

24"

MACHINE No. 28264

ENGINE No. 26344

THE

HOWARD

**ROTAVATOR**

*'Gen'*

Series IV model

INSTRUCTION BOOK

AND

SPARE PARTS LIST

99915-204

THE HOWARD ROTAVATOR CO LTD

SAXHAM.

Bury ST EDMOND.

SUFFOLK.

0284-63266.

( Mr. JOHN BRAWN. STORES, )

THE  
HOWARD**ROTAVATOR**

'Gem' Series IV model

*This instruction book has been written with the object of providing in the simplest possible manner a complete guide for the owner in the operation of the "Gem" Series IV Model.*

*Detailed instructions for the larger maintenance operations, especially those which may become necessary after long service, are not included in this publication, as such work should be entrusted to the local "Gem" Service Distributor.*



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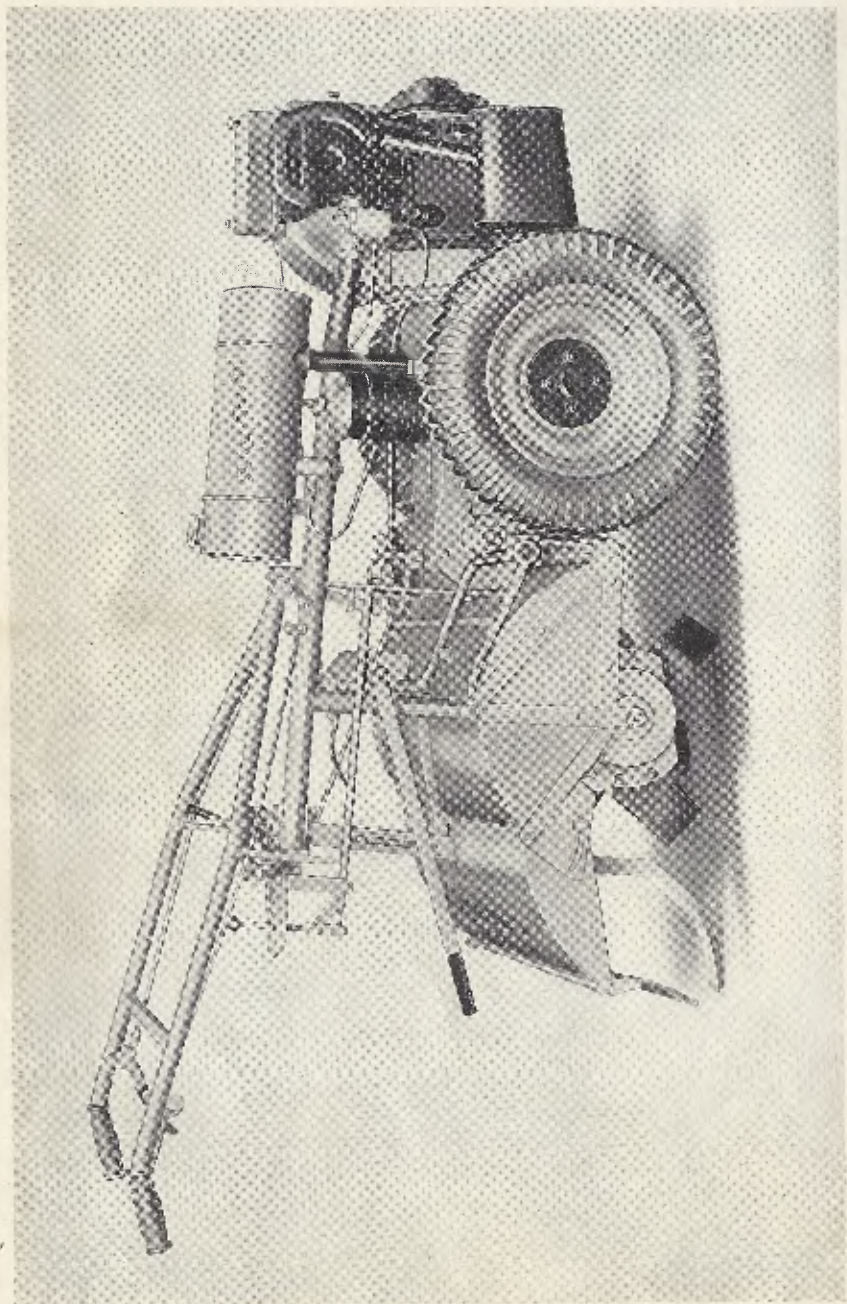
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THE "GEM" Series IV Model.

## SPECIFICATION

### ENGINE

Air-cooled (Fan) Twin cylinder (in line vertical) 4-stroke  
(810 cc.).

### BORE AND STROKE

3" diam. × 3½" stroke.

### ENGINE SPEED

2,000 r.p.m.

### FUEL TANK

Capacity 2 gallons

### CLUTCH

High duty single dry plate.

### GEAR-BOX

Three speed and reverse transmission by hardened gears running in oil. All shafts mounted on ball bearings. Differential gear for easy turning automatically locked when rotor is engaged.

### SPEEDS

1st gear—.87 m.p.h. 2nd gear—1.3 m.p.h.  
3rd gear—1.83 m.p.h. Reverse gear—1.55 m.p.h.

### ROTOR

Speed 172 r.p.m. 18" diam.

### POWER TAKE-OFF PULLEY

10" diam. 4" face. 500 r.p.m. 1,309 ft. per min.

### OVERALL DIMENSIONS OF MACHINE

Length 6' 8". Width (24" rotor) 2' 5".  
(30" rotor) 2' 11".

### WEIGHT

5½ cwt. approximately.

## CONTROLS

### THROTTLE

The throttle control lever is fitted under the right handlebar grip. By raising it the engine speed is increased; by pressing it down the engine speed is reduced. The twin engine is governed, the hand throttle being used for starting and idling. At all other times the governor has control.

### CLUTCH

Control lever is mounted on left handlebar. Normal operation for forward travel, pull up lever to disengage drive, release to re-engage. To reverse machine, operate as follows: pull up clutch lever, move gear lever to reverse (which operates safety interlock), release clutch lever. No movement takes place until clutch lever is pushed down. Removal of pressure automatically stops machine. To disengage reverse gear, pull up clutch lever, move gear lever to neutral.

### HANDLEBAR POSITIONING LEVER

This is mounted on the main frame and is situated between the gear levers. To swing the handlebars to either side, press the handlebar positioning lever down to its full extent and swing the handlebar to whichever side is desired.

### HEIGHT OF HANDLEBARS

To adjust the height to suit the operator, remove the bolt at each end of the handlebar slide and select another hole in the lugs attached to the handlebars.

### ROTOR GEAR CONTROL LEVER

The lever on the quadrant engages with either of two notches. Pushing the lever forward disengages the rotor whilst pulling it back engages the rotor.

### TRAVEL GEAR CONTROL LEVER

Operates in a 4-star quadrant, marked 1, 2, 3, R to indicate forward travel and reverse positions. Neutral position is central. To engage gear, move lever to required position. Note safety feature, clutch interlock with reverse gear, see instructions under "Clutch".

### ROTOR DEPTH CONTROL LEVER

This is linked with the depth control skid, or wheel, and situated above the rotor shield. To lower the rotor for deeper work, the lever is raised to decrease the depth the lever is pushed down.

### EXHAUST VALVE LIFTING LEVER

This is placed under the main frame over the centre of the rotor shield and lifting up decompresses the engine for easy starting.

### THE ENGINE STARTING HANDLE

When this is not in use it is folded back on the rotor shield. When starting the engine, lift it out of the bracket and swing it forward until the recessed square on the handle will engage with the protruding square end of the starting dog on the gear-box. *Both travel gear and rotor must be out of gear when starting.*

## PREPARING FOR WORK

Before starting the engine check the oil and petrol supply. Check the oil level in the crankcase by means of the dipstick which is located on the exhaust side of the engine immediately below the governor radius arm.

Unscrew the dipstick, wipe clean, and check oil level without screwing in the threaded portion of the dipstick. The indicating marks on the dipstick indicate High and Low levels (when the thread of the dipstick is not engaged).

The engine should not be run with the oil level below the Low level as shown by the dipstick. Always top up the oil level before starting the day's work. The oil filler cap is situated on the exhaust side of the crankcase, just below the carburettor. The "Gem" Series IV being a wet sump model, the oil is carried in the engine sump.

Make certain that all the oiling points listed on the chart have received attention. See that no nuts or bolts are loose, particular attention being paid to the rotor blade bolts.

Standing on the right-hand side of the machine looking forward, flood the carburettor, and see that *both the rotor and the travel gears are in neutral*. Ensure that the throttle control lever is only just open. With the left hand lift the exhaust valve lifter. Place the starting handle into position. Briskly crank the engine and release the exhaust valve lifter after the first turn or two. When the engine starts replace the starting handle in the bracket provided on the shield.

Adjust throttle control to a brisk idling speed. See that the depth control handle is set so that the rotor is clear of the ground. Next, lift the clutch hand lever and engage the desired gear, release the clutch at the same time gently accelerating the engine.

## COMMENCING CULTIVATION

Adjust the depth control lever to give the required depth of work, select the appropriate travel gear to give the required fineness of tilth, put the rotor gear in mesh and commence work keeping the engine running at a constant speed whatever type of work is being done. Do not race the engine if the work is light nor labour the engine if the work is heavy. After a little practice, no difficulty will be found in maintaining the best engine speed.

## Rear Shield

To avoid an accumulation of soil choking the rotor and causing the use of unnecessary power, always keep the rear shield well raised so that the blades will throw the soil clear.

## To stop the engine

Put both gears in neutral and then lift the exhaust valve lifter.

## NOTES ON CULTIVATION

Since the scope of operation is so extensive, and as soil tillage methods differ so greatly with various crops, climates and soil conditions, it is only possible to deal briefly with this aspect. However, the following hints should enable the user to obtain the best results from the machine.

Virgin soil or land tightly bound together with grass or roots is best cultivated by first working shallow to break up the surface. The required depth may then be reached on successive runs over the ground.

The low gear must be used when cultivating ground that is very hard or covered with heavy growths. Second gear is used for all ordinary cultivation, and top gear for light cultivation. Always work on the highest gear that will produce the quality of tilth required. Always use top gear for running the machine between work. A depth control skid, or wheel, is fitted and by moving this up and down the depth of work is controlled in  $\frac{3}{4}$ " stages from  $\frac{3}{4}$ " to about 8" in depth.

When cultivating a ploughed field, the "Gem" 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 top to the bottom of the hill. After the first cut, one road wheel can be run in the soil just cut up and any tendency to slip will be obviated by the wheel coming against a wall of uncut soil.

If the land is exceptionally light special extension rims may be supplied to prevent the machine sinking in.

Do not 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.

## NOTES FOR OPERATOR

1. The importance of regular and correct lubrication cannot be over-emphasized and particular attention must be paid to the Lubrication Chart on page 11.
2. *Air cleaner maintenance is of paramount importance. (See page 13.)*
3. The throttle must always be shut to idling position when lifting the clutch lever for engaging or disengaging gears.
4. The engine must not be allowed to idle at slow speeds for long periods.
5. Do not hold the handles firmly down if the machine jumps on striking a stump or similar obstacle, but just lightly resist the movement and let the machine right itself. This particularly applies when working on hillsides in badly cleared land.
6. When taking sharp corners, put the rotor out of gear, if necessary lifting the machine at the handles to help in turning.
7. Never run the "Gem" with the engine labouring. By selecting the right gear and the correct depth of work a reserve of engine power is always in hand.
8. When operating the "Gem," 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 12 hours after delivery, only light work should be done in order that the working parts are allowed to bed down properly.

## LUBRICATION

(See Lubrication Chart, page 11)

**ENGINE** Oil must be renewed completely after every 24 hours work. The oil may require topping up from time to time and the oil level should never be allowed to fall below the Low level on the dipstick.

**ROTOR DOG CLUTCH HOUSING** Remove the square-headed plug [point "B" on chart], and give half a dozen spurts of oil from the oil-can. This should be done every 24 hours and particularly before starting up after any prolonged period of rest.