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# TRACTOR ATTACHMENT

Four point Linkage

# OWNER'S HANDBOOK

~~FOR THE~~ ~~CO.~~  
DISK  
DES MOINES, IOWA



BY APPOINTMENT  
TO HER MAJESTY THE QUEEN  
MANUFACTURERS OF  
AGRICULTURAL EQUIPMENT

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The purpose of this book is to provide, in the simplest possible manner, a complete guide to the operation of the Howard Rotavator Tractor Attachment, including the following models:—

Centrally Mounted 36"—40"—50"—60" (36V, 40V, 50CM, 60CM).

Off-set 36"—50"—60" (36S, 50F, 60F).

Narrow Track 50" Off-set and Centrally Mounted.  
Orchard (Fully Off-set) 50"—60" (50O, 60O).

Detailed instructions for major maintenance operations, especially those which may become necessary after long service, are not included because such work should be entrusted to the Service Dealer.

FOR SPARES AND SERVICE CONSULT YOUR ROTAVATOR DEALER:

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## The Howard Rotavator Tractor Attachment

The ROTAVATOR has been described as 'a revolution in agriculture'. It is certainly something more than an agricultural implement, for it represents a completely new science in cultivation.

Robust construction and sound design, plus the power from your tractor, enable the Rotavator to tackle successfully a wide range of tasks on or about the farm, from seed-bed preparation to land reclamation. It will work on steep contours without side-skidding, can be backed into awkward corners and, because power is applied directly to the hoe-shaped blades, will entirely eliminate tractor wheel-spin when working in loose-natured soils.

The Rotavator is ideal for preparing seed beds, unsurpassed as an implement for turning in green cover crops and crop residues, and invaluable for eradicating heavy weed growths and light scrub. It has been used with outstanding success to clear gorse, and in forestry work will most effectively keep down weed growths in fire breaks, etc.

### Brief Specification

#### Power Lift

The Rotavator is linked to the tractor power lift, enabling it to be raised or lowered at will. In the raised position it can be used for normal transport of the machine along roads. Alternatively the rotor can be put out of gear when it will roll on the surface of the land without the help of the power lift, and may be transported in this manner for short distances.

#### Safety Clutch

As a safeguard against damage to the blades under difficult working conditions an automatic safety clutch is built into the drive to the rotor. This means that stumpy or stony ground may be cultivated with the minimum risk of damage to the working parts of the machine.

#### Controls

In addition to the tractor power lift the Rotavator itself has two simple controls, namely a GEAR LEVER which can be operated from the tractor driving seat, enabling the ROTOR to be put in or out of action at will, and a DEPTH CONTROL HANDLE for setting the depth of cultivation.

#### Fitting

Fitting the Rotavator to your tractor is an easy job well within the scope of any ordinary farm hand. No special skill is needed.

#### Howard Reduction Gear

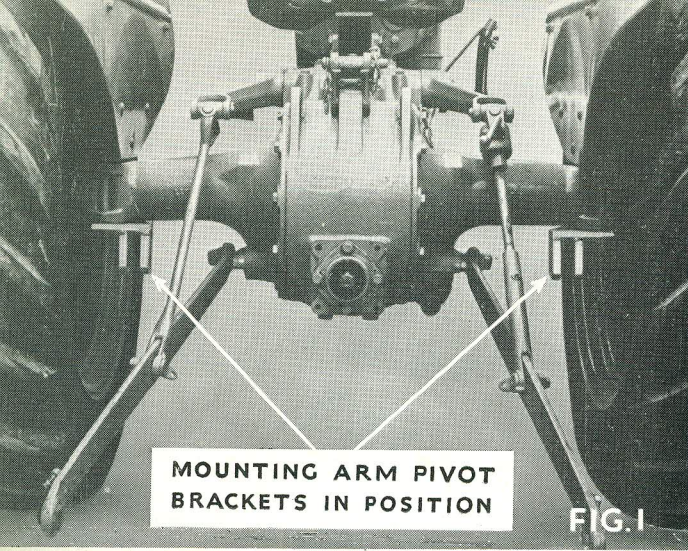
Some tractors require a Reduction Gear Unit to allow the Rotavator to perform at maximum efficiency. This unit reduces the travel speed of the tractor without reducing the speed of the power take-off, and is additional to the normal gearing of the tractor.

Howard Reduction Gear Units are available to fit various tractors. Particulars will be supplied with this instruction book by stating the make and horsepower of your tractor.

**WARNING**—The Reduction Gear Unit may remain in use without the Rotavator. It is not, however designed to increase the drawbar capacity of the tractor, therefore these additional low gears must only be used for light pulling work where very low speeds are required. The rear axle of the tractor has adequate strength when the standard gears are used and it will be appreciated that these very low gears could, when adhesion is good, cause stresses that the tractor axle was never designed to carry.

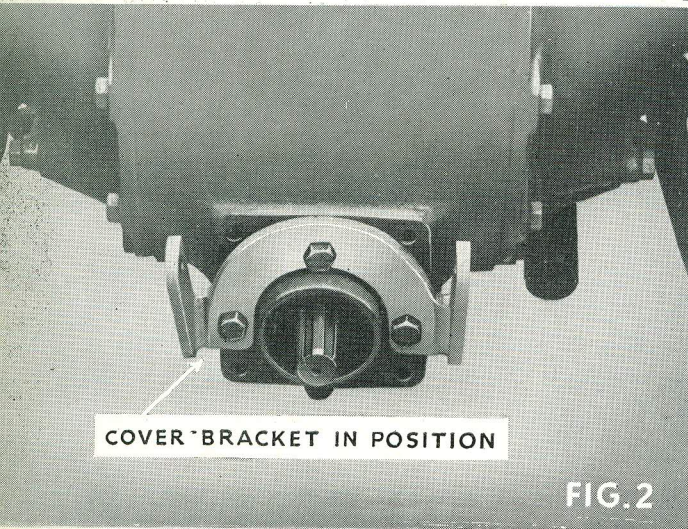
This warning does not apply, of course, when the Rotavator is fitted to the tractor since the Rotavator is not being pulled. In fact, the forward thrust of the rotor, actually assists propulsion.





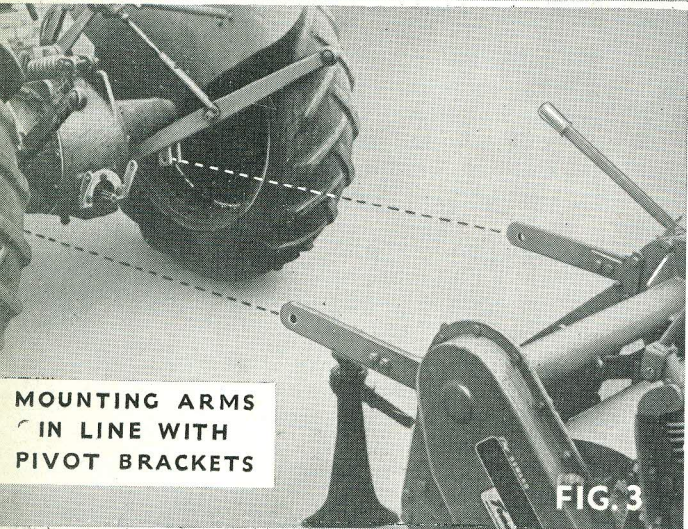
MOUNTING ARM PIVOT BRACKETS IN POSITION

FIG. 1



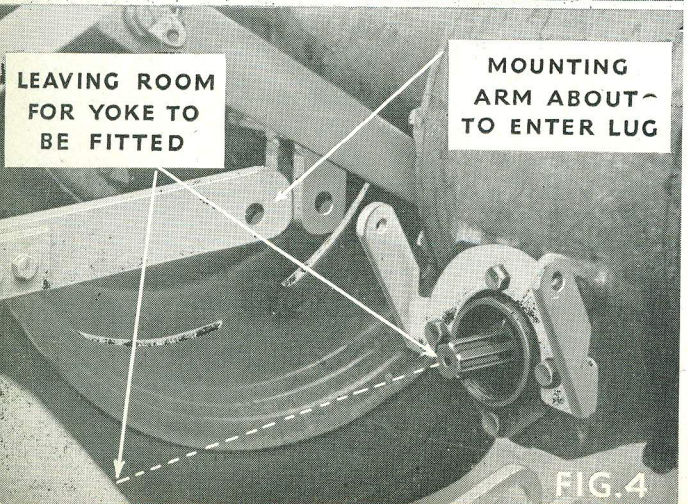
COVER BRACKET IN POSITION

FIG. 2



MOUNTING ARMS IN LINE WITH PIVOT BRACKETS

FIG. 3



LEAVING ROOM FOR YOKE TO BE FITTED

MOUNTING ARM ABOUT TO ENTER LUG

FIG. 4

## Fitting Instructions

### 36" Off Set, 50" and 60" Models

Note:

All references to 'left' and 'right' apply to the tractor as viewed from the rear looking forward.

1. Fit the mounting-arm pivot brackets to the lower sides of the tractor axle-brackets (Fig. 1).
  
2. Place the cover bracket in position (Fig. 2).
  
3. Using a jack, or blocks of wood, raise the Rotavator so that the mounting arms line up with the pivot brackets (Fig. 3).
  
4. Back the tractor so that the mounting arms enter the lugs (Fig. 4) and slide the yoke on to the P.T.O. shaft. Make sure that the draw pin hole in the yoke lines up with the pin hole in the P.T.O. shaft (Fig. 5). Insert the draw pin and secure with clip pin (Fig. 6). Secure the mounting arms with the draw-pins and clips.



5. Connect the tractor power lift arms to the Rotavator connecting links, securing them with the pins and clips provided.

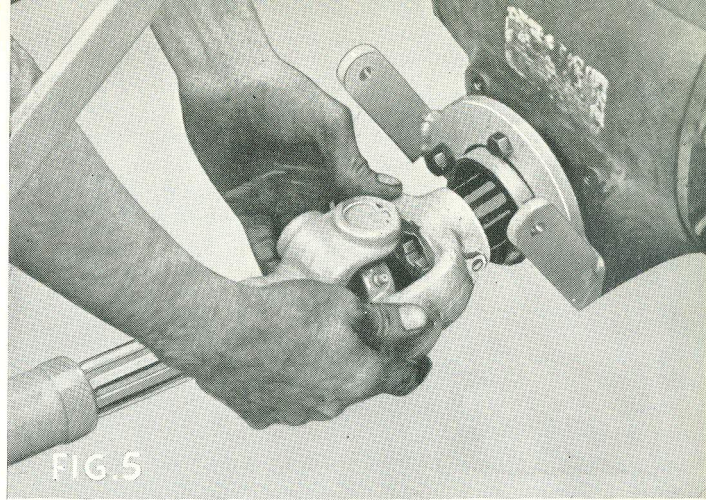


FIG. 5

6. Adjust the safety cover and secure with the pin and clip (Fig. 7).

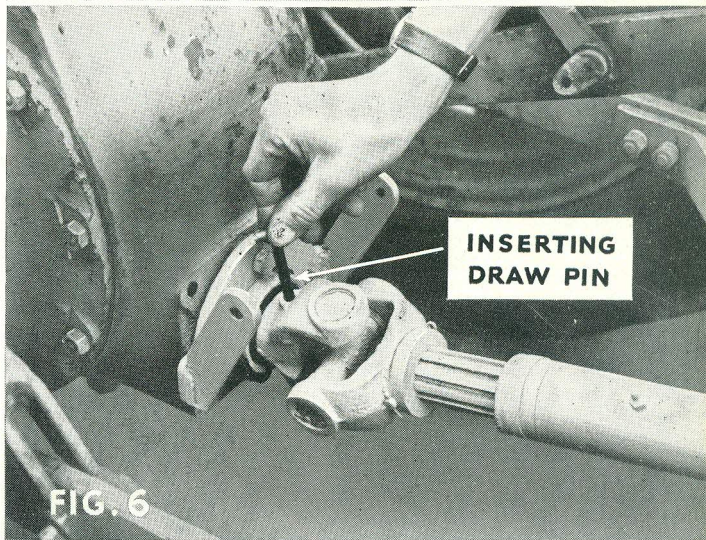


FIG. 6

7. Adjust the Rotavator for balance so that it will cut evenly through its width (Fig. 8).\*

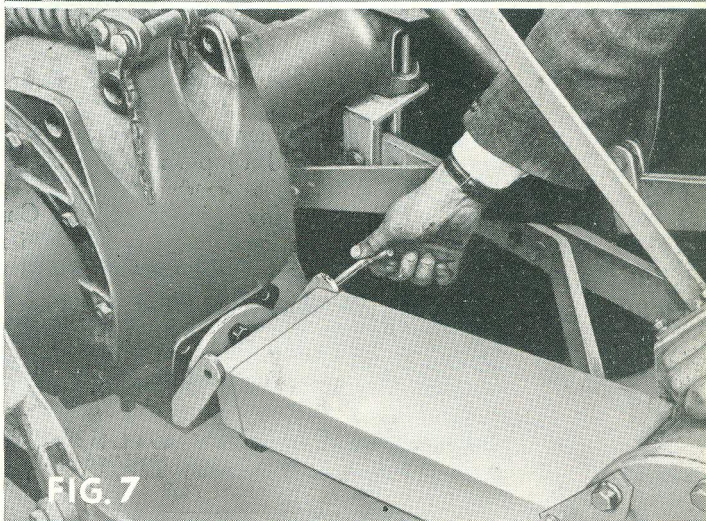


FIG. 7

8. Check all nuts and bolts. Raise the attachment on the hydraulic lift and check that the universal joint is running freely. Check lubrication. Check adjustment of the safety clutch (see p. 5).

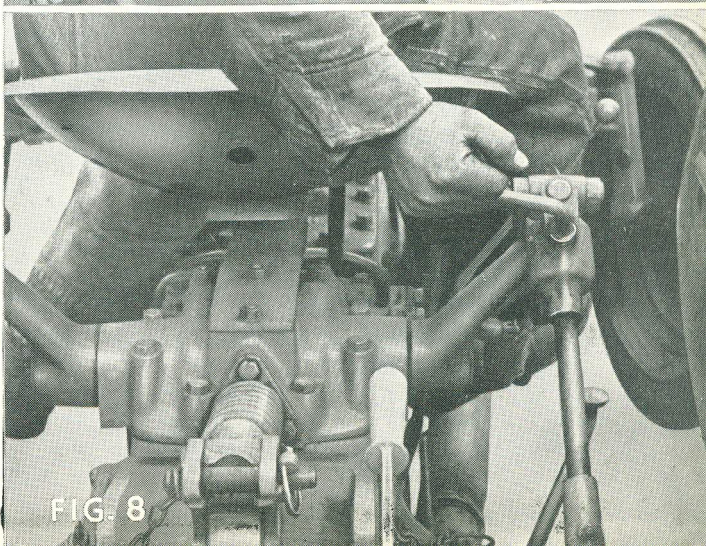
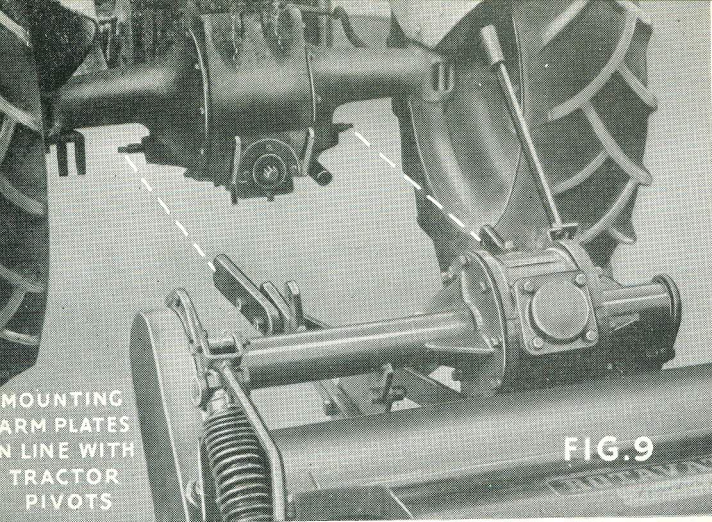


FIG. 8

\* The following procedure for ensuring correct depth-setting is recommended; position tractor and Rotavator so that the Rotavator can be lowered to its maximum depth of approximately 10 inches (e.g. run the tractor up a ramp so that the Rotavator hangs clear over the edge). Then adjust the lifting links until this depth is obtained. This should also produce the required clearance when the Rotavator is lifted for travel, and ensure that the universal joint runs freely.

**WARNING**—Failure to carry out this adjustment correctly may cause damage to the universal joint when the Rotavator is raised.





MOUNTING  
ARM PLATES  
IN LINE WITH  
TRACTOR  
PIVOTS

FIG. 9

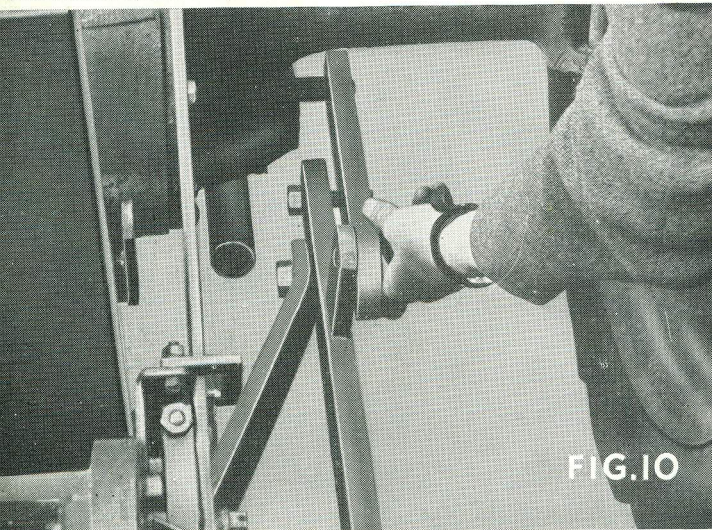


FIG. 10

## Fitting the 36" C.M. Models

The method of attaching the Mounting Arms to the tractor is somewhat different with the narrow gauge Rotavator attachments but otherwise the fitting is in every way similar. To attach the mounting arms proceed as follows:—

1. Support the mounting arms as in the case of the 50" and 60" models. Loosen the bolts securing the Mounting Arm Links (Fig. 9 and Illus. No. 230) so that these links will pass over the pivots on the tractor transmission case.
2. Back the tractor up to the Rotavator and slide the drive yoke on to the power take-off shaft. Insert the draw pin and secure with clip pin (Fig. 6).
3. Manoeuvre the mounting arm links on to the pivot studs (Fig. 10) and secure with nuts and split pins. Tighten nuts and bolts on the mounting arms.
4. Connect the power lift arms to the lugs on top of the mounting arms.
5. Remove jack or blocks of wood and complete the fitting and adjustments as described in items 5-8 of the fitting instructions for the wide gauge Rotavators.

## Lubrication

Put one quart of heavy gear oil (1.135 litres) in the Chain Case and 1½ pints (0.850 litres) in the Gearbox.

Maintain the oil level in the Chain Case and Gearbox up to the level plugs provided, i.e., keep the oil level not more than two inches (5 cms.) from the bottom of each box.

**IMPORTANT**—The above oil level checks should be carried out with the Rotor lowered to the normal working position. Otherwise, with the Rotor

raised, it is possible to overfill before the plug level is reached.

After 400 working hours the Gearbox and Chain-case should be drained, preferably when the oil is warm, flushed out with flushing oil and refilled to the correct level.

All other moving parts should be lubricated at regular working intervals in accordance with Diagram . . . .

## RECOMMENDED OILS

### TEMPERATE CLIMATES

	WAKEFIELD	SHELL	VACUUM	S.A.E. No.
GEARBOX & CHAIN CASE } GREASE } NIPPLES }	AGRICASTROL	SHELL EP	MOBILAND EP	140 EP
	GEAR OIL EP	TRACTOR GEAR OIL 140 EP	GEAR OIL	

### TROPICAL CLIMATES

GEARBOX & CHAIN CASE } GREASE } NIPPLES }	CASTROL	SHELL SPIRAX	MOBILUBE	140 E.P.
	HI-PRESS	140 EP	GX.140	

NOTE.—Light grease, instead of gear oil, may be used for all grease nipples except at universal joints.



# Instructions for Working

The machine is now ready for work.

The depth of work is controlled by adjusting the wheel on the Rotavator. The depth limit skid on the right-hand side should be adjusted so that it is about one inch clear of the ground at working depth. The skid does not control the depth, but limits it when the right-hand tractor wheel enters a depression.

The Reduction Gear of the Tractor should be used for practically all Rotavator work. 1st Gear is required for putting heavy cover crops into the ground, but higher gears may be used for practically all other purposes.

**TO START WORK.**—Screw the Depth Control Wheel up so that it allows the blades to enter the ground to the required depth. Engage the appropriate tractor gear and let the clutch in slowly, at the same time placing the Power Lift Lever in the 'down' position.

For turning on headlands and for transporting the machine, the Rotavator should be elevated on the power lift. It is not necessary to disengage the Rotor Gear when turning on headlands.

For breaking virgin soil or land tightly bound together with grass, the best results are obtained by a first shallow working (just enough to take the top off), then leaving the land for a few days before working to the required depth.

## Blades (see diagram 1)

Blade maintenance is of the greatest importance.

Examine the blades daily to see that they are correctly set. Note the use of a straight edge (or the blade setting bar). With the straight edge held in line with the blade mounting flange there should be approximately  $\frac{3}{32}$ " clearance at the back edge of the blade when correctly set (Fig. 1). Any bent blades (Fig. 2) should be straightened with the Blade Setting Bar (Fig. 3).

When land hard-panned through persistent ploughing to a constant depth, or land that is very stony, is being worked, the cutting edges of the blades may be turned slightly (Fig. 4). These blades must be corrected (Fig. 5) in the following manner:

Put the end of the straightening bar behind the blade (Fig. 6) and beat the cutting edge back into its correct position with a hammer. The blades will then cut cleanly, with only the cutting edge touching the ground and the back having clearance.

Blades must be kept properly straightened and set. When a blade is bent (Fig. 2), its back edge wastes a lot of power and wears the blades out very quickly. What is more, the quality of the work will be poor.

Badly-worn blades should, of course, be renewed.

## Drive Chain

The cover should normally be taken off the Drive Chain Box at least once a year, the box thoroughly cleaned out and the tension of the chain adjusted by the externally operated Adjuster. Turning the screw (Diagram 5, Illust. No. 140) clockwise tightens the chain and vice-versa. Tension can be checked by putting a hooked wire through the filler plug opening and feeling the chain. When the desired tension is obtained, the Adjuster is secured with the locknut on the screw.

## Safety Clutch (see diagram 5)

The springs of the Safety Clutch must be kept adjusted so that the Clutch will drive the blades through anything you may want to cut, but will slip when the blades strike stumps and similar obstacles. The Safety Clutch will work rather stiffly at first, and must be adjusted shortly after the Rotavator has been put to work.

To adjust the Safety Clutch, tighten hard all nine nuts on the Safety Clutch Springs, then slacken each one or two turns according to conditions. If the Clutch is adjusted too loosely, Clutch lining wear will occur.

## Rotor Clutch Control Gate

When the Rotor Clutch Hand Lever is in the rear notch (neutral position) of the Gear Gate, the Rotor should turn freely by hand. If it fails to do so, the Clutch Control Gate should be adjusted. Slacken the two bolts securing the Gate to the Gearbox. Slide the Gate in the required direction and when the neutral position is obtained, securely tighten the bolts.

## Weed Cutters

To prevent grass and weeds from fouling the rotor, Weed Cutters are fitted on either side of the Rotavator (see Illust. Nos. 215 and 330). Each Weed Cutter can be adjusted by means of two setscrews.

## General

Keep all nuts tightened.



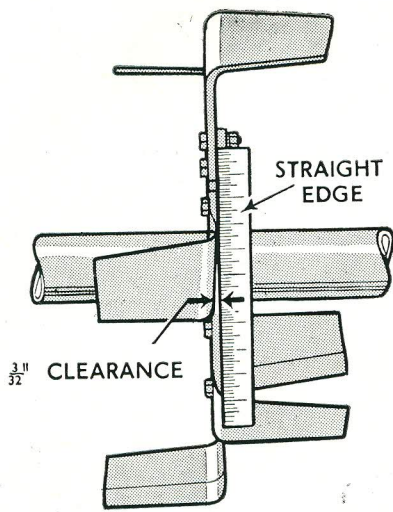


Fig. 1. Checking blade alignment with straight edge (or setting bar)

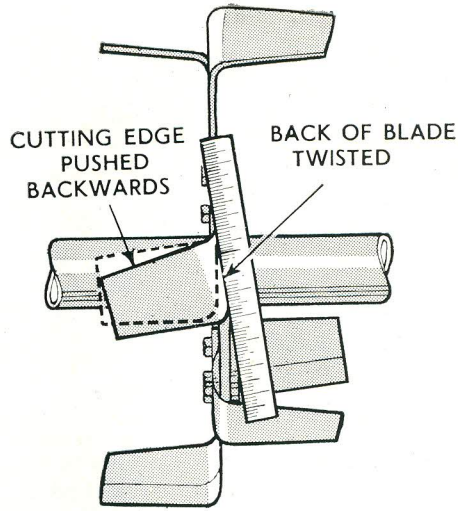


Fig. 2. Showing bent blade.

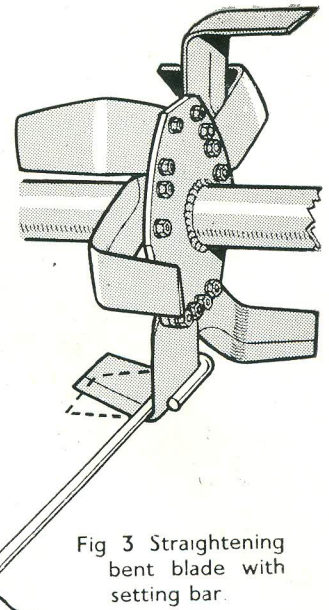


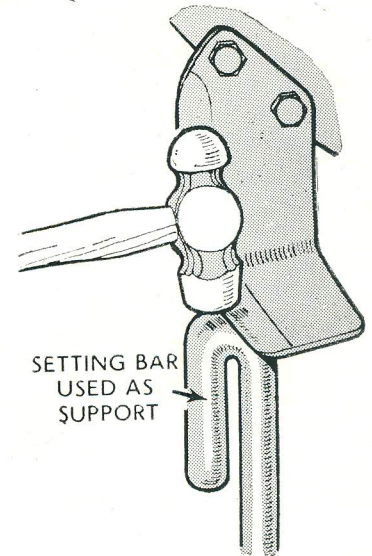
Fig 3 Straightening bent blade with setting bar.



Fig. 4 Enlarged view of blade with cutting edge turned inwards



Fig 5 Normal blade



SETTING BAR USED AS SUPPORT

Fig 6 Restoring turned up edge

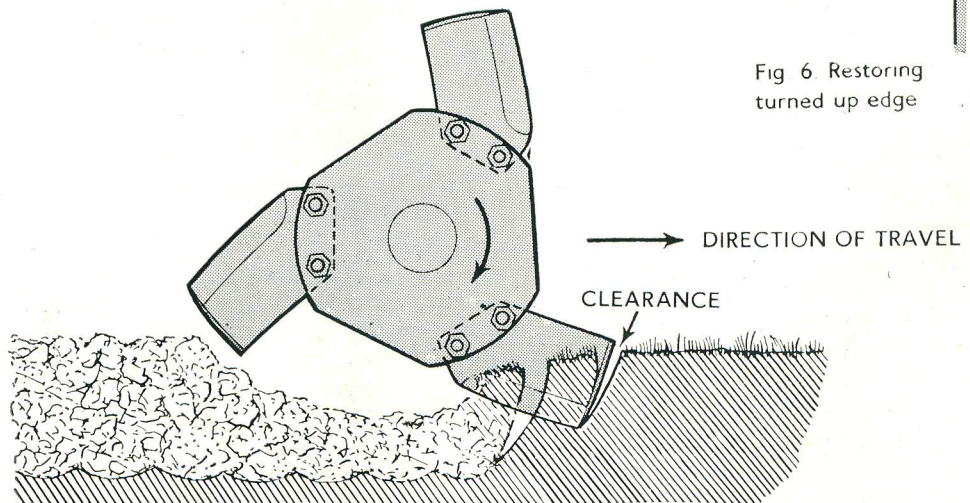


Fig. 7. Correct blade setting showing clearance at back of blade.

## DIAGRAM I—BLADE MAINTENANCE



# Blade Fitting

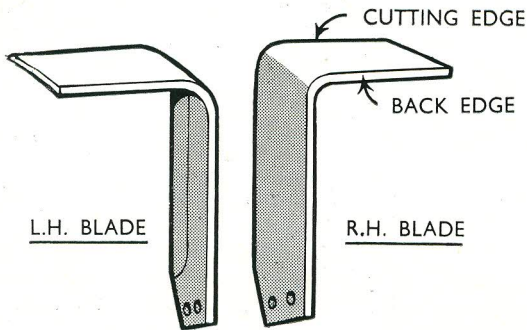


Fig. 1 (left). How to identify right and left hand blades

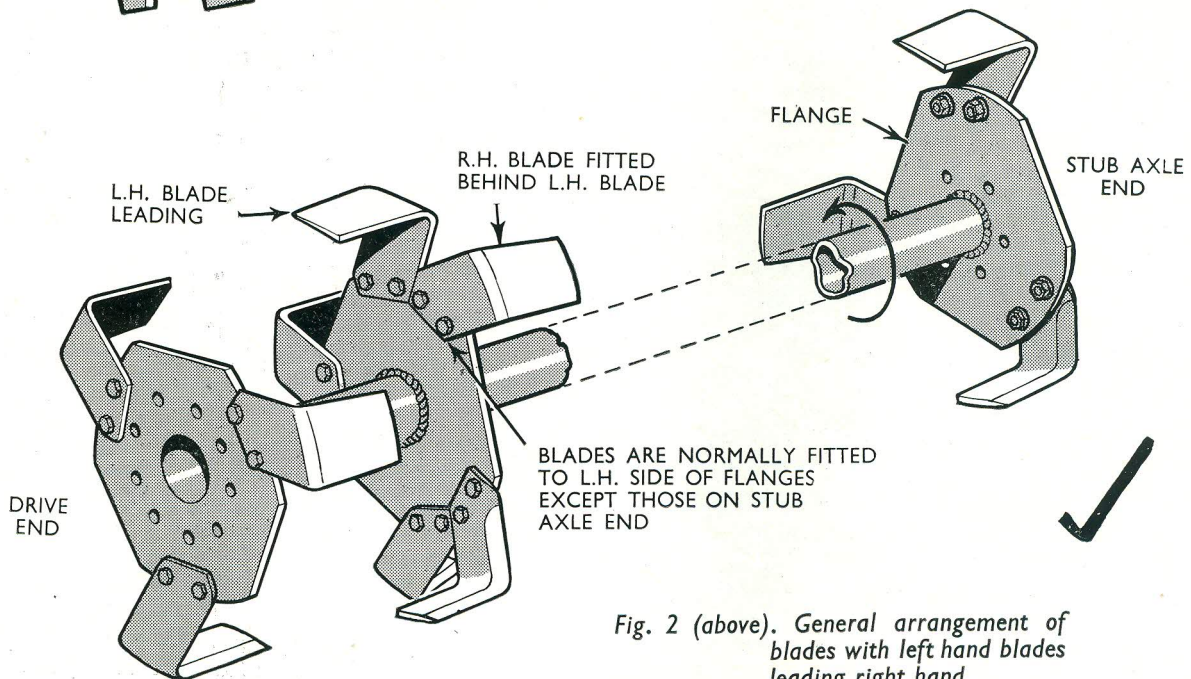


Fig. 2 (above). General arrangement of blades with left hand blades leading right hand

NOTE.—Bolts should be fitted with heads next to blade

Rotavators are normally delivered with the blades already fitted. But if it is necessary to fit your own blades, this is the way it should be done:

Identify left-hand and right-hand blades (Fig. 1).

Bolt the blades to the Rotavator flanges with the left-hand blades leading on each section of the flange. There should be a total of three left-hand and three right-hand blades on each flange, except on the end flanges. The latter take (a) three right-hand blades only, on the drive end; (b) three left-hand blades only, on the stub axle end.

All blades should usually be fitted to the left-hand sides of the flanges, except on the stub axle end flange. Left-hand blades are provided for the

latter; these should be fitted to the right-hand, or outer, side of the flange.

When the blades are correctly fitted, any left-hand blade must face, and be approximately half-way between, two right-hand blades on the next flange, and vice versa.

In each case the heads of the bolts should be in contact with the blade and with the spring washer fitted under the nut.

Note (Fig. 3) the 'scroll' effect obtained when the blades are correctly fitted. Compare this with what happens when blades are fitted incorrectly (Fig. 5).



## Blade Fitting (contd.)

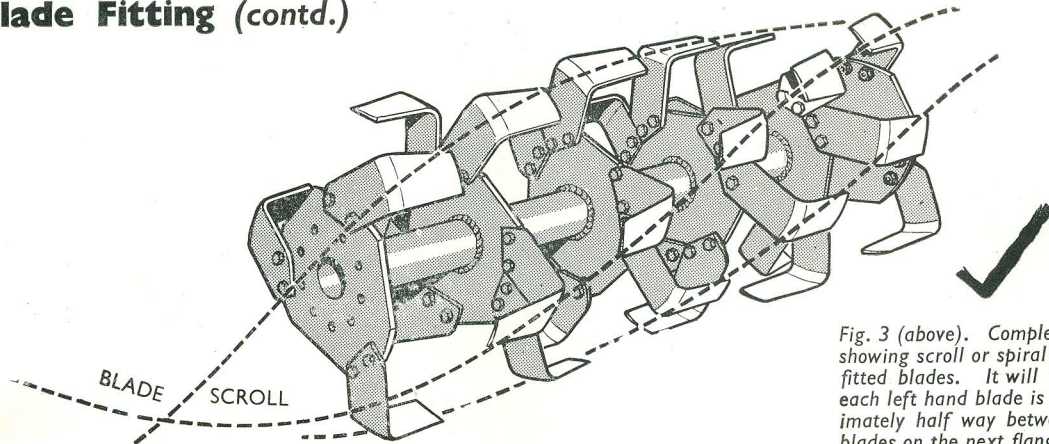


Fig. 3 (above). Completed blade assembly showing scroll or spiral effect of correctly fitted blades. It will be noticed also that each left hand blade is facing and approximately half way between two right hand blades on the next flange and vice versa

IF R.H. BLADES BE USED WHERE L.H. BLADES SHOULD BE FITTED AS SHOWN, BLADES WILL NOT CUT BUT WILL JUMP AND VIBRATE

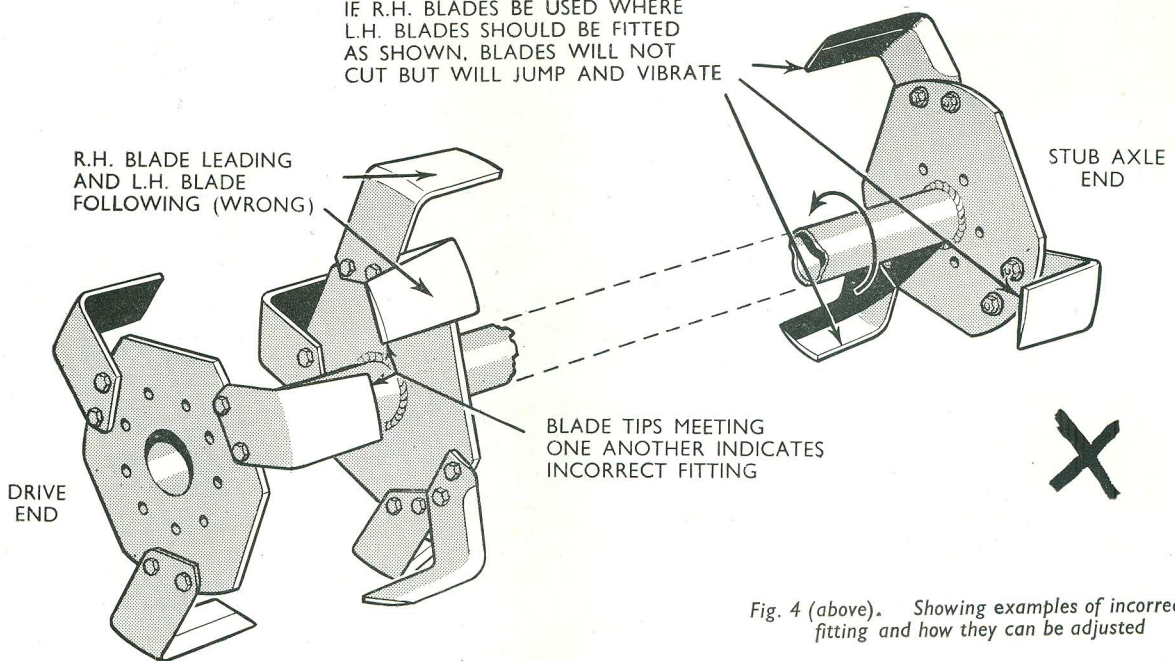
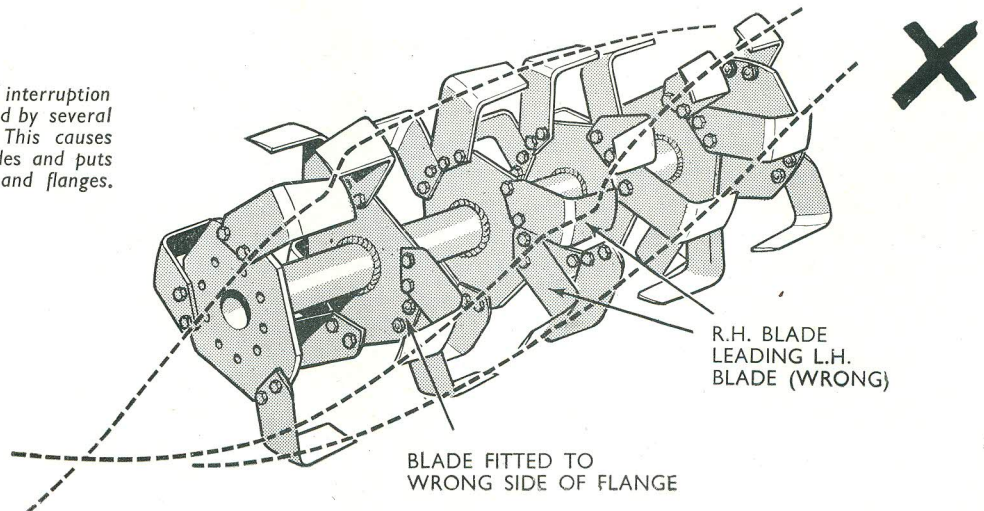


Fig. 4 (above). Showing examples of incorrect blade fitting and how they can be adjusted

Fig. 5 (right). Showing the interruption in the blade scrolls caused by several wrongly fitted blades. This causes clogging between the blades and puts additional strain on blades and flanges. Compare this with Fig. 3.





# Making the Most of Your Rotavator

THIS section of your Handbook is based not only on long practical experience of Rotavation, but on tests and work done at various universities and colleges.

To give some examples: seed bed preparation and the germination of seed in rotavated seed beds have been studied at Wye College, Kent; much land reclamation has been done at the farm of the University College of Wales near Aberystwyth; weed control, and the eradication of couch have been the subject of experiments at Durham University.

Research of this kind, and the day to day experience of Rotavator owners in over a hundred countries, support the claim that the Rotavator, when used wisely and with understanding, is one of the most valuable and versatile agricultural implements made to-day.

Although the following notes are based on the English system of farming, they show clearly the principles of Rotavation, and overseas users should find little difficulty in applying these principles to their own crops and conditions. It may be mentioned that crops such as sugar, rice, coffee and vines benefit greatly from cultivation with the Rotavator. Specialist uses in certain crops, e.g. chopping up sugar cane trash and old stools, will readily suggest themselves once the principles of Rotavation are understood.

## General

The Rotavator takes power direct from the tractor and puts it to the land through its rotor and hoe blades. The speed of the rotor is directly related to that of the power take-off shaft and does not vary with different tractor gears. It is determined by the size of jackshaft sprocket used. The Rotavator dealer will recommend the most suitable size of sprocket for your conditions and class of work.

## Type of Tilth

The type of tilth, coarse or fine, produced by the rotavator can, in general, be controlled. The following factors affect the type of tilth produced:

- (1) The type of soil—light or heavy.
- (2) The speed of travel of the Rotavator.
- (3) The moisture content of the soil.
- (4) The position of the shield.

### (1) The Effect of Soil Type

The amount of clay present in the heavier soils gives them cohesion. It is, therefore, possible to vary the type of tilth produced on a heavy soil, cloddy for autumn sowing and the winter fallow, and fine for spring sowing.

The amount of clay present in a light soil is insufficient to give cohesion to groups of particles. A fine tilth is, therefore, produced by the rotavator on a light soil.

### (2) The Effect of Speed of Travel of Rotavator

The speed of travel of the rotavator, which can be varied, in relation to the speed of the rotor, determines the size of the slice of soil cut by the hoe blades. If the tractor is travelling in high gear, a coarse tilth will be produced; if the tractor is travelling in low gear, a fine tilth will be produced. The operator must, therefore, use the tractor gears to obtain the type of tilth required.

### (3) The Effect of Soil Moisture Content

There is a certain range of soil moisture content, which the farmer easily recognizes, when the soil is in a condition which is most suitable for cultivation operations. Rotavation within this range of moisture content enables the tilth required to be produced. If a soil has a high moisture content, then it "balls"; if the soil is too dry then dust as well as coarser aggregates will be produced. Generally speaking, satisfactory results can be produced by rotavations under wetter soil conditions than those suitable for ploughing.

### (4) The Effect of the Hinged Shield

When the shield is raised, a relatively coarse tilth is produced as the slice cut is not broken by impact on the shield. With the shield lowered, a finer tilth results as the clods tend to break on hitting the shield.

The hinged shield should be folded back when the Rotavator is being transported.

## The Cultivation of Heavy Land

### (a) FOR AUTUMN SOWING

In order to enable the soil to deal with the winter rainfall and in order to provide protection for the seedlings, it is generally recognised that a rough tilth is necessary for an autumn seed bed. To obtain this rough finish, the tractor should have as high a ground speed as is possible for the depth of cultivation desired. The depth of cultivation should preferably be between four and six inches. The shield of the Rotavator should be raised.

### (b) FOR SPRING SOWING

The production of tilth for a Spring bed is greatly assisted by frost action during the winter. Frost action on the maximum amount of soil is obtained when the land is left rough. In the autumn the land should be rotavated at high tractor speed with the rotavator shield raised. The tilth produced by the frost during the winter will be confined to the top few inches of soil. In the Spring, the weathered soil should be rotavated to a shallow depth. If a second rotavation is required it should be shallower than the first. As the surface soil in the Spring is usually friable, the tractor speed can be high. To obtain a fine finish, the rotavator shield should be lowered.



## The Cultivation of Lighter Lands

To produce a tilth it is unnecessary to leave the lighter soils rough for the winter, all cultivations being carried out in the Spring. There is also little danger of producing a tilth which is too coarse for a seed bed. The travel speed of the tractor can be high and the rotavator set for the full depth of cultivation desired. Two passes of the rotavator are generally sufficient to produce a seed bed. If the second rotavation has a depth of about two inches, it can also be used to produce a weed-free bed.

## Weed Control

Weeds are of two types, annual and perennial, the perennial types being the more difficult to control.

Weeds do their greatest damage during the early stages of crop growth. The primary object should be, therefore, the production of a weed-free seed bed. Usually it is the weed seeds in the top two inches of a soil which germinate and compete with the crop in its early stages. Having obtained a tilth by means of the Rotavator, the weed seeds should be allowed to germinate. This usually requires a period of ten to fourteen days. At the end of this period, the land should be rotavated to a depth not exceeding two inches. This rotavation will kill the young weeds and a weed-free seed bed will have been produced.

The most important perennial weeds are couch (*Agropyron*) on heavy land, and twitch (*Agrostis*) on light land.

To eradicate couch, it is almost always necessary to have a fallow for a portion of the year. On heavy, wet clay five rotavations have been found necessary to eradicate couch. The rotavations should be given at approximately three weekly intervals when the cut-up rhizomes have re-rooted and green leaves are appearing above ground.

Twitch eradication on light land has been successfully carried out by three rotavations using a similar technique to that for couch eradication.

## Bracken Eradication

The main bracken rhizomes and bud stems are seldom situated more than 5—6 inches deep but there appear to be occasional rhizomes about 2—3 inches deep below the surface. The first rotavation should be shallow to deal with the rhizomes at 2—3 inches depth. The cut-up rhizomes will die out in two or three weeks. A second rotavation to a depth of 6 inches should be given at the end of this period. A third rotavation at the end of a further two or three weeks to a depth beyond six inches should be given to disintegrate all the remaining underground parts of the plant.

Bracken rhizomes when cut-up by the rotavator dry out and die very quickly. In view of this it has been suggested that the control of bracken by

rotavation can be carried out at any season of the year.

Rotavation is also a quick and valuable method for preventing bracken from encroaching on clean land. It is only necessary to run the Rotavator along the outer limit of the encroachment to form a "bracken break," repeating the run in future years if bracken fronds appear in the rotavated strip.

## Green Manuring

The objects of green manuring are either to conserve the nitrogen in the soil during a period that is likely to be wet or to add organic matter which on decompositions will produce humus. Green manuring will have its greatest effect when the green manure crop is thoroughly mixed with the soil. The Rotavator is the ideal implement for this purpose since in one operation it chops up the crop and incorporates it efficiently with the soil.

## The Breaking of Leys and Old Grassland

It is a well-known fact that land has been down to grass for a number of years has an improved and more stable structure than similar land which has been under arable crops. One of the objects of ley farming is to improve soil structure during the arable portion of the rotation. The improvement in structure is closely associated with grass roots and is greatest near the soil surface where the grass roots have had their maximum development. The breaking of the ley or grassland is a most important operation. If the ley is broken too deeply, then the soil with the best structure is buried and the benefit of the ley to the arable portion of the rotation is reduced. The ley should be broken up so that the soil with the best structure is retained near the surface and the organic matter accumulated in the soil during the ley is mixed with the soil to maintain the structure as long as possible. Both these objects can be best achieved with the rotavator.

The best technique is a shallow cultivation to break up the turf and mat, and allow an interval of from two to three weeks to kill the turf, and then two deeper rotavations to mix lime and fertilisers with the soil and to bring up some soil to make a mulch with the disintegrated turf. It has been shown that the turf soil mulch gives a better seed bed and germination than obtained where the turf is turned in by ploughing.

## Liming

Authorities agree that lime has its greatest effect in neutralising soil acidity when it is evenly distributed on the soil surface and vertically throughout the soil depth. Investigations have shown that the Rotavator gives the best vertical mix of materials to be incorporated with the soil. Having obtained even horizontal distribution of the lime with a lime-spreader, even distribution of the lime vertically can be best obtained by rotavation.



## **Land Reclamation**

Land covered with gorse, bramble and other scrub can be reclaimed with the Rotavator. Light Rotavators should not be expected to carry out heavy reclamation; there are heavy duty models for this work.

The number of rotavations required varies with the density of the scrub and the depth of rooting. The final rotavation can be used to mix in lime and fertilisers and to prepare the seed bed for re-seeding. Land treated in this manner in Wales and in the Isle of Man has been fit for grazing after six weeks.

## **Combine Straw**

If the combine straw is not to be baled, it is worth while putting it back into the land where, on decomposition, it will produce humus and assist in the maintenance of soil structure. It is preferable to spread the straw and then follow up with the Rotavator. If a crop is to be sown immediately after putting in the combine straw, the field should be dressed with 1 cwt. sulphate of ammonia per acre. This dressing provides nitrogen for the micro-organisms decomposing the straw and so prevents their competing with the crop seedlings for the available nitrogen in the soil.

## **Improving Soil Structure**

The principal effect of incorporating farmyard manure, crop residues and other organic materials

with the soil is the improvement in soil structure which results. To obtain the maximum benefit from these materials it is essential that they should be intimately mixed with the soil. The Rotavator makes this intimate mix certain.

Gypsum is now being used, especially on heavy land, to improve soil structure. As in the case of lime, the maximum effect of the gypsum is obtained by even horizontal and vertical distribution. The even vertical distribution, so necessary for its action in depth, can be obtained by rotavation.

## **Other Uses**

**TURNING IN BRUSSEL STALKS.** Use a Rotavator to chop up and turn in the stalks of Brussel Sprouts and cabbages.

**CLEARING HEDGE BOTTOMS.** Clear out hedge bottoms with the Rotavator and so increase the area under cultivation.

**MUCK SPREADING, ROW CROP WORK.** As you get to know the wide scope of operations for which the Rotavator can be used, you will find many other applications. The Rotavator will help with muckspreading, with ditch filling and the making of silage pits. It can be used for levelling, and for orchard and row-crop work.



# List of Parts

for the

## Howard Rotavator Tractor Attachment

"D" TYPE, FOUR POINT LINKAGE

Including the following models

Centrally Mounted 36"—40"—50"—60".  
~~Off-Set 36"—50"—60".~~  
~~Narrow Track 50" Off-Set and Centrally Mounted.~~  
~~Orchard (Fully Off-Set) 50"—60".~~

WHEN ORDERING PARTS IT IS NECESSARY TO QUOTE THE NUMBER OF THE ROTAVATOR AND THE PART NUMBER (NOT THE ILLUSTRATION NUMBER).

The number of the Rotavator is stamped on the left-hand mounting arm and on the gearbox.

We cannot guarantee that correct replacements will be supplied unless this number and the correct part number are quoted.

In the following parts list all directions are given left or right looking forward from the back of the Rotavator.

### Universal Drive Cover Assembly

Illust. No.	Part No.	Description	No. off.
1	P.H.7046	Cover Bracket	1
2	3174	Sliding Cover	1
3	3175	Draw Bolt	1
4	3306	Clip Ring	1
5	3172	Hinged Cover	1
6	3914	Plate	1
7	3173	Hinge Rod	1
8		Nut, $\frac{3}{8}$ " U.N.C.	2
9		Spring Washer, $\frac{3}{8}$ " dia.	2
10		Setscrew, $\frac{7}{16}$ " U.N.C. $\times$ $1\frac{1}{4}$ " Long Hex. Hd.	2
11		Spring Washer, $\frac{7}{16}$ " dia.	2

### Universal Drive

	5070	<b>Universal Joint Assembly</b> comprising:—	
12	5346	Yoke, P.T.O. end	1
13	5347	Draw Pin	1
14		Clip Pin	3
	2895	Yoke, P.T.O. end	1
		Bolt, $\frac{1}{2}$ " B.S.F. $\times$ $2\frac{3}{4}$ " long	1
		Spring Washer, $\frac{1}{2}$ " dia.	1
		Nut, $\frac{1}{2}$ " B.S.F.	1
15	3275	Spider Assembly	2
16	22532	Yoke	1
17	22509	Pin	1
18	5075	Shaft	1
19	3294	Screw Cap	1
20	22530	Steel Washer	1
21	22531	Felt Washer	1
22		Grease Nipple $\frac{1}{8}$ " B.S.P.	1
23	5071	Yoke Tube	1
24	22528	Collar	2
25	3288/2	Disc	1
26		Circlip, 40 m.m. Internal	1
27	3154	Special Nut	1
28	3155	Tab Washer	1



Illust. No.	Part No.	Description	No. off.
29	22937	Yoke, Attachment End	1
	5365	<b>Universal Joint Assembly (Alternative Wide Angle Type)</b>	
		comprising:—	
30	5366	Yoke, P.T.O. end	1
31	5347	Draw Pin	
32	3196	Clip Pin	1
	22287	Yoke, P.T.O. end	
		Bolt, $\frac{1}{2}$ " B.S.F. $\times$ $3\frac{1}{4}$ " long	1
		Spring Washer, $\frac{1}{2}$ " dia.	
		Nut, $\frac{1}{2}$ " B.S.F.	
33	3275	Spider Assembly	2
34	22289	Yoke	1
35	22294	Pin	1
36	5369	Shaft	1
37	3294	Screw Cap	1
38	22530	Steel Washer	1
39	22531	Felt Washer	1
40		Grease Nipple, $\frac{1}{8}$ " B.S.P.	1
41	5367	Yoke Tube	1

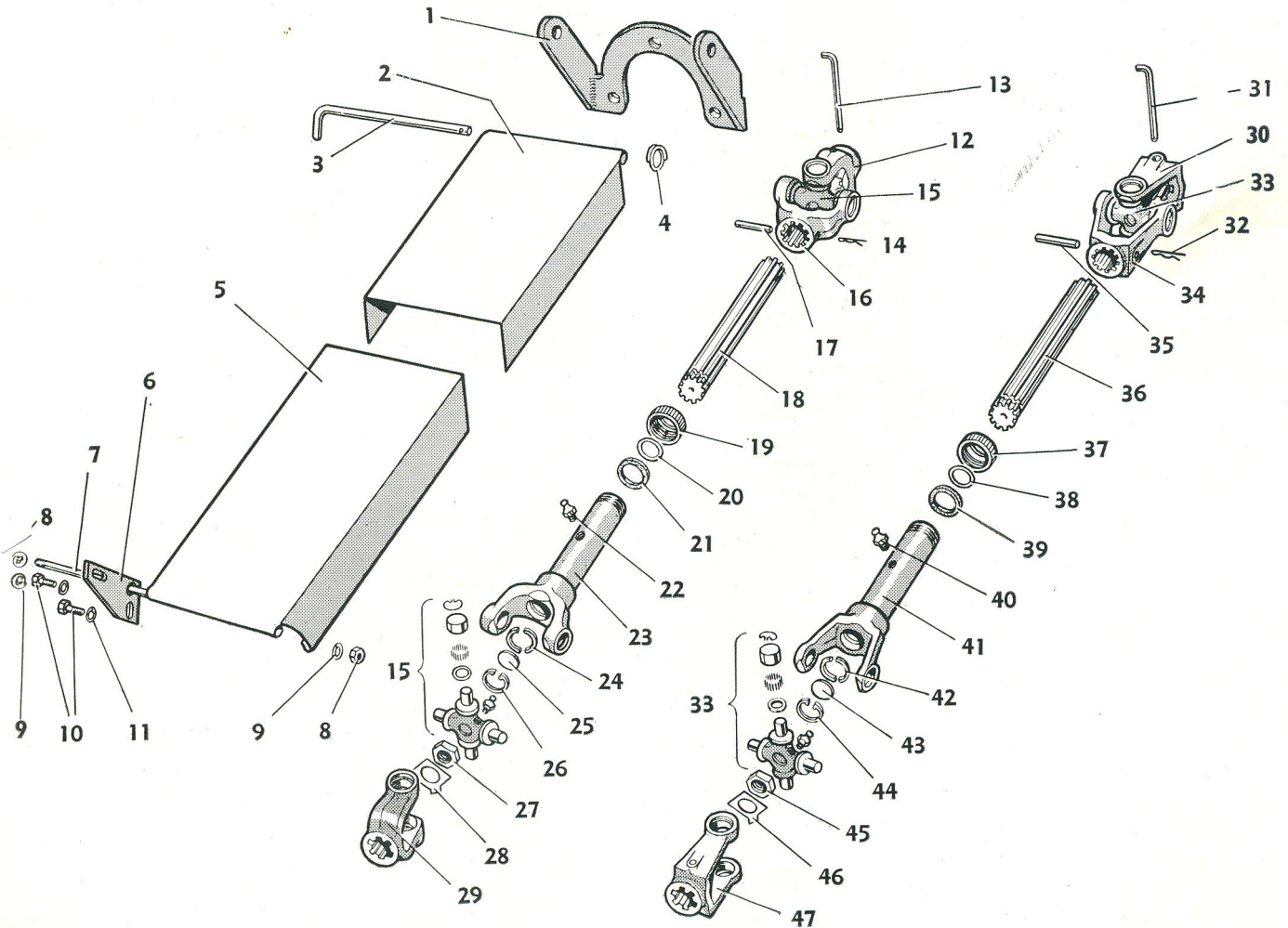


DIAGRAM 2—UNIVERSAL DRIVE



Illust. No.	Part No.	Description	No. off.
42	22528	Collar ... ..	2
43	3288/2	Disc ... ..	1
44		Circlip, 40 m.m. Internal ... ..	1
45	3154	Special Nut ... ..	1
46	3155	Tab Washer ... ..	1
47	22288	Yoke, Attachment End ... ..	1

### Gearbox, Dog Clutch and Jackshaft

50		Circlip, 3" dia. Internal ... ..	1
51	3869	Oilseal Sleeve ... ..	1
52		Oilseal, 2 $\frac{3}{4}$ " O.D. $\times$ 2" I.D. $\times$ $\frac{1}{4}$ " wide ... ..	2
53		Toroidal Sealing Ring, 1 $\frac{5}{8}$ " O.D. $\times$ 1 $\frac{3}{8}$ " I.D. $\times$ $\frac{1}{8}$ " wide ... ..	1
54	BRL.1 $\frac{3}{8}$	Ball Bearing, 3" O.D. $\times$ 1 $\frac{3}{8}$ " I.D. $\times$ $\frac{1}{16}$ " wide ... ..	1
55		Circlip, 3" dia. Internal ... ..	1
56	3894	Extension Shaft ... ..	1
57	3893	Sliding Dog ... ..	1
58	3879	Pinion Assembly Comprising:—	
	3892	Pinion ... ..	1
	3891	Bush ... ..	1
59		Circlip, 90 m.m. Internal ... ..	1
60	BRM.040	Ball Bearing, 90 m.m. O.D. $\times$ 40 m.m. I.D. $\times$ 23 m.m. wide ... ..	1
61		Circlip, 40 m.m. External ... ..	1
62	3621	End Cover Gasket ... ..	1
63	3620	End Cover ... ..	1
64		Spring Washer, $\frac{7}{16}$ " dia. ... ..	4
65		Setscrew, $\frac{7}{16}$ " U.N.C. $\times$ 1 $\frac{1}{4}$ " long, Hex. Hd. ... ..	4
70		Nyloc Nut, $\frac{7}{16}$ " B.S.F. (Simmonds NT./F.146) ... ..	1
71	5027	Spring ... ..	1
72	3881	Handle ... ..	1
73	2654	Fulcrum Arm ... ..	1
74	G.711	Key ... ..	1
75		Pinch Bolt, $\frac{5}{16}$ " B.S.W. $\times$ 1" long ... ..	1
76	2657	Spring ... ..	1
77		Bolt, $\frac{3}{8}$ " B.S.W. $\times$ 3" long ... ..	1
78		Locknut, $\frac{3}{8}$ " B.S.W. ... ..	2
79	3895	Gate ... ..	1
80	3896	Gate Plate ... ..	1
81		Setscrew, $\frac{7}{16}$ " U.N.C. $\times$ 1 $\frac{1}{4}$ " long, Hex. Hd. ... ..	2
82		Spring Washer, $\frac{7}{16}$ " dia. ... ..	2
83		Bolt, $\frac{1}{4}$ " U.N.C. $\times$ $\frac{3}{4}$ " long ... ..	2
84		Spring Washer, $\frac{1}{4}$ " dia. ... ..	2
85		Nut, $\frac{1}{4}$ " U.N.C. ... ..	2
86	3636	Clutch Yoke ... ..	1
87	3888	Selector Crank ... ..	1
88		Split Pin, $\frac{1}{16}$ " dia. $\times$ 1" long ... ..	1
	5240	Gear Box Side Plate, C.M. & Off-set 50" Narrow Track ... ..	1
	3957	Gear Box Side Plate, C.M. 36", 40", Off-set 36" ... ..	1
89	3887	Gear Box Side Plate, C.M. 50", 60", Off-set 50" & 60", Orchard 50", 60" ... ..	1
90		Oil Level Plug, $\frac{1}{8}$ " B.S.P. Sq. Head ... ..	1
91		Setscrew, $\frac{7}{16}$ " U.N.C. $\times$ 1" long, Hex. Head ... ..	12
92		Spring Washer, $\frac{7}{16}$ " dia. ... ..	12
93	3090	Gasket ... ..	2
94	3890	Gear Box ... ..	1
95		Filler Plug $\frac{1}{2}$ " B.S.P., Sq. Hd. ... ..	1
96	2333	Special Nut ... ..	1



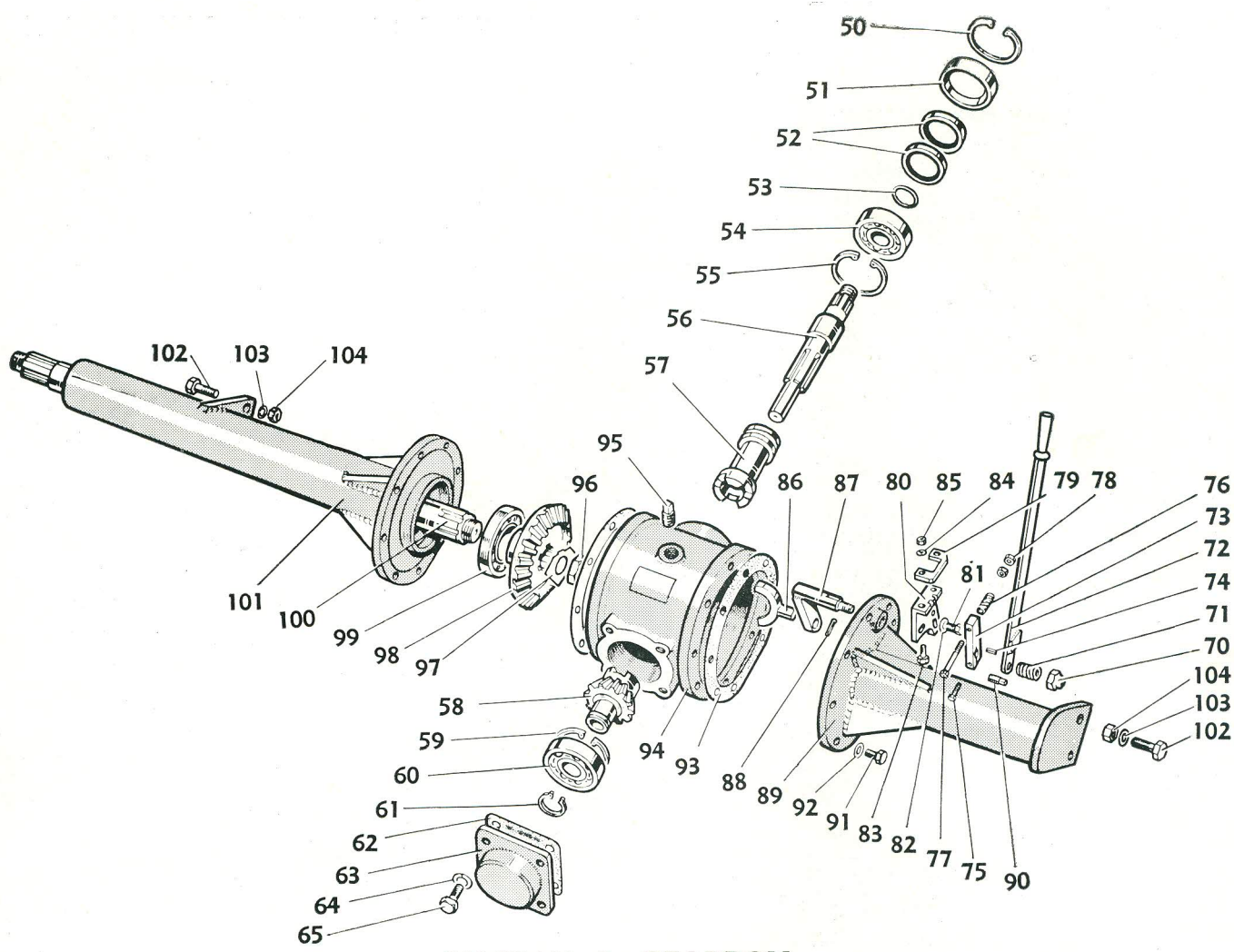


DIAGRAM 3—GEARBOX

Illust. No.	Part No.	Description	No. off.
97	2518	Tab Washer	1
98	3614	Crownwheel	1
99	BRL.2 $\frac{1}{4}$	Ball Bearing, 4 $\frac{1}{2}$ " O.D. $\times$ 2 $\frac{1}{4}$ " I.D. $\times$ $\frac{7}{8}$ " wide	1
100	5307	Jackshaft, C.M. 36", 50" Off-set & 50" Off-set Narrow Track, Orchard 60"	1
	50485	Jackshaft, Off-set 36"	1
	3962	Jackshaft, C.M. 40"	1
	3917	Jackshaft, C.M. 50", Off-set 60" & C.M. 50" Narrow Track	1
	3097	Jackshaft, Orchard 50"	1
	23316	Jackshaft, C.M. 60"	1
101	5308	Jackshaft Housing, C.M. 36"	1
	50486	Jackshaft Housing, Off-set 36"	1
	3955	Jackshaft Housing, C.M. 40"	1
	3886	Jackshaft Housing, C.M. 50" & 60" Off-set	1
	5242	Jackshaft Housing, C.M. 50" Narrow Track	1
	5086	Jackshaft Housing, Off-set 50", Orchard 60"	1
	50860	Jackshaft Housing, Orchard 50"	1
	5065	Jackshaft Housing, Off-set 50", Narrow Track	1
	24995	Jackshaft Housing, C.M. 60"	1
102		Bolt, to mounting arm, $\frac{5}{8}$ " U.N.C. $\times$ 1 $\frac{3}{4}$ " Long	4
103		Spring Washer, $\frac{5}{8}$ " dia.	4
104		Nut, $\frac{5}{8}$ " U.N.C.	4



# MAINTENANCE AND LUBRICATION TRACTOR ATTACH

## DAILY MAINTENANCE

OR EVERY 8 WORKING HOURS

- 1 CHECK TIGHTNESS OF BLADE BOLTS
- 2 CHECK FOR BENT BLADES. STRAIGHTEN IF REQUIRED. RESTORE TURNED-UP EDGES
- 3 LUBRICATE ALL NIPPLES
- 4 LUBRICATE WITH OIL CAN SAFETY COVER, SHIELD HINGES, LIFTING LINKS, DEPTH CONTROL AND ALL MOVING PARTS NOT PROVIDED WITH NIPPLES
- 5 WATCH FOR UNDUE SAFETY CLUTCH SLIP (INDICATED BY CLUTCH BECOMING VERY HOT, ROTOR STOPPING UNNECESSARILY). ADJUST IF REQUIRED

**DAILY**

OIL SAFETY COVER,  
DRAW BOLT AND SLIDE

**FORTNIGHTLY**

CHECK CHAIN ADJUSTMENT

**DAILY**

LUBRICATE WITH OIL CAN

**EVERY TWO MONTHS**

DRAIN, FLUSH OUT  
REFILL WITH OIL

**DAILY**

WATCH FOR SIGNS OF UNDUE CLUTCH SLIP  
(TO ADJUST TIGHTEN ALL NINE NUTS.  
THEN SLACKEN APPROXIMATELY 1-3 TURNS  
ACCORDING TO CONDITIONS)

**WEEKLY**

CHECK CHAINCASE OIL LEVEL

**DAILY**

LUBRICATE WITH OIL CAN

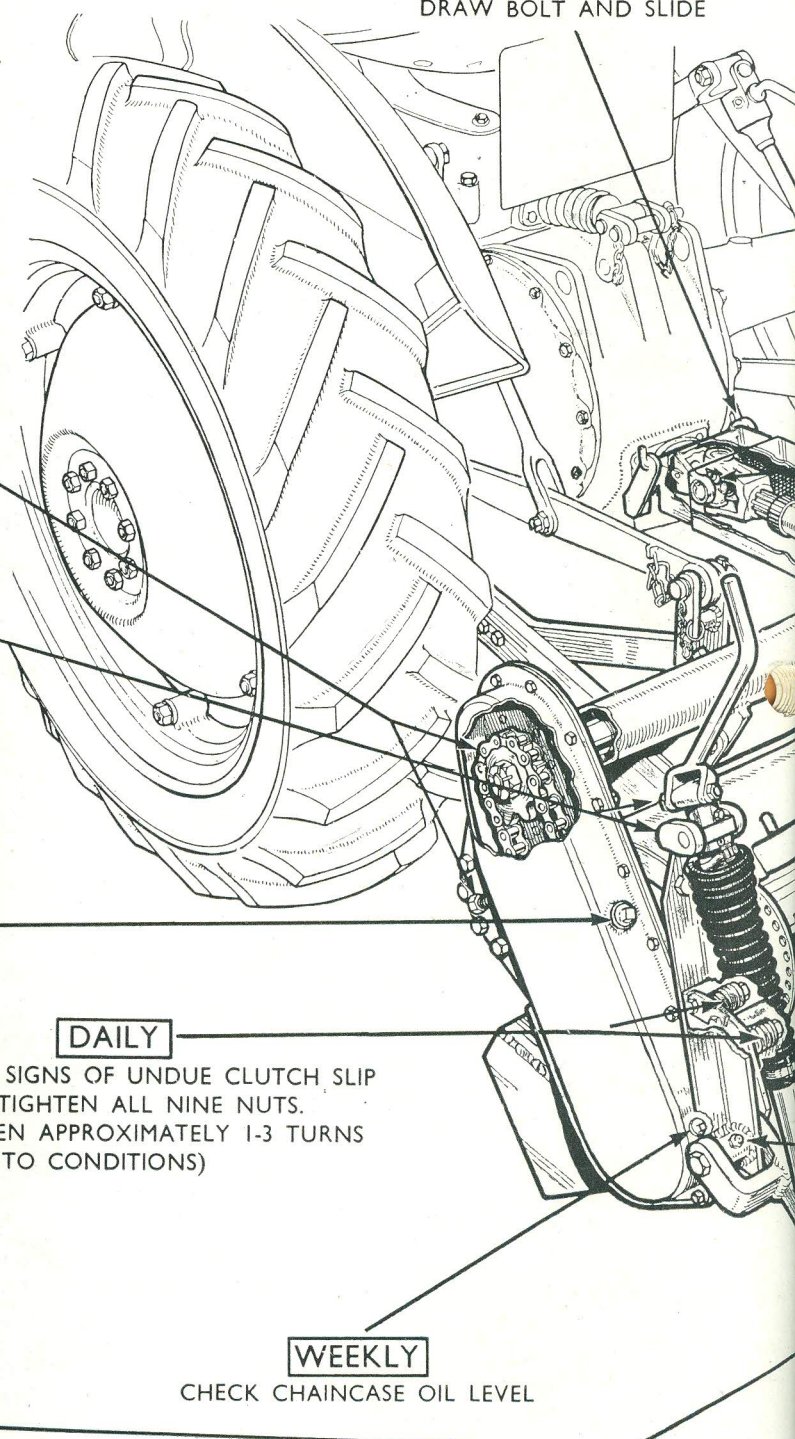
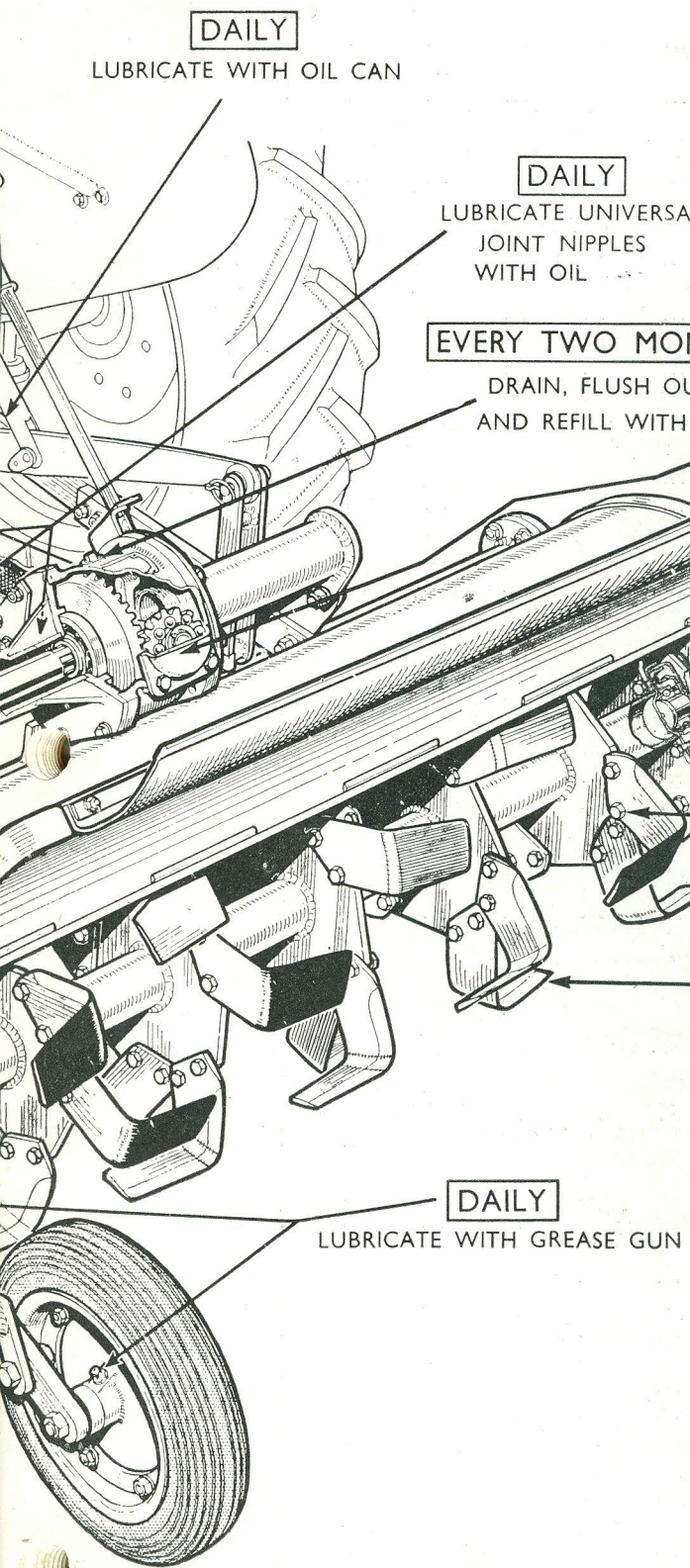


DIAGRAM 4



# GUIDE FOR THE HOWARD ROTAVATOR (4 POINT MOUNTED MODELS)



**DAILY**

LUBRICATE WITH OIL CAN

**DAILY**

LUBRICATE UNIVERSAL  
JOINT NIPPLES  
WITH OIL

**EVERY TWO MONTHS**

DRAIN, FLUSH OUT  
AND REFILL WITH OIL

**WEEKLY**

CHECK GEARBOX OIL LEVEL  
(LEVEL PLUG ON RIGHTHAND SIDE)

**DAILY**

LUBRICATE STUB AXLE

**DAILY**

CHECK BLADE BOLTS FOR TIGHTNESS

**DAILY**

CHECK FOR BENT BLADES (STRAIGHTEN  
WITH BLADE SETTING BAR IF NECESSARY)

**DAILY**

LUBRICATE WITH GREASE GUN

## WEEKLY MAINTENANCE

OR EVERY 48 WORKING HOURS

- 1 CHECK OIL LEVELS IN GEARBOX AND CHAINCASE

## FORTNIGHTLY

- 1 CHECK CHAIN ADJUSTMENT

## EVERY TWO MONTHS

OR EVERY 400 WORKING HOURS

- 1 DRAIN, FLUSH OUT AND REFILL GEARBOX
- 2 REMOVE CHAINCASE COVER, CLEAN OUT, AND REFILL WITH OIL

## RECOMMENDED LUBRICANTS

GEARBOX & CHAINCASE	...	S.A.E. 140 E.P.
GREASE NIPPLES	...	S.A.E. 140 E.P.

NOTE:—LIGHT GREASE MAY BE USED ON ALL  
POINTS EXCEPT UNIVERSAL DRIVE

BRICATION



## Chain and Chaincase Assembly

Illust. No.	Part No.	Description	No. off.
110	3111	Jackshaft Bearing Housing ... ..	1
111		Rivet, $\frac{5}{16}$ " dia. $\times$ $\frac{7}{8}$ " Long Pan Head ... ..	10
112	3125	Backplate ... ..	1
	3124	Backplate Assembly complete (comprising Backplate, Jackshaft Bearing Housing, Rotor Bearing Housing and Rivets) ... ..	1
113	3121	Gasket ... ..	1
114	BRM.1 $\frac{5}{8}$	Ball Bearing, 4" O.D. $\times$ $1\frac{5}{8}$ " I.D. $\times$ $\frac{15}{16}$ " wide ... ..	1
115	3504	Sprocket, 11 Tooth ... ..	1
116	3157	Chain Assembly ... ..	1
117		Chain Connecting Link ... ..	1
118		Splitpin, $\frac{5}{32}$ " dia. $\times$ 2" long ... ..	1
119	2635	Special Nut ... ..	1
120		Filler Plug, $\frac{3}{4}$ " B.S.P. Sq. Head ... ..	1
121	3119	Chaincase ... ..	1
122		Chaincase Bolt, $\frac{5}{16}$ " U.N.C. $\times$ $\frac{7}{8}$ " long ... ..	13
123		Spring Washer, $\frac{5}{16}$ " dia. ... ..	13
124		Nut, $\frac{5}{16}$ " U.N.C. ... ..	13
125		Bolt to Depth Control, $\frac{7}{16}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long ... ..	4
126		Spring Washer, $\frac{7}{16}$ " dia. ... ..	4
127		Nut, $\frac{7}{16}$ " U.N.C. ... ..	4
128		Bolt, Coultter to Chaincase, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{1}{4}$ " long ... ..	2
129		Spring Washer, $\frac{1}{2}$ " dia. ... ..	2
130		Nut, $\frac{1}{2}$ " U.N.C. ... ..	1
131	3203	Coultter ... ..	1
132		Bolt, Groundskid to Chaincase, $\frac{5}{16}$ " U.N.C. $\times$ $1\frac{1}{8}$ " long ... ..	2
133		Spring Washer, $\frac{5}{16}$ " dia. ... ..	2
134		Nut, $\frac{5}{16}$ " U.N.C. ... ..	2
135	3211	Ground Skid ... ..	1
136		Oil Level Plug, $\frac{1}{8}$ " B.S.P., Sq. Head ... ..	1
137	5341	Chain Skid ... ..	1
138		Pivot Bolt, $\frac{7}{16}$ " U.N.C. $\times$ 2" long ... ..	1
139		Nut, $\frac{7}{16}$ " U.N.C. ... ..	1
140	5343	Adjusting Screw (All Models except Orchard 50") ... ..	1
	50863	Adjusting Screw, Orchard 50" only ... ..	1
141		Locknut, $\frac{5}{8}$ " U.N.C. ... ..	1

## Sprocket and Safety Clutch Assembly

142	3150	Rotor Drive Sprocket and Shaft ... ..	1
143		Circlip, 4" dia. Internal ... ..	1
144	BRM. $\frac{5}{8}$	Ball Bearing, 4" O.D. $\times$ $1\frac{5}{8}$ " I.D. $\times$ $\frac{15}{16}$ " wide ... ..	1
145		Rivet, $\frac{5}{16}$ " dia. $\times$ $\frac{7}{8}$ " long, Pan Head ... ..	10
146	3156	Rotor Bearing Housing ... ..	1
147		Oilseal, 3" O.D. $\times$ $2\frac{1}{16}$ " I.D. $\times$ $\frac{1}{2}$ " wide ... ..	1
148	3159	Spacer ... ..	1
149	3160	Dust Cover ... ..	1
150	5354	Dust Seal ... ..	1
151	5671	Pressure Plate ... ..	1
152	5679	Friction Disc ... ..	1
153	5678	Wearing Disc ... ..	1
154	22329	Friction Disc ... ..	1
155	5676	Clutch Disc ... ..	1
156	5679	Friction Disc ... ..	1
157	3209	Wearing Plate ... ..	1
158		Splitpin, $\frac{5}{32}$ " dia. $\times$ 2" long ... ..	1
159	2635	Special Nut ... ..	1
160	5025	Inner Spring ... ..	9



Illust. No.	Part No.	Description	No. off.
161	5024	Outer Spring ... ..	9
162	14034	Washer ... ..	9
163		Nut, 1/2" U.N.C. ... ..	9

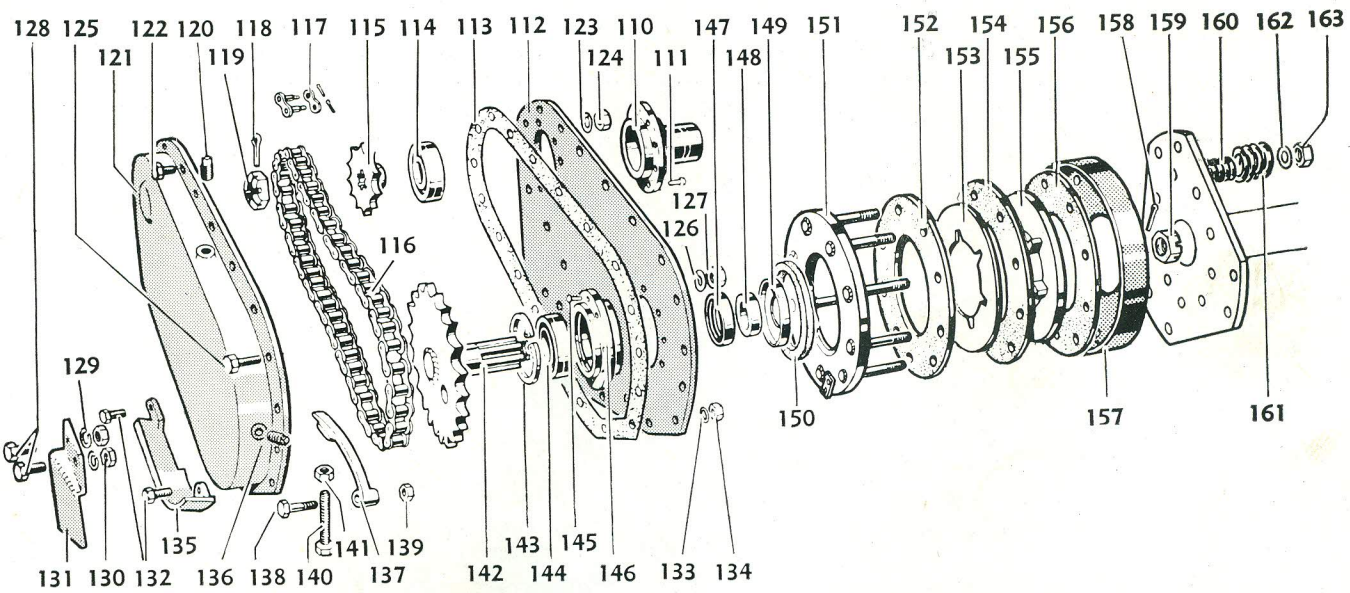


DIAGRAM 5—CHAIN DRIVE AND SAFETY CLUTCH

### Rotor and Blades Assembly

Illust. No.	Part No.	Description				No. off.
	x5315	Rotor Standard, 3-point, 36" machine	...	...	...	1
	x3823	Rotor Standard, 3-point 40" machine	...	...	...	1
165	x3400	Rotor Standard, 3-point 50" machine	...	...	...	1
	x3406	Rotor Standard, 3-point 60" machine	...	...	...	1
	x5317	Hoe Blade, R/H, 36" machine	...	...	...	12
	x5318	Hoe Blade, L/H, 36" machine	...	...	...	12
			40" M/C.	50" M/C	60" M/C	
166	x5226	Swept Back Blade, L/H	12	15		18
167	x5227	Swept Back Blade R/H	12	15		18
	†3900	Hoe Blade, L/H	12	15		18
	†3901	Hoe Blade, R/H	12	15		18
	*5224	Rice Blade, L/H	12	15		18
	*5225	Rice Blade, R/H	12	15		18
			36" M/C			
168	3903	Blade Bolt	48	60		72
169		Spring Washer, 1/2" dia.	48	60		72
170		Nut, 1/2" U.N.F.	48	60		72
	†5335	Rotor, 2-point, 36" machine	...	...	...	1
	x5317	Hoe Blade, R/H	...	...	...	8
	x5318	Hoe Blade, L/H	...	...	...	8
	3903	Blade Bolt	...	...	...	32
		Spring Washer, 1/2" dia.	...	...	...	32
		Nut, 1/2" U.N.F.	...	...	...	32



Illust. No.	Part No.	Description	No. off.
	3329	Rotor, 2-point, 50" machine	1
166	x5226	Swept Back Blade, L.H.	10
167	x5227	Swept Back Blade, R.H.	10
	†3900	Hoe Blade, L.H.	10
	†3901	Hoe Blade, R.H.	10
	*5224	Rice Blade, L.H.	10
	*5225	Rice Blade, R.H.	10
	3903	Blade Bolt	40
		Spring Washer, 1/2" dia.	40
		Nut, 1/2" U.N.F.	40

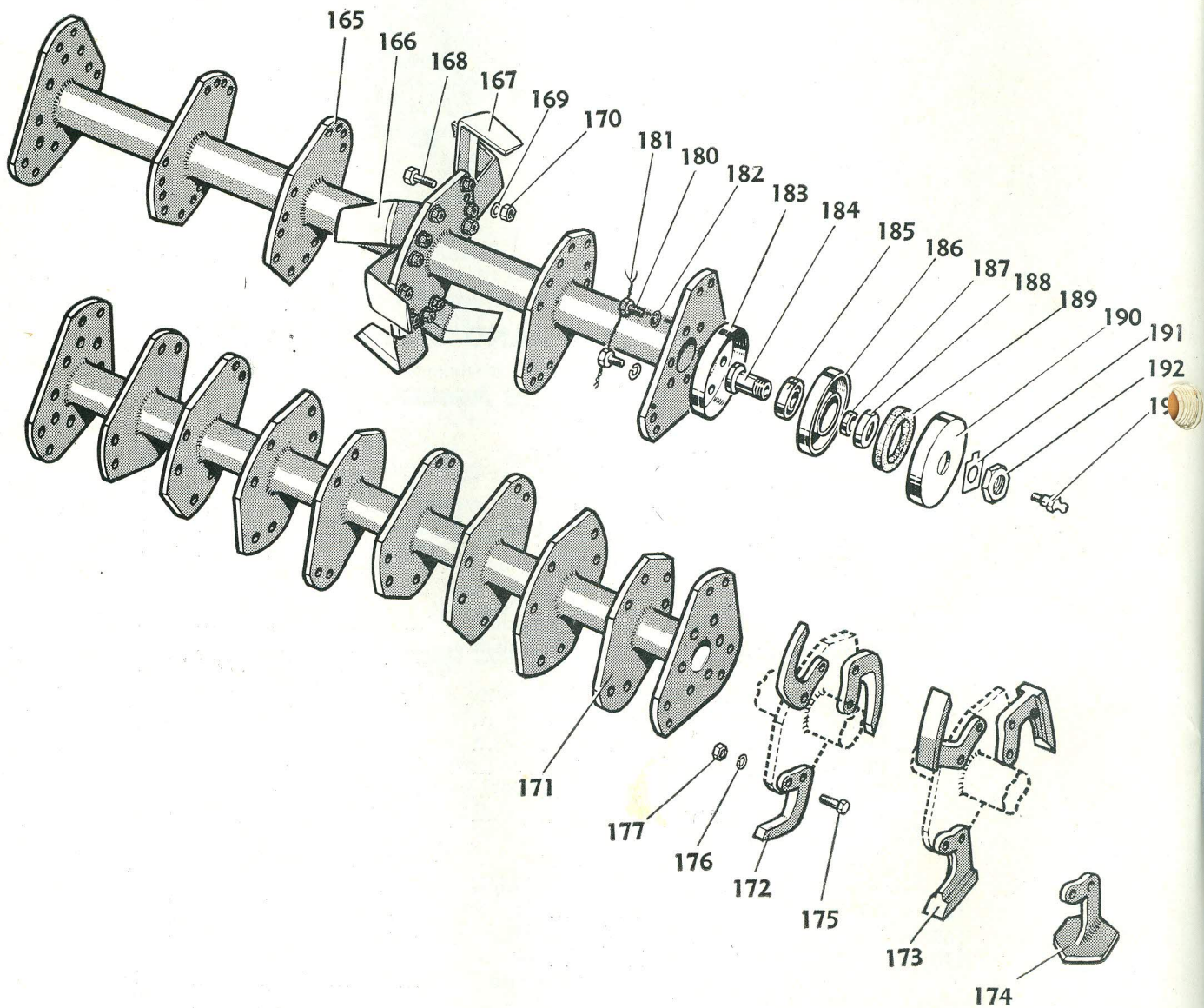


DIAGRAM 6—ROTORS AND BLADES



## Picktine Rotor and Tines

Illust. No.	Part No.	Description					No. off.
	†5338	3-point Picktine Rotor, 36" machine	...	...	...	...	1
171	†3399	3-point Picktine Rotor, 50" machine	...	...	...	...	1
	†5336	2-point Picktine Rotor, 36" machine	...	...	...	...	1
	†3328	2-point Picktine Rotor, 50" machine	...	...	...	...	1
			3-Point Rotor		2-Point Rotor		
			36" M/C	50" M/C	36" M/C	50" M/C	
172	†3906	Lucerne Tine	24	30	16	20	
173	†3905	Picktine	24	30	16	20	
174	†3721	Stone Blade	24	30	16	20	
175	3903	Bolt	48	60	32	40	
176		Spring Washer $\frac{1}{2}$ " dia.	48	60	32	40	
177		Nut, $\frac{1}{2}$ " U.N.F.	48	60	32	40	

x Standard Fitting.    † Alternative Fitting.    \* Special Orders.

## Stub Axle Assembly

180	3337	Special Bolt	...	...	...	...	6
181	3336	Locking Wire, 16 S.W.G. × 15" long	...	...	...	...	1
182		Spring Washer, $\frac{7}{16}$ " dia.	...	...	...	...	6
183	3333	Outer Dust Cover	...	...	...	...	1
184	3340	Stub Axle	...	...	...	...	1
185	BRL. $1\frac{1}{8}$	Ball Bearing, $2\frac{1}{2}$ " O.D. × $1\frac{1}{8}$ " I.D. × $\frac{5}{8}$ " wide	...	...	...	...	1
186	3330	Stub Axle Housing	...	...	...	...	1
187	3338	Spacer	...	...	...	...	1
188		Oilseal, $2\frac{1}{16}$ " O.D. × $1\frac{3}{8}$ " I.D. × $\frac{3}{8}$ " wide	...	...	...	...	1
189	5353	Felt Dust Seal	...	...	...	...	1
190	5356	Dust Cover	...	...	...	...	1
191	2518	Tab Washer	...	...	...	...	1
192	2333	Special Nut	...	...	...	...	1
193		Grease Nipple, $\frac{1}{8}$ " B.S.P.	...	...	...	...	1

## Rotor Support Arm

	3153	Rotor Support Arm Assembly, comprising:—					
200	3118	Support Arm	...	...	...	...	1
201	3339	Key	...	...	...	...	1
202	3820	Depth Skid	...	...	...	...	1
203		Bolt, support arm to depth skid, $\frac{7}{16}$ " U.N.C. × $1\frac{1}{4}$ " long	...	...	...	...	1
204		Spring Washer, $\frac{7}{16}$ " dia.	...	...	...	...	1
205		Nut, $\frac{7}{16}$ " U.N.C.	...	...	...	...	1
206		Bolt, adjusting bar to depth skid, $\frac{7}{16}$ " U.N.C. × $1\frac{1}{4}$ " long	...	...	...	...	1
207		Spring Washer, $\frac{7}{16}$ " dia.	...	...	...	...	1
208		Nut, $\frac{7}{16}$ " U.N.C.	...	...	...	...	1
209	3213	Adjusting Bar	...	...	...	...	1
210		Bolt, support arm to adjusting bar, $\frac{7}{16}$ " U.N.C. × 1" long	...	...	...	...	1
211		Spring Washer, $\frac{7}{16}$ " dia.	...	...	...	...	1
212	3185	R.H. Shield Support	...	...	...	...	1
213		Bolt, $\frac{7}{16}$ " U.N.C. × 1" long	...	...	...	...	1
214		Spring Washer, $\frac{7}{16}$ " dia.	...	...	...	...	1
215	3497	Cutter Blade	...	...	...	...	1
216		Weed Bolt, $\frac{5}{16}$ " U.N.C. × $\frac{3}{4}$ " long	...	...	...	...	2
217		Shakeproof Washer, $\frac{5}{16}$ " dia.	...	...	...	...	2
218		Flat Bright Washer, $\frac{5}{16}$ " dia.	...	...	...	...	2
219	3904a	Blade Setting Bar	...	...	...	...	1



## Staytube and Power Lift Arm Assembly

Illust. No.	Part No.	Description	No. off.
220	5305	Staytube, 36" C.M. ... ..	1
	50489	Staytube, 36" Off-set ... ..	1
	50490	Staytube Extension, 36" Off-set ... ..	1
	3950	Staytube, 40" C.M. ... ..	1
221	3885	Staytube, 50" C.M. ... ..	1
	5089	Staytube, 50" Off-set ... ..	1
	5238	Staytube, 50" C.M. Narrow Track ... ..	1
	5067	Staytube, 50" Off-set Narrow Track ... ..	1
	50855	Staytube, 50" Orchard ... ..	1
	50856	Staytube Extension, 50" Orchard ... ..	1
	24925	Staytube, 60" Off-set ... ..	1
	24998	Staytube, 60" C.M. ... ..	1
	5023	Staytube, 60" Orchard ... ..	1
222		Bolt, to support arm, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long ... ..	5
223		Bolt, to support arm and shield, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{3}{4}$ " long ... ..	1
224		Spring Washer, $\frac{1}{2}$ " dia. ... ..	6
225		Nut, $\frac{1}{2}$ " U.N.C. ... ..	6
226		Bolt, to backplate, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{3}{4}$ " long ... ..	7
226		Bolt, to Backplate, 36" Off-set and 50" Orchard, $\frac{1}{2}$ " U.N.C. $\times$ $2\frac{1}{4}$ " long ... ..	7
227		Bolt, to Backplate and Shield, $\frac{1}{2}$ " U.N.C. $\times$ 2" long ... ..	1
227		Bolt, to Backplate and Shield, 36" Off-set and 50" Orchard $\frac{1}{2}$ " U.N.C. $\times$ $2\frac{1}{2}$ " long ... ..	1
228		Spring Washer, $\frac{1}{2}$ " dia. ... ..	8
229		Nut, $\frac{1}{2}$ " U.N.C. ... ..	8
230	3947	Link ... ..	2
231		Bolt (Link to Mounting Arm), $\frac{5}{8}$ " U.N.C. $\times$ $2\frac{1}{4}$ " long ... ..	2
232		Bolt (link to mounting arm and brace), $\frac{5}{8}$ " U.N.C. $\times$ $\frac{3}{4}$ " long ... ..	2
233		Spring Washer, $\frac{5}{8}$ " dia. ... ..	4
234		Nut, $\frac{5}{8}$ " U.N.C. ... ..	4
235	3899	Connecting Link ... ..	2
236	3911	Draw Pin ... ..	2
237	3912	Hook ... ..	2
238	3913	Chain ... ..	2
239		Bolt, Link to Mounting Arm, $\frac{1}{2}$ " U.N.C. $\times$ $2\frac{1}{2}$ " long ... ..	2
		Nut, $\frac{1}{2}$ " U.N.C. ... ..	2
240	3332	Tab Washer ... ..	4



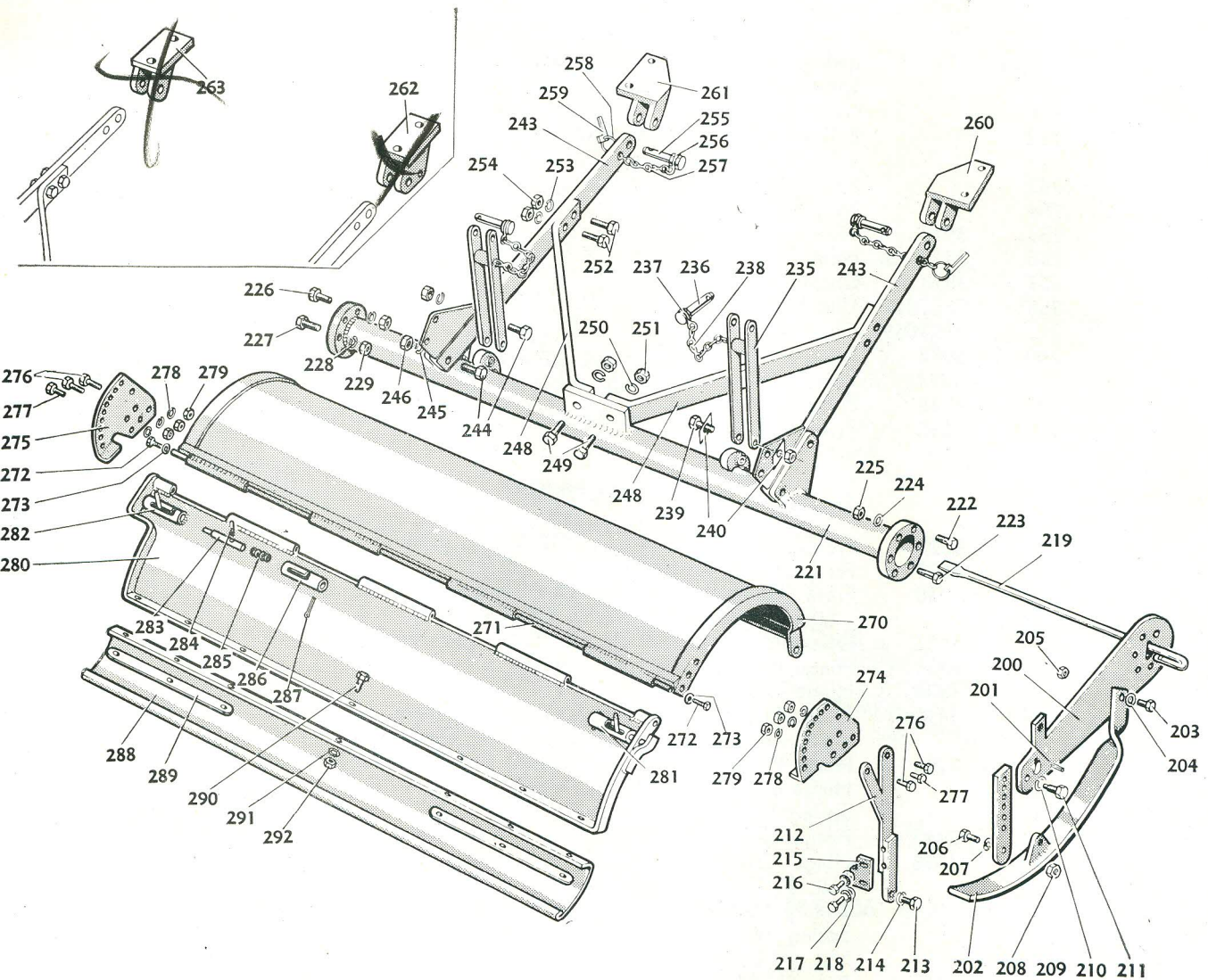


DIAGRAM 7—FRAME AND SHIELDS

### Mounting Arms

Illust. No.	Part No.	Description	No. off.
241	3946	Mounting Arm, L.H. 36" CM. & 40" CM. ....	1
242	3945	Mounting Arm, R.H. 36" CM. & 40" CM. ....	1
243	3889	Mounting Arm, 36" Off-set and all 50" & 60" M/C except 50" Orchard	2
243	3889	Mounting Arm, R.H., 50" Orchard	1
243	3889/1	Mounting Arm, L.H., 50" Orchard	1
244		Bolt, $\frac{5}{8}$ " U.N.C. $\times$ 2" long (Mounting Arm to Staytube)	4
245		Spring Washer, $\frac{5}{8}$ " dia.	4
246		Nut, $\frac{5}{8}$ " U.N.C.	2
247	3963	Brace, 36" CM. & 40" CM.	2
248	3882	Brace, C.M. 50" & 60", Off-set 36", 50" & 60", Orchard 50" & 60"	2
	5237	Brace, CM. 50" Narrow Track/Off-set 50" Narrow Track	2



Illust. No.	Part No.	Description	No. off.
249		Bolt, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{3}{4}$ " long (Brace to Staytube) ...	2
250		Spring Washer, $\frac{1}{2}$ " dia. ...	2
251		Nut, $\frac{1}{2}$ " U.N.C. ...	2
252		Bolt, Mounting Arm to Brace, $\frac{1}{2}$ " U.N.C. $\times$ 2" long ...	4
253		Spring Washer, $\frac{1}{2}$ " dia. ...	4
254		Nut, $\frac{1}{2}$ " U.N.C. ... 36" Off-set, ...	4
255	3910	Draw Pin ... 50" & 60" machines ...	2
256	3912	Hook ...	2
257	3913	Chain ...	2
258	PH.7060	Clip Ring ...	2
259	PH.7059	Clip Pin ...	2
260	5092	Pivot Bracket, R.H. } C.M. 50" & 60", Off-set 36", 50" &	1
261	5093	Pivot Bracket, L.H. } 60", Orchard 50" & 60"	1
262	5236	Pivot Bracket, R.H. }	1
263	5235	Pivot Bracket, L.H. } C.M. & Off-set 50", Narrow Track	1

### Shield Assembly

	5322	Front Shield, 36" C.M. and Off-set ...	1
	3804	Front Shield, 40" CM. ...	1
270	3040	Front Shield, 50" CM., 50" CM. Narrow Track, 50" Off-set, 50" Off-set Narrow Track, 50" Orchard ...	1
	3927	Front Shield, 60" Off-set, 60" C.M. and 60" Orchard ...	1
	5333	Hinge Pin, 36" C.M. and Off-set ...	1
	3805	Hinge Pin, 40" CM. ...	1
271	3490	Hinge Pin, 50" CM., 50" CM. Narrow Track, 50" Off-Set 50" Off-set Narrow Track, and 50" Orchard ...	1
	3996	Hinge Pin, 60" Off-set, 60" C.M., and 60" Orchard ...	1
272		Hinge Bolt, $\frac{3}{8}$ " U.N.C. $\times$ 1" long ...	2
273		Spring Washer, $\frac{3}{8}$ " dia. ...	2
274	3487	Hinge Quadrant, R.H. ...	1
275	3488	Hinge Quadrant, L.H. ...	1
276		Bolt, $\frac{3}{8}$ " U.N.C. $\times$ $1\frac{1}{4}$ " long ...	4
277		Bolt, $\frac{3}{8}$ " U.N.C. $\times$ 1" long ...	2
278		Spring Washer, $\frac{3}{8}$ " dia. ...	6
279		Nut, $\frac{3}{8}$ " U.N.C. ...	6
	5326	Rear Shield, 36" C.M. and Off-set ...	1
	3829	Rear Shield, 40" CM. ...	1
280	3831	Rear Shield, 50" CM. and 50" Narrow Track ...	1
	3041	Rear Shield, 50" Off-set, 50" Off-set Narrow Track and 50" Orchard ...	1
	23401	Rear Shield, 60" Off-set (std.) and 60" Orchard ...	1
	3928	Rear Shield, 60" CM. and 60" Off-set (Swivel Depth Control) ...	1
281	3466	<b>Locking Pin Assembly R.H. comprising:—</b>	
	3468	Locking Pin ...	1
	2475	Handle ...	1
	3492	Spring ...	1
	2441	Spring Tube ...	1
		Splitpin, $\frac{3}{32}$ " dia. $\times$ $1\frac{1}{4}$ " long ...	1
282	3467	<b>Locking Pin Assembly L.H. comprising:—</b>	
283	3468	Locking Pin ...	1
284	2475	Handle ...	1
285	3492	Spring ...	1
286	2440	Spring Tube ...	1
287		Splitpin, $\frac{3}{32}$ " dia. $\times$ $1\frac{1}{4}$ " long ...	1



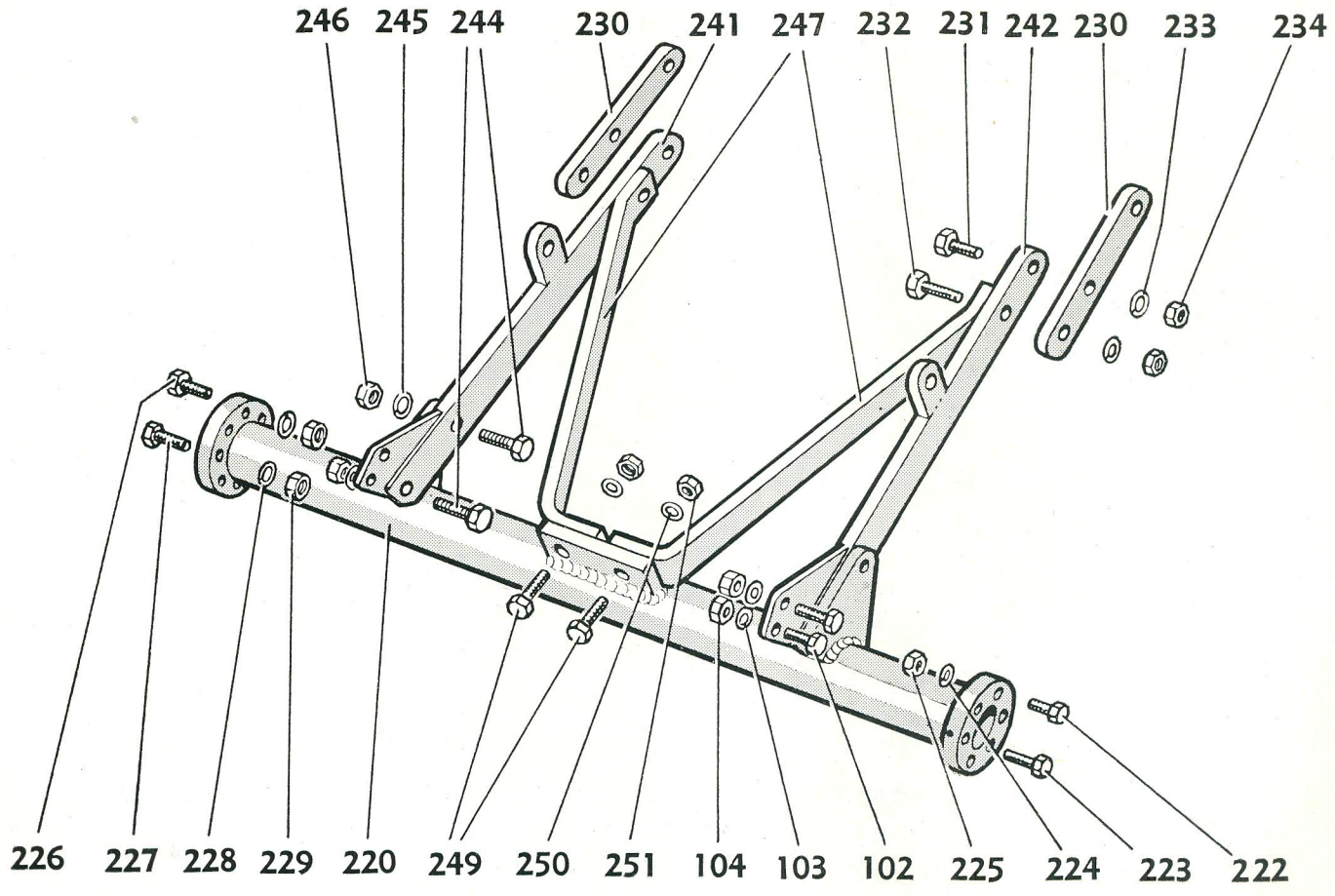


DIAGRAM 8—STAYTUBE AND MOUNTING ARMS, 36" and 40" Machines

### Screed Plate

Illust. No.	Part No.	Description	No. off.
	5329	Screed Plate, 36" C.M. and Off-set	1
	3834	Screed Plate, 40" C.M.	1
288	3836	Screed Plate, 50" CM. and 50" CM. Narrow Track	1
	3469	Screed Plate, 50" Off-set, 50" Off-set Narrow Track and 50" Orchard	1
	23402	Screed Plate, 60" Off-set (Std.) and 60" Orchard	1
	3997	Screed Plate, 60" CM. and 60" Off-set (Swivel Depth Control	1
289	3489	Support Strip	2
		50", 60" M/C 60" M/C	
		36" M/C Off-set C.M.	
290		Bolt, $\frac{5}{16}$ " U.N.C. $\times$ $\frac{7}{8}$ " long	6 7 9
291		Spring Washer, $\frac{5}{16}$ " dia.	6 7 9
292		Nut, $\frac{5}{16}$ " U.N.C.	6 7 9



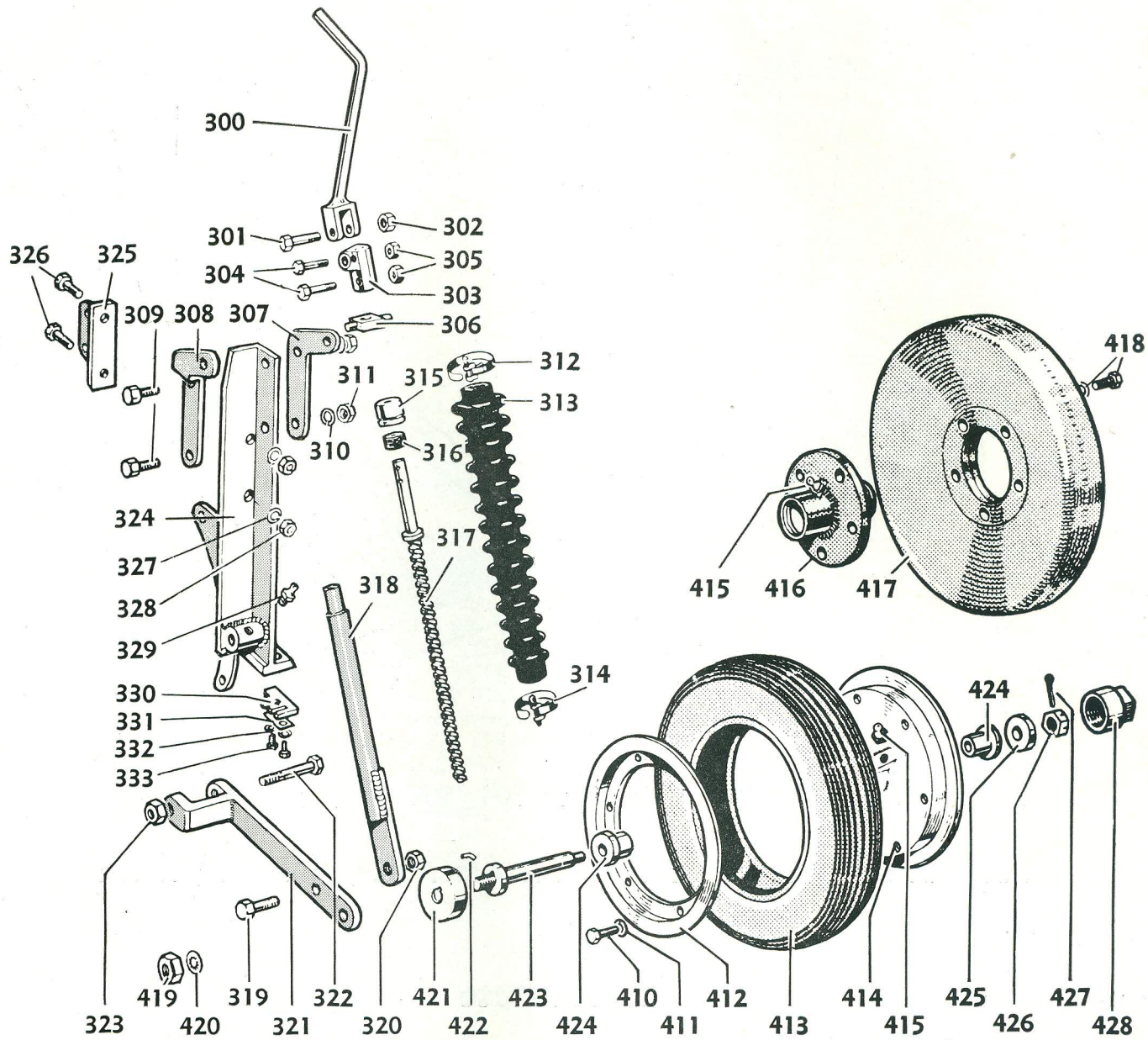


DIAGRAM 9—DEPTH CONTROL C. M. MODELS

**Depth Control, Centrally Mounted Models  
Also alternative on 60" Off-set Model**

Illust. No.	Part No.	Description	No. off.
300	3448	Handle	1
301		Bolt, $\frac{3}{8}$ " U.N.C. $\times$ $2\frac{3}{8}$ " long	1
302		Nut, $\frac{3}{8}$ " U.N.C.	1
303	3449	Handle Block	1
304		Bolt, $\frac{1}{4}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long	2
305		Nut, $\frac{1}{4}$ " U.N.C.	2
306	2385	Trunnion	1
307	2386	Trunnion Support Straight	1
308	2387	Trunnion Support Cranked	1



Illust. No.	Part No.	Description	No. off.
309		Bolt, Trunnion Supports to body, $\frac{1}{2}$ " U.N.C. $\times$ 2" long	2
310		Spring Washer, $\frac{1}{2}$ " dia.	2
311		Nut, $\frac{1}{2}$ " U.N.C.	2
312	3395	Clip, Long	1
313	2398	Gaiter	1
314	3394	Clip, Short	1
315	2399	Dust Cap	1
316	SFL- $\frac{3}{4}$ "	Thrust Bearing, $1\frac{17}{32}$ " O.D. $\times$ $\frac{3}{4}$ " I.D. $\times$ $\frac{5}{8}$ " wide	1
317	3685	Screw	1
318	3689	Screw Tube	1
319		Bolt, Screw Tube to Arm, $\frac{5}{8}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long	1
320		Locknut, $\frac{5}{8}$ " U.N.C.	1
321	3719	Wheel Arm	1
322	3720	Pivot Bolt	1
323		Locknut, $\frac{5}{8}$ " U.N.C.	1
324	5330	Depth Control Body	1
325	3686	Body Support	1
326		Bolt, Body Support to Body, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{1}{4}$ " long	2
327		Spring Washer, $\frac{1}{2}$ " dia.	2
328		Nut, $\frac{1}{2}$ " U.N.C.	2
329		Grease Nipple, $\frac{1}{8}$ " B.S.P.	1
330	23795	Cutter Blade	1
331	3678	Weed Backing Strip	1
332		Shakeproof Washer, $\frac{3}{8}$ " dia. Internal	2
333		Bolt, $\frac{3}{8}$ " U.N.C. $\times$ $\frac{3}{4}$ " long	2

### Depth Control, Offset and Orchard Models

340	2790	Handle	1
341		Bolt, $\frac{1}{4}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long	2
342		Nut, $\frac{1}{4}$ " U.N.C.	2
343	2385	Trunnion	1
344	2386	Trunnion Support, Straight	1
345	2387	Trunnion Support, Cranked	1
346	3682	Plate	1
347		Bolt, Trunnion Supports to Body, $\frac{1}{2}$ " U.N.C. $\times$ 2" long	2
348		Spring Washer, $\frac{1}{2}$ " dia.	2
349		Nut, $\frac{1}{2}$ " U.N.C.	2
350	3395	Clip, Long	1
351	2398	Gaiter	1
352	3394	Clip, Short	1
353	2399	Dust Cap	1
354	SFL- $\frac{3}{4}$ "	Thrust Bearing, $1\frac{17}{32}$ " O.D. $\times$ $\frac{3}{4}$ " I.D. $\times$ $\frac{5}{8}$ " wide	1
355	3685	Screw	1
356	3689	Screw Tube	1
357		Bolt, Screw Tube to Arm, $\frac{5}{8}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long	1
358		Locknut, $\frac{5}{8}$ " U.N.C.	1
359	3692	Wheel Arm	1
360	3693	Pivot Bolt	1
361		Locknut, $\frac{5}{8}$ " U.N.C.	1
362	3177	Depth Control Body	1
363	3686	Body Support	1
364		Bolt, Body Support to Body, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{1}{4}$ " long	2
365		Spring Washer, $\frac{1}{2}$ " dia.	2
366		Nut, $\frac{1}{2}$ " U.N.C.	2
367		Grease Nipple, $\frac{1}{8}$ " B.S.P.	1



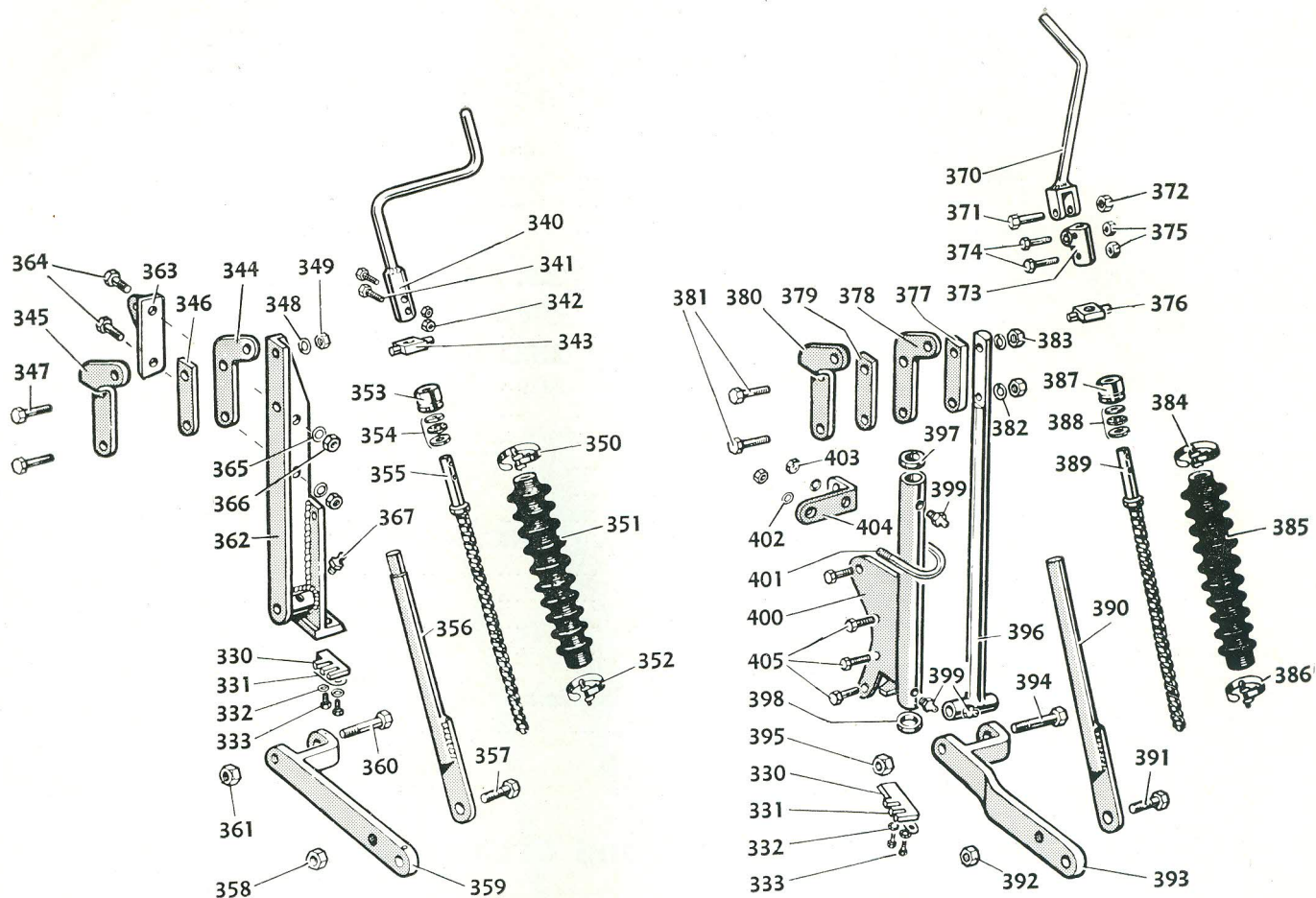


DIAGRAM 10—DEPTH CONTROL OFFSET MODELS  
AND SWIVEL DEPTH CONTROL

**Swivel Depth Control Assembly Alternative on :-**

Centrally Mounted 50" & 60", Centrally Mounted 50" Narrow Track, and Off-set 60" Models with alternative Shield.

Illust. No.	Part No.	Description	No. off.
370	3448	Handle	1
371		Handle Pivot Bolt, $\frac{3}{8}$ " U.N.C. $\times$ $2\frac{3}{8}$ " long	1
372		Nut, $\frac{3}{8}$ " U.N.C.	1
373	3449	Handle Block	1
374		Bolt, $\frac{1}{4}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long, Handle Block to Screw	2
375		Nut, $\frac{1}{4}$ " U.N.C.	2
376	2385	Trunnion	1
377	5387	Spacer	1
378	2386	Trunnion Support, Straight	1
379	3682	Plate	1
380	2387	Trunnion Support, Cranked	1
381		Bolt, $\frac{1}{2}$ " U.N.C. $\times$ $3\frac{1}{2}$ " long	2
382		Spring Washer, $\frac{1}{2}$ " dia.	2
383		Nut, $\frac{1}{2}$ " U.N.C.	2



Illust. No.	Part No.	Description	No. off.
384	3395	Clip, Long	1
385	2398	Gaiter	1
386	3394	Clip, Short	1
387	2399	Dust Cap	1
388	SFL $\frac{3}{4}$ "	Thrust Bearing, $1\frac{17}{32}$ " O.D. $\times$ $\frac{3}{4}$ " I.D. $\times$ $\frac{5}{8}$ " wide	1
389	3685	Screw	1
390	5385	Screw Tube	1
391		Bolt, Screw Tube to Arm, $\frac{5}{8}$ " U.N.C. $\times$ $1\frac{1}{2}$ " long	1
392		Locknut, $\frac{5}{8}$ " U.N.C.	1
393	5395	Wheel Arm	1
394	3693	Pivot Bolt	1
395		Locknut, $\frac{5}{8}$ " U.N.C.	1
396	5397	Swivel	1
397	2231	Top Ring	1
398	2232	Bottom Ring	1
399		Grease Nipple, $\frac{1}{8}$ " B.S.P.	3
400	5251	Depth Control Body	1
401	22486	'U' Bracket	1
402		Spring Washer, $\frac{3}{8}$ " dia.	2
403		Nut, $\frac{3}{8}$ " B.S.W.	2
404	5253	Shield Support	1
405		Bolt, $\frac{7}{16}$ " $\times$ $1\frac{5}{8}$ " long (Replaces Bolts, Illus. No. 125)	4

### Depth Control Wheel (standard, rubber)

410		Bolt, $\frac{7}{16}$ " U.N.C. $\times$ $1\frac{1}{8}$ " long	6
411		Spring Washer, $\frac{7}{16}$ " dia.	6
412	3700/2	Rim	1
413	3704	Tyre	1
414	3324	Wheel	1

### Depth Control Wheel (alternative, steel)

415		Grease Nipple, $\frac{1}{8}$ " B.S.P.	1
416	5381	Wheel Hub	1
417	5382	Wheel	1
418		Bolt, $\frac{7}{16}$ " U.N.C. $\times$ $1$ " long	5
		Spring Washer, $\frac{7}{16}$ " dia.	5

### Axle Assembly

419		Nut, $\frac{3}{4}$ " U.N.C.	1
420		Shakeproof Washer, $\frac{3}{4}$ " dia., Internal	1
421	3705	Dust Cover	1
422	3714	Nib	1
423	3326	Axle	1
424	3701	Bush	2
425	3703	Special Washer	1
426		Slotted Nut, $\frac{1}{2}$ " U.N.C.	1
427		Splitpin, $\frac{3}{32}$ " dia. $\times$ $1\frac{1}{4}$ " long	1
428	3706	Cap	1



## Lift Stop Assembly (Optional)

Illust. No.	Part No.	Description	No. off.
440	5681	Sliding Arm	...
441	5682	Fixed Tube	...
442	5692	Pivot Pin	...
443	5694	Side Plate	...
444		Washer, $\frac{5}{8}$ " dia.	...
445		Splitpin, $\frac{1}{16}$ " dia. × 1" long	...
446	5696	Draw Pin	...
447	5697	Chain	...
448	3912	Hook	...
449	PH.7059	Clip Pin	...
450	PH.7060	Clip Ring	...

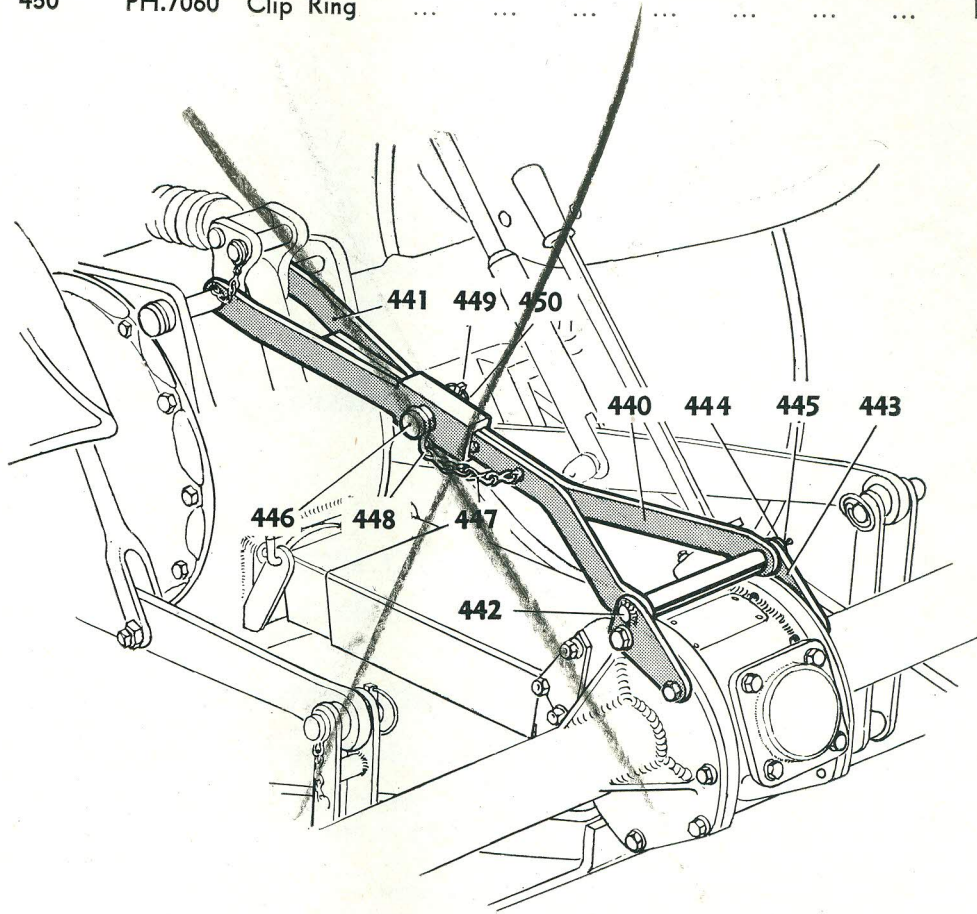


DIAGRAM II—LIFT STOP

To relieve the tractor hydraulic system if it is intended to transport the rotavator over long

distances the Lift Stop illustrated above has been designed and is available as an extra fitment.



## Coffee Rotor Conversion Unit Rotor Assembly

Illust. No.	Part No.	Description	No. off.
460	5359	Rotor	1
461	5289	Special Blade Bolt	12
462	3903	Blade Bolt	40
		Spring Washer, $\frac{1}{2}$ " dia.	52
		Nut, $\frac{1}{2}$ " U.N.F.	52
463	5294	Blade	16

## Staytube Assembly

464	50877	Staytube (Off-set Rotavator)	1
464	50872	Staytube (Centrally Mounted Rotavator)	1
465	5285	Scraper Blade	3
466		Bolt, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{1}{2}$ " L.	6
		Nut, $\frac{1}{2}$ " U.N.C.	6
		Spring Washer, $\frac{1}{2}$ " dia.	6
467	3281	Laminated Spacer	12
468		Bolt, $\frac{1}{2}$ " U.N.C. $\times$ 2" L. (from Machine No. 16034, replaces Bolt, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{1}{2}$ " L.)	5
469		Bolt, $\frac{1}{2}$ " U.N.C. $\times$ $2\frac{1}{4}$ " L. (from Machine No. 16034, replaces Bolt, $\frac{1}{2}$ " U.N.C. $\times$ $1\frac{3}{4}$ " L.)	1
470	5683	Spacer Disc (Required on Machines from and including Serial No. 16034)	1
	5291	L.H. Cutter Blade (not illustrated)	1
471	5290	R.H. Cutter Blade	1

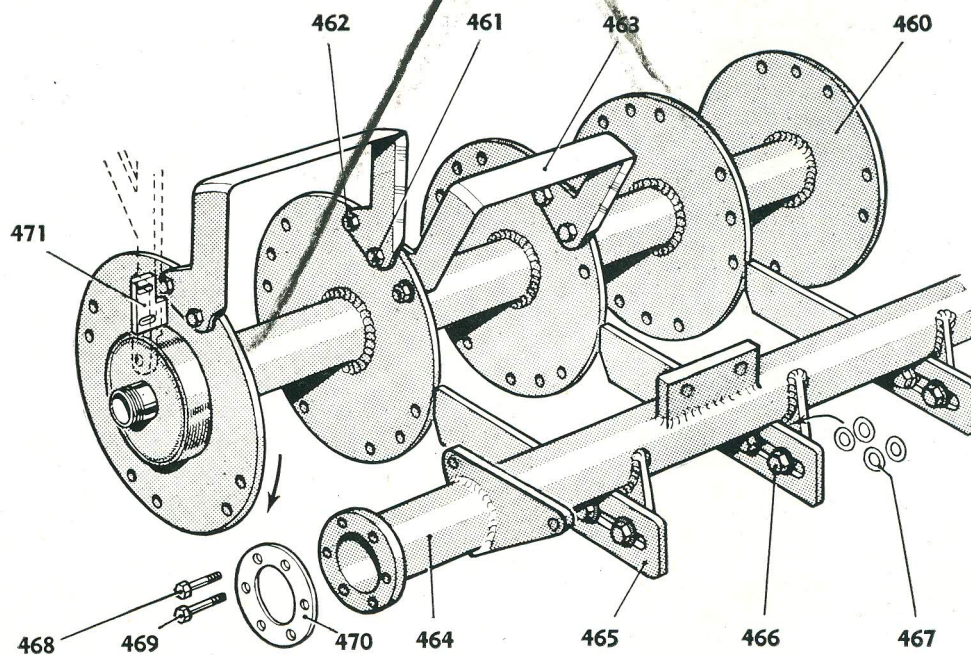


DIAGRAM 12—COFFEE ROTOR CONVERSION UNIT



## List of Part Numbers in numerical order

with equivalent Illustration Numbers.

Part No.	Illus. No.	Part No.	Illus. No.	Part No.	Illus. No.	Part No.	Illus. No.	Part No.	Illus. No.
G.711	74	3275	15	3700/2	412	3957	89	5369	36
2231	397	3275	33	3701	424	3962	100	5381	416
2232	398	3281	467	3703	425	3963	247	5382	417
2333	96	3288/2	25	3704	413	3996	271	5385	390
2333	192	3288/2	43	3705	421	3997	288	5387	377
2385	306	3294	19	3706	428	5023	221	5395	393
2385	343	3294	37	3714	422	5024	161	5397	396
2385	376	3306	4	3719	321	5025	160	5671	151
2386	307	3324	414	3720	322	5027	71	5676	155
2386	344	3326	423	3721	174	5065	101	5678	153
2386	378	3328	171	3804	270	5067	221	5679	152
2387	308	3329	165	3805	271	5070		5679	156
2387	345	3330	186	3820	202	5071	23	5681	440
2387	380	3332	240	3823	165	5075	18	5682	441
2398	313	3333	183	3829	280	5086	101	5683	470
2398	351	3336	181	3831	280	5089	221	5692	442
2398	385	3337	180	3834	288	5092	260	5694	443
2399	315	3338	187	3836	288	5093	261	5696	446
2399	353	3339	201	3869	51	5224	166	5697	447
2399	387	3340	184	3879	58	5225	167	7046	1
2440	286	3394	314	3881	72	5226	166	7059	259
2441	286	3394	352	3882	248	5227	167	7059	449
2475	284	3394	386	3885	221	5235	263	7060	258
2518	97	3395	312	3886	101	5236	262	7060	450
2518	191	3395	350	3887	89	5237	248	14034	162
2635	119	3395	384	3888	87	5238	221	22287	30
2635	159	3399	171	3889	243	5240	89	22288	47
2654	73	3400	165	3889/1		5241	400	22289	34
2657	76	3406	165	3890	94	5242	101	22294	35
2790	340	3448	300	3891		5253	404	22329	154
2895	12	3448	370	3892		5285	465	22486	401
3040	270	3449	303	3893	57	5289	461	22509	17
3041	280	3449	373	3894	56	5290	471	22528	24
3090	93	3466	281	3895	79	5291		22528	42
3097	100	3467	282	3896	80	5294	463	22530	20
3111	110	3468	283	3899	235	5305	220	22530	38
3118	200	3469	288	3900	166	5307	100	22531	21
3119	121	3487	274	3901	167	5308	101	22531	39
3121	113	3488	275	3903	168	5315	165	22532	16
3124		3489	289	3903	175	5317	167	22937	29
3125	112	3490	271	3903	462	5318	166	23316	100
3150	142	3492	285	3904a	219	5322	270	23401	280
3153		3497	215	3905	173	5326	280	23402	288
3154	27	3504	115	3906	172	5329	288	23795	330
3154	45	3614	98	3910	255	5330	324	24925	221
3155	28	3620	63	3911	236	5333	271	24995	101
3155	46	3621	62	3912	237	5335	165	24998	221
3156	146	3636	86	3912	256	5336	171	50485	100
3157	116	3678	331	3912	448	5338	171	50486	101
3159	148	3682	346	3913	448	5341	137	50489	220
3160	149	3682	379	3913	238	5343	140	50490	
3172	5	3685	317	3913	257	5346	12	50855	221
3173	7	3685	355	3914	6	5347	13	50856	
3174	2	3685	389	3917	100	5347	31	50860	101
3175	3	3686	325	3927	270	5353	189	50863	140
3185	212	3686	363	3928	280	5354	150	50872	464
3196	32	3689	318	3945	242	5356	190	50877	464
3203	131	3689	356	3946	241	5359	460		
3209	157	3692	359	3947	230	5365			
3211	135	3693	360	3950	220	5366	30		
3213	209	3693	394	3955	101	5367	41		



## WARRANTY

All machines supplied by the Company are sold with the benefit of and subject to the following conditions:—

1.—In the event of any defect being disclosed in any part or parts of any machine supplied by the Company, within six months from the date when such machine is delivered new to the retail customer, the Company undertakes to examine the part alleged to be defective and, should any fault due to defective materials or workmanship be found on such examination, to repair the defective part or, at the option of the Company, to supply free of charge a new part in place of it. This undertaking is limited to the delivery to the retail customer free at the Company's Works of the new or repaired part in exchange for that acknowledged by the Company to be defective and the Company will not be responsible for carriage, or for labour charges incurred in the refitting of such part. The decision of the Company on all claims and on all questions as to defects and to the exchange of any part shall be final and conclusive.

2.—The above undertaking does not apply to, and the Company shall in no way be liable for, either

- (a) defects caused by wear and tear, misuse or neglect, or to defects in any machine which has been altered outside the Company's Works or the identification number of which has been altered, removed or defaced; or
- (b) defects in any part not of the Company's own manufacture.

3.—The Company gives no Warranty in respect of any machines supplied by it other than that stated above and the Company shall be under no liability whatsoever by reason of any express or implied conditions, statement or warranty, statutory or otherwise not stated above, or in respect of any loss, damage, injury or expense, consequential or otherwise, even where such loss damage injury, or expense was caused by the negligence or breach of duty of the Company, its servant or agents.

4.—In order to avail himself of the above undertaking the retail customer must send to the Company's Works promptly on the discovery of the alleged defect any part which is alleged to be defective, and carriage is to be prepaid by the retail customer. Such part must be properly packed for transit and clearly marked for identification with the name and full address of the retail customer and with the number of the machine from which it was taken. The Company shall not be liable for any loss or damage, howsoever caused occurring to such part while in transit or in possession of the Company.

5.—The above undertaking is personal to the retail customer and shall not be assigned or transferred to anyone

N.B.—Persons dealing in the Company's goods are in no way agents of the Company and have no right or authority to bind it in any way or to assume on its behalf any obligation expressed or implied.

ROTARY HOES LTD.,  
WEST HORNDON, ESSEX,  
ENGLAND.





*A*

*True Benefit to Mankind*

'And he gave it for his opinion that whosoever could make two ears of corn, or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country.'

"Gulliver's Travels"—Jonathan Swift 1667-1745