

IM 974

**BOMFORD RAPTOR
1200, 1600 & 2000
VERGE MOWER**

**INSTRUCTION MANUAL
ISSUE 2**

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.

IMPORTANT

NOTEZ ICI LES NUMEROS DE SERIE DE VOTRE MACHINE QUI SONT A MENTIONNER DANS TOUTE COMMUNICATION AVEC NOS SERVICES OU VOTRE REVENDEUR. CES NUMEROS SONT PARTICULIEREMENT IMPORTANTS POUR COMMANDER DES PIECES DETACHEES. N'OMETTEZ AUCUN CHIFFRE, NI AUCUNE LETTRE.

NUMEROS DE SERIE DE LA MACHINE _____

LES INFORMATIONS DONNEES DANS CE MANUEL SONT CORRECTES. CEPENDANT, DU FAIT DU DEVELOPPEMENT CONSTANT DES MACHINES BOMFORD TURNER, DES CHANGEMENTS DANS LES CARACTERISTIQUES SONT INEVITABLES. EN CAS DE DIFFERENCES IMPORTANTES ENTRE LES INFORMATIONS DE CE MANUEL ET VOTRE MACHINE, VEUILLEZ CONTACTER LE SERVICE DES REPARATIONS QUI SERA EN MESURE DE VOUS DONNER DES INFORMATIONS PLUS RECENTES.

CE MANUEL PRESENTE DES CARACTERISTIQUES STANDARDS ET EN OPTION, ET NE CONSTITUE DONC PAS LES SPECIFICATIONS DE VOTRE MACHINE. CELLE-CI, QUI A FAIT L'OBJET D'ESSAIS RIGOUREUX, EST CONSIDEREE SANS DANGER SOUS RESERVE D'UNE UTILISATION CORRECTE. VOTRE OPERATEUR DEVRA AVOIR RECU LA FORMATION NECESSAIRE A SON UTILISATION ET A SON ENTRETIEN.

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 IN DIESEM HANDBUCH SIND BEI VERÖFFENTLICHUNG 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 VERWENDET.

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.

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);

Linkage mounted unit	Product code
RAPTOR 1.2M	B323
RAPTOR 1.6M	B323
RAPTOR 2M	B323

A tractor linkage mounted, vegetation control flail mowing attachment.

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

Designed by: BOMFORD TURNER LTD, Salford Priors, Evesham, Worcestershire, 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.

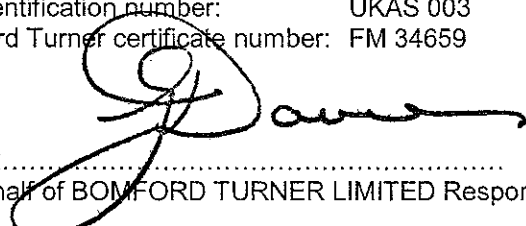
BOMFORD TURNER LIMITED operates an ISO 9001:2008 quality management system.

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: 02/01/10

***THIS HANDBOOK COVERS THE OPERATION AND SERVICING
OF THE RAPTOR 1200, 1600 AND 2000 VERGE MOWERS***

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IMPORTANT

**THIS MACHINE IS 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.**

The RAPTOR 1200, 1600 & 2000 are linkage-mounted offset verge mowers. Drive is provided by the tractor PTO shaft through vee belts and gearbox. The flail head is offset from the mainframe and hydraulic controls provide on-the-move adjustment of the offset and cowl angle.

The machines are designed for on the ground vegetation control and may be used for cutting verges and banks within the scope of their reach and performance.

It is essential the machines are fitted and operated in accordance with this manual.

TECHNICAL DATA

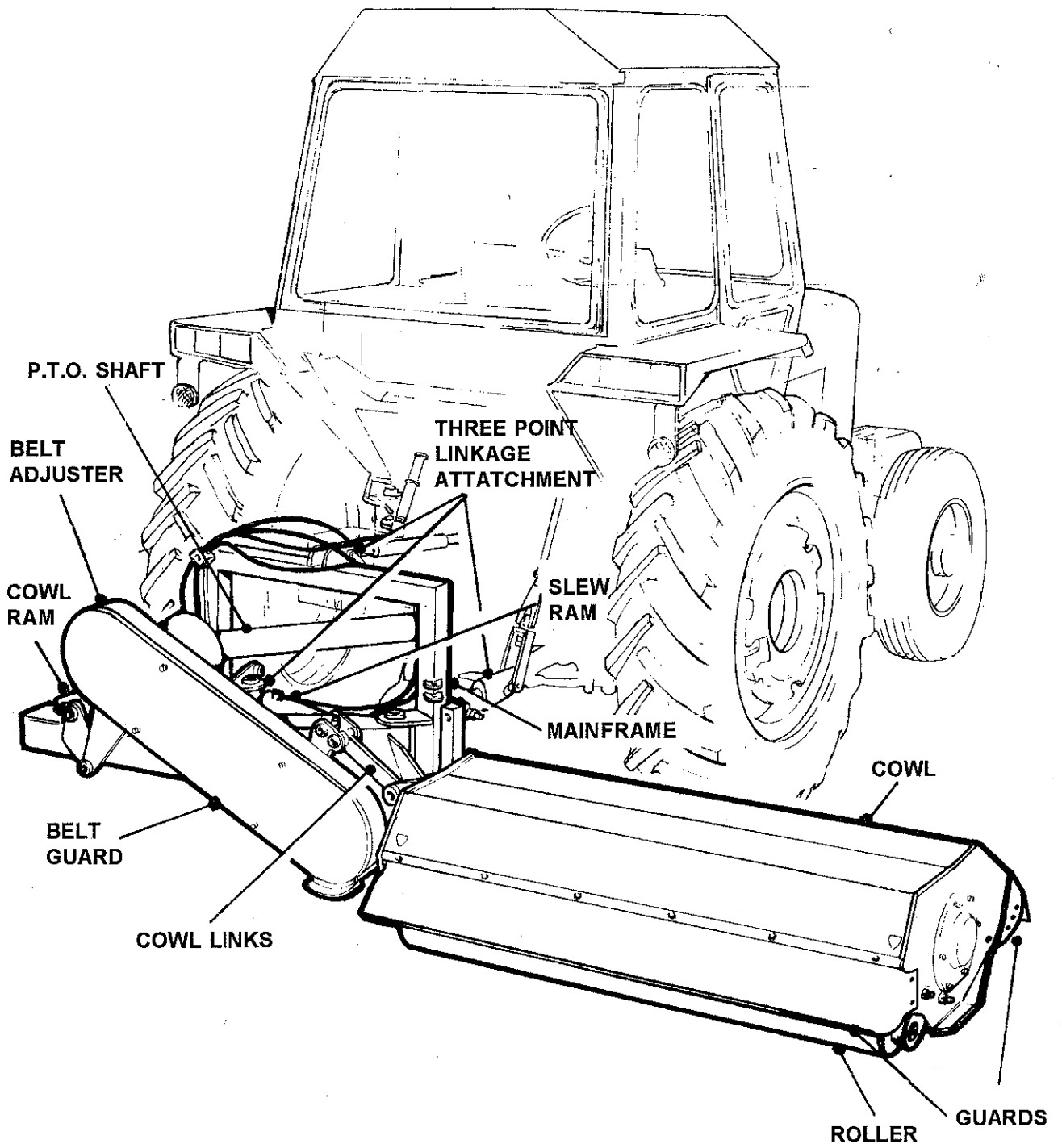
Machine details	RAPTOR 1200	RAPTOR 1600	RAPTOR 2000
Maximum reach - ground level fully offset	2835mm	3235mm	3635mm
Maximum offset - hydraulically operated	750mm	750mm	750mm
Transport width	←	within tractor width	→
Machine weight (complete)	640kg	870kg	840kg
Rotor Unit			
Cutting width	1200mm	1600mm	2000mm
Cowl size	Medium	Large	Large
Shaft type	Tubular 4 ½ o.d./114.3mm	Tubular 5 ½ o.d./139.7mm	Tubular 5 ½ o.d./139.7mm
Shaft speed @ 1000 rev/min PTO	2160 rev/min	2160 rev/min	2160 rev/min
Optional @ 540 rev/min PTO	2250 rev/min	2250 rev/min	2250 rev/min
Tip speed m/s @ 1000	45	53	53
Tip speed m/s @ 540	47	55	55
Number of Flails	32	44	54

NOISE

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

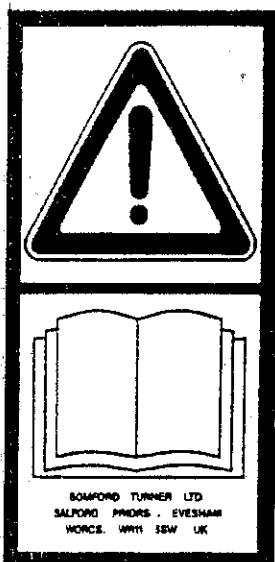
This applies when the machine is attached to a tractor fitted with a quiet cab and used in accordance with the operating instructions in a generally open environment.

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



- 1 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 PUT THE PTO OUT OF GEAR
 - b STOP THE TRACTOR ENGINE
 - c LOWER THE CUTTING UNIT ON TO THE GROUND
- 2 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.

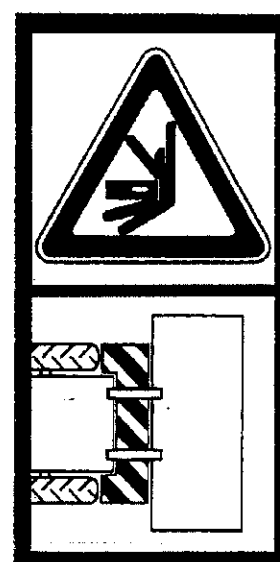
Replace the PTO shaft guard if any of the following are evident; guard cracked or damaged, any part of the PTO shaft exposed. Ensure that PTO shaft guard is free to rotate and the anti-rotation chains are securely fitted and effective.
- 3 Ensure that the correct guards for the particular operation are properly fitted to the machine and tractor at all times, and that they are in good condition. See section on guards and rotation.
- 4 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 full understand the meanings shown. Any safety decal found missing should be replaced.
- 5 THINK SAFETY - WORK SAFELY
 - a 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.
 - b 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'.
 - c 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.
 - d CHECK the flails for wear and the attachment bolts for tightness every day during work (see Maintenance). A few moments, whenever the machine is stopped, e.g. whenever removing obstructions, will help reduce flail wear or loss.
 - e 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.
 - f DIRECT cut material away from the tractor. It is important that while operating the cut material is not directed towards the operator. Avoid position the cutting unit so that the underside is angled towards the cab.
 - g Keep a careful watch for passers by who may inadvertently get in the way of cut material being thrown from the cutting unit. Stop the rotor shaft until people are well clear.
 - h Keep roller/skid in position at all times.



READ THE INSTRUCTION MANUAL BEFORE STARTING WORK.



KEEP ALL NUTS TIGHT



DANGER OF CRUSHING STAY CLEAR OF ZONES



DO NOT WORK UNDER OR STAND UNDER UNSUPPORTED MACHINE



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

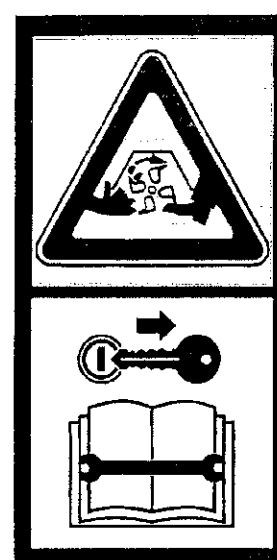


DANGER OF ROTATING BLADES STAY CLEAR OF OPERATING MACHINE



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

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



1 TRACTOR REQUIREMENTS

Ensure the specifications of the tractor meet the requirements listed below:

- a A PTO output of 1000 rev/min. (Optional 540 rev/min).
- b A Cat II three point linkage.
- c Adjustable top link.
- d Ballasted weight of tractor should exceed 2000kg (4400 lb) for 1200 and 1600 models and 2500kg for 2000 model.
- e Adequate ballast should be added to the rear wheel opposite to the arm and front of the tractor to ensure stability.

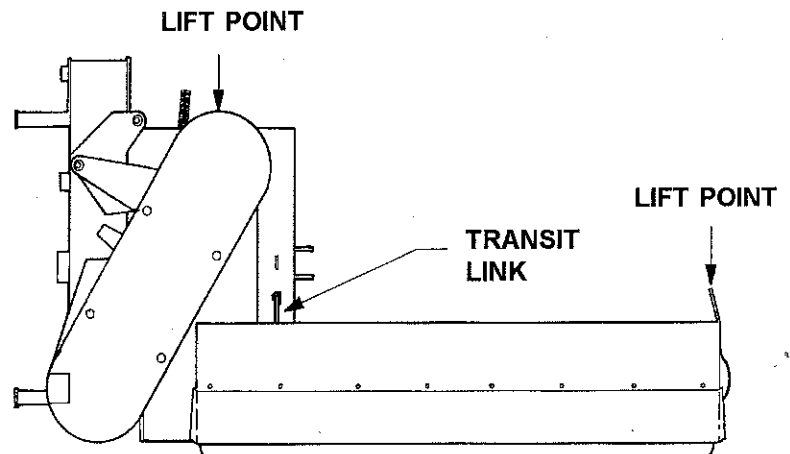
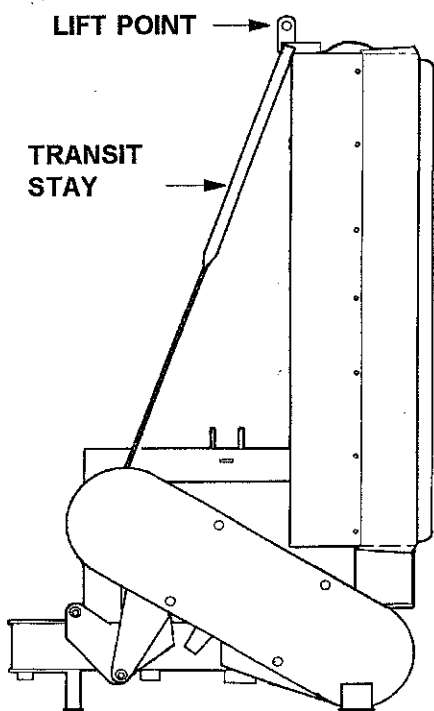
MACHINES USING TRACTOR SPOOL VALVE

Ensure that the spool valve can provide:

- a Flow 22-45 lit/min (5-10 gal/min).
- b Minimum pressure 125 bar (2200 lbf/in).
- c Two spools, both double acting.

2 MACHINE PREPARATION

- a The machine will normally be delivered fully assembled either standing on the mainframe with the cowl vertical (A), or with the cowl on the ground and mainframe vertical (B).
- b The lifting points are for machines fitted with transit stay. When lifting in anything other than this condition extreme care should be exercised as the centre of gravity may change
- c Only personnel experienced in lift and hoist operation should attempt repositioning the machine.
- d If supplied in position (B) the machine must be craned into position (A). The machine to remain supported on the crane until attached to the tractor.

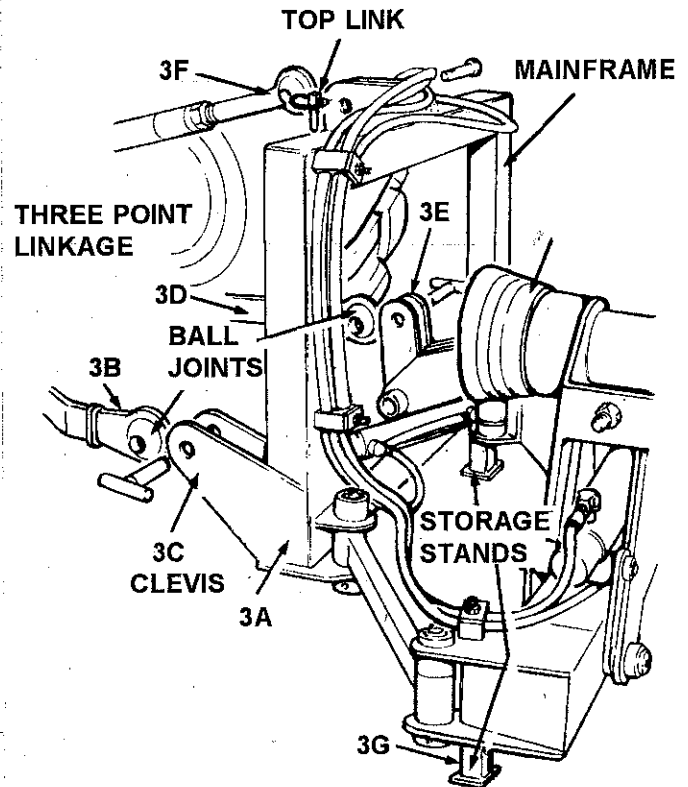


1 FITTING TO TRACTOR

IMPORTANT

COWL RAM MUST BE BLED BEFORE THE STAY SUPPORTING THE COWL IS REMOVED. FAILURE TO BLEED RAM WILL RESULT IN THE COWL CRASHING TO THE GROUND. (See Section 6 on page 6-3)

- a Position the machine on a flat, hard surface
- b Reverse tractor squarely to the machine
- c Carefully reverse the tractor so that the ball joints on the linkage line up with the clevis on the mainframe 3 (A).
- d Position left lift arm 3(B) in mounting clevis 3(C), fit pin and lock with linch pin and ring.
- e Adjust right lift arm 3(D) if necessary.
- f Position right lift arm 3(D) in mounting clevis 3(E), fit pin and lock with linch pin and ring.
- g Fit adjustable top link 3(F) between tractor and top of mainframe.
- h Secure with pin provided with tractor.
- i Lift the machine hydraulically until the stands are clear of the ground. Adjust the right arm and the top link until the machine is square with the tractor.
- j Raise stands 3(G) and store by putting the locking pin in the bottom hole of the stand.
- k Fit the tractor external check chains to the lift arms and adjust until there is no sideways movement.



2 FITTING PTO

Due to the many different makes and sizes of tractor to which BOMFORD TURNER mowers can 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 THE PTO SQUARE DRIVE IS 100MM (4") AND 150MM (6") FOR THE LEMON TUBE TYPE IN THE WORKING POSITION. THIS MEASUREMENT MUST BE TAKEN INTO ACCOUNT WHEN SHORTENING THE PTO SHAFT. MINIMUM ENGAGEMENT OF THE PTO MUST BE CHECKED THROUGHOUT THE RANGE OF OFFSET.

Before fitting the PTO shaft to the 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 the tractor and machine

3 CONNECTING THE HYDRAULICS

(A) MACHINES USING TRACTOR SPOOL VALVE

Connect the four hydraulic hoses to the spool valve fittings. To establish the position and type of fitting refer to the tractor instruction manual **IF IN DOUBT CONSULT YOUR LOCAL DEALER.**

(B) MACHINES USING MAINFRAME SPOOL VALVE

Alternative kits are available for:

- a Open centre hydraulics. This kit includes parts so that it can be converted to closed centre or 'carry over' system.
- b Load sensing hydraulics. This kit must be used when the tractor requires a load sensing system.

Ensure that the correct kit is used.

Correct the relevant hoses to the tractor, referring to the tractor instruction manual for the correct tappings into the tractor hydraulic system.

4 REMOTE CONTROL LEVERS (if fitted)

The hydraulic control valves have the cable control already connected to the control valve and the lever console attached to the mainframe.

The cables can be routed through the rear cab window, and should be as free of bends as possible. **DO NOT PINCH CABLES IN CLOSED CAB WINDOW.** If the tractor cab has special apertures for cables, then the lever unit should be fed through them before they are attached to the tractor cab.

IMPORTANT

THE CABLES MUST HAVE A BEND OF NOT LESS THAN 150MM (6") RADIUS

- a Attach console mounting bracket to side of cab.

IMPORTANT

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

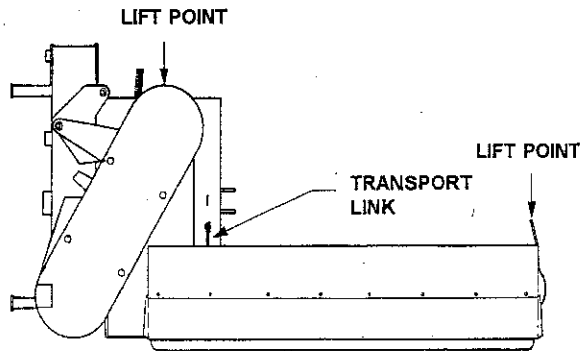
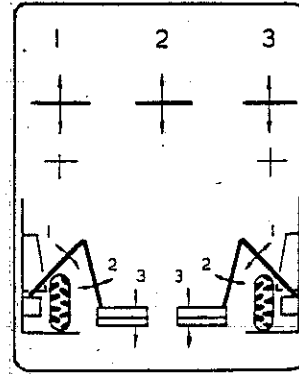
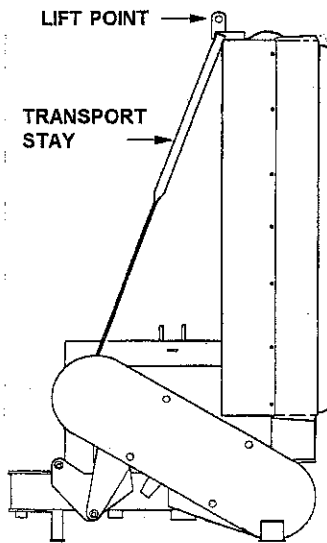
- b Mount console on to the mounting bracket securely with the bolts provided.
- c Finally, check lever for smooth operation in both directions. If any stiffness is felt or if lever does not return to centre, check cable run for sharp bends.

IMPORTANT

WHENEVER THE MACHINE IS REMOVED AND THE TRACTOR IS OPERATED WITH THE CONTROL VALVE CONSOLE IN PLACE, FIT RUBBER BEADING (CONTAINED IN THE CAB FITTING KIT) TO THE EDGE OF THE CONSOLE MOUNTING BRACKET TO PREVENT RISK OF INJURY.

5 CONTROL VALVE OPERATION - LEVERS

A control valve operation instruction plate is provided just behind the levers, clipped to the cables, to indicate the lever movement. If this plate is damaged in any way it must be replaced. A typical plate is reproduced below. Familiarize yourself with the operation of these levers before commencing work.

**6 TRANSIT STAY REMOVAL****IMPORTANT**

COWL RAM MUST BE BLED BEFORE THE STAY SUPPORTING THE COWL IS REMOVED. FAILURE TO BLEED RAM WILL RESULT IN THE COWL CRASHING TO THE GROUND.

- a Slacken the 1/4" BSP hose nut at the rod end of the cowl ram.
- b Start tractor engine and ensure that controls are switched to the auxiliary hydraulics.
- c Operate the cowl ram control valve lever until oil appears at the slackened joint.
- d Stop tractor engine.
- e Tighten hose joint on ram.
- f Stand clear of unsupported cutting unit and remove transport stay and any other transit straps.
- g Restart tractor engine.
- h Operate the cowl ram control and lower the cowl to the ground. Raise and lower cowl several times to ensure all the air is expelled

BLEEDING THE SLEW RAM

- i Operate slew ram controls and open and close several times to exclude any air.
- j Stop tractor engine.
- k Check all hose joints for leaks.
- l Top up tractor hydraulic oil reservoir (see Tractor Manual for recommended oils).

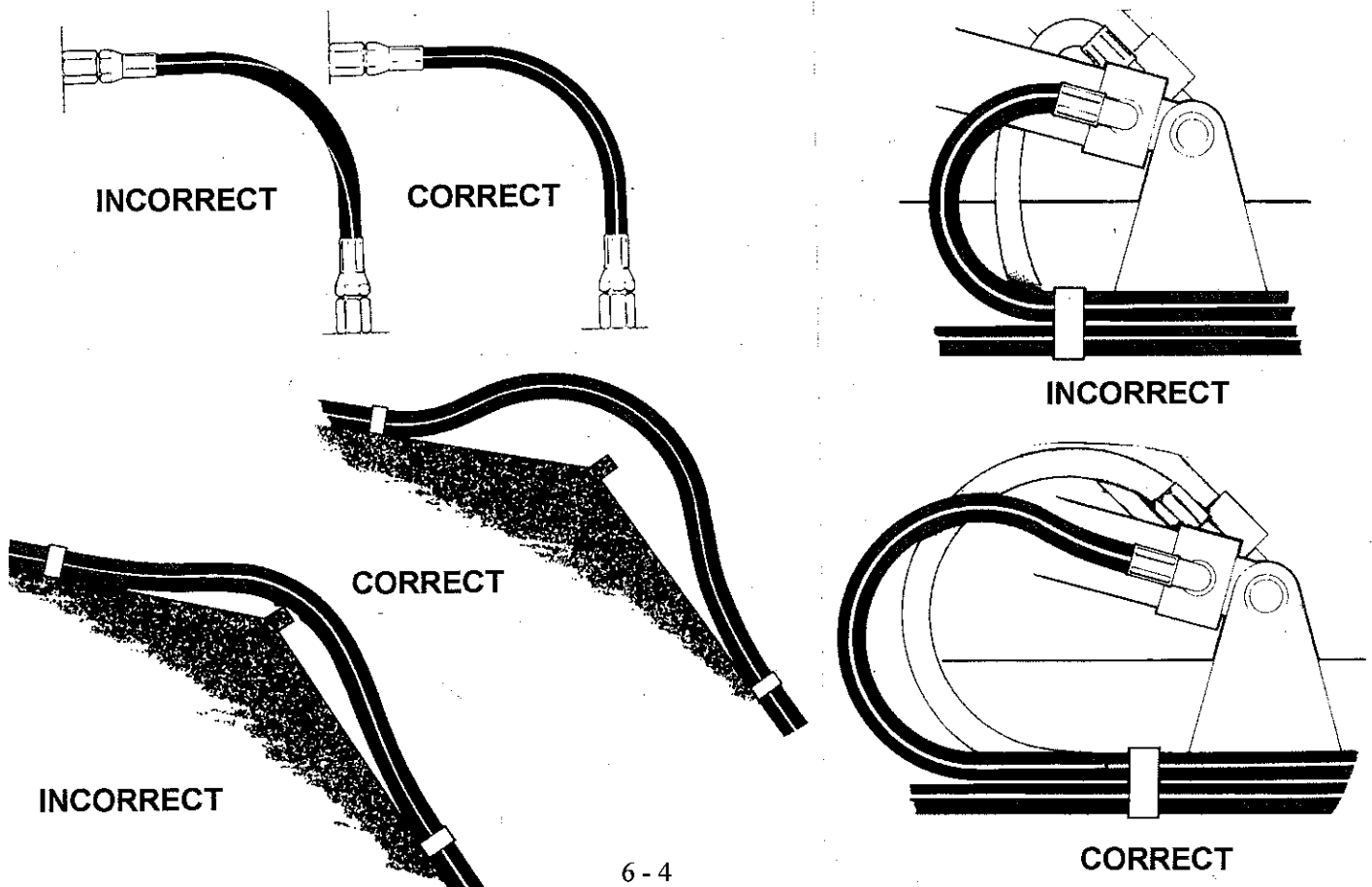
NOTE

DO NOT PRESSURIZE THE ARM RAM WITH THE TRANSIT STAY IN POSITION.

7 CONNECTING HOSES

It is important that hoses are fitted and aligned correctly. Hoses should never be twisted or kinked. On most hoses there is a line which runs the full length of the hose which acts as a useful guide. If there is no guide line along the hose follow the fitting instructions below.

- a Attach angled end of hose to its coupling but do not tighten. Either end can be attached if both ends of hose are straight, although most hoses on BOMFORD TURNER machines have one end with an angle bend.
- b Position the hose to its required route.
- c Connect other end loosely to its union.
- d Tighten angled end of hose in required position.
- e Tighten straight end. It may be found that as the nut is tightened the hose may twist slightly. If this happens follow instruction (f), if it does not twist follow from instruction (h).
- f Slacken off nut and turn hose in opposite direction to that of twist.
- g Retighten nut and bring hose back centrally.
- h Tighten hose clamps and clips where applicable.
- i Finally, operate the arms to all positions to ensure that the hoses are clear of any obstructions and also that the pipes are not pulling tight due to being clamped up incorrectly.
- j Always give plenty of clearance around sharp edges.



1 INITIAL RUN

- a Raise the rotor unit off the ground using the hydraulics.
- b Ensure nobody is standing near to the machine.
- c Run tractor engine at idle speed and engage PTO drive.
- d If rotor starts increase PTO speed gradually to 1000 rev/min.
- e If rotor fails to start stop tractor engine; check PTO drive and belt tension.
- f Allow the machine to run for approximately ten minutes.
- g Stop the machine immediately if excessive noise is heard or vibration is felt and refer to Maintenance section.

2 NORMAL RUN-UP

- a With a new machine never start cutting in arduous conditions. Allow at least one day's light work for running in.
- b Never attempt to start the machine while it is under load at any time. Always free rotor shaft from any obstructions.
- c Never increase or decrease PTO speed rapidly as this can lead to gearbox damage.

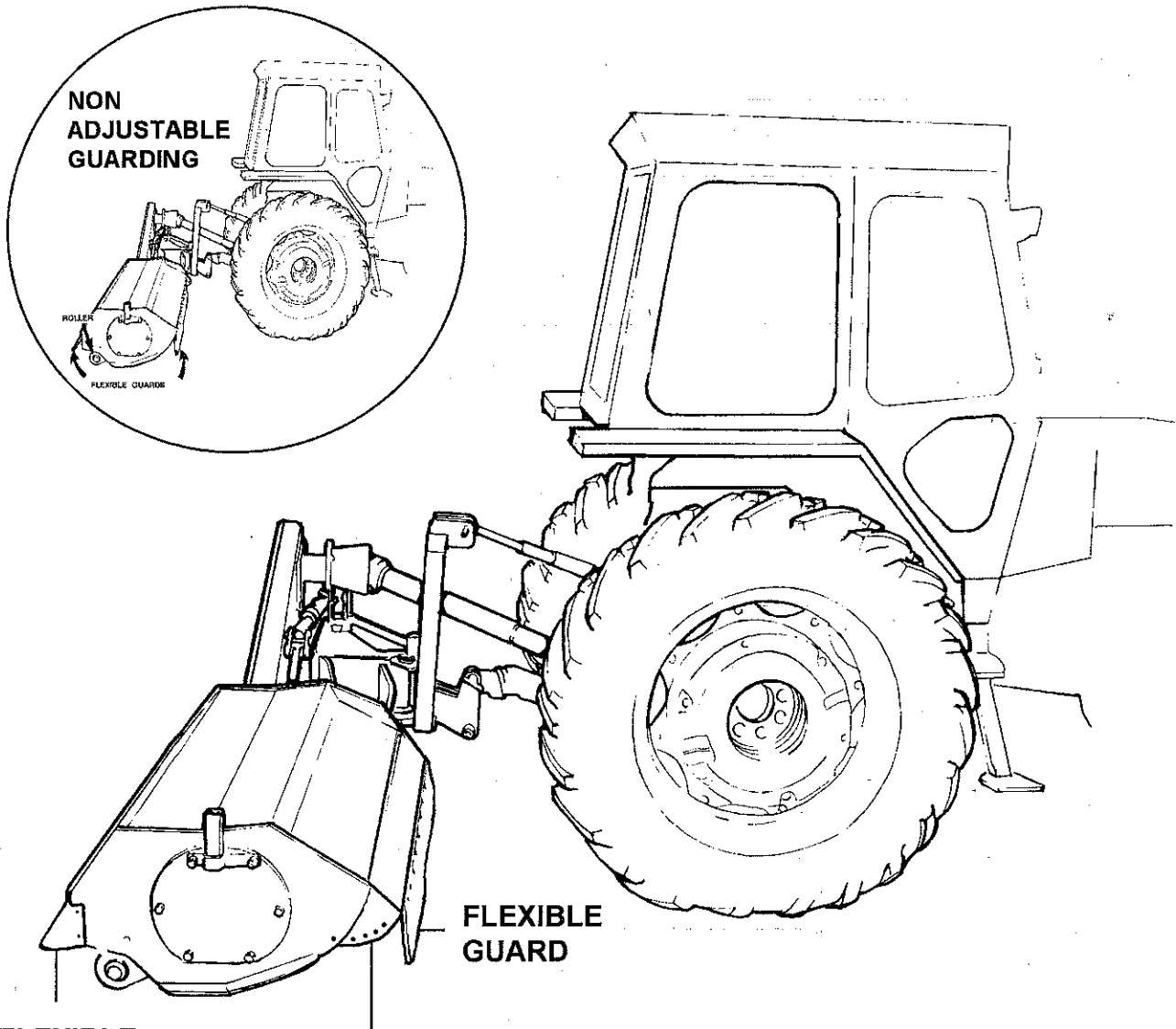
WARNING

STOP RUN UP IMMEDIATELY IF NOISE IS DETECTED FROM THE ROTORS
OR GEARBOX, AND REFER TO SAFETY PRECAUTIONS' SECTION

3 DRIVE BELT TENSIONING (See section on Maintenance)

Before operating the machine it is essential that the belts are checked for tension.

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.



**FLEXIBLE
GUARD**

**ADJUSTABLE
GUARD**

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:** 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 with the minimum of trouble and downtime.

Read the following pages carefully and familiarize yourself with the contents.

Make a note of the serial numbers stamped on the top of the mainframe and the rotor itself. Always quote these numbers in any correspondence with your dealer.

2 INITIAL CHECKS

Check that the tractor is equipped to deliver 1000 rev/min at the power take-off shaft. IN NO CIRCUMSTANCES MUST THE PTO EXCEED 1050 REV/MIN.

3 NORMAL PRE-START CHECKS

- a Check that the rotor shaft is free from obstructions, especially pieces of wire.
- b Check that all flails are in good condition and securely attached to the shaft.
- c Check that all guards are in their correct places and in good condition. See Section 8.
- d Check that the roller is in place and correctly adjusted.
- e Examine the job to be cut. It is very important that the work site is inspected before cutting and all hidden obstructions removed or their position marked so that these may be avoided.
- f Check ditches for tree stumps, drain pipes, large stones, etc.

4 OPERATING HINTS

- a AVOID wire. STOP the tractor engine instantly if an unusual noise is heard from the machine. On no account raise or move the cutting unit until the rotor has stopped. NEVER IN ANY CIRCUMSTANCES run the rotor to clear itself.
- b AVOID stumps and pipes, etc. Stalling in heavy growth may cause damage to the rotor shaft.
- c DO NOT allow personnel near the machine while it is operating.
- d AVOID rushing into material when operating. Remember the unit has to chop material as well as cut it to the required height.
- e AVOID taking too much material by selecting the appropriate forward gear.
- f Run rotor at normal speed.
- g Advantage may be gained in exceptional conditions to take narrow cuts with part of the rotor shaft running idle.
- h When cutting it is always advisable to take a cut along the edges of ditches, etc. so that the ditch limits can be seen.

5 STALLING THE ROTOR

If the rotor becomes choked the tractor will stall or the belts will slip.

If this occurs follow the instructions below:

- a Stop forward motion, disengage PTO drive immediately and place PTO drive lever in neutral.
- b Ensure that the rotor has stopped and lift the rotor unit using the hydraulics.
- c Stop the tractor engine.
- d Remove any obstructions that may be present on the rotor. If working under the raised machine, ensure that it is safely supported.
- e NEVER IN ANY CIRCUMSTANCES run the rotor to clear itself.

6 BREAKOUT

A vertical link gravity breakout is fitted at the lift arm attachment point in the mainframe. This will reduce the risk of damage if an obstruction is encountered during work.

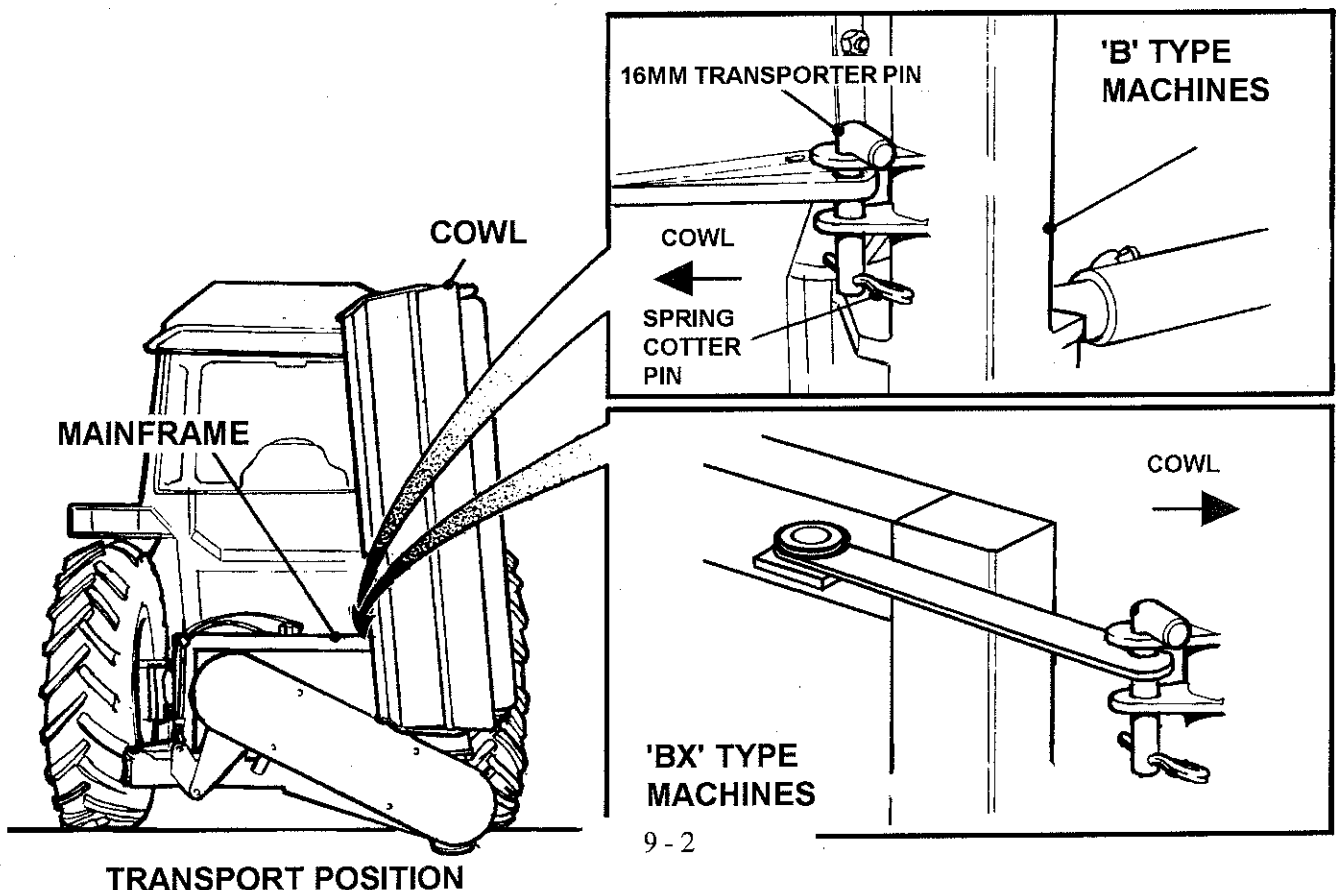
7 ROLLER HEIGHT

The roller is pre-set in its raised position before leaving the factory. The method of adjustment is detailed in the section on Maintenance.

8 TRANSPORT

Normally the machine will need to be at the driver's work site before commencing work. To keep the machine/tractor width to a minimum it will be necessary to place the machine in the transport position. This is described and illustrated below.

- a The tractor must be stationary.
- b Retract the cowl ram.
- c Retract the offset ram.
- d Do not transport with PTO drive engaged.
- e Fit link between mainframe and cowl.
- f To remove machine from the transport position the above sequence is reversed.



1 CONVERTING TO 540 REV/MIN PTO OUTPUT

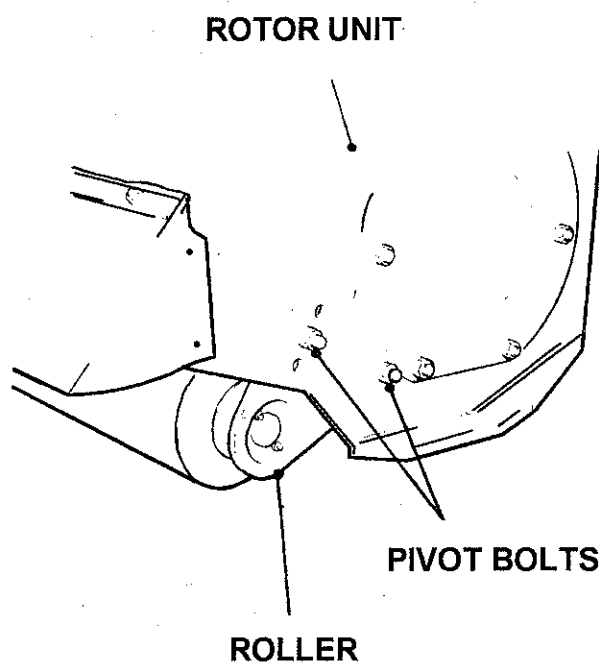
- a Ensure that the tractor rev counter is checked and marked so that under no circumstances can 540 rev/min PTO be exceeded.
- b If necessary obtain a yoke to convert your PTO shaft to match tractor.
- c The drive pulleys are set up for 1000 rev/min PTO input and need to be reversed for 540 rev/min PTO output.

The method of reversing the pulleys is detailed below:

- a Remove drive cover.
- b Slacken drive belts by unscrewing the adjusting bolt and remove belts.
- c Remove 180 p.c.d. pulley from the PTO drive shaft.
- d Remove 250 p.c.d. pulley from the gearbox shaft.
- e Fit 250 p.c.d. pulley on to the PTO drive shaft.
- f Fit 180 p.c.d. pulley on to the gearbox shaft.
- g Fully tighten all grubscrews and setscrews.
- h Refit the drive belts and tension to correct setting.

2 ROLLER ADJUSTMENT

- a Raise the rotor unit off the ground.
- b Stop tractor engine and disengage PTO drive.
- c Place a strong support under the side skids.
- d Slacken off the pivot bolts of the roller bracket.
- e Remove remaining bolts and nut from roller bracket.
- f Lower or raise the roller to the height required.
- g Replace bolts in required hole.
- h Fully tighten all nuts on both sides.
- i Remove support and lower the rotor unit to the ground.



IMPORTANT

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

3 TENSIONING DRIVE BELTS

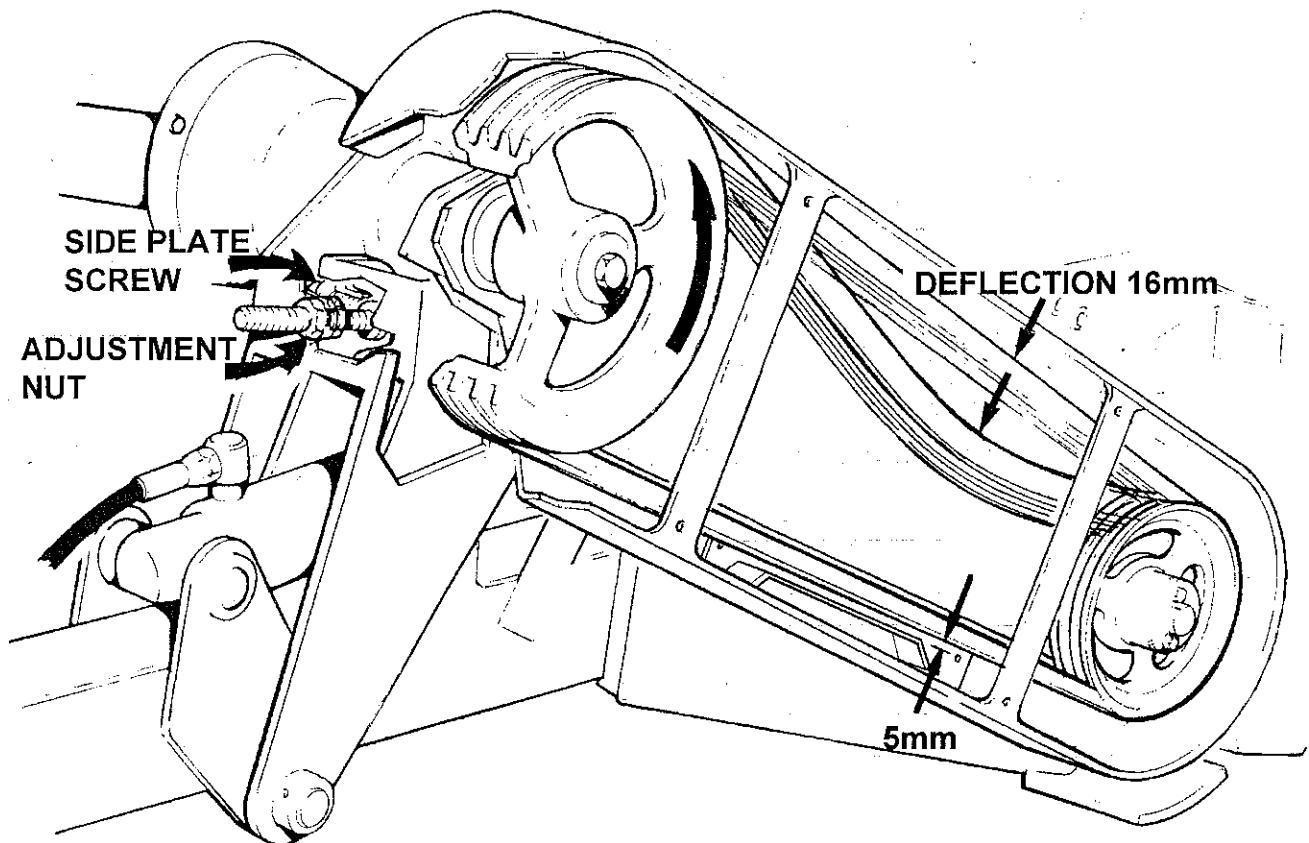
The rotor shaft/gearbox is driven from the PTO via the 'V' belts which are adjustable for tension. The following instruction describes the procedure for tightening the belts.

- a Lower the rotor unit to the ground using the hydraulics.
- b Stop tractor engine and disengage PTO drive.
- c Remove drive guard cover.
- d Slacken locknut sideplate screw and adjustment locknut.
- e Turn nut adjusting bolt in an anticlockwise direction until each belt can be deflected 16mm by applying a force of 6.1 to 9.2kg at right angles to the belt in the centre of the two pulleys.

IMPORTANT

DO NOT OVERTIGHTEN BELTS as this may cause premature failure of belts and gearbox/PTO bracket bearings.

- f Tighten locknut and recheck belt tension.
- g Refit drive guard cover.



4 GEARBOX LUBRICATION

The gearbox is filled with 1.7 litres of EP90 oil before it leaves the factory and should not need topping up unless the gearbox is taken apart for any reason. However, it is advisable to check the level now and again through the level plug provided.

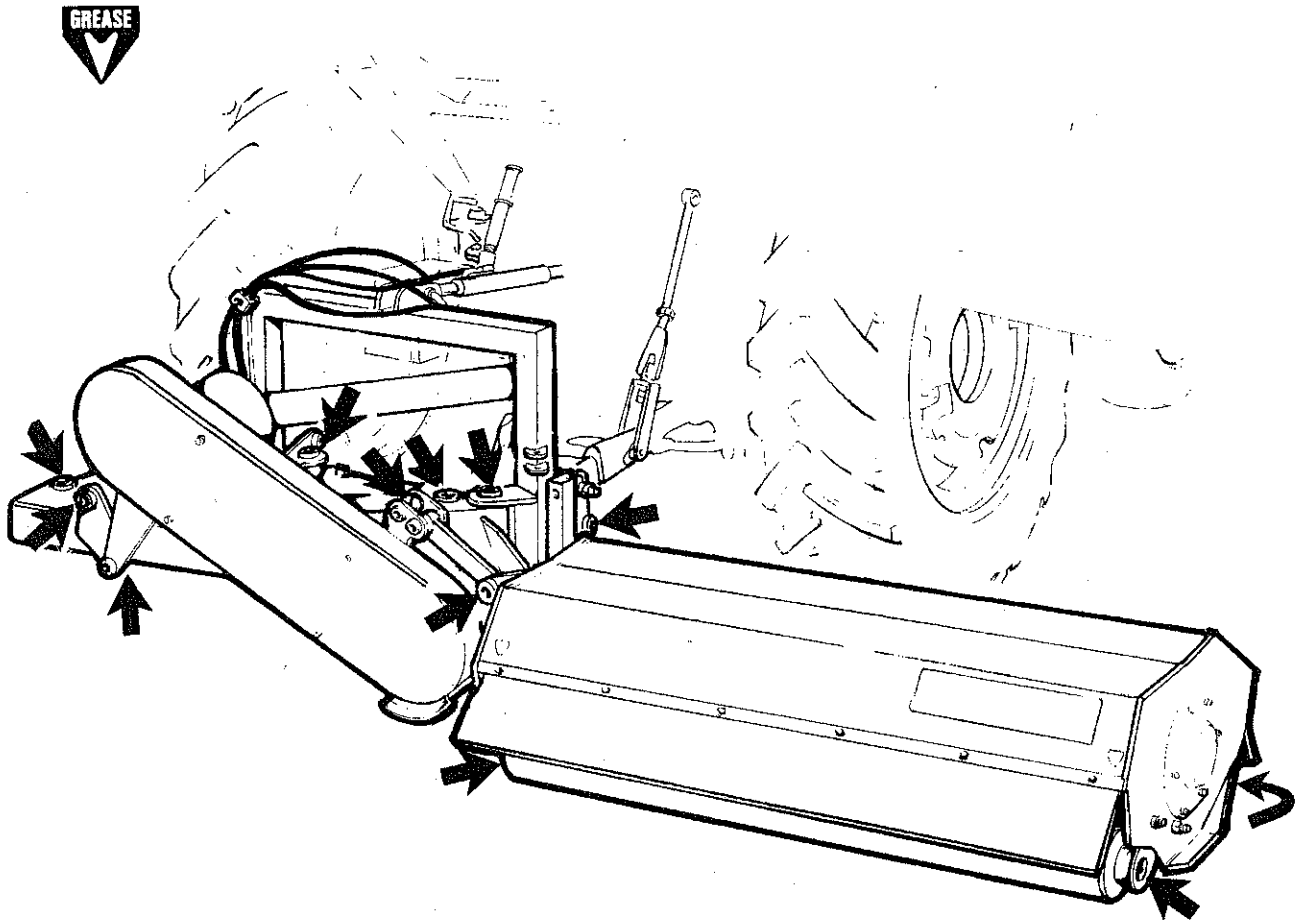
5 GREASING

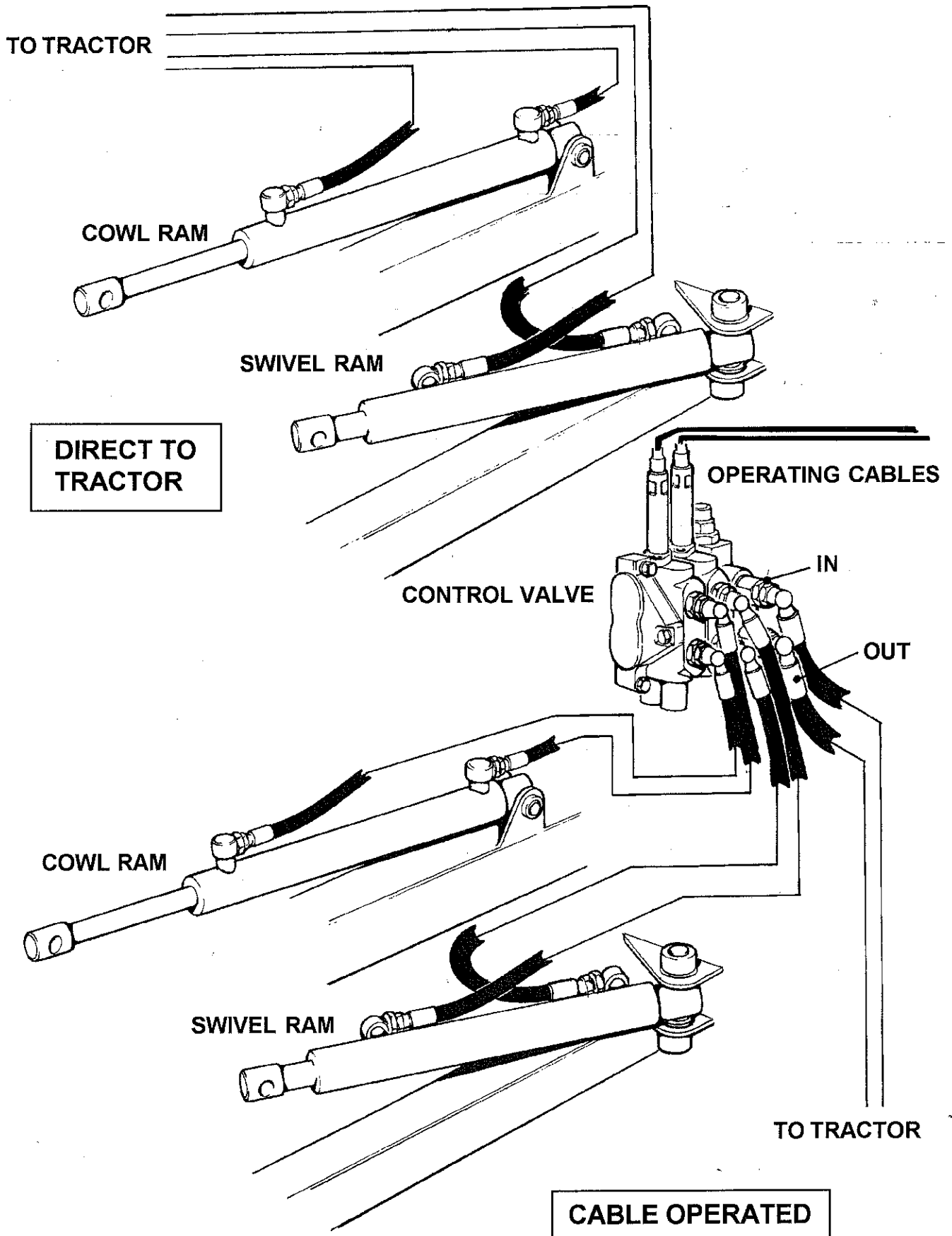
Note: Greasing points are at the positions shown below. The frequency of greasing is shown on the adjacent lubrication table.

Make greasing easier by relieving the weight from the pivot pins. Rest the rotor on the ground, stop tractor engine and operate control levers in both directions.

LUBRICATION CHART

	DAILY	WEEKLY	MONTHLY
ROTOR SHAFT BEARINGS	●		
P.T.O. SHAFT BEARINGS	●		
P.T.O. SHAFT TUBES		●	
PIVOT PINS	●		
ROLLER BEARINGS	●		
OIL TANK			●
GEARBOX			●
GREASE ●	OIL ○		CHECK ○





6 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 most agricultural dealers.

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. For best results:

- a Grease PTO shaft sliding tubes regularly.
- b Grease both ends of PTO shaft daily.
- c Ensure check chains are securely attached and in good condition.
- d Check that the PTO guard is in good condition and replace it if not.
- e Check universal joint bearing journals for roughness or slackness. Replace if necessary.

7 HOSES

It is false economy to try and make a damaged hose last a bit longer, because a failure can spill several gallons 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 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 if necessary.
- d Re-route any hose that has been chafing (see Section 4).
- e If in doubt about the condition of any hose REPLACE IT.

8 ROTOR UNIT

Vibration of the rotor shaft can 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 head vibrating. As soon as any vibration is felt stop operating the machine and make the checks listed below:

- a Stop tractor engine and neutralize PTO drive.
- b Check all flails and replace missing ones immediately.
- c Check and ensure that all flail attachments are tight.
- d If any flails are missing or loose and have been replaced or tightened, run the rotor shaft and test for vibration. If vibration is still present check as follows.
- e Stop tractor engine and neutralize PTO drive.
- f Check rotor shaft bearings for roughness or signs of slackness.
- g Replace bearings which have the same problems stated above.
- h If vibration persists it is an indication that the rotor shaft is probably bent and must therefore be replaced.

1 STORAGE

Before removing the machine from the tractor a thorough check should be made, as follows:

- a Thoroughly clean all moving parts, particularly the rotor unit.
- b Check 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 Slacken off tension from drive belts.
- e Smear all unpainted metal parts with grease and lubricate all grease nipples.
- f Make a note of any item that needs replacing so that parts can be ordered.

2 PARKING AND REMOVAL

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

- a Place the rotor unit on the ground.
- b Disengage PTO drive
- c Lift the mainframe on the tractor lift arms, lower stands and pin in position.
- d Lower mainframe on to its stands.
- e Stop tractor engine and operate control valve levers in both directions to release pressure.
- f If fitted, remove control lever console from inside tractor and feed through rear of cab. Without bending cables too tightly, tie console on to mainframe and protect from weather.
- g Fit rubber beading supplied with cab fitting kit to the edge of console mounting.
- h Release tractor end of PTO shaft, pull back along splines and release from shaft.
- i Slacken lift arms and check chains.
- j Slacken adjustable top link and remove.
- k Remove linch pin and rings securing lift arms to mounting pins.
- l Remove lift arms from mounting pins.
- m Start tractor and drive carefully forward, releasing machine and PTO shaft from tractor.
- n Replace lower link pins, ensuring breakout link is pinned to the mainframe.
- o Place cap over tractor PTO.
- p Remove the machine PTO and store in a safe place