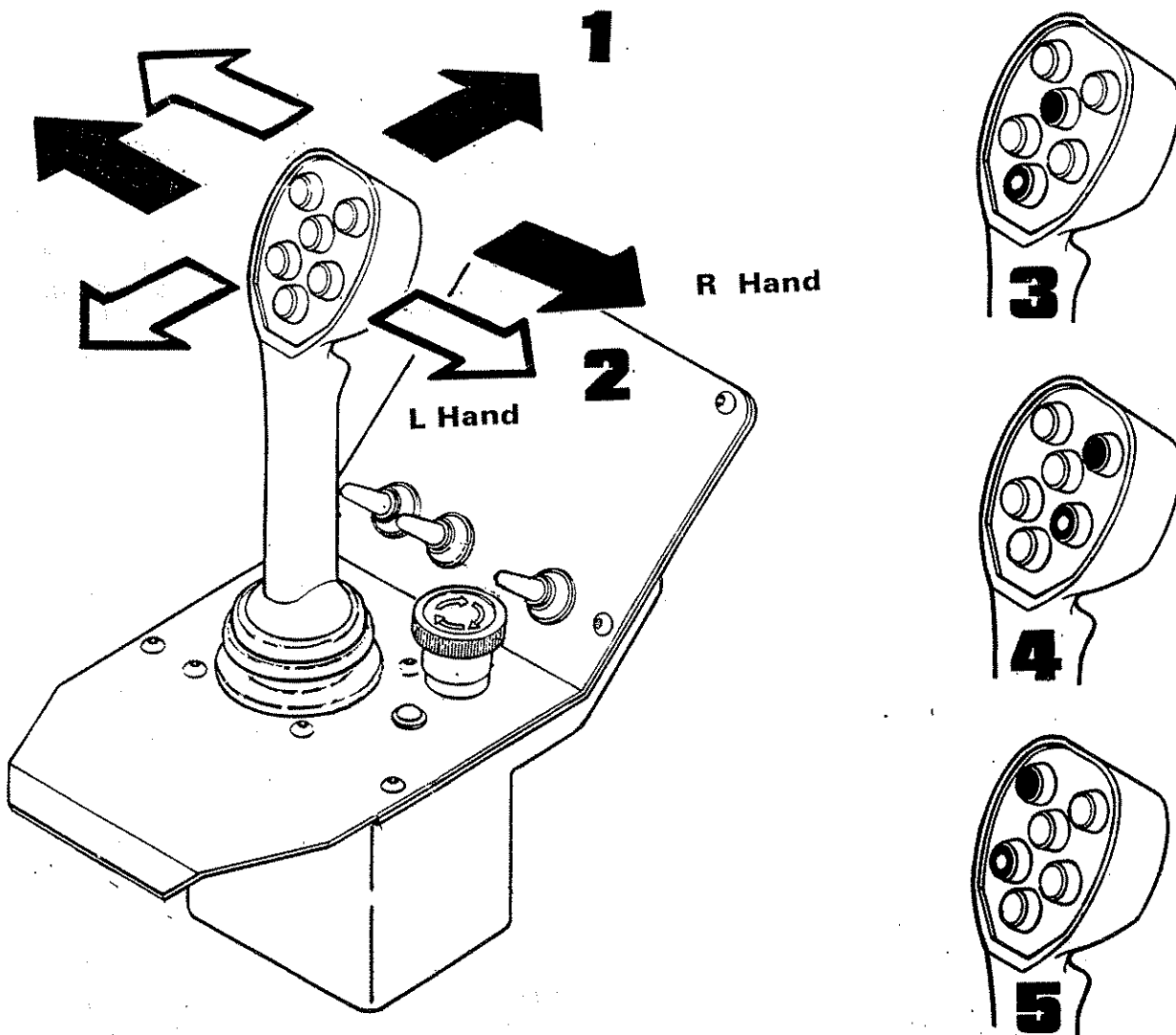
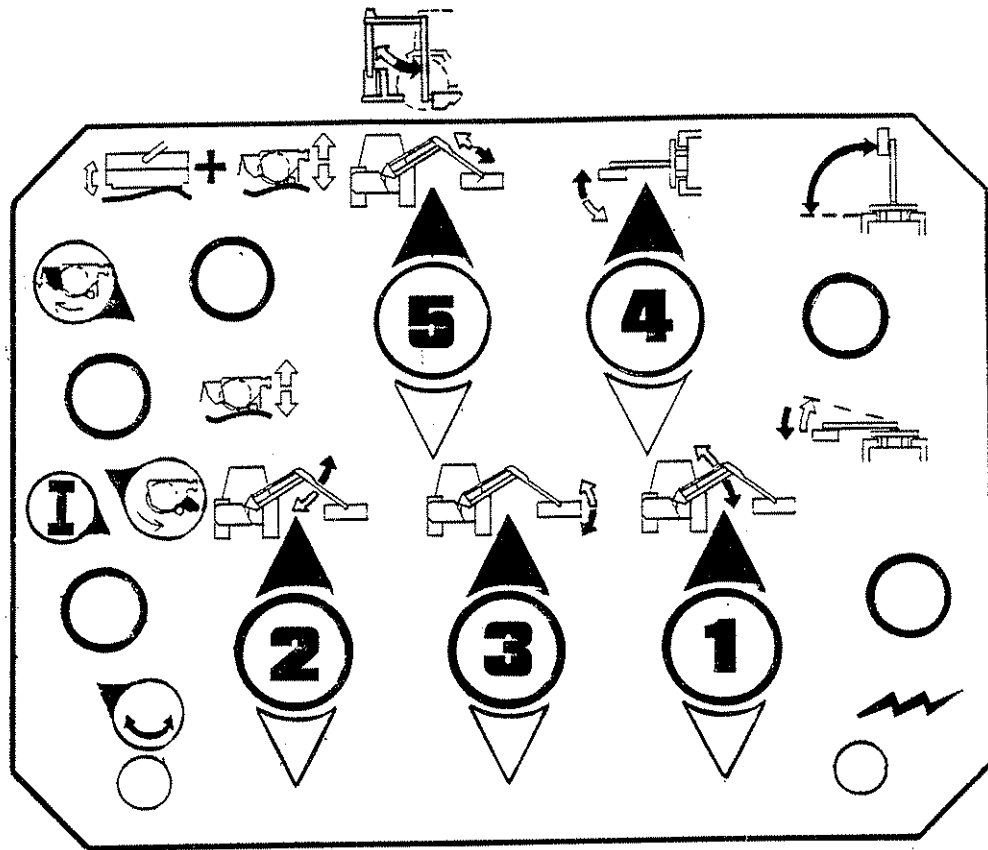
Auto reset - allows normal working

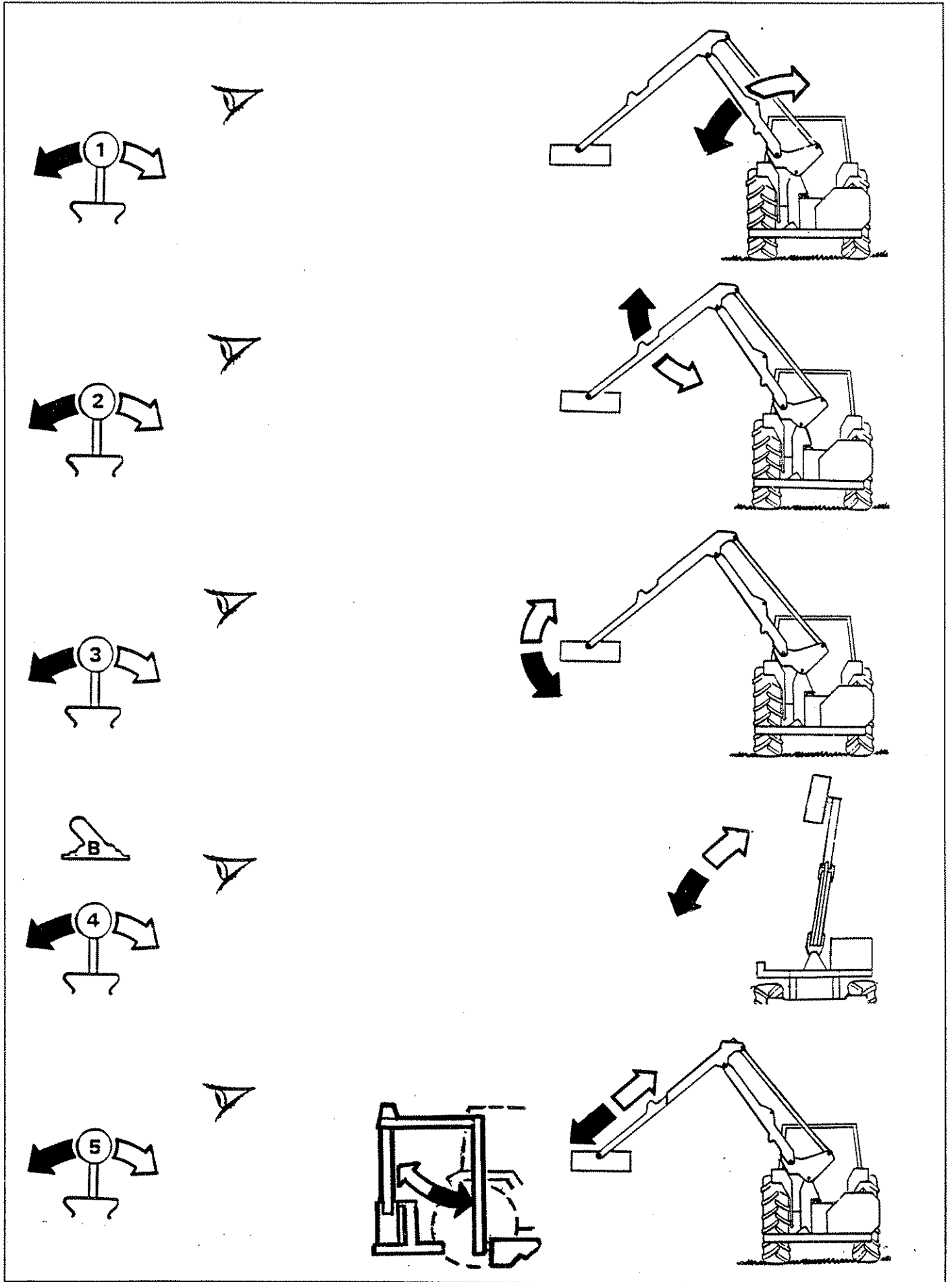


An angle 'float' position can be selected which allows the flail head to automatically angle itself to follow the contours of the ground. To obtain this position the control lever must be pushed away from the operator beyond its normal range until it locks into the float position. To return to normal operation the float position must be manually deselected. When working with head angle float the flail head must be in balance about its mounting point. Failure to observe this will result in a poor untidy finish.

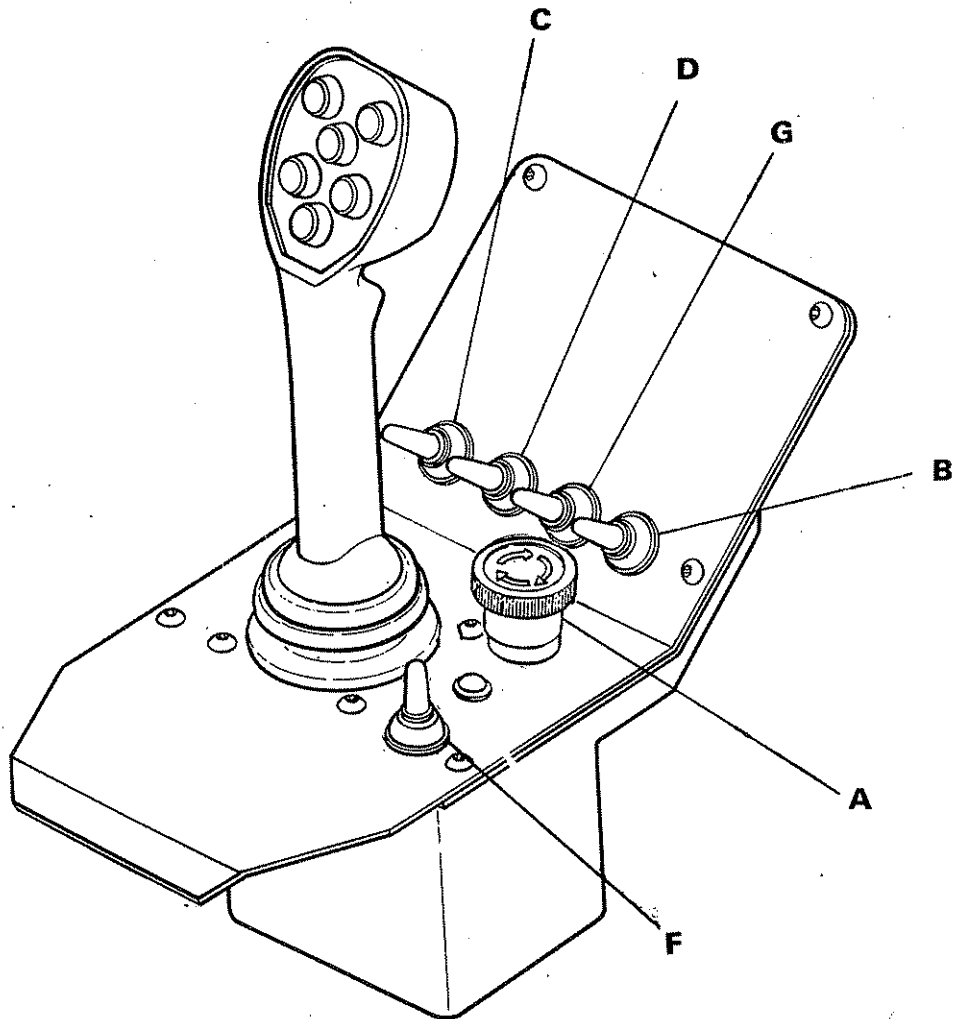
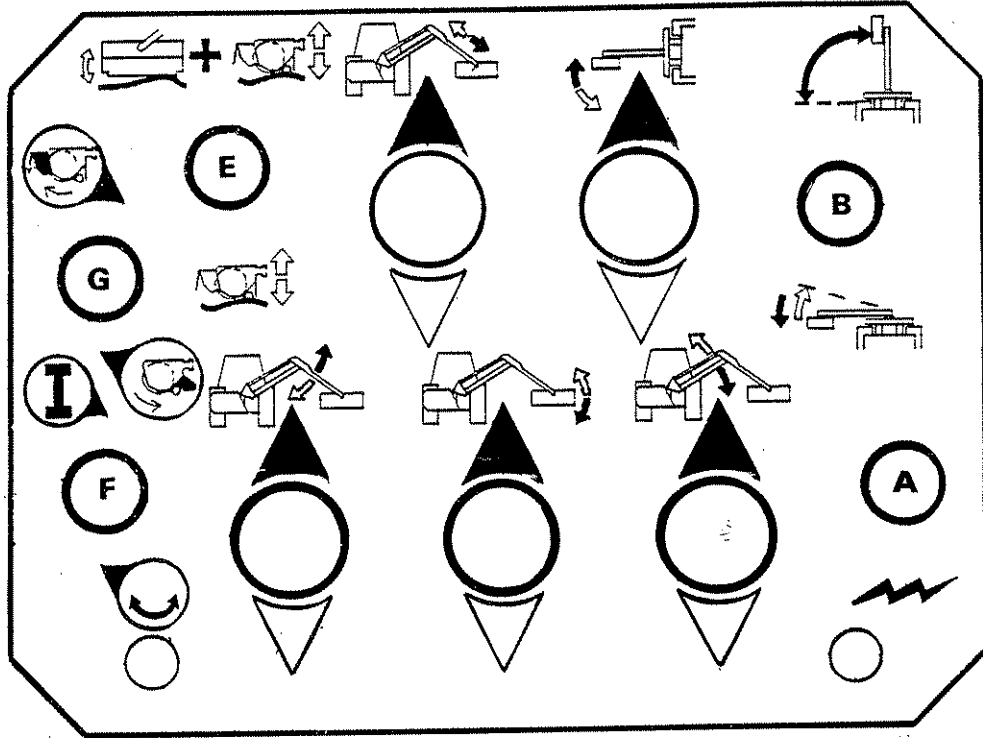


ARM CONTROLS - Electric controlled machines only



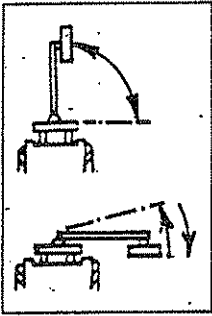


SWITCH FUNCTIONS - Electric controlled machines only



A Power on/off.  
On monolever controls turn clockwise for 'on' and push down for 'off'

B



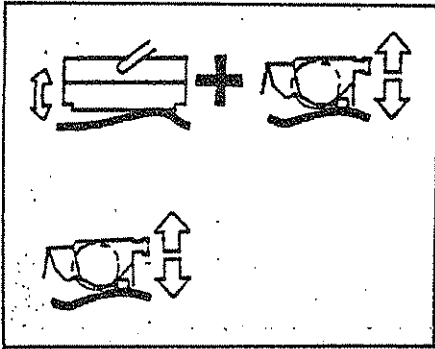
Slew - allows slew working

Auto reset - allows normal working

C Lift float on/off - if fitted

D Angle float on/off - if fitted

E Head float on/off - if fitted



Allows lift and angle float in unison.

Allows lift float selection alone.

F Power on and reset switch for the large section of the pump responsible for rotor power.

Present on all proportional machines. Operational on piston machines only

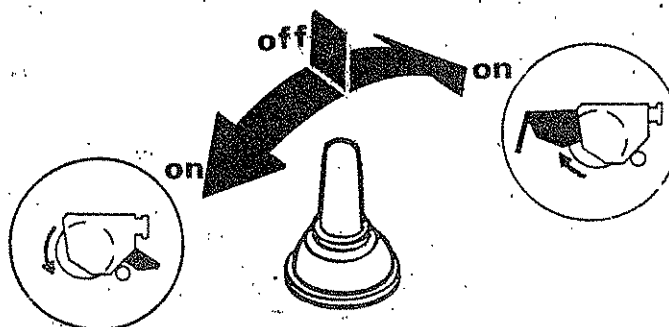
For the pump to function the switch must be in the 'on' position. This switch can be used to stop and start the rotor even if the rotor control lever is not deselected.

Following the selection of main power 'on' and any emergency stops the switch must be pushed into and held momentarily (2 - 3 secs) in the reset position before power 'on' is selected.

G Rotor on/off.

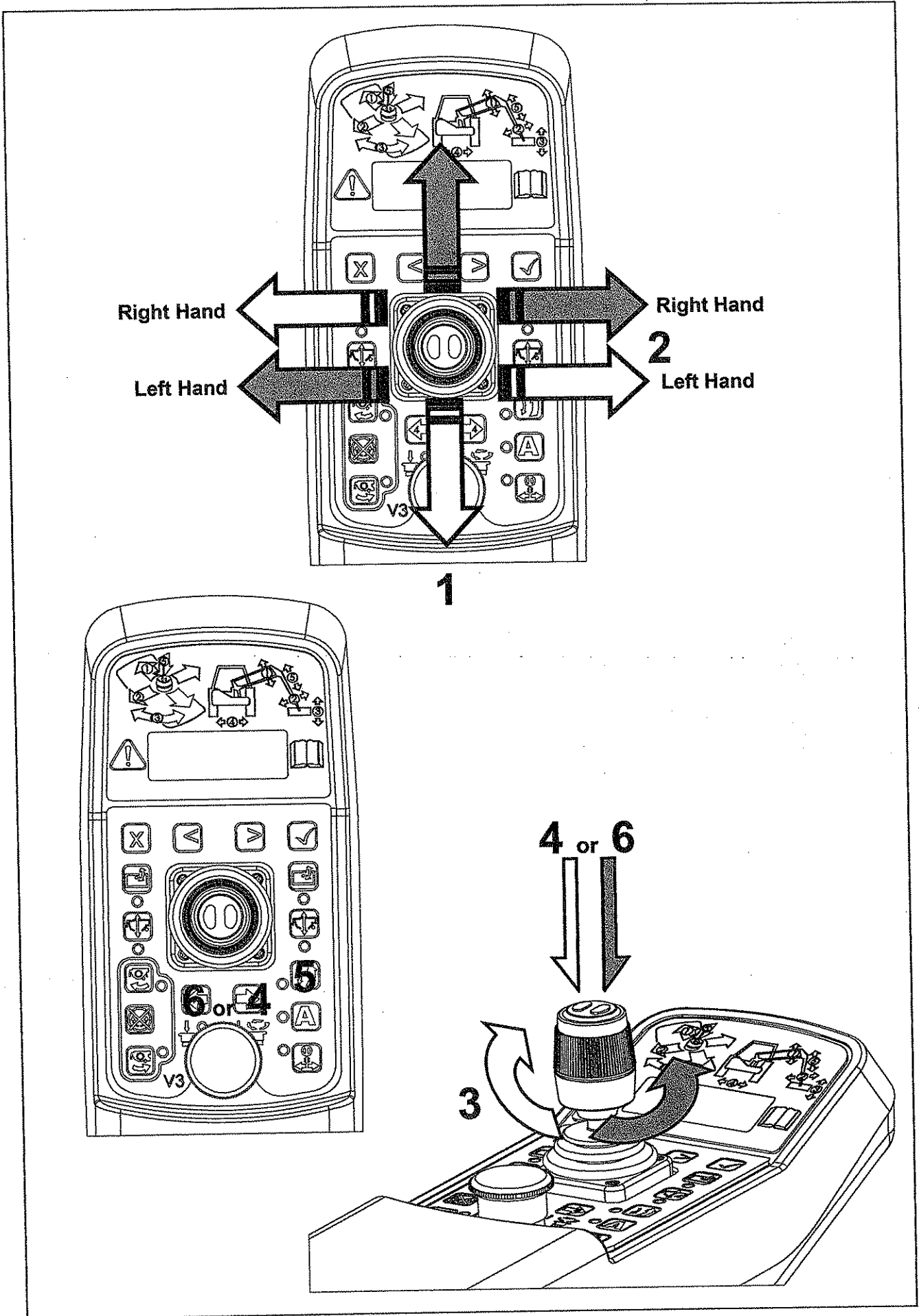
Present on all proportional machines. Operational on piston machines only.

Before selecting opposite rotation allow rotor to stop completely.



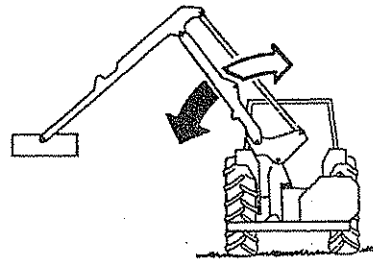


# PROPORTIONAL ARMREST CONTROLS - v.3

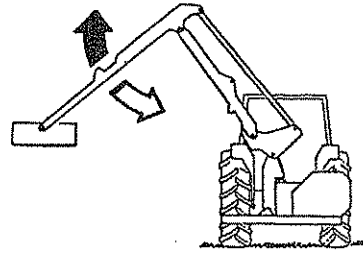


# ARMHEAD FUNCTIONS – Electric Proportional Control Machines

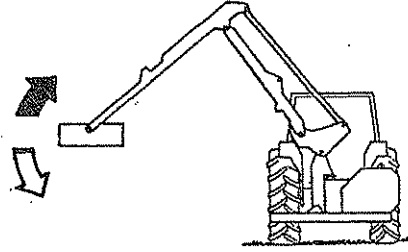
①



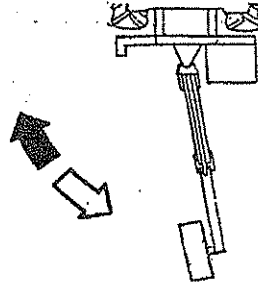
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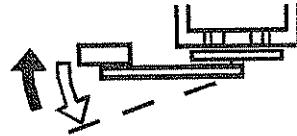
③



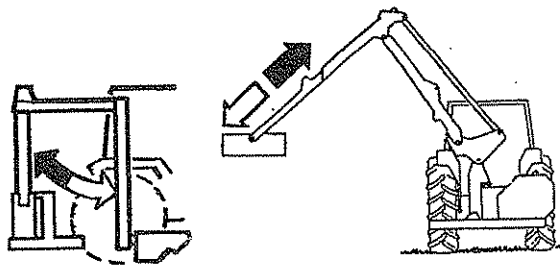
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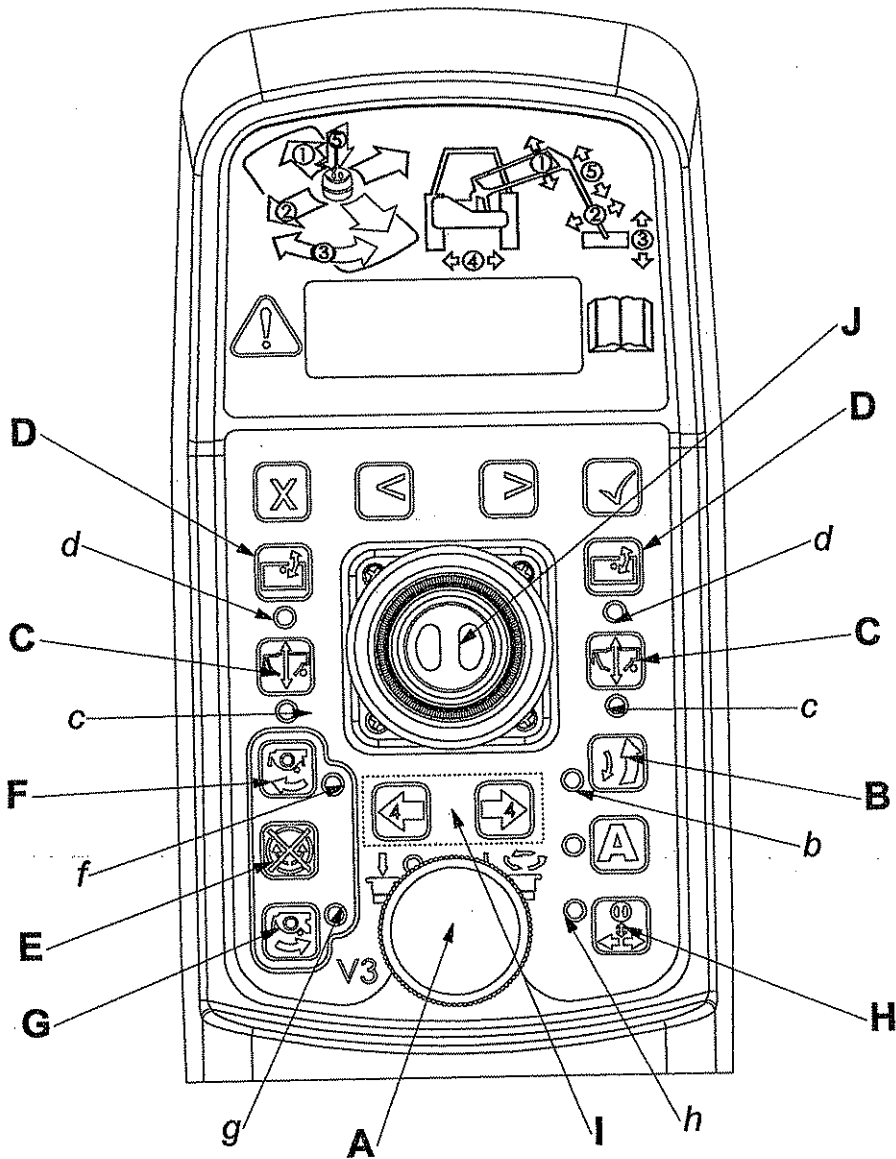
⑤



⑥



# SWITCH LOCATIONS - v.3 Proportional Armrest Controls



SWITCH	FUNCTION	L.E.D.
A	Power ON/OFF - Turn clockwise for ON, Push for OFF	-
B	Auto Reset	b
C	Lift Float	c
D	Head Angle Float	d
E	Rotor Off	e
F	Rotor On - Upward Cutting	f
G	Rotor On - Downward Cutting	g
H	Tele/Slew Swap - determines operating mode of: I & J	h
I	Slew Operation - H deactivated	h OFF
J	Tele Operation - H deactivated	h OFF
I	Tele Operation - H activated	h ON
J	Slew Operation - H activated	h ON

Note: The mode selection of H is retained in the circuit memory when powering on and off, it does not deselect when the unit is switched off and on.

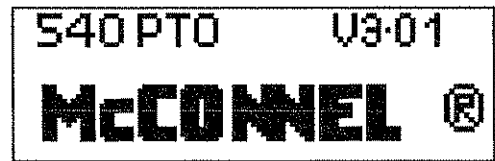
## SWITCH FUNCTIONS - v.3 Proportional Armrest Controls

<u>SWITCH</u>	<u>FUNCTION/OPERATION</u>
SWITCH 'A'	<b>POWER ON/OFF</b> <i>Turn clockwise for 'ON' and push down for 'OFF'</i>
SWITCH 'B' (L.E.D. light 'b')	<b>AUTO RESET</b> <i>Press down to select 'auto reset' (i.e. normal working). Pressing either 'Slew' buttons will de-select 'Auto Reset' and allow 'Slew' operation. 'Auto Reset' will have to be reselected if required.</i>
SWITCHES 'C' (L.E.D. light 'c')	<b>LIFT FLOAT</b> <i>Press either switch to select or deselect the 'lift float' function. When 'lift float' is selected operating the lift service will override the float operation. On completion of the arm adjustment 'lift float' will automatically be reinstated.</i>
SWITCHES 'D' (L.E.D. light 'd')	<b>HEAD ANGLE FLOAT</b> <i>Press either switch to select or deselect the 'head angle float' function. When 'angle float' is selected operating the angle service will override the float operation. On completion of the head adjustment 'angle float' will be automatically reinstated.</i>
SWITCHES 'E', 'F' & 'G'	<b>OPERATIONAL ON MACHINES WITH ELECTRIC ROTOR ON/OFF CONTROL ONLY</b>
SWITCH 'E'	<b>ROTOR OFF</b>
SWITCH 'F' (L.E.D. light 'f')	<b>ROTOR ON - UPWARD CUTTING</b> Press to select
SWITCH 'G' (L.E.D. light 'g')	<b>ROTOR ON - DOWNWARD CUTTING</b> Press to select
<b>REVERSING ROTATION:</b>	<b>TURN ROTOR OFF</b> <i>WAIT until Rotor has STOPPED</i> <i>Select opposite rotation</i>
SWITCH 'H' (L.E.D. light 'h')	<i>Press switch 'H' to swap the operation controls of the Slew' and 'Tele' (red light appears). The Control box will remember this mode when the controls are turned off and will remain in the same mode when next switched on.</i>
SWITCHES 'I' & 'J'	<b>SLEW &amp; TELE or TELE &amp; SLEW</b> <i>dependent on mode of Switch 'H'</i>

## SCREEN DISPLAY AND FUNCTIONS

Twist E/stop on armrest controls to power on and the screen will light up. Note: 12Volts at the battery are required for correct function.

1. The screen will initially display the McConnell logo, software version and the PTO maximum speed.



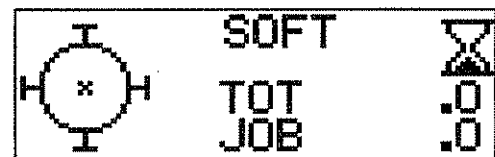
2. Pressing scroll forward once will display the running screen. The TOT displays the total time the rotor has been switched on. The JOB also displays the rotor on time but may be reset to zero by pressing the X button for 3 seconds.



3. Pressing either of the Rotor ON buttons will activate the 'egg timer' and rotor image.



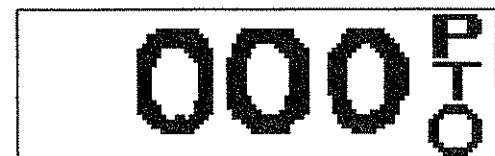
4. Pressing the EDS Lift float button will turn on the EDS (EDS Lift Float machines only). Then SOFT, MED or HARD will be added to the running screen.



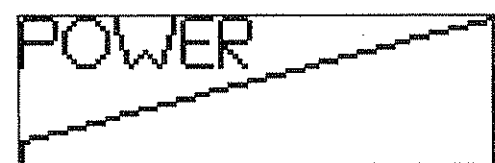
5. Pressing ✓ while the EDS is turned on will scroll through the SOFT, MED and HARD working settings.



6. Pressing scroll forward displays the actual Tractor PTO running speed



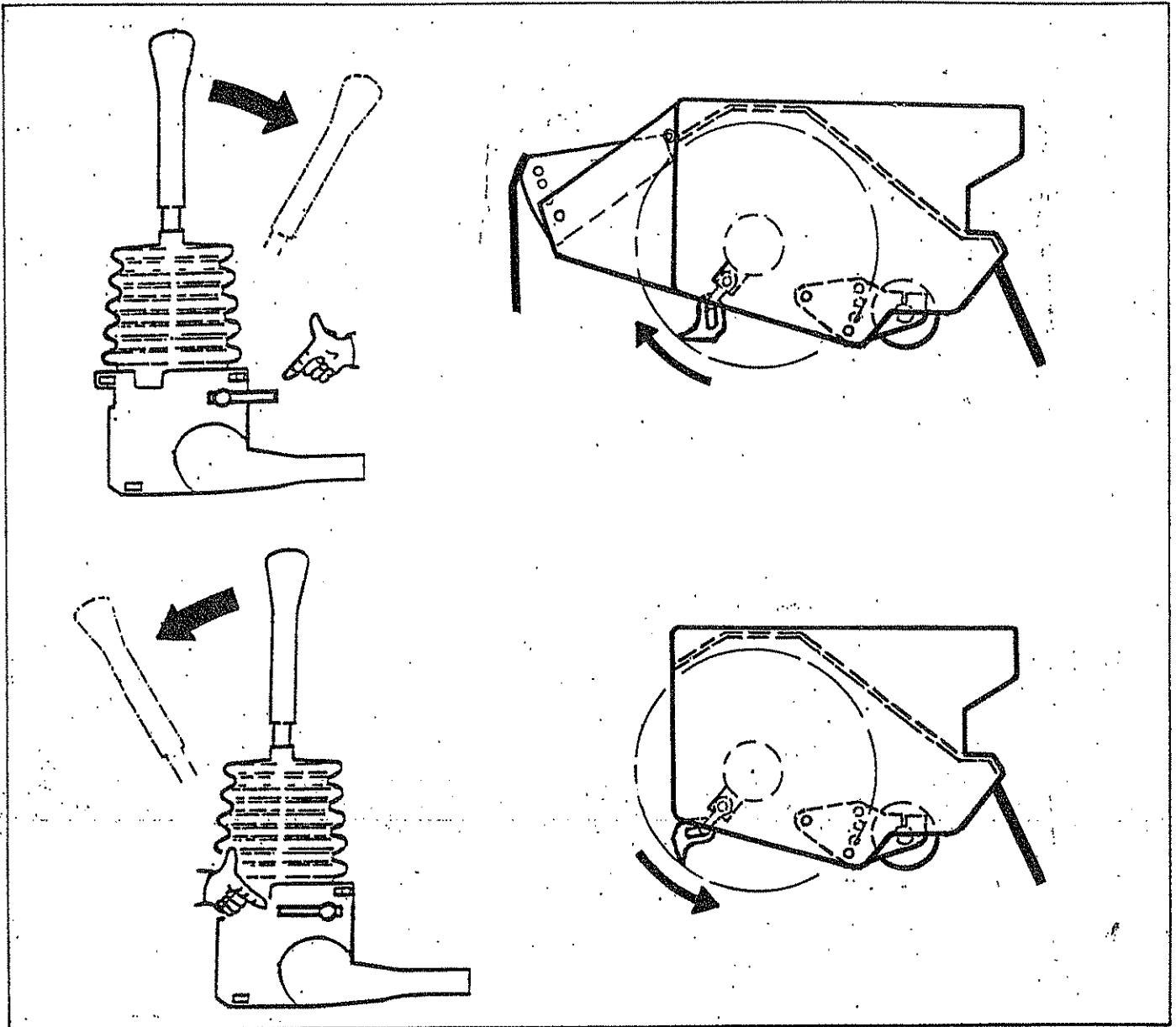
7. Scrolling forward again displays the Power Monitor screen.



Scrolling backwards will display the screens in the opposite order.



## ROTOR CONTROLS - Gear hydraulic machines only



### REVERSING ROTATION - Gear hydraulic machines only

Select "Rotor OFF"

Wait until the rotor has stopped turning.

Turn the small lever on the side of the rotor control lever pivot box through 180 degrees. This will reset the control lever stop inside the pivot box and allow opposite rotation to be selected.

## MOVING INTO THE TRANSPORT POSITION

Position arms at approximately half reach (with transport cradle in position on main arm 5200M. 6000M)

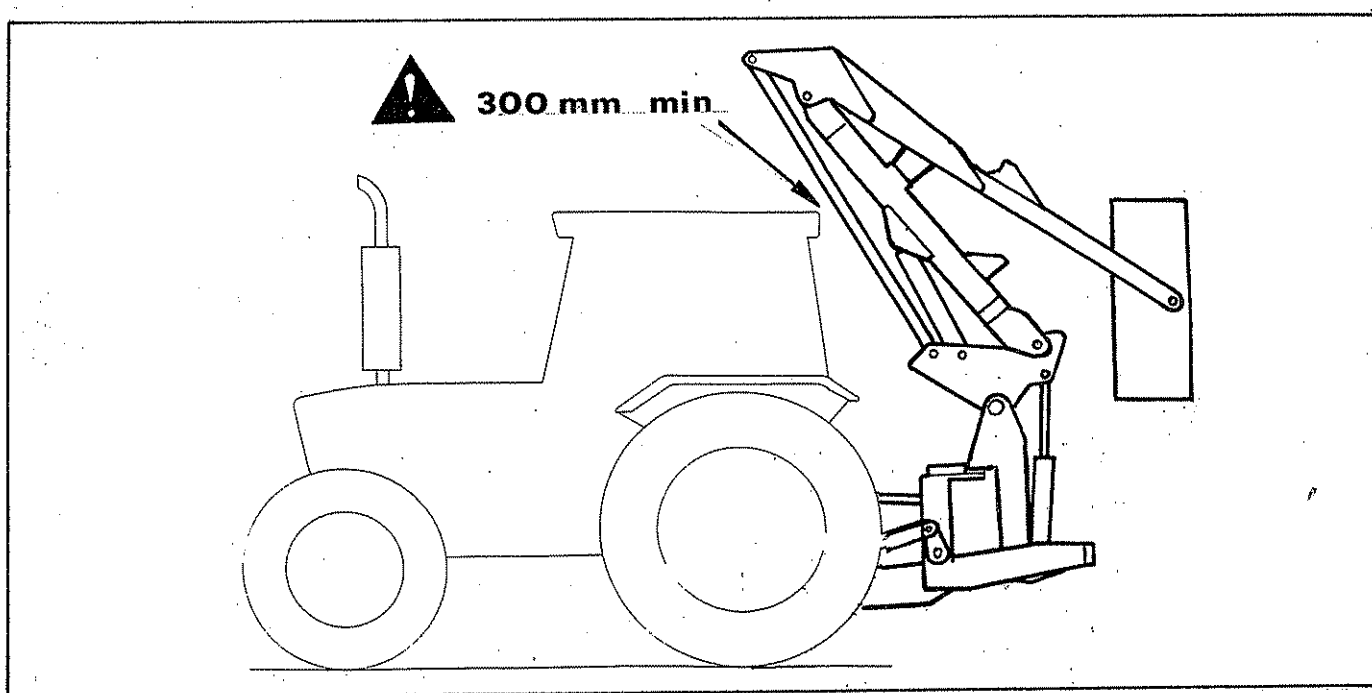
Select "slew" and "slew in" to position the arms to the rear of the tractor.

fold the arms in and up until there is a minimum clearance of 12" (300mm) between the cab and the parallel motion link

Fold the flail head into a vertical position with the flails facing forward

Fully screw in the lift ram taps.

## TRANSPORT POSITION



When in transport the PTO must be disengaged and the power to the control box switched off

### WARNING

During transport the "Slew" mode must remain selected.

## MOVING FROM TRANSPORT TO WORK POSITION

Fully unscrew the lift ram taps.

Position arms to rear at approximately half reach.

"Slew out" and place head in the work position.

Select "Auto Reset" for general working conditions.



## ENGAGING DRIVE - Gear hydraulic machines only

Ensure that the rotor control lever is in the 'Stop' position before engaging the P.T.O. shaft. Allow the oil to circulate for a minute or so before operating the armhead levers. Position the flail head in a safe position, increase the engine speed to a high idle and move rotor control lever to 'START'. After initial surging the rotor will run at an even speed.

## ENGAGING DRIVE - Piston hydraulic machines only

Ensure the rotor control lever is in stop position.

Switch main power on.

Prime pump and switch pump power on.

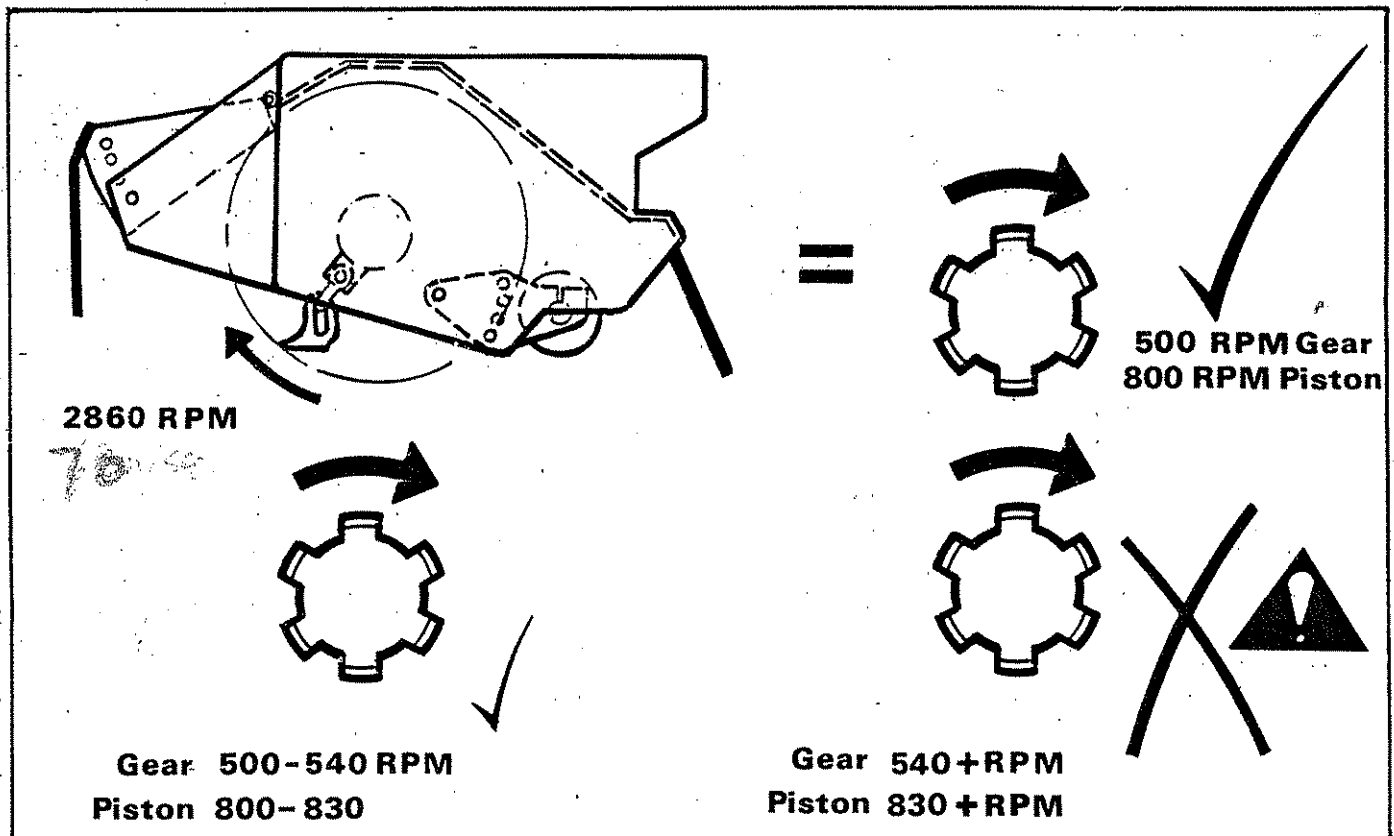
Engage P.T.O. shaft.

Allow the oil to circulate for a few minutes.

Place the flail head in a safe position.

Increase engine speed to high idle and move rotor control lever to 'ON' selecting the rotation required. After initial surging the rotor will run at an even speed.

## ROTOR OPERATING SPEED



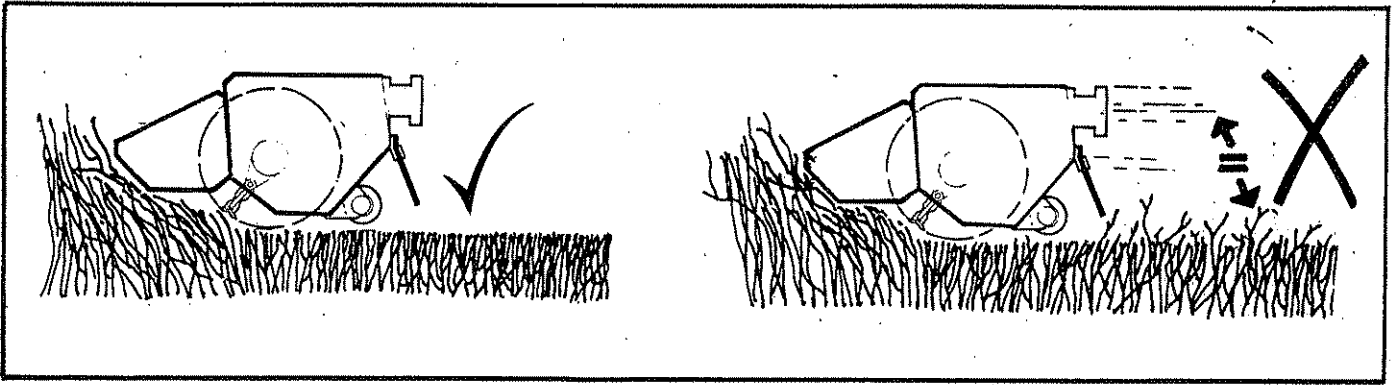
## HIGHWAY WORKING

Local highway working regulations must be observed at all times.

### WARNING

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

## TRACTOR FORWARD SPEED



## GENERAL WORKING PRACTISES

It is the operators responsibility to develop safe working procedures.

Always:-

Be aware of hazards in the vicinity.

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

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

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

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

Check frequently that all nuts and bolts are tight.

Keep bystanders at a safe distance.

## CUTTING PRECAUTIONS

Inspect the work area, remove any hazardous material and note any immovable obstructions.

## BREAKAWAY

With "Auto Reset" selected

Breakaway to the rear and up occurs when an obstacle is encountered. On clearing the obstacle the head automatically returns to the work position.

With "Slew" selected

When an obstacle is encountered the head breaks back horizontally until the obstruction is cleared. Re-setting the head is carried out manually by operating the slew lever.

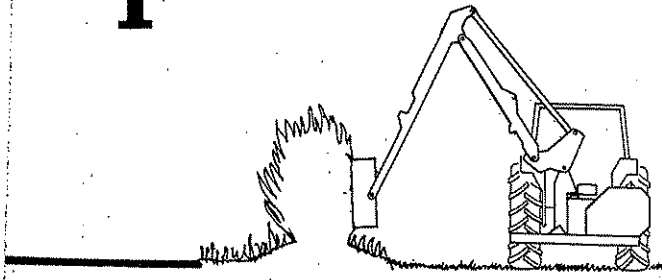
## POWERED SLEW

95 degrees of powered slew allows awkward areas to be cut more easily.

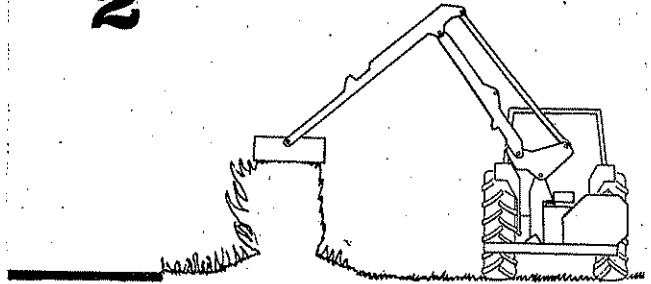
"Slew" must be selected on the switch box.

# CUTTING SEQUENCE

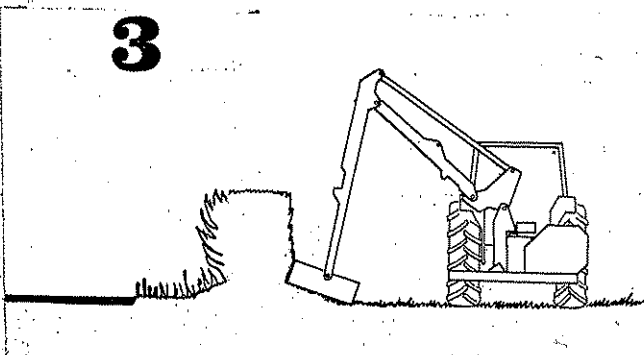
**1**



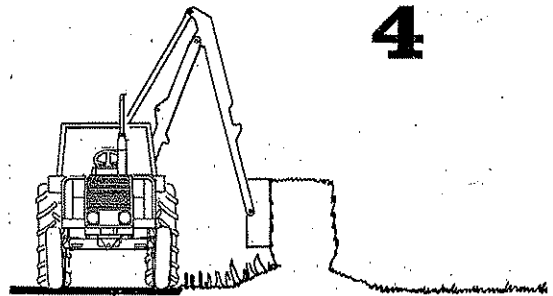
**2**



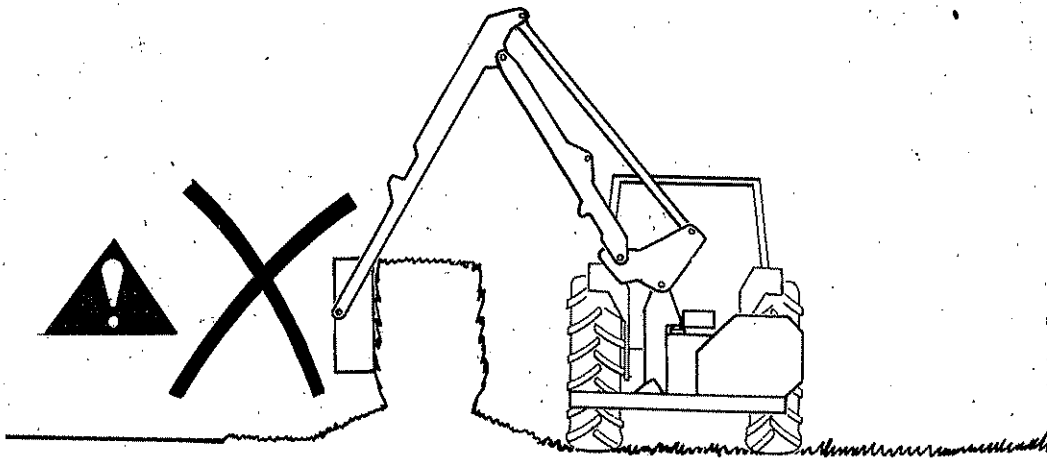
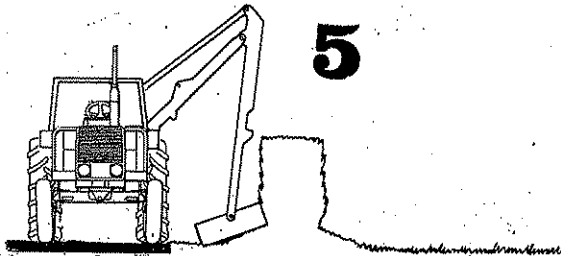
**3**



**4**



**5**



## TELESCOPIC DIPPER PA5000T/7000T only

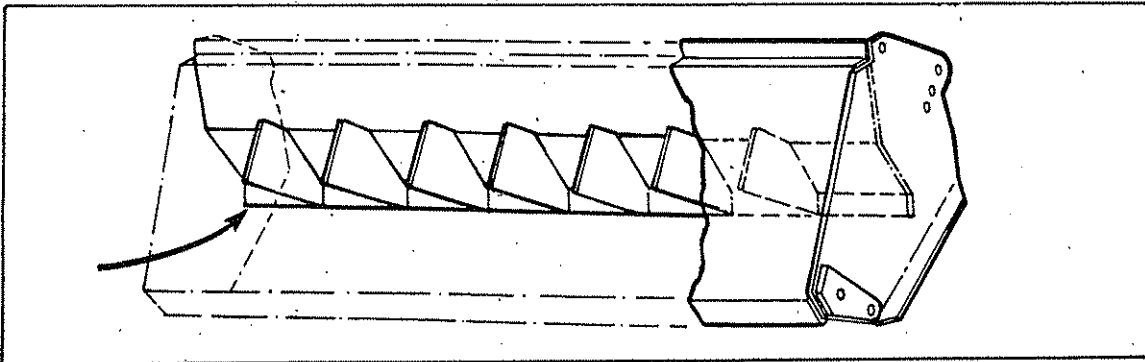
5000T - The telescopic dipper gives 1.05 metres of reach extension

7000T - The telescopic dipper gives 1.35 metres of reach extension.

Normally the tele is pre-set and then the machine operated using the normal controls. The 'Tele' function could be used in place of 'Reach' but a slower response to the controls must be expected.

'Tele' alters the parallel motion geometry. This works best at ground level when 'tele' is fully out and at 4-5 feet (1.2 - 1.5 metre) high when fully in.

### WIRE TRAP



The flail head is equipped with a wire cutting edge welded into the underside. This plate should not be interfered with in any way.

Any wire caught in the rotor must be immediately removed.

### REMOVING WIRE

Select rotor "OFF" and wait until it has stopped rotating.

STOP the tractor and only then remove wire.

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

### WORKING ON ADVERSE SLOPES

When working high with the reach fully in it is possible for the main arm balance to go over centre and take the weight off the lift ram. A restrictor in the gland connection of the lift ram prevents sudden unpredictable movements should this occur.

#### WARNING

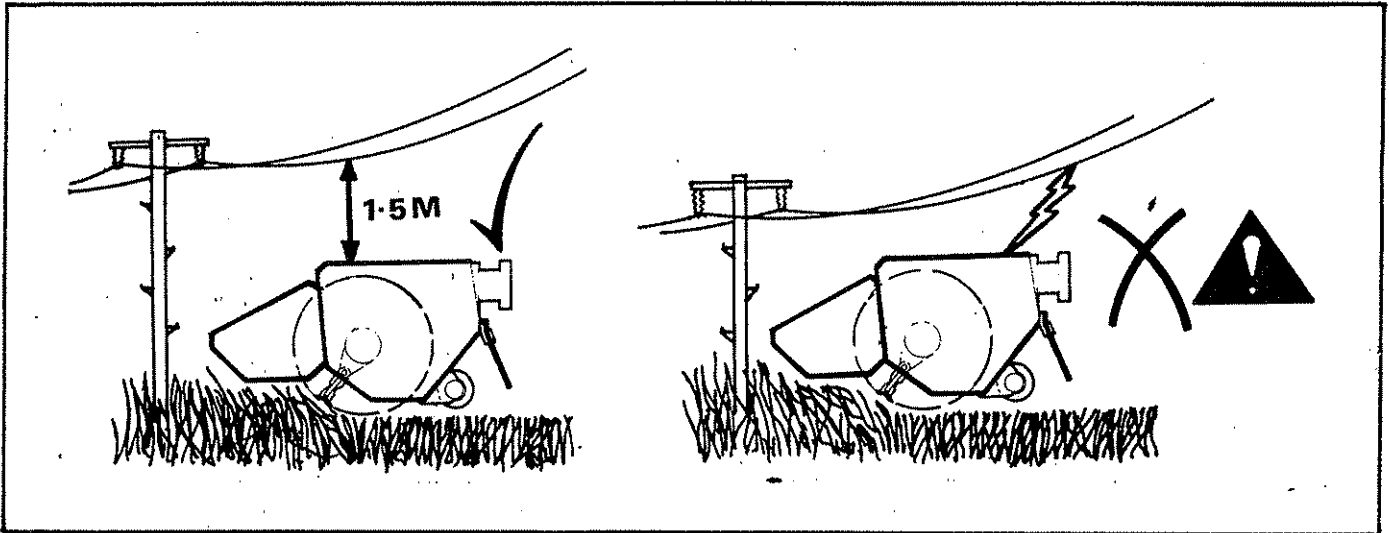
Do not remove this restrictor  
from the lift ram gland connection

To regain the lower position extend the reach ram to return the centre of balance onto the lift ram which will then retract when 'Lift down' is selected.

## OVERHEAD OBSTRUCTIONS

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

## HIGH VOLTAGE CABLES



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

## AUTO HEAD CONTROL (Optional extra)

An automatic function which maintains the flail head angle at the chosen setting during normal 'Lift' and 'Reach' adjustments.

Note:- The performance of the function deteriorates when working within half a metre of full reach.

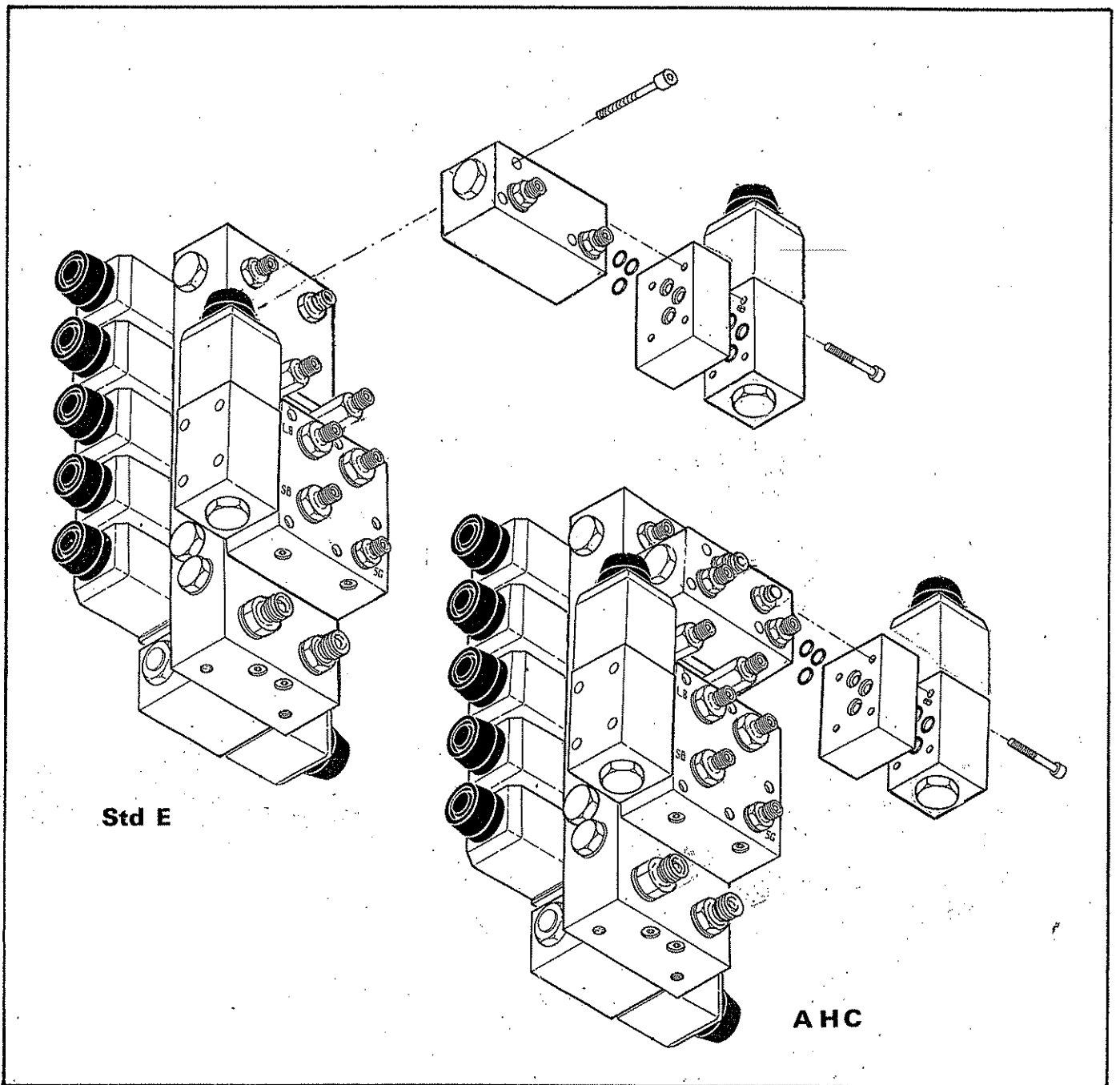
Should "Head angle float" be selected the auto head control feature ceases to function. On de-selection it becomes automatically re-instated.

## HEAD ANGLE FLOAT

- Optional extra on all std electric controlled models
- Standard equipment on proportional controlled models.

This facility will allow the flail head to angle itself automatically to suit the contours of the ground. It is activated by selecting B

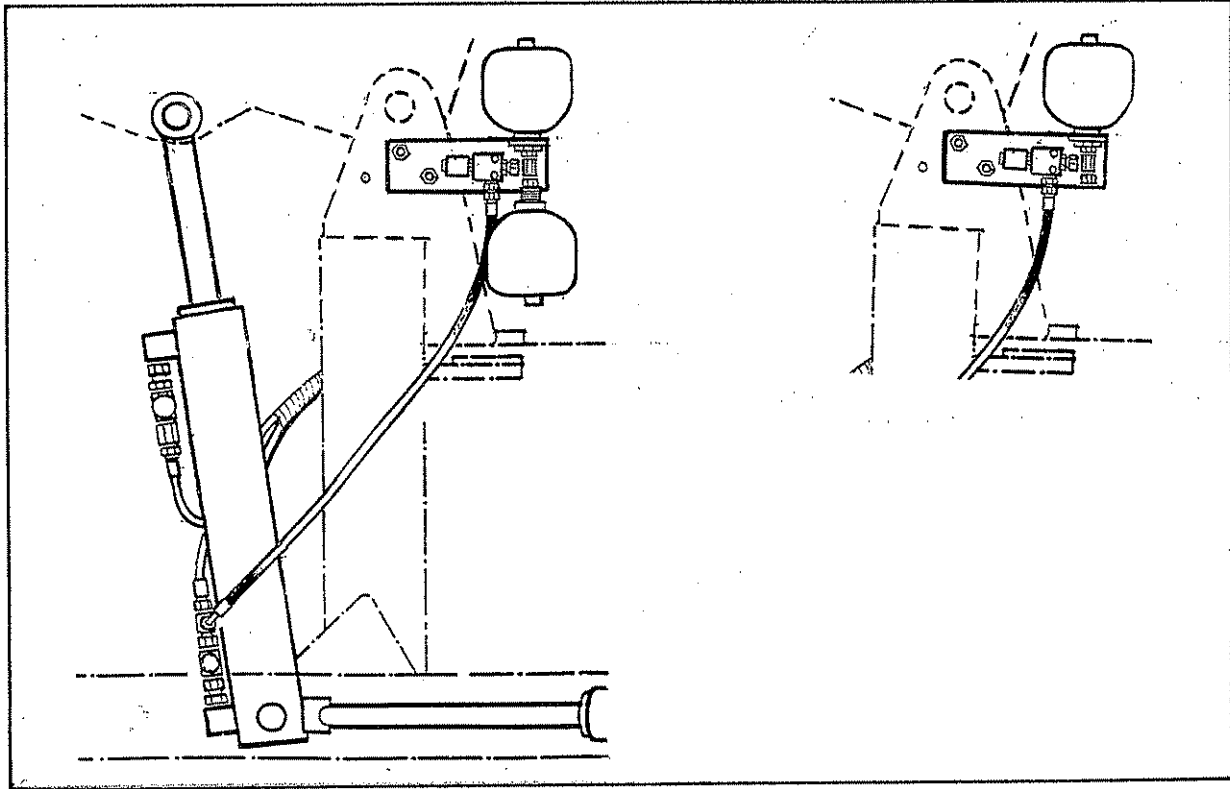
When working with head angle float the flail head mount must be positioned such that the flail head is balanced about the mounting position. Failure to observe this will result in a poor untidy cut.



**HEAD ANGLE FLOAT KIT - FITTING - electric models only.**

The kit is bolted in position as shown.

On electric controlled machines the cable from the poppet valve solenoid is connected to the auxiliary connection on the loom. Refer to connection sticker on valve cover.



The hydraulic float kit should be mounted as shown bolted to the pillar.

On cable controlled machines the switch is mounted in a convenient location in the cab. The supply cable from the valve solenoid is connected into the tractors ignition system. The brown lead is positive and the blue is negative.

On electric controlled machines the cable from the poppet valve solenoid is connected to the auxiliary connection on the loom. Refer to connection sticker on valve cover.

The auxiliary switch on multilever electric controlled machines is a three position type which will allow the selection of head float alone, or head and angle float in unison, if both options are fitted.

For multilever switchboxes an additional switching kit Part No. 84 02 303 is available which will, when the dual action position is selected, isolate the lift float function and allow angle float to be selected alone.

On monolever controls both lift and angle float have individual on/off switches.

In work with the solenoid valve open the flail head will automatically follow the ground contours.

The float action is engaged by selection of the auxiliary switch

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

To revert to standard operation the accumulator/s is isolated from the lift ram by deselecting the float switch.

LIFT FLOAT - electronic response - standard equipment on E.D.S. machines.

Prior to selecting lift float ensure the flail head is on the ground and deselected.

The lift float is selected by using either button designated for this purpose on the control console.

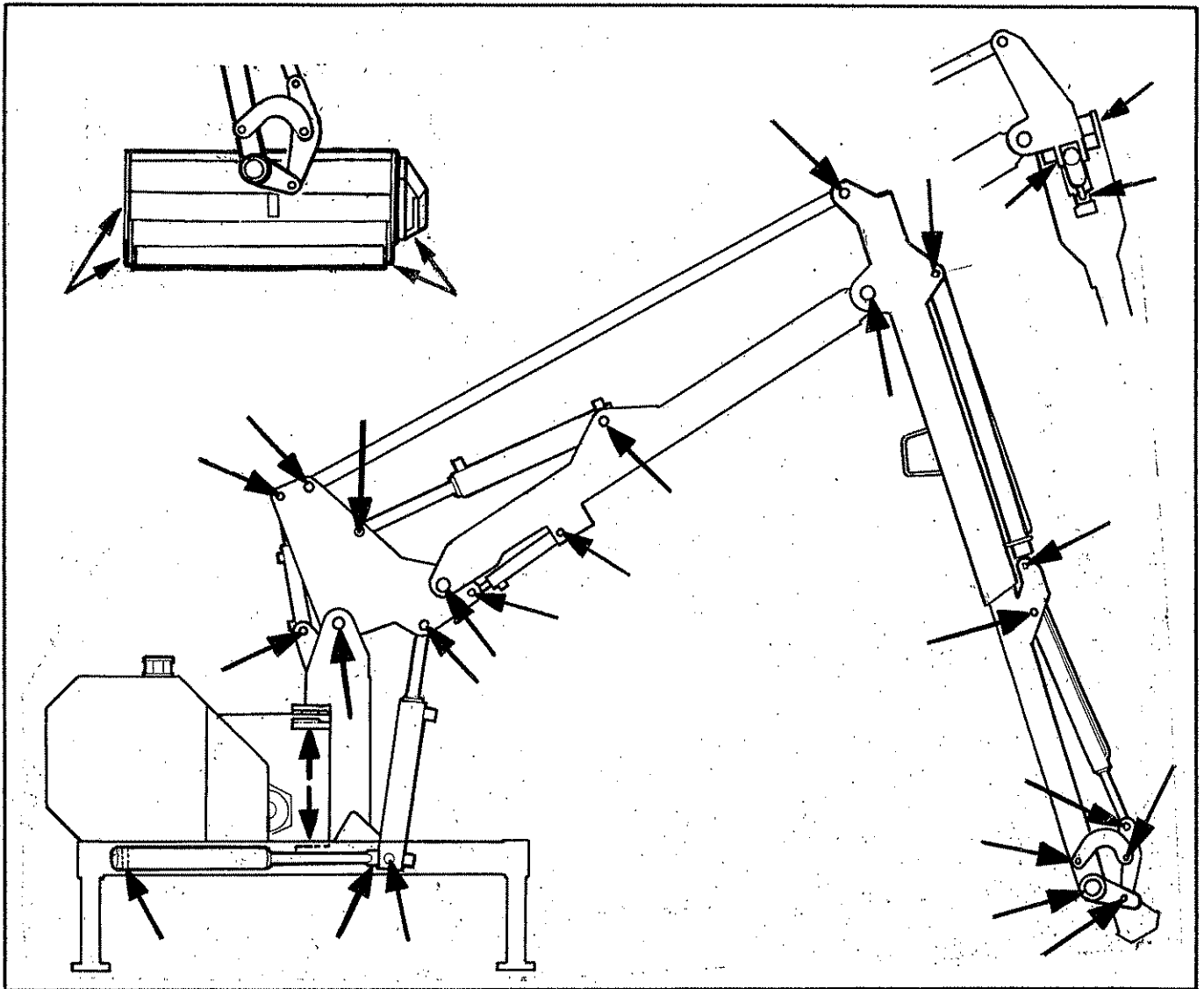
Once selected the system is automatic and requires no adjustments of the lift service by the operator.

The proportion of the flail head weight that is taken by the lift ram is preset by the manufacturer to provide the optimum ground following characteristics.

Should the weight of the flail head vary considerably i.e. changing from a 1.2m head to a 1.5m/1.6m head or vice versa contact McConnell Service Department to have your float response re-calibrated.



# MAINTENANCE



## LUBRICATION

### GENERAL

Grease daily all points shown.

### POWER TAKE-OFF SHAFT

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

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

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

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

## HYDRAULIC SYSTEM

### OIL SUPPLY

Check the oil level in the reservoir daily.

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

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

Contamination can be reduced by:-

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

11) Using clean containers when replenishing the system

111) Regular servicing of the filtration system.

### FILTRATION MAINTENANCE

The machine is protected by a 125 micron suction strainer, a 10 micron low pressure tank return line filter, a medium pressure 10 micron charge flow filter, a 10 micron pressure line filter, and a 5 micron air filter.

1) Suction strainer

The strainer is permanently fixed within the reservoir.

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

11) Filters

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

iii) Air filter

The air filter should be changed at intervals of 500 hours.

### P.T.O. GEARBOX

The gearbox is rigidly bolted on to the main frame and has a filler plug. Oil level is correct when level with the filler plug aperture. The gearbox oil should be changed every year or at 600 hour intervals: whichever occurs first. Top up with EP90 oil.

## HYDRAULIC HOSES

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

### HOSE REPLACEMENT

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

Before changing hoses study the installation these are carefully calculated to prevent hose damage during operation. Always replace hoses in exactly the same manner. This is especially important for the flail hoses where they must be crossed, upper to lower, at the dipper and head pivots.

All Hydraulic Hoses (B.S.P.) now fitted to McConnel Power Arm Hedge/Grass Cutters have "Soft Seal" connections on both flail and ram circuit hoses.

Recommended torque settings for nut security are as follows:-

				REF 'O' ring	
1/4" BSP	=	24 N.m	or	18 lbf ft	10 000 01
3/8" BSP	=	33 N.m	or	24 lbf ft	10 000 02
1/2" BSP	=	44 N.m	or	35 lbf ft	10 000 03
5/8" BSP	=	58 N.m	or	43 lbf ft	10 000 04
3/4" BSP	=	84 N.m	or	62 lbf ft	10 000 05
1" BSP	=	115 N.m	or	85 lbf ft	10 000 06

For hose unions (B.S.P.) fitted in conjunction with bonded seals the recommended torque settings are as follows:-

1/4" BSP	=	34 N.m	or	25 lbf ft
3/8" BSP	=	75 N.m	or	55 lbf ft
1/2" BSP	=	102 N.m	or	75 lbf ft
5/8" BSP	=	122 N.m	or	90 lbf ft
3/4" BSP	=	183 N.m	or	135 lbf ft
1" BSP	=	203 N.m	or	150 lbf ft

### \*SAFETY NOTE\*

Soft Seal hose connections are capable of holding pressure when the nut is only "finger tight". It is therefore recommended that when dismantling the hose is manually flexed, to relieve any residual pressure, with the retaining nut slackened prior to complete disassembly.

## **CABLES**

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

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

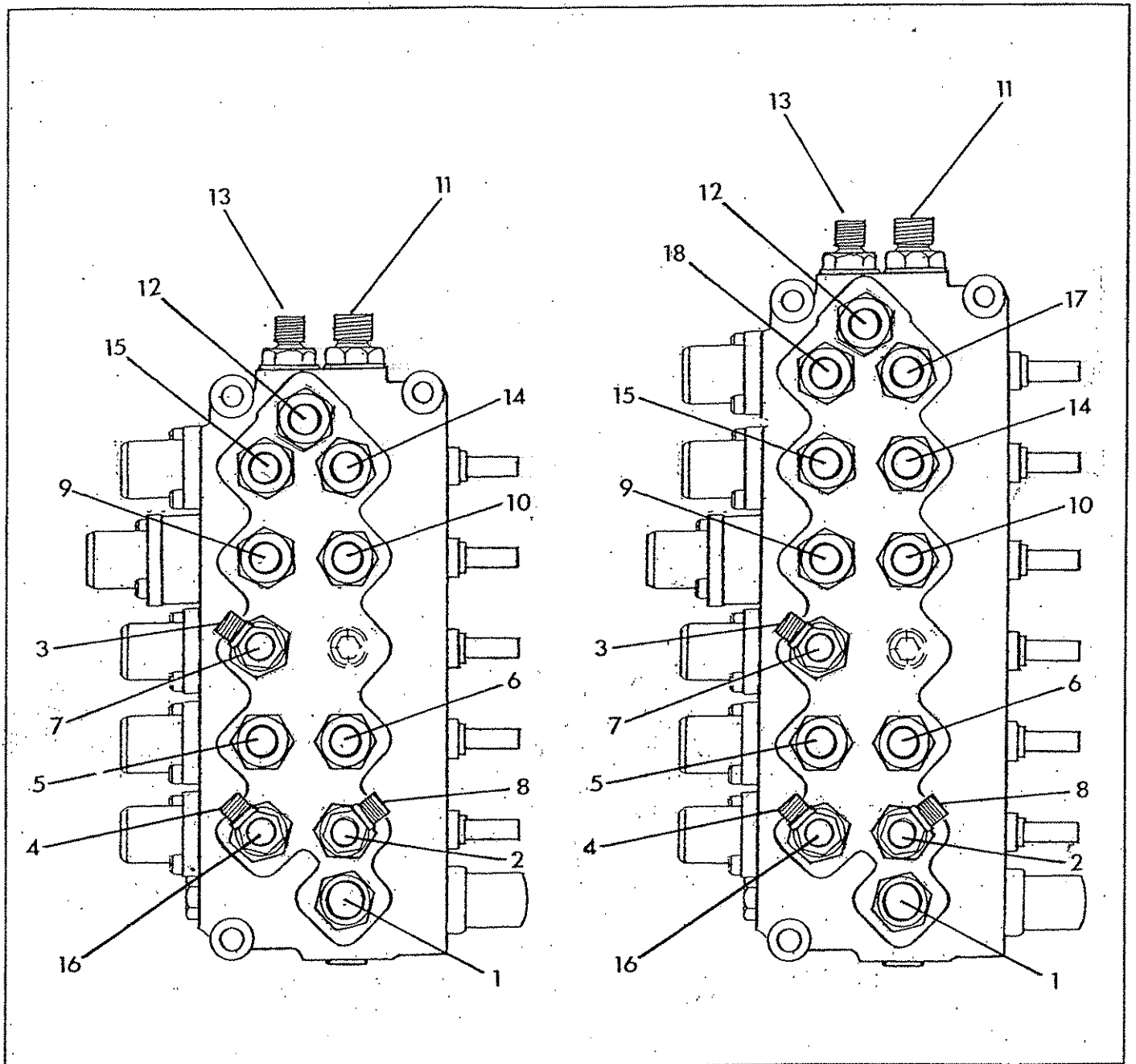
No routine adjustment of the cables are necessary as they do not stretch. The threaded collar is correctly adjusted when the lever is in a vertical position in its housing allowing an equal amount of travel in either direction.

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

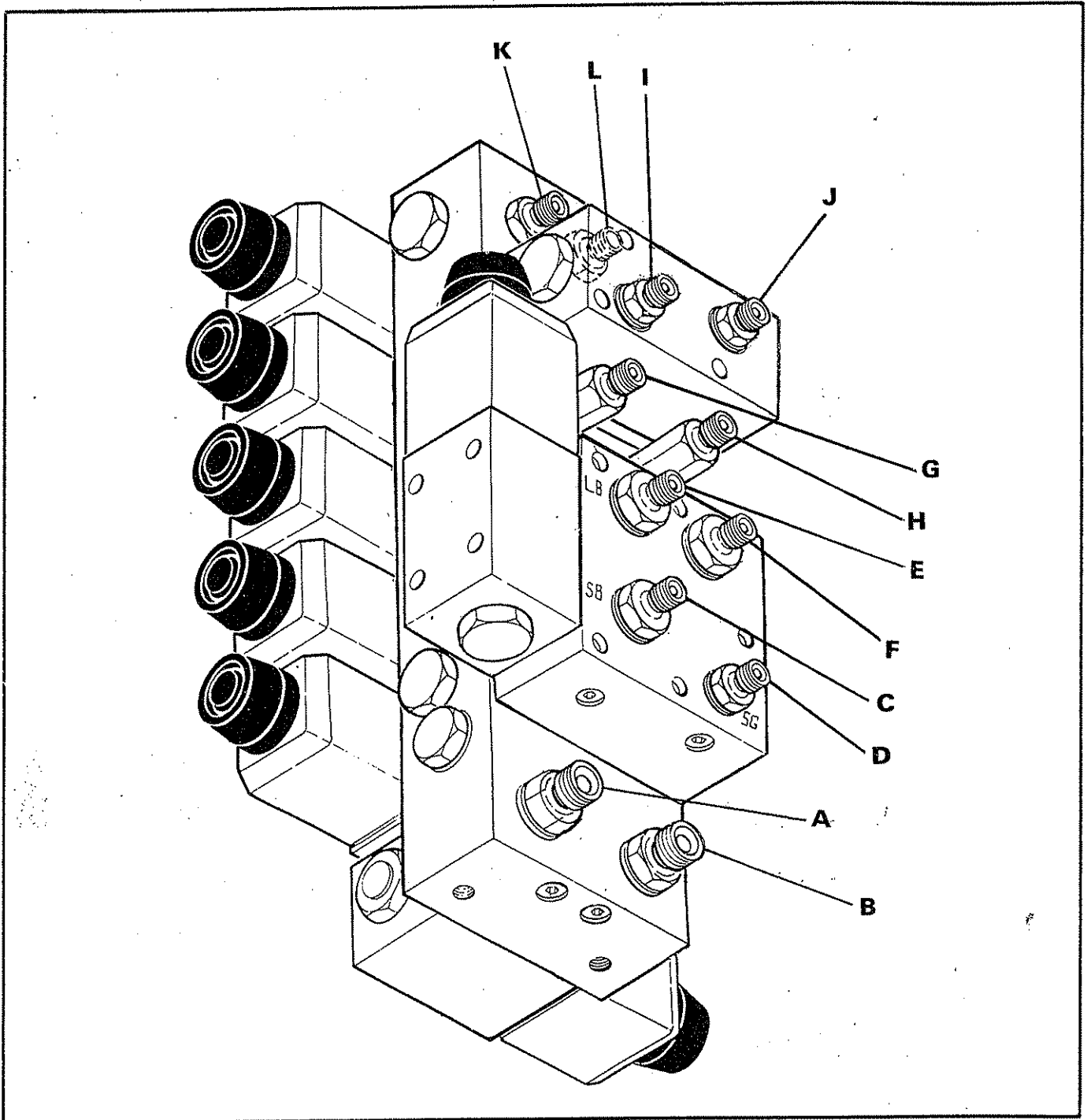
**NOTE** Take care to ascertain the correct cable connections on both the control unit and the valve in the event of cable replacement.

# HOSE CONNECTIONS

MAIN VALVE - Cable controlled machines only



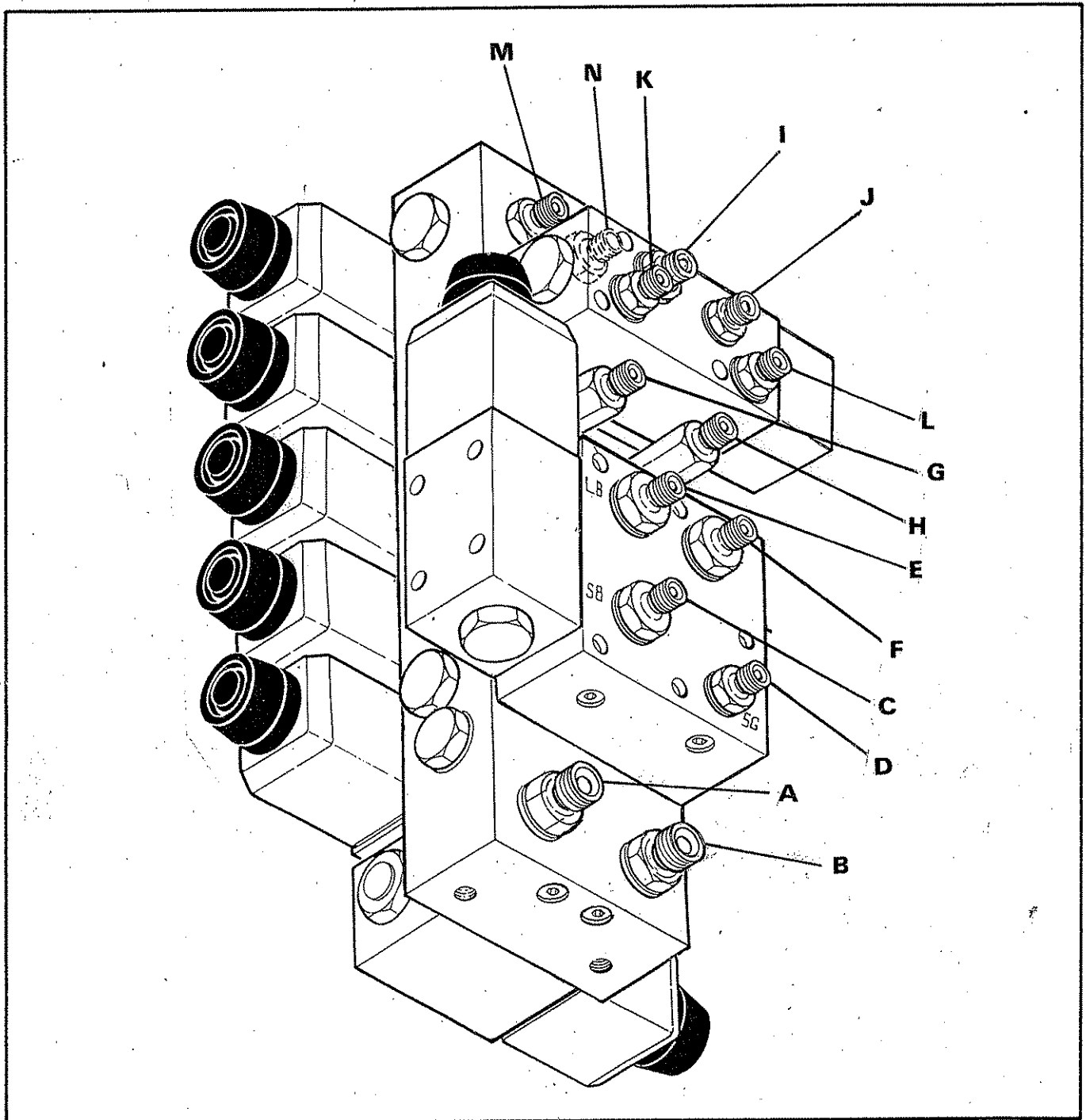
- |                     |  |
|---------------------|--|
| 1. Supply from pump | 11. Return to Rotor valve                              |
| 2. Slew base        | 12. Lift gland   |
| 3. Connection 13    | 13. Connection 3                                       |
| 4. Connection 15    | 14. Connection 8                                       |
| 5. Reach gland      | 15. Connection 4                                       |
| 6. Reach base       | 16. Slew gland   |
| 7. Lift base        | 17. Tele base (if fitted)<br>Midcut base (if fitted)   |
| 8. Connection 14    | 18. Tele gland (if fitted)<br>Midcut gland (if fitted) |
| 9. Angle gland      |  |
| 10. Angle base      |  |



**MAIN VALVE -**

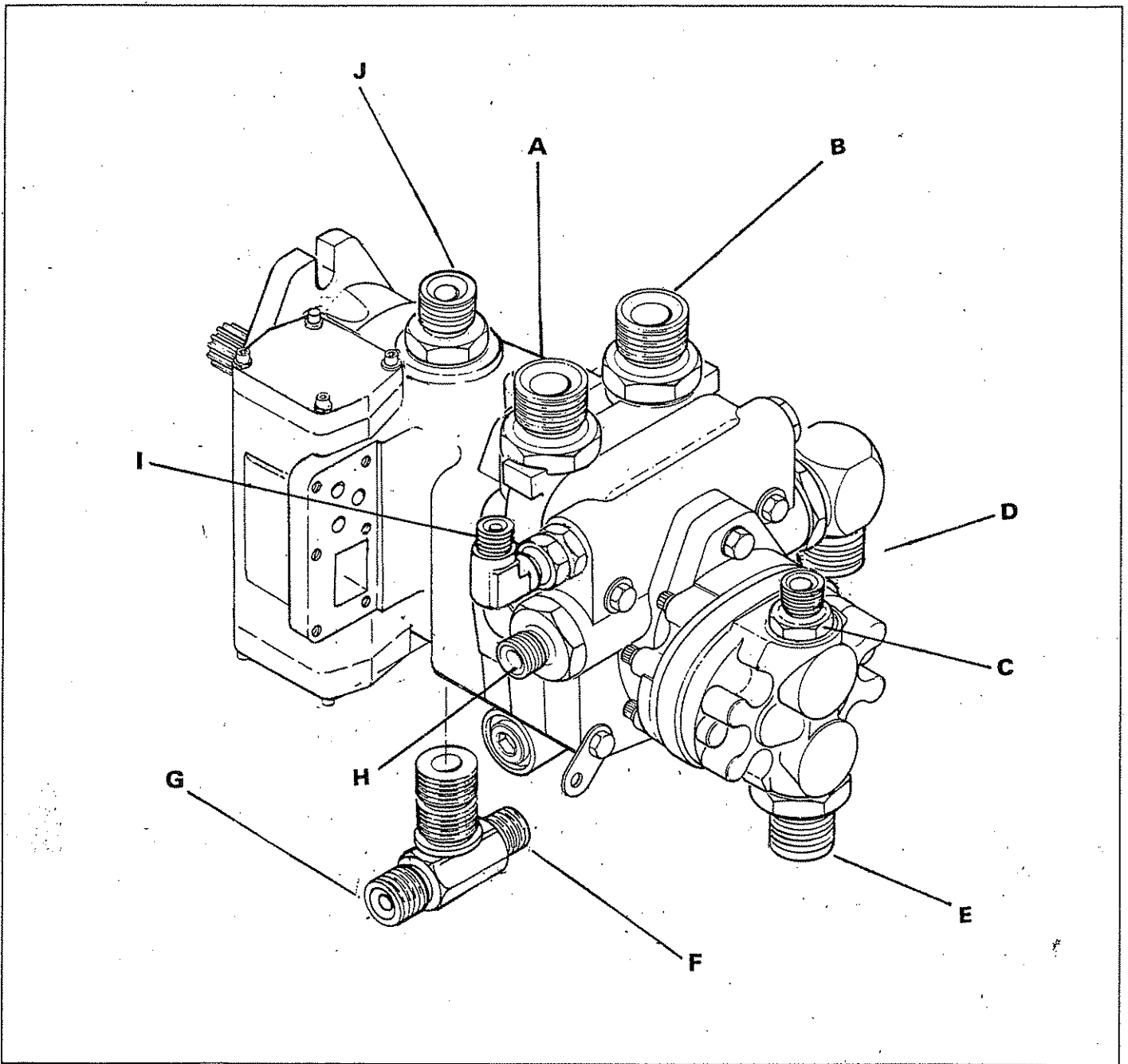
**ELECTRIC**

- |  |  |
|--|--|
| A - Supply   | B - Return to Rotor control valve                      |
| C - Slew base  | D - Slew gland   |
| E - Lift base  | F - Lift gland   |
| G - Tele base (if fitted)<br>Midcut base (if fitted) | H - Tele gland (if fitted)<br>Midcut gland (if fitted) |
| I - Angle base                                       | J - Angle gland  |
| K - Reach base                                       | L - Reach gland  |



**MAIN VALVE - STANDARD ELECTRIC WITH A.H.C.**

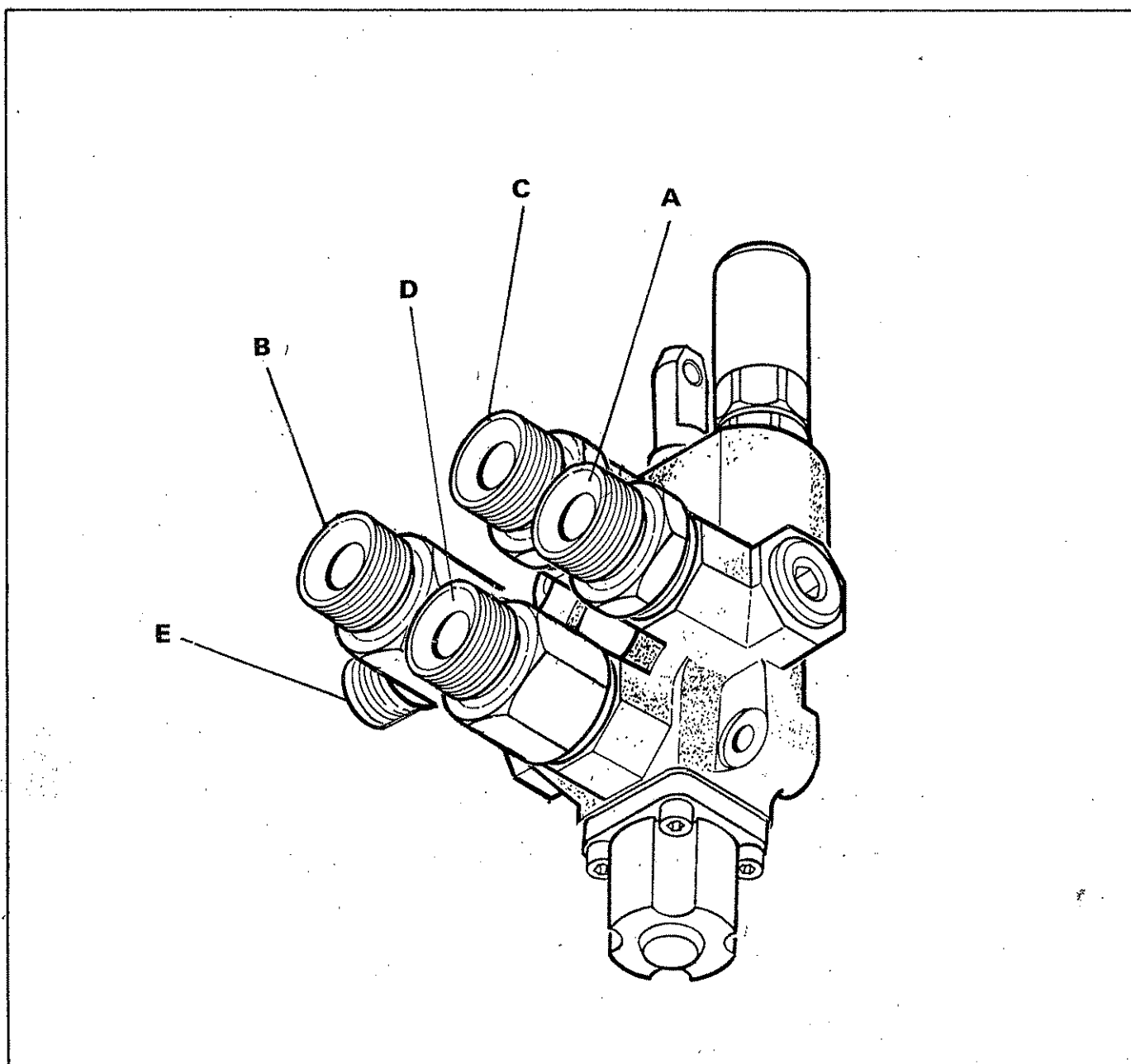
- |  |  |
|--|--|
| A - Supply   | B - Return to Rotor control valve                      |
| C - Slew base  | D - Slew gland   |
| E - Lift base  | F - Lift gland   |
| G - Tele base (if fitted)<br>Midcut base (if fitted) | H - Tele gland (if fitted)<br>Midcut gland (if fitted) |
| I - Lift compensator base                            | J - Lift compensator gland                             |
| K - Angle base / Reach<br>Compensator base           | L - Angle gland / Reach<br>Compensator gland           |
| M - Reach base                                       | N - Reach gland  |



**PUMP - Piston machines only**

- A - Motor upper
- B - Motor lower
- C - Supply to armhead valve
- D - Suction from tank
- E - Suction from tank
- F - Return from armhead valve
- G - Return from motor drain line
- H - Supply to charge filter
- I - Return from charge filter
- J - Return to tank filter





**ROTOR CONTROL VALVE.** - Gear hydraulic machines only

A - Supply from pump

B - Return to tank

C - Motor upper

D - Motor lower

E - Return from main valve.



McConnel Limited, Temeside Works, Ludlow, Shropshire SY8 1JL. England.  
Telephone: 01584 873131. Facsimile: 01584 876463. [www.mcconnel.com](http://www.mcconnel.com)