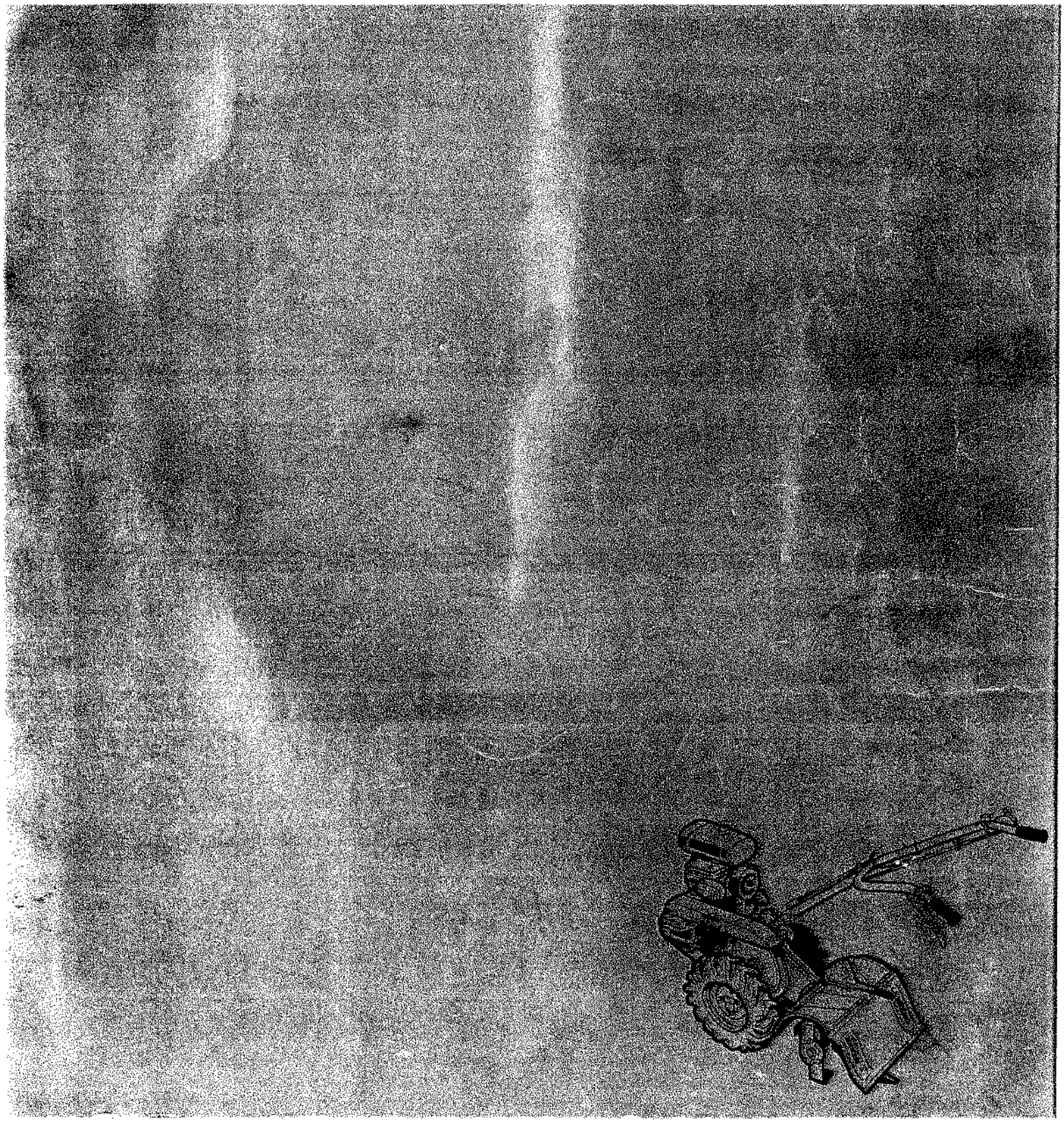
HOWARD ROTAVATOR®

'350' INSTRUCTIONS



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HOWARD ROTAVATOR

'350'

The Howard "350", with a rotor width of either 16 in. or 23 in., is a powerful hand-controlled Rotavator, ideal for the larger garden or for the commercial grower, and with enough tractive power to pull a trailer or a plough.

The "350" digs, reclaims land, eradicates weeds, cultivates between the rows, turns in spent crops and mulches in manure or fertilisers.

A variable belt pulley drive gives a choice of four forward speeds and two reverse, providing just the right speed for any type of work or soil condition. The reverse gear gives ease of handling in confined areas; adjustable handlebars, up or down, side to side, aid operator comfort and flexibility of control.

Simple construction and a proven design keep maintenance to a minimum.

Optional attachments include furrower, side shields, toolbar and plough.

HOWARD ROTAVATOR CO. LTD. - WEST HORNDON - ESSEX

SPECIFICATION

ENGINE

Kohler K 141 T 266 c.c. 4-stroke single cylinder air-cooled Petrol engine - developing 5.3 b.h.p. at 3,600 r.p.m. governed speed; fitted with Automatic Compression Release for easy starting. 2 ⅞ in. (73 mm.) bore x 2½ in. (63.5 mm.) stroke.

FUEL CAPACITY

1 gallon (4.5 litres).

TRANSMISSION

Four forward speeds, two reverse. Transmission by V-belt and twin ratio pulley to gearbox with all gears hardened and running in oil, and drive shaft of hardened steel mounted on ball bearings. Then by bullwheel and pinion gears to landwheels. Safety clutch with slip action when under shock load.

CLUTCH

Cone type.

CONTROLS

1. Throttle control by lever and cable.
2. Clutch control by Bowden cable and hand lever.
3. Rod-operated gear lever incorporating safety reverse.
4. Rod-operated rotor engagement lever.
5. Handlebars adjustable for height and sideswing.
6. Depth setting lever.
7. Engine ignition/cut-out switch.

WHEELS

4.00 - 8 2-ply pneumatic tyres. Tyre pressure 20 p.s.i. (1.4 kg./sq.cm.)

ROTAVATOR

12 in. (30.4 cm.) diameter rotor; drive by ⅜ in. (16 mm.) pitch roller chain. Rotor speeds 254 r.p.m. and 508 r.p.m. @ 2,800 r.p.m. engine speed.

WIDTH OF TILLAGE

16 in. (41 cm.) or 23 in. (58 cm.)

DEPTH OF CUT

Adjustable to 6 in. (15 cm.) maximum.

TRAVEL SPEEDS (at 3,600 engine r.p.m.)

Low Belt Ratio	1st	.75 m.p.h. (1.2 k.p.h.)
	2nd	2.5 m.p.h. (4 k.p.h.)
	Reverse	1.25 m.p.h. (2 k.p.h.)
High Belt Ratio	1st	1.65 m.p.h. (2.5 k.p.h.)
	2nd	5 m.p.h. (8.2 k.p.h.)
	Reverse	2.5 m.p.h. (4 k.p.h.)

OIL CAPACITY

Gearbox - 1½ pints (.8 litres)
Engine - 2 pints (1.1 litres)

RECOMMENDED LUBRICANTS

SAE 90	-	Gearbox and oiling points.
Lithium Grease	-	Inner clutch cone spline.
SAE 30	-	Engine - above 30°F (-1°C).
SAE 10 or 10W30		Engine - between 30°F and 0°F (-1°C and -18°C).
SAE 5W20	-	Engine - below 0°F (-18°C).

DIMENSIONS (overall)

Length 61 in. (155 cm.)
Height 38 in. (96 cm.) (to top of handlebar)
Width 17½ in. (44 cm.) (16 in. model)
24½ in. (62 cm.) (23 in. model)

WEIGHT

16 in. model 255 lb. (115 kg.)
23 in. model 260 lb. (118 kg.)

OPTIONAL EXTRA EQUIPMENT

Furrower; Skid Tine; Wheel Weights; Toolbar and Cultivators; Plough; Towing Hitch; Plough Weight and Beam; Axle Extensions; Side Shields; Rotor Conversion Kit (from 16 in. to 23 in. and conversely); Waterproof Canvas Cover.

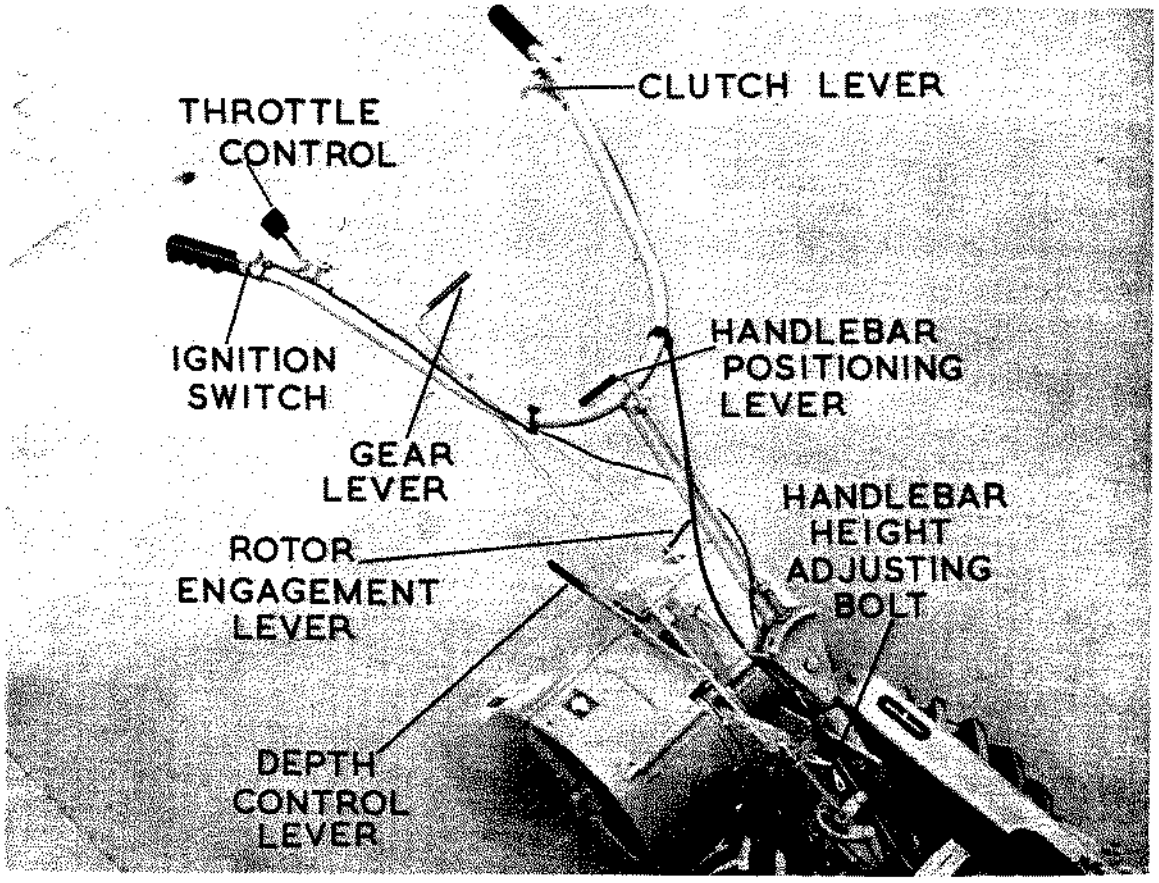
SERIAL NUMBER

The serial number of the "350" is stamped on the plate fixed to the left-hand side of the engine support frame beneath the engine, and on the central stem of the handlebar immediately below the handlebar pivot.

For future reference, record the serial number in the space below:

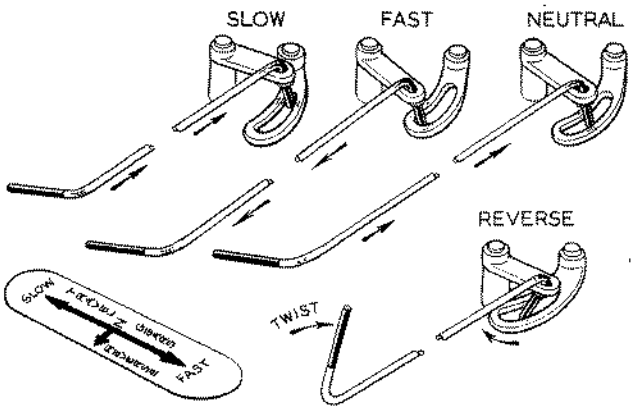
Howard "350" Serial No. . . . . .
Date Purchased . . . . . .

CONTROLS



CLUTCH LEVER is raised to release clutch, and lowered to engage.

GEAR LEVER is pushed FORWARD for SLOW, pulled BACK for FAST; NEUTRAL is midway between. For REVERSE, put the lever into neutral, then turn the gear lever clockwise, and hold in position. As a safety precaution, the gear lever operates against a spring when in the reverse position. On removal of pressure the lever automatically returns to neutral. (See diagrams below).



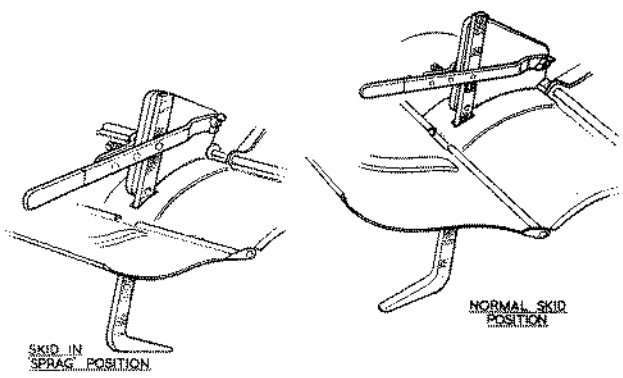
ROTOR ENGAGEMENT LEVER is moved a quarter-turn clockwise, pulled out, then released, to engage the rotor; turned clockwise, pushed in and released to disengage.

IGNITION SWITCH is turned "ON" to start, and turned "OFF" to stop the engine in an emergency.

HANDLEBAR POSITION LEVER is pulled out to free handlebars for movement to either side.

DEPTH CONTROL LEVER on the rotor hood, is pushed to the right, then raised to increase working depth, or lowered for shallow work.

SKID is used in the slide position for hoeing or digging in crumbly soils, and in the 'sprag' position to improve penetration into hard ground.



The drive V-belt can be changed from one pair of pulley grooves to the other, to vary the working speeds (see under "Land Speeds" page 2). See also "Adjustments" section, page 8).

WORKING THE MACHINE

YOUR NEW MACHINE

On receipt of your new "350" first read and study the instruction manuals for both engine and machine. Satisfactory performance and a long working life for your Rotavator will depend upon your following the instructions given. Be certain to keep the manuals in a safe convenient place ready for quick reference.

When in need of spare parts or service, contact your Howard dealer, who has genuine replacement Howard parts, and trained, experienced staff to service your machine correctly.

STARTING

Before starting to use your "350", fill the fuel tank, and check the gearbox oil level, and the lubrication points. Check that all nuts and bolts are tight. Select the required pulley ratio. (See Travel Speeds, page 2, and "Making the most of your "350", pages 11 and 12).

Turn the ignition switch to "On". Put the gear lever into neutral, then disengage the rotor drive lever. Start the engine (see engine handbook).

OPERATING

Lift the clutch lever and engage the required gear. Release the clutch to drive. DO NOT FORCE THE GEARS INTO MESH. If they do not immediately engage, release the clutch lever momentarily.

When in a position to begin Rotavating, lift the clutch lever again and move the rotor engagement lever to the "IN" position. Increase the engine speed and gently release the clutch, allowing the machine to pull itself into the work. Do not "ride" the clutch, i.e. do not keep partial pressure on the clutch lever when at work.

The depth of working is controlled by pressing the depth control lever to the right. This releases the skid, allowing it to be positioned as required. Choose the depth to suit the crop being planted. If this is deeper than can be obtained in one pass without the engine labouring, several passes should be made at progressively increasing depths.

If the skid is to be placed in the "sprag" position, the working depth must be adjusted accurately. If the skid is too deep, too much wheel spin will result; if the skid is too shallow, the machine may slide forward from the thrust of the rotor. Experiment until the correct position is found.

First gear, low belt ratio, should be used for heavy work, and where a fine tilth is required. First gear, high belt ratio, or second gear, low belt ratio, should be used for average conditions, and second gear, high belt ratio, for light hoeing and road work.

Always disengage the rotor when turning at headlands; also when reversing.

To stop the machine, raise the clutch lever and move the gear lever to the neutral position. Turn the rotor engagement lever to the "OUT" position and release the clutch.

Run the machine lightly at first, and gradually increase the loads during the first 25 hours work. NEVER allow the engine to labour during this running-in period.

After the first five hours of operation, check all nuts and bolts for tightness.

REVERSING

To reverse, pull up the clutch lever, move the gear lever to reverse, in which position it must be held, and release the clutch lever. Removal of pressure from the gear lever causes it to return automatically to the neutral position, and stops the movement of the machine.

NEVER, UNDER ANY CIRCUMSTANCES, TAMPER WITH THE REVERSE GEAR MECHANISM. THIS IS A SAFETY DEVICE.

TURNING

Normally, provided the rotor is disengaged and the blades are lifted clear of the ground, the machine can be turned with ease in either forward gear or reverse. When ground conditions are extremely wet and sticky, and earth adheres to the underside of the shield, it may be found that the machine is turned more easily in reverse gear.

HANDLEBAR ADJUSTMENT

Handlebar height can be adjusted to suit the operator, by means of the bolt and wingnut securing the handlebar stem to one of the five alternative holes in the top of the backplate.

The handlebars can also be offset to one side or the other, by pulling out the spring-loaded handlebar positioning lever and swinging the handlebars to whichever side is required. A hole is provided at each end of the handlebar mounting, into which the handlebar positioning lever positively locks when in the offset position.

HINTS FOR TOP PERFORMANCE

1. The importance of correct and regular lubrication cannot be over-stated. Study the lubrication chart on pages 6 and 7.
2. Do not neglect air cleaner maintenance.
3. Always shut the throttle to the idling position when lifting the clutch lever for engaging or disengaging gears.
4. Do not allow the engine to idle at slow speeds for long periods.
5. Do not press the handles down should the machine jump if hitting a stump or similar obstacle; lightly resist the movement and let the machine right itself. This applies particularly when working on hillsides in badly cleared land.
6. When taking sharp corners, put the rotor out of gear, lifting the handlebars to help in turning.
7. Never run the "350" with the engine labouring. Selection of the right gear, and correct depth of work ensures a constant reserve of engine power.
8. Always use the clutch in the same way as in a car, that is, for changing gear only. DO NOT "slip the clutch" to obtain extra engine speed.
9. For the first 25 hours, attempt only fairly light work, to allow the working parts to "bed down".

LUBRICATION AND MAINTENANCE

The simple, sturdy construction of the Howard "350" enables it to withstand the toughest conditions of work and use. The small amount of maintenance and lubrication detailed below, will, if done regularly, extend its working life and maintain its high efficiency.

BEFORE OILING, ADJUSTING OR SERVICING THE MACHINE STOP THE ENGINE

OILS

Use only good quality oils, as specified on page 2, under "Recommended Lubricants".

FIRST MAINTENANCE

(If machine not already serviced by dealer):

1. Check engine oil level.
2. Check the condition of the air cleaner element.
3. Check tightness of all nuts and bolts.
4. Check the gearbox and chaincase oil level. Tip the machine on to its engine bearers. Remove the oil level screw from the right-hand side of the gearbox backplate (see illustration on pages 6 and 7.) Oil should just appear over the threads. Top-up if necessary through the filler cap on the rear of the gearbox.
5. Check the drive chain tension; turn the rotor by hand to test the free rotation of the rotor. Any alteration to the chain tension is made by turning the adjuster screw on the underside of the chaincase.
6. Check that the clutch is correctly adjusted (see Adjustments section, page 8).
7. Check the alignment and tension of the drive V-belt; total up and down movement at the centre of the belt span should be no more than ¼ in. (6 mm.) under a load of 6 lb. (2.7 kg.).
8. Check tyre pressures (20 p.s.i. - 1.4 kg./sq.cm.).
9. Check that the weed cutter blades just clear the outside blades of the rotor.
10. Lightly oil the throttle and clutch cables, the gear, clutch and rotor control pivots, handlebar pivot and slide, shield securing pins, depth control adjustment, engine adjuster bolts, wheel cotter pins, and all pivot points and control rod guides.
11. Grease the inner clutch cone spline with lithium-base grease (see Adjustments section, page 8).

EVERY 10 HOURS OR DAILY

1. Check the engine oil level.
2. Check the air cleaner element. If dirty, remove the filter element and lightly tap along the edge to dislodge dust, then replace.
3. Check tightness of blade bolts, and straighten any bent blades.
4. Watch for signs of clutch slip; adjust the clutch cable if necessary.

EVERY 25 HOURS OR WEEKLY

(additional to 10 Hours maintenance)

1. Service the engine (see engine handbook).
2. Change the engine oil.
3. Check gearbox and chaincase oil level.
4. Check chain tension.
5. Check the drive V-belt alignment and tension.
6. Oil all pivots points as detailed in "First Maintenance", para. 10 above.
7. Tighten all nuts and bolts.
8. Check the clutch adjustment and reset if necessary.
9. Check tyre pressures.
10. Adjust weed cutter blades if necessary.

EVERY 250 HOURS OR 3 MONTHLY

(additional to 10 Hours and 25 Hours Maintenance)

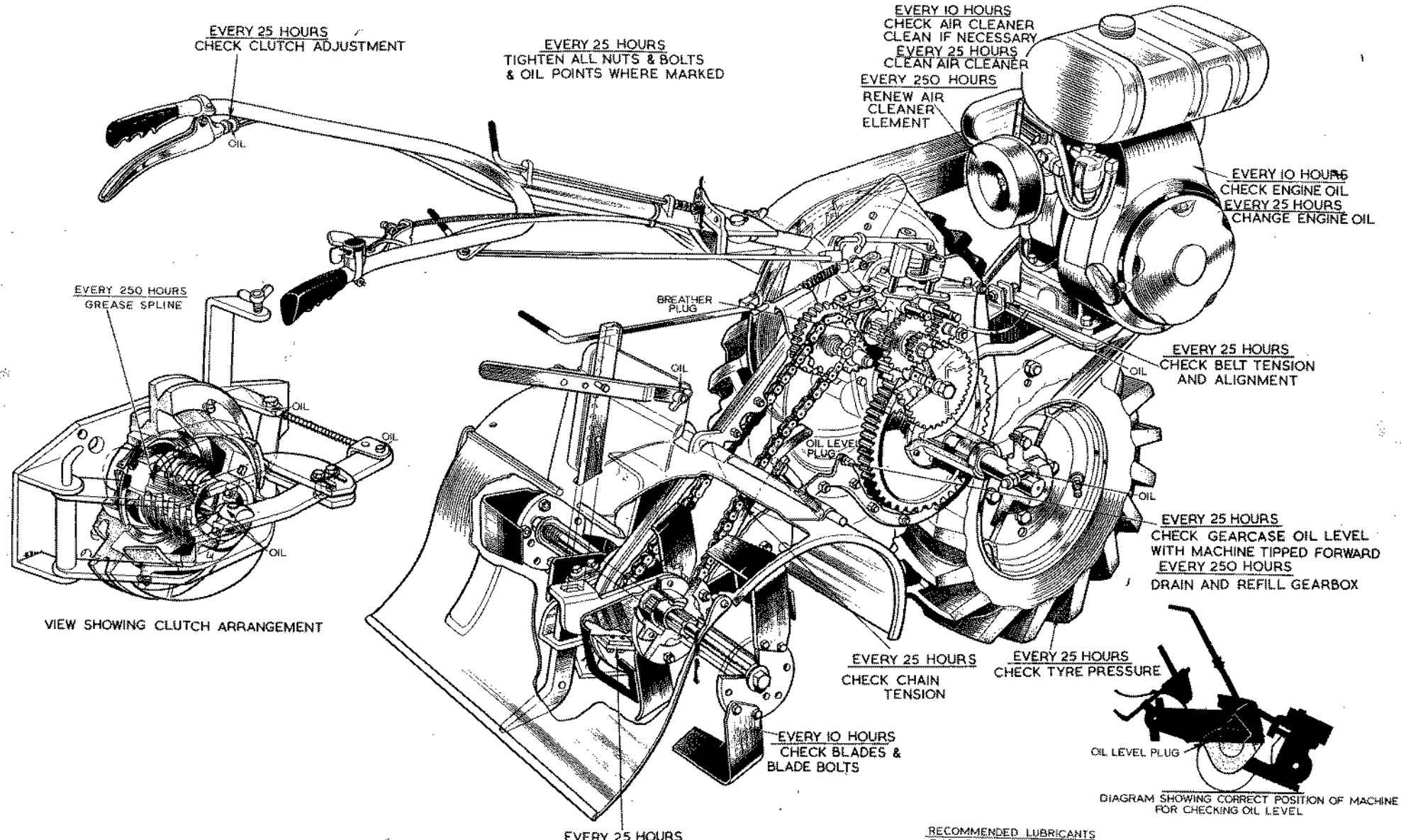
1. Drain the gearbox and chaincase, flush out and refill with 1½ pints (.8 litre) SAE 90 gear oil (see Adjustments section, page 9).
2. Renew the air cleaner element (see Adjustments section, page 8).
3. Grease the inner clutch cone spline with lithium-base grease.

NUTS AND BOLTS

All nuts and bolts must be kept tight, and as a guide, the following table may help:

Nut Size	Torque lb./ft.	Torque kg./m.
1/4 BSF	8.5	1.2
No.10 UNC	4.12	.56
¼ UNC	8.5	1.2
5/16 UNC	17.5	2.4
⅜ UNC	31	4.2
7/16 UNC	49.6	6.8
½ UNC	73.2	10
⅝ UNC	131.9	18.1
¼ UNF	9.5	1.3
5/16 UNF	19	2.6
⅜ UNF	33.8	4.63
½ UNF	81.2	11.1

LUBRICATION AND MAINTENANCE CHART

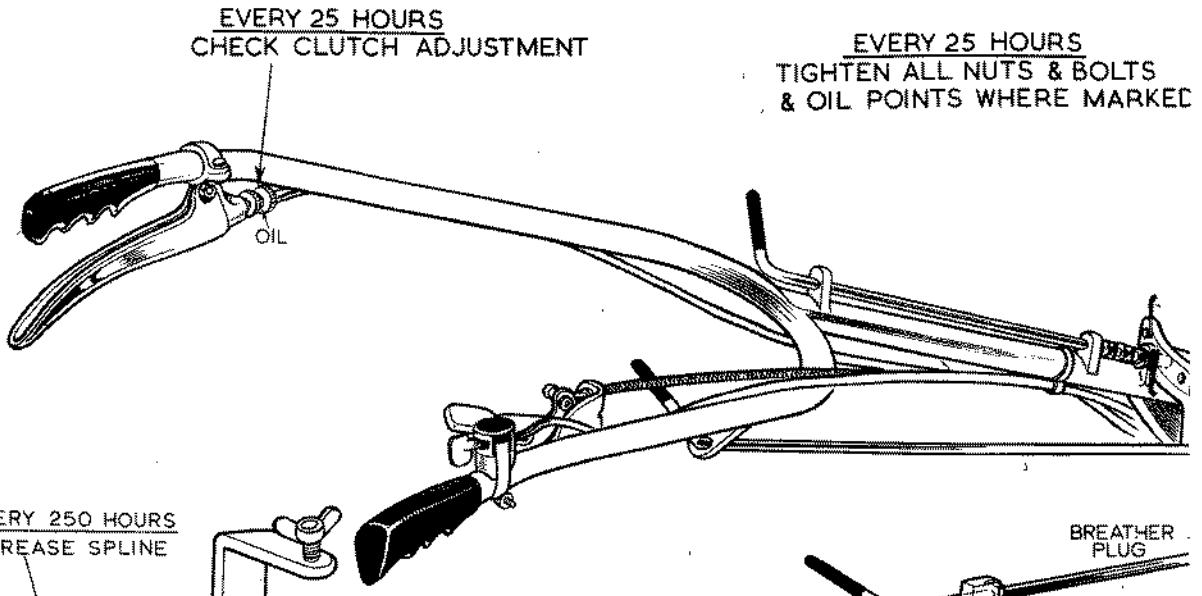


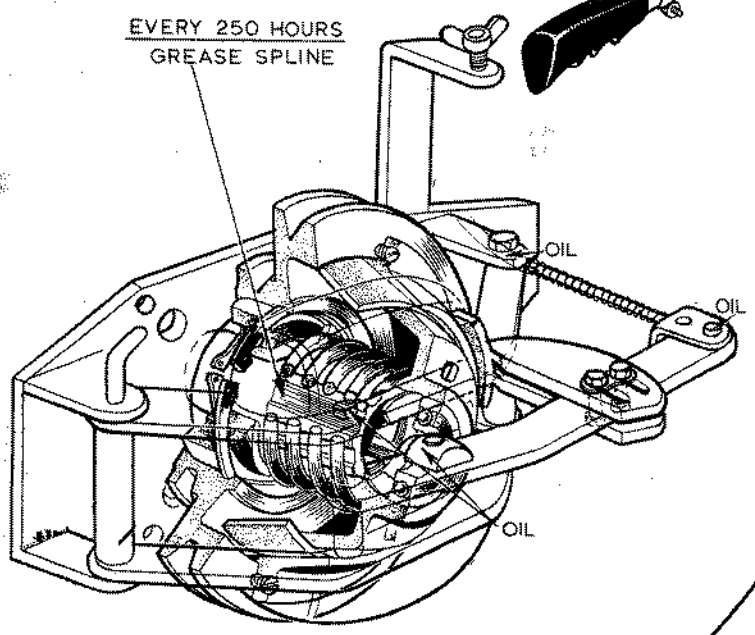
VIEW SHOWING CLUTCH ARRANGEMENT

DIAGRAM SHOWING CORRECT POSITION OF MACHINE FOR CHECKING OIL LEVEL

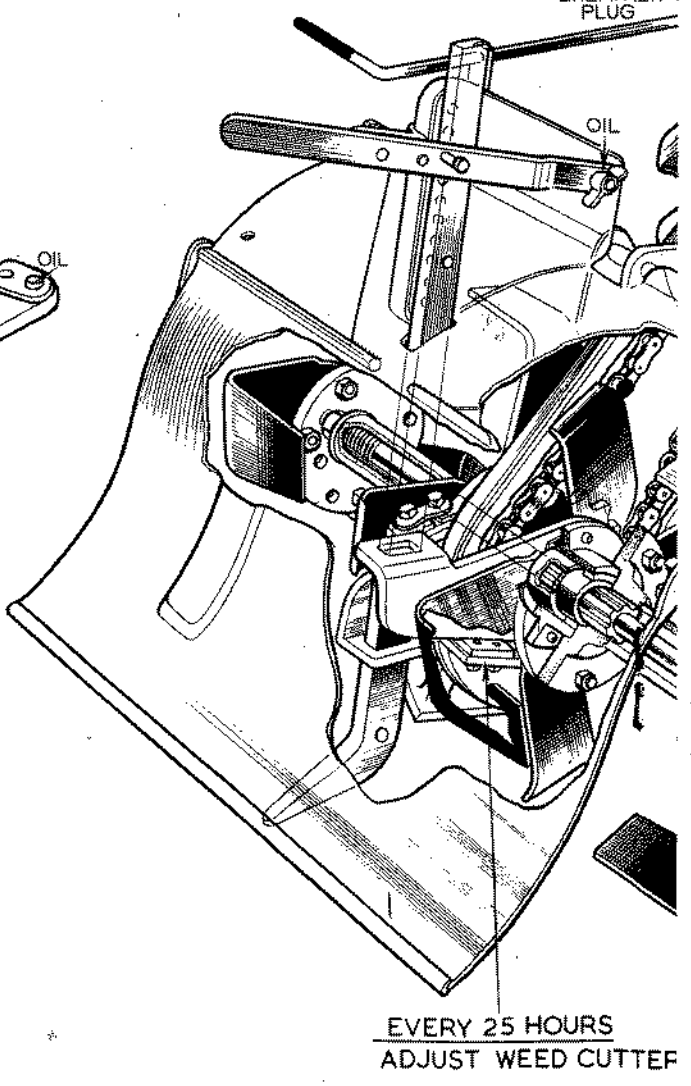
RECOMMENDED LUBRICANTS
ENGINE SAE 30 OR MULTIGRADE
GEARBOX & OILING POINTS SAE 90

LUBRICATION AND MA





VIEW SHOWING CLUTCH ARRANGEMENT



MAINTENANCE CHART

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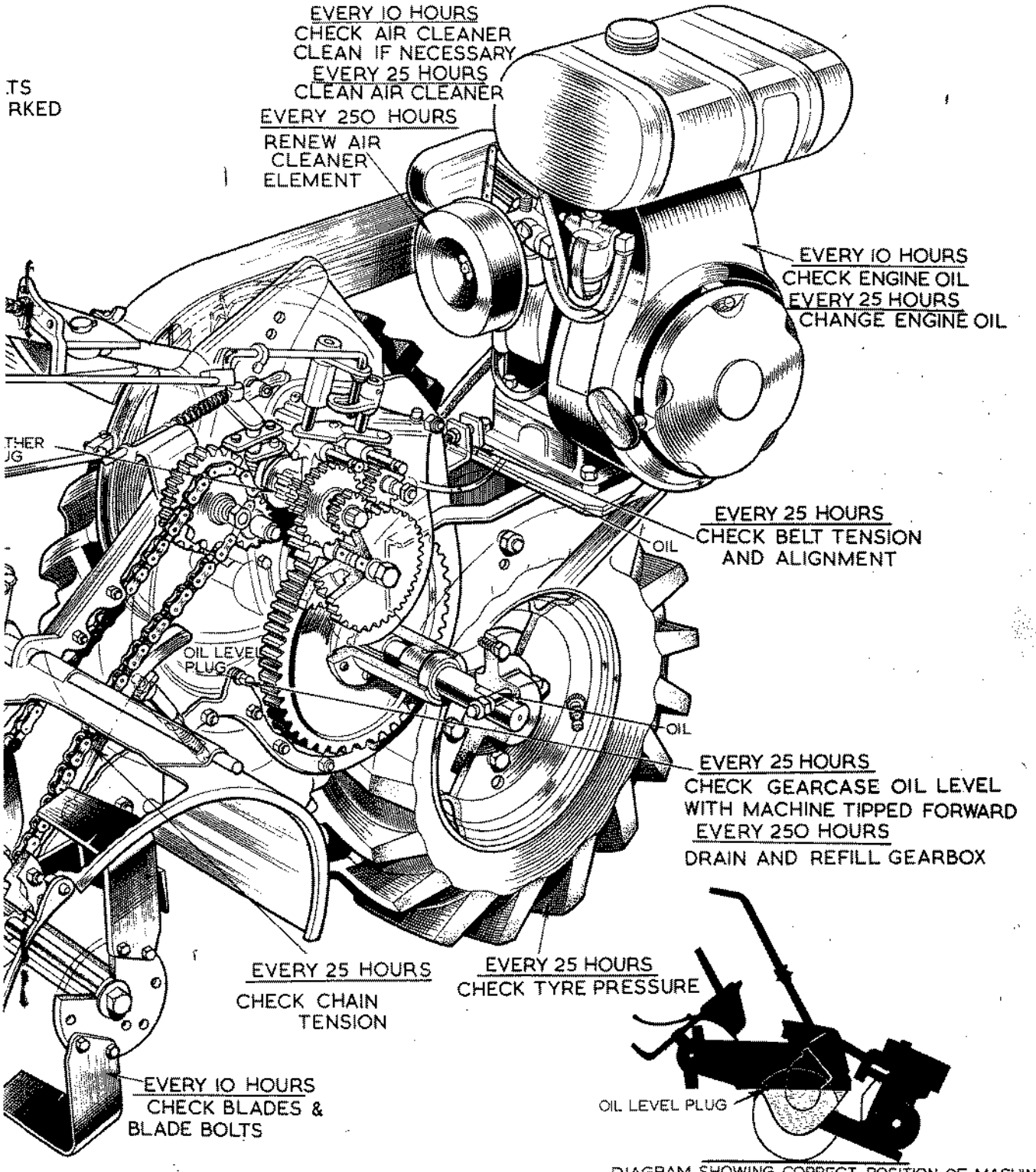


DIAGRAM SHOWING CORRECT POSITION OF MACHINE FOR CHECKING OIL LEVEL

TTERS

RECOMMENDED LUBRICANTS
ENGINE SAE 30 OR MULTIGRADE
GEARBOX & OILING POINTS SAE 90

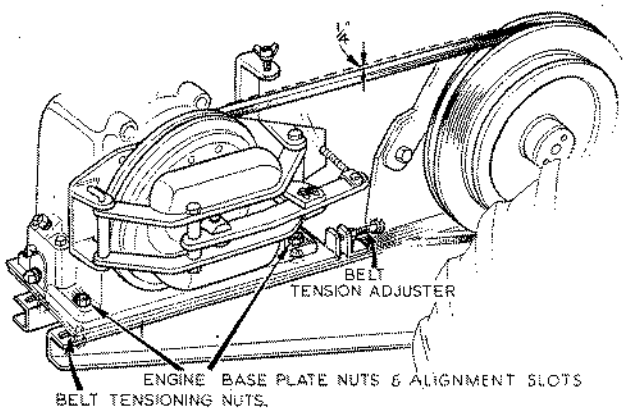
ADJUSTMENTS

AIR CLEANER

To take out the air cleaner element, remove the wing nut and washer and detach the housing containing the element. Lift out the element and tap it lightly along the edge, to dislodge any accumulation of dust. When refitting, check that the element fits correctly into its housing. If, after cleaning the element, engine performance does not improve, the element will probably need replacing. It should in any case be renewed after each 250 hours of work.

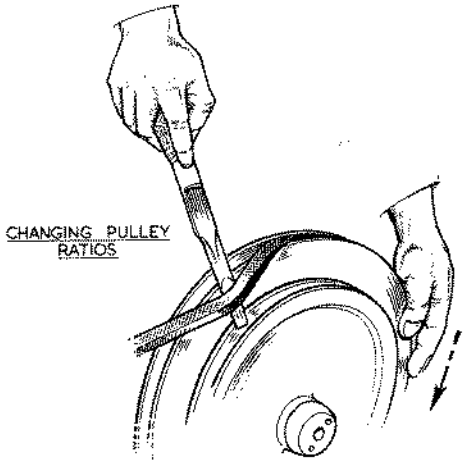
V-BELT TENSION

Slacken the four engine baseplate nuts and the adjusting screw locknut. Turn the adjusting screw until the belt is at correct tension, approximately ¼ in. (6 mm.) deflection at the centre of the belt span, under a load of 6 lb. (2.7 kg.). Check also that the V-belt pulleys are correctly aligned before tightening the baseplate nuts and adjuster locknut (see illustration below).



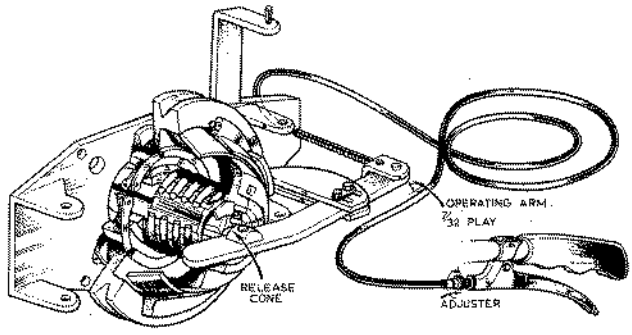
CHANGING V-BELT RATIO

Unscrew the wing nuts securing the V-belt guard which is removed. Turn the large pulley clockwise one complete turn, with one hand, at the same time levering the belt outwards with the other hand, to free it from the rear (small) pulley. Use a screwdriver as a lever to prevent fingers being trapped between belt and pulley (see illustration). Then position the belt around the required groove on the small pulley, and into the corresponding groove in the top of the large pulley. Turn the large pulley clockwise to wind the belt fully into position. Avoid twisting the belt. Finally, refit the belt guard.



CLUTCH ADJUSTMENT

To maintain the clutch at its correct setting, as it wears, keep 1/16 in. (1.6 mm.) of free movement on the operating arm, measured at the thrust bearing and socket position, or 7/32 in. (5.5 mm.) free movement at the arm end, (see illustration). Adjustment is made by turning the knurled screw on the control lever.



Every 250 hours of work, the clutch inner splined shaft must be lubricated with lithium-base grease. Remove the V-belt guard and the belt from around the pulleys. Unscrew the long bolt to open the clutch control frame. The pulley and clutch cone assembly are then eased off the shaft, and secured firmly upright in a vice. Remove the eight ½ in. (12.5 mm.) long screws securing the clutch outer housing to the pulley and detach the outer housing from the clutch inner lining. Withdraw the lining and the inner cone from the inner splined shaft, and remove from the vice. Apply grease liberally to the shaft. Reverse the dismantling sequence to re-assemble, again using a vice to hold the components in place against the pressure of the spring. Ensure that the outer housing is tight against the engine pulley before tightening the set-screws. When re-assembled, refit the assembly on to the shaft, secure the clutch control frame, refit the V-belt and replace the belt guard.

CHAINCASE GROUND SKID

A wearing skid protects the rotor drive chaincase from abrasive contact with the soil. The skid is secured with two setscrews, and should be replaced before it is so worn that the bottom of the chaincase itself starts rubbing on the ground.

ADJUSTMENTS (continued)

CLEANING GEARBOX AND CHAINCASE

After 250 hours of work, the gearbox and chaincase should be cleaned out. Unscrew the drain plug on the bottom 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 with 1½ pints (.9 litres.) of flushing oil. Run the machine for about 3 minutes, holding the machine with the rotor well clear of the ground, then drain the flushing oil. Refill the gearbox with 1½ pints (.9 litres) of good quality SAE 90 gear oil.

WEED CUTTING BLADES

Two weed cutter blades are fitted, one at each side of the rotor chaincase, to prevent long grass or weeds wrapping around the centre of the rotor. The blades are slotted and secured by two bolts each, and should be adjusted so that they just clear the rotor blades when the rotor is turned BY HAND. Severe power losses will occur in weedy conditions unless these blades are correctly adjusted.

REMOVING WHEELS

Undo the cotter pin nut on each wheel hub and gently drive back the cotter pin, taking care not to damage the threads. The wheels can then be removed.

NOTE: Should it be necessary to dismantle the gearbox or chaincase for repair or overhaul, we recommend the use of Red Hermetite paste jointing for re-sealing gaskets. On the rotor selector cover Plastic Hermetite 1250 should be used. Both products made by Kenilworth Manufacturing Co. Ltd., Hermetite Works, West Drayton, Middlesex, England.

ROTOR AND BLADES

BLADES

The Howard "350" is normally delivered already equipped with blades. Both standard L-blades and special centre blades are fitted. Each blade type is supplied in a left-hand and right-hand version, depending on the direction it faces with the cutting edge leading, (see illustration on right).

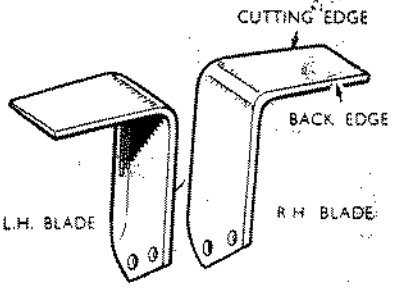
Blades should be fitted as shown, equally spaced so that only one blade at a time can enter the ground.

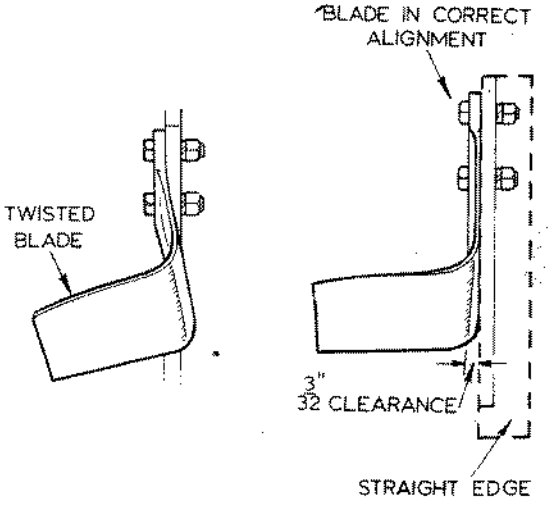
When replacing worn blades, remove one blade and fit the new one of correct form in its place before proceeding to the next. If it is necessary to fit your own blades, this is done as follows:

1. Identify left-hand and right-hand blades.
2. Viewed from the rear of the machine, i.e. behind the handlebars, the left-hand flange carries two right-hand blades; the right-hand end flange carries two left-hand blades.
3. The left-hand centre flange carries two left-hand blades and two right-hand centre blades; the right-hand centre flange carries two right-hand blades and two left-hand centre blades (see illustration overleaf). The outer blades are fitted to the outsides of the end flanges; the centre blades on the inner sides of the centre flanges, as illustrated.

Blade bolts must always be inserted from the blade side, head against the blade, spring washer and nut against the flange.

Recognising Right-hand & Left-hand Blades





ROTOR AND BLADES (continued)

MAINTENANCE OF BLADES

Only the cutting edges of the blades should rub in the soil; the backs of the blades should be clear.

The blades are so designed that use in average soils should keep them sharp. If the ground is very stony however, it is recommended that two sets of hoe blades be used alternately, so that one set may be kept sharpened.

The efficiency of the machine is determined largely by the condition of the blades. If they are left bent or distorted through striking solid obstacles in the ground, and are not straightened, they will require double the power to drive, the quality of the work will be poor and the blades will wear much more quickly. Trouble will also arise with clogging under the shield. Blades must therefore be examined daily and any bent ones straightened immediately.

ROTOR-REMOVING, REPLACING OR EXTENDING

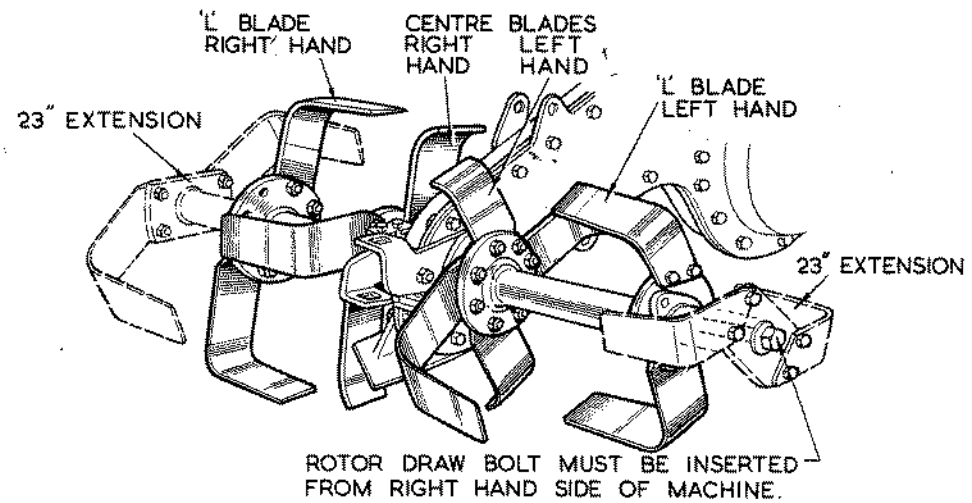
To remove the rotor, first release the depth lever from the skid, by swivelling the spring-loaded clip and then pulling the lever to the right. Withdraw the skid from below. Then, twist and drive out the two shield securing pins, and remove the shield complete.

Unscrew the two $\frac{5}{8}$" UNC locknuts on the left of the rotor tube, and remove the rotor draw bolt. Pull the two rotor tubes from the central splined drive shaft.

If the machine is to be used without the rotor tubes, the protection covers should always be fitted in their place.

When replacing the rotor tubes on the rotor drive shaft, ensure that the blades are fitted with the leading edges of the blades forward; viewed from the right-hand side of the machine, the rotor turns clockwise. It is also essential that the correct spline on the rotor drive shaft is selected, to give equal spacing of the blades. The rotor tubes must be so fitted that the rotor "scroll" pattern is maintained to ensure that only ONE blade at a time can enter the ground. Otherwise, undue strain will be placed on the transmission. (As a guide, the centre blades of the left-hand tube should be 30 degrees ahead of the centre blades of the right-hand tube). Then, insert the draw bolt *from the right*, with the locknuts on the left, and tighten fully.

To extend the rotor to 23 in. (58.5 cm.) fit the extension pieces to each end of the rotor, ensuring that the cutting edges of the blades are leading. Then secure the assembly with the longer draw bolt, ensuring that the bolt head is at the right of the rotor, with locknuts to the left.



MAKING THE MOST OF YOUR "350"

GENERAL

As the scope of operation is so wide, and, as soil tillage methods differ so greatly according to crop, climate and soil condition, it is not possible to deal more than superficially with this aspect. However, it is hoped that the following hints will help the user to obtain the best results from the machine.

The Howard "350" will cultivate to a maximum depth of 6 in. (15 cm.). An average first pass of 4 to 5 in. (10 to 12 cm.) should be obtainable in previously cultivated soil. On some soils, especially the heavier kinds, the full depth will not be obtained in a single pass. Where cultivation in depth is needed, a first pass should be made at 3 to 4 in. (7 to 10 cm.) followed by a further pass at full depth.

The low gear, low belt ratio, must be used when cultivating ground which is very hard or covered with heavy growths. Second gear, low belt ratio, or first gear, high belt ratio, is used for all ordinary cultivation, and second gear, high belt ratio, for light cultivation. Always work in the highest gear that will produce the quality of tilth necessary. Always use second gear, high belt ratio, for running the machine between jobs. A depth control skid is fitted, and by moving this up and down the depth of work can be controlled in ½ in. (15 mm.) stages down to 6 in. (15 cm.) deep.

If the surface of the ground is very hard or baked, the depth control should be adjusted so that the machine just bites the surface. Further passes should then be made until the required depth is reached.

On heavy land which is to be laid up for the winter, the surface should be left rough. By using the ridging or furrowing attachment during this final or late autumn cultivation, the land can be left in ridges so that the maximum surface area is exposed to the effects of weathering. Alternatively, the plough attachment may be used.

If heavy land is Rotavated too finely and left bare to the winter rains, the soil may pack together, making spring cultivation difficult.

When cultivating ploughed land, the "350" should be run across the furrows, not along them. This will ensure complete cultivation.

On hilly ground always run the machine around the contour, working from the top to the bottom of the hill. After the first cut, one road wheel can be run in the soil just worked, so that any tendency to slip will be countered by the wheel coming against a wall of uncut soil.

On light soils, two courses are open. The ground may either be left rough, or it may be Rotavated to medium depth and sown to a green crop, e.g. rye. The green crop will prevent the leaching out of the nitrogen in the soil. In the early part of the year the crop is then Rotavated; more than one pass may be necessary. After a week or ten days, the spring seed bed may be prepared. This Rotavation should be shallower than that used to work-in the green crop.

SEED BEDS

On ground which has been cultivated properly, seed beds should seldom exceed 2 in. (5 cm.) in depth, except for certain crops. Seeds require a well-aerated soil with a firm bottom. Some small seeds require a seed bed to be lightly consolidated. This is particularly important on light soil, where consolidation will bring moisture nearer to the seedling plant.

Competition from weeds is most critical when the crop is at the seedling stage. To obtain weed-free seed beds, the ground should be prepared a few weeks ahead of the sowing dates. Rotavation should be carried out at a depth of 4 in. (10 cm.); this causes any weed seeds to germinate. These weeds may be turned in by a second Rotavation, which will prepare the seed bed at the same time. It is most important that this second Rotavation is shallower than the first. Remember that the ground is more open, so that the machine will tend to dig more deeply. When the seed bed has been prepared, it should ideally be allowed to settle for 24 hours before sowing.

WEED CONTROL

Rotavation produces a well-aerated warm seed bed in which germination takes place readily. Inevitably, such conditions also favour weed seeds.

Weeds are eliminated by preventing them seeding or by progressive weakening of the deep tap roots or rhizomes. Weeds are killed most easily and inexpensively by Rotavating them directly they show green. Annuals will be killed outright and perennials will be reduced until they too, die out. This is true even of such persistent weeds as couch or twitch.

If a particularly tall and dense infestation of weeds is to be tackled, as much growth as possible should be cut away and burned before Rotavating.

ROW-CROP WORK

Working will be easier if rows are made as long as possible. At least 3 ft. (1 m.) should be allowed at each end for turning.

Weeds between rows may be controlled by Rotavation. Ideally, this should be done when the weeds are small, but even a heavy growth can be turned in.

This will not prevent weeds growing in the rows themselves; such weeds must be controlled by hand-hoeing when they are still small. Should land become weed-infested because these weeds have been allowed to seed, the following crop should be a cleaning one, e.g. roots or potatoes, which will give a period of several weeks in the early part of the year when the weed seeds will shoot and can be killed by Rotavation.

In planning your crops to make the best use of the "350", allow 2 or 3 in. (5 or 7 cm.) over the effective width on each side of the machine.

HINTS ON CROPPING LAYOUT

For the grower at home, mechanical cultivation requires a wider crop spacing than that for hand working. Experience shows that 36 in. (1 m.) is the most suitable spacing. Tall crops, e.g. peas and beans, should be sown at 6 ft. (2 m.) centres, with intermediate crops at 3 ft. (1 m.) spacing, and either of a dwarf variety (if peas or beans) or of a similar height to cabbage, lettuce, etc. This might suggest that more ground has to be cleared, involving additional time and labour. The "350" will make the passes that are necessary between rows so quickly and easily however, and without damage to the growing crop, that much time and effort will be saved, and will, in fact, allow the maximum amount of mechanical cleaning to be done while the crop is growing.

Commercial growers, of course, may well decide to plant at narrower spacings to obtain maximum possible yield per acreage.

Most growers, commercial and amateur, appreciate the need for a rotation of crops, and know that the same crop should not be planted in the same row season after season.

GREEN MANURING

Land not immediately required may be sown down to such crops as mustard or rye grass during spring and summer, or rye during the winter. These crops should be allowed to mature if they are to be used as green manures - they will then have the best effect on the soil. A winter cover crop will preserve plant foods which would otherwise be leached away, so it need not be allowed to mature.

MIXING-IN

The "350" will be found ideal for the thorough mixing-in of lime into acid soils, for working-in gypsum as a soil conditioner, or, for any organic or manufactured additive for fertilising or improving soil texture.

LAND RECLAMATION

The "350" may also be used to bring derelict land back into cultivation. Virgin ground or soil tightly bound with roots or grass is best cultivated by first working at only a shallow depth, to break up the surface. Depth can then be gradually increased by subsequent passes made at intervals of about a week or ten days.

CONCLUSION

Never overtax the power of the machine. Far better results will be obtained from working in easy stages, rather than by forcing the machine to do work in excess of its horsepower.

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