IM1886

# *HAWK RANGE*

## *Hawk 4.8 & 4.8P*
## *Hawk 5.4 & 5.4P*
## *Hawk 6 & 6P*
## *Hawk 6.5T & 6.5TP*

## *ARM MOWER*

***INSTRUCTION BOOK***

ISSUE 4

**IMPORTANT**

NOTE HERE THE SERIAL NUMBER OF YOUR MACHINE AND ALWAYS QUOTE IT IN ANY COMMUNICATION WITH US OR YOUR DEALER. THIS IS PARTICULARLY IMPORTANT WHEN ORDERING SPARES. REMEMBER TO INCLUDE ALL NUMBERS AND LETTERS.

MACHINE SERIAL NUMBERS _____

THE INFORMATION GIVEN THROUGHOUT THIS MANUAL IS CORRECT AT THE TIME OF PUBLICATION. HOWEVER, IN THE COURSE OF CONSTANT DEVELOPMENT OF BOMFORD TURNER MACHINES, CHANGES IN SPECIFICATION ARE INEVITABLE. SHOULD YOU FIND THE INFORMATION GIVEN IN THIS BOOK TO BE AT VARIANCE WITH THE MACHINE IN YOUR POSSESSION, YOU ARE ADVISED TO CONTACT THE BOMFORD TURNER SERVICE DEPARTMENT WHERE UP-TO-DATE INFORMATION WILL BE PROVIDED.
THE MANUAL CAN CONTAIN STANDARD AND OPTIONAL FEATURES AND IS NOT TO BE USED AS A MACHINE SPECIFICATION.
THE MACHINE HAS BEEN TESTED AND IS CONSIDERED SAFE IF CAREFULLY USED. ENSURE YOUR OPERATOR IS PROPERLY TRAINED IN ITS USE AND MAINTENANCE.

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**IMPORTANT**

NOTEZ ICI LES NUMEROS DE SERIE DE VOTRE MACHINE ET MENTIONNEZ LES DANS TOUTE COMMUNICATION AVEC NOS SERVICES OU VOTRE REVENDEUR. CECI EST IMPORTANT POUR LA COMMANDE DE PIECES DETACHEES. PENSEZ A NOTER TOUS LES NUMEROS ET TOUTES LES LETTERS.

NUMEROS DE SERIE DE LA MACHINE_____.

LES INFORMATIONS DONNEES DANS CE MANUEL SONT CORRECTES CEPENDANT, DU FAIT DE DEVELOPPEMENT CONSTANT DES MACHINES BOMFORD TURNER.
CHANGEMENTS DANS LES CARACTERISTIQUES SONT INEVITABLES.
SI VOUS TROUVEZ QUE LES INFORMATIONS DONNEES NE CORRESPONDENT PAS A VOTRE MACHINE VEUILLEZ CONTACTER LE SERVICE DES REPARATIONS OU DES INFORMATIONS PLUS RECENTES VOUS SERONT DONNEES.
CE MANUEL PEUT MONTRER DES CARACTERISTIQUES OPTIONNELLES ET NE PEUT PAS ETRE CONSIDERE COMME SPECIFICATION DE LA MACHINE.
CETTE MACHINE A ETE TESTEE, ET ELLE EST CONSIDEREE COMME FIABLE A CONDITION D'UNE BONNE UTILISATION. ASSUREZ-VOUS QUE VOTRE OPERATEUR EST QUALIFIE EN CE QUI CONCERNE L'UTILISATION DE LA MACHINE AINSI QUE SON ENTRETIEN.

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**WICHTIG**

TRAGEN SIE HIER DIE SERIENNUMMERN IHRER MASCHINE EIN UND GEBEN SIE DIESE IMMER AN, WENN SIE SICH AN UNS ODER IHREN HÄNDLER WENDEN. DAS IST BESONDERS BEI ERSATZTEILBESTELLUNGEN WICHTIG. VERGESSEN SIE NICHT, ALLE ZAHLEN UND BUCHSTABEN ZU NOTIEREN.

SERIENNUMMERN DER MASCHINE_____

DIE ANGABEN INDIESEM HANDBUCH SIND BEI VERÖFFENTLICHING KORREKT. AUFGRUND DER KONSTANTEN WEITERENTWICKLUNG VON BOMFORD TURNER MASCHINEN SIND JEDOCHÄNDERUGDEN IN DER SPEZIFIKATION UNVERMEIDLICH. WENN DIE INFORMATION IN DIESEM HANDBUCH NICHT MIT IHRER MASCHINE ÜBEREINSTIMMEN, NEHMEN SIE BITTE KONTAKT MIT DER BOMFORD TURNER KUNDENDIENSTABTEILUNG AUF, DIE IHNEN GERNE DIE AKTUELLEN INFORMATION ZUKOMMEN LÄSST.
DAS HANDBUCH KANN SOWOHL BESCHREIBUNGEN FÜR DIE STANDARD AUSFÜHRUNG ALS AUCH FÜR ZUBEHÖR ENTHALTEN UND IST NICHT ALS MASCHINENSPEZIFIKATION ZU VERWENDED.
DIE MASCHINE IST GETESTET UND BEI SACHGEMÄSSEM BETRIEB ALS SICHER BEFUNDEN WORDEN. SORGEN SIE DAFÜR, DASS IHR BEDIENPERSONAL IN ANWENDUNG UND WARTUNG RICHTIG GESCHULT WIRD.

**This manual covers the Hawk range of two-arm Flail mowing machines which are hydraulically-powered and are designed for vegetation control. The Hawk 4.8 and 5.4 range can be mounted to the tractor's 3-point linkage system and the Hawk 6 range has the option of being mounted onto suitable axle brackets.**

**The machinery may be used for the cutting and thinning of all types of hedges and verges within the scope of its reach and performance, provided the correct guards are fitted.**

**It is essential that the machine is operated in line with the procedures and practices detailed in this manual.**



NOTE:
Diagrams may show left or right hand build machines, in either case the same text applies.
If in any doubt consult Bomford Turner Limited.

**IMPORTANT**

This machine is designed for vegetation control and must not be used for any other purpose.

It is potentially hazardous to fit or use. Any parts other than genuine **Bomford Turner** parts.

The company disclaims all liability for the consequences of such use which, in addition, voids the machine warranty.

Original Certificate

# EC DECLARATION OF CONFORMITY

**Conforming to EU Directive 2006/42/EC**

We,

Of BOMFORD TURNER LIMITED, Station Road, Salford Priors, Evesham, Worcestershire, WR11 8SW, UK.

Declare that under our sole responsibility the product (type);

| Reach arm base unit | Product code | Reach arm base unit | Product code |
|---|---|---|---|
| **HAWK 5M** | **H50P & H50S** | **HAWK 5.4M** | **H54P & H54S** |
| **HAWK 6M** | **H60P & H60S** | **HAWK 6.5M** | **H65P & H65S** |

A vegetation control tractor mounted arm mower, to be fitted with one of the following flail mower cutting attachments;

| Reach arm attachment | Product code |
|---|---|
| **1200 PRO-TRIM CUTTING HEAD** | **12PT** |
| **1500 PRO-TRIM CUTTING HEAD** | **15PT** |
| **1200 PRO-TRIM ISMP CUTTING HEAD** | **12PT** |

Serial No(s). & Date:.....

Designed by: BOMFORD TURNER LTD, Salford Priors, Evesham, Worcetershire, WR11 8SW, UK.

Manufactured by: ALAMO MANUFACTURING SERVICES (UK) Limited, Station Road, Salford Priors, Evesham, Worcestershire, WR11 8SW, UK.

Complies with the required provisions of;

- Directive 2006/42/EC
- Directive 2004/108/EC
- BS EN ISO 12100:2010

And other national standards associated with its design and construction as listed in the technical file.

BOMFORD TURNER LIMITED operates an ISO 9001:2008 quality management system.
This system is accredited by;

BSI, Beech House, Linford Wood, Milton Keynes, UK, MK14 6ES
BSI identification number: UKAS 003
Bomford Turner certificate number: FM 34659

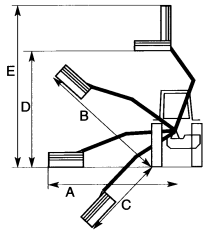
Signed.....
On behalf of BOMFORD TURNER LIMITED Responsible person

Status Managing Director

Date: 04/08/11

| TRACTOR | 4.8 | 4.8P | 5.4 | 5.4P | 6 | 6P | 6.5T | 6.5TP |
|---|---|---|---|---|---|---|---|---|
| PTO type | Live | Live | Live | Live | Live | Live | Live | Live |
| PTO speed (rpm) | 540 | 540 | 540 | 540 | 540 | 540 | 540 | 540 |
| PTO size | 1 3/8in 6 spline | 1 3/8in 6 spline | 1 3/8in 6 spline | 1 3/8in 6 spline | 1 3/8in 6 spline | 1 3/8in 6 spline | 1 3/8in 6 spline | 1 3/8in 6 spline |
| Minimum tractor weight without ballast | 2100kg | 2100kg | 2200kg | 2200kg | 3000kg | 3000kg | 3800kg | 3800kg |
| **Machine Weight** | | | | | | | | |
| Base-dry | 720kg | 760kg | 790kg | 810kg | 870kg | 910kg | 1200kg | 1150kg |
| With oil | 890kg | 930kg | 960kg | 980kg | 1040kg | 1080kg | 1343kg | 1293kg |
| Head (Pro-Trim 1200) | 270kg | 270kg | 270kg | 270kg | 270kg | 270kg | 270kg | 270kg |
| Complete Machine including oil | 1160kg | 1200kg | 1210kg | 1250kg | 1310kg | 1350kg | 1613kg | 1563kg |
| Oil tank capacity Litres | 170 L | 170 L | 170 L | 170 L | 170 L | 170 L | 170 L | 170 L |

**DIMENSIONS** (with 1.2m Pro-Trim Head)




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| A | 4.8m | 4.8m | 5.4m | 5.4m | 6.0m | 6.0m | 6.5m | 6.5m |
| B | 4.9m | 4.9m | 5.5m | 5.5m | 6.1m | 6.1m | 6.65m | 6.65m |
| C | 3.2m | 3.1m | 3.8m | 3.7m | 4.3m | 4.2m | 4.85m | 4.8m |
| D | 4.6m | 4.1m | 5.15m | 4.5m | 5.6m | 5.4m | 5.8m | 4.9m |
| E | 6.25m | 5.72m | 6.8m | 6.16m | 7.3m | 7.0m | 7.65m | 6.6m |

**CUTTING UNITS – PRO-TRIM**

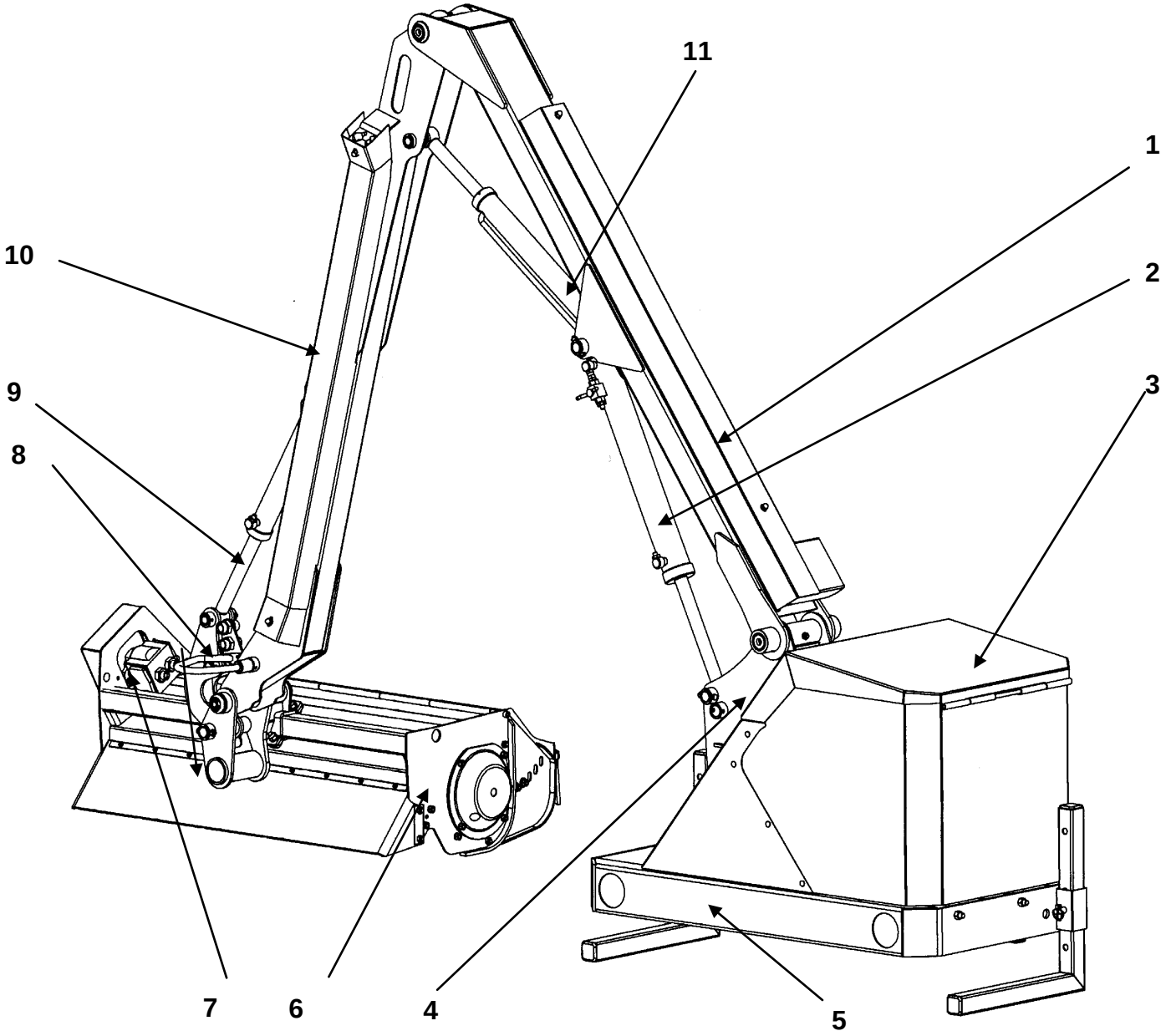
| | | **1.2** |
|---|---|---|
| Shaft speed (Nominal) | | 3000 (2485) |
| (Dependant on pulley orientation) | | rev/min |
| Flail type & quantity: | Proflail | 32 |
| | Twin | 64 |
| | MP44 | 32 |
| | Tee 40 | 32 |
| | Tee 60 | 32 |
| | Bushmaster | 24 |

NOISE

The equivalent daily personal noise exposure from this machine, measured at the operator's ear, is within the range of 80-85dB when used in conditions where the load fluctuates between zero and maximum.

This applies when the machine is attached to a tractor fitted with a quiet cab and used in accordance with the operating instructions in a generally open environment.

At equivalent daily noise exposure levels of between 85 and 90dB, suitable ear protectors are recommended.




| | | | |
|---|---|---|---|
| 1. | First Arm | 2. | First Ram |
| 3. | Oil Tank | 4. | Kingpost |
| 5. | Mainframe | 6. | Cutting Head |
| 7. | Motor | 8. | Cowl Bracket |
| 9. | Cowl Ram | 10. | Second Arm |
| 11. | Second Ram | | |

## 1 Safety

Read, Understand and Follow the Safety Messages. Serious injury or death may occur unless care is taken to follow the warnings and instructions given in the safety messages,

**CAUTION!** The lowest level of Safety Message; warns of possible injury.

**WARNING!** Serious injury or possible death.

**DANGER!** Imminent death/critical injury.

Never operate the tractor or machinery until you have read and completely understand this manual and the tractor operators manual and each of the safety messages found in the manuals and those displayed on the tractor and implement.

**DANGER!** DO NOT attempt any maintenance of or adjustment to the machine while it is running. Before carrying out any work on the machine follow the three safety instructions below:

a LOWER THE CUTTING HEAD ON TO THE GROUND
b PUT THE PTO OUT OF GEAR
c STOP THE TRACTOR ENGINE

**DANGER!** At all times ensure that the PTO shaft guard is in position, securely fitted and in good condition and that the tractor PTO shaft shield is fitted.

**CAUTION!** Replace the PTO shaft guard if any of the following are evident::- guard cracked or damaged any part of the PTO shaft exposed. Ensure the PTO shaft guard is free to rotate and the anti-rotation chains are securely fitted and effective.

**WARNING!** Ensure that the correct guards are properly fitted to the machine and tractor at all times and that they are in good condition. Refer to section on Guards and Rotation in this manual to ensure you have the correct guards fitted for the type of operation being performed.

**WARNING!** While the tractor is running all personnel should keep well clear of the area around the machine as there are numerous crushing, shearing, impact dangers caused by the machine operation.

**DANGER!** **AVOID WIRE**. It can be extremely dangerous if wire catches in the rotor, and every care must be taken to ensure this will not happen. Inspect the working area before commencing. Remove all loose wire and obstructions and clearly mark those that are fixed so that you can avoid them. Any unusual noise from the cutting unit area indicates that the rotor shaft may have been fouled by an obstruction. A visual indication that wire is in contact with the flails may be a sudden movement of the vegetation ahead of the cutting unit. In any such event STOP the tractor engine INSTANTLY. On no account move the cutting unit until the rotor has completely stopped. NEVER IN ANY CIRCUMSTANCES run the rotor to 'clear itself'. When the rotor has stopped inspect it and remove any obstruction that may be present. If working under a raised machine ensure that it is safely supported. Before working on the rotor always stop the tractor engine.

**DANGER!** Flail mowers are capable under adverse conditions of throwing objects great distances at high velocity. CHECK the flails for wear and the attachment bolts for tightness every day during work .A few moments whenever the machine is stopped, e.g. whenever removing obstructions, will help reduce flail wear or loss.

**DANGER!** Keep your forward speed to a level appropriate to the operating conditions. High-speed manoeuvres with the arms stretched out are very dangerous, particularly on uneven ground where there is risk of overturning.

**WARNING!** Direct the cut material away from the tractor. It is important that while operating the cut material is not directed towards the operator. Avoid positioning the cutting head so that the underside is angled towards the cab.

**DANGER!** Keep a careful watch for passers by who may inadvertently get in the way of cut material being thrown from the cutting unit. Flail mowers are capable under adverse conditions of throwing objects great distances at high velocity. Stop the rotor shaft until all people are well clear.

**WARNING!** Extreme care should be taken when operating near loose objects such as gravel, rocks, wire, and other debris. Inspect the area before mowing. Foreign objects should be removed from the site to prevent machine damage and/or bodily injury or even death. Any objects that cannot be removed must be clearly marked and carefully avoided by the operator. Stop mowing immediately if flails strike a foreign object. Repair all damage and make certain the rotor shaft is still balanced before resuming cutting operations.

**WARNING!** Transport the machine only at safe speeds. Serious accidents and injuries can result from operating this equipment at unsafe speeds

**DANGER!** Do not operate or transport with the arms extended rearwards as instability will result and also the possibility of overturning

**CAUTION!** Keep the roller in position at all times. It is an essential part of the machines guarding. The machine must not be operated with the roller missing.

**DANGER!** A wire mesh cab guard must be fitted on the outside of the cab window, between the operator and the cutting head, in such a position as to give the operator maximum protection.

**DANGER!** Where a hedge trimmer is used in conjunction with tractors not fitted with a glazed safety cab, a clear polycarbonate safety screen together with a mesh guard must be fitted to the tractor between the operator and the cutting head. A polycarbonate safety screen must be used on cabs where windows are likely to be left open for ventilation purposes. We emphasise that cab windows on the operating side through which the cutting head is observed MUST be intact, clean and closed, or a clear polycarbonate safety screen must be fitted where hedge cutting and trimming operations are carried out. A mesh guard must also be fitted when hedge cutting.

## 2 Noise

The equivalent daily personal noise exposure from this machine, measured at the operator's ear, is within the range of 80-85dB when used in conditions where the load fluctuates between zero and maximum. This applies when the machine is attached to a tractor fitted with a quiet cab and used in accordance with the operating instructions in a generally open environment. At equivalent daily noise exposure levels of between 85 and 90dB, suitable ear protectors are recommended.

## 3 Emergency Stop

To stop the rotor in an emergency use the tractor stop control. The use of the tractor stop control must only be done in an emergency. Its use to stop the rotor can cause damage to the hydraulic components. After an emergency stop of the rotor; ensure that the PTO lever and rotor control is set to **OFF** before restarting the tractor

## 4, Reverse Rotation

The term REVERSE rotation in the following notes indicates the direction of the rotation of the rotor shaft in relation to the tractor wheels, assuming that the tractor is moving in a forward direction.

## 5, Grass and Hedge Trimming

a The standard build for **hedge trimming** is REVERSE rotation with the steel guard and wire trap at the front of the cutting unit.

b The standard build for **grass cutting** is REVERSE rotation with the flexible flap guard fitted at the front of the cutting unit.

c See Section 12 for detailed guarding instructions.

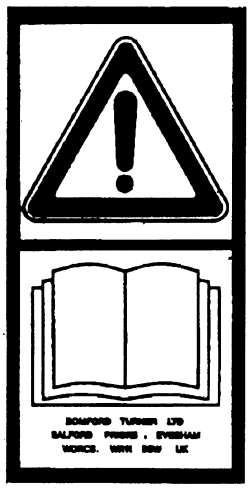
## 6, Safety Decals

Safety decals are located on various points of the machine. They can be identified by the yellow upper panel depicting the hazard, and the lower white panel indicating means of avoidance or precautions to be taken. These decals have no text. It is essential that all operators and personnel associated with the machine fully understand their meanings, which are shown on the following pages.

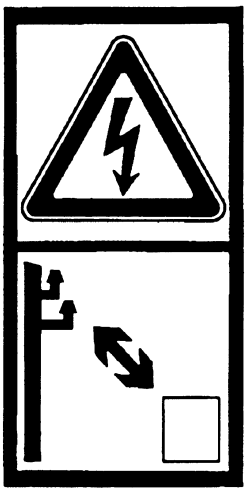
Any safety decals which are found missing should be replaced.


## 7, Electromagnetic Compatibility (EMC) - Radio Telephones

Machines fitted with electric controls are subject to EU directives. The use of radiotelephone equipment should not affect their performance. Ensure that the telephone is installed correctly. Check that no unexpected movements of the machine occur when the telephone is used to transmit.



READ INSTRUCTION MANUAL BEFORE STARTING WORK

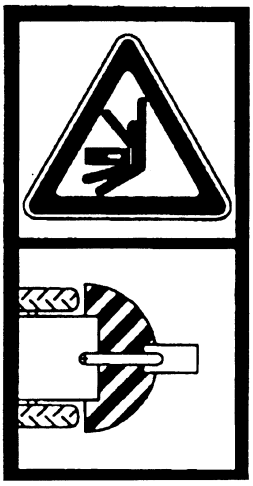


DANGER OF ELECTRIC SHOCK. STAY CLEAR OF CABLES

DO NOT WORK OR STAND UNDER AN UNSUPPORTED MACHINE

DANGER FROM THROWN DEBRIS. KEEP ALL PERSONNEL AT A SAFE DISTANCE FROM THE MACHINE WHEN WORKING

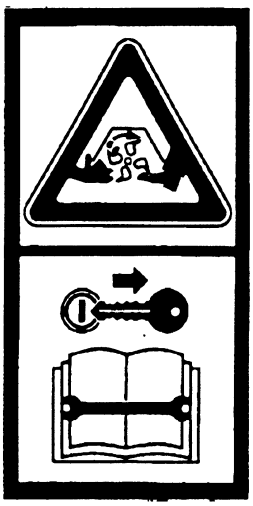
DANGER ROTATING MACHINERY STAY CLEAR OF OPERATING MACHINE



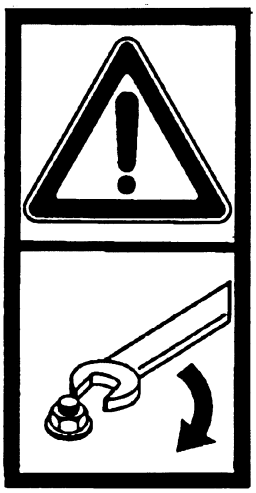
DANGER OF CRUSHING STAY CLEAR OF ZONES

RESIDUAL PRESSURE IN HYDRAULIC LINES READ INSTRUCTION BOOK BEFORE ATTEMPTING MAINTENANCE

STOP TRACTOR AND REMOVE KEY BEFORE UNBLOCKING OR ATTEMPTING MAINTENANCE ON THE HEAD



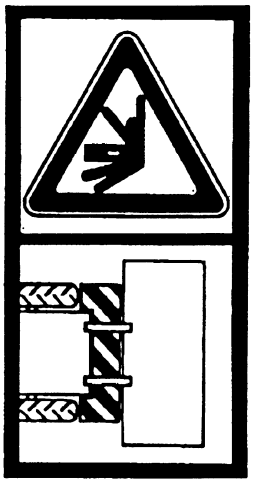
HOT SURFACE DO NOT TOUCH



KEEP ALL NUTS AND BOLTS TIGHT

WARNING! ARMS MAY HIT CAB IF CLEARANCE IS NOT SUFFICIENT

WARNING! ARMS MAY HIT CAB IF CLEARANCE IS NOT SUFFICIENT



DANGER OF CRUSHING STAY CLEAR OF ZONES

DANGER OF ENTANGLEMENT IN SHAFT. KEEP ALL PERSONNEL CLEAR WHILE TRACTOR IS RUNNING

PINCH POINT. KEEP CLEAR WHILE TRACTOR IS RUNNING

## 1 TRACTOR REQUIREMENTS

Before preparing the tractor for the machine ensure that specifications of the tractor meet the requirements listed below.

a 6 spline PTO of l.3/8in dia.

b A PTO output of 540 rev/min.

c A top link is available if required.

d Adequate ballast should be added to the rear wheel opposite to the arms of the mower and front of the tractor to ensure stability. The amount will vary depending on type of tractor used and prevailing conditions.

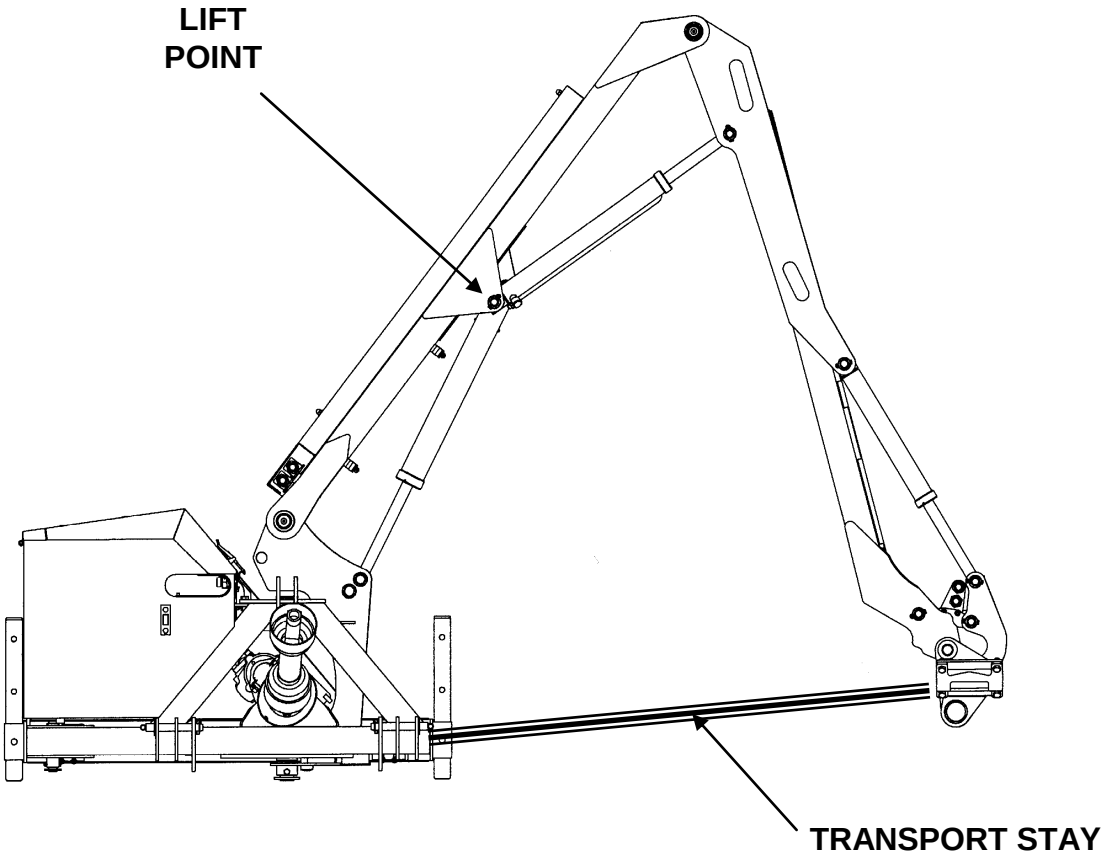
**IF IN DOUBT FOR YOUR MACHINE/TRACTOR COMBINATION, CONTACT BOMFORD TURNER SERVICE DEPARTMENT.**

## 2 MACHINE PREPARATION

The machine will normally be delivered with the arms fully assembled to the mainframe, but with the cutting unit detached.

Only personnel experienced in lift and hoist operation should be involved in lifting machines.

The lifting points (indicated with arrows) are for machines without the cutting unit attached. Due to the fact that machine may be supplied with or without a tank full of oil there are several lifting points. Ensure the correct points are used to suit the machine's condition, as the centre of gravity changes with or without oil exercise caution.



**MACHINE PREPARATION: THREE POINT LINKAGE**

The machine is attached to the tractor by the tractor lift arms, top link and telescopic 'A' frame.

IMPORTANT

DUE TO VARIATIONS IN THE STRENGTH OF DIFFERENT TRACTOR MANUFACTURERS DROP LINKS. IT IS RECOMMENDED THAT SUPPORT TUBES ARE FITTED AROUND THE EXPOSED SECTION OF DROP LINKS THAT ARE LESS THAN 50MM IN DIAMETER

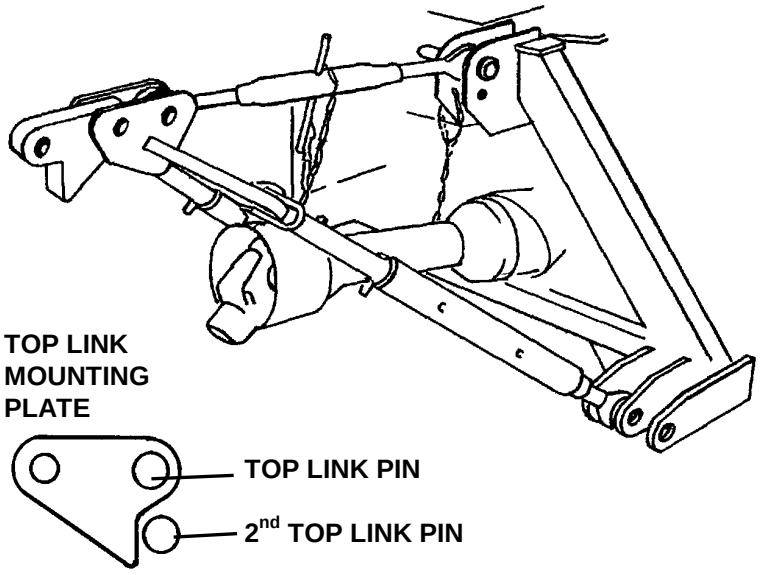
a Position the machine on a flat, hard surface.

b Prepare the mower by using the top link to join the mower's upper hitch point to the 'A' frame upper clevis – (See illustration below). Select top link mounting plate to fit tractor cat 2 is standard with 2 optional plates for cat 3 and 28 dia pins. (a cat 1 bush is also included)

c Using the lower pins, fix the 'A' frame ball ends in the inner clevis of each lower hitch point.

**IMPORTANT**

WHEN FITTING TO SOME MAKES OF TRACTOR, A TOP LINK SUPPORT KIT IS REQUIRED. CONSULT YOUR LOCAL DEALER FOR DETAILS.




**FITTING MACHINE ON THE TRACTOR**

a Carefully reverse the tractor so the ball joints on the tractor linkage line up with the clevis on the mainframe. Connect the mower by pushing the hitch pins through the lift arm ball ends in the outer clevises and fit the linch pins.

DO NOT ALLOW PERSONNEL BETWEEN TRACTOR AND MOWER.

b Connect the upper hitch point of the A frame to the tractor upper hitch point, adjusting the top link as necessary. It is recommended a second top link pin is fitted to act as a stop against top link mounting plate.

c Lift machine to its working height ensuring that the machine is level by adjusting the tractor linkage to suit.

d Adjust the outer part of each A frame arm by turning it until one of the 15mm holes in the outer tube lines up with one of the holes in the inner rod, then insert pin and R clip.

e The A frame is now a rigid unit and the tractor lift arms can be lowered, removing the weight from the tractor hydraulics.

**IMPORTANT**

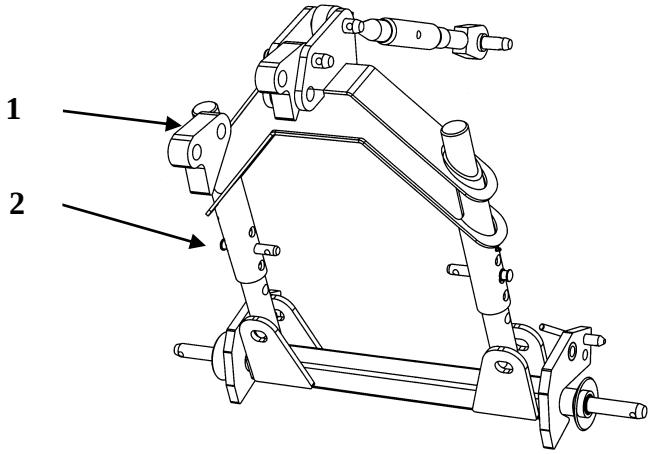
IT IS IMPORTANT THAT AT THIS STAGE THE TRACTOR LOWER LINK CHECK CHAINS ARE FULLY TIGHTENED TO REMOVE ALL HORIZONTAL MOTION FROM THE TRACTOR LOWER LINKS.

f Adjust the top link until the rear of the tank is vertical.

g Raise support stands and place in storage position.

**TRACTOR PREPARATION – for Hawk Models 6.5T & 6.5TP:**

a) Attach Frame linkage kit to the tractor 3 Pt linkage using the appropriate nose section (1) to the top link-position.(see diagram **1**).




b) Remove pins (2) through the Guide tubes allowing the Lower Links to drop on the lift mechanism.

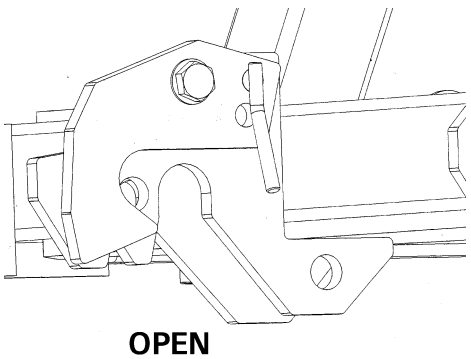
c) Do not replace the pins in the Guide Tubes until after fitting machine on tractor

**FITTING MACHINE ON THE TRACTOR**

a Carefully reverse the tractor till the Linkage bar is below the Location slots in the Mainframe

DO NOT ALLOW PERSONNEL BETWEEN TRACTOR AND MOWER.

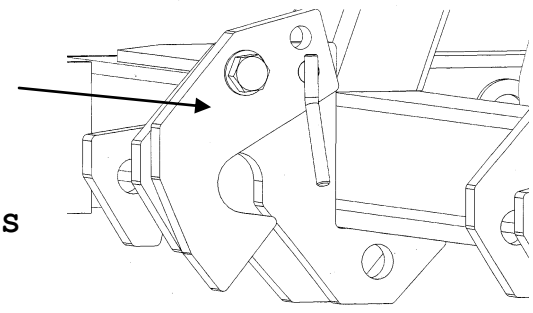
b Raise the Lower links gradually watching that the pins slid easily in the guide tubes and the linkage bar engages centrally in the Location plates in the Mainframe.



**OPEN**

**CATCH PLATE**

**CATCH PLATES**



**CLOSED**

c Close the Catch Plates on the mainframe and replace pin to hold the Plates in their closed position.
d. Fit the top link between Linkage Frame and the machine.
e. Lift machine to its approximate working height and replace pins in appropriate holes through the Guide tubes.
f. With the Frame now a rigid unit the lift can be lowered, removing the weight from the tractor hydraulics

**IMPORTANT**

IT IS IMPORTANT THAT AT THIS STAGE THE TRACTOR LOWER LINK CHECK CHAINS ARE FULLY TIGHTENED TO REMOVE ALL HORIZONTAL MOTION FROM THE TRACTOR LOWER LINKS.

g Adjust the top link until the rear of the tank is vertical.
h Raise stands for storage.

**FITTING PTO**

THE TANK MUST BE FILLED WITH THE CORRECT GRADE OF OIL BEFORE THE PTO IS FITTED -SEE SECTION 8.

Due to many different makes and sizes of tractor to which mowers may be fitted, a nominal length PTO shaft is supplied with the machine. In some cases it may be found that this PTO shaft is too long and will have to be shortened.

**IMPORTANT**

**MINIMUM ENGAGEMENT OF PTO IS 150MM IN THE WORKING POSITION. THIS MEASUREMENT MUST BE TAKEN INTO ACCOUNT WHEN SHORTENING THE PTO SHAFT.**
**(See illustration on Page 6 - 5)**

Before fitting PTO shaft to tractor, grease the sliding drive shafts and bearing units.

a Fit PTO to tractor ensuring locking peg on the splined coupling is fully engaged.

b Attach PTO guard check chains to tractor and machine.

## 1 MACHINE TO TRACTOR ATTACHMENT POINTS

The machine is attached to the rear of the tractor at three points: by two brackets mounted on the tractor axle and by a mounting yoke connected to the tractor drop links.

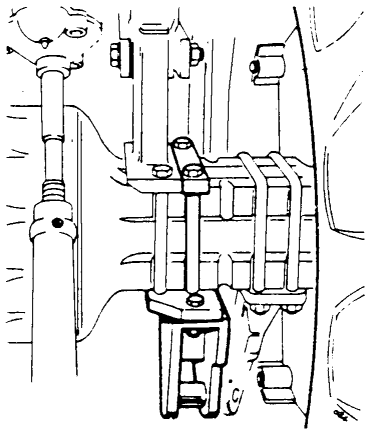
### TRACTOR AXLE BRACKETS

The illustration below shows typical axle brackets fitted to Ford/New Holland type tractors. Some tractors may have brackets of different design fitted below or to the rear of the axle.

As the axle brackets vary for each make and model of tractor it is necessary to follow the correct fitting instructions for the tractor concerned. Therefore instructions for installing the brackets, incorporating a complete parts checklist are supplied with the brackets as a separate booklet from this manual. These should be read in conjunction with the instructions given below.

**IMPORTANT**

THE AXLE BRACKET MUST BE FITTED IN ACCORDANCE WITH THE INSTRUCTIONS, (SUPPLIED SEPARATELY) FOR THE RELIVANT TRACTOR. PARTICULARLY WHEN THE BRACKETS UTILIZE THE SAFETY CAB MOUNTINGS



## 2 MACHINE PREPARATION

Position the machine on a flat hard surface. Detach the axle forks from their transport position and fit them to the pivot gates using 4 off 20mm bolts and nuts (1) each side. The length of the assembled forks and the position of the tie rod mountings will depend on the tractor to which the machine is fitted.

## 3 FITTING MACHINE TO TRACTOR

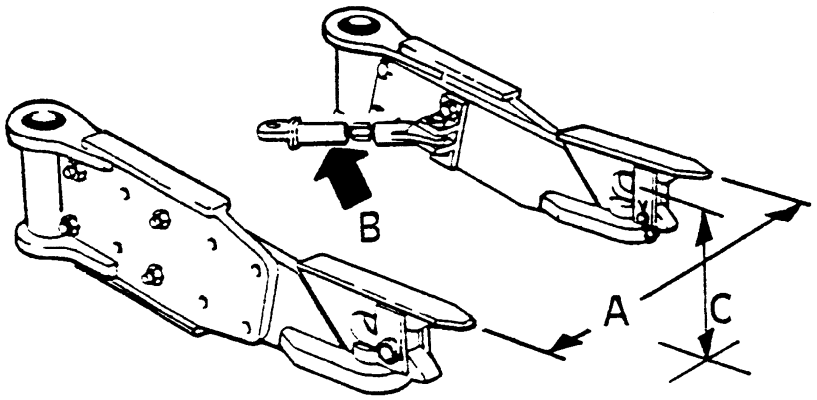
To fit the machine to the tractor follow the instructions carefully, referring to the illustrations for guidance.

**MOUNTING FORK WIDTH**

a Measure the distance between the axle brackets on the tractor (dimension A).

b Set the mounting forks to this dimension (A), making sure that they are equidistant from the sides of the mainframe.(See illustration below)

c Lock ONE of the mounting forks in position using the tie rod (B) between the fork and the mainframe.




**MOUNTING FORK HEIGHT**

a Measure height to centre of mounting fork jaw, dimension (C).

b Compare this height with the height of the axle bracket pivot on the tractor.

c If the forks are too high adjust the height of the mower on the stands to obtain the correct height.

**4 ATTACHING TO TRACTOR**

INSTRUCTIONS for Non Latching Forks

a Remove mounting fork jaw retainers and lift the machine using transport lift point, until the mounting forks are in line with the axle brackets.

b Carefully reverse tractor until axle bracket pivots just start to enter the mounting fork jaws by equal amounts. If not equal, refitting of the mounting fork jaw retainers will be difficult.

**DO NOT ALLOW PERSONNEL BETWEEN TRACTOR AND MACHINE.**

c On some tractors it may not be possible to fit the PTO shaft after the machine is fitted; if so. stop tractor when forks are 70-80mm short of full engagement.

d Fit the PTO shaft to drive shaft at rear of tractor and to the machine.

**IMPORTANT**

IT MAY BE NECESSARY IN SOME CASES TO SHORTEN THE DRIVE TUBES OF THE PTO SHAFT: FIRST TRY THE SHAFT WITHOUT THE GUARD, SHORTEN TO SUIT AND THEN SHORTEN THE GUARD TO FIT THE PTO (see page 6-5).

e Gradually reverse tractor until full engagement of fork is achieved.

f Lock forks in position using jaw retainers pins and spring cotters.

g Attach PTO guard check chains to the holes provided in the PTO guards on the tractor machine.

h Lock the remaining tie rod in position.

i Attach tractor top link to position on top of mainframe and adjust until the rear face of the tank is vertical.

**IMPORTANT**

WHEN OPERATING THE MACHINE ENSURE THAT THE DROP ARMS ARE AT THEIR LOWEST POSITION AND THAT THE TRACTOR HYDRAULICS ARE UNLOADED.

j Remove the remaining items of the transport pack from the machine These items are identified by some red paint.

k Stow the parking stands in their transport position.. Lock in position using the linch pins supplied.

**5. FITTING PTO**

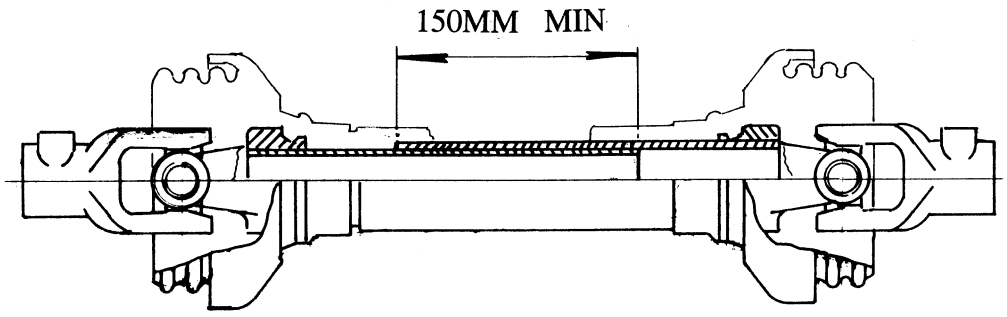
**IMPORTANT**

**MINIMUM ENGAGEMENT OF PTO IS 150MM IN THE WORKING POSITION. THIS MEASUREMENT MUST BE TAKEN INTO ACCOUNT WHEN SHORTENING THE PTO SHAFT. (See illustration below)**

Before fitting PTO shaft to tractor, grease the sliding drive shafts and bearing units.

a Fit PTO to tractor ensuring locking peg on the splined coupling is fully engaged.

b Attach PTO guard check chains to tractor and machine.




**IMPORTANT**

**THE PTO SHAFT, WHICH DRIVES THE HYDRAULIC SYSTEM, MUST NOT BE OPERATED UNTIL THE TANK IS FILLED WITH THE CORRECT BRAND/GRADE OF OIL. (See section 8.)**

**FITTING CONTROLS**

There are two types of controls:

Mechanical - where the control valve is operated by levers.

Electrical - where the control valve is operated by switches mounted in the control box.

MECHANICAL CONTROLS

1 FITTING CONTROL LEVER UNIT

The position of the lever unit inside the tractor cab depends largely upon the route of the cables between unit and control valve.

The cable can normally be routed through the rear cab window and should be as free of bends as possible. DO NOT PINCH CABLE IN CLOSED WINDOW.

If the tractor cab has special apertures for cables, then the lever unit should be fed through them before the lever unit is mounted in the tractor cab.

**IMPORTANT**

THE REMOTE CONTROL CABLES MUST NOT HAVE A BEND OF LESS THAN 150MM (6IN) RADIUS.

Follow instructions below for fitting lever unit:

a Pass lever unit and cable through the window or suitable aperture in rear of tractor cab.

**IMPORTANT**

SEE SEPARATE CAB FITTING KIT INSTRUCTION SHEET SUPPLIED WITH THE MACHINE. IT IS ESSENTIAL NOT TO DRILL MOUNTING HOLES THROUGH ANY STRUCTURAL MEMBER OF THE SAFETY CAB.

b Mount the lever unit securely on to the mounting bracket with bolts provided.

c Check motor control lever for smooth operation in both directions. If any stiffness is felt then check cable for sharp bends.

**IMPORTANT**

WHENEVER THE MACHINE IS REMOVED AND THE TRACTOR IS OPERATED WITHOUT THE CONTROL LEVER UNIT IN PLACE, FIT RUBBER BEADING (CONTAINED IN CAB FITTING KIT) TO THE EXPOSED EDGE OF THE COTROL LEVER MOUNTING BRACKET TO PREVENT RISK OF INJURY.

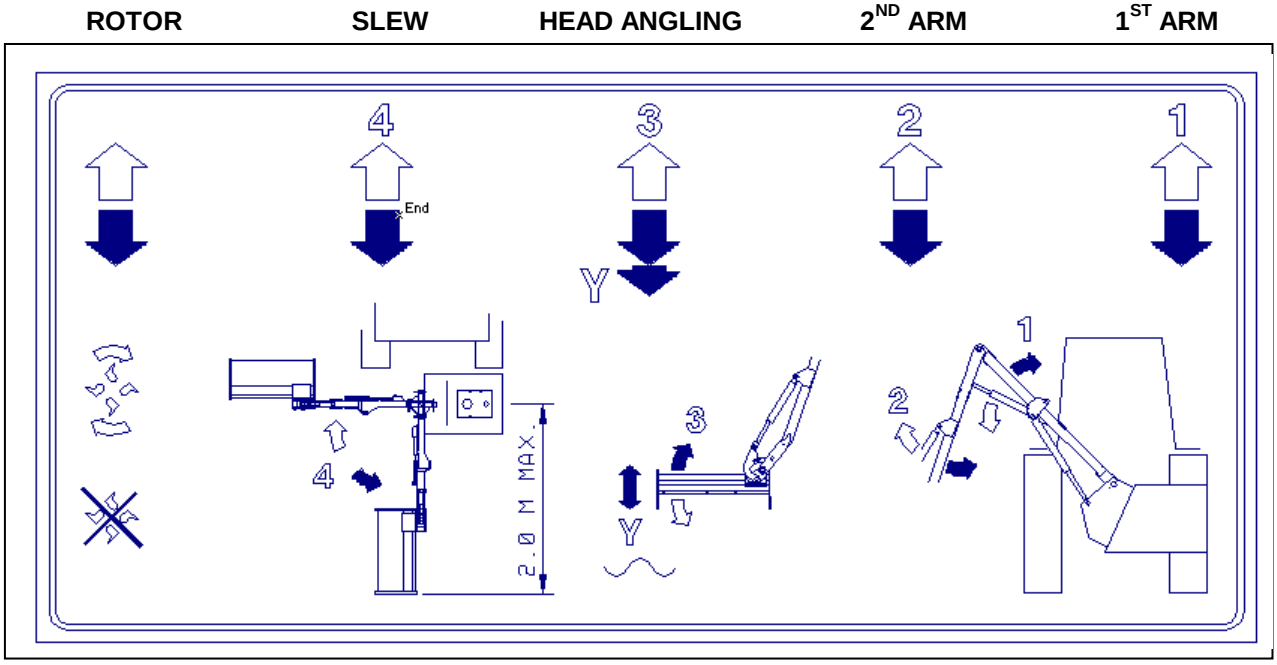
## 2 CONTROL VALVE OPERATION

Control Valve 0peration - Levers

A control valve operation instruction decal is provided just behind the levers on the lever mounting plate to indicate the lever moment, and on twin pump independent machines the rotor ON/OFF position. If this decal is damaged in any way it must be replaced.

The tractor PTO control should not be used to engage or disengage the drive to the rotor except in an emergency.

The plate is reproduced below. Familiarise yourself with the operation of these levers before commencing work.




## 3 ROTOR ON/OFF LEVER DSR VALVE

The DSR valve allows the rotor direction to be changed without adjustment of hoses.

The lever is fitted with a balking switch, which prevents accidental operation or reversal of the rotor. When the balking switch handle is vertical the lever is locked in the neutral position; when horizontal the rotor control lever will only move in the direction of the balking switch handle.

A rotor lever operation decal is provided on the control lever unit to indicate the rotor operation. If this decal is damaged in any way it must be replaced. Familiarise yourself with the operation of the lever unit before commencing work.

**IMPORTANT**

Check guarding (see Section 12) before changing rotor direction.

THE TRACTOR PTO CONTROL SHOULD NOT BE USED TO ENGAGE AND DISENGAGE THE DRIVE TO THE ROTOR EXCEPT IN AN EMERGENCY.

## 4 HEAD FLOAT

Machines fitted with head float have the option to allow the cutting head to follow the ground contours. This works efficiently when the arm is centrally positioned on the head rail.

To engage the head float pull fully back the cowl-angling lever until it engages in the valve detent position 'Y'.

## 5 OIL COOLER (OPTIONAL)

**Electrical connection.**
Connect power lead to tractor.
The brown lead must be fitted to the live ‘L’ terminal and the blue to the neutral ‘N’ terminal.

**Controls.**
A three-position switch in its own box controls use of the cooler.
1) Off, 2) Controlled by thermostat. 3) Permanently On
Position (2) is recommended for normal use.

## 6. EPP CONTROLS

The EPP control system allows the operator to control both first and second arms on the machine using a single, small joystick control.

The controls are proportional in action, i.e. the further the joystick is moved the faster the corresponding service responds. By moving the joystick, such that both services operate together, it is possible with a little practice to move the cutting head very precisely in and out or up and down at will.

The remaining machine controls are operated on self centring rocker switches, which are not proportional but are restricted hydraulically for smooth operation.

A head float is fitted to this control system as standard and is activated using a 2-position rocker switch. When the head float is engaged the red light in the switch is illuminated. When the head float (optional) is engaged the head angling control will have no effect and the head will not be supported by the hydraulics when the arms are raised.

When verge mowing the head float will work best when the head is centre mounted and an arm float kit is fitted and in operation.

**IMPORTANT**

*The direction of the rotor cannot be reversed instantaneously whilst in operation. First switch off the rotor; this will activate lights on the dual rotation switch which will flash for approximately 8 seconds. Once the lights have stopped flashing the rotor can be restarted.*

An emergency stop button is incorporated in the system and pushing this button stops the entire arm control system. It is reactivated by twisting the button clockwise and allowing it to release upwards. The emergency stop control must be used to disable the control box during road transit and whenever the operator stops the tractor or leaves the cab.

It is recommended that the power to the EPP control box is disconnected at the end of each working day.

**STOP Control.** The large red button stops all the controls. Push down to latch in OFF position. Twist to release up before attempting to operate any control.

**First and Second Arm.** The joystick enables either separate or combined movement of both arms to give Electric Proportional Parallel (EPP) control.

**Head Angling.** A spring-to-centre switch adjusts the cutting head in relation to the arms. The location enables use by the first and second fingers whilst the joystick is grasped.

**Head Float.** A two-position switch sets the cutting head angling control in a free moving mode to allow the head to follow ground contours. This should be used when grass cutting on undulating ground. It must be turned OFF whenever the arms are lifted - to transport.

**Telescopic Arm** (Not available)

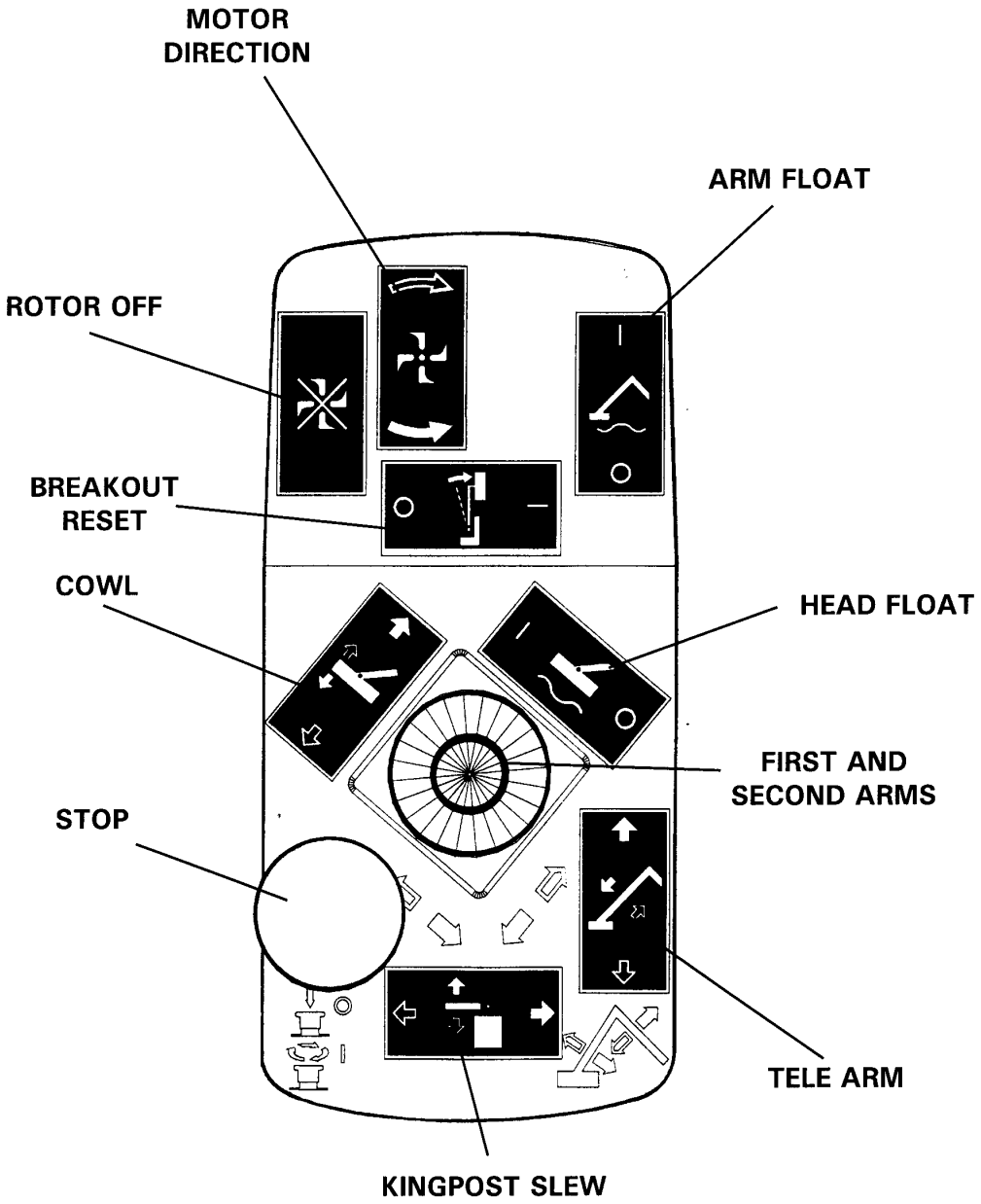
**Arm Float.** A two position switch sets the first arm to float by connecting the twin accumulators into the first ram circuit. This should always be used when grass cutting on undulating ground. It must be turned OFF when the machine is transported.

**Slew.** A spring-to-centre switch slew's the arm assembly at the kingpost .

**Auto-reset Isolator.** A two position switch disables the automatic reset of the arms, In the OFF (green light) position the arms will return to the normal work position if the arms have been pushed back by an obstruction or the first arm is raised during a slew operation. In the ON (red light) position the automatic return is prevented, allowing the machine to work with the arms partially slewed.

**Motor Controls.** The black spring-to-centre switch starts the cutting rotor. If a motor reversing (DSR) valve is fitted, either direction can be selected. SEE ALSO GUARDING AND ROTATION. The red switch stops the cutting unit. IT CANNOT BE RESTARTED (OR REVERSED) UNTIL THE LIGHT STOPS FLASHING.

THE TRACTOR PTO SHOULD NOT BE USED TO START AND STOP THE CUTTING UNIT EXCEPT IN AN EMERGENCY.




**Typical EPP Control Unit**

## EPP III ADDENDUM TO OPERATOR INSTRUCTIONS FOR CONTROL SYSTEMS

Your Bomford Turner machine will be fitted with one of four available control systems.

CABLE CONTROL: which is a mechanical system where the control valve is operated by cables and is actuated by mechanical levers.

LPH CONTROL: which is a hydraulic system where the control valve is operated by low pressure hydraulic flow and is actuated by a single joystick.

EPP III CONTROL: which is an electrical system where the control valve is operated by electronic signals and is actuated by joystick or electronic switches mounted in a control box. Two services (1st and 2nd rams) are proportionally controlled.

ICS CONTROL: which is an electrical system where the control valve is operated by electronic signals and is actuated by joystick or electronic switches mounted in a control box. All hydraulic services are proportionally controlled.

### This machine is fitted with the EPP III control system.

## DEFINITION:

The text in this instruction by necessity needs to refer to relative rotational directions. The terms clockwise and anti-clockwise are themselves relative definitions and depend on the operator's viewpoint. To eliminate confusion the following definition will be used throughout this text;

Under normal cutting conditions flail rotation in the flail head should be the reverse of the tractor drive wheel rotation, this will be defined as **'Reverse rotation' (RR)**.

When the direction of flail rotation in the flail head is the same as the tractor drive wheel rotation, this will be defined as **'Forward rotation' (FR).**

Additionally, other references to 'clockwise' and 'anti-clockwise' actions by the operator conform to international right hand thread conventions for 'screw down' and 'un-screw' respectively.

## 6.0 EPP III Control Unit overview

The Bomford EPP III (Electronic Proportional Parallel) control system is fitted and comprises a joystick and switch console for mounting in the tractor cab and an ECU (electronic control unit) installed on the machine positioned usually under the tank lid.

The joystick provides proportional control to the first ram, second ram and non-proportional control to slew ram, cowl ram, (and if fitted) the telescopic ram, forward arm ram and turntable ram.

Additional touch buttons are provided for cutting unit controls, head float, arm float and other functions such as breakout-reset lockout and cutting head turntable which are applicable to certain machines in the Bomford range.

Simple signal diagnostics together with service availability and activity feedback are available via bi-colour LED's on the keypad. The EPP III control box is illustrated in figure 6.0 below;

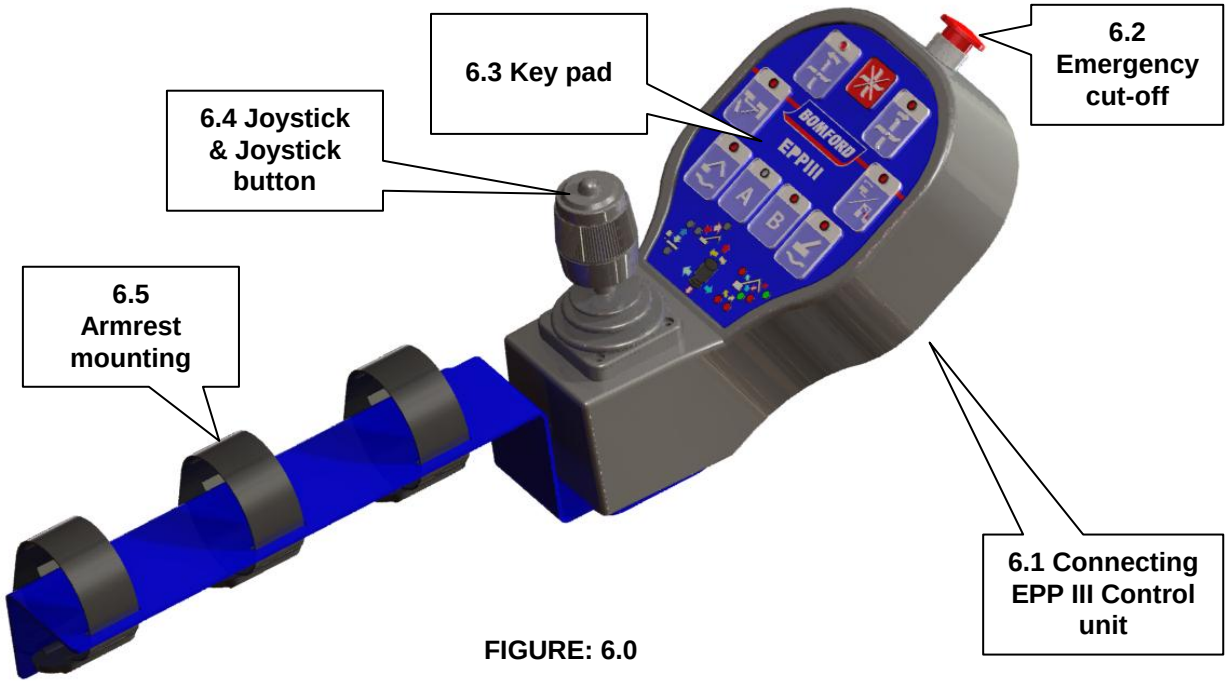



**FIGURE: 6.0**

## 6.1 Connecting EPP III Control Unit

The controller is supplied separately and the position of the unit inside the cab depends largely upon the preference of the operator. An armrest support plate is available which attaches the unit to the operator armrest via straps, see section 6.5 and figure 6.5.

### 6.1.1 Electrical Connections

a) Fit the power lead from the ECU box to the tractor. It is recommended that this be fitted direct to a battery terminal to avoid overloading the tractor circuits. Two 30 amp fuses in the power lead protect the ECU box. (Fuse part no. 43034.03)

b) The power lead is 5 metres long. The lead with the 'POS' label must be fitted to the live 'L' terminal and the lead with the 'NEG' label fitted to the neutral 'N' terminal.

c) Connect the control lead from the ECU box to the EPP III controller, taking care to line up the mating connections without force. The cable may be fed through an open cab window or suitable aperture in the rear of the cab. Take care to avoid sharp edges which may damage the cable. Do not trap the cable when closing cab windows. It is recommended that the power to the EPP III control box is disconnected at the end of each working day.

**WARNING** Once the machine is fitted to the tractor and the power connected, it may be possible to slew the arms to hit the cab. Serious injury or damage could occur. The slewing operation must be practised with care to ensure safe operation.

## 6.2 Emergency cut-off

The large red 'mushroom' button stops all the controls. Push down to latch in OFF position. This stops the entire arm control system and cutter rotation. It is reactivated by twisting the button clockwise and allowing it to release upwards. When reactivated all previously active functions are re-set to inactive. The emergency stop control must be used to disable the control box during road transit and whenever the operator stops the tractor or leaves the cab.

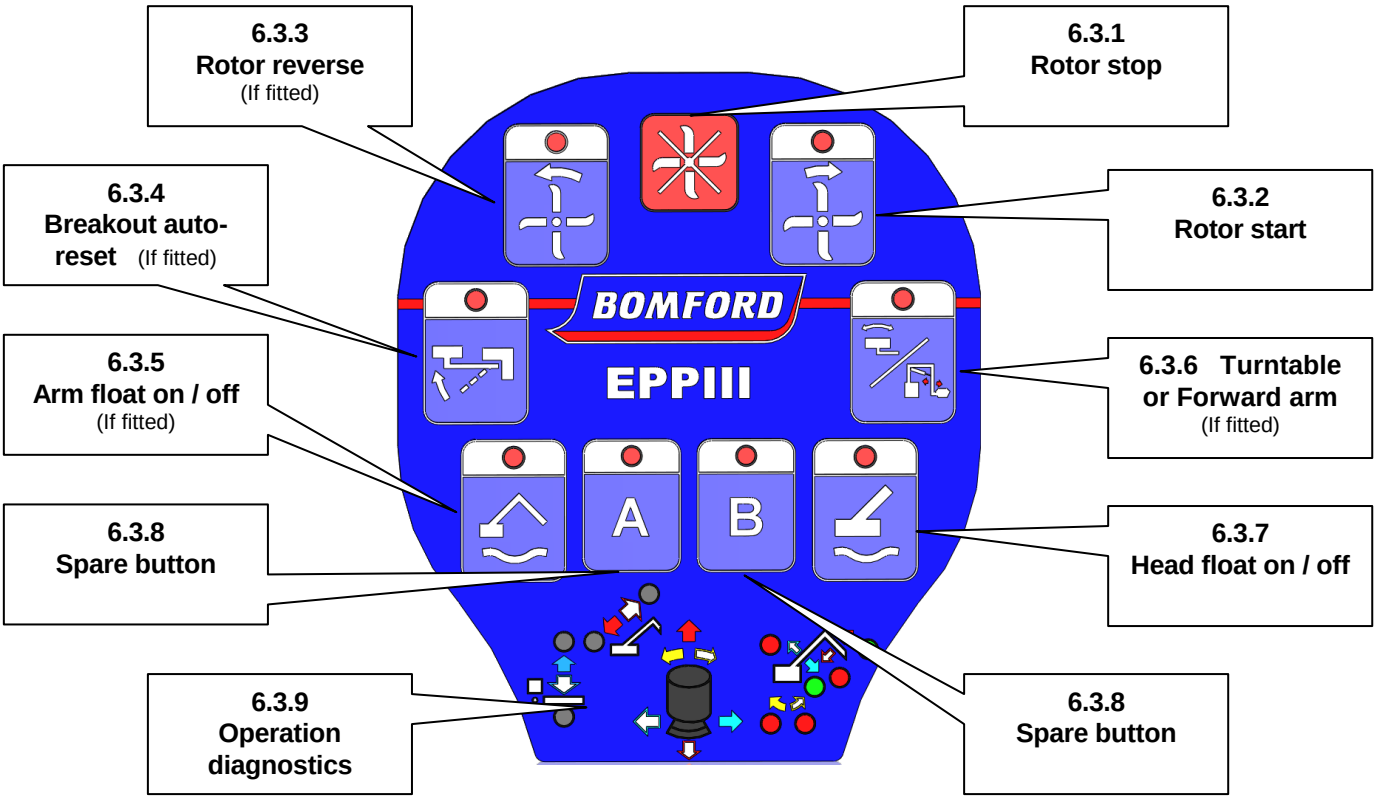



**FIGURE: 6.3a**

## 6.3 The Keypad

The keypad is illustrated in figure 6.3a above.

The keypad controls are operated by two position membrane push button toggle switches. These change state with each single press, see figure 6.3b below.

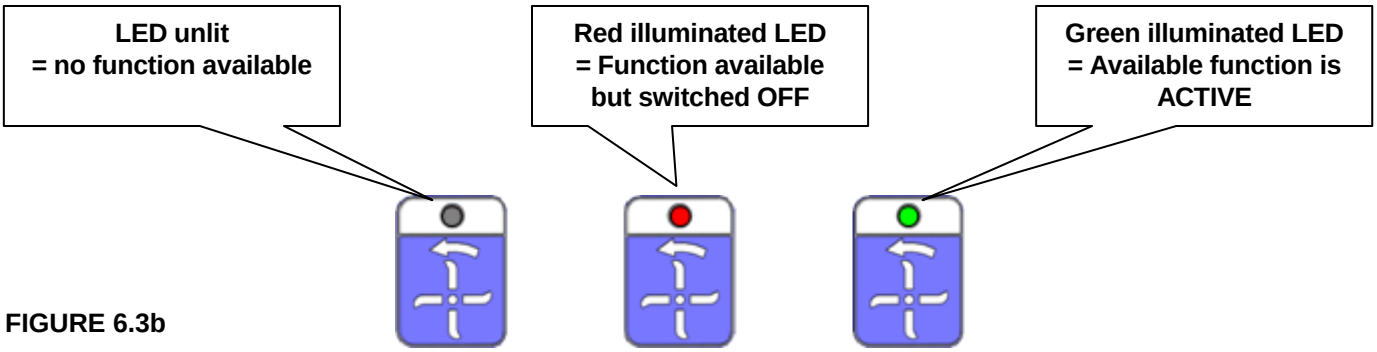



**FIGURE 6.3b**

Each button is accompanied by a bi-colour LED. When the control box is connected and powered up all available services are illuminated in red. LED's which remain 'off' indicate services which are not available on the machine. When a red illuminated (available) LED service is subsequently activated the LED changes colour from red to green.

**6.3.1 Rotor Stop –** To stop the rotor depress the “Rotor Stop” button. NOTE: It is not possible to reverse or re-start the rotor until the LED’s on the rotor start buttons stop flashing (after approximately 8 seconds). Once the lights have stopped flashing the rotor can be restarted.

**CAUTION** The tractor PTO should not be used to start and stop the cutting unit except in an emergency.

**6.3.2 Rotor Start –** Reverse rotation. Depress the appropriate “Rotor Start” button to start the rotor in the reverse rotation direction. The LED changes from red illumination to green illumination.

**6.3.3 Rotor Reverse** – For Dual Sense Rotation (DSR - where fitted). Depress the appropriate “Rotor Start” button to start the rotor in the forward rotation direction. The LED changes from red illumination to green illumination.

**DANGER!** Direction of rotation must only be selected according to the correct guarding.

**CAUTION** Do not reverse the rotor to clear obstructions.

**6.3.4 Breakout auto-reset** (When fitted) - When the LED on this button is red illuminated the breakout will automatically reset. This means that the arms will return to the normal work position if the arms have been pushed back by an obstruction or the first arm is raised during a slew operation. When the LED is illuminated green the breakout will not reset. This means that the first arm can be lifted and lowered in any slewed position without breakout re-setting and allows for the machine to work with the arms partially slewed.

**6.3.5 Arm Float** (When fitted) - If the LED is red illuminated the Arm float is switched off. When the LED is green illuminated the first arm is set to float by connecting an accumulator into the first ram circuit. This should always be used when grass cutting on undulating ground. To lift the cutting head over an obstacle pull the joystick to raise the first arm, the arm float will remain active. When the obstacle is cleared push the joystick to lower the first arm.

**CAUTION** Arm float must be switched **OFF** when transporting the machine.

**6.3.6 Turntable ram or Forward arm ram** (When fitted) – Only one function is activated by this button. Either a Forward arm ram can be controlled or a turntable whichever is fitted to the machine. If the LED is red illuminated then the cowl ram is active on the joystick bezel. If the LED is green illuminated then whichever function is fitted (Turntable ram or Forward arm ram) is active on the joystick bezel.

**6.3.7 Head Float** (Standard equipment) - If the LED is red illuminated the Head float is switched off. When the LED is green illuminated the cowl ram is set in a free moving mode to allow the head to follow ground contours. This should be used when grass cutting on undulating ground. When verge mowing the head float will work better when the flail head is centre mounted and an arm float kit is fitted and in operation.

**CAUTION** If the cowl ram is operated whilst head float is engaged, then head float will be cancelled. Only when the joystick bezel is returned to the centre position will head float resume.

**CAUTION** If the first arm is raised; for example to clear an obstacle; when head float is engaged and the joystick bezel is in the centred position the flail head will not be supported by the cowl ram hydraulics and can droop depending on how it is mounted.

**CAUTION** Head float must be turned OFF whenever the arms are lifted for transport.

**6.3.8 Spare buttons** – Up to four other non-proportional services can be customised by using the A and B buttons. As standard the buttons are unassigned and have no attached function.

**6.3.9 Operation diagnostics** – The LED’s and symbols signify the relationship with the joystick operation. From the operators viewpoint;-

- **Push and pull joystick operations** are indicated by Red solid fill arrowhead and white arrowhead with red border respectively.
- **Right and left joystick operations** are indicated by Blue solid fill arrowhead and white arrowhead with blue border respectively.
- **Anti clockwise and clockwise joystick bezel rotations** are indicated by Yellow solid fill arrowhead and white arrowhead with yellow border.

The LED’s accompanying the symbols illuminate to indicate which function is operating at any instant in time. For more detail see section 6.3 Joystick below.

## 6.4 The Joystick and Joystick button

The joystick has three directions of movement to control three ram services;

- Push forward and pull backward,
- Push left or right, and
- Twist (the end of the bezel) clockwise or anticlockwise.

The joystick also has a 'mode selection' button on the end of the bezel. When this button is depressed it allows another service to be controlled on each direction of movement giving rise to six possible service controls.

With the 'mode selection' button de-selected the EPP III joystick allows the operator to control the 1st ram, 2nd ram and Cowl ram movement.

With the 'mode selection' button depressed the EPP III joystick allows the operator to control the Slew ram, and (if fitted) the telescopic ram and either the turntable ram or Forward arm ram (as this is a split service) depending on operator selection.

All joystick controls are self-centring and cannot be activated without the control being first in the central position. As a safety device on start up no service will activate if the joystick is off-centre.

The 1st and 2nd ram controls are proportional in action, i.e. the further the joystick is moved the faster the corresponding service responds. The joystick enables either separate or combined movement of both arms. By moving the joystick, such that both services operate together, it is possible with a little practice to move the cutting head very precisely in and out or up and down at will in a simulated parallel movement.

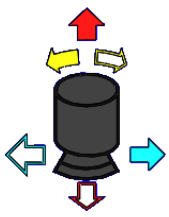
The cowl ram speed control is a two stage stepped control. Turning the end of the joystick initially promotes slow cowl movement, turning it fully promotes a faster movement.

The slew ram, and where fitted the telescopic ram, forward arm ram and power turntable ram are not proportional services but these services are restricted hydraulically for smooth operation.

**CAUTION** Extend the telescopic ram (if fitted) with caution when the cutting unit is already close to the ground.

Both cowl ram movement and, if fitted turntable rotation, benefit from being allocated to the rotating joystick bezel. This location allows for use of the first and second fingers to turn the bezel whilst the joystick is grasped between the remaining fingers and palm.

Operation diagnostic symbols appear on the bottom of the key pad in front of the joystick. The LED's and symbols signify the relationship with the joystick operation. The arm symbol indicates flail head and arms. The LED's accompanying the symbols illuminate to indicate which function is operating at any instant in time. See figures 6.4a and 6.4b below;



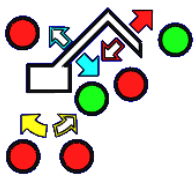


**FIGURE 6.4a**

| For **Left hand** machine setup with Mode selection button **not held down** | | | | | |
|---|---|---|---|---|---|
| **(ref)** | **Joystick action** | **Diagram arrow** | **Ram activity** | **Function** | **LED illumination** |
| | Push forward | Solid Red | Extend 1st ram | Raise 1st arm | GREEN |
| | Pull Back | Solid White - Red outline | Retract 1st ram | Lower 1st arm | RED |
| 1 | Push right | Solid Blue | Retract 2nd ram | Pull in 2nd arm | GREEN |
| 2 | Push left | Solid White - Blue outline | Extend 2nd ram | Push out 2nd arm | RED |
| | Rotate ACW | Solid Yellow | Retract cowl ram | Raise head angle | RED |
| | Rotate CW | Solid White - Yellow outline | Extend cowl ram | Lower head angle | RED |

**Ref (1) and (2): Note these actions are reversed for a right hand machine configuration**

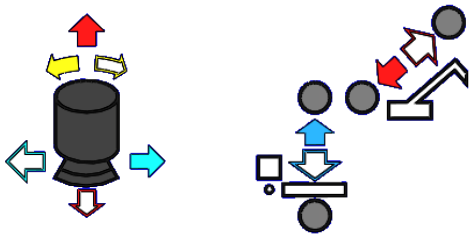


**FIGURE 6.4b**

| For **Left hand** machine setup with Mode selection button **held down** | | | | | |
|---|---|---|---|---|---|
| **(ref)** | **Joystick action** | **Diagram arrow** | **Ram activity** | **Function** | **LED illumination** |
| | Push forward | Solid Red | Extend tele ram | Push out tele arm | GREEN |
| | Pull Back | Solid White - Red outline | Retract tele ram | Pull in tele arm | RED |
| 1 | Push right | Solid Blue | Extend slew ram | Slew into work | GREEN |
| 2 | Push left | Solid White - Blue outline | Retract slew ram | Slew into transport | RED |
| 3 | Rotate ACW | Solid Yellow | Extend Turntable | Turntable ACW | RED |
| 3 | Rotate CW | Solid White - Yellow outline | Retract Turntable | Turntable CW | RED |
| 4 | Rotate ACW | Solid Yellow | Retract FWD arm | Park forward arm | RED |
| 4 | Rotate CW | Solid White - Yellow outline | Extend FWD arm | Raise forward arm | RED |

**Ref (1) and (2): Note these actions are reversed for a right hand machine configuration.**
**Ref (3) : Note if turntable is fitted there is no forward arm capability on this service.**
**Ref (4) : Note if forward arm is fitted there is no turntable capability on this service.**

## 6.5 Armrest mounting

Connect the power lead as indicated in section 6.1 above and illustrated in figure 6.4 below.

To mount the EPP III control unit to the operator seat armrest, first remove the four screws on the underside of the control unit.

Align the four radial slots on the armrest support bracket with the screw holes on the underside of the control unit and re-fasten with the four screws.

Connect the control cable to the back of the unit and also to the ECU mounted underneath the tank lid.

Feed the assembly through into the cab and affix the armrest support bracket to the arm of the operator seat using the three buckled straps.

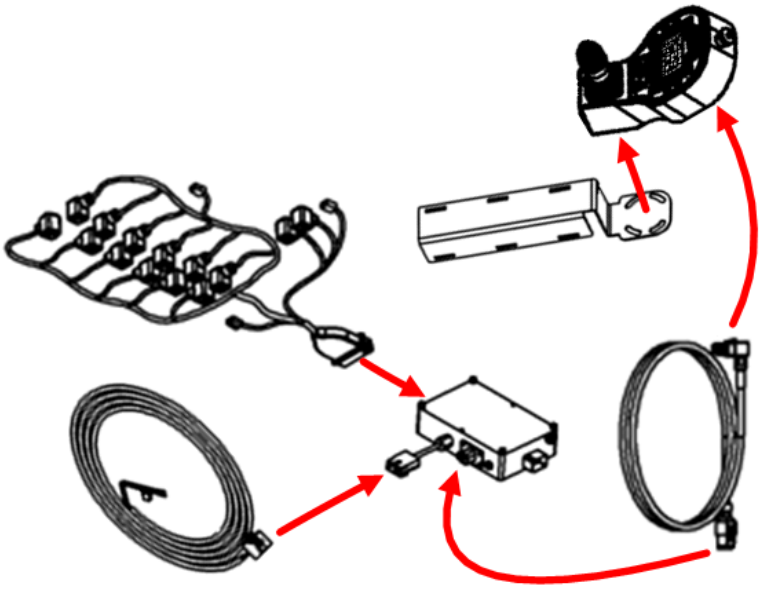
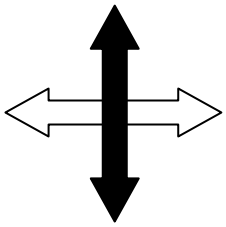


**FIGURE 6.5**

**LOW PRESSURE CONTROLS – Operation and Functions** *(Refer to diagrams)*

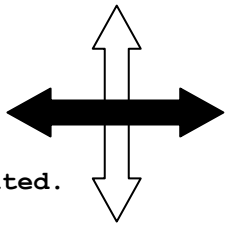
**Power ON – Connect electrical power plug to tractor battery.**
**Power OFF – Disconnect electrical power from hedgecutter to tractor.**



**LEVER FUNCTIONS**

**1. Lever** – Movement of the lever in a 'Forward' and 'Backward' direction operates the first arm:

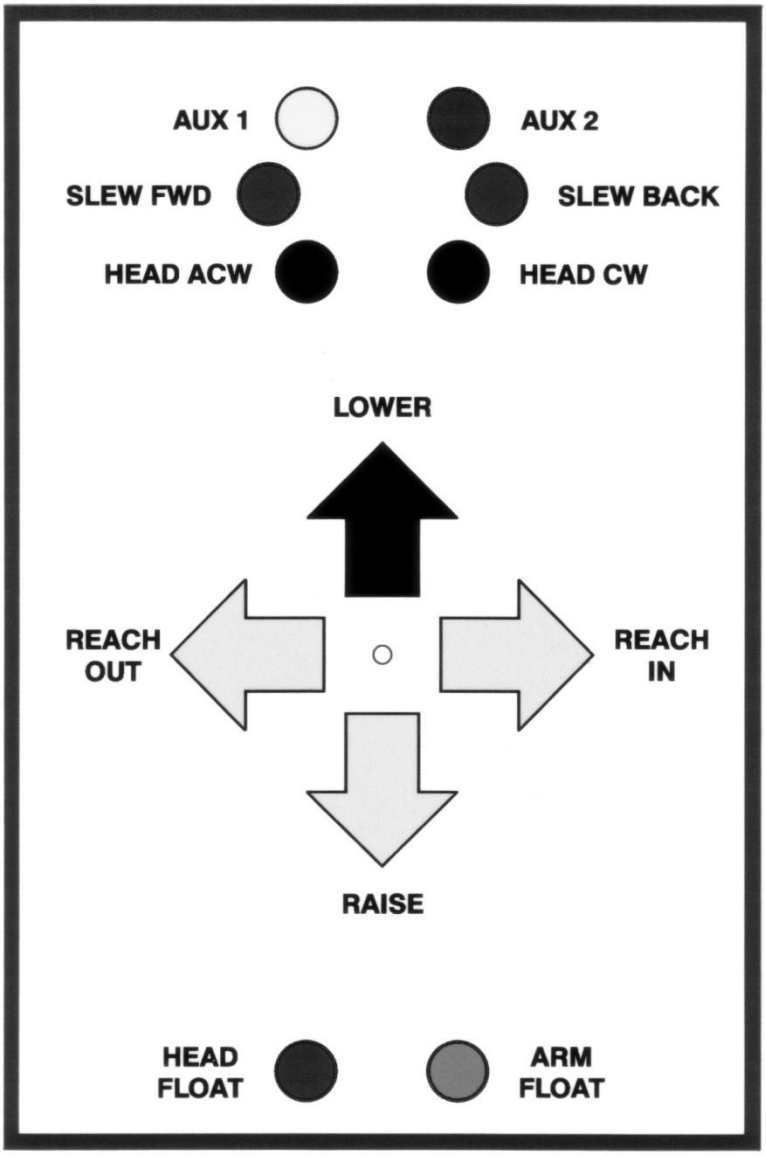
- *Forwards (away from the operator) - lowers the first arm*
- **Backwards (towards the operator) – raises the first arm**



**2. Lever** – Movement of the lever in a 'Sideways' direction operates the second arm: (for LEFT HAND MACHINES)

- **Left – Moves second arm away from the operator**
- **Right – Moves second arm towards the operator**
- **These are REVERSED if a right handed machine is being operated.**

**SWITCH FUNCTIONS**




Functions illustrated as viewed from the driving position.

Float functions are located on the underside face of the joystick. Press once to engage – press again to disengage.

Note that electrical arm float (i.e. operated from the cab) is only available if fitted as an option.

**SWITCH / BUTTON FUNCTIONS**

1. **AUX 1** – If the machine is fitted with a telescopic second arm or a forward arm / midcut option, then this switch will operate the service to extend / open the arms.
2. **AUX 2** – If the machine is fitted with a telescopic second arm or a forward arm / midcut option, then this switch will operate the service to shorten / close the arms.
3. **SLEW FWD** – If the machine is fitted with a slew option, then this switch will open the slew ram, and move the arms into work position.
4. **SLEW BACK** – If the machine is fitted with a slew option, then this switch will close the slew ram, and move the arms back into transport position.
5. **HEAD ACW** – This function rotates the head in an anti-clockwise direction when viewed from behind the tractor.
6. **HEAD CW** - This function rotates the head in a clockwise direction when viewed from behind the tractor.

**MANUAL ARM FLOAT OPERATION**

If the machine is to be used on rough or undulating ground, then the manual arm float may be engaged. In order to do this, both hydraulic taps on the first arm ram need to be opened. When the machine is to be moved into transport position, both valves will need to be closed before manoeuvring the arms.

**ELECTRIC ARM FLOAT OPERATION**

If the machine has this fitted option, then it may be turned on via the relevant joystick button (see diagram above). Turning on arm float will allow the arm mower to ride undulating ground without transferring these displacements to the tractor, and will also prolong the life of the arm mower. When the machine is to be moved into transport position, or the arms are to be moved from their work position, then the arm float will need to be disabled by pressing the same button on the joystick again.

**ELECTRIC HEAD FLOAT OPERATION**

When the machine is to be used for cutting verges, the head float may be turned on electrically by pressing the relevant button on the joystick (see diagram above). Head float has the benefit of letting the flail head pitch side to side around the cowl movement axis, smoothing out lumps and bumps in the ground being worked upon. This will create a more level cut, reduce "scalping" of the ground, and will prolong the life of the arm mower by reducing shock loads in the arms.

### *HYDRAULIC CONTROLS - CUTTING POSITION*

The cutting head must at all times be lowered gently into the cutting position. Never 'drop' a flail head into a hedge at speed.
When cutting at ground level (grass etc.) the head must be lowered gently to give a slight contact pressure of roller to ground.

**WARNING:**

Ensure flail head does not come into contact with obstacles such as rocks, stones, stumps etc. Keep rotor away and free from wire, as to entangle wire in a rotor is both dangerous and costly.
Should large obstacles be encountered or wire become entangled in the rotor **stop immediately** and reset or clear before continuing.

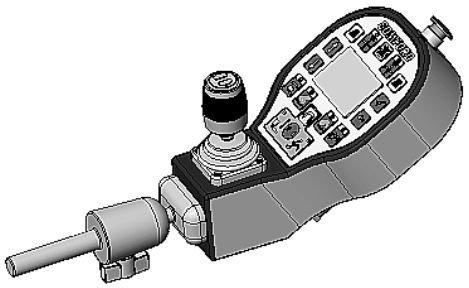
**DANGER WARNING**

**Always stop machine, disengage PTO, switch off engine and pocket the key before attempting to remove any items that foul the flail head.**

Normal obstacles and level variations should be overcome by the operator slowing 'forward motion' and raising/lowering the arms of the machine to suit.

## 7. ICS ELECTRONIC CONTROL SYSTEM

The Bomford ICS (intelligent control system) is fitted and comprises a joystick and switch console for mounting in the tractor cab and an ECU (electronic control unit) installed on the machine positioned under the tank lid.



### ICS Control Unit

The unit has a monolever joystick which provides proportional control to the first arm, second arm, head angling, slew and telescopic arms.

Additional touch buttons are provided for cutting unit controls, head float and arm float.

Other functions such as breakout-reset lockout and cutting head turntable are applicable only to certain machines in the Bomford range.

A liquid crystal display (LCD) screen displays job time hours, faults, error messages and other warnings. For example should a fault occur with the wiring an error message/warning will flash on the screen.

### Fitting ICS Control Unit

The controller is supplied separately and the position of the unit inside the cab depends largely upon the preference of the operator. A socket is provided on the base of the unit to enable the connection of the control lead from the ECU. Care should be taken when mounting the unit not to drill holes through structural members of the safety cab.

### Electrical Connections

a) Fit the power lead from the ECU box to the tractor. It is recommended that this be fitted direct to a battery terminal to avoid overloading the tractor circuits. Two 30 amp fuses in the power lead protect the ECU box. (Fuse part no. 43034.03)

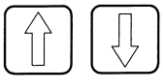
b) The power lead is 5 metres long. The brown lead must be fitted to the live ‘L’ terminal and the blue to the neutral ‘N’ terminal.

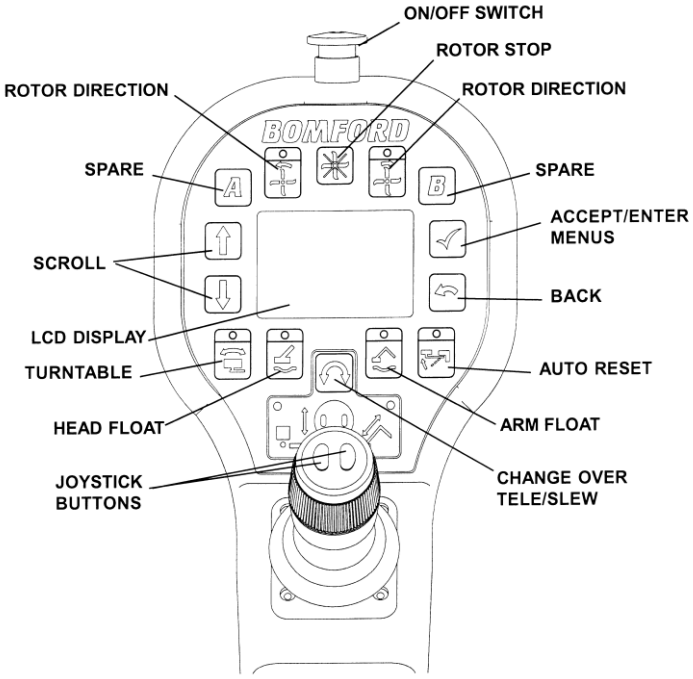
c) Connect the control lead from the ECU box to the ICS controller, taking care to line up the mating connections without force. The cable may be fed through an open cab window or suitable aperture in the rear of the cab. Take care to avoid sharp edges which may damage the cable. Do not trap the cable when closing cab windows.

**WARNING** Once the machine is fitted to the tractor and the power connected, it may be possible to slew the arms to hit the cab. Serious injury or damage could occur. The slewing operation must be practised with care to ensure safe operation.

### CONTROL UNIT OPERATION

Access the menu’s on the ICS by pressing the accept/enter menu’s key 

Scroll through the menu with the up and down keys and select machine settings. Set each function as required by pressing accept/enter key. 
(See page 7 – 8)




Return to main screen by pressing Back key and check operation of machine.

On/Off Switch – Depress to switch off all operations. Twist and release to switch On. Always switch off when the machine is not in use.

First and Second Arm. The joystick enables either separate or combined movement of both arms. The controls are proportional in action; the further the joystick is moved the faster the corresponding service responds. By moving the joystick such that both services operate together it is possible with a little practice to move the cutting head in a very precise manner, in and out or up and down on command.

Head Angling. Twist the knurled bezel on the joystick to alter the angle of the cutting head.

Slew and Telescopic Arm Operation – Both operations are controlled by the joystick buttons. Depress the change over button to select the function required which will be indicated by an LED (light emitting diode) indicator.

Head Float. To select Head Float depress the head float button; an LED will illuminate. Should the head angling control (knurled bezel) be turned head float will be cancelled. When the joystick bezel returns to the neutral position head float will resume.

Rotor Start, and Reverse. Depress the appropriate "Rotor Start" button to start the rotor in required direction. An LED will illuminate.

**DANGER!** Direction of Rotation must only be selected according to the correct guarding.(See Section 12 Guards & Rotation.)

Rotor Stop – To stop the rotor depress the "Rotor Stop" button. It is not possible to reverse the rotor until the LED's on the rotor start buttons stop flashing (after approximately 8 seconds).

**Caution.** Do not reverse rotor to clear obstructions.

Turntable (When fitted) To operate Power Turntable press Turntable button; an LED will illuminate. Rotate joystick bezel to operate the turntable.

Auto Reset. Breakout. (When fitted) When selected the breakout will <u>not</u> reset when the first arm is lifted. You may lift and lower first arm in any slewed position without breakout re-setting. An LED will illuminate when selected.

Arm Float (When fitted) When selected will allow the first arm to float and should always be used for grass cutting on undulating ground. An LED will illuminate when arm float is selected. To lift cutting head over an obstacle move the joystick to lift the head; arm float will be switched off but the LED will still be illuminated.
When the obstacle is cleared push the joystick to lower the head; arm float will re-engage.

**Caution**. Arm float must be switched OFF when transporting the machine.

**CONTROL UNIT SETTINGS**

Switch the system on with the Red On/Off button.

A **Welcome** screen will be displayed;


**Job Time 00.00**

You can then swap between;

**Job Time**
**Total Time**
**PTO Speed Sensor (when fitted)**

Use the up/down buttons to select.

To enter menu press

You will then see:

**Machine Clock**

Press

Displayed will be **>** **Job Timer ø.ø**
**Reset timer**
**Total Timer ø.ø**
**Reset timer**

The small arrow > at the left of the text denotes the chosen selection.

To select another option use the up/down buttons

To select chosen option.Press

To Exit this screen press:

Scroll through the menu's using the arrow keys

If you press the Down key –

The next screen displayed is **Machine Set Up**

To enter press

Displayed will be

> **Machine Setup**
**Machine Type**
**Fitted Options**
**Swap Solenoids**

To enter sub menu press
(The > denotes choice)

(Machine Type) Move > with up and down buttons to select

To select press

To return to previous screen press

(Fitted Options) Move > with up and down buttons to select

To select option press

to accept option **Y**

or to deselect option **N**

To return to previous screen press

(Swap Solenoids) Move > with up and down buttons to select

To select option press

to accept option **Y**

or to deselect option **N**

With this facility it allows operations of functions to be swapped without changing the wiring or hoses

To return to previous screen press

Press the Down key again –

The **User Settings** screen will be displayed:

To enter press

**User Settings**
**> First Arm Lift**
**First Arm Lower**
**2nd Arm In**
**2ND Arm Out**
**Cowl (Head) CW (Clockwise)**
**Cowl (Head) CCW (Counter Clockwise)**
**Slew In**
**Slew Out**
**Tele In**
**Tele Out**
**Reset Defaults**

Move > with up and down buttons to required option

To select option press

Each option will display:

**> Slow** √
**Medium**
**Fast**

This shows the slow option has been selected for this operation

> Slow √

To change this use the up and down buttons

When selection has been made press
To confirm and accept

To return to previous screen press

It is possible to set up the operation of each service in both directions to whichever speed suits the operator.

Reset Defaults option

> Reset Defaults

If this is selected it will reset the settings to the factory defaults.

To return to the main menu press

Press the Down key again – 

The **Oil Warnings** screen will be displayed:

**Oil Warnings** 

(This Icon will be displayed on the screen when attention is due or maintenance required.)

To enter press 

**Oil Warnings**
**> Oil Filter**
**Tank/GBX (Gearbox) Check**
**Grease Warning**
**PTO Overspeed**

Move > with up and down buttons to required option 

To enter sub menu press
(The > denotes choice) 

**Oil Filter**
**> Hours; øøø.øø**
**Reset Timer**

This displays the hours remaining (Counting Down) until the filter requires changing.

When the filter has been changed press the down button 

Select Reset Timer Option

**Oil Filter**
**Hours; øøø.øø**
**> Reset Timer**

To enter press 

The timer will be reset.

To exit press 

Move to the next option by pressing the down button 

**Oil Warnings**
**Oil Filter**
**> Tank/GBX Check**
**Grease Warning**
**PTO Overspeed**

To enter sub menu press
(The > denotes choice) 

Move > with up and down buttons to required option 

To enter sub menu press
(The > denotes choice) 

**Tank/GBX Check**
**> Hours; øøø.øø**
**Reset Timer**

This displays the hours remaining (Counting Down) until the oils require changing.

When the oils have been changed press the down button 

Select Reset Timer Option

**Tank/GBX Check**
**Hours; øøø.øø**
**> Reset Timer**

To enter press 

The timer will be reset.

To exit press 

Move to the next option by pressing the down button 

**Oil Warnings**
**Oil Filter**
**Tank/GBX Check**
**> Grease Warning**
**PTO Overspeed**

To enter sub menu press
(The > denotes choice) 

**Grease Warning**
**> Hours; øøø.øø**
**Reset Timer**

This displays the hours remaining (Counting Down) until the machine requires greasing.

When the machine has been greased press the down button 

Select Reset Timer Option

**Grease Warning**
**Hours; øøø.øø**
**> Reset Timer**

To enter press 

The timer will be reset.

To exit press 

Move to the next option by pressing the down button 

**Oil Warnings**
**Oil Filter**
**Tank/GBX Check**
**Grease Warning**
**>** **PTO Overspeed**

PTO Overspeed
This option (when fitted) records the amount of time that the PTO has exceeded 540 r.p.m. This cannot be reset.

To exit press

Press the Down key again –

The **Diagnostics** screen will be displayed:

To enter press

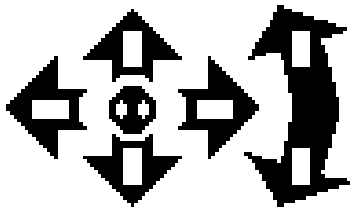
**Diagnostics**
**>** **Joystick**
**Keypad**
**Voltage**
**Sensors**

Move > with up and down buttons to required option

To enter sub menu press
(The > denotes choice)

**Diagnostics**
**>** Joystick
Keypad
Voltage
Sensors

Joystick



Xø Yø Zø

As the joystick is moved the bars in the joystick will illuminate. When the joystick is in neutral there should be 6 clear bars displayed. Should there be shading in any of the bars with the joystick in neutral a fault is indicated and there is a problem with the joystick. Contact Bomford Turner Service Department.

To exit press

Move to the next option by pressing the down button

**Diagnostics**
**Joystick**
**> Keypad**
**Voltage**
**Sensors**

Keypad

Keypad Test: Press each button, The symbol displayed on the button will now be displayed on the LCD screen. If a button is depressed and nothing appears on the screen a fault is indicated in the keypad. Contact Bomford Turner Service Department.

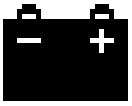
To exit switch Off control box with On/Off switch 

Switch box back on and return to Diagnostics menu. To enter press 

Move to the next option by pressing the down button 

**Diagnostics**
**Joystick**
**Keypad**
**> Voltage**
**Sensors**

Battery



**Voltage: øø.øv**

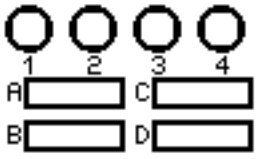
This indicates the voltage at your power source. Additionally it indicates if the alternator is charging

To exit press 

Move to the next option by pressing the down button 

**Diagnostics**
**Joystick**
**Keypad**
**Voltage**
**> Sensors**

Sensors

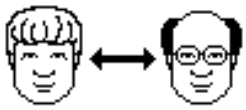



The above graphic will be displayed, these are only in operation if the option is fitted to the machine.

To exit press 

Press the Down key again – 

The **Select User** screen will be displayed:



To Enter press 

The following will be displayed:

**Select User**
**>** **User A** √
**User B**
**User C**

(The > denotes choice, the √ confirms selection)

To enter press 

All the settings previously set throughout the system will be held in each user menu.

To set up user B move > with up and down buttons to select the √ confirms selection 

**Select User**
**User A**
**>** **User B**√
**User C**

To exit press 

Scroll up or down to find User Settings menu 

User Settings

To enter press 

Now repeat set up of services as required.

The factory default settings mean

**User A is Slow**
**User B is Medium**
**User C is Fast**

It is possible to enter each user and alter each ram service individually as required.

If unsure scroll down to Reset Defaults using Down button 

**User Settings**
**First Arm Lift**
**First Arm Lower**
**2nd Arm In**
**2ND Arm Out**
**Cowl (Head) CW (Clockwise)**
**Cowl (Head) CCW (Counter Clockwise)**
**Slew In**
**Slew Out**
**Tele In**
**Tele Out**
**>** **Reset Defaults**

Press the accept button 

All the settings will be reset to the factory defaults.

**Fault Diagnostics:**

During use if a service fails to operate check the LCD screen for a graphical error message. Operate joystick; if there is an electrical problem it will be highlighted on the screen. If not, enter Diagnostics screen and perform joystick and keypad checks. If problem persists or fault cannot be found contact Bomford Turner Service Department.

The error message will replicate the service trying to be operated. See the example below:

 1st Arm Lift not operative

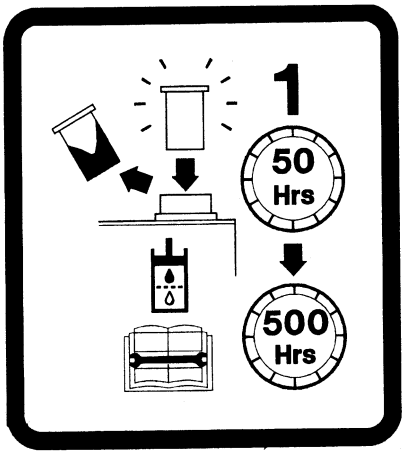
## 1 CORRECT HYDRAULIC OILS FOR FLAIL MOWERS

The list of oils on page 8 – 2 has been approved for use with hydraulically driven flail mowers. All these oils tolerate a wide temperature range.

Customers using oil not recommended will invalidate warranty on hydraulic equipment.

**FILTER REPLACEMENT**

THE FILTER ELEMENT SITUATED IN THE FILTER UNIT IN THE TOP OF THE TANK MUST BE REPLACED INITIALLY AFTER 50 HOURS OF WORK AND THEREAFTER EVERY 500 HOURS' WORK OR AFTER TWO SEASONS' WORK.




## 2 FILL TANK WITH OIL - unless already full

**NOTE**
**BEFORE FILLING TANK WITH OIL CONNECT THE DRIVE HOSES TOGETHER USING ONE OF THE ADAPTERS FROM THE MOTOR FITTED TO THE CUTTING HEAD.**

The correct procedure for filling the oil tank is as follows:

a Remove breather cap and strainer assembly and place at side of tank.
b Check unions on suction hose from tank to pumps for tightness and freedom from kinks and restrictions.
c Fill tank to half way up the sight glass with the correct grade of oil from the recommended list.

**WARNING**
ONLY USE OIL ON THE RECOMMENDED LIST.

d Replace breather cap and strainer assembly.
e Avoid contamination at all times particularly when the breather cap and strainer assembly is removed.

## 3 GEARBOX - Recommended oil

MOBIL - MOBILAND UNIVERSAL MULTI-PURPOSE TRACTOR
EXELUBE - SUPER UNIVERSAL TRACTOR OIL

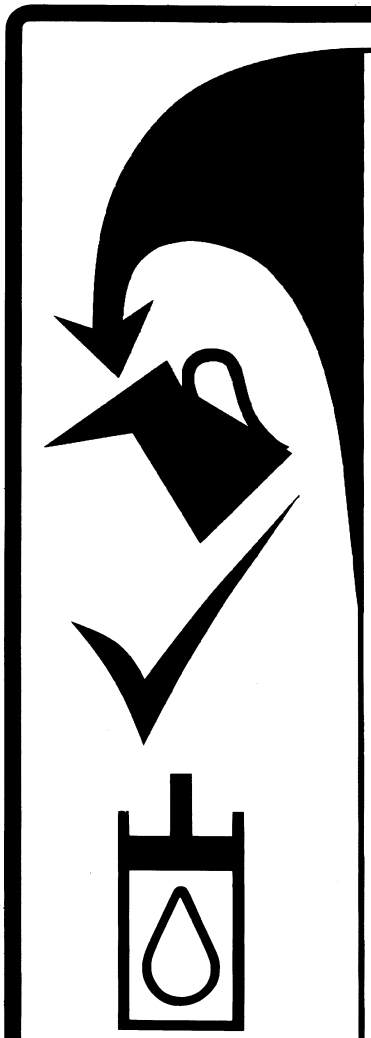
Check oil level before use and top up if necessary.

Gearbox capacity 0.5 litres

## 4 GREASING PIVOT POINTS

Any lithium-based grease can be used for lubricated pivot points

# APPROVED OILS FOR USE IN BOMFORD TURNER HYDRAULIC EQUIPMENT



| | | |
|---|---|---|
| ANTAR | - | Agria FM 10W/30 |
| B.P. | - | Energol SHF 32 (ISO) |
| | - | Energol SHF 46 (ISO) |
| | - | Energol HLP 32 (ISO) |
| BRASWAY | - | HO.32V |
| CALTEX | - | Rando HD 46 |
| | | Five Star Motor Oil 10W |
| | | RPM Delo 200 10W |
| CASTROL | - | Hyspin AWH 46 (not AWS 46) |
| | | Hyspin AWH 68 (not AWS 68) |
| | | Agricastrol Multi-use 10W/30 (not 20/30) |
| | | Agricastrol Hydraulic Oil |
| CENTURY OILS | - | Nevis 10 |
| COMMA OIL | - | Comma LIC 10 Hydraulic Oil |
| DALTON | - | Silkolene - Grade 219 |
| DUCKHAMS | - | Fleetol Multilite 10W/30 |
| | | ZirconQ32 |
| | | Zircon 68 |
| ELF | - | Multiperformance 2B 10W/30 |
| | | Olna 46 |
| | | Hydelf 32 |
| | | Hydelf 68 |
| ESSO | - | Univis N46 |
| FILTRATE | - | Hydraulic Oil 10W/30 |
| FORD | - | M2C-48-C Multi-purpose Hydraulic Oil |
| GULF | - | Gulflube Motor Oil XHD 10W/30 |
| | | Gulf Hydrasil 32 |
| | | Multi G 10W/30 |
| J.O. BUCHANAN | - | Alpha 'O' 10W/30 |
| | | Hydroil 66 |
| LORCO | - | FVT 46 Fourfold Treated Hydraulic Oil |
| MOBIL | - | DTE 15 |
| DTE 24 | | Delvac Special 10W/30 |
| PETROFINA | - | Fina Delta Multigrade 10W/30 |
| | | Fina Hydran 32 |
| | | Fina Hydran 68 |
| SHELL | - | Tellus T46 |
| | | Tellus T37 |
| TEXACO | - | Rando AZ 32 |
| | | Rando CZ 68 |
| TOTAL | - | Equivis ZS32 |
| | | Equivis ZS46 |

## 1 FITTING THE CUTTING UNIT

With the machine assembled the cutting unit can now be fitted to the end of the arms.

a Start tractor engine.

b Raise the arms so that the cutting unit clamp is approximately 500mm clear of the ground.

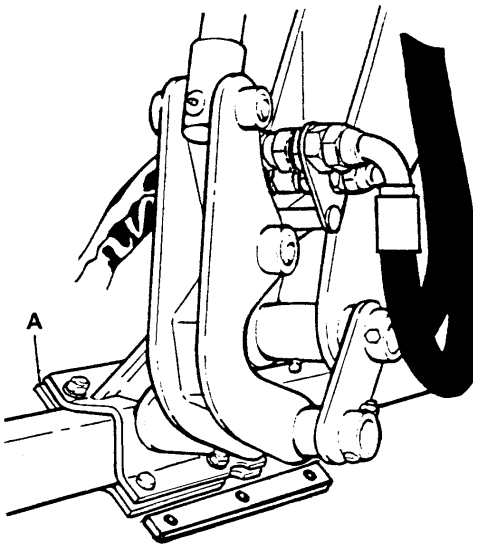
c Place cutting unit directly in front of the clamp.

d Level up cutting unit with wood packing if necessary.

e Remove clamp bracket (A) from the end of the arms.

f Adjust position of the arms until the cutting unit clamp is lined up with the clamping bar on top of the cutting unit in the desired. position along the bar

g Replace clamp bracket (A).




## 2 CONNECTING THE MOTOR

The connection of the hoses to the motor will determine the direction of rotation of the rotor shaft.

a Connect the hoses to the motor.

b Start the tractor and engage the PTO with engine on low revs.

c Switch on the rotor control in reserve rotation as shown on the decal.

d Check the direction of rotation.

e Stop the rotor and the tractor.

f If the rotor has run in the wrong direction, reverse the large hoses on the motor.

WITH THE MACHINE FULLY ASSEMBLED, FAMILIARIZE YOURSELF WITH ALL THE CONTROLS, START THE TRACTOR AND CHECK FOR LEAKS

## 1. HYDRAULIC BREAKOUT - SLEW MACHINES, PARALLEL AND NON PARALLEL

**To check the breakout is operating correctly:-**

a Using the slew control power the kingpost forward into the stop bracket on the mainframe.

b With the cutting head against an obstacle drive gently forward until the unit folds back about 300mm (12").

c Reverse the tractor and the arms will automatically swing back to their normal working position. If you feel that either the ram moved too easily or that it moved only with difficulty then the pressure requires checking.

d Correct service line pressure: 136 bar
Accumulator charge pressure: 90 bar

## 2. HYDRAULIC BREAKOUT – NON SLEW MACHINES, PARALLEL AND NON PARALLEL

a Ensure the transport tap on the rod end of the breakout ram and the base end of the first ram are open.

b With the cutting head against an obstacle drive gently forward until the unit folds back about 300mm (12").

c. At the same time as going backwards the first arm should also rise.

d. Reverse the tractor and the arms will automatically swing back to their normal working position.

**Note:** The breakout will not work if the first ram tap is closed.

1 It is important that hoses are fitted correctly. To ensure that there are no kinks or sharp bends, and that the hoses do not chafe against sharp edges, the following instructions and diagrams should be used as a guide.

2 **TWISTS**

Hoses should never be twisted or kinked. On most hoses there is a line which runs the full length of the hose acting as a useful guide. If there is no guideline running along the hose, follow the fitting instructions below. (See Fig 8.)

a Loosen any clamps.
b Attach one end of hose to its coupling, but do not tighten.
c Place the hose in its required position.
d Connect other end loosely to its union.
e Tighten angled end of hose in required position.
f Tighten straight end. It may be found that as the nut is tightened the hose may twist slightly. If this happens follow instruction (g), if it does not follow instruction (h).
g Slacken off nut and turn hose in opposite direction to that of twist.
h Re-tighten nut and bring hose back centrally.
i Tighten any clamps.
j Finally, re-bleed the rams and operate the arms in all positions whilst carefully checking for twists and obstructions.

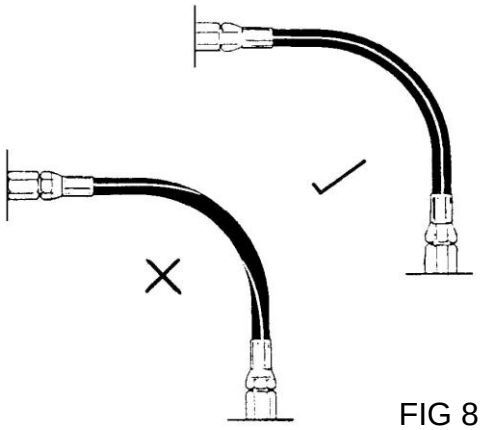


FIG 8

3 **SHARP BENDS**

a AVOID SHARP BENDS
b Always allow enough hose radius for free movement (see Fig 9).

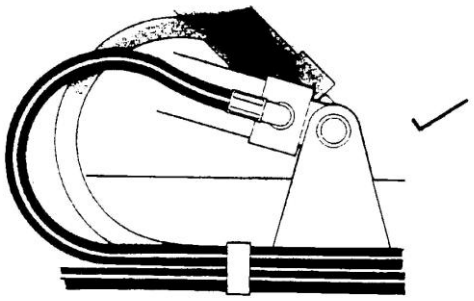


FIG 9

4 **CHAFING HOSES**

a AVOID CHAFING HOSES
b Always give plenty of clearance around sharp edges (see Fig 10).

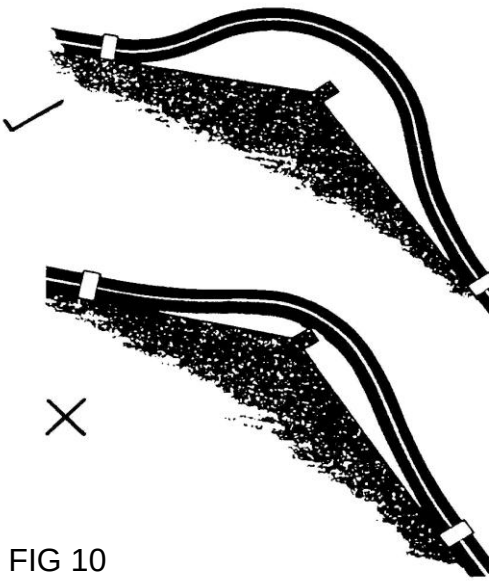


FIG 10

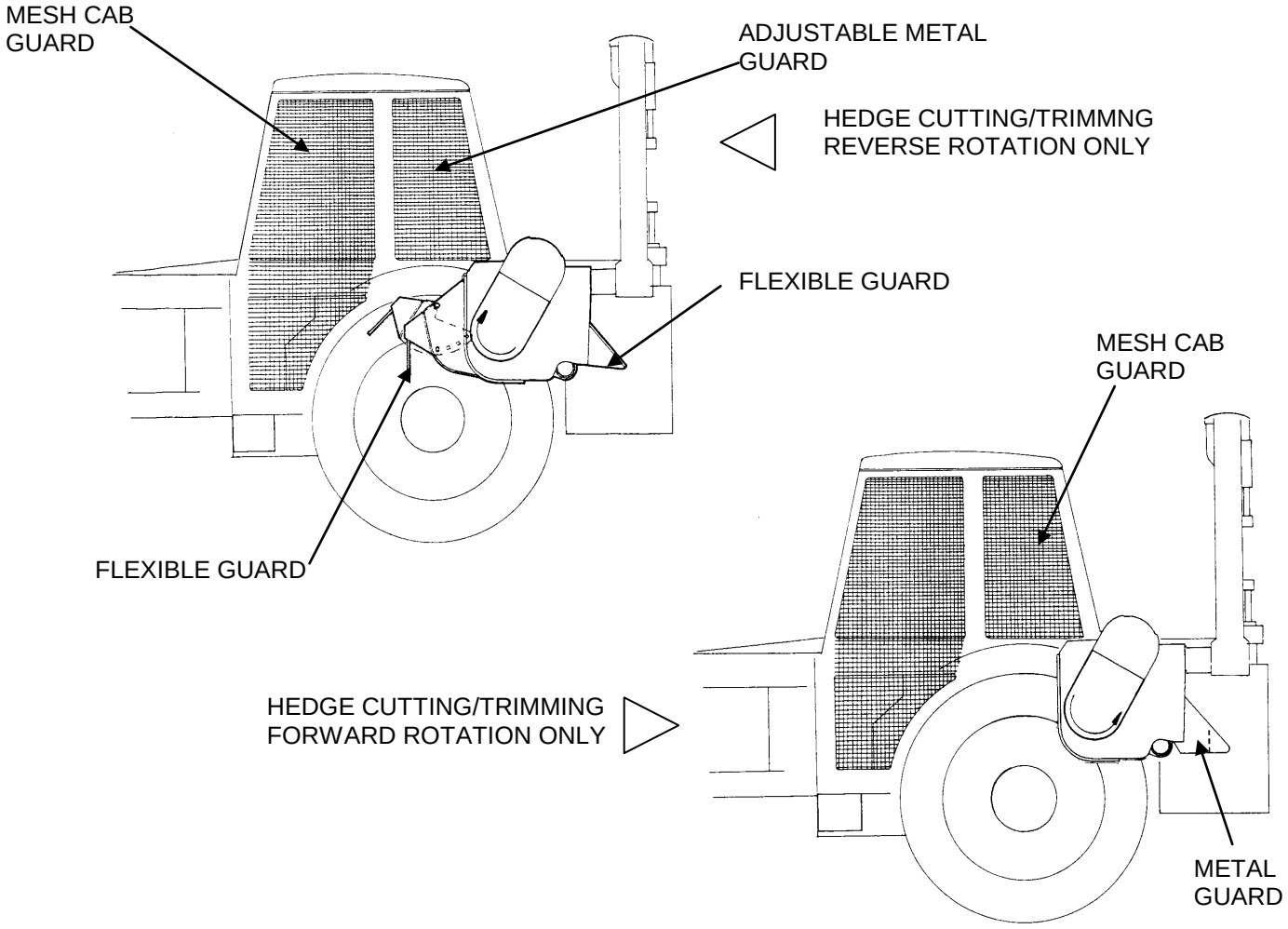
1. It is essential that in the interests of safety all guards and the roller must be kept in position on the machine whenever the machine is running. Bomford Turner Ltd disclaim all responsibility for any damage or injury arising as a result of guards or roller being removed, or of guards other than of Bomford Turner manufacture having been fitted, or of operation of the machine other than in accordance with these instructions.

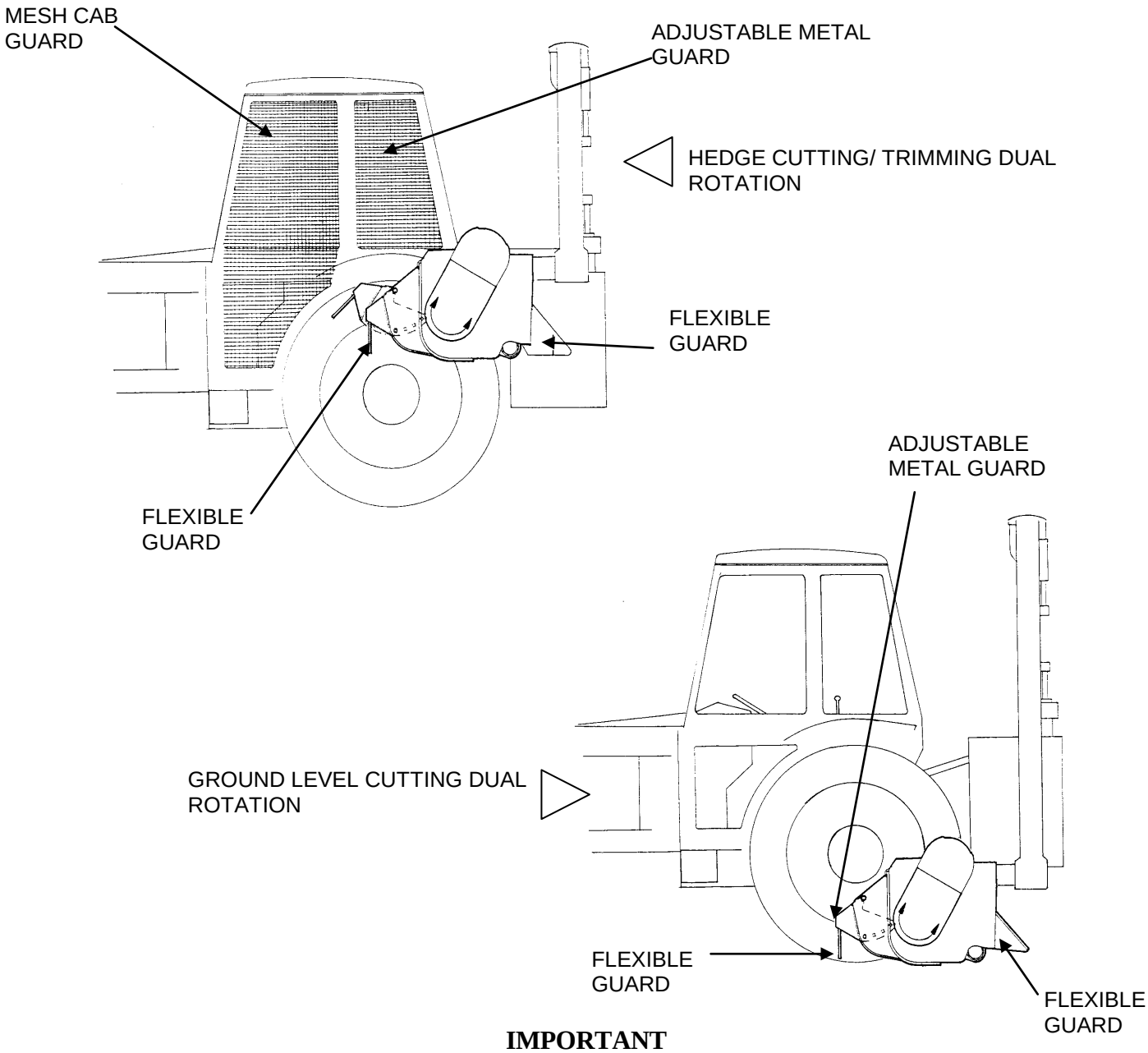
2. When hedge cutting/trimming or any operation where the cutting head is not in contact with the ground, a weld mesh guard (Part No. 90.050.06) must be fitted to the side window of the tractor cab. Cabs without laminated or toughened glass must be fitted with a laminated glass or polycarbonate shield.

**SHAFT ROTATION**

3. **Single Rotation**
   The shaft rotation may be changed by reversing the hose connection on the motor. Ensure the correct guards are fitted for the rotation being used.

4. **Dual Rotation**
   Machines fitted with a DSR rotor control valve can reverse head rotation by operation of a lever. Ensure the correct guards are fitted for all rotations used.






**IMPORTANT**

INSPECTION OF GUARDS

Inspect guards twice daily or immediately damage is suspected.

Replace guards that have damage or wear which could impair their performance, as follows:

a **STEEL GUARD**: distorted or with sharp outer edges.

b **WIRE TRAP GUARD (when fitted)**: with bent, missing or blunt cutting edge.

c **FLEXIBLE GUARD**: with missing portions, damaged, or worn sufficiently to permit stones to be ejected beneath it in normal conditions.

**IF IN DOUBT CONSULT BOMFORD TURNER SERVICE.**

## 1 OPERATOR

These notes are produced for guidance and are intended to help you obtain the best results from your machine, with the minimum of trouble and downtime.

Read the following pages carefully and familiarise yourself with their contents.

Make a note of the serial numbers; stamped on the top of the mainframe and the cutting unit itself, inside the front cover of this manual. Always quote these numbers in any correspondence with your dealer.

## 2 INITIAL CHECKS

Check that the tractor is equipped to deliver 540 rev/min at the PTO shaft. The machine is designed to run at this speed and IN NO CIRCUMSTANCES MUST THE PTO EXCEED 600 REV/MIN.

## 3 MACHINE PRE-START CHECK

a Check that the rotor is free from obstructions especially pieces of wire.
b Check that all flails are in good condition and securely attached to the rotor.
c Check that all guards are in their correct place (see Section 12) and also that they are in good condition.
d Check the oil level in the tank. The level is correct when up to the indicator mark in the sight glass or visible in the bottom of the filler assembly strainer . DO NOT OVERFILL. Most oils increase in volume as they warm up and aerate and can then spill out through the breather. (Refer to Approved Oils Section.)

## 4 STARTING UP PROCEDURE

COLD START UP

When starting the machine for the first time, prior to commencing work, it is essential not to run the pump initially at too high a speed. Therefore the tractor PTO speed should not exceed 360 rev/min, and should only reach this speed gradually. The cold start up instructions given below should be strictly adhered to.

a Ensure that the tractor PTO drive is in neutral.
b Ensure that the rotor control lever (fitted to twin pump independent machines) operating the diverter valve (adjacent to the ram operation levers) is in the rotor-stopped position.
c Start tractor engine, run at idle speed and engage PTO drive.
d Slowly move the rotor control lever to start the rotor.
e Gradually increase engine speed.
f Continue increasing engine speed until rotor is running smoothly and PTO speed is approximately 350 rev/min.
g Run rotor at this speed for minimum of 5 minutes to allow oil in system to warm up.
h The machine is now ready for work.

NORMAL START UP

i Never attempt to start the rotor while it is under load. Always free the rotor from any obstructions first.
j Never increase or decrease PTO speed rapidly as this can lead to pump and motor damage.

## 5 TRANSPORT

Normally the machine will need to be driven to the work site before commencing work. To keep the machine/tractor width to a minimum it is necessary to fold the arms to the transport position. The arms may be slewed back to provide a narrow transport position.

a Keep hoses away from tyres.

b When the machine is in the transport position it is essential that all the isolator valves are closed.

c When transporting with the arms slewed back, keep the first arm vertical as the arms can bounce forward and damage the tractor cab.

d When transporting on the highway, obey all relevant highway laws.

## 6 CUTTING CONTROL

Do not swing cutting unit inboard beyond vertical cut when arms are raised above tractor cab height. In this position a loss of control can occur.

**Roller Height**
The roller on the cutting unit is set in its middle position before the machine leaves the factory. It should be reset to suit the operating conditions and cut length required.

### a Grass Cutting
Adjust the height of the roller to give required cut length. The higher the roller is raised the shorter the grass.
Note: The higher the roller is set the greater the flail wear.

### b Hedge Trimming
Raise roller to its maximum to give lowest cut possible.

**IMPORTANT**

THE ROLLER MUST BE KEPT IN POSITION AT ALL TIMES AS IT IS AN ESSENTIAL PART OF THE CUTTING UNIT GUARDING.

## 7 STOPPING THE CUTTING UNIT

The rotor must only be engaged/disengaged by means of the rotor on/off control lever or switch depending on method of control (cable or electric). see Section 7. Stopping the rotor by use of the tractor engine stop or PTO control risks damage to the cutting unit's hydraulic system, and should only be used in an emergency.

If the rotor is stopped by use of either the tractor engine stop or PTO control, care must be taken to ensure the rotor control lever is returned to the OFF position before restarting the tractor.

## 8 ARM FLOAT (Optional)

The machine is fitted with an accumulator to allow the arms to float for grass cutting application.

The purpose of the armfloat is to permit the cutting unit to follow uneven ground without operator intervention as far as possible and to allow most of the weight of the cutting unit to be carried by the tractor, thus minimising the tendency to slew. This also reduces wear on the rotor and in the bearings of the roller.

The armfloat is not used when hedge trimming, as the cutting unit would be very difficult to control and uneven (castellated) results would be obtained.

To shut off the arm float close the isolator valve manually or by means of the switch on electric machines When opening the isolator valve ensure all head weight is on the ground, otherwise the first arm may move unexpectedly.

**WARNING**

THIS VALVE MUST BE CLOSED WHEN THE MACHINE IS TRAVELLING, WHETHER IN TRANSPORT POSITION OR NOT.

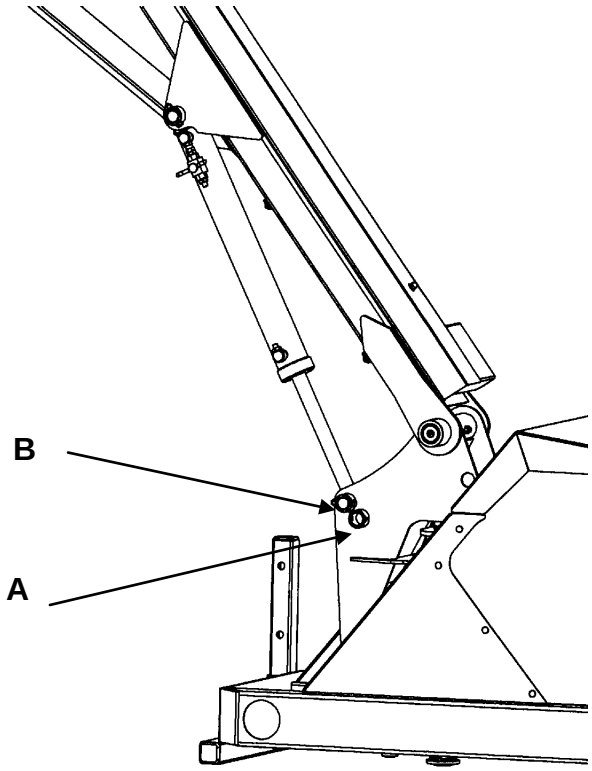
**Test procedure of the armfloat Accumulator**

a Start tractor engine and move the arms into a normal work position with the rotor unit resting on the ground.
b Open accumulator isolator valve by switching on the float.
c Operate the first ram and lift the rotor unit about 1 metre (39 ins) off the ground).
d Test accumulator by pushing the rotor unit downwards. This should compress the first ram slightly.
e No movement of the first rams normally means the accumulator is inoperative or the isolator valve is defective.
f Replace the cutting head back on the ground. Operate the control levers to remove pressure from the hydraulic system.
g Stop tractor engine.
h Remove isolator valve. Reconnect hose and repeat test from (a).
i No movement of the first ram at this time indicates that the accumulator is not working. Movement indicates that the isolator valve is defective.
Repeat instruction (f) and replace defective part.

## 9 ADJUSTABLE FIRST RAM POSITION (Non Parallel Machines Only)

The purpose of the first ram position adjustment is to maximise the working envelope of the machine. Two positions are available - A, and B.

The lower position "A" maximises the downbank reach of the machine.
The upper position "B" optimises the machine's geometry for narrow work situations.



1 **OPERATING HINTS**

a Keep tractor PTO speed at 540-550 rev/min to maintain the correct rotor speed for the job to be tackled. Depending on the type of cutting unit fitted this may be either 3200 rev/min (fast), or 2485 rev/min (slow) depending on pulley setting (see Section 16-10). Slower speeds MAY reduce the quality of cut obtained by the rotor, but satisfactory performance can be maintained down to a rotor speed of 2100 rev/min. This can be an advantage with tractors with a high bottom gear.

b Examine the piece of work to be cut. It is very important that the work site is inspected before cutting and all hidden obstructions removed or their position clearly marked so they may be avoided.

c Check hedges for wire and fencing stakes, and ditches for tree stumps, drain pipes, large stones, etc.

d Stalling in heavy growth is likely to cause damage to the rotor.

e Do not operate with the head slewed more than 40° backwards.

**IMPORTANT**

DO NOT ALLOW PERSONNEL NEAR THE MACHINE WHILE IT IS OPERATING.

f DO NOT angle the cutting unit in such a way as to throw cut material towards the tractor.

g Avoid rushing into the work. Remember that the unit has to chop up material as well as cut it to the required height.

h When hedge cutting close the isolator valve on the arm float accumulator, (if fitted.)

i Always give the rotor shaft enough material to 'bite' into, particularly when a hedge has a lot of leaf and very flexible thin stems.

2 **GRASS CUTTING**

a Run the rotor at normal speed, i.e. 540 rev/min. PTO speed

b Avoid taking in too much grass by regulating tractor forward speed.

c If rotor shaft slows down or begins to choke up in grass, raise the cutting unit a little and allow grass to fall clear.

d Before proceeding with the cutting let the rotor speed recover again.

e Advantage may be gained in exceptional conditions by taking a narrow cut with part of the cutting unit clear of the work.

f When working alongside or clearing ditches, take a first cut along the edge of the ditch so that the ditch limits can be seen.

g When working over a hedge or into a ditch, keep the highest point of the mower arms directly over the obstacle.

h Do not run the machine for prolonged periods when the head is not at 90° to the direction of travel.

3 **HEDGE TRIMMING**

Consider how the job should be done before commencing work, as every hedge has a different height, width, thickness and density of growth.

Hedges that have previously been cut by machine tend to have denser growth, and although they can be cut to any desired shape, it is advisable to trim to the same shape and height as before.

The flails cause the growth to 'tiller' and thicken up the hedge. Therefore it is advisable to cut the hedge side at a slight angle rather than straight, otherwise the hedge may eventually die at the bottom due to lack of light.

The following information gives a few hints on how to tackle a hedge.

a First trim the top down to previous year's trim in one cut, but do not cut into it as the old growth will be very thick and strong and can cause premature wear to the flail cutting edges.

b Next trim the sides to the previous trim but not into it.

IMPORTANT

DO NOT ANGLE THE CUTTING UNIT SO THAT ANY DEBRIS IS THROWN THROUGH THE HEDGE WHEN TRIMMING THE FAR SIDE OF THE HEDGE. ALWAYS ENSURE CUT MATERIAL IS DIRECTED AWAY FROM YOU OR ON TO THE GROUND.

c Finally, lower the roller and trim along the bottom of the hedge to clear debris and undergrowth.

4 **STALLING THE ROTOR**

If the rotor does become choked the tractor will stall, the belts will slip or the relief valve will operate.

If this occurs follow the instructions below:

a Stop forwards motion and disengage drive to cutting unit immediately by placing the lever controlling the rotor in the stop position.

b Ensure that the rotor has stopped and lift the cutting unit.

c Stop tractor engine.

d Remove any obstruction that may be present on the rotor. If working under the raised machine ensure that it is safely supported.

NEVER IN ANY CIRCUMSTANCES run or reverse the rotor to "clear itself".

## 1 STORAGE

Before removing the machine from the tractor a thorough check of the machine should be made as follows.

a Thoroughly clean all moving parts, particularly the cutting unit
b Check that all flails are in place and that they are in good condition
c Check all hoses for damage such as cracks, evidence of chafing and leaks
d Smear all unpainted metal parts with grease and lubricate all grease nipples.
e Make a note of any item that needs replacing so that parts can be ordered

## 2 PARKING AND REMOVAL

To remove the machine from the tractor the following procedure should be followed.

**IMPORTANT**

**DO NOT ALLOW PERSONNEL BETWEEN TRACTOR AND MACHINE WHEN MANOEUVRING**.

In the parked position the machine is supported by two stands on the mainframe and also the cutting unit.

a Find a flat, hard area on which to park
b Place the cutting unit on the ground at the rear of the machine as shown above.
c Stop tractor engine.
d Lower stands from stored position.
e Adjust top link/hydraulic drop arms so that the weight of the machine is on the stands and cutting unit.
f Open armfloat valve (if fitted) and operate control levers in both directions to release pressure.
g CLOSE ISOLATOR VALVES ON FIRST RAM AND ARMFLOAT (IF FITTED).
h Remove control lever unit from inside tractor and feed through rear of cab without bending cable too tightly. Tie unit on to mainframe and protect from weather.
i Disconnect electric cable from control box to control valve and feed through rear of cab. Store cables inside mainframe and protect from weather.
j Release tractor end of PTO shaft and pull back along splines until the PTO shaft is free from the tractor.
k On 3 point linkage machines remove top link and link arm pins. On axle bracket mounted machines remove axle fork latches.
l Start tractor engine and drive carefully forward releasing the machine from the tractor.
m Remove PTO shaft from machine and store in secure position.
n Replace cap over PTO output shaft on tractor.

## 1 POWER TAKE-OFF SHAFT

The PTO shaft used is of the normal agricultural type. Spares kits comprising the spider, needle bearings, circlips etc., are available from your dealer. For correct part numbers, which must be quoted when ordering spares, see parts manual.

Some routine maintenance is needed to ensure a trouble free life for the PTO shaft.

a Grease both ends of PTO shaft daily.

b Grease the PTO shaft tubes regularly.

c Ensure guard check chains are securely attached and in good condition.

d Check that PTO guard is in good condition and **replace if cracked or damaged**.

e Check universal joint bearing journals for roughness or slackness. Replace if necessary.

## 2 HOSES

It is false economy to try and make a damaged hose last a bit longer, because a failure can spill a lot of oil on the road endangering traffic and costing money. To reduce the risk of this happening and ensure a long life from the hoses, follow instructions given below:

a Check weekly that all hoses and their connections (**with particular attention to the rotor drive circuit**) are in good condition and that there are no leaks or damage.
b Replace any hose that is leaking or damaged.
c Ensure that hoses have not chafed against sharp edges. If they have, inspect damage and replace.
d Re-route any hose that has been chafing (see Section 11).
e Ensure that hoses are fitted without kinks or sharp bends (see Section 11).
f Pay particular attention to the suction hose from the tank to the pump.
g If in doubt about the condition of any hose **REPLACE IT**.

| *Recommended Torque Settings for Hose Nuts* | | | |
|---|---|---|---|
| 1/4” BSP | = | 24 N.m | (18 lbf ft) |
| 3/8” BSP | = | 33 N.m | (24 lbf ft) |
| 1/2” BSP | = | 44 N.m | (35 lbf ft) |
| 5/8” BSP | = | 58 N.m | (43 lbf ft) |
| 3/4” BSP | = | 84 N.m | (62 lbf ft) |
| 1” BSP | = | 115 N.m | (85 lbf ft) |

**IMPORTANT: SOME HOSES MAY CONTAIN RESIDUAL HIGH PRESSURE, TAKE CARE WHEN REMOVING**

## 3 PINS

Periodically check all pins for damage and correct retention.

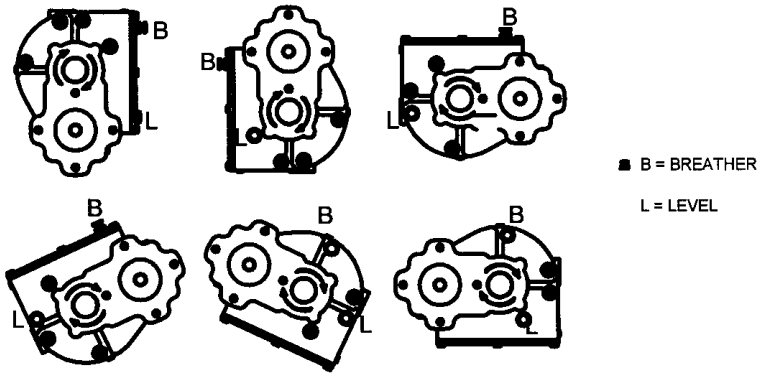
## 4 RAMS

It is advisable to check all ram caps for tightness occasionally and if found to be loose tighten them immediately.

## 5 GEARBOX

**Check oil level before use and top up if necessary**

Drain and replace oil after first 50 hours' work, thereafter every 1000 hours or 12 months, whichever is the earlier. The position of the filler plug is dependent on the orientation of the gearbox.
Various examples are shown




**Recommended oil**:

| | |
|---|---|
| MOBIL | MOBILAND UNIVERSAL MUTLI-PURPOSE TRACTOR OIL |
| EXELUBE | SUPER UNIVERSAL TRACTOR OIL |

Gearbox capacity 0.5litres

## 6 GREASING

**Any good quality lithium based grease may be used for lubrication of pivot pins and bearings.**

There is a number of greasing points on the machine that need regular attention.

Do not overgrease the roller and its bearings or the carriers may be forced apart and distorted by the pressure.

**To grease the rotor shaft bearings follow the instructions below**:

a Place head on ground or support it safely.

b Stop tractor engine and disengage drive to PTO shaft.

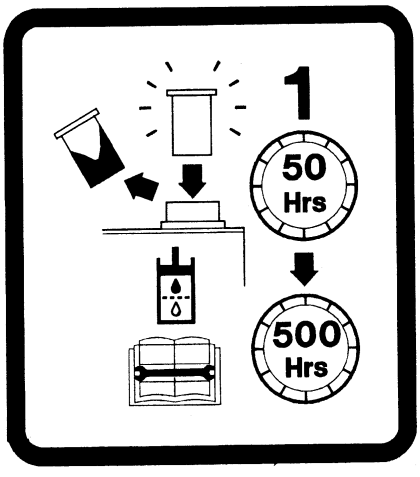
c Rotor shaft bearings - grease nipples are located through a cut out in the drive guards.

d Apply grease to the nipples but do not grease violently as damage to the seals may result.

e Do not overgrease or it could cause overheating.

## 7 FILTER

The element must be changed after the first 50 hours work and thereafter every 500 hours.



## 8 ROTOR SHAFT

**WARNING!**

**Flails** - Check each day that flails are in good condition and securely attached to the rotor shaft. Replace any that are damaged and tighten any loose nuts.

Vibration of the rotor shaft will cause premature failure of the rotor shaft bearings, as well as hydraulic and structural failures. It is important not to operate the machine with the cutting unit vibrating. As soon as any vibration is felt stop operating the machine and make the checks listed below:

a Place head vertically on ground or support it safely.

b Stop tractor engine and disengage PTO drive.

c Check flails are in place and the securing nuts and bolts are tight.

d Check for missing or worn flails. Always replace missing/worn flails in pairs opposite each other to maintain shaft balance.

e When replacing missing/worn flails check if the retaining bolts are worn or bent. Replace any suspect bolts. Always fit new locknuts and spring washers when replacing flails.

**IMPORTANT**

ONLY FIT GENUINE BOMFORD TURNER PARTS.

f If any flails were missing or loose and have been replaced or tightened, run the rotor and retest for vibration. If vibration is still present check rotor shaft bearings as follows.

g Stop tractor engine and disengage PTO drive.

h Check rotor shaft bearings for roughness or signs of slackness.

i Replace bearings if either of the above symptoms are found. If vibration persists it is an indication that the rotor shaft is probably bent and must therefore be replaced.

**ATTENTION**

When replacing bearings or changing pulley ratios, ensure the centre bolt retaining the taperlock is fully tightened, before tightening the grub screws holding the taper lock to pulley. Failure to do this may result in the bearing rotating on the shaft journal

## 9 TENSIONING DRIVE BELTS

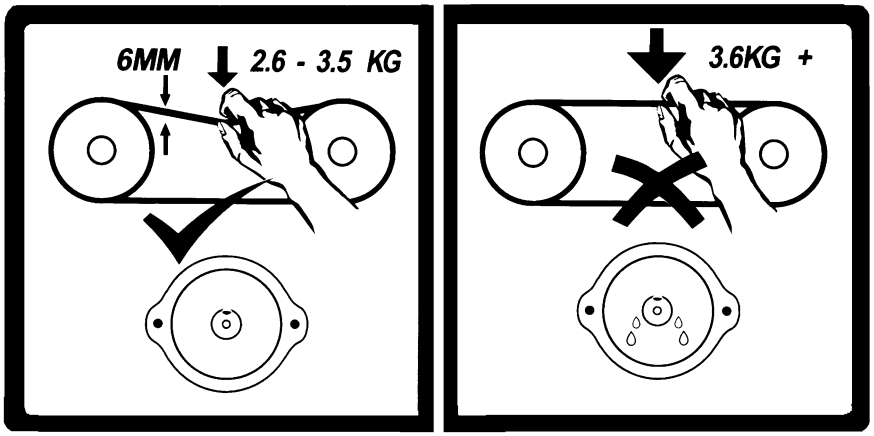
The rotor shaft is driven from the gear motor via 'V' belts, which are adjustable for tension.

The instructions below describe the procedure for tightening the belts.

a Stop tractor engine and disengage PTO drive.

b Remove drive guard.

c Check the tension by applying a force of 2.6-3.5kg at right angles to the belts in the centre of the two pulleys. If the deflection is greater than 6mm increase the belt tension.




Refer to illustration on Page 16 – 5.

d Release the motor mounting plate bolts (C).

e Loosen the adjuster locknut and rotate the adjuster (G) to tighten the belts.

f Tighten locknut and motor mounting plate bolts.

g Replace belt cover.

**ATTENTION**

DO NOT OVERTIGHTEN BELTS as this may cause premature failure of the rotor shaft, motor bearings and seals.

**10 REVERSING THE DRIVE PULLEYS**

Some cutting units have unequal pulleys for either **hedge trimming** or **grass cutting,** see General Operation - Section 13.

a Stop tractor engine and disengage PTO drive.

b Remove drive guard.

c Slacken motor mounting plate nuts (C), see illustration below.

d Slacken the adjuster (G) enough to push motor mounting plate fully down in the slots.

e Remove lower pulley centre bolt and washer (D).

f Remove the top pulley by taking out the 2 grubscrews (E) from the taperlock bush and using one of them to loosen the pulley by inserting into the third tapped hole (F).

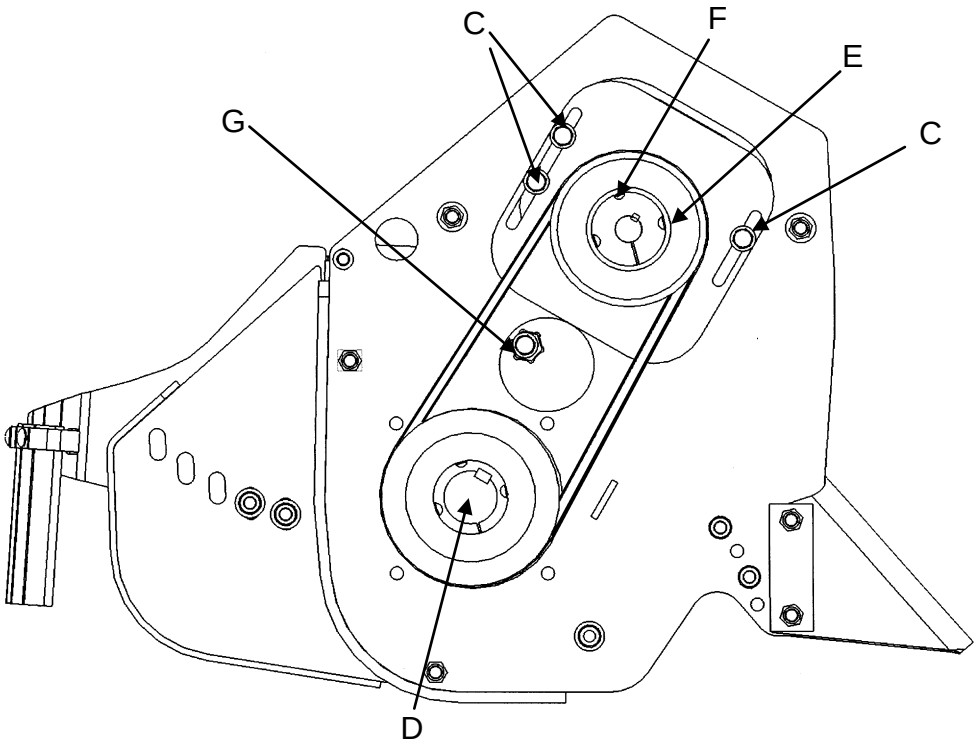
g Remove the vee belts and remove the bottom pulley in the same manner as (F) above.

h Exchange the pulleys on the taper lock bushes and loosely fit the 2 grubscrews (E).

i Replace the lower taper lock bush and pulley on to the rotor shaft, being careful not to displace the drive key. **Replace and fully tighten centre bolt before tightening the grubscrews holding the taper lock. Failure to do this may result in the bearing rotating on the shaft journal.**

j Replace vee-belts at the same time as replacing the top taperlock bush and pulley. With a straight edge line up top and bottom pulleys and fully tighten grubscrews. Check pulley alignment and repeat if not aligned correctly.

k Tension drive belts - see paragraph 9.



## 11 LEVER ADJUSTMENT

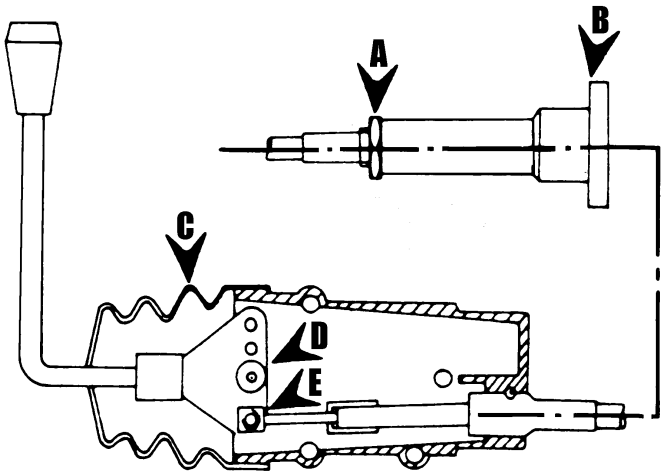
### 1 LEVER UNIT

The position of levers can be adjusted - see illustration.

a The adjustment is provided at the cable attachment, the control valve.

b Loosen locknut on the cable/valve connection flange A.

c Loosen the two capscrews holding the valve connection flange B.




d Rotate valve connection by hexagonal nut provided whilst holding the cable to stop it rotating until lever is in the required position.

e Retighten the two capscrews.

f Retighten the locknut.

### 2 ADJUSTING CABLE/LEVER RATIO

The ratio of lever movement to cable movement can be adjusted to suit individual requirements. Normally the lever/cable ratio is supplied to give the lowest force to operate the control valve, which gives the longest cable travel.

To adjust ratio:

a With the lever unit removed from the control valve, take out the three throughbolts and remove plastic cover from lever unit

b With the lever body supported drive out the tension pin from handle pivot.

c Remove collars and refit in handle to give required lever/cable movement ratio.

d Support body and drive in tension pin.

e Reassemble lever unit on to control valve.

## 11 TELESCOPIC ARM (when fitted)

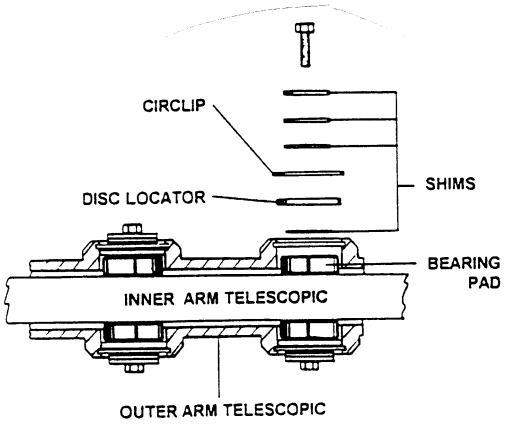
When necessary the wear pads can be adjusted to alleviate any excessive slack or play between the inner and outer arm. The desired clearance between the inner arm and the wear pads is 0.5mm. Also ensure that the inner arm is parallel inside the outer arm. The method of adjustment is described below dependant on the type of wear pads fitted.

**Early Type**
Adjustment can be achieved by varying the shim configuration between the wear pad and the locating disc. Shims are provided of varying thickness and combinations of these can be used to obtain the desired packing.

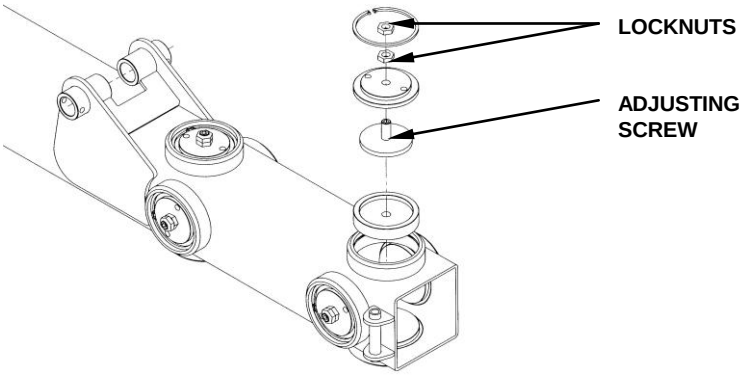
Extra caution should be used when operating the machine after an adjustment has been made to the wear pads in case they have been over adjusted.

Annually coat the inner arm with black Waxoil Original or a similar product.

Do not lubricate the inner arm or the wear pads.




**Early Type**



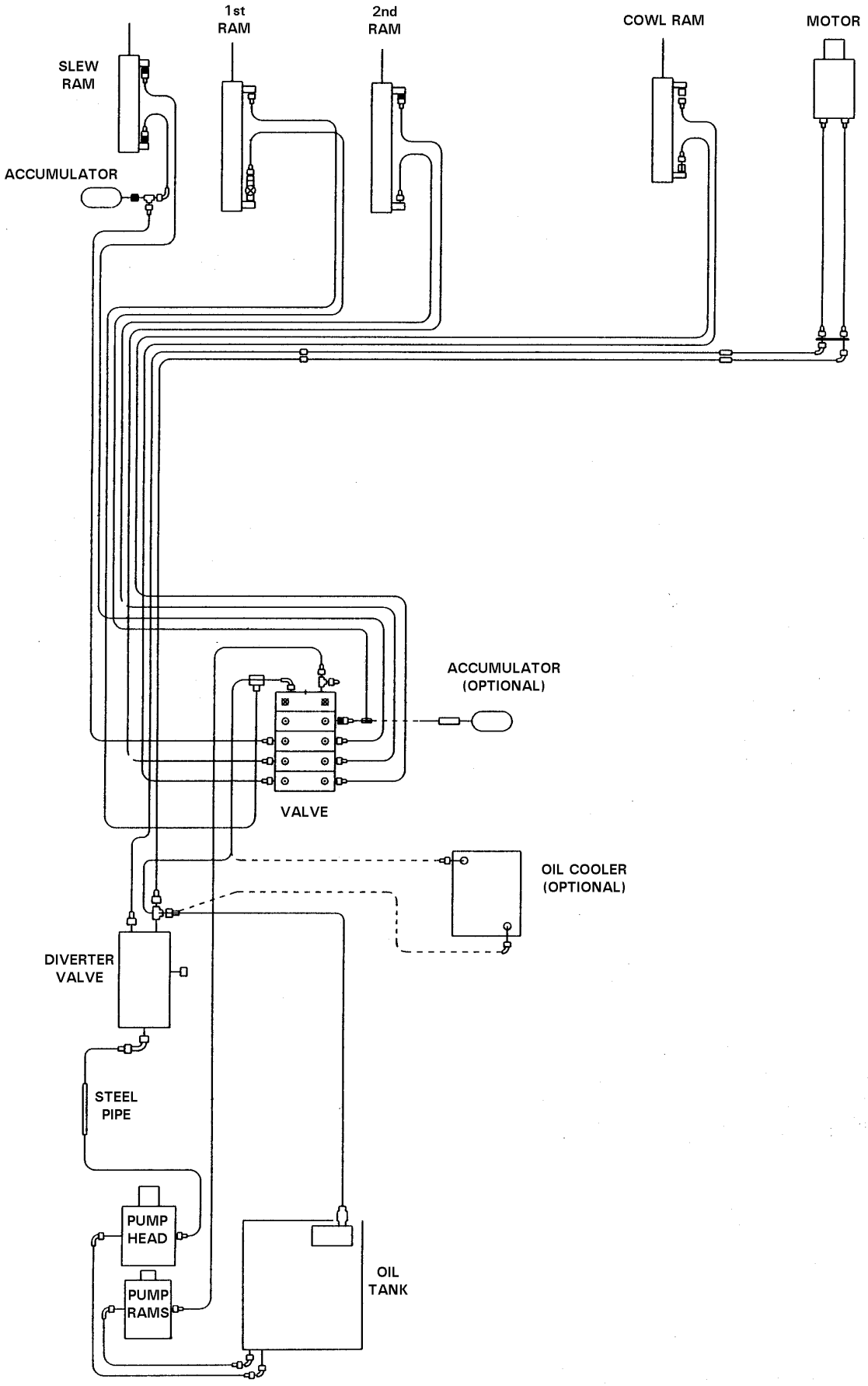

**Later Type**

**Later Type**
Adjustment can be achieved by slackening the locknuts and turning the adjusting screw. When the desired clearance between the pad and inner arm has been set retighten the locknuts.

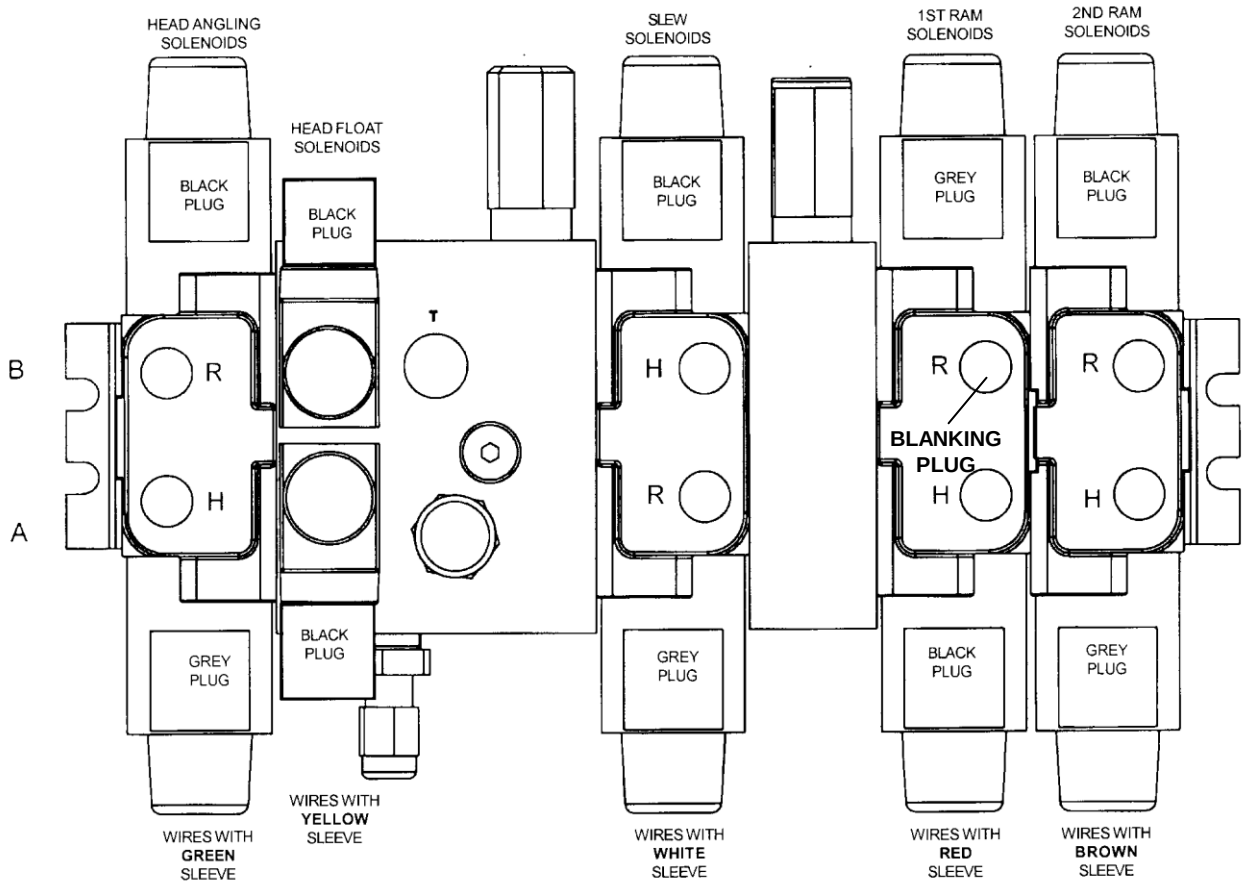
Extra caution should be used when operating the machine after an adjustment has been made to the wear pads in case they have been over adjusted.

Annually coat the inner arm with black Waxoil Original or a similar product.

Do not lubricate the inner arm or the wear pads.




**HOSE CIRCUIT DIAGRAM (Power Slew Machines)**




**WIRING – 4 SERVICE DMV VALVE**