HOWARD ROTAVATOR

HE

OPERATING INSTRUCTIONS

⚠ SAFETY PRECAUTIONS ⚠

Read and familiarise yourself with the operating instruction book.

Disengage the pto apply the parking brake and stop the tractor engine before making any repairs or adjustments to the ROTAVATOR.

Disengage the pto when transporting or not in use.

Take all possible precautions when leaving the tractor unattended, such as disengaging the pto, lowering the attachment(s), shifting into neutral, setting the parking brake, stopping the tractor engine and removing the key.

Keep all nuts, bolts and screws tight and be sure that the equipment is regularly lubricated to keep it in a safe working condition.

Ensure all guards and covers are in working order and in position before starting work.

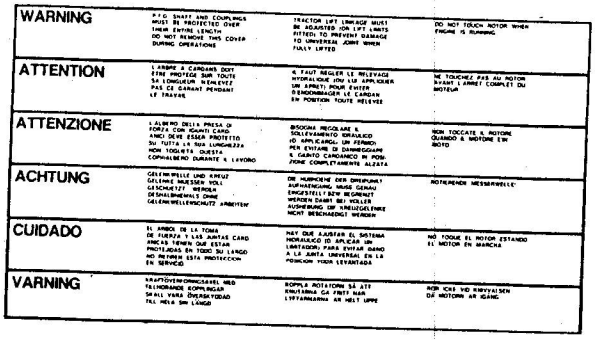
The pto shaft and couplings must be protected over their entire length. Do not remove the cover during operations.

If working on the ROTAVATOR whilst it is held on the tractor's 3-point linkage, make certain it is properly attached to the tractor and supported by wooden blocks or metal stands under the toolbar or tractor link arms.

Only use the machine for the tasks mentioned in this book.

Never touch the rotor with the tractor engine running — switch off first.

The warning transfer (part number 58173) illustrated below should always be in position on your machine. If, for any reason it is missing a replacement will be supplied free of charge.



CONTENTS

SERIAL NUMBER

The serial number of the machine is stamped on the right hand suppport angle of the top mast, and Serial Number Plate.

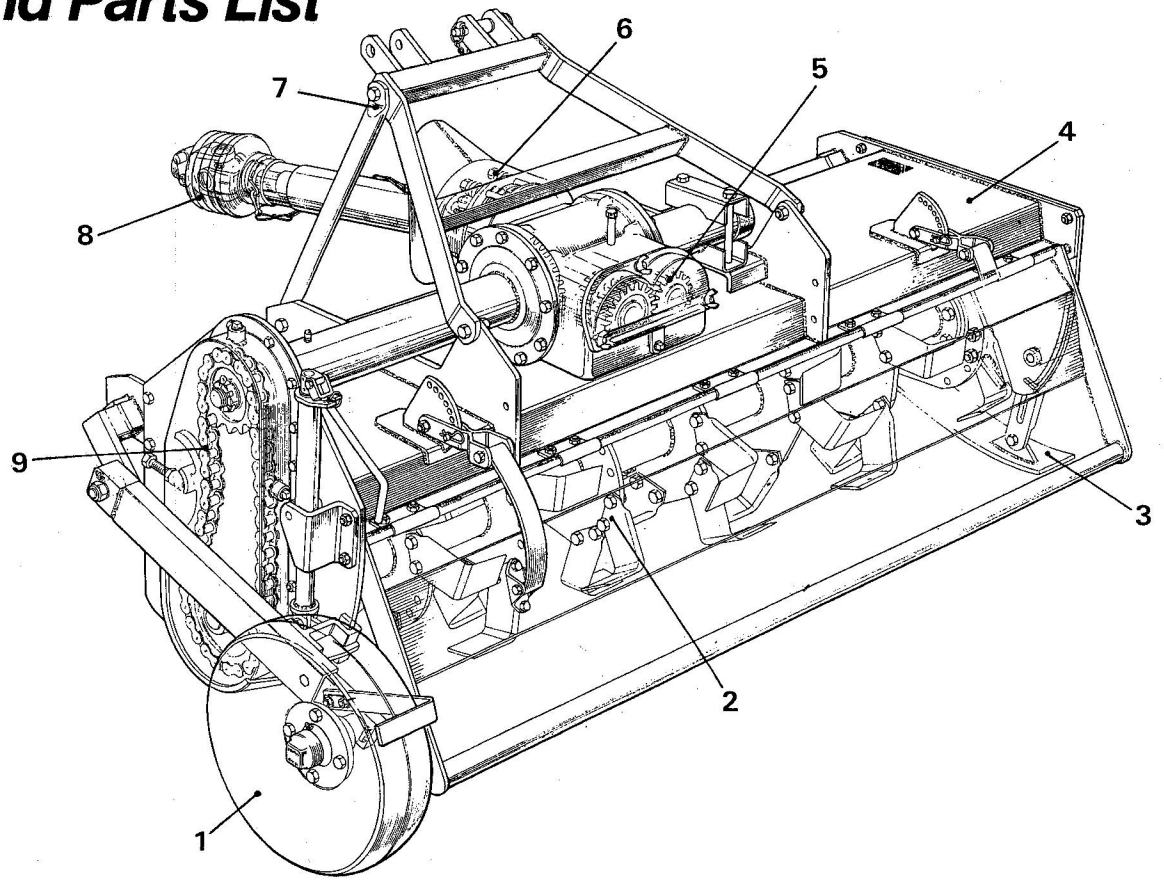
For future reference record the serial number of the machine in the space provided.

Serial number .....

Date purchased .....

HE Rotavator Operating Instructions and Parts List

HOWARD



INTRODUCTION

To obtain the best results follow these instructions carefully and do not neglect the lubrication and maintenance necesary to keep the machine in good working order.

All directions, left and right are given when standing behind the ROTAVATOR and facing towards the tractor.

DESCRIPTION

The HOWARD HE Series ROTAVATOR is intended for use with tractors having from 37-75 hp (26-56 kw) 540 or 1000rpm pto and working widths from 127 cm (50 inches) to 229 cm (90 inches).

Drive is via the universal joint assembly (8), safety clutch (6), SELECTATILTH® multi-speed gearbox (5) and heavy duty chain side drive (9) to the rotor (2).

Depth of tillage is maintained by rear mounted depth control wheels (1), skids (3) or an optional crumble roller.

Suitable for either category I or II 3-point linkage, the HE Series can be centrally mounted and the 50, 60 and 70 versions can be offset 26cms (10 inches) maximum to the right.

KEY

1 Depth control wheel	6 Safety clutch
2 Rotor	7 Top mast
3 Skid	8 Universal joint assembly
4 Hull	
5 Selectatilth gearbox	9 Side drive

The type of tilth produced is controlled by:-

(a) The type and moisture content of the soil -see page 10.
(b) The type of rotor - see page 4
(c) The rotor speed - see pages 2 and 10.
(d) The trailing board position - see page 10.
(e) The tractor power and speed - see page 10.

Optional equipment:-

50, 60, 70,	Slip flange rotor
60, 70, 80, 90	Rear tool bar
70, 80, 90	Front power relief tynes
80, 90	Spike rotor - Crumble roller

WORKING WIDTHS

(as illustrated above)

50	126cm (50 inches)
60	152cm (60 inches)
70	178cm (70 inches)
80	204cm (80 inches)
90	228cm (90 inches)

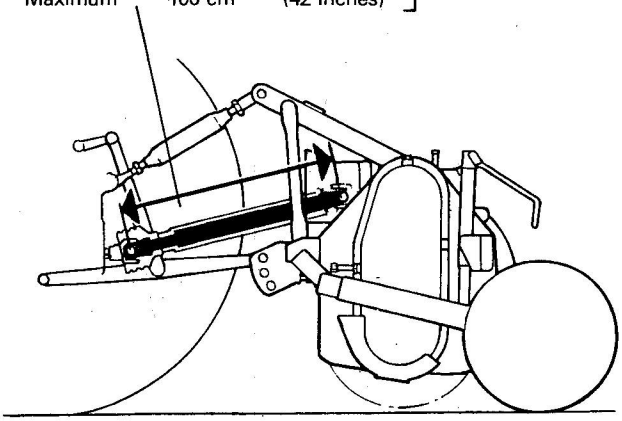
YOUR MACHINE

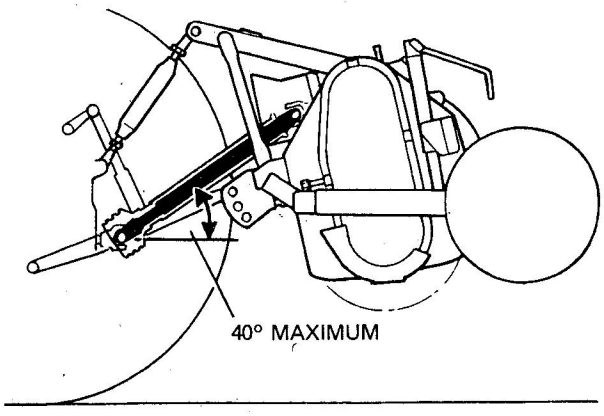
UNIVERSAL JOINT ASSEMBLY

The universal joint assembly transmits the engine power to the ROTAVATOR. Whilst it is rotating, the uneven nature of the land and the lifting and lowering of the machine at the headland causes the male inner drive shaft to slide in and out of the outer drive tube. This continually alters its working angle causing it to pivot on the journal cross assemblies at each end, therefore correct lubrication as mentioned on page 12 is essential to keep it in good working order.

The safe operating length between the journal cross assemblies centres is from 61 cm (24 inches) to 92 cm (36⅜ inches) with the standard joint, and from 76cm (30 inches) to 106cm (42 inches) for the extended version, so that at least 10cm (4 inches) of the male inner drive shaft is engaged within the female outer drive tube. To obtain a suitable setting the mounting arms can be repositioned as mentioned on page 8 to move the ROTAVATOR nearer to or further away from the tractor. The tractors hydraulic lift linkage must never lift the ROTAVATOR high enough to cause the two halves of the universal joint assembly to part, or exceed an angle of 40°. To prevent this happening a limit stop should be fitted to the tractors hydraulic lift lever control quadrant, or the lower links rearranged according to the tractor manufacturers instruction book.

Minimum	61 cm	(24 inches)	Standard Version
Maximum	92 cm	(36⅜ inches)	
Minimum	76 cm	(30 inches)	Extended Version
Maximum	106 cm	(42 inches)	





SAFETY CLUTCH

The safety clutch comprises clutch plates and friction discs held in compression by coil springs, washers and nuts. It protects the transmission should the blades meet an obstruction and if not correctly set the slipping friction discs will overheat, smoke and smell. This will cause it to wear out quickly resulting in erratic driving of the rotor and a poor finish to the work.

To adjust the clutch:-

Remove the three M10 setscrews and spring washers and slide the clutch guard forward onto the universal joint assembly.

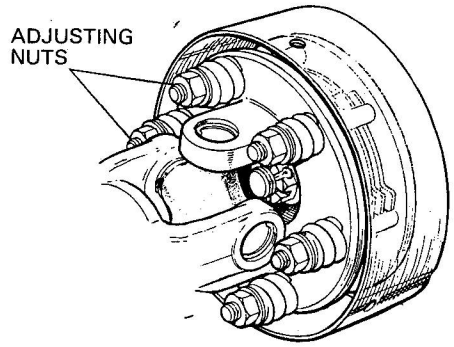
Tighten two opposite nuts until the springs are coil bound.

This will centralise the plates and disc.

Slacken off the remaining four nuts.

Tighten these nuts finger tight – until the nut just touches the washer and the washer just touches the spring, and tighten the nuts 2½ turns. Slacken off the nuts on the coil bound springs and set them as the other four.

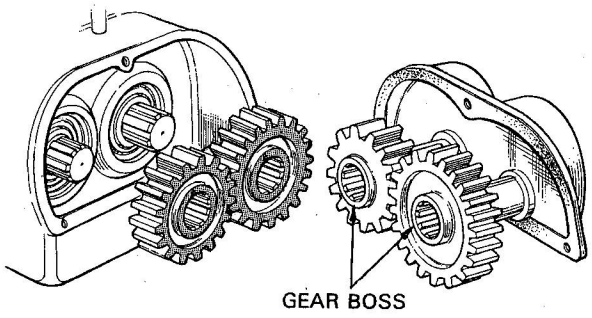
Replace the clutch guard and secure it in position with the setscrews and spring washers.



SELECTATILTH GEARBOX

The rotor speed is altered by simply transposing or changing the pairs of pick-off gears in the SELECTATILTH® gearbox, so that the required tilth is produced using the minimum of power. The faster the rotor speed, the finer the tilth and conversely, but, fast rotor speeds demand more power. Therefore use the slowest rotor speed that will provide the type of tilth required.

Two pairs of SELECTATILTH gears are supplied with each machine which together with gears available as optional extras provide the following rotor speeds.



Rotor speed	Gears LH	RH	Colour	Availability
With 540 rpm:-				
85 rpm	23	12	Red	Optional
95 rpm	22	13	Black	Optional
110 rpm	21	14	Grey	Optional
122 rpm	20	15	Blue	**Standard**
140 rpm	19	16	White	Optional
153 rpm	18	17	Orange	**Standard**
172 rpm	17	18	Orange	**Standard**
195 rpm	16	19	White	Optional
216 rpm	15	20	Blue	**Standard**
245 rpm	14	21	Grey	Optional
With 1000 rpm:-				
155 rpm	23	12	Red	**Standard**
180 rpm	22	13	Black	Optional
200 rpm	21	14	Grey	**Standard**
225 rpm	20	15	Blue	Optional

Changing the SELECTATILTH® gears.

STOP THE TRACTOR AND ENGINE

Clean any dirt away from the rear gear box cover.

Remove the three wing bolts and cover plate.

Find the gear position required to obtain the desired rotor speed.

Fit the gears the correct way round.

The front face has a boss which must always face forwards.

The rear face is painted, stamped with the number of teeth, and the splines are indented to prevent it being fitted the wrong way round.

DO NOT MIX THE COLOURS

Fit the pair of gears not in use on the gearbox cover plate.

DO NOT USE THE MACHINE WITHOUT THE SPARE PAIR OF GEARS FITTED

Refit the cover plate and secure in position with the wing bolts. The gasket must be in place and effective.

SIDE DRIVE

The side drive is by a heavy duty roller chain which can be adjusted manually to compensate for wear. The sprockets run on tapered roller and ball bearings which operate in an oil bath and so adequate lubrication is essential and should be checked regularly as mentioned on page 11.

To check the chain tension:-

Remove the ¾ inch BSP plug in the side of the chaincase.

Measure the total slack in the chain which should be approximately 2 cm (¾ inch).

To tension the chain:-

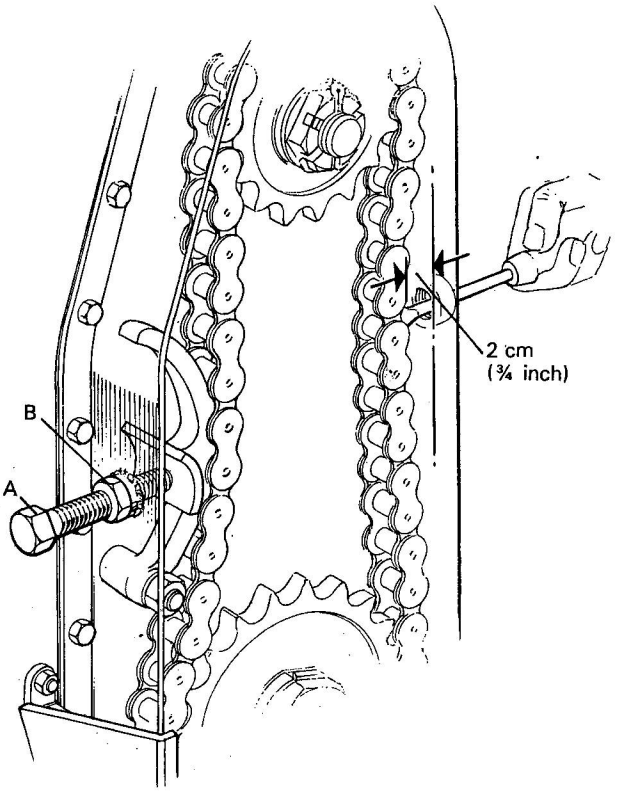
Hold the adjusting screw (A) steady and slacken the ¾ BSW locknut (B)

Hold the locknut steady and adjust the screw until the total free chain movement is approximately 2cm (¾ inch).

Turn the rotor by hand and check the chain in more than one position.

Hold the adjusting screw steady and tighten the locknut to a torque figure of 40 Mkp (240 lb/ft).

Replace and tighten the chaincase plug.



CHAINCASE WEAR SHOE

To protect the chaincase there is a wear shoe which should be replaced when worn. Failure to do so will result in the chaincase wearing through also allowing the oil to escape and dirt to enter with consequent damage to the side drive components.

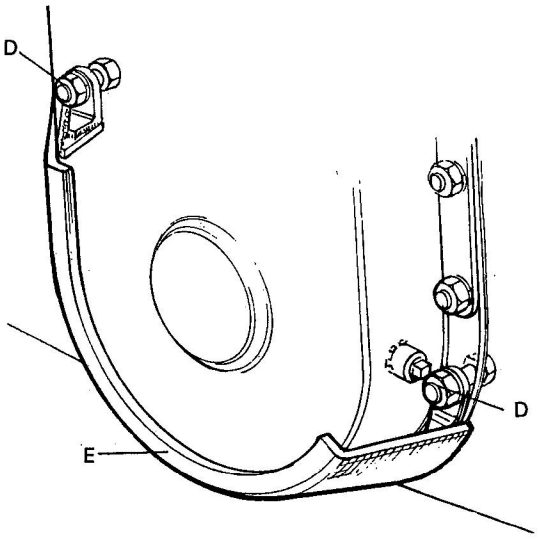
To replace the chaincase wear shoe:-

Remove the 2 M12 nuts, spring washers and setscrews (D).

Remove the worn wear shoe (E).

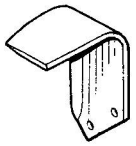
Fit a new wear shoe and secure with the original setscrews if still suitable.

Tighten the sectscrews to a torque figure of 10 Mkp (72 lb/ft).

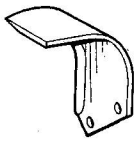


ROTOR AND BLADES

To increase the versatility of the machine a bladed or spike rotor is available as mentioned on page 1. The bladed rotor can be fitted with alternative blades as follows:-



Universal or 'L' shaped blades which give level shallow or deep tillage. Long shank blades which as the name implies are longer than the universal blades for deeper cultivation.



Speed blades which are specially suited for penetration in hard ground and mixing in heavy trash. They have less tendency to clog in wet conditions.

When correctly fitted, the blades must form a 'scroll' pattern. This ensures that they enter the soil at regular intervals to even out the load on the transmission. **When replacing worn blades, remove one blade and fit the new one in its place before proceeding to the next.** This will ensure that the blade 'scroll' pattern is maintained.

Use only HOWARD blade bolts which have the correct shank length and tensile strength. Fit the bolt head against the blade and the spring washer and nut against the flange. Tighten the nuts to a torque of 18.9 Mkp. (100 lb/ft) and check them every day.

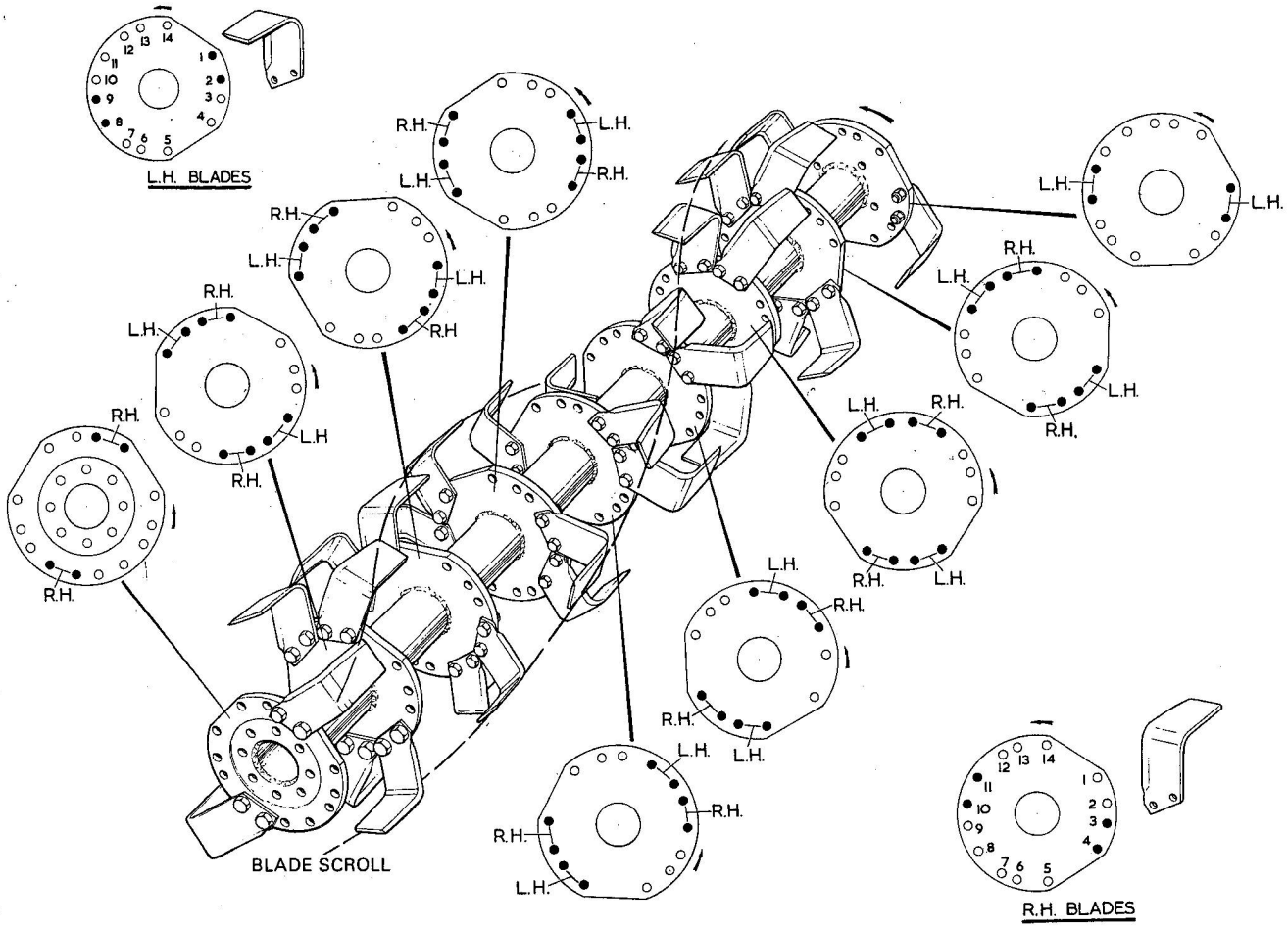
To help provide alternative tilths the flanges are drilled for either 2 or 3 blade formation which allows for a rougher cloddy finish for overwintering or a finer tilth suitable for spring seed beds.

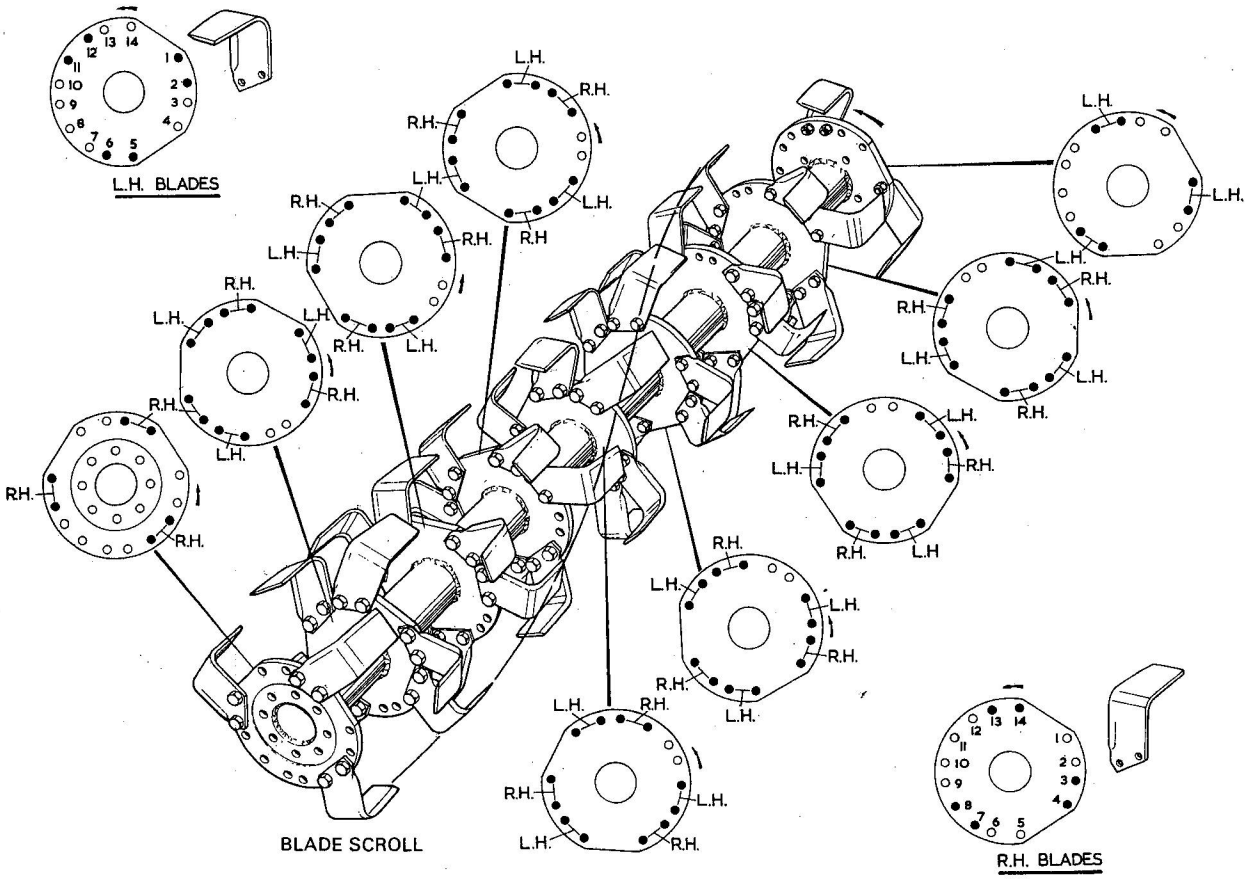
To simplify changing from one formation to another, each blade bolt hole has a number and the blades are fitted in the following fashion:-

Left hand blades - except stub axle end flange
2 blade formation 1 + 2 8 + 9
3 blade formation 1 + 2 5 + 6 11 + 12

Right hand blades - except drive side end flange
2 blade formation 3 + 4 10 + 11
3 blade formation 3 + 4 7 + 8 13 + 14

2 BLADE ROTOR





SPIKE REMOVAL AND FITTING

The spikes are held in place by coiled spring Spirol pins.

Included with each machine is a pin inserter and remover which fits into a tool holder for knocking the Spirol pins in and out.

Removal

To remove worn or damaged spikes, hammer out the Spirol pin with the special tool provided.

These pins are a tight fit in the retaining block and some effort is required to remove them, consequently, when they do come out it is with some force. ADVISE ANY BYSTANDERS TO STAND WELL CLEAR.

If, after removing the Spirol pin, the spike cannot be removed because it is bent it will be necessary to cut it in two with an oxyacetylene cutting torch as follows:-

(a) Knock the end of the bent spike in and out of the rotor tube until it is loose. Do not hit the spike sideways. This would elongate the hole in the rotor and retaining block, making it impossible for spikes to be a snug fit in the rotor tube.

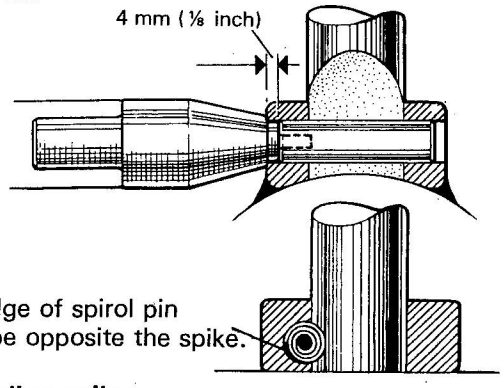
(b) Cut the spike as close to the outside edge of the block as possible, taking care not to damage the block.

(c) Knock the cut end of the spike through the rotor tube.

Fitting

Insert a spike through the rotor tube. Equal lengths of the spike must protrude each side of the rotor and the groove in the spike must line up with the Spirol pin hole in the retaining block.

Insert a Spirol pin into the retaining block. Ensure that the lap edge of the pin is against the retaining block to ensure maximum contact of the spirol pin with the spike. Using the special insertion tool, hammer the Spirol pin into the block finishing with the head of the pin 4mm (⅛in.) below the face of the block.



Re-seeding spikes

When re-seeding rocky hill land, re-seeding spikes 475mm (18-11/16 inches) long as opposed to the standard 560mm (22⅛ inches) spikes can be fitted. Being shorter they are less prone to bending when striking boulders.

DEPTH CONTROL

The depth of tillage goes down to 20cm (8in.) and is controlled by depth control wheels, skids or an optional crumble roller fitted at the rear. Fitting the crumble roller in place of the depth control wheels is a simple matter of removing the depth wheel assemblies (illustration nos. 350-370 page 28) and fitting the crumble roller (illustration nos. 535-544 page 36) instead.

To alter tillage depth:-

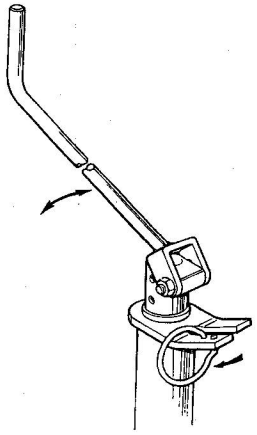
Depth control wheels or crumble roller

Raise the spring ring, lift the handle and rotate it:-

Clockwise to increase depth of tillage.

Anti-clockwise to reduce depth of tillage.

Replace the handle in the slot and lower the spring ring.

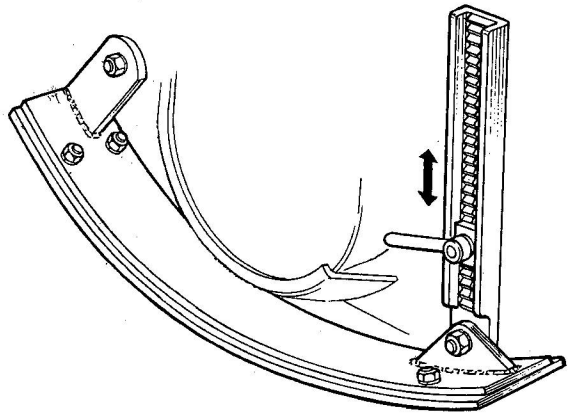


Depth control skids

Slacken the adjusting bolt and stop.

Raise or lower the skid manually.

Tighten the bolt ensuring that the stop locates with serrations in the adjusting bar.



Bolted to the bottom of the depth control skid is a sole plate which must be replaced when worn to prevent the skid from also wearing away.

When fitting a new sole plate use the original two $\frac{7}{16}$ inch UNF coach bolts, nuts and spring washers if still suitable, and tighten to a torque figure of 7 Mkp (53 lb/ft).

DEPTH LIMIT SKID

When using a single depth control wheel with the 50, 60 and 70 machines on the left hand side, a depth limit skid should be fitted on the right side. This should be set 1 inch (25 mm) above ground level and its function is to prevent the machine sinking in soft soil. It is not designed as a depth control device.

TRAILING SHIELDS

The position of the trailing shields helps control the type of tilth produced. With the shields lowered the cultivated soil strikes them and the clods are broken on impact, producing a fine tilth. Trash is buried and the shields have a levelling effect.

With the shields raised the soil is thrown out unimpeded producing a coarse tilth. Trash and weeds are brought to the surface and left to wither and die.

The trailing board is held at the required setting by leaf springs which apply pressure to the board and enable smooth seed beds to be obtained at the lower setting.

To adjust:-

Remove the 'R' clips.

Slightly raise the trailing board and remove the securing pins.

Re-position the trailing board as required.

Replace the securing pins and 'R' clips.

SIDE PLATE SKID

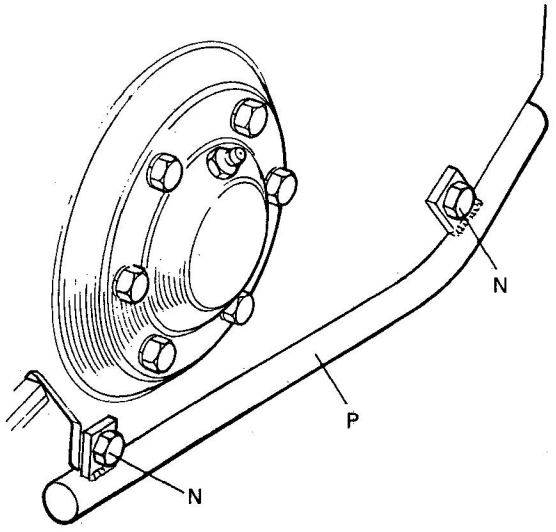
To protect the side plate a skid is fitted and this must be replaced when worn and no longer effective.

To replace a worn skid:-

Remove the M12 nuts, spring washers and set-screws (N)

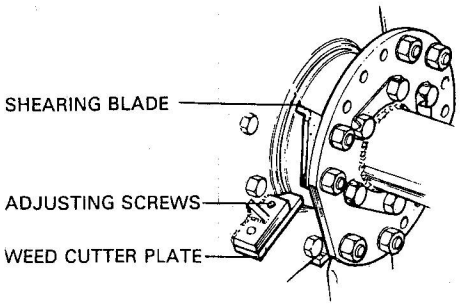
Remove the skid (P)

Fit a new skid and secure with the original setscrews spring washers and nuts if still suitable and tighten to a torque figure of 10 Mkp (72 lb/ft).



WEED CUTTERS

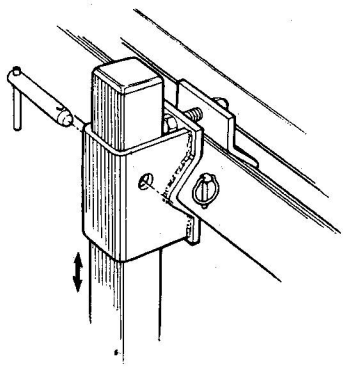
Small weed cutter plates are fitted at each end of bladed rotor to prevent weeds and long grass wrapping around the rotor. These plates are slotted and should be adjusted so that they just clear the shearing blades when the rotor is turning. Severe power losses will occur in weedy conditions unless the plates are properly adjusted. Tighten the M10 setscrews to a torque figure of 5.7Mkp (41 lb/ft).



PARKING PROP

To support the machine when it is not attached to the tractor a parking prop is fitted on the front tool bar.

When the machine is attached to the tractor linkage the prop should be raised.



SLIP FLANGE ROTOR

The slip flange rotor is designed to perform strip cultivation, inter-row weeding or hoeing. It replaces the bladed rotor and uses standard blades. The blade carrying flanges can be slid along the square rotor tube to produce cultivated strips of soil from 127mm (5 inches) - the width of a blade - to the full tillage width of the rotor. To prevent soil splash onto growing plants, crop guards are available. Contact your Dealer for further details.

REAR TOOL BAR

The tool bar (illus. no. 590 - 603 page 39) fits between the hull end plates and utilizes the bolt holes which secure the depth control assemblies. It enables light rear mounted equipment to be fitted and should prove useful for the inventive farmer. Should advice or guidance be required contact your Dealer or Howard Rotavator Co. Product Managers Dept.

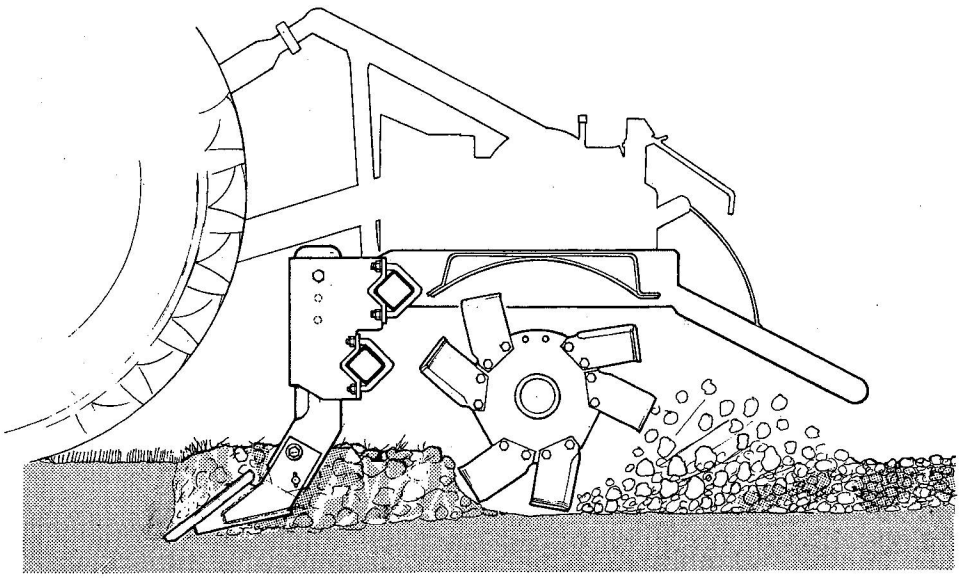
FRONT POWER RELIEF TYNES

In hard or stony ground, front mounted power relief tynes fracture the soil ahead of the blades or spikes and so reduce the amount of power required by the rotor to obtain the desired tilth. This helps to reduce blade or spike wear and faster rotor speeds may be possible in certain conditions. Contact your Dealer for further details.
The special tool bar (Illus. no. 560 - 581 page 39) fits between the hull side plates and each tyne point is protected by a replaceable shear pin.

Tyne depth settings are:-

Above rotor blade cut 70mm (2¾ inches)
40mm (1½ inches)
Below rotor blade cut 10mm (⅜ inches)
60mm (2⅜ inches)

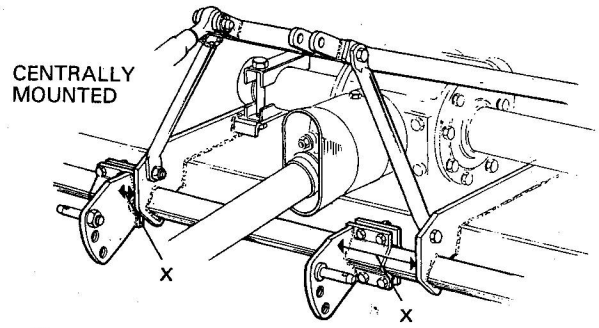
When fitted, the parking prop must be re-positioned on to the lower tool bar.

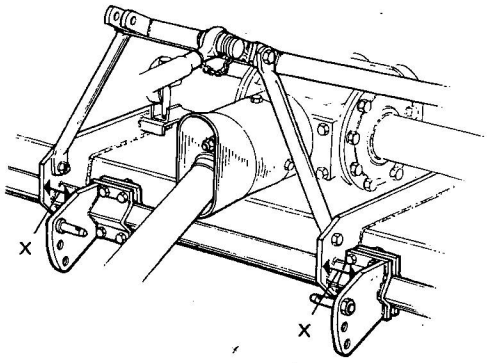


TOP MAST AND MOUNTING PLATES

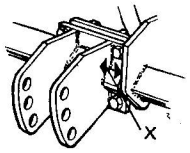
The 50, 60 and 70 machines can be off-set 25 cm (10 inches) maximum to the right. When the machine is centrally mounted the lower link mounting pin brackets are located each side of the hull support plate nearest the stub axle, and when off-set, they are each side of the support plate nearest the side drive.

To achieve some changes in settings, it is not necessary to remove both mounting brackets, since the one between the support plates can be slid along the tool bar and the other removed and refitted. These settings are listed in pairs, so find the present setting and use the other of the pair. The plates must be at the dimension - x - away from the hull support plates to keep the mounting pins at the correct distance apart.

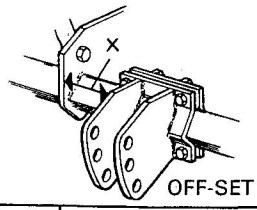




OFF-SET

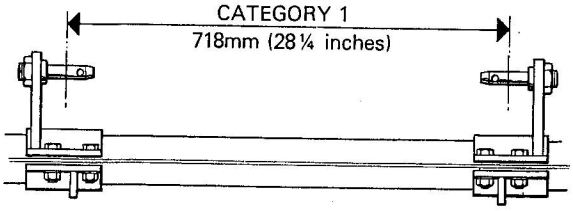


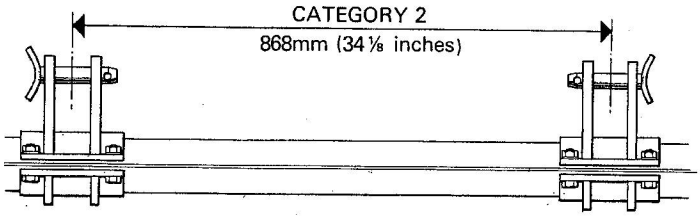
CENTRALLY MOUNTED



OFF-SET

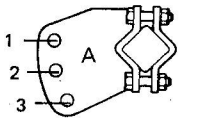
Machine position	Category pin	Mounting pin facing (50 only)	-X- dimension Stub axle bracket 50	Stub axle bracket 60-70	Side drive bracket 50	Side drive bracket 60-70
central	1	inwards	32mm (1¼ inches)	–	190mm (7½ inches)	–
off-set	1	outwards	102mm (4 inches)	–	110mm (4 5/16 inches)	–
central	1	outwards	118mm (4⅝ inches)	–	110mm (4 5/16 inches)	–
off-set	1	inwards	176mm (6 15/16 inches)	–	17mm (11/16 inches)	–
central	2	outwards	110mm (4 5/16 inches)	114mm (4½ inches)	119mm (4 11/16 inches)	40mm (1 9/16 inches)
off-set	2	towards side drive	36mm (1⅜ inches)	40mm (1 9/16 inches)	110mm (4 inches)	114mm (4½ inches)
central	2	inwards	190mm (7½ inches)	114mm (4½ inches)	33mm (1 5/16 inches)	40mm (1 9/16 inches)
off-set	2	outwards	120mm (4¾ inches)	40mm (1 9/16 inches)	110mm (4 5/16 inches)	114mm (4½ inches)

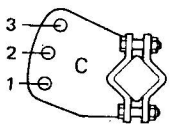


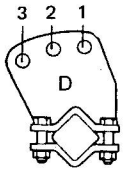


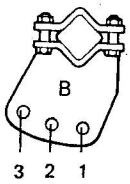
To maintain the universal joint at the correct angle as mentioned on page 2, the machine can be moved away from the tractor by using alternative mounting plate positions.

Position	Machine moves Up	Forwards	Down
A1	–	–	–
A2	50mm (2 inches)	5mm (3/16 inches)	–
A3	96mm (3¾ inches)	26mm (1 inch)	–
B3	131mm (5⅛ inches)	61mm (⅜ inches)	–
B2	152mm (6 inches)	17mm (4½ inches)	–
B1	157mm (6 inches)	157mm (6 3/16 inches)	–
C1	24mm (15/16 inches)	–	–
C2	–	5mm (3/16 inches)	26mm (1 inch)
C3	26mm (1 inch)	26mm (1 inch)	72mm (2¾ inches)
D3	–	61mm (2⅜ inches)	107mm (4½ inches)
D2	–	107mm (4½ inches)	128mm (5 inches)
D1	–	157mm (6 3/16 inches)	133mm (5¼ inches)







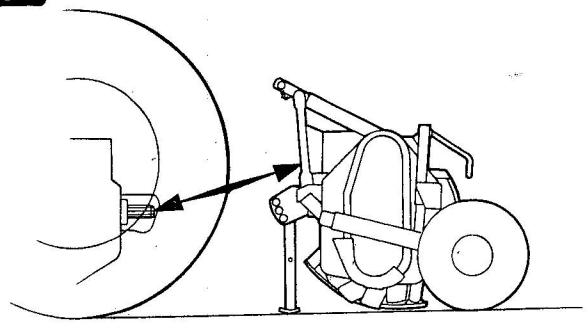


ATTACHING THE ROTAVATOR TO THE TRACTOR

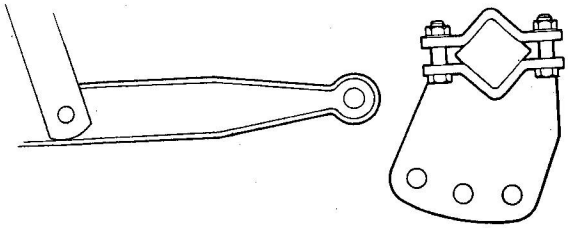
Set the depth control device as mentioned on page 6 so that the ROTAVATOR is horizontal.

Reverse the tractor to the ROTAVATOR until the distance between the tractor pto shaft and the ROTAVATOR gearbox input shaft is approximately 71cm (28 inches), standard universal joint, 86 cm (34 inches) with the extended version.

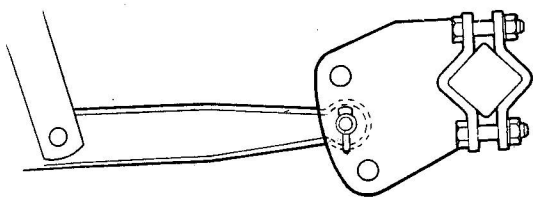
SWITCH OFF THE TRACTOR ENGINE



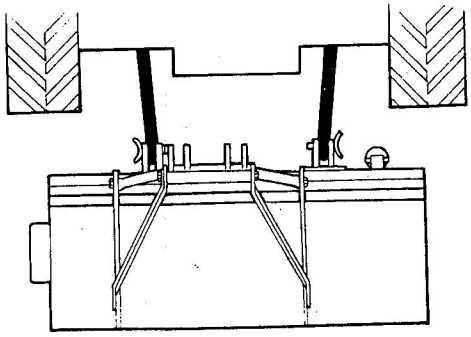
Position the tractor lower links until they are in line with the mounting pins.



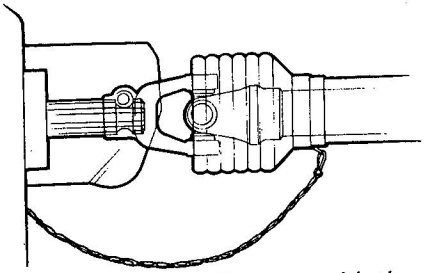
Rearrange the mounting plates if necessary so that the universal joint assembly will be at the correct length and angle as mentioned on page 2.



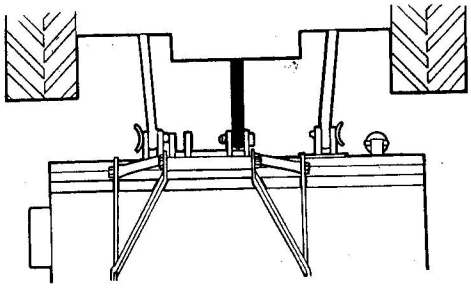
Fit the tractor lower links onto the mounting pins and secure with the clip pin and ring.



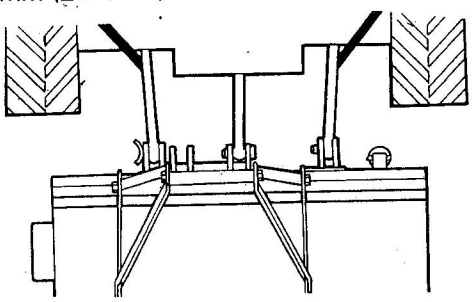
Fit the universal joint assembly onto the tractor pto shaft. The quick release pin must be engaging in the drive shaft groove. Attach a safety guard chain to the tractor and to the ROTAVATOR.



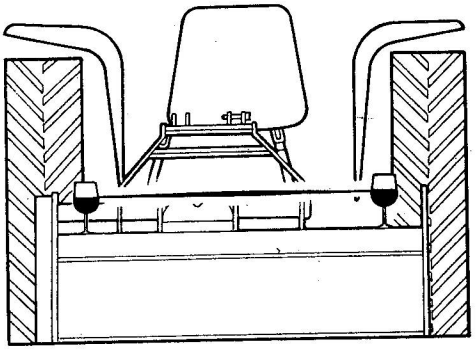
Fit the tractor top link and secure with the clip pin and ring.

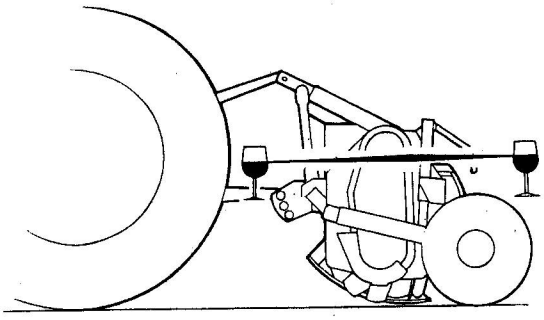


Fit stabilizer bars or chains to limit the side swing to 50mm (2 inches).



Adjust the tractor linkage until the ROTAVATOR is level from side to side and from front to rear.





Check the universal joint assembly length and angle as mentioned on page 2. If necessary, reposition the mounting plates as mentioned opposite.

TRACTOR POWER AND SPEED

Use a tractor which has the power to suit the application. Up to 75bhp for primary tillage up to 45bhp for secondary tillage. Choose a high tractor speed to enable the ground to be covered as quickly as possible to achieve economic operation. Because of the lower power requirement of the spike rotor, faster speeds are possible than with a bladed rotor.

BEFORE WORKING,

Check that:-

The machine is mounted on the tractor correctly
The safety guards are in place and effective
The maintenance procedures have been carried out
The setting of the depth control device and trailing board

TRACTOR HYDRAULIC SYSTEM

If the tractor is equipped with a dual hydraulic control system, make certain that the system selected is that for use with implements having depth control wheels such as 'Position control' and not 'Draft control'

PTO BRAKE

If the tractor is fitted with a pto brake, reduce the engine speed before disengaging the drive to the pto shaft. Damage to pto machines could occur if a fast revolving pto shaft is brought to a sudden stop.

USING THE MACHINE

The pattern of working will depend on the depth control device fitted. If the machine has a depth limit skid on the right hand side, see page 6, - this must be 25mm (1 inch) above the rotavated soil, so work the fields in lands with the unworked ground on the left hand side. With two depth control skids, wheels or crumble roller, the field can be worked as required.

Engage the tractor pto. Drive the tractor forward at the same time lowering the ROTAVATOR into the ground with the rotor turning. Work a short distance, then stop, disengage the pto and switch off the tractor engine. Check that the tilth is satisfactory and the depth of tillage is equal across the full rotor width. If not, then either change the speed of the tractor or the trailing board setting to obtain the desired tilth or alter the depth control device to obtain the required depth. It may be necessary to start at a shallow setting and work progressively deeper on subsequent runs. If more than one pass is necessary, the second should be at right angles to the first to ensure total coverage. When turning at headlands, lift the ROTAVATOR out of work and disengage the drive to the pto. Do not operate the ROTAVATOR with the tractor in neutral.

TILTH TABLE

	Fine	Coarse
Tractor speed	Slow	Fast
Rotor speed	Fast	Slow
Blade formation	3-Blade	2-Blade
Trailing board	Lowered	Raised

BLADE CUT LENGTH

Using the graphs opposite it is possible to establish the blade cut length for a two or three blade rotor at 540 or 1000 pto rpm.

Method

(a) Check the SELECTATILTH® gears fitted to establish the rotor speed.
(b) Establish the tractor speed and read across horizontally until the rotor speed line is reached.
(c) Read down vertically to obtain blade cut length.

Examples:-*

2-blade formation
(a) Gears 18-17 153 rpm
(b) 2.4 kph (1½ mph)
(c) 127 mm (5 inches)

3-blade formation
(a) Gears 15-20 216 rpm
(b) 4 kph (2½ mph)
(c) 102 mm (4 inches)

TYPE AND MOISTURE CONTENT OF THE SOIL

With heavy clay soils, a greater variation in tilth is possible than with light soils, since the clay will bind it together and allow a coarse, medium or fine tilth. With light soil a finer tilth is produced. If the soil has a high moisture content it tends to stick together and becomes difficult to work. If the soil is dry, dust will be produced and blade or spike wear will increase. The ideal time to rotavate is when the soil is drying out and disintegrates with a sharp kick.

FAULT FINDING

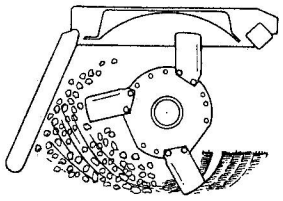
If the machine fails to operate as expected, refer to the fault finding chart on page 14.

REMOVING THE ROTAVATOR FROM THE TRACTOR

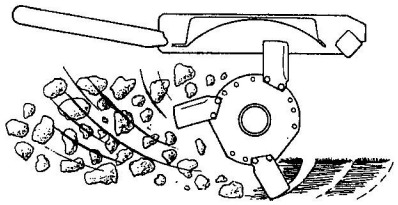
SWITCH OFF THE TRACTOR ENGINE

Lower the depth control device and parking prop until they support the weight of the machine
Lower the ROTAVATOR to the ground
Remove the top link
Remove the safety guard chain from the tractor
Depress the quick release pins on the universal joint assembly and slide the yoke off the shaft
Remove the stabilizer bars or chains
Remove the lower links

FINE TILTH
Rotor speed - Fast
Blade cut - Short
Trailing board - Lowered

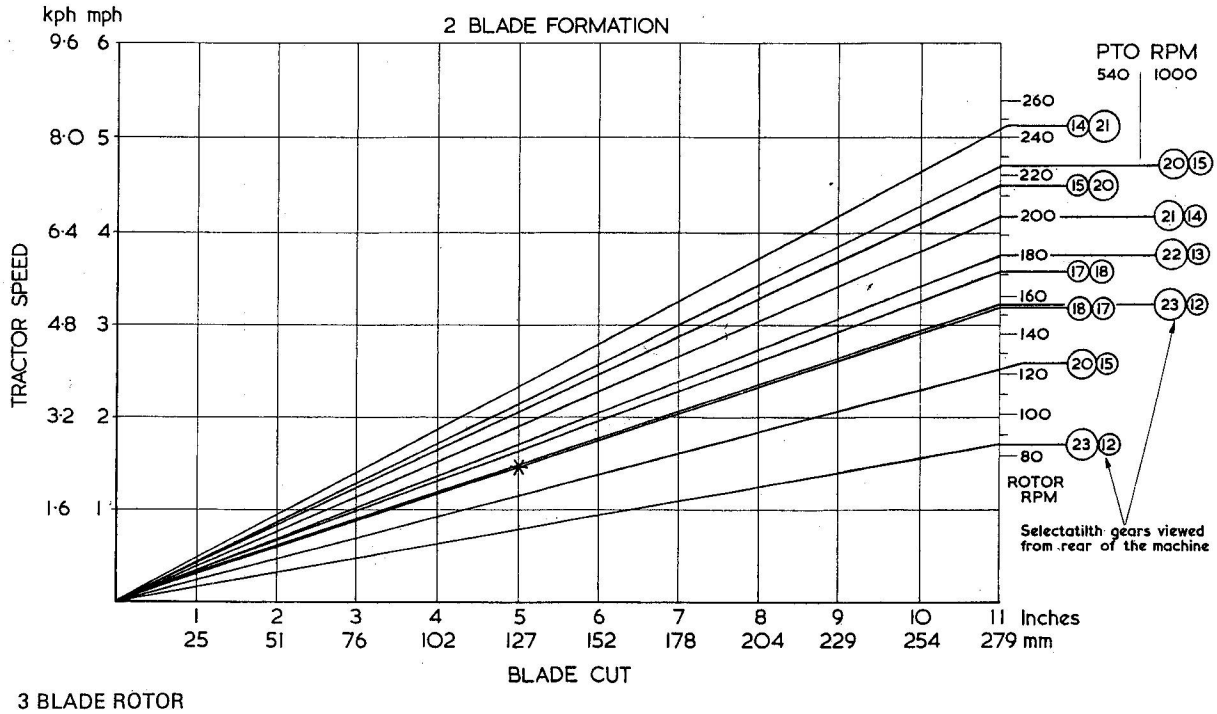


COARSE TILTH
Rotor speed - Slow
Blade cut - Long
Trailing board - Raised

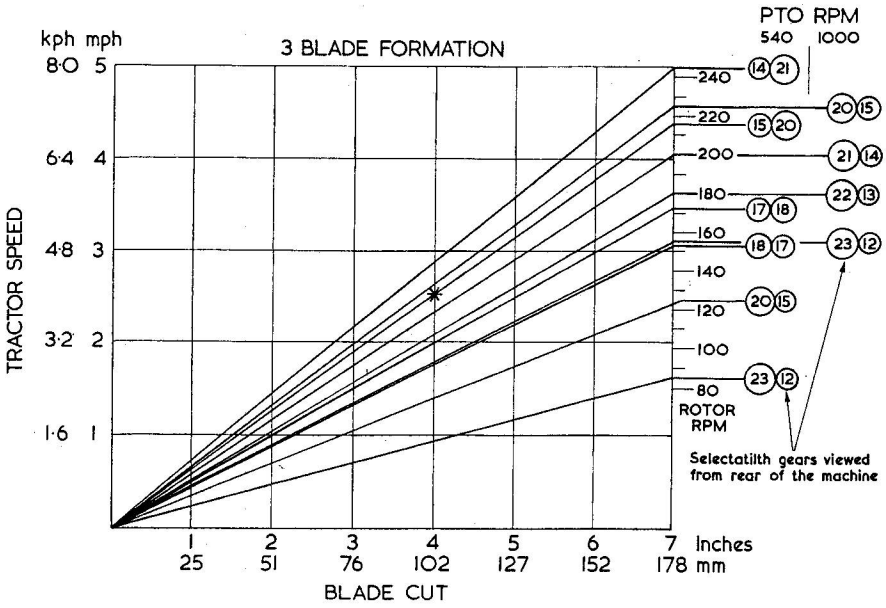


BLADE CUT GRAPHS

2 BLADE ROTOR

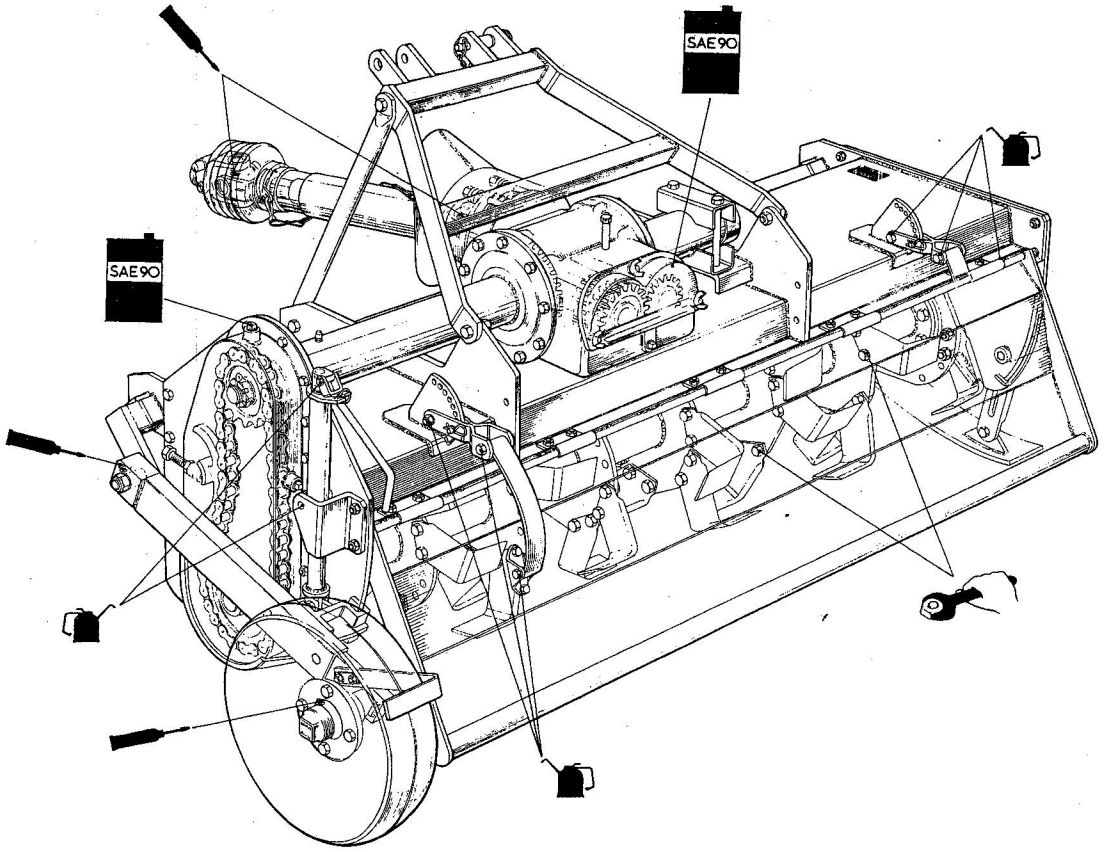


3 BLADE ROTOR



LUBRICATION AND MAINTENANCE

WARNING – Never touch the ROTAVATOR with the tractor engine running - SWITCH OFF THE TRACTOR ENGINE



Regular lubrication and maintenance is essential if a long working life is to be expected from the machine.

This entails:-
Keeping all nuts and bolts tight, particularly during the early 'bedding down' period.
Using good quality lubricants of the correct grade. If in doubt, contact your Dealer.
Replacing any worn or damaged parts.
Carrying out the following maintenance procedures:-

DAILY or every 10 hours

Replace any bent, worn or missing blades, or spikes. Check blade bolts for tightness.

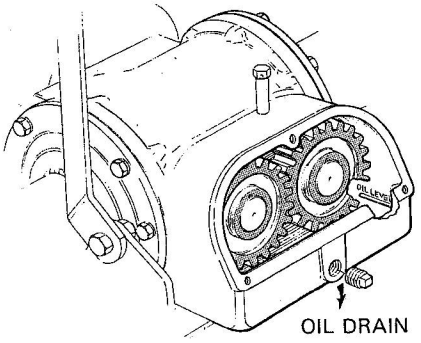
Oil the following pivot points with SAE90 oil:-

Trailing board adjusters
Trailing board hinges
Depth control screw thread

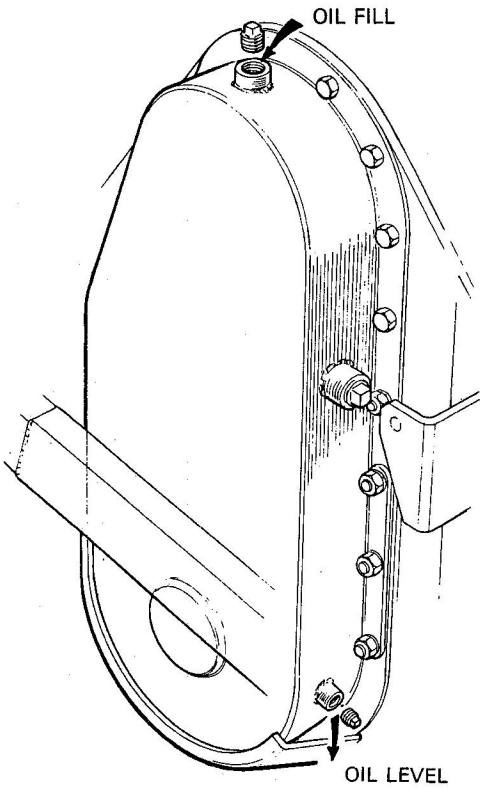
WEEKLY or every 50 hours

With good quality lithium base grease lubricate the nipples in the:-
Universal joint cross journal assemblies and safety guards
Stub axle
Depth control arm pivots
Depth control wheels

Check the gearbox oil level - With the machine level from side to side and front to rear, remove the SELECTATILTH® gearbox cover plate. If the oil is below the level mark, top up with SAE90 oil and replace the cover plate. The capacity of the gearbox is 2½ litres (4 pints).



Check the chaincase oil level - With the machine level from side to side and front to rear, remove the ⅛" BSP level plug and the ¾" BSP filler plug. Pour in SAE90 oil until it flows out of the level plug hole. The capacity of the chaincase is 1¼ litres (2 pints).



Separate the two halves of the universal joint assembly, thoroughly clean the sliding sections with petrol or kerosene and liberally smear them with graphite or molybdenum disulphide grease.

Tighten any loose nuts and bolts according to the table opposite.

Flushing out the Gearbox and Chaincase

This should be carried out after the first 10 hours then six monthly or every 1000 hours.

Run the machine so the the oil is warm and any sediment is in suspension in the oil.

Place a suitable container underneath the gearbox which has a capacity of 2½ litres (4 pints).

Take care. The oil could be hot and harmful to sensitive skin.

Remove the ½ inch BSP plug from the gearbox. When the oil has stopped flowing refit the plug.

Remove the SELECTATILTH® gearbox cover plate and fill the gearbox with 2½ litres (4 pints) of flushing oil. Replace the cover plate.

Place a suitable oil container underneath the chaincase which has a capacity of 1¼ litres (2 pints).

Slacken the M10 and M12 setscrews which secure the chaincase to the side plate and allow the oil to run out.

When the oil has stopped flowing tighten the setscrews to a torque figure of 5.7 and 10Mkp (41 and 72 lbs/ft) see table.

Remove the ¾ inch filler plug and pour in 1¼ litres (2 pints) of flushing oil and refit the plug.

Start the tractor engine and with the rotor raised clear of the ground, run the machine for five minutes.

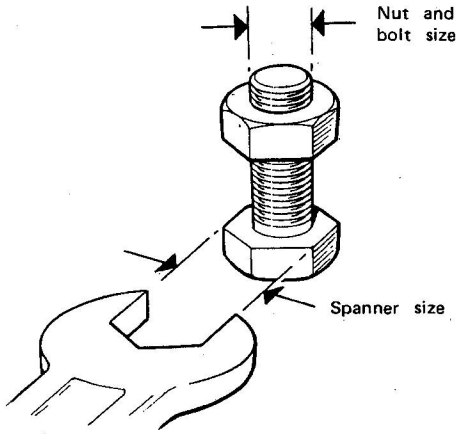
Stop the tractor engine and as described above drain the gearbox and chaincase and refill with SAE90 oil.

NUTS AND BOLTS

The torque setting for nuts and bolts used on the HE ROTAVATOR are as follows:-

Nut size	Torque		Spanner required size	length
	mkp	lbs/ft		
⅜ UNF	4.8	35	9/16 A/F	15cm (6 inches)
½ UNF	11.1	80	¾ A/F	38cm (5 inches)
M 8	2.9	21	13mm	12.5cm (5 inches)
M10	5.7	41	17mm	16cm (6½ inches)
M12	10	72	19mm	25cm (14 inches)
M14	16	115	22mm	47cm (18½ inches)
M16	25	180	24mm	63cm (25 inches)
M24	84	607	36mm	
Blade bolts	13.6	100	¾ A/F	40cm (16 inches)

If a torque wrench is not available, use a spanner of the length mentioned to obtain a suitable setting.



STORAGE

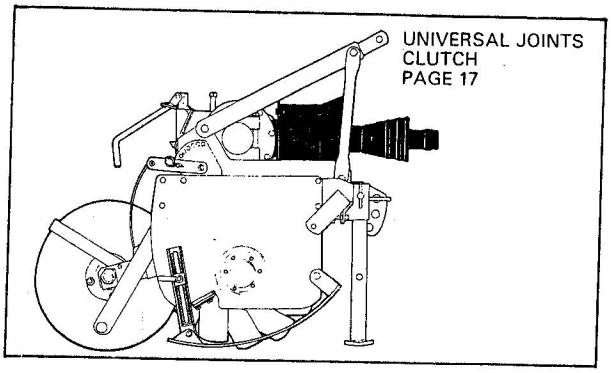
Clean all soil working parts and liberally smear them with grease or used engine oil.

FAULT FINDING

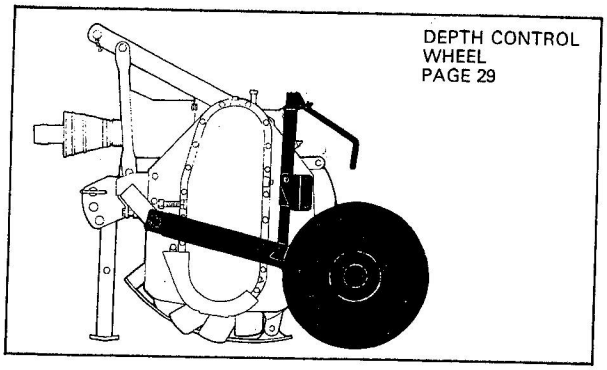
If the ROTAVATOR fails to operate as expected, check with the list below to find the possible cause and rectify accordingly. Make only one adjustment at a time in the order listed in each section.

FAULT FINDING

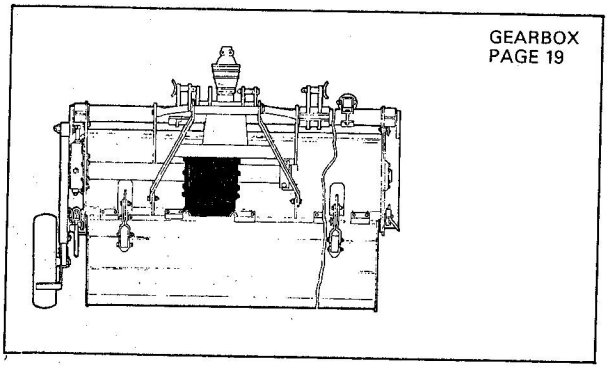
Fault	Possible Cause	Remedy	See Page
Rotor will not turn	Pto drive not engaged	Engage pto drive	
	Clutch slipping	Adjust clutch	2
	SELECTATILTH gears incorrectly fitted	Fit gears correctly	2
Rotor turns erratically	Clutch slipping	Adjust clutch	2
	Blades or spikes missing	Fit new blades or spikes	4-5
	Blades fitted incorrectly	Check blades have a 'scroll' pattern	4
	Universal joint assembly journals knuckle	Do not exceed safe working angle	2
	Obstacle in rotor	Remove obstacle	
Insufficient depth of work	ROTAVATOR carried by hydraulic system	Use 'Position Control' not 'Draft Control'	10
	Insufficient power	Use lower tractor gear	
	Depth control device too low	Raise depth control device	6
	Worn or bent blades or spikes	Fit new blades or spikes	4-5
	Blades rolling over ground	Increase rotor speed	
	Blades incorrecty fitted	Check that blades have a 'scroll' pattern	4
	Machine held out of soil by side drive or stub axle side plate	Further passes required	10
	Obstacle in rotor	Remove obstacle	
	Insufficient power	Fit power relief tynes	7
Tilth too coarse	Trailing board too high	Lower trailing board	6
	Rotor speed too slow	Increase rotor speed	2
	Tractor speed too fast	Select slower tractor speed	
	Soil too wet	Allow soil to dry out	10
	2-blade formation	Change to 3-blade formation	5
Tilth too fine	Trailing board too low	Raise trailing board	6
	Tractor speed too slow	Change to a higher gear	
	Rotor speed too fast	Reduce rotor speed	2
	3-blade formation	Change to 2-blade formation	4
Soil packs around rotor	Soil too wet for working	Allow soil to dry out	10
	Worn or bent blades	Fit new blades	4
	Blades incorrectly fitted	Check that blades have a 'scroll' pattern	4
	Obstacle in rotor	Remove obstacle	
	Rotor speed too slow	Increase rotor speed	2



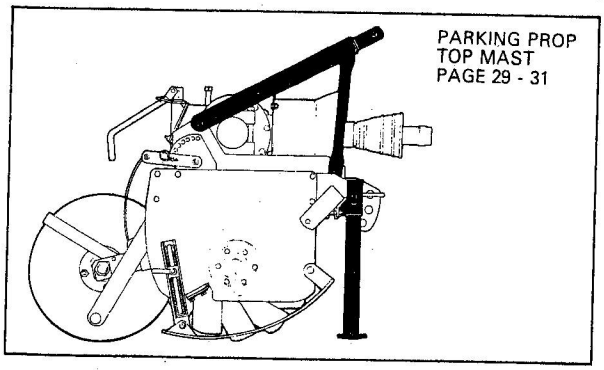
UNIVERSAL JOINTS CLUTCH
PAGE 17



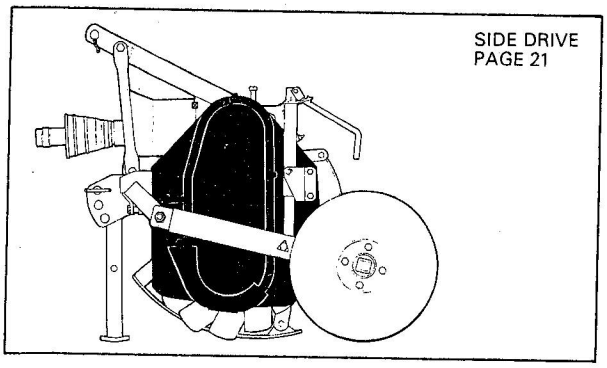
DEPTH CONTROL WHEEL
PAGE 29



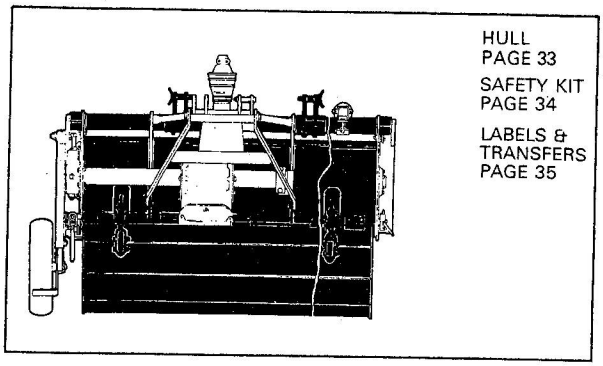
GEARBOX
PAGE 19



PARKING PROP TOP MAST
PAGE 29 - 31



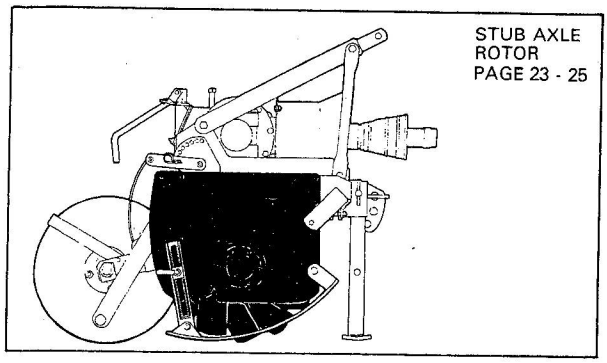
SIDE DRIVE
PAGE 21



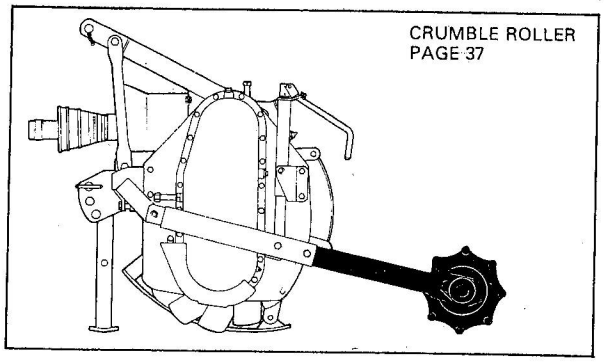
HULL
PAGE 33

SAFETY KIT
PAGE 34

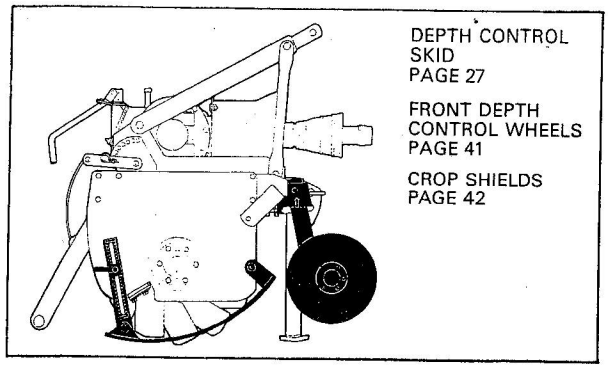
LABELS & TRANSFERS
PAGE 35



STUB AXLE ROTOR
PAGE 23 - 25



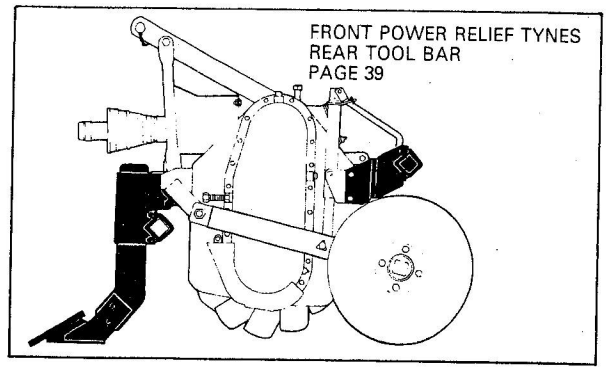
CRUMBLE ROLLER
PAGE 37



DEPTH CONTROL SKID
PAGE 27

FRONT DEPTH CONTROL WHEELS
PAGE 41

CROP SHIELDS
PAGE 42



FRONT POWER RELIEF TYNES REAR TOOL BAR
PAGE 39