HOWARD

Howard Rotavator E Series IV Operating Instructions

CONTENTS

SPECIFICATION

All directions, left or right, are given from the rear of the Rotavator, facing towards the tractor.

HORSE-POWER RANGE

E 40, 50, 60 and 70
For tractors with standard category I or II, 3-point linkage and with 30-60 b.h.p. at the p.t.o.

E 80 AND 90
For tractors with category II linkage only, with 50-65 b.h.p. at the p.t.o.

WIDTH OF TILLAGE

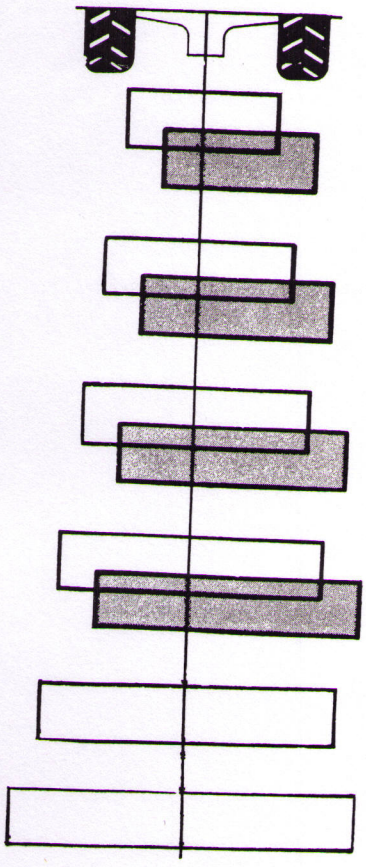
40" (102 cms.), 50" (127 cms.), 60" (152 cms.), 70"(178cms.) 80"(203cms.) and 90"(229cms.).

DEPTH OF CUT

Adjustable to 8" (20 cms.) max.

ROTOR POSITIONS BEHIND TRACTOR

The E Series Rotavator can be mounted to the tractor either centrally or offset, except for the E 80 and 90 which are centrally-mounted only. The diagram shows rotor positions relative to tractor centre-line.



E 40 (Central)
20" (51 cms.) to left
20" (51 cms.) to right

E 40 (Offset)
10" (26 cms.) to left
30" (76 cms.) to right

E 50 (Central)
25" (63 cms.) to left
25" (63 cms.) to right

E 50 (Offset)
15" (38 cms.) to left
35" (89 cms.) to right

E 60 (Central)
30" (76 cms.) to left
30" (76 cms.) to right

E 60 (Offset)
20" (51 cms.) to left
40" (102cms.) to right

E 70 (Central)
35" (89 cms.) to left
35" (89 cms.) to right

E 70 (Offset)
25" (64 cms.) to left
45" (114 cms.) to right

E 80 (Central only)
40" (102 cms.) to left
40" (102 cms.) to right

E 90 (Central only)
45" (114 cms.) to left
45" (114 cms.) to right

SELECTATILTH GEARBOX

A multi-speed gearbox providing variable rotor speed.

OIL CAPACITY

Selectatilth Gearbox—4 pints (2½ litres).
Chaincase—2 pints (1¼ litres).

TRANSMISSION

By Universal Drive Splined Shaft from tractor power-take-off to Selectatilth Gearbox, then through heavy duty jack-shaft and 1½" (3.8 cms.) pitch drive to the chain to the rotor. The machine transmission is protected by a multi-plate clutch between the tractor p.t.o. shaft and the Selectatilth gearbox.

CONTROLS

E 40, 50, 60 and 70

(a) Depth control by adjustable land wheel.
(b) Tilth control by (1) Adjustable rear shield,
(2) Selectatilth gearbox.
(c) Depth limit skid by adjustable ratchet clamp on right-hand side of the rotor.

E 80 and 90

(a) Depth control by twin hand-adjusted pneumatic wheels with 5.20 x 12 tyres, or depth limit skid on left-hand side of rotor with adjustable depth control skid on right-hand side of rotor.
(b) Tilth control by (1) Adjustable twin rear Shields,
(2) Selectatilth gearbox.

ROTOR

Standard rotor drilled for 2- or 3-bladed systems; will also take coffee blades.

ALTERNATIVE ROTORS

Rowcrop Rotor: with slip flanges and crop guards for inter-row work. Spike Rotor.

STANDARD NUTS AND BOLTS

Unified series threads are used throughout the machine.

SERIAL NUMBER

The serial number of the Rotavator is stamped on:— (1) the brass plate on the inside of the chaincase back-plate, above the shield, and (2) on the right-hand staytube flange to which the mounting plate is bolted.

DIMENSIONS

	E 40	E 50	E 60	E 70	E 80	E 90
Width overall	52" (132 cms.)	62" (157 cms.)	72" (183 cms.)	82" (208 cms.)	97" (246 cms.)	107" (272 cms.)
Length (less drive shaft)	50" (127 cms.)				54" (137 cms.)	
Height (including topmast)	48" (122 cms.)				50" (127 cms.)	
Weight	950 lb. (430 kg.)	970 lb. (445 kg.)	1,030 lb. (475 kg.)	1,150 lb. (530 kg.)	1,344 lb. (610 kg.)	1,484 lb. (693 kg.)

SELECTATILTH GEARBOX

Rotor speed is altered by simply transposing or changing the pairs of pick-off gears in the Selectatilth gearbox, so that the correct 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 and result in increased blade wear. Therefore, use the slowest rotor speed that will provide the type of tilth required. If rotor speed is too slow, the soil, especially if wet and heavy, may block the rotor. If this happens, use either a slightly faster rotor speed or change to the 2-blade rotor system (described on page 13).

ROTOR SPEED GRAPHS

The rotor speed graphs show the 'cut' per blade at different rotor speeds for a 3-blade rotor, and a 2-blade rotor. In the 2-blade system, only two cuts per rotor revolution are made, and, in effect, increase by 1.5 the length of the 'cut' that would be made by the 3-blade rotor at the same travel speed and with the same gear arrangement.

SELECTATILTH GEARS

Two pairs of Selectatilth gears are supplied with each machine. These standard gears give the following rotor speeds at 540 r.p.m. tractor p.t.o. speed.

Colour	Ratio	Rotor Speed
Blue	15T driving 20T	122 r.p.m.
Orange	17T " 18T	153 r.p.m.
Orange	18T " 17T	172 r.p.m.
Blue	20T " 15T	216 r.p.m.

Optional gears (available to order) include grey 14T/21T (giving 110 and 245 r.p.m.), white 16T/19T (giving 140 and 195 r.p.m.), black 13T/22T (giving 95 r.p.m. only) and red 12T/23T (giving 85 r.p.m. only).

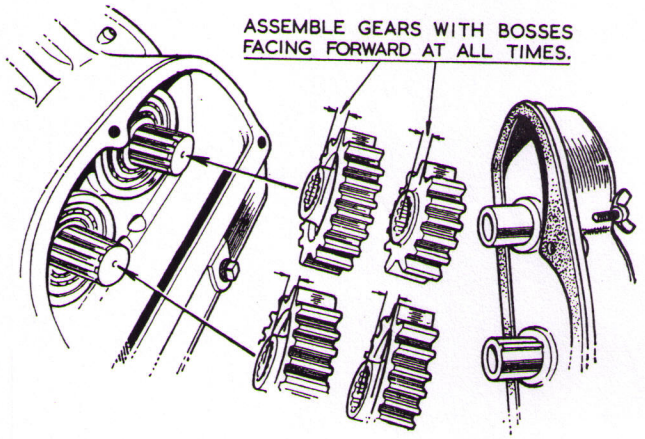
1,000 r.p.m. P.T.O. TRACTORS

Where tractors with 1,000 r.p.m. P.T.O. shaft speeds are used the red gears (12T/23T) and the grey gears (14T/21T) should be specified. They should be used only in the 'slow' position (smallest to the right) to give rotor speeds of 155 and 200 r.p.m. The black and the blue gears can also be used in the 'slow' position, giving 180 and 230 r.p.m. respectively at 1,000 r.p.m. tractor P.T.O. speed. A special Universal Joint Yoke is required to suit certain 1,000 r.p.m. P.T.O. tractors.

CHANGING SELECTATILTH GEARS

1. Stop the tractor engine and disengage the tractor P.T.O.
2. Remove gearbox cover on which the 'spare' pair of gears is carried.
3. Transpose the gears or change for the spare pair. Do not mix the colours. When the smaller gear of the pair is on the right the slower of the two speeds will be obtained. Slide the gears on the shafts with the protruding boss of the gear against the bearing. (The spline is cut so that it will only fit one way).

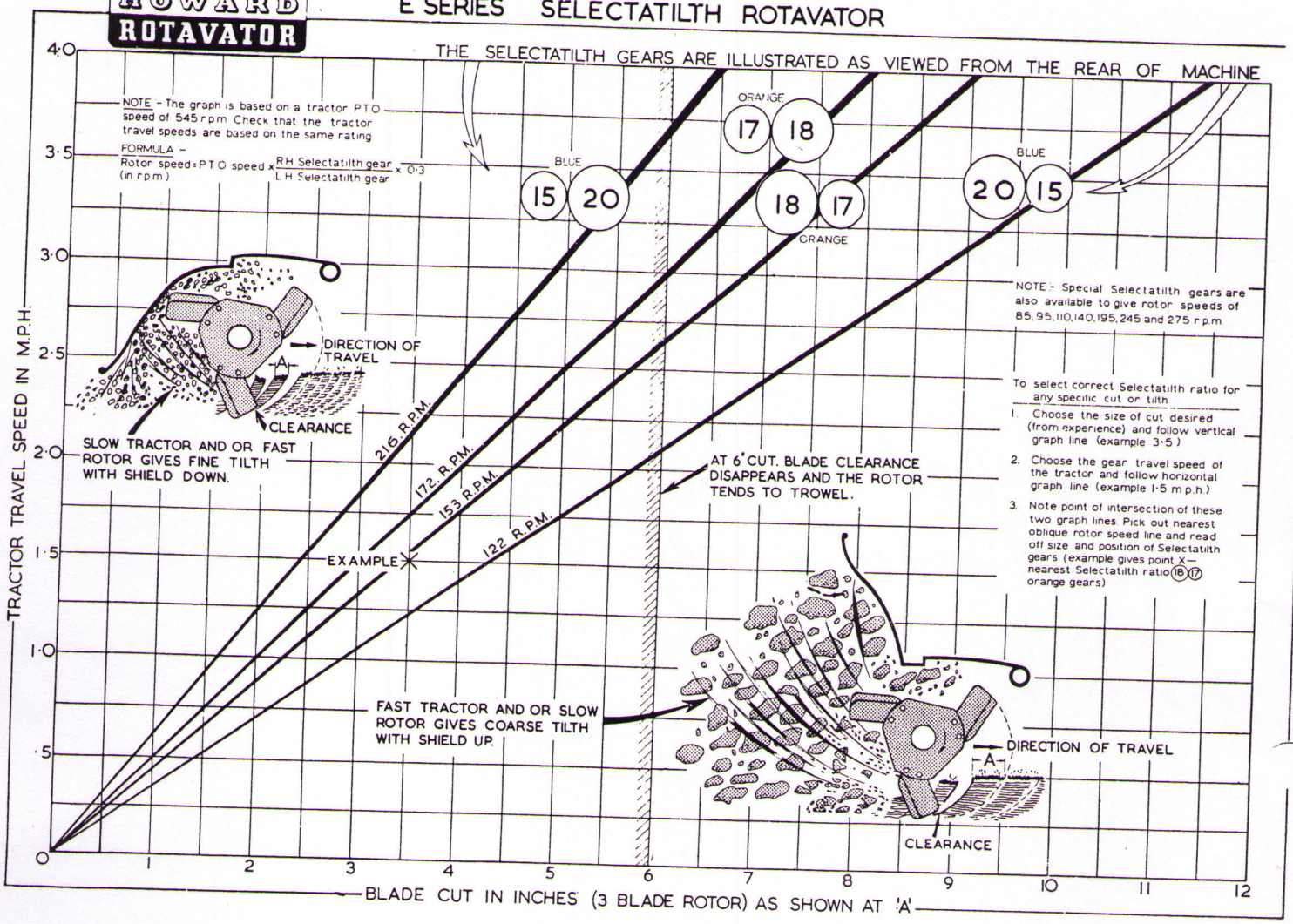
Never operate the Rotavator without the spare pair of gears fitted to the posts on the gear case lid, boss to the front. (There is a small key on one post which engages with a spline in the gear hub, preventing either gear from turning).



3 BLADE ROTOR

ROTOR SPEED GRAPH
FOR
'E' SERIES SELECTATILTH ROTAVATOR

HOWARD ROTAVATOR



MOUNTING THE ROTAVATOR

THE NEW MACHINE

On receipt of the new Rotavator:

1. Check oil levels in gearbox and chaincase. (Use gear oil S.A.E. 90). Refer to lubrication chart.
2. Check all nuts and bolts for tightness—see charts on pages 9, 10 and 11.
3. Bolt the mounting plates and pins in the correct position for the tractor to be used and tighten bolts hard.
4. After a few hours' work retighten all nuts and bolts.

ADJUSTMENT OF TRACTOR LINKAGE FOR FLOATING POSITION

It is essential that the Rotavator should be able to ride easily over any obstructions.

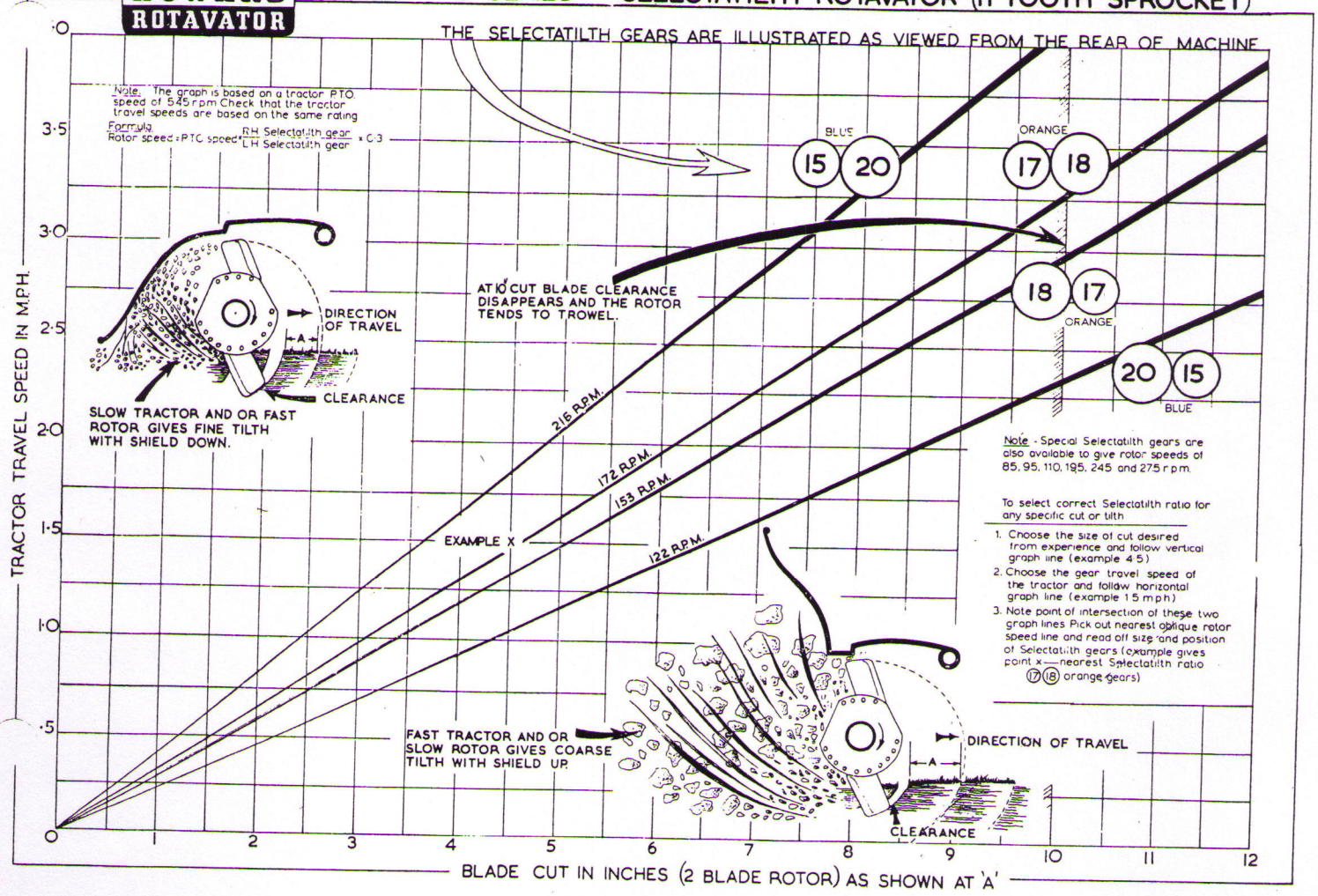
There must therefore be no downward pressure from the tractor hydraulic system, and all 'Down Pressure' pins or means of applying downward pressure should be removed.

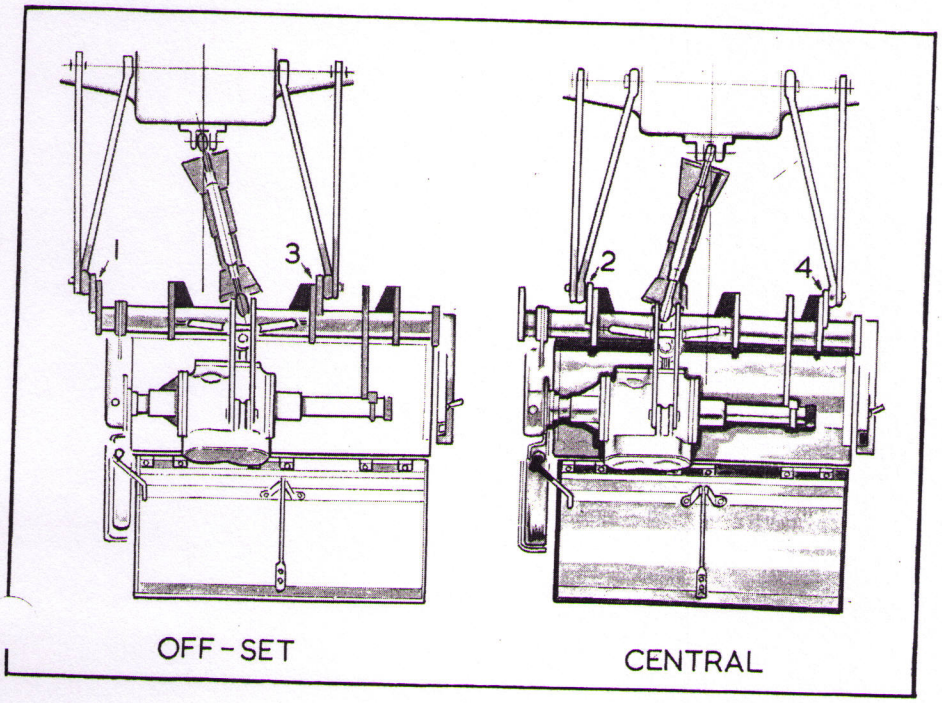
On many tractors the lift rods have an adjustable collar for exerting such pressure. This collar must be moved to its lowest position so that both lift rods may 'float' and allow the Rotavator to lift should it hit an obstacle.

2 BLADE ROTOR

ROTOR SPEED GRAPH
FOR
'E' TYPE SERIES SELECTATILTH ROTAVATOR (11 TOOTH SPROCKET)

HOWARD ROTAVATOR





MOUNTING

The illustration shows the alternative positions in which the E Mounted Universal Rotavator can be fitted to the tractor. Using mounting flanges 1 and 3 the Rotavator is offset to the right-hand side, using mounting flanges 2 and 4 the Rotavator is mounted centrally behind the tractor.

Having decided in which of these two positions you require the Rotavator to work refer to the chart on page 6. This chart gives the positions of the mounting plates on the mounting flanges for each individual tractor. If your tractor is not mentioned in the chart use the procedure shown on page 8.

E SERIES TRACTOR MOUNTING CHART

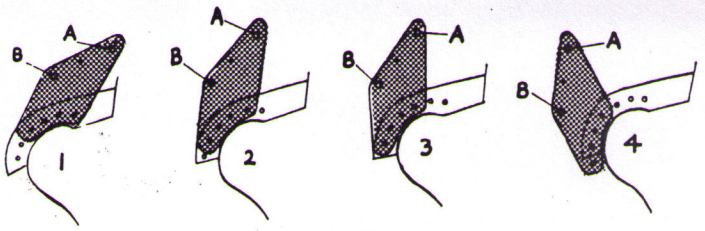
Tractor	Mounting Plate Diagram*	Mounting Plate Direction	Mounting Flange Holes	Mounting Pin Hole and Pin Direction	Top Link Hole Position (Tractor)	Top Link Length Ins. (cms.)	L.H. Lift Rod Length Ins. (cms.)	Special Instructions
David Brown 850,950	3	Backwards	3,4,5,6	B	–	–	–	
David Brown 880 †	3	Backwards	3,4,5,6	B Out	–	37" (94)	18" (46)	Use rear holes on lower links for lift rods.
David Brown 990. . . .	3	Backwards	3,4,5,6	B Out	–	37" (94)	17½" (45)	Use forward holes on lower links for lift rods. Use 1000 r.p.m. p.t.o. and special Selectatilth gears.
David Brown 990 Selectamatic.	3	Backwards	3,4,5,6	B Out	–	25" (63)	21" (53)	
David Brown 1200	3	Backwards	3,4,5,6	B Out	–	24½" (62)	18" (45)	
County Crawler P55	2	Backwards	2,3,4,5	A Out	Vertically above P.T.O.	30½" (77.5)	–	Maximum ground clearance 6½" (16.5 cms.) under blades. Ensure stabiliser chains are tight.
John Deere 710. . . .	3	Backwards	3,4,5,6	B Out	–	27" (69)	25½" (65)	Use 540 r.p.m. p.t.o. if offset and 1000 r.p.m. p.t.o. if centrally mounted.
John Deere 1020. . .	4	Backwards	4,5,6	B Out	–	26¼" (67)	25½" (65)	
John Deere 1120. . .	4	Backwards	4,5,6	B Out	–	25½" (65)	25½" (65)	
John Deere 2020. . .	4	Backwards	4,5,6	B Out	–	27½" (70)	25½" (65)	
Fordson Dexta † & Super Dexta . . .	5	Forwards	1,2,3,4	A In	Bottom	27¾" (70.5)	–	Limit lift to 9" (23 cms.) under blades by using Hydraulic Quadrant Stop.
Fordson Super Major (England), Ford 5000 (U.S.A.). . .	2	Backwards	2,3,4,5	B Out	Top	25½" (65)	23" (58)	
Ford 2000 †	3	Backwards	3,4,5,6	B In	Bottom	27½" (70)	22½" (57)	
Ford 3000	3	Backwards	3,4,5,6	B In	Bottom	27 5/8" (70)	23¼" (59)	Restrict lift to 10" (25 cms.) under blades by using Hydraulic Quadrant Stop.
Ford 4000	3	Backwards	3,4,5,6	B Out	Top	29½" (75)	29½" (75)	Restrict lift to 10" (25 cms.) under blades by using Hydraulic Quadrant Stop.
Ford 5000	3	Backwards	3,4,5,6	B Out	Centre	29" (74)	30" (76)	Restrict lift to 11" (28 cms.) under blades by using Hydraulic Quadrant Stop.
International Harvester B250 & B275	3	Backwards	3,4,5,6	B In	–	27¾" (70.5)	19¼" (49)	Attach lower links to top hitch points at tractor end.
International Harvester B414.	7	Forwards	3,4,5,6	B In	–	29" (74)	21" (53)	Attach lower links to top hitch points at tractor end. Fit lift rods to forward holes on lower links when using cat. 1. Screw L.H. rod to shortest length. Fit both in fixed position.
International Harvester B434.	3	Backwards	3,4,5,6	B	–	29" (74)	21" (53)	
International Harvester B450.	2	Backwards	2,3,4,5	B Out	–	28" (71)	–	Use top pivot position for tractor lower link. Anti-sway chains in position 1.
International Harvester B614.	2	Backwards	2,3,4,5	B Out	–	27¼" (69)	23" (58)	
Nuffield 342,460 1042 and 1060. . .	7	Forwards	3,4,5,6	B Out	Bottom	27" (69)	27" (69)	Use lower hole on lift rod clevis for lower links. Use second hole up on lift rod telescopic section. Use middle hole in lower links (draft arms) for lift rods.
Massey-Ferguson 130 †	3	Backwards	3,4,5,6	B In	Bottom	28¼" (72)	17¾"(45)	Stabiliser bars must be used, Limit lift to 9" (23 cms.) under blades by using Hydraulic Quadrant Stop. Ensure *Draft Control* is in *Full Down* position.
Massey-Ferguson 35 † and 135.	3	Backwards	3,4,5,6	B In	–	27¼" (70)	Fixed	
Massey-Ferguson 65 and 165 (65 Utility U.S.A.)	2	Backwards	2,3,4,5	B Out	Bottom	27" (69)	24" (61)	Ensure Engine p.t.o. and not ground p.t.o. is engaged.
Massey-Ferguson 165 High Clearance. . .	2	Backwards	2,3,4,5	B Out	Bottom	28½" (72)	24¼" (62)	
Massey-Ferguson 175	2	Backwards	2,3,4,5	B Out	Bottom	29" (74)	24¼" (62)	Stabiliser bars must be used.

* The numbers in the Mounting Plate Diagram column refer to the numbered diagrams at the top of page 7.

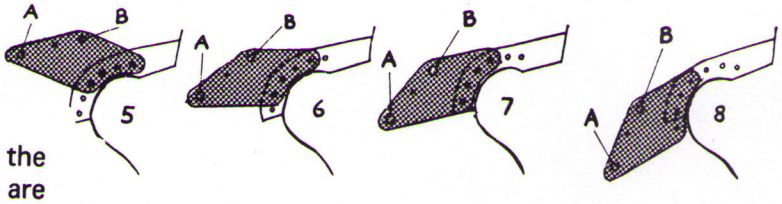
† Vineyard models of these tractors require a special mounting bracket—see Spare Parts List.

SEQUENCE OF MOUNTING

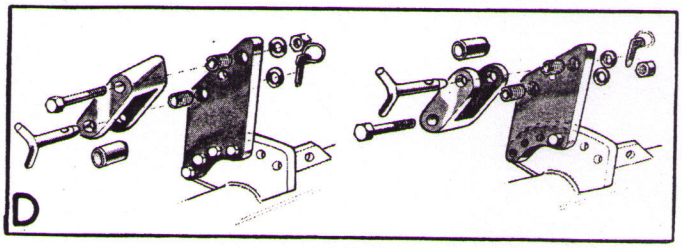
1. Bolt the mounting plates to the outside of the mounting flanges in the recommended holes. These are numbered 1 to 6 starting at the top. The mounting plates can be fitted either in the BACKWARD position (diagrams 1 to 4 on the right) or in the FORWARD position (diagrams 5 to 8).



2. Screw in the mounting pins to hole A or B as indicated in the mounting chart, using a short bar through the pin hole for leverage. Lock on the opposite side of the plate with the locking nut.

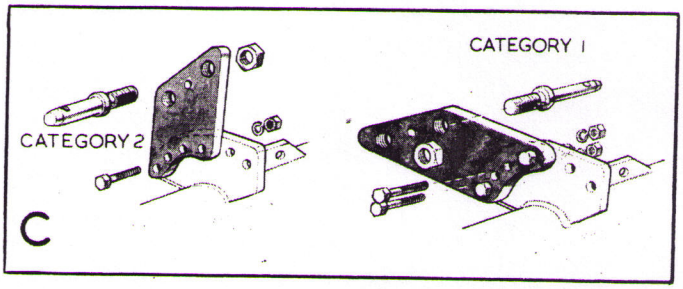


Where Category I (Small Pin) tractors are used, the sleeves on the mounting pins and top mast pin are not necessary (illustration C). For Category I tractors the mounting pins or clevis should normally be on the inside of the plate and for Category II (Large Pin) tractors on the outside, unless stabiliser check chains make the opposite position preferable for easy attachment.



When the clevis hitch is used (illustration D) it should be attached to the mounting plate by a special bolt, $\frac{7}{8}$" UNF x 5" through hole A or B. A small intermediate hole and dowel locates the clevis against the mounting plate. The position of the clevis mounting pin (65616) is the same as that given under the heading "Mounting Pin Hole" in the chart on page 5.

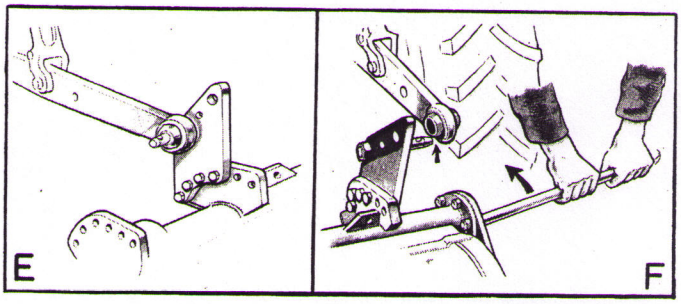
Note: The clevis hitch should be used where the Rotavator will be working continuously in hard and compacted soils or in any operation where excessive vibration is likely to occur.



3. Back up the tractor to the Rotavator and hitch up as follows:

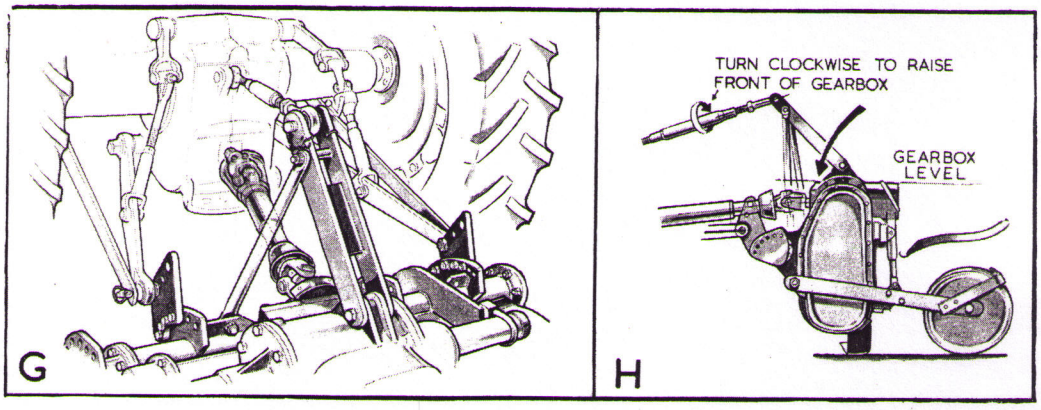
   (a) Left-hand bottom link (illustration E).

   (b) Right-hand bottom link. Use a convenient bar to slew the Rotavator into line—do not manoeuvre the tractor (illustration F).



   (c) Connect Drive Shaft Yoke to tractor P.T.O. Ensure that the protection cover does not foul the tractor P.T.O. guard.

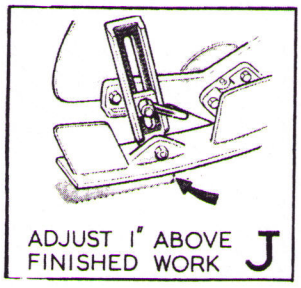
   (d) Fit stabiliser bars on the Rotavator mounting pins, raise the machine on the linkage and connect the front of the stabiliser bars to the tractor (illustration G). If stabiliser chains are provided use these to ensure that the Rotavator is limited to 1" maximum sideways swing.



   (e) **Top link—adjust until gearbox is horizontal "fore and aft" when the blades are resting on the ground (illustration H).**

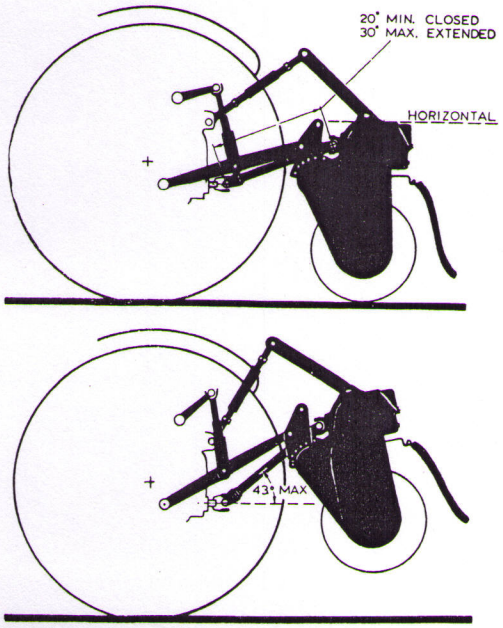
4. Level Rotavator laterally by winding down the depth wheel until the blades are clear of the ground, then adjust the right-hand tractor lift rod so that the blade ground clearance is equal across the width of the machine (illustration I).

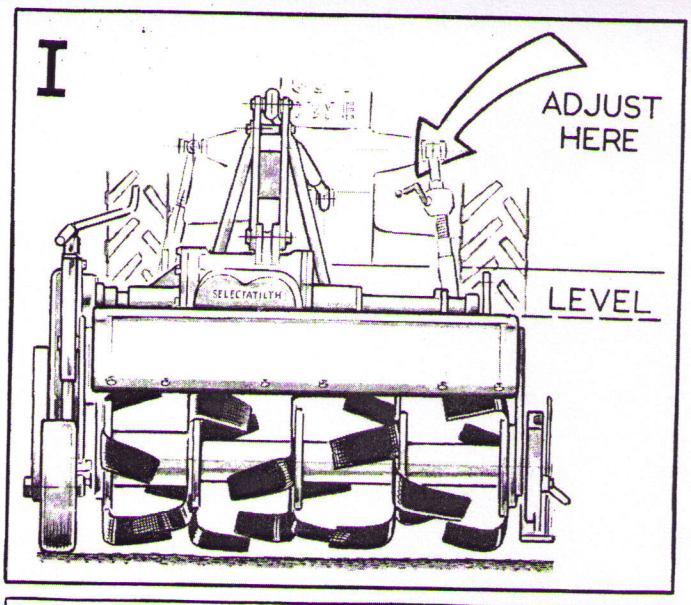
5. Adjust the right-hand depth limit skid (illustration J) so that it runs clear of the ground when the machine is at work. Its sole purpose is to prevent the blades from cutting too deep on the right of the rotor on uneven ground. It may be removed altogether for deep work. IT IS NOT A DEPTH CONTROL SKID.

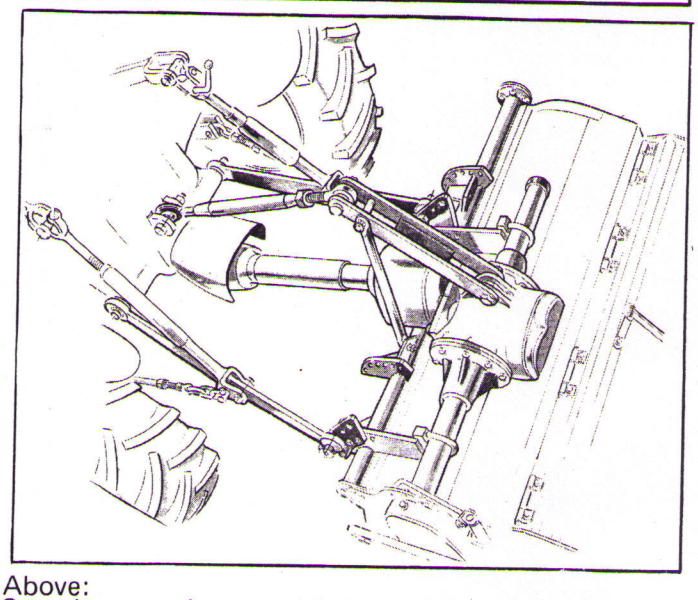


FOR TRACTORS NOT SHOWN ON MOUNTING CHART

The correct position for the mounting plates and pins can be found by positioning the Rotavator (without the mounting plates) at a distance from the tractor which will give 2"-3" (5-8 cms.) extension of the drive shaft when this is connected to the tractor P.T.O. shaft. The mounting plates are then connected to the TRACTOR bottom links and allowed to hang loosely. By moving the bottom links up and down the nearest set of flange holes for the mounting plates will be found. For tractors with very short bottom links (relative to the P.T.O. position) always use hole A in the first trial fitting, with the plates in the forward position. Finally, connect up top link and adjust to level the gearbox.







Above:
Complete attachment of E Series Rotavator to tractor.

GENERAL

1. The mounting plates must be bolted to the correct flange holes so that they allow adequate sliding movement to the drive shaft. Minimum safe length is 20" (52 cms.), maximum 30" (76 cms.).

2. The mounting pins (or clevis) must be located in whichever of the two holes, A or B, that gives adequate blade clearance without overlifting. (Maximum safe angle of drive shaft is 43° above horizontal).

3. The stabiliser chains or bars must be used to prevent sideswing of the Rotavator. Maximum swing allowed is 1".

4. The tractor lift links may have to be lengthened or a stop fitted to the hydraulic lift lever to prevent the Rotavator being lifted too high and consequent damage to the P.T.O. shaft.

LUBRICATION AND MAINTENANCE

The Howard Rotavator is designed to withstand the toughest conditions of work, but regular lubrication and maintenance is essential if a long life is to be obtained from the machine. Particular attention should be paid to keeping all nuts and bolts tight, especially in the early "bedding down" period.

BEFORE OILING, MAINTAINING OR ADJUSTING THE ROTAVATOR, SWITCH OFF THE TRACTOR ENGINE.

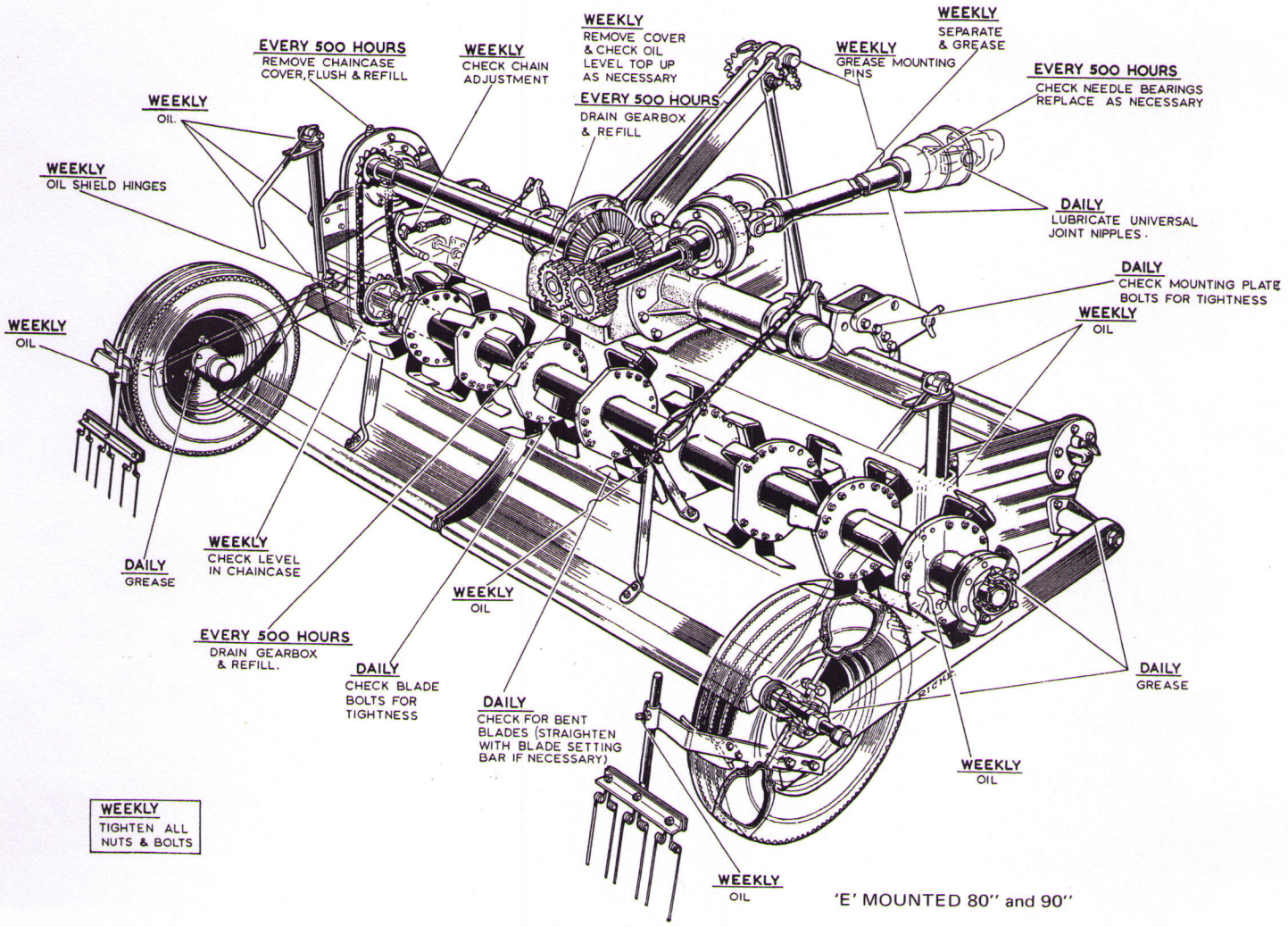
MAINTENANCE SCHEDULE

DAILY OR EVERY 8 HOURS WORKED

1. Grease the following points, using a lithium-base grease:
   (a) Universal drive shaft bearings; grease thoroughly until grease is forced from all four bearing cups in each spider assembly.
   (b) Depth control wheel bearings.
   (c) Wheel arm pivot.
   (d) Stub axle bearings.
2. Tighten all blade bolts—100 lb./ft. (13.8 kg./m.) Replace badly bent blades.
3. Tighten any loose bolts.
4. Check mounting plate bolts for tightness.

WEEKLY OR EVERY 50 HOURS WORKED

1. Separate the two sections of the drive shaft, thoroughly clean and then liberally smear the sliding surfaces with graphite or Molybdenum Disulphide grease.
2. Check gearbox oil level by removing cover. Level mark is on the right side of gearbox casting.
3. Check chaincase oil level.
   Note: All levels should be checked when the blades are on the ground and the gearbox horizontal in both directions. The chaincase oil level plug is at the rear, close to the ground.



'E' MOUNTED 80" and 90"

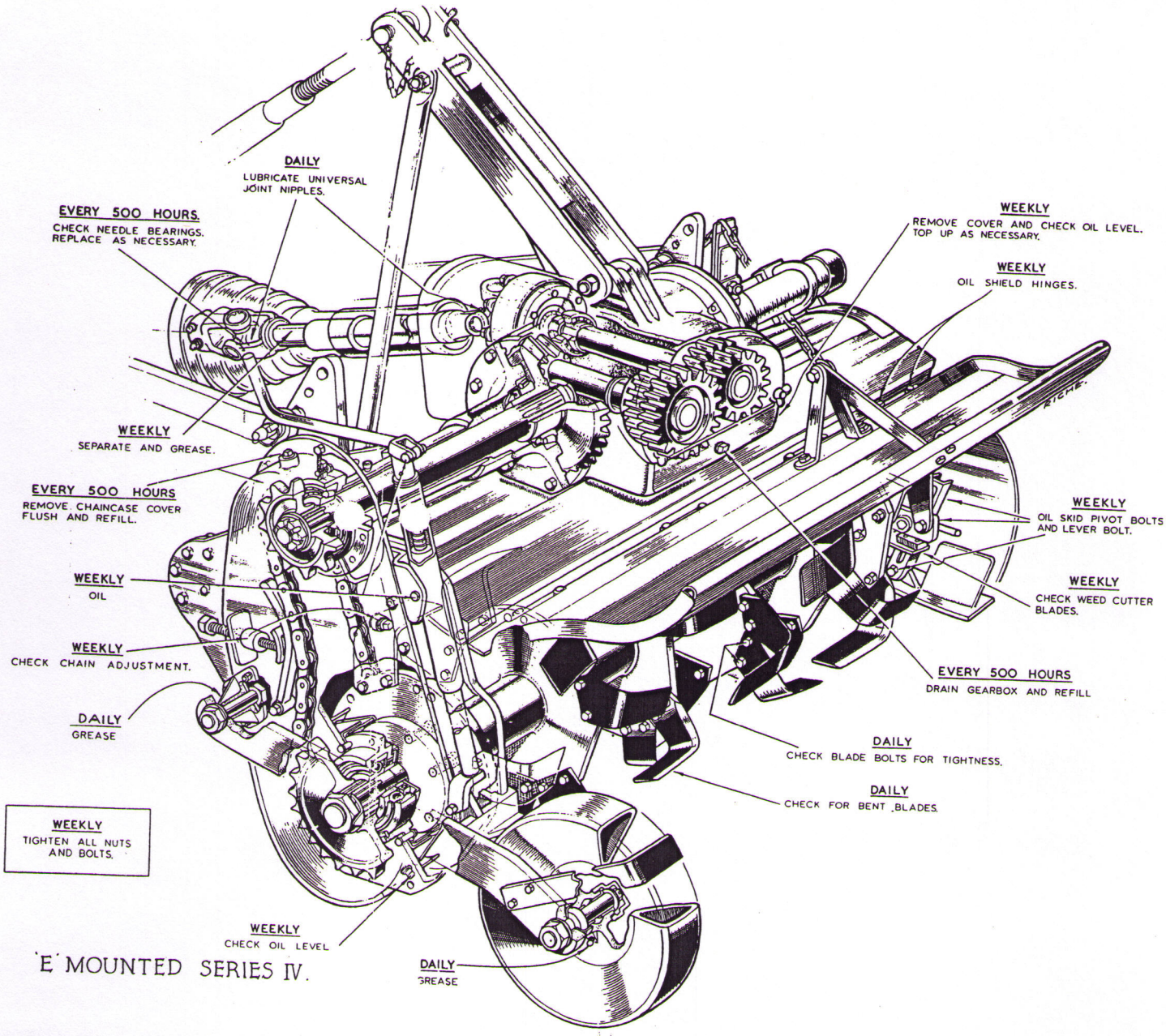
4. Oil the following points with an oilcan using S.A.E. 90 oil:
   (a) Shield hinges.
   (b) Depth control wheel handle pivots, screw tube trunnions and bottom clevis brackets.
   (c) Spring tine holder screws (E 80 only).
5. Check and tighten all bolts on the machine.
6. Check and adjust weed cutter blades where fitted.
7. Check chain adjustment through plug on rear of chaincase.
8. Lubricate all grease nipples.
9. Smear mounting pins lightly with grease.
10. Check depth control wheel tyre pressures—40 p.s.i. (3 kg./sq. cm.)—E 80 only.

EVERY 500 HOURS WORKED

1. Drain gearbox, flush out and refill with S.A.E. 90 gear oil.
2. Remove chaincase, flush out and refill with S.A.E. 90 gear oil.
3. Check drive shaft needle bearings. Replace spider assemblies if badly worn.
4. Dismantle stub axle bearing, clean out and repack with grease.

RECOMMENDED LUBRICANTS

1. For all grease nipples including stub axle use only LITHIUM BASE GREASE.
2. For the sliding section of the drive shaft and for repacking stub axle bearings use GRAPHITE or MOLYBDENUM DISULPHIDE GREASE.
3. For the gearbox and chaincase use good quality S.A.E. 90 gear oil.


DAILY
LUBRICATE UNIVERSAL JOINT NIPPLES.
EVERY 500 HOURS.
CHECK NEEDLE BEARINGS. REPLACE AS NECESSARY.
WEEKLY
REMOVE COVER AND CHECK OIL LEVEL. TOP UP AS NECESSARY.
WEEKLY
OIL SHIELD HINGES.
WEEKLY
SEPARATE AND GREASE.
EVERY 500 HOURS
REMOVE CHAINCASE COVER FLUSH AND REFILL.
WEEKLY
OIL SKID PIVOT BOLTS AND LEVER BOLT.
WEEKLY
OIL
WEEKLY
CHECK WEED CUTTER BLADES.
WEEKLY
CHECK CHAIN ADJUSTMENT.
EVERY 500 HOURS
DRAIN GEARBOX AND REFILL
DAILY
GREASE
DAILY
CHECK BLADE BOLTS FOR TIGHTNESS.
DAILY
CHECK FOR BENT BLADES.
WEEKLY
TIGHTEN ALL NUTS AND BOLTS.
WEEKLY
CHECK OIL LEVEL
DAILY
GREASE
'E' MOUNTED SERIES IV.

WORKING INSTRUCTIONS

Before working:

1. Check that the Rotavator is mounted correctly, and stabiliser bars or chains are fitted.
2. Determine the depth and type of tilth required.

Engage the Rotavator clutch where fitted and tractor p.t.o. Select a low gear on the tractor, open the throttle and as the tractor moves forward lower the Rotavator into the ground with the rotor turning. Work a short distance, then stop, switch off engine, and see that the result is satisfactory.

If not, then adjust depth and tilth (by Selectatilth gears or shield positioning). Check that the depth of work is equal across the rotor width; adjust the tractor linkage if necessary. If the depth limit skid is leaving a visible mark either raise it to its maximum height or take it off altogether.

DO NOT TOUCH THE ROTAVATOR OR LEAVE THE TRACTOR SEAT WHILE THE ROTOR IS TURNING. STOP THE ENGINE BEFORE DOING ANY ADJUSTMENTS OR MAINTENANCE ON THE ROTAVATOR.

OPERATOR'S CHECK CHART

INSUFFICIENT DEPTH OBTAINED

(a) Adjust depth control wheel.

(b) Insufficient power: use lower tractor gear, reduce rotor speed, use "Speed Blades".

(c) Chaincase on hard soil. Further passes required.

(d) Blades "trowelling" (rolling over ground). Increase rotor speed or use lower tractor gear.

TILTH TOO FINE

(a) Raise rear shield.

(b) Reduce rotor speed.

(c) Use a faster tractor gear.

(d) Drive at half throttle.

(e) Convert to 2-bladed rotor system.

TILTH TOO COARSE

(a) Lower rear shield.

(b) Increase rotor speed.

(c) Use lower tractor gear.

(d) Drive at full throttle.

(e) Wait until soil is drier if wet and sticky.

BLADES "BALLING UP" WITH SOIL

(a) Ground too wet for work-working.

(b) Increase rotor speed.

(c) Raise rear shield.

(d) Decrease tractor speed.

(e) Use "Speed Blades".

(f) Convert to 2-bladed rotor system.

OBVIOUS POINTS ON EACH RUN

(a) Rotavator not level—cutting too deep on right side. Shorten right-hand tractor lift rod.

(b) Furrow or ridge between passes. Depth limit skid too low. Raise or remove.

(c) Not overlapping. Drive closer to last run.

(d) Working on hillsides. Work up if possible, or if lateral work cannot be avoided, work from top to bottom to reduce terracing effect.

ROTAVATOR "BUMPING" ON GROUND

(a) Obstacle entangled in blades.

(b) Blades incorrectly mounted with no scroll effect, or blade fitted with blunt edge leading.

EXCESSIVE BLADE WEAR

(a) Reduce rotor speed.

(b) Loose or bent blades.

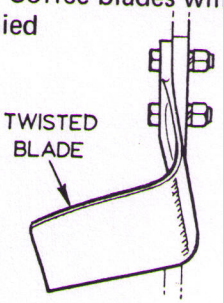
NOTES ON DRIVING

1. In a normal field work "lands" round and round, as for ploughing. Even with E70 in central position or E80 the field should not be worked up and down in adjacent bouts, since an even depth would not be obtained and a wheel mark would be left. Drive with the rotavated ground on your right.
2. When rotavating the field headland it is best to start against the fence and work anti-clockwise making sure that the machine is not lowered while the tractor is turning. The Rotavator should be lifted at headland.
3. Open plough furrows may be filled in by driving the right-hand tractor wheel on the edge of the furrow with the right-hand blades over the furrow itself.

BLADES

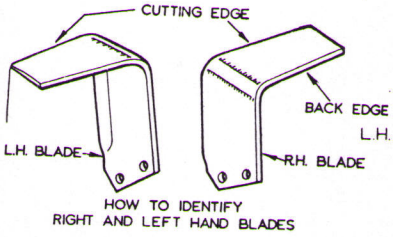
The following blades are available:—

1. Universal Blades.
2. Long Shank Blades. As its name implies, it is longer than the Universal Blade and can be used for deeper cultivations and to give additional clearance in row-crop work.
3. Speed Blades. (In some territories these are called 'C' blades.) Specially suited for penetration in hard ground and for mixing in heavy trash. Speed Blades have less tendency to clog in wet conditions.
4. Coffee Blades. A stirrup-shaped blade designed to leave a very coarse tilth in soils where erosion is a major problem. Coffee blades will fit the standard rotor supplied on all E Series Rotavators.
5. Blade maintenance is of the greatest importance. Examine blades daily. Any badly bent or worn blades should be replaced.



BLADE FITTING

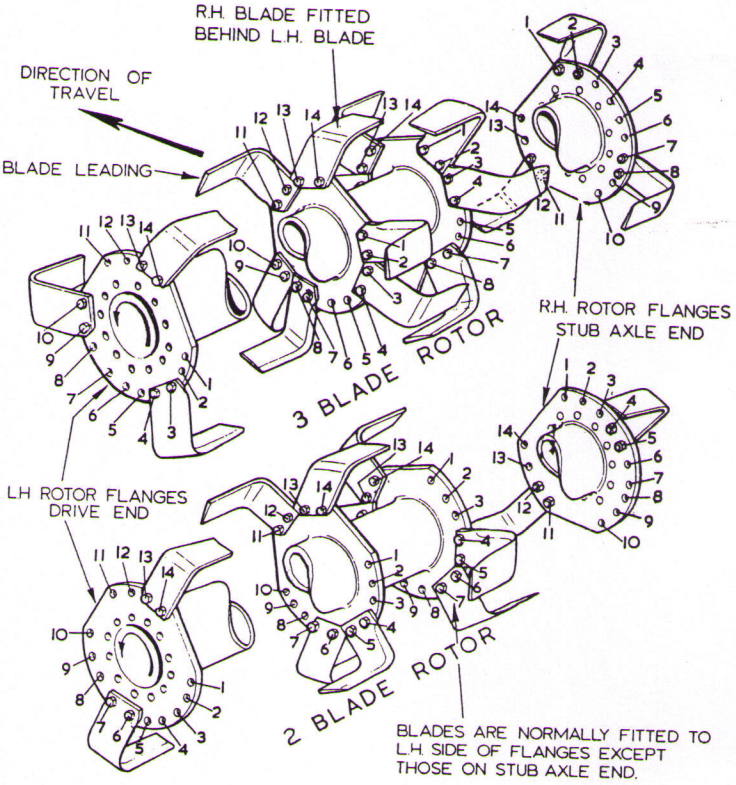
Rotavators are normally delivered with blades already fitted. When replacing worn blades, remove one blade and fit the new one of correct hand in its place before proceeding to the next. The correct method of installing blades is as follows:



HOW TO IDENTIFY RIGHT AND LEFT HAND BLADES

Identify right- and left-hand blades (see illustration). On all but the end flanges blades are fitted in pairs, on the left of each flange, with the LEFT-HAND BLADE LEADING.

Blade bolts must be inserted from the blade side, head against the blade, spring washer and nut against the flange. The special Howard Rotavator blade bolts and high nuts must be used. Ordinary bolts do not have the correct thread length and will cause elongation of the holes in the flanges. The torque wrench setting for these bolts is 100 lb./ft. (13.8 kg/m.).



BLADE FITTING FOR 3-BLADE ROTOR
(for fine tilth in normal conditions).

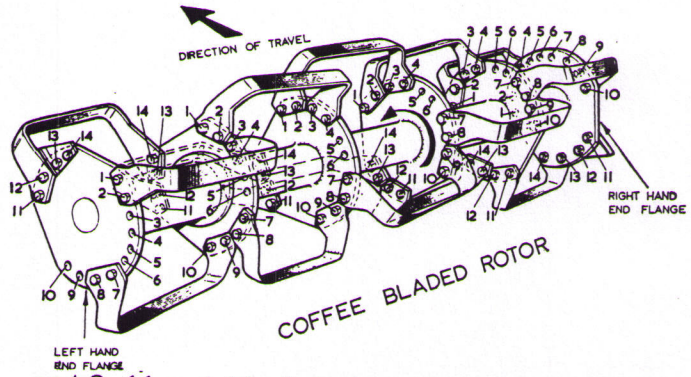
This rotor has 3 right-hand and 3 left-hand blades per flange, except for the end flanges which carry only three blades. A left-hand blade always leads a pair. Standing at the rear of the machine, turn the rotor so that the cut-away sections are forward and away from you, as in the diagram. Fit right-hand blades to the outside of the first flange, using holes 3 and 4, 9 and 10, 13 and 14. Follow the same procedure along the entire rotor length, except for the right-hand end flange. Start again on the second flange at the left of the rotor and fit three left-hand blades immediately in front of the blades already fitted. For all left-hand blades use holes 1 and 2, 7 and 8, 11 and 12; this includes the right-hand end flange.

CONVERSION FROM 3-BLADE TO 2-BLADE FITTING (to obtain a coarser tilth)

The 2-blade rotor has 2 right-hand and 2 left-hand blades per flange, except for the end flanges which carry only two blades. A left-hand blade should always lead a pair. The rotor is normally fitted with 3 pairs of blades (i.e., 6 blades) per flange, so requires the following procedure for conversion to a 2-blade arrangement: Standing at the rear of the machine, turn the rotor so that the cut-away sections are forward and away from you, as in the diagram. Remove all the blades from the rotor, except those fitted to holes 11 and 12, 13 and 14, which remain the same for both 2- and 3-bladed rotors. Fit right-hand blades to the left side of each flange, using holes 6 and 7. Follow the same procedure along the entire length of the rotor, except for the right-hand end flange. Start again on the second flange at the left of the rotor and fit one left-hand blade immediately in front of the blades already fitted, in holes 4 and 5.

FITTING COFFEE BLADES

Make sure the cutting edge of each blade is facing the direction of travel, then fit the first three blades on to the left-hand end flange in holes 1 and 2, 7

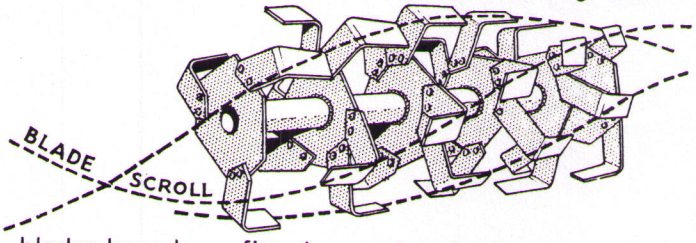


COFFEE BLADED ROTOR

and 8, 11 and 12. Bolt these blades, which line up with holes 3 and 4, 9 and 10, 13 and 14, on to the second flange. Start again on the second flange using the same procedure: holes 1 and 2, 7 and 8, 11 and 12, to holes 3 and 4, 9 and 10, 13 and 14 on the next flange. Follow this system the complete length of the rotor. The last three blades have to be stretched over the outside edge of the right-hand end flange. This prevents the rotor flange being damaged during work.

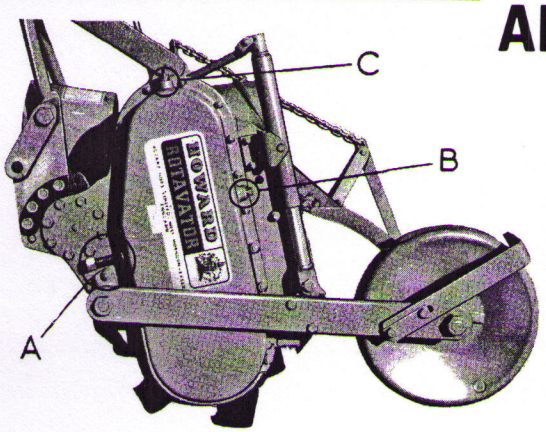
BLADE PATTERN

You will see that the blade pattern gives a corkscrew or 'scroll' effect and that in the space between the flanges the right-hand blades are approximately equidistantly spaced from the left-hand blades of the adjoining flange and vice-versa. Should any blade tips be nearly touching some



blades have been fitted wrongly. At the rotor ends two or three blades only are fitted to the outside of the end flanges; three right-hand blades to the left end flange and three left-hand blades to the right end flange. Take care to use the correct set of holes for the end blades by following the scroll pattern on the rest of the rotor.

ADJUSTMENTS



DRIVE CHAIN

Correct tension of the drive chain is as important as proper lubrication. To check chain tension remove the inspection plug (B) on the rear side of the chaincase and check the movement of the chain, using a screwdriver or a piece of hooked wire. The total back and forward movement should be approximately ¾" (2 cms.). If the chain needs tightening unscrew the locknut on the chain adjusting screw (A) on the leading edge of the chaincase, and screw up the adjuster until the

required tension is obtained. Re-tighten the locknut.

CLEANING CHAINCASE

After every 500 hours the chaincase should be thoroughly cleaned out. With the depth control wheel resting on the ground, remove the $\frac{5}{8}$" UNC bolt and nut securing the depth control handle tube bottom end to the clevis bracket. Unscrew the 1" UNC locknut on the pivot end of the wheel arm, and lift the depth control wheel and arm assembly clear.

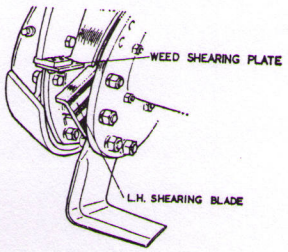
Slacken the chain adjusting screw (A), then unscrew all the bolts securing chaincase to backplate, allowing the chaincase oil to drain out from the joint; no drain plug is fitted. Remove the cover, ensuring that the gasket is not damaged, and wash out the inside of the case and the chain, with kerosene. Reassemble and fill with 2 pints (1¼ litres) of SAE 90 gear oil through the top plug (C) in the chaincase. Finally, refit the depth control wheel and arm assembly.

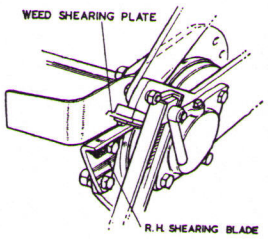
CLEANING SELECTATILTH GEARBOX

The Selectatilth gearbox must also be cleaned out after 500 hours' work. Unscrew the drain plug on the bottom rear face of the gearbox and drain the box immediately after a period of running. The oil will be warm and free-running and any sediment will be in suspension in the oil. Replace the drain plug and refill the gearbox will about 4 pints (2½ litres) of flushing oil. Run the machine for about 3 minutes with the rotor well clear of the ground, then drain the flushing oil. Refill the gearbox with 4 pints (2½ litres) of good quality SAE 90 gear oil.

WEED SHEARING BLADES (except E 80 and 90)

Small weed shearing plates are provided at each end of the rotor to prevent weeds and long grass wrapping around the rotor ends. 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 weed cutters are properly adjusted. Shearing blades can be fitted in any available pair of bolt holes on the rotor end flanges to suit whatever blade formation is being used.





SAFETY CLUTCH

The high speed sintered metal/steel multi-plate safety clutch, where fitted, is located in front of the gearbox. As a general rule, the clutch springs must be adjusted so that the clutch will drive the rotor blades through anything met in normal work, but will slip when tree stumps, boulders and similar obstacles are hit.

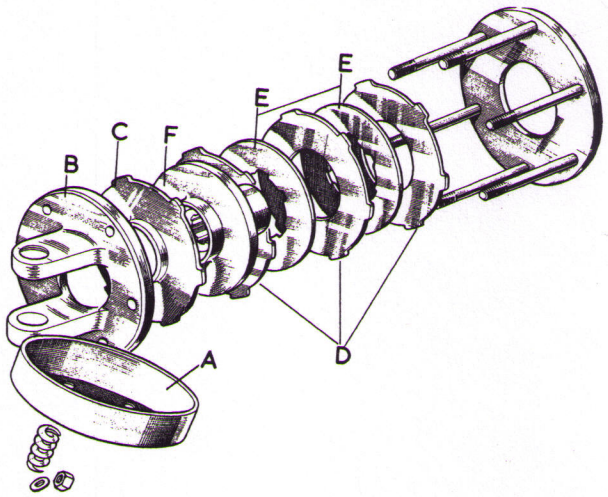
The clutch will tend to work stiffly at first, and some adjustment will be needed after the first few hours of work.

To adjust the clutch, turn the six spring-loaded nuts clockwise and evenly by hand until each nut just touches a washer. Each nut is then tightened 1½ complete turns so that the springs are compressed 1/16" (1.5mm.). The clutch is now correctly set for working from a p.t.o. speed of either 540 r.p.m. or 1000 r.p.m.

Local working conditions may necessitate some further adjustments of the nuts. If so, the adjustment should be even, the same amount of turn being given to each nut.

In normal operation the temperature of the clutch should be no higher than the working temperature of the gearbox. However, if the clutch becomes hotter than the gearbox, this indicates that the clutch needs tightening. If set too loosely the clutch plates slip excessively, generating considerable frictional heat. In addition to causing the clutch plates to quickly wear out, too loose a clutch setting will result in erratic turning of the rotor and irregular work. It is therefore important to check that the clutch is correctly adjusted.

FITTING NEW SAFETY CLUTCH PLATES



Remove the clutch outer protection cover and the forward end of the universal drive shaft. Remove the six nuts, washers and springs, and withdraw the inner cover (A).

Take out the rear section of the drive shaft, including the clutch plate (D).

Note the order of dismantling to ensure correct assembly.

Note also that the front friction disc has a lip which fits in the centre hole of the clutch plate assembly. Separate the plates and wash them in petrol, renewing any which are badly scored or marked. Re-assemble the clutch, making sure that the lipped friction disc is correctly fitted and locating the clutch plate. Reset the clutch as already described above.

NUTS AND BOLTS

All nuts and bolts must be kept tight and as a guide the following chart will help.

Nut Size	Torque lbs./ft.	Kgs./m.	Length of spanner required to obtain the correct torque
¼" UNF	11	1.5	5" (12.5 cms.)
¾" UNF	300	41.5	36" (91.5 cms.)
⅜" UNF	38	5.25	6" (15 cms.)
7/16" UNF	62	8.6	8" (20 cms.)
½" UNF	93	12.8	15" (38 cms.)
⅝" UNF	167	23.0	20" (50 cms.)
¼" UNC	10	1.4	5" (12.5 cms.)
5/16" UNC	22	3.0	5" (12.5 cms.)
⅜" UNC	39	5.4	6" (15 cms.)
½" UNC	93	12.8	15" (38 cms.)
⅝" UNC	173	23.0	22" (56 cms.)
¾" UNC	310	42.8	36" (91.5 cms.)
Blade Bolt Nut	100	13.8	16" (40 cms.)

SPECIAL EQUIPMENT

ROW-CROP ROTOR

A slip flange row-crop rotor is available.

Adjustable blade flanges are arranged to slide along the solid square section rotor shaft to provide the spacings required. The stub axle end flange is removable and thus the flanges can also be removed or added to as may be necessary. Crop guards may be used in conjunction with this rotor.

MAKING THE MOST OF YOUR ROTAVATOR

This section of your handbook is based not only on our experience of rotary tillage, but on tests and actual farming operations under all weather conditions in over 100 countries throughout the world.

Research and the experience of owners raising crops in varied soil conditions prove that the Rotavator, when used wisely and with understanding, is one of the most valuable and versatile agricultural implements available to today's modern progressive farmer.

Before going into the various applications there are several points that must be understood in order to get the best results from your Rotavator.

The Rotavator takes its power direct from the tractor p.t.o. through a Universal Drive Joint to a multi-speed transmission; this transmission permits the operator to select the speed of the rotor. Blades are mounted on the rotor in a pre-determined scroll pattern. As the blades enter the soil the size of the blade cut is determined by the speed of the rotor and/or the forward speed of the tractor. The tractor p.t.o. speed always remains constant with the engine r.p.m. Full details of the Selectatilth transmission are shown on page 3.

PRODUCING TILTH

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

1. The type of soil—light or heavy.
2. The speed of the rotor.
3. The forward travel speed of the tractor.
4. The position of the rear shield.
5. The moisture content of the soil.

1. THE 2- OR 3-BLADE SYSTEM

The standard rotor is sent out with 3 pairs of blades per rotor flange (except the end flanges). These flanges may be converted to a 2-blade formation at will (that is 2 pairs of blades per flange except the end flanges). This has been done to increase the flexibility of the Rotavator.

In particular the 2-blade system has proved superior on the following counts:

1. There is less tendency to clog in wet or or sticky soil conditions.
2. The rotor is self cleaning in heavy trash (e.g., sugar cane, maize stalks, etc.), and under these conditions it is possible to work to a greater depth, thus providing more soil to mix with the crop residue.
3. A good "cloddy" autumn finish is easier to obtain.

The 3-blade formation is still preferred for general use, but the 2-blade formation has its advantages and these are now available to users at will.

2. THE EFFECT OF SOIL TYPE

The amount of clay present in heavier soils gives them cohesion. It is, therefore, possible to obtain a greater variation of tilth on a heavy soil—coarse, medium or fine.

The amount of clay present in a light soil is usually insufficient to give cohesion to groups of particles. A finer tilth is, therefore, produced on a light soil.

3. THE EFFECT OF ROTOR SPEEDS

At a constant forward tractor speed, the speed of the rotor controls the size of the slice cut in the soil, a slow rotor speed will produce a large blade cut leaving a rough cloddy finish. A high rotor speed reduces the blade cut resulting in a fine tilth. Slow rotor speeds require much less power than high speeds. Extremely high rotor speeds should be used with care, as the blade wear will increase sharply and the soil structure may be damaged. High rotor speeds are available for special applications where a very fine tilth is required, but medium speeds are usually quite adequate for general agriculture. Wet soil will tend to clog if the rotor speed is not fast enough to throw the soil clear.

4. THE EFFECT OF TRAVEL SPEEDS

Assuming that the rotor speed and engine speed are constant, the size of the soil slice can be varied by use of the tractor gears; low gear will produce a fine tilth, higher gears will produce a progressively rougher finish.

Travel speeds between 1-3 miles per hour are usually used, but higher speeds may be used for shallow scalping passes for weed control and shallow seedbeds in previously broken ground, provided the rotor speed is increased proportionately.

5. THE EFFECT OF THE REAR SHIELD

When the rear shield is raised, a relatively coarse tilth is produced since the soil cut by the blade is not broken by impact on the shield, and the larger particles of soil remain on top, Trash and weed roots are also thrown up and stay on the surface to die.

With the rear shield lowered the clods are broken on impact and a fine tilth is produced; trash is buried and the shield will have a levelling effect.

Less power is required to operate with the shield raised, allowing the tractor to be driven at higher speeds. There is also less tendency for damp clay soil to clog the rotor and stick to the underside of the shield.

6. THE EFFECT OF SOIL MOISTURE CONTENT

There is a certain range of soil moisture content which the farmer easily recognises when the soil is in a condition which is most suitable for tillage operation. Rotavation within this range of moisture content enables the tilth required to be produced. If the soil has a high moisture content it tends to 'ball'. If the soil is dry, dust will be produced and blade wear will be increased. Care must be taken not to work soil when the moisture content is too high. Working extremely wet soil with any implement will tend to break down soil structure.

ROTAVATION ON HEAVY LAND

(a) For Autumn seedbeds or before a rainy season.

To enable the soil to deal with excess rainfall and in order to provide protection for the seedlings, it is generally recognised that a rough finish tilth is necessary for an autumn seedbed. To obtain this rough finish, raise the rear shield, set the depth control wheel for a four- to six-inch cut, use a medium or low rotor speed and select the forward travel speed of the tractor according to the power available and the finish required. The 2-blade formation is most useful for obtaining this rough finish.

(b) For Spring seedbeds.

When land has been broken in the autumn, the production of tilth is assisted by the action of freezing and thawing during the winter, and usually one pass with the Rotavator will be adequate to produce a good seedbed. When a second pass is carried out, in order to eliminate weeds, it should be shallower than the first—this prevents bringing more weed seeds to the surface area to germinate. The second pass may be carried out with a high rotor speed. If the land is not broken in the autumn, two passes with the Rotavator must be expected for the production of a good seedbed.

ROTAVATION ON LIGHT LAND

In many areas of light soil, the land may be left covered with growth during the non-cropping season until close to seeding time. This prevents erosion and the leaching of soil nutrients.

Where rapid drying out is a major problem, work should also be deferred until a seed bed is needed.

Should more than one pass be necessary, this should be given immediately, especially when it is necessary to work in any trash or crop residues.

If heavy trash is present it will, however, cut down work at seedbed time if the crop residues are rotavated in the autumn or before the wet season.

On light land lower rotor speeds are required and on poor structured soils care must be taken not to overwork the soil.

CROP RESIDUES & STUBBLE CLEANING

The incorporation of heavy residues after the harvest has always been a problem, and the Rotavator with its chopping and mixing ability is an ideal implement for handling such crops as corn (maize), Tracey Sorghum, tobacco, sugar cane, cotton, rice, etc. Wherever possible, crop residues should be rotavated in the autumn to assist the rotting down action during the winter. The trash mixed evenly throughout tillage depth will add valuable humus to the land.

Select the rotor speed and tractor speed most suitable for the conditions prevailing, and work at an angle of approximately 20° to the row; this ensures even distribution of the trash, knocks down and levels the ridges, and helps keep the rotor clear. The rear shield may be raised or lowered according to the finish required.

STUBBLE CLEANING

If the combined straw is not to be baled, it aids the soil structure if it is returned to the land. To do this the straw is best spread with a straw chopper on the combine or by means of a forage harvester. If this cannot be done then the Rotavator should work diagonally across the swaths, as this gives an even mix of straw and soil.

This pass will also serve to germinate the Black Grass (and Autumn Wildoats). These weeds, which are a major drawback to continuous corn productions on much arable land, can then be killed by the final autumn cultivation.

GREEN MANURING

The objects of green manuring are either to conserve the nitrogen in the soil and prevent leaching or to add organic matter which will improve the soil structure. Best results will be obtained if the green crop is chopped and mixed evenly throughout tillage depth. Medium to high rotor speeds ensure a complete breakdown of the crop; the rear shield should be lowered if the trash is to be completely buried.

IMPROVING SOIL STRUCTURE

The principle effect of incorporating farmyard manure, crop residue and other organic material with the soil is the improvement in soil structure. To obtain the maximum benefit from these materials it is essential that they should be intimately mixed with the soil. Rotavation makes this intimate mix certain.

Gypsum is being used in some countries, especially on heavy land, to improve soil structure. As in the case of lime, the maximum effect of 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.

LIMING

Authorities agree that lime has its greatest effect in neutralising soil acidity when it is evenly distributed on the soil surface and mixed evenly throughout tillage depth. Having obtained even horizontal distribution with a lime spreader, the Rotavator will guarantee a perfect vertical mix.

GRASSLAND, CLOVER AND ALFALFA, ETC.

It is a well-known fact that land that has been down to grass for a number of years has an improved and more stable structure than similar land which has been cropped for a number of years. One of the objects of grassland 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 greater near the soil surface where the grass roots have had their maximum development. The breaking of grassland is a most important operation. If the sod is broken too deeply, then the soil with the best structure is buried and the benefit of the turf to the arable portion is reduced.

The best technique is a shallow rotavation to break up the grass mat and allow an interval of approximately two or three weeks before the second pass with the Rotavator at greater depth. This will bring up more soil to make a mulch with the disintegrated turf. Lime and fertilisers can be mixed in during the second pass. It has been shown that the turf/soil mulch gives a better seedbed and germination than that obtained where it is turned by ploughing.

The same results may be obtained on clover, alfalfa and other legumes.

PASTURE RENOVATION

Pastures which have been established a considerable length of time tend to become root bound. The grazing value of the pasture declines and normal renovation methods such as harrowing are ineffective.

With the Rotavator blades may be removed from alternate flanges, leaving ten-inch strips of untilled land. After the grass has established itself in the tilled strip the remaining old grass should be cut out by a second pass.

WEED CONTROL

Weeds are of two types—annual, and perennial; the perennial being more difficult to control. Weeds do their greatest damage during the early stages of crop growth; therefore the primary object should be the production of a weed-free seedbed. With annual weeds it is the seeds in the top two inches which germinate and compete with the crop in its early stages. To eliminate this competition, the first pass with the Rotavator should be to obtain the depth of tillage required and produce a tilth, and the weed seeds should then 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 seedbed will have been produced.

The most important perennial weeds are couch (Agropyron repens) on heavy land, and twitch (Agrostis spp) 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 three to five cultivations have been found necessary to eradicate couch. The cultivation should be given at approximately three-weekly intervals when the cut-up rhizomes have re-rooted and green leaves are appearing above the ground, thus ensuring complete exhaustion.

Twitch eradication on light land has been successfully carried out in three passes using a similar technique to that for couch eradication. The objective must be to cut up the rhizomes into as small pieces as possible to the full depth of the root (normally about 4-6 inches). This stimulates dormant buds into growth, which are then killed by subsequent passes. Unless these dormant buds are made to shoot, the rhizomes remain a source of reinfestation. Land should not be ploughed before rotavating.

BRACKEN ERADICATION

The main bracken rhizomes may be 12-15 inches deep with frond-bearing branches appearing from about 4 inches to 9 inches under the surface. The first pass should be shallow to deal with the rhizomes near the surface. The cut up rhizomes will die out in two or three weeks. A second pass to a depth of 6 inches should be given at the end of this period. A third pass at the end of a further two or three weeks, to a depth beyond 6 inches should be given to disintegrate all the remaining underground parts of the plant.

Bracken rhizomes, when cut up by the machine dry out and die very quickly. In view of this it has been suggested that the control of bracken by rotary cultivation can be carried out at any season of the year.

Rotary cultivation is also a quick and valuable method for preventing bracken from encroaching on clean land. It is only necessary to run the machine along the outer limit of the encroachment to form a 'bracken break' repeating the run in future years if bracken fronds appear in the cultivated strip.

ORCHARDS

In all types of orchard the Rotavator is of special advantage because of its ability to work effectively at shallow depths and to maintain that depth by accurate depth control setting; consequent delicate feeder roots are undamaged during weeding or green manuring operations.

TROPICAL AGRICULTURE

In the cultivation of wet rice, the forward thrust of the blades permits the use of mechanisation where no pull-type implement can be used. The effect of the blades completely erases the old crop and weeds as well as giving perfect puddling of the soil.

In tropical soils of poor structure and where danger of erosion exists, slow rotor speeds and a 2-blade rotor should be employed and as much trash as possible should be incorporated into the surface to protect the soil from the effects of wind and rain.

GENERAL SAFETY PRECAUTIONS

1. Read and familiarise yourself with the operating instruction book.
2. Disengage the pto and stop the tractor engine before making any repairs or adjustments to the Rotavator.
3. Disengage the pto when transporting or not in use.
4. 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.
5. Keep all nuts, bolts and screws tight and be sure that the equipment is regularly lubricated to keep it in a safe working condition.
6. Ensure all guards and covers are in working order and in position before starting work.
7. The pto shaft and couplings must be protected over their entire length. Do not remove the cover during operations.
8. 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 staytube or tractor link arms.
9. Never touch the rotor with the tractor engine running – switch off first.
10. 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.

WARNING	P.T.O. SHAFT AND COUPLINGS MUST BE PROTECTED OVER THEIR ENTIRE LENGTH. DO NOT REMOVE THIS COVER DURING OPERATIONS.	TRACTOR LIFT LINKAGE MUST BE ADJUSTED (OR LIFT LIMITS FITTED) TO PREVENT DAMAGE TO UNIVERSAL JOINT WHEN FULLY LIFTED.	DO NOT TOUCH ROTOR WHEN ENGINE IS RUNNING.
ATTENTION	L'ARBRE A CARDANS DOIT ETRE PROTEGE SUR TOUTE SA LONGUEUR N'ENLEVEZ PAS CE GARANT PENDANT LE TRAVAIL.	IL FAUT REGLER LE RELEVAGE HYDRALIQUE (OU LUI APPLIQUER UN APRET) POUR EVITER D'ENDOMMAGER LE CARDAN EN POSITION TOUTE RELEVEE.	NE TOUCHEZ PAS AU ROTOR AVANT L'ARRET COMPLET DU MOTEUR.
ATTENZIONE	L'ALBERO DELLA PRESA DI FORZA CON IGIUNTI CARDANICI DEVE ESSER PROTETTO SU TUTTA LA SUA LUNGHEZZA NON TOGLIETA QUESTA COPRIALBERO DURANTE IL LAVORO.	BISOGNA REGOLARE IL SOLLEVAMENTO IDRAULICO (O APPLICARGLI UN FERMO) PER EVITARE DI DANNEGGIARE IL GIUNTO CARDANICO IN POSIZIONE COMPLETAMENTE ALZATA.	NON TOCCATE IL ROTORE QUANDO IL MOTORE E'IN MOTO.
ACHTUNG	GELENKWELLE UND KREUZGELENKE MUESSEN VOLL GESCHUETZT WERDEN DESHALBNIEMALS OHNE GELENKWELLENSCHUTZ ARBEITEN!	DIE HUBHOEHE DER DREIPUNKTAUFHAENGUNG MUSS GENAU EINGESTELLT BZW. BEGRENZT WERDEN, DAMIT BEI VOLLER AUSHEBUNG DIE KREUZGELENKE NICHT BESCHAEDIGT WERDEN.	ROTIERENDE MESSERWELLE!
CUIDADO	EL ARBOL DE LA TOMA DE FUERZA Y LAS JUNTAS CARDANICAS TIENEN QUE ESTAR PROTEJIDAS EN TODO SU LARGO NO RETIREN ESTA PROTECCION EN SERVICIO.	HAY QUE AJUSTAR EL SISTEMA HIDRAULICO (O APLICAR UN LIMITADOR) PARA EVITAR DANO A LA JUNTA UNIVERSAL EN LA POSICION TODA LEVANTADA.	NO TOQUE EL ROTOR ESTANDO EL MOTOR EN MARCHA.
VARNING	KRAFTÖVERFORINGSAXEL MED TILLHÖRANDE KOPPLINGAR SKALL VARA ÖVERSKYDDAD TILL HELA SIN LÄNGD.	KOPPLA ROTATORN SÅ ATT KNUTARNA GÅ FRITT NÄR LYFTARMARNA ÄR HELT UPPE.	RÖR ICKE VID KNIVVALSEN DÅ MOTORN ÄR IGÅNG.