Howard 400 Rotavator
Instruction Book (Manual)
Spare Parts List

56480

Howard-Clifford
400

Kingston House
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Instruction Book
and
Spare Parts List

HOWARD-CLIFFORD LIMITED, WEST HORNDON, ESSEX, ENGLAND
ONE OF THE ROTARY HOES GROUP OF COMPANIES

Telephone: HERONGATE 361

Cables: ROTAVATOR, BRENTWOOD

Price in United Kingdom 31- 3/6

Howard-Clifford 400

The "400" is a heavy duty Rotavator specifically designed for growers, nurserymen and contractors who demand high performance and rugged construction at minimum cost.

The Rotavator can work to a maximum depth of 8–9 in., depending on soil conditions.

There are two forward gears which give deep digging and hoeing speeds and one reverse gear.

Handlebars may be swung to either side and adjusted for height. A P.T.O. pulley may be fitted to the machine for belt pulley work.

HOWARD-CLIFFORD LTD. - WEST HORNDON - ESSEX

Specification

Engine. J.A.P. 4/3 4-stroke Petrol model, Bore 70 mm./75 mm. Displacement 288 c.c. 5.5 b.h.p. at 2,000 r.p.m. (Maximum engine speed 3,000 r.p.m.). Splash type lubrication. Centrifugal type governor, handle starting.
or:—
HIRTH DIESEL type D.24. 447 c.c. 6.5 b.h.p. at 2,200 r.p.m. 2-stroke diesel. Governor controlled.

Clutch. 2 plate, dry type.

Gearbox. Two speed and reverse incorporating worm and heavy-duty spur wheel drive.

Speeds. Petrol Model:
1st gear — .85 m.p.h. (1.4 k.p.h.)
2nd gear — 1.8 m.p.h. (2.9 k.p.h.)
Reverse gear .7 m.p.h. (1.1 k.p.h.) @ 2,800 r.p.m.
NOTE: Speeds of the diesel model will be approximately 30% less at normal operating engine speeds.

Fuel capacity.
Petrol model 1 gallon (4.5 litres).
Diesel model 14 pints (7.9 litres).

Oil capacities.
Main gearbox—2½ pints (1.5 litres).
Bevel gearbox—⅔ pint (0.4 litres).
Chaincase—¼ pint (0.3 litres).

Dimensions.
Overall length 72″ (183 cms.)
Overall width 20″ (51 cms.)
Overall height (to control lever tips) 42″ (107 cms.)

Weight.
Petrol model approx. 422 lbs. (192 kgs.).
Diesel model approx. 485 lbs. (220 kgs.).

Wheels.
20″ dished wheels fitted 400 x 12 tractor tread tyres.
Tyre pressure 14 lbs./sq. in. (0.98 km./cm.)
Wheel centres—12″ (30 cms.) in narrow position (16″ overall)
14½″ (32 cms.) in wide position (18½″ overall).

Controls.
(1) Gear control by lever and connecting rod.
(2) Rotor engagement control by lever and connecting rod.
(3) Handlebar control by handgrip and connecting rod.
(4) Engine clutch via Bowden cable with external adjustments.
(5) Engine speed control via Bowden cables.

Rotavator.
Drive by bevel pinion, crownwheel and ¾″ pitch roller chain.
Speed.
Petrol model 200 r.p.m. at rated engine speed (2,800 r.p.m.).
Diesel model 157 r.p.m. at rated engine speed (2,200 r.p.m.).
Depth control by adjustable skid in ¼″ stages.
Weedcutter blades fitted at rotor extremities to prevent weed bind-up. 16″ (41 cms.) working width.

P.T.O. (Optional fitment)
10″ dia. pulley, 3½″ width.
630 r.p.m. at rated engine speed (2,800 r.p.m.)
Belt speed 1,650 r.p.m.

The New Machine

Before attempting to start your "400", study the instruction books for both engine and machine.

Check all oil levels and lubrication points.

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 period. After the first five hours of operation the engine oil must be changed and all nuts and bolts checked for tightness.

Operating the Machine

Start the engine according to the engine instruction book.

Lift the clutch lever and engage the appropriate gear.

Do not force the gears into mesh. If they do not immediately engage, release the clutch lever momentarily.

When in a position to start rotavating, lift the clutch lever and move the rotor engagement lever to the "IN" position. Increase the engine speed and then gently release the clutch, allowing the machine to pull itself into work.

The depth is controlled by pressing the depth control lever to the right, which frees the skid in the socket and allows it to be repositioned in the desired hole.

There are two alternative holes in the skid itself. The lower one will permit a greater depth to be obtained.

Choose the depth to suit the crop to be planted. If this is deeper than can be obtained in one pass without the engine labouring, several passes should be made at progressively increasing depth.

The rotor should always be disengaged for turning at headlands and when reversing.

To stop the machine, raise the clutch and move the gear lever to the neutral (N) position. Move the rotor engagement lever to the OUT position then release the clutch.

Ensure that the wheels are not forcing the machine foward when the clutch is lifted, otherwise disengagement of the gears may be difficult.

Power-Take-Off Unit (optional fitment)

To fit the P.T.O. unit, first remove the cover plate (No. 62196) from the right end of the staytube.

Insert the P.T.O. shaft into the staytube and engage the sleeve over the splined jackshaft inside the tube.

Fasten the P.T.O. bearing housing to the staytube flange with the 4 bolts removed with the cover plate, by screwing them from the inside of the flange into the threaded holes of the bearing housing casting. The 4 nuts are not required to secure the P.T.O. unit.

Furrower (extra equipment)

The furrower, which is used for opening and splitting potato drills, making temporary irrigation furrows etc., fits over the depth control skid.

Remove the skid by releasing and swivelling the spring loaded clip so that the depth control lever is freed from the skid. Slide the furrower over the skid until the point is approximately level with the foot, and secure by tightening the locknut. Replace the skid complete with furrower into the depth control socket.

The furrower must always be used with the rotor in operation.

Wheel Settings

Wheels are "dished" and reversible, thus giving 2 wheel spacings of 12″ (30 cms.) centres in the narrow position and 14½″ (37 cms.) in the wide position. On sloping or uneven land the wider setting will give the greatest stability.

Lubrication and Maintenance

Oils.

Use only good quality oils. The grade of oil recommended throughout the machine (except the engine) is SAE 90. For the engine and air cleaner see separate engine handbook.

Air Cleaner.

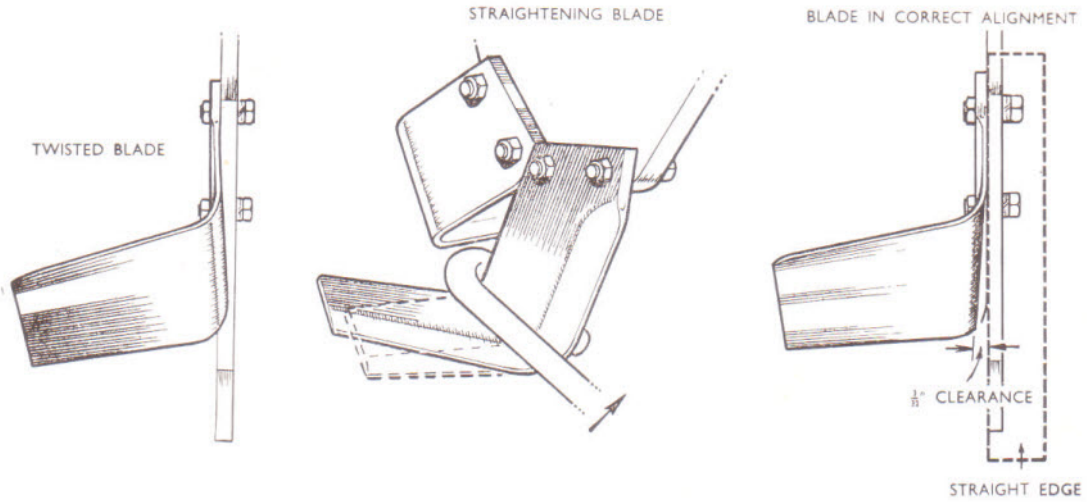
Pay particular attention to the air cleaner at all times. It may be necessary to change the air cleaner oil twice daily under dusty conditions. If the oil is not changed in time, the accumulated dust will raise the level to a point where the oil is sucked into the engine, where the absorbed dirt would cause immediate and expensive damage.

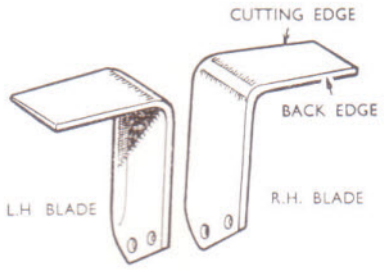
Never allow sediment to build up in the air cleaner base.

Routine Maintenance

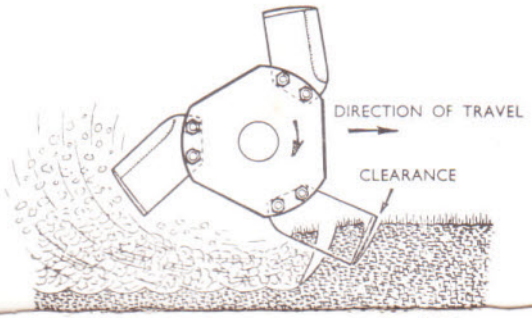
Every 10 hours work or daily. (Time required 5-15 minutes):
(1) Maintain engine according to engine handbook.
(2) Check level and condition of oil in air cleaner. Wash out with petrol and renew with fresh engine oil if necessary (twice daily in extremely dusty conditions).
(3) Check tightness of blade bolts. Straighten any bent blades with blade setting bar (see opposite page).

Every 25 hours work (Time required 30-45 minutes):
(1) Maintain engine according to engine handbook.





How to identify right and left-hand blades



Correct blade setting showing clearance at back of blade.

(2) Check gearbox oil level with dipstick.
(3) Check bevel gearbox oil level with dipstick.
(4) Check chain case oil level. Oil should just seep over oil level plughole (situated at rear of chaincase) when blades are touching the ground.
(5) Lubricate rotor stub axle bearing with an oilcan. (The oilway screw is situated on the rotor tube, just inside the right hand flange.)
(6) Lightly oil the clutch and throttle cables, pivot points on the gear, rotor and indexing controls and the handlebar swivel, the depth control lever pivot and the shield hinges.
(7) Check the chain tension and reset if necessary to give a total up-and-down movement of ⅜"-½". This can be checked with a suitable screwdriver inserted through the oil filler hole and turned to grip the chain between the links. Loosen locknut on the external adjuster (bottom front of chaincase) and screw in to tighten. Retighten locknut.
(8) Check engine clutch adjustment and reset if necessary to give approximately ¼" free movement at the handlebar lever. A screw adjuster is fitted to the lower end of the cable.
(9) Remove and clean out the sediment bowl on the fuel tank.
(10) Check all nuts and bolts for tightness.
(11) Check tyre pressure 14 lbs./sq. in. (0.98 kg./sq. cm.)
(12) Adjust weed cutter blades if necessary to just clear the outside blades of the rotor.

Every 250 hours work (Time required approximately 60 minutes):

(1) Drain and refill the gearbox with fresh oil. Drainplug is on underside of gearbox (2½ pints (1.5 litres) SAE 90 gear oil).
(2) Drain and refill the bevel gearbox with fresh oil. Drainplug is on underside of gearbox (2/3 pints (0.4 litres) SAE 90 gear oil).
(3) Remove chaincase. Wash out with petrol (including chain), replace and refill with fresh oil (½ pint (0.3 litres) SAE 90 gear oil).

Blade fitting

The "400" is normally delivered with the blades already fitted. If it is necessary to fit your own blades, this is the way it should be done.

(1) Identify left-hand and right-hand blades.
(2) The left-hand end flange carries two-right-hand blades; the right-hand end flange carries two left-hand blades.
(3) The centre flange carries two left-hand and two right-hand blades. Bolt the blades to the flange with the left-hand blades leading. All blades should be fitted to the left-hand side of the flange. In each case the heads of the bolts should be in contact with the blades and with spring washer fitter under the nut.

Making the most of your "400"

General

The "400" will cultivate to a depth of 9 inches (23 cms.) On certain, especially the heavier, types of soil, this depth will not be obtained in a single pass. Where cultivation in depth is needed, a first pass should be made at 3-4 inches (7-10 cms.) and followed by a second at full depth.

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 to promote better drainage and to expose a greater surface area to weather.

If heavy land is rotavated too finely and left bare to the winter rains, the soil may run together, and spring cultivations will be difficult.

On light land two courses are open. It 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 soil nitrogen. In the early part of the year, the crop is rotavated. After a week or ten days, the spring seed bed may be prepared; this rotavation should be more shallow than that which worked in the green crop.

Seed Beds

In ground which has been cultivated properly, seed beds should seldom exceed 2 in. (5 cms.) 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.

Weeds are at their most dangerous when the crop is in the seedling stage. To obtain weed-free seed beds, the ground should be prepared a few weeks in advance of the sowing dates. Rotavation should be carried out at a depth of 4 inches (10 cms.) and 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 now more open and the machine will consequently tend to dig more deeply.

Weed Control

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

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

Row-Crop Work

Weeds between rows may be controlled by rotavation under almost all conditions while the weeds are small.

This will not prevent weeds growing in the rows themselves. Such weeds must be controlled by hand-hoeing when small. Should land become filthy because these weeds have been allowed to seed, the following crop should be a cleaning crop, 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.

The overall width of the "400" for cultivation is 20 inches (51 cms.); actual width of cultivation is 16 inches (41 cms.) In planning your crops so that the best use may be made of the "400", two or three inches over the effective width should be allowed on either side of the machine. This means that the minimum planting or sowing distance is 24 inches (61 cms.) Such a sowing would allow only one cultivation for hoeing, and this cultivation should be done in high gear.

Green Manuring

Land not immediately required may be sown down to such crops as mustard or rye grass during the 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. But a winter cover crop will preserve plant foods which would otherwise be leached away, and need not be allowed to mature.

Land Reclamation

The "400" may also be used for bringing derelict land back into cultivation. When virgin land is being cultivated, the first pass should be at shallow depth. Depth can be increased by subsequent passes made at intervals of about a week or ten days.

UBRICATION and MAINTENANCE CHART

EVERY 10 HOURS (OR MORE OFTEN)
CHECK AIRCLEANER OIL.

MAINTAIN ENGINE AS
MANUFACTURERS INSTRUCTION BOOK.

EVERY 10 HURS OR DAILY
CHECK ENGE OIL LEVEL.
EVERY 25 HURS
RAIN AND EFILL ENGINE OIL.

EVERY 25 HOURS
CLEAN OU SEDIMENT BOWL.

EVERY 25 HOURS
CHECK GEARBOX OIL LEVEL.
EVERY 250 HOURS
DRAIN AND REFILL GEARBOX.

EVERY 25 HOURS
LUBRICATE CLUTCH & THROTTLE CABLES. GEAR & ROTOR CONTROL PIVOTS.
INDEXING PLUNGER & HEAD. HANDLE BAR SWIVEL PIN.

EVERY 25 HOURS
CHECK CLUTCH CABLE
AND ADJUST IF NECESSARY.

EVERY 25 HOURS
CHECK OIL LEVEL BEVEL BOX.
EVERY 250 HOURS
DRAIN AND REFILL BEVEL BOX.

EVERY 25 HOURS
OIL ROTOR STUB AXLE.

EVERY 25 HOURS
ENSURE TYRES ARE KEPT AT
CORRECT WORKING PRESSURE.

EVERY 10 HOURS OR DAILY
CHECK BLADES AND BLADE BOLTS.

EVERY 25 HOURS
CHECK ALL NUTS AND BOLTS
FOR TIGHTNESS.

GEARBOX DRAI UG.

VERY 25 HOURS
HECK CHAIN TENSION

EVERY 25 HOURS
CHECK CHAIN CASE
OIL LEVEL.
EVERY 250 HOURS
DRAIN, WASH OUT
AND REFILL CHAINCASE.

EVERY 25 HOURS CHECK WEEDCUTTER BLADES.
ADJUST IF NECESSARY

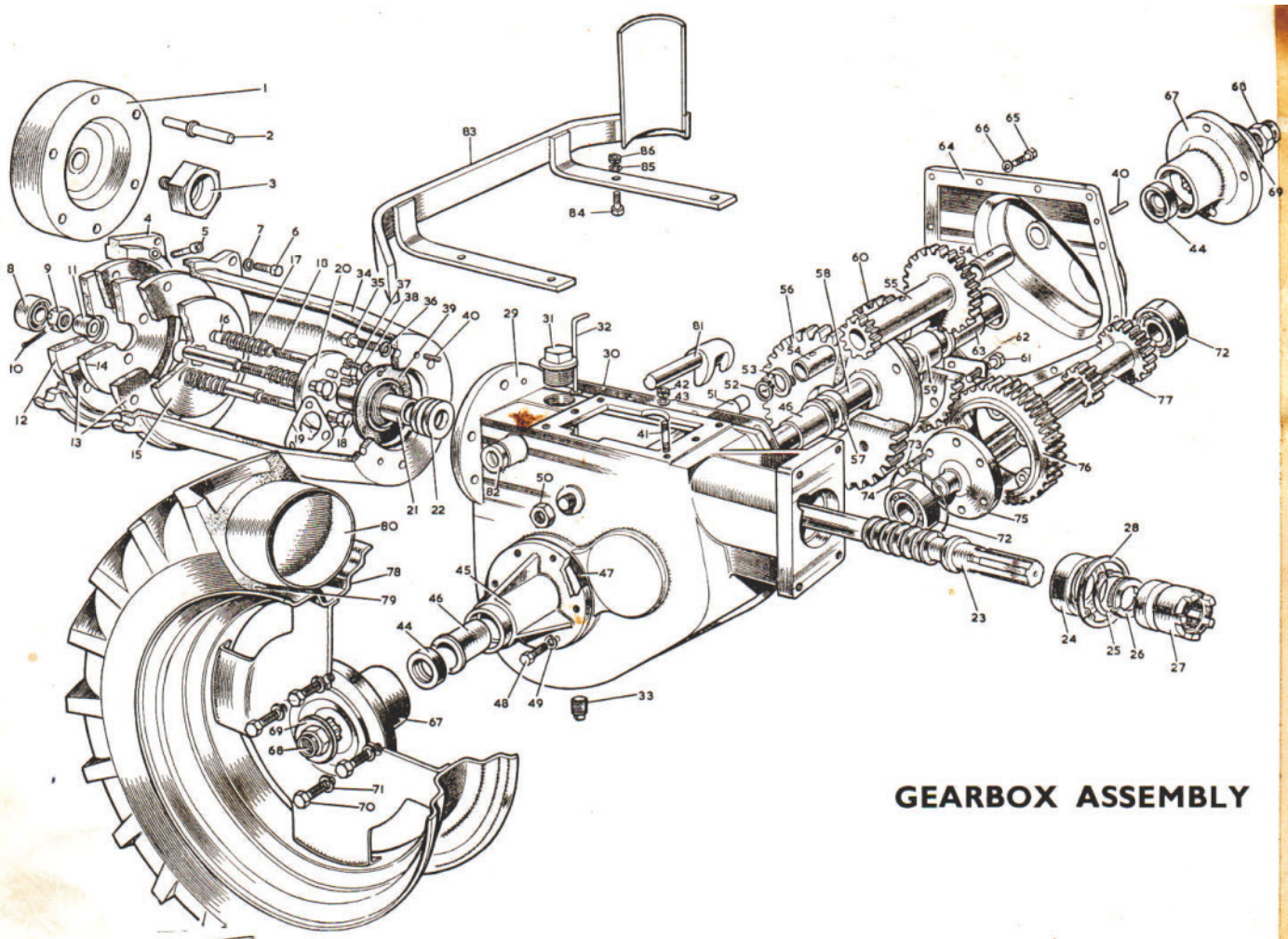
Parts List

IMPORTANT. When ordering spare parts always give the serial number of your machine. Then give the part number (not the illustration number) and description. We cannot guarantee that correct parts will be supplied unless these numbers are quoted.

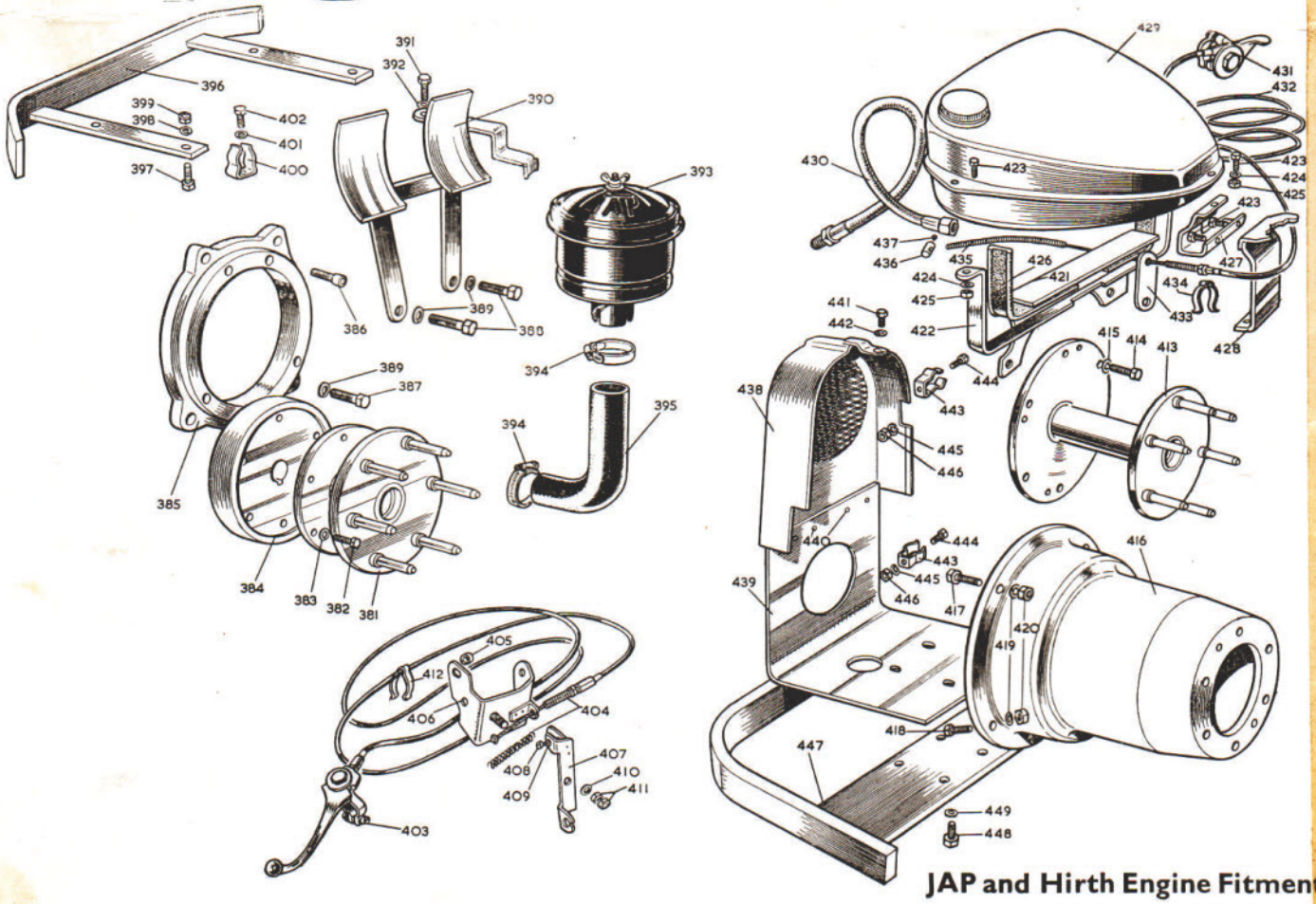
In the following parts list all directions are given left or right looking forward from the back of the machine.

Illus. No.	Part No.	Description	No. off
		ENGINE FITMENTS	
		For Clinton and Wisconsin ACN Engine : (For JAP & Hirth Fittings see Page 10)	
	62425	Flywheel Rivet Assembly ... ... comprising :—	1
1	62426	Flywheel	1
2	62228	Clutch Pin	6
3	62230	Flywheel Nut	1
4	62229	Adaptor Plate	1
5		Cap Screw, 3/8" A.N.C. x 5/8" long	4
6		Setscrew 7/16" U.N.F. x 1 1/8" long	4
7		Spring Washer, 7/16" dia.	4
		For Clinton Engine only:	
		Setscrew No. 10 U.N.C. x 1 1/2" long Rd. Head	2
		Shakeproof Washer 3/16" dia.	2
		Spring Clip (Herbert Terry No. 186) ...	2
	26579	Spring Clip	1
		Setscrew 5/16" U.N.C. x 1 1/2" long Hex. Head	1
		Spring Washer 5/16" dia.	1
		WORMSHAFT ASSEMBLY	
8		Ballbearing, Fischer DN.201	1
9	25062	Special Nut	1
10		Splitpin, 3/32" dia. x 1 1/4" long	1
11	62069	Sleeve	1
12	62068	Clutch Pressure Plate	1
13	62066	Clutch Friction Plate	2
14	62067	Clutch Plate Loose	1
15	62065	Clutch Plate Fixed	1
16	62063	Clutch Distance Piece	3
17	62064	Spring	3
18		Bolt 1/4" UNF. x 2 3/4" long	3
19	62384	Tab Plate	1
20	62059	Clutch Thrust Plate Rivet Assembly ... comprising :—	1
	62060	Thrust Plate	1
	62061	Stud	1
21	62056	Clutch Thrust Sleeve	1
22		Thrust Race, Hoffman W.3/4.	1
23	62054	Wormshaft	1
24	BRM.7/8	Ballbearing, 7/8" i.d. x 2 1/4" o.d. x 11/16" w. (Hoff.MS.9)	1
25		Circlip, 1 1/4" dia. External	1
26	62055	Split Collar	1
27	62243	P.T.O. Dog	1
		GEARBOX AND FINAL DRIVE ASSEMBLY	
28		Circlip 2 1/4" dia. Internal	1
29	62043	Gearbox	1
30	62050	Gasket	1
31	24633	Filler Plug 1/4" BSP (Enots ref. 1385F.) ...	1
	24634	Special Washer (Enots ref. 1386F) ...	1
32	62047	Dipstick	1
33		Plug 1/2" BSP. Sq. Head	1
34	62045	Clutch Housing (for Clinton and Wisconsin AEN and ACN and JAP 4-3) ...	1
35		Bolt, 5/16" UNC. x 1" long	6
36		Spring Washer 5/16" dia.	6
37		Setscrew, 1/4" UNC. x 1/2" long, Round Head	3
38		Spring Washer, 1/4" dia.	3
39	25069	Special Oilseal	1
40		Mills Pin 1/4" dia. x 5/8" long. GP.4	4
41	62251	Stud	1
42		Nut, 5/16" UNC.	1

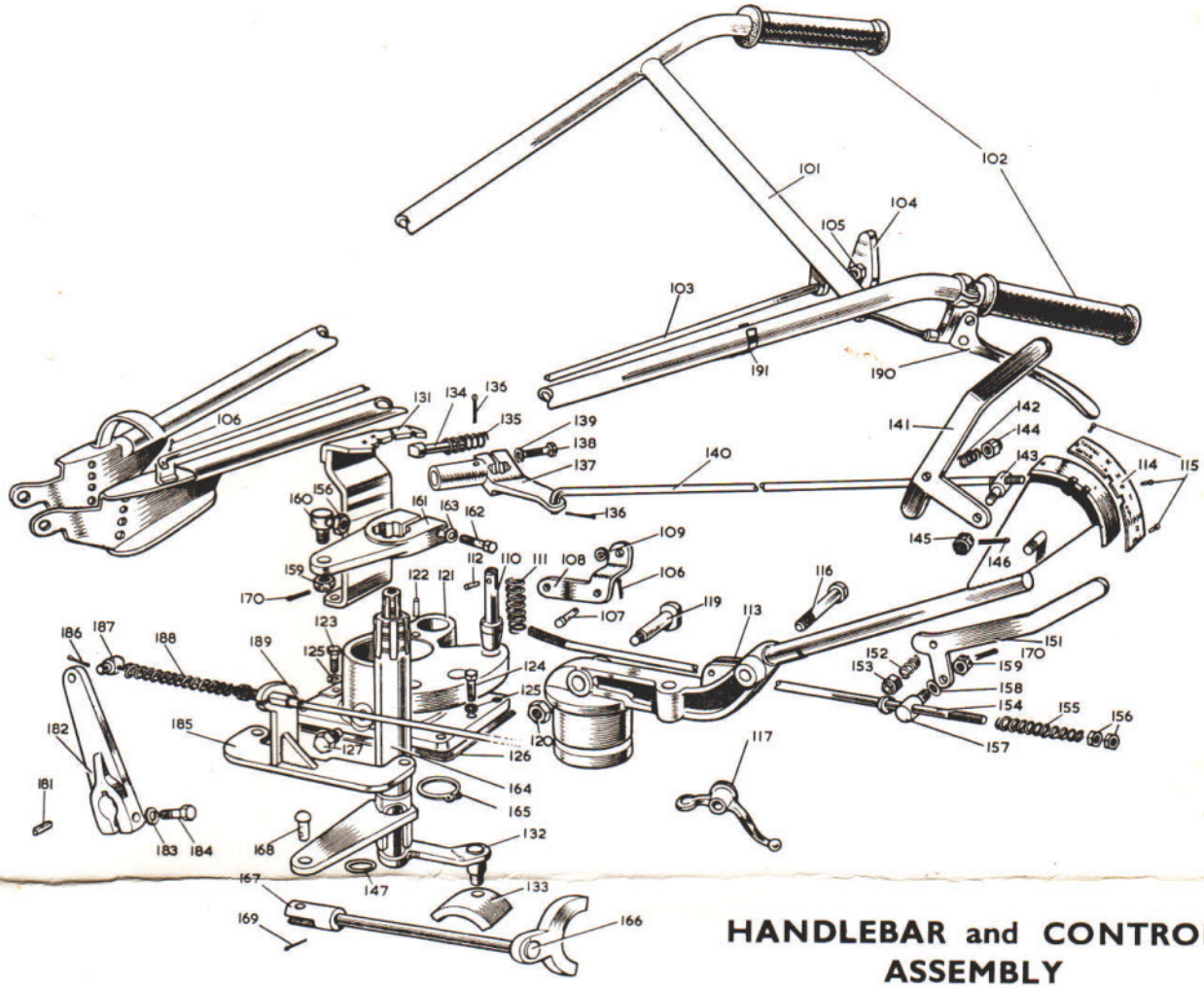
Illus. No.	Part No.	Description	No off
43		Spring Washer, 5/16" dia.	1
44		Oilseal, 1" i.d. x 1 1/2" o.d. x 3/8" w.	2
45	62051	Axle Housing	1
46	62046	Bush	2
47	62252	Gasket, Gearbox to Axle Housing	As req'd.
48		Setscrew, 3/8" UNC x 1" long	6
49		Spring Washer, 3/8" dia.	6
50		Locknut, 3/8" U.N.F.	1
51	62087	Reverse Shaft	1
52		Circlip, 3/4" dia. External	1
53	62089	Thrust Ring	1
54	25242	Bush	2
55	62088	Reverse Gears	1
56	62083	Bull Gear 44T.	1
57	62081	Thrust Washer	1
58	62078	Axle	1
59	62085	Axle Spacer	1
60	62082	Bull Gear 37T.	1
61		Bolt 5/16" UNF. x 1 1/4" long	6
62	62369	Tab Washer	3
63	62052	Bush—long	1
64	62044	Gearbox Cover Plate	1
65		Setscrew 5/16" UNC. x 7/8" long, Hex. Head	10
66		Spring Washer, 5/16" dia	10
67	62245	Hub	2
68		Nut, Philidas 1/4" UNF. (thin industrial) ...	2
69	16759	Washer	2
70		Setscrew, 1/4" UNC. x 3/4" long, Hex. Head	8
71		Shakeproof Washer, 1/4" dia.	8
72	BRM.7/8	Ballbearing, 7/8" i.d. x 2 1/4" o.d. x 11/16" w. (Hoff.MS.9.)	2
73	62075	Special Setscrew	6
74		Locking Wire, 16 SWG. x 12" long ...	1
75	62071	Wormwheel Shaft	1
76	62074	Wormwheel	1
77	62076	Cluster Gear	1
78	62158	Wheel Rim	2
79		Tyre, 4.00 x 12	2
80		Tube, 4.00 x 12	2
81	G.291	Clutch Fulcrum Pawl	1
82	62099	Fulcrum Arm Spacer	1
83	62254	Bumper Bar (Clinton)	1
83	62259	Bumper Bar (Wisconsin ACN.)	1
84		Bolt, 3/8" UNF. x 2 1/2" long (Wisconsin ACN)	4
		Bolt 3/8" UNF. x 1 1/2" long (Clinton) ...	4
85		Spring Washer, 3/8" dia.	4
86		Nut, 3/8" UNF.	4
87-100	not allocated		
		HANDLEBAR AND INDEX CONTROL	
101	62140	Handle Bar	1
102	G.121	Handle Grip	2
103	62136	Rod	1
104	62137	Index Handle	1
105		Locknut, 1/4" UNF.	1
106		Splitpin, 1/16" dia. x 1/2" long	2
107	62133	Bell Crank Pin	1
108	62132	Bell Crank	1
109		Flat Washer, 1/4" dia....	1
110	62131	Plunger	1
111	62135	Index Spring	1
112	62134	Plunger Pin	1
113	62307	Headstock Swivel	1
114	62309	Index Plate	1
115		Screws, No. 2 x 3/16" long, Parker Kalon Type 'U' Rd. Head	3



GEARBOX ASSEMBLY



JAP and Hirth Engine Fitments



HANDLEBAR and CONTROL ASSEMBLY

116	62148	Drawpin	1
117		Thumb Grip Lever	1
118	not allocated		
119	62147	Swivel Bolt	1
120		Locknut, $\frac{5}{8}$" UNF.	1
121	62155	Headstock	1
122		Mills Pin, $\frac{1}{4}$" dia. x $\frac{5}{8}$" long GP.4	1
123		Bolt, $\frac{5}{16}$" UNC. x $1\frac{1}{4}$" long	3
124		Bolt, $\frac{5}{16}$" UNC. x 1" long	2
125		Spring Washer, $\frac{5}{16}$" dia.	5
126	62250	Gasket, Headstock to Gearbox	1
127	62156	Locating Bolt	1
128-130	not allocated		

SPEED CONTROL

131	62125	Selector Gate for Clinton, Wisconsin, AEN, and JAP.	1
	63580	Selector Arm Assembly ... ... comprising :—	1
132	62116	Selector Arm	1
133	62120	Selector Block	1
134	62129	Selector Pawl	1
135	62244	Spring	1
136		Splitpin, 3/32" dia. x 1" long	2
137	62121	Selector Lever	1
138		Bolt, $\frac{1}{4}$" UNF. x 1" long	1
139		Spring Washer, $\frac{1}{4}$" dia.	1
140	62122	Gear Control Rod	1
141	62306	Gear Lever	1
142	G.792	Spring	1
143	62669	Trunnion	1
144		Nut, $\frac{5}{16}$" UNF. Philidas GUFI	1
145		Slotted Nut $\frac{5}{16}$" UNF.	1
146		Split Pin $\frac{1}{16}$" dia. x $\frac{1}{2}$" long	1
147	62415	Selector Spacer	As req'd.
148-150	not allocated		

ROTOR CONTROL

151	62111	Rotor Lever	1
152	G.792	Spring	1
153		Nut, $\frac{5}{16}$" UNF. Philidas GUFI.	1
154	62109	Control Rod	1
155	20875	Spring	1
156		Locknut, $\frac{5}{16}$" UNF.	3
157	62668	Trunnion	1
158		Flat Washer, $\frac{5}{16}$" dia.	1
159		Nut, $\frac{5}{16}$" UNF. Slotted	2
160	62669	Trunnion	1
161	62108	Selector Lever	1
162		Bolt, $\frac{1}{4}$" UNF x $1\frac{1}{2}$" long	1
163		Spring Washer, $\frac{1}{4}$" dia.	1
164	62101	Selector Arm	1
165		Circlip, 1" dia. External	1
166	62104	Selector Yoke	1
167	62107	Trunnion	1
168	25801	Connecting Rivet	1
169		Splitpin, $\frac{1}{16}$" dia. x $\frac{5}{8}$" long	1
170-180	not allocated		

CLUTCH CONTROL

181	G.711	Control Arm Key	1
182	62092	Control Fulcrum Arm	1
183		Spring Washer, $\frac{5}{16}$" dia.	1
184		Bolt, $\frac{5}{16}$" UNF. x 1" long	1
185	62094	Clutch Control Bracket	1
186		Splitpin, 3/32" dia. x $\frac{5}{8}$" long	1
187	16733	Trunnion	1

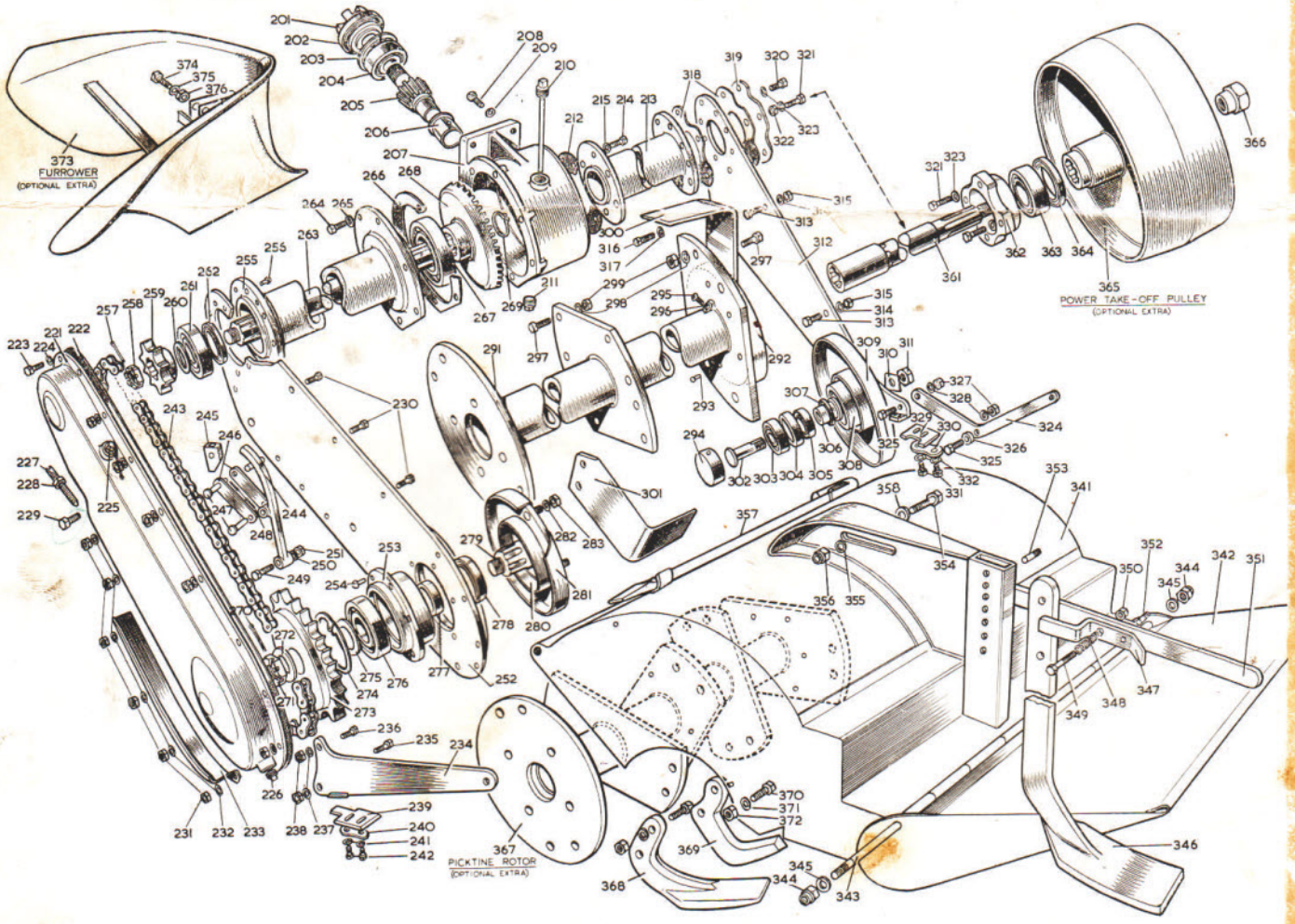
188	62098	Clutch Cable Spring	1
189	62093	Clutch Cable	1
190	16736	Clutch Lever	1
191		Spring Clip Herbert Terry No. 186 ...	2
192-200 not allocated			

BEVEL BOX

201	62164	Rotor Dog	1
202		Oilseal, $1\frac{3}{8}$" i.d. x $2\frac{1}{16}$" o.d. x $\frac{3}{8}$" w. ...	1
203		Circlip, $1\frac{7}{8}$" dia. Internal	1
204		Ballbearing, $\frac{3}{4}$" i.d. x $1\frac{7}{8}$" o.d. x $\frac{9}{16}$" w. (Hoff.LS8.)	1
205	62163	Pinion	1
206	16728	Bush	1
207	62162	Bevel Box	1
208		Bolt, $\frac{1}{2}$" UNC. x $1\frac{1}{8}$" long	4
209		Spring Washer, $\frac{1}{2}$" dia.	4
210	54657	Dipstick	1
211		Drain Plug, $\frac{1}{4}$" BSP. Sq. Head	1
212	62166	Gasket	1
213	62165	Staytube	1
214		Setscrew, $\frac{5}{16}$" UNC. x $\frac{7}{8}$" long, Hex Head	6
215		Spring Washer, $\frac{5}{16}$" dia.	6
216-220 not allocated			

CHAINCASE AND BACKPLATE

221	62241	Chaincase	1
222	52630	Gasket	1
223		Bolt, Backplate to Jackshaft Hsg. $\frac{1}{4}$" UNC. x $\frac{3}{4}$" long	3
224		Spring Washer, $\frac{1}{4}$" dia.	3
225		Plug, $\frac{3}{8}$" BSP. Sq. Head	1
226		Plug, $\frac{1}{8}$" BSP. Sq. Head	1
227	62631	Adjusting Screw	1
228		Nut, $\frac{5}{16}$" UNF.	1
229		Bolt, $\frac{7}{16}$" UNF. x $\frac{3}{4}$" long	1
230		Bolt, $\frac{1}{4}$" UNF. x $\frac{5}{8}$" long	8
		Bolt $\frac{1}{4}$" UNF. x $\frac{3}{4}$" long	4
231		Nut, $\frac{1}{4}$" UNF.	12
232		Spring Washer, $\frac{1}{4}$" dia.	12
233	16570	Wearing Shoe	1
234	62186	Shield Support L.H.	1
235		Bolt, $\frac{1}{4}$" UNF. x $\frac{3}{4}$" long	1
236		Bolt, $\frac{1}{4}$" UNF. x $\frac{7}{8}$" long	1
237		Spring Washer, $\frac{1}{4}$" dia.	2
238		Nut, $\frac{1}{4}$" UNF.	2
239	62189	Scraper Blade L.H.	1
240	G.830	Keeper Plate	1
241		Spring Washer, $\frac{1}{2}$" dia.	2
242		Bolt, $\frac{1}{4}$" UNF. x $\frac{5}{8}$" long	2
243	16783	Chain complete	1
244	25917	Chain Skid	1
245	25920	Sliding Block	1
246	25919	Connecting Link	2
247	25914	Connecting Pin	2
248		Splitpin, $\frac{1}{16}$" dia. x $\frac{5}{8}$" long	2
249		Bolt, $\frac{5}{16}$" UNF. x $1\frac{1}{4}$" long	1
250		Flat Washer, $\frac{5}{16}$" dia.	1
251		Nut, $\frac{5}{16}$" UNF.	1



HOWARD ROTAVATOR ASSEMBLY

	62168	Backplate Rivet Assembly ... ... comprising :—	1
252	62630	Backplate	1
253	62169	Bearing Housing	1
254		Rivet, $\frac{1}{4}$" dia. x $\frac{5}{8}$" long, Pan Head ...	6
255	62170	Jackshaft Housing	1
256		Rivet, $\frac{1}{4}$" dia. x $\frac{3}{4}$" long, Pan Head ...	7
257		Splitpin, $\frac{1}{8}$" dia. x $1\frac{1}{2}$" long	1
258	51656	Special Nut	1
259	62171	Jackshaft Sprocket 8T.	1
260	G.462	Shim	As req'd.
261		Ballbearing, 1" i.d. x $2\frac{1}{2}$" o.d. x $\frac{3}{4}$" w. (Hoff.MS.10)	1
262		Oilseal, $1\frac{1}{8}$" i.d. x $1\frac{3}{8}$" o.d. x $\frac{3}{8}$" w. ...	1
263	62172	Jackshaft	1
264		Setscrew, $\frac{1}{4}$" UNC. x $\frac{3}{4}$" long	7
265		Spring Washer, $\frac{1}{4}$" dia.	7
266	62174	Gasket	1
267		Ballbearing, 40 mm. i.d. x 80 mm. o.d. x 18 mm. wide (Hoff.140.)	1
268	62173	Crownwheel 40T.	1
269		Circlip, 1" dia. External	1
270		Splitpin, $\frac{1}{8}$" dia. x 2" long	1
271	51639	Special Nut	1
272		Flat Washer, $\frac{7}{8}$" dia.	1
273	62183	Rotor Drive Sprocket	1
274		Circlip, 72 mm. dia. Internal	1
275	62184	Shim	As req'd.
276		Ballbearing, 30 mm. i.d. x 72 mm. o.d. x 19 mm. wide (Hoff.330)	1
277	62182	Spacer	1
278		Oilseal, $1\frac{1}{2}$" i.d. x $2\frac{1}{4}$" o.d. x $\frac{5}{16}$" wide ...	1
279	62175	Rotor Drive Shaft Rivet Assembly ... comprising :—	1
	62176	Rotor Drive Shaft	1
	62178	Stud	4
280	62179	Dust Cover	1
281	16551	Wearing Plate	1
282		Spring Washer, $\frac{7}{16}$" dia.	4
283		Nut, $\frac{7}{16}$" UNF.	4
284-290 not allocated			

ROTOR ASSEMBLY

291	62214	Rotor	1
292	53390	Dust Cover	1
293		Rivet, $\frac{3}{16}$" dia. x $\frac{1}{4}$" long, Rd. Head ...	6
294	G.635	Back Plug	1
295		Setscrew, $\frac{1}{4}$" UNF. x $\frac{1}{2}$" long, Rd. Head ...	1
296		Spring Washer, $\frac{1}{4}$" dia.	1
297	61095	Blade Bolt	16
298		Spring Washer, $\frac{7}{16}$" dia.	16
299	61188	Special Nut	16
300	16793	Hoe Blade L.H.	4
301	16792	Hoe Blade R.H.	4
302	52648	Stub Axle	1
303		Ballbearing, $\frac{5}{8}$" i.d. x 1.13/16" o.d. x $\frac{5}{8}$" w. (Hoff.MS.7.)	1
304	G.637	Oilseal Holder	1
305		Oilseal $\frac{7}{8}$" i.d. x $1\frac{1}{2}$" o.d. x 13/32" wide	1
306	16557	Spacing Sleeve	1
307	G.629	Felt Dust Seal	1
308	G.632	Bearing Cap	1
309	G.640	Dust Cover	1
310	G.648	Tab Washer	1
311		Locknut, $\frac{5}{8}$" UNF.	1

SIDE PLATE ASSEMBLY

312	62191	R.H. Side Plate	1
313		Setscrew, $\frac{1}{4}$" UNF. x $\frac{5}{8}$" long, Hex. Head	2
314		Spring Washer, $\frac{1}{4}$" dia.	2
315		Nut $\frac{1}{4}$" UNF.	2
316		Setscrew, $\frac{7}{16}$" UNF. x $\frac{3}{4}$" long, Hex. Head	1
317		Spring Washer, $\frac{7}{16}$" dia.	1
318	62197	Gasket	2
319	62196	Cover Plate	1
320		Setscrew, $\frac{5}{16}$" UNC. x $\frac{5}{8}$" long, Hex. Head	4
321		Bolt, $\frac{5}{16}$" UNC. x 1" long	4
322		Nut, $\frac{5}{16}$" UNC.	4
323		Spring Washer, $\frac{5}{16}$" dia.	8
324	62193	Shield Support Arm R.H.	1
325		Setscrew, $\frac{1}{4}$" UNF. x $\frac{3}{4}$" long, Hex. Head	2
326	62194	Spacer	1
327		Nut $\frac{1}{4}$" UNF.	2
328		Spring Washer $\frac{1}{4}$" dia.	2
329	62195	Scraper Blade R.H.	1
330	G.830	Keeper Plate	1
331		Setscrew, $\frac{1}{4}$" UNF. x $\frac{5}{8}$" long, Hex. Head	2
332		Spring Washer, $\frac{1}{4}$" dia.	2
333-340 not allocated			

SHIELDS AND DEPTH CONTROL

341	62199	Shield	1
342	62210	Trailing Board	1
343	62211	Hinge Rod	1
344		Nut, $\frac{5}{16}$" UNF. Philidas No. GUFI. ...	2
345		Flat Washer, $\frac{5}{16}$" dia.	2
346	53352	Skid	1
347	53347	Depth Control Clip	1
348	G.675	Spring	1
349		Bolt, $\frac{1}{4}$" UNC. x $1\frac{1}{2}$" long	1
350		Locknut, $\frac{1}{4}$" UNC.	1
	62208	Depth Control Handle Rivet Assembly ... comprising :—	1
351	62209	Depth Control Handle	1
352	G.671/3	Clip Pin	1
353	G.671/2	Pivot	1
354		Bolt, $\frac{3}{8}$" UNF x $1\frac{3}{8}$" long	1
355		Flat Washer, $\frac{3}{8}$" dia.	1
356		Nut, $\frac{3}{8}$" UNF. Philidas No. JUFI	1
357	16811	Blade Setting Bar	1
358 & 316		Spacer	1
359-360 not allocated			

P.T.O. PULLEY ASSEMBLY—OPTIONAL EXTRA

361	62218	P.T.O. Extension Shaft	1
362	62217	Bearing Housing	1
363		Ballbearing, 1" i.d. x $2\frac{1}{4}$" o.d. x $\frac{5}{8}$" w. (Hoff.LS.10)	1
364		Oilseal, $1\frac{3}{8}$" i.d. x $2\frac{1}{4}$" o.d. x $\frac{5}{16}$" wide ...	1
365	62221	P.T.O. Pulley	1
366	62222	Retaining Nut	1

PICKTINE ROTOR—Optional Extra

367	62366	Rotor	1
368	26992	Picktine—Chisel } Alternatives ...	10
369	G.991	Picktine—Lucerne } Alternatives ...	10
370	55271	Special Bolt	20
371		Spring Washer $\frac{7}{16}$" dia.	20
372		Nut $\frac{7}{16}$" UNF.	20

FURROWER—Optional Extra

373	62633	Furrower	1
374		Bolt $\frac{5}{16}$" UNF. x $1\frac{1}{4}$" long	1
375		Spring Washer $\frac{5}{16}$" dia.	1
376		Nut $\frac{5}{16}$" UNF.	1
377-380 not allocated			

ENGINE FITMENTS—for J.A.P. 4-3 Engine

381	60497	Clutch Adaptor	1
382		Setscrew $\frac{1}{4}$" UNC. x $\frac{3}{4}$" long, Hex. Head	6
383		Spring Washer $\frac{1}{4}$" dia.	6
384	60499	Flywheel	1
385	62671	Adaptor Plate	1
386		Cap Screw $\frac{3}{8}$" UNC. x 1" long Series 'C'	4
387		Setscrew $\frac{7}{16}$" UNF x $1\frac{1}{4}$" long, Hex. Head	2
388		Setscrew $\frac{7}{16}$" UNF. x $1\frac{3}{8}$" long, Hex. Head	2
389		Spring Washer $\frac{7}{16}$" dia.	4
390	60984	Fuel Tank and Air Cleaner Bracket ...	1
391	61743	Special Bolt	1
392		Spring Washer $\frac{5}{16}$" dia.	1
393		Air Cleaner, Coopers No. 4 PD. 1695A.	1
394		Jubilee Clip 2a	2
395	61742	Elbow	1
396	62427	Bumper Bar ... ... } Optional extra ...	1
397		Bolt $\frac{3}{8}$" UNF. x $1\frac{1}{2}$" long, Hex. Head ... ... } Optional extra ...	4
398		Spring Washer $\frac{3}{8}$" dia. } Optional extra ...	4
399		Nut $\frac{3}{8}$" UNF. ... } Optional extra ...	4
400	26579	Spring Clip	1
401		Spring Washer $\frac{5}{16}$" dia.	1

Numerical Parts List

Part No.	Illus. No.
G.121	102
AC.170	435
G.291	81
G.316	358
G.462	260
G.629	307
G.632	308
G.635	294
G.637	304
G.640	309
G.648	310
G.671/2	353
G.671/3	352
G.675	348
G.711	181
G.792	142
G.792	152
G.830	240
G.830	330
G.991	369
16551	281
16557	306
16570	233
16728	206
16733	187
16736	190
16759	69
16783	243
16792	301
16793	300
16811	357
20875	155
24633	31
24634	31
25062	9
25069	39
25242	54
25801	168
25914	247
25917	244
25919	246
25920	245
26579	400
26579	443
26992	368
51639	271
51656	258
51847	422
51848	426
51856	429
52464	433
52630	222
52648	302
53284	439
53291	438
53293	438
53298	430
53347	347
53352	346
53390	292
53859	157
54557	447
54657	210
54695	436
55271	370
60497	381
60499	384
60984	390
61095	297
61188	299
61742	395
61743	391
62043	29
62044	64
62045	34
62046	46
62047	32
62050	30
62051	45
62052	63
62054	23
62055	26
62056	21
62059	20
62060	20
62061	21
62063	16
62064	17
62065	15
62066	13
62067	14
62068	12
62069	11
62071	75
62074	76
62075	73
62076	77
62078	58
62081	57
62082	60
62083	56
62085	59
62087	51
62088	55
62089	53
62092	182
62093	189
62094	185
62098	188
62099	82
62101	164
62104	166
62107	167
62108	161
62109	154
62111	151
62116	132
62120	133
62121	137
62122	140
62125	131
62129	134
62131	110
62132	108
62133	107
62134	112
62135	111
62136	103
62137	104
62140	101
62147	119
62148	116
62155	121
62156	127
62158	78
62162	207
62163	205
62164	201
62165	213
62166	212
62168	252
62169	253
62170	255
62171	259
62172	263
62173	268
62174	266
62175	279
62176	279
62178	279
62179	280
62182	277
62183	273
62184	275
62186	234
62189	239
62191	312
62193	324
62194	326
62195	329
62196	319
62197	318
62199	341
62208	351
62209	351
62210	342
62211	343
62214	291
62217	362
62218	361
62221	365
62222	366
62228	2
62229	4
62230	3
62241	221
62243	27
62244	135
62245	67
62250	126
62251	41
62252	47
62254	83
62259	83
62263	117
62306	141
62307	113
62309	114
62366	367
62369	62
62384	19
62415	147
62416	421
62417	427
62419	416
62420	413
62423	432
62424	428
62425	1
62426	1
62427	396
62630	253
62631	227
62633	373
62668	157
62669	143
62669	160
62671	385
63580	132

OILSEALS	Illus. No.
$\frac{7}{8}$" i.d. x 1$\frac{1}{2}$" o.d. x 13/32" w.	305
1" i.d. x 1$\frac{1}{2}$" o.d. x $\frac{1}{4}$" w.	44
1$\frac{1}{2}$" i.d. x 1$\frac{3}{4}$" o.d. x $\frac{1}{4}$" w.	262
1$\frac{1}{2}$" i.d. x 2$\frac{1}{4}$" o.d. x $\frac{5}{16}$" w.	364
1$\frac{1}{2}$" i.d. x 2$\frac{1}{4}$" o.d. x $\frac{5}{16}$" w.	278
1$\frac{5}{8}$" i.d. x 2$\frac{13}{16}$" o.d. x $\frac{1}{4}$" w.	202
BALLBEARINGS	
Hoff. MS.7.	303
Hoff. W$\frac{1}{2}$ Thrust Race	22
Hoff. LS.8.	204
Hoff. MS.9	72
Hoff. MS.9.	24
Hoff. MS.10.	261
Hoff. LS.10.	363
Hoff. 330.	276
Hoff. 140	267
Fischer DN.201.	8