



THE

SUFFOLK
DEMON

MOTOR MOWER

**OPERATING & MAINTENANCE
MANUAL**

Works and Service Department :
SUFFOLK IRON FOUNDRY (1920) LTD.,
STOWMARKET,
SUFFOLK,
ENGLAND.



"THE SUFFOLK DEMON" Motor Lawn Mower

The Suffolk Demon Motor Lawnmower

INSTRUCTIONS

for the Operation and Maintenance

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I. GENERAL ADVICE.

The Suffolk Demon Motor Lawnmower is sent out from the factory in perfect condition, and when received should be carefully examined to see that it has not been damaged in transit. Should any part of the machine be damaged in any way, your dealer should be advised at once.

Flush out petrol tank with a small quantity of petrol before filling for the first time.

Do not start the engine in your shed or garage unless the doors are open. Exhaust gases are poisonous.

Before starting, always check that there is petrol in the tank and sufficient oil in the crank case. Top up if necessary. Oil and grease working parts regularly, with the exception of the CENTRIMATIC.

Before mowing, make sure your lawn is quite free from stones, and other obstructions, i.e. pieces of bones, wood, etc., which might cause damage to the cutting cylinder.

If any obstacle should get caught, NEVER ATTEMPT TO CLEAR OBSTACLE OR REVOLVE CYLINDER BY HAND WHILE ENGINE IS RUNNING.

Never drive the machine over gravel paths without keeping the revolving cutting cylinder well clear of the ground.

The petrol tank should not be filled while the engine is running. Petrol spilling on a hot engine can be dangerous.

DO NOT MIX OIL WITH PETROL. The S.I.F. engine is a 4-stroke type and is designed with separate oil lubrication. It is wise to filter your petrol through a fine wire gauze when filling the tank. The tank holds $1\frac{1}{2}$ pints—enough for $1\frac{1}{2}$ hours' normal use.

Do not race the engine. A speed of 3 miles per hour is recommended. At this speed the machine can mow half an acre per hour.

After use, always wipe blades with oily rag.

If your mower is going to be stored for any length of time, drain the engine completely of fuel to prevent gum deposit forming on essential parts. Remove sparking plug, pour a teaspoonful of engine oil, S.A.E. 20, into the cylinder, and turn the engine round slowly by hand to spread the oil. Replace the sparking plug.

II. OPERATING INSTRUCTIONS.

1. PREPARATION FOR USE.

(a) Fill the petrol tank with any good commercial grade of petrol. The tank will hold $1\frac{1}{2}$ pints which is sufficient for $1\frac{1}{2}$ hours running under average working conditions. DO NOT MIX ANY OIL WITH THE PETROL.

(b) Remove square-headed oil plug (2) from the sump at the base of the engine and fill with half-pint of any one of the following recommended oils or equivalents. When filling, turn starting pulley slowly by hand to expel any air trapped in the sump, after first tilting the mower backwards slightly. Do NOT use a new engine without first filling sump with oil.

See illustration Page 7.

RECOMMENDED LUBRICATION OILS.

Climate	Shell	B.P.	Wakefield	Vacuum	Esso
Temperate	X-100 30	Energol SAE. 30	Castrol XL	Mobiloil A	Essolube 30
Tropical	X-100 40	Energol SAE. 40	Castrol XXL	Mobiloil AF	Essolube 40

(c) Lubricate all oil and grease points of the machine.

See Section III. Para. 1, Page 9

(d) Before fitting handle (1) remove the bolts, nuts and washers (2) from the sideplates (3). Fit the forks so that the bosses (4) on the sideplates pass through the upper of the two holes in the forks. Replace the bolts through the sideplates and through the lower holes in the forks. The heads of the bolts should be on the inside of the sideplates.

See illustration Page 4

Replace washers and nuts on the bolts but set the handles in the position most comfortable for your height before tightening the nuts.

(e) Fit the control lever to either bar of the handle. Fasten the cable to the handle by the rubber clip.

See illustration Frontispiece

(f) Set the position of the roller brackets (5) at the rear of the machine to give the desired height of cut by slackening bolts (6). Retighten bolts after setting. If the grass is long it is advisable to set for high cutting at first. Then lower machine to normal height required for season. It is important that the two brackets should be adjusted equally.

A second hole (7) is provided in each sideplate as an alternative position for the roller bracket bolts, thus providing an even greater range of variation of height of cut.

See illustration Page 4

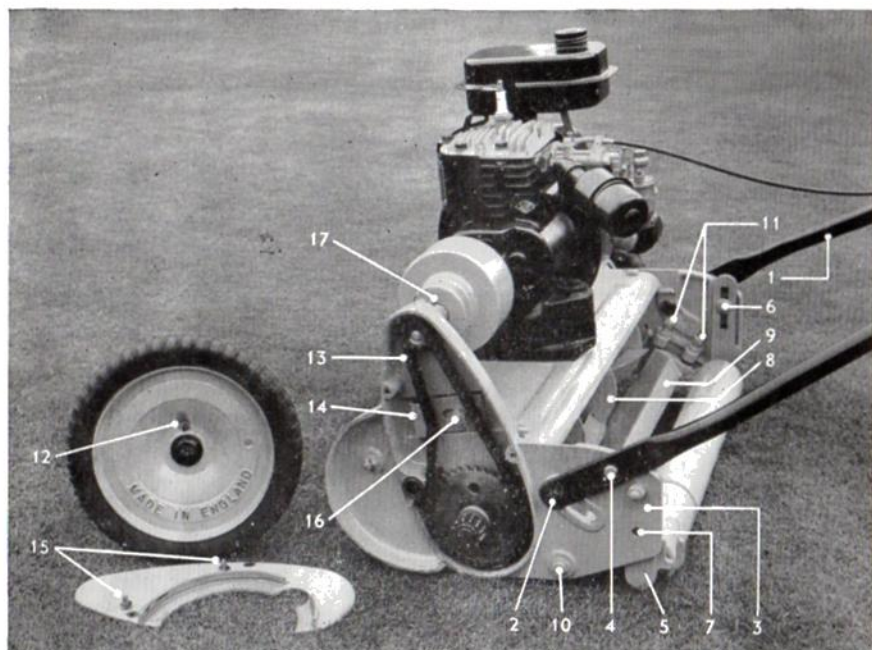
(g) Before starting the mower, spin the cutting cylinder to see that it runs freely. If during transit the adjustment has been displaced, perfect alignment can readily be restored by resetting the bottom blade.

See Section II. Para 6(b), Page 8

(h) To fit the grasscatcher, place the 'C' shaped clip at the top of the handle and slide it down the tubes until it grips tightly.

Fit the bottom edge of the grasscatcher on to the special hooks on the roller brackets. Form the two twisted wires on the top of the grasscatcher into a hook and hang over the 'C' shaped clip, adjusting the hook so that the base of the grasscatcher is just clear of the ground when the handle is in the desired position.

See frontispiece.



II.

2. THE CENTRIMATIC.

The mower is driven by the engine through the SUFFOLK CENTRIMATIC transmission which incorporates three special features :

(a) An AUTOMATIC CENTRIFUGAL CLUTCH—which enables the machine to be controlled completely by a single lever.

(b) An OVERLOAD SAFETY DEVICE—which prevents damage to the machine should an obstacle be caught in the cutting cylinder.

(c) A MANUAL CLUTCH which allows the engine to be disconnected from the mower for starting and testing purposes.

The centrifugal clutch is housed within the drum (1).

The manual clutch consists of a sliding collar (2) which is kept in engagement with the drum by a spring (3). The collar engages internally with a pin (4) passing through the driving shaft (5).

See illustration Page 5.

BEFORE STARTING THE ENGINE, pull the collar about $\frac{1}{2}$ " along the driving shaft against the spring, and turn it anti-clockwise $\frac{1}{4}$ turn to hold it in position.

This will also disengage the collar from the pin in the driving shaft.

The centrifugal clutch cannot now drive the mower.

After starting the engine, CLOSE THE CONTROL LEVER SO THAT THE ENGINE IS IDLING.

Re-engage the manual clutch by rotating the collar and the drum simultaneously anticlockwise, keeping the teeth of the drum opposite the grooves in the collar. After about $\frac{1}{4}$ turn the collar will spring into re-engagement.

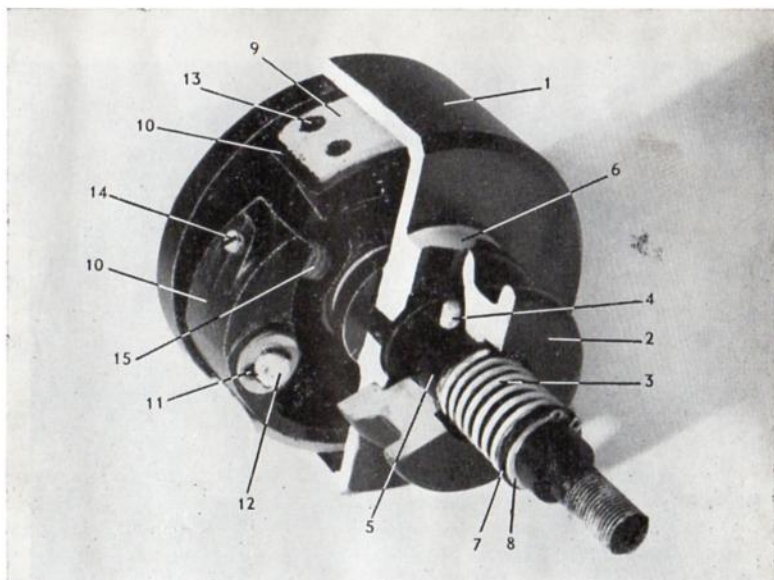
If during mowing, an obstacle be caught in the cutting cylinder, the safety device will immediately disconnect the engine from the mower by throwing the sliding collar out of engagement.

BEFORE ATTEMPTING TO CLEAR THE OBSTACLE, STOP THE ENGINE. After clearing, re-start the engine before re-engaging the sliding collar.

The spring (3) of the sliding collar is held in position by a washer (7) and a circlip (8) fitted in a groove on the driving shaft. An alternative groove is provided nearer to the collar so that the spring can be compressed further if the user desires to adjust the safety device for a greater overload.

DO NOT LUBRICATE ANY PART OF THE CENTRIMATIC.

See illustration below.



II.

3. TO START ENGINE WHEN COLD.

(a) Check that ignition cut out switch (1) on top of engine is clear of sparking plug terminal.

See illustration Page 7.

(b) Pull manual clutch of the CENTRIMATIC out of engagement.

See Para. II 2, Page 4, and illustration Page 5.

(c) Turn on petrol by means of petrol tap immediately under petrol tank. Tap should be turned downwards.

(d) Close the air strangler by turning the small lever (1) at the side of the carburetter to horizontal position.

See illustration below

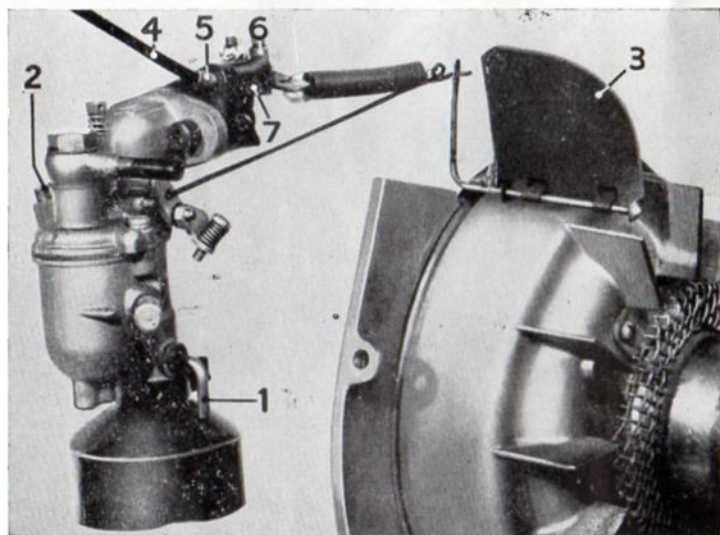
(e) Open control lever on handle-bar about one-third of its full opening.

(f) Press the tickler (2) on top of the carburetter float chamber until the petrol just commences to overflow.

See illustration below

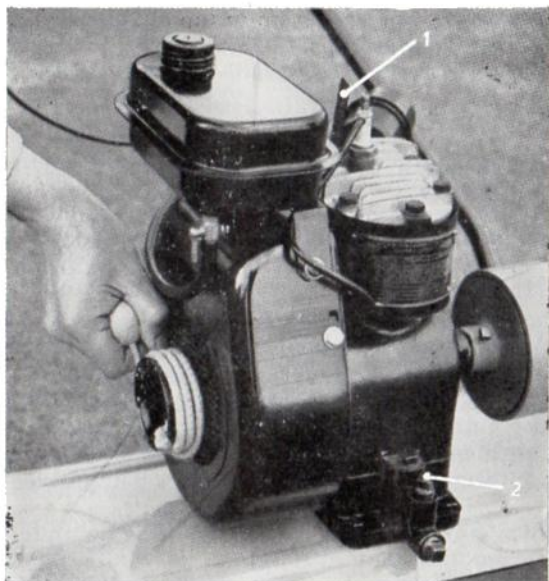
(g) Fix the knot at the end of the starting cord into the slot in the pulley and wind the cord round the pulley in a clockwise direction, leaving just sufficient cord to grip securely. Grip wooden knob as shown in illustration. Do not wind the cord round the hand. Then pull upwards sharply when the cord will release automatically.

See illustration Page 7.



(h) After engine has started, gradually open strangler as engine warms up. When engine is warm and running smoothly, partially close control lever so that engine is idling.

(i) When engine is idling, engage the manual clutch of the CENTRIMATIC. Machine will not move forward but is now ready for use.



II.

4. TO START ENGINE WHEN HOT.

The same procedure should be adopted except that it should not be necessary to close the strangler or to flood carburetter by pressing tickler.

II. USING THE MOWER.

5. The following procedure for using the machine should be adhered to :

(a) Ensure that cutting cylinder spins freely before starting engine.

(b) Allow engine to warm up before starting mowing.

(c) Engage manual clutch of **CENTRIMATIC ONLY WHEN ENGINE IS IDLING.**

(d) Open control lever smoothly, when the machine will automatically take up the drive and move forward.

(e) Do not race the engine. A speed of 3 m.p.h. is recommended.

(f) Reduce speed on corners by closing the lever slightly until you get used to the control of the machine.

(g) To stop the mower, close the control lever fully. This will stop the mower but not the engine.

(h) To stop the engine after finishing mowing, turn off the petrol. This will not stop the engine immediately since there will still be some petrol in the carburetter to be used up before the engine finally receives no fuel. A little economy in petrol may be obtained by turning off the petrol a few minutes before finishing mowing.

(i) To stop the engine quickly in event of an emergency, press the ignition cut out switch on to top of sparking plug, and keep pressed until engine stops.

II.

6. MOWING ADJUSTMENTS.

(a) Cutting Cylinder—the bearings of the cylinder are self-aligning and no adjustment is necessary.

(b) Bottom Blade—if at any time the mower is found not to be cutting satisfactorily, the bottom blade may readily be restored to perfect alignment with the cylinder by the following procedure.

The soleplate (9) pivots on the two screws (10) and is held securely in its correct position by means of the adjusting screws (11) of which there are four—two on each side.

To lower the soleplate, thus bringing the bottom blade away from the cutting cylinder, loosen the rear pair of adjusting screws and tighten the front pair. To raise the bottom blade towards the cutting cylinder, loosen the front pair and tighten the rear pair.

When correctly adjusted, the cutting cylinder should just touch the bottom blade throughout its whole length.

It is of the utmost importance that all four adjusting screws are equally tight on the soleplate so that undue strain on the sideplate is avoided.

See illustration Page 4

(c) Height of Cut—the height of cut is regulated by the position of the roller brackets.

See Section II. Para 1 (f)

(d) Handles—

See Section II. Para. 1 (d)

II.

7. FAILURE TO START.

If after a reasonable number of trials the engine should not start, this may be due to one or more of several causes, such as :

(a) Lack of petrol through tap not being turned on, fuel supply choked, or failure to flood the carburetter.

(b) Too much petrol through excessive flooding causing wet sparking plug. If so, remove and dry the plug, turn engine over smartly with control lever closed. Replace plug.

(c) Control lever open too wide. One quarter to one third is correct.

(d) Sparking plug dirty or gap between points incorrect. Clean or adjust if necessary. Gap should be .020 in.—.022 in.

(e) No spark. Remove plug and place plug body on top of cylinder with lead attached and turn starting pulley. There should be a spark at the points. If not, clean and adjust gap between points.

If, after all above items have been checked, the engine still will not start, a more detailed examination will be required.

See section on 'Engine.'

III. MAINTENANCE & REPAIRS.

1. LUBRICATION.

The following points should be greased regularly before use:

(a) The driving wheels through the nipples (12) provided at their centres.

(b) The cylinder bearings through the nipples provided at each end of the cylinder shaft.

(c) The bearing at the end of the driving shaft, by the nipple (17) at the top of the chain case.

The following points should be oiled regularly with light machine oil :

(d) The driving pinions on each side of the mower. Lift one side of the machine well clear of the ground and turn the driving wheel round until its specially provided hole reveals the pinion within. The free-wheel and pinion can then be oiled through the hole. Repeat for the other wheel.

(e) The wooden land rollers.

In addition, always check that the sump of the engine is full. Top up if necessary.

DO NOT LUBRICATE ANY PART OF THE CENTRIMATIC.

See illustration Page 4

2. CHAIN.

The cylinder driving chain (13) is packed with grease before leaving the works and should require no further lubrication.

The chain is fitted with a hook type adjuster (14) in order to take up any variations in chain wear.

To obtain access to the chain adjuster first remove the driving wheel next to the chain case by slackening the square-headed bolt which screws into the wheel bearing on the inside of the sideplate. Remove the split pin in the spindle. Then tap the spindle of the wheel outwards. Remove the two screws (15) on the outside of the chain case and withdraw the cover.

Slacken the nut (16) and move the adjuster to give the required tension on the chain. Retighten the nut. Check the tension in several different positions of the chain before re-assembling the mower.

See illustration Page 4

3. THE CENTRIMATIC.

i. Centrifugal Clutch.

Access to the centrifugal clutch of the CENTRIMATIC is readily obtained by removing the screws which fix the engine to the mower platform and withdrawing the engine.

If it is suspected that the clutch is not operating satisfactorily this may be due to one or more of the following causes :

(a) Oil or grease on the linings (9) of the clutch shoes (10) or on the inside of the clutch drum (1). Clean thoroughly with petrol or other degreasing agent.

(b) Clutch shoes unable to turn on pivot pins (12). Clean if necessary and free the obstruction.

(c) Linings of clutch shoes worn. This is not likely to occur except after very prolonged life. Remove shoes by withdrawing split pins (11) which secure the shoes to their pivot pins and fit new linings. Use new rivets (13).

(d) If, after attention to the foregoing points, the clutch is found still to be slipping, turn the spring adjusting screws (14) in an anticlockwise direction. This will allow the shoes to exert a greater pressure on the clutch drum.

After adjustment check that clutch is completely disengaged when engine is idling.

ii. Safety Device & Hand Clutch.

Should the safety device operate prematurely and disengage the manual clutch during normal mowing, check that there is no oil, grease or obstruction on the teeth of the drum or in the grooves of the collar. Check the spring.

See illustration Page 5.

4. PROCEDURE FOR REMOVING DRIVING SPROCKET, CYLINDER SPROCKET & SIDEPLATE.

(a) Remove wheel, chaincase cover and cylinder chain adjuster. *See Para. III, 2, Page 9.*

(b) Block the cutting cylinder (37) with a wooden wedge. Remove the nut on the outside of the driving sprocket (49). Then withdraw the driving sprocket.

(c) To remove the cylinder sprocket (48), keep the cutting cylinder (37) blocked with a wooden wedge and tap the sprocket in a clockwise direction with a brass drift. If any difficulty is experienced, apply heat to the sprocket.

(d) To remove sideplate, first remove engine.

See Para. III, 3 (i), Page 9.

(e) Remove engine platform screws (4).

(f) Remove soleplate screw (28) and tie rod nut (24).

(g) Sideplate (6) can then be withdrawn.

See Mower Assembly Illustration

5. THE ENGINE.

A description of the engine together with instructions for maintenance will be found in a separate section towards the end of this booklet.

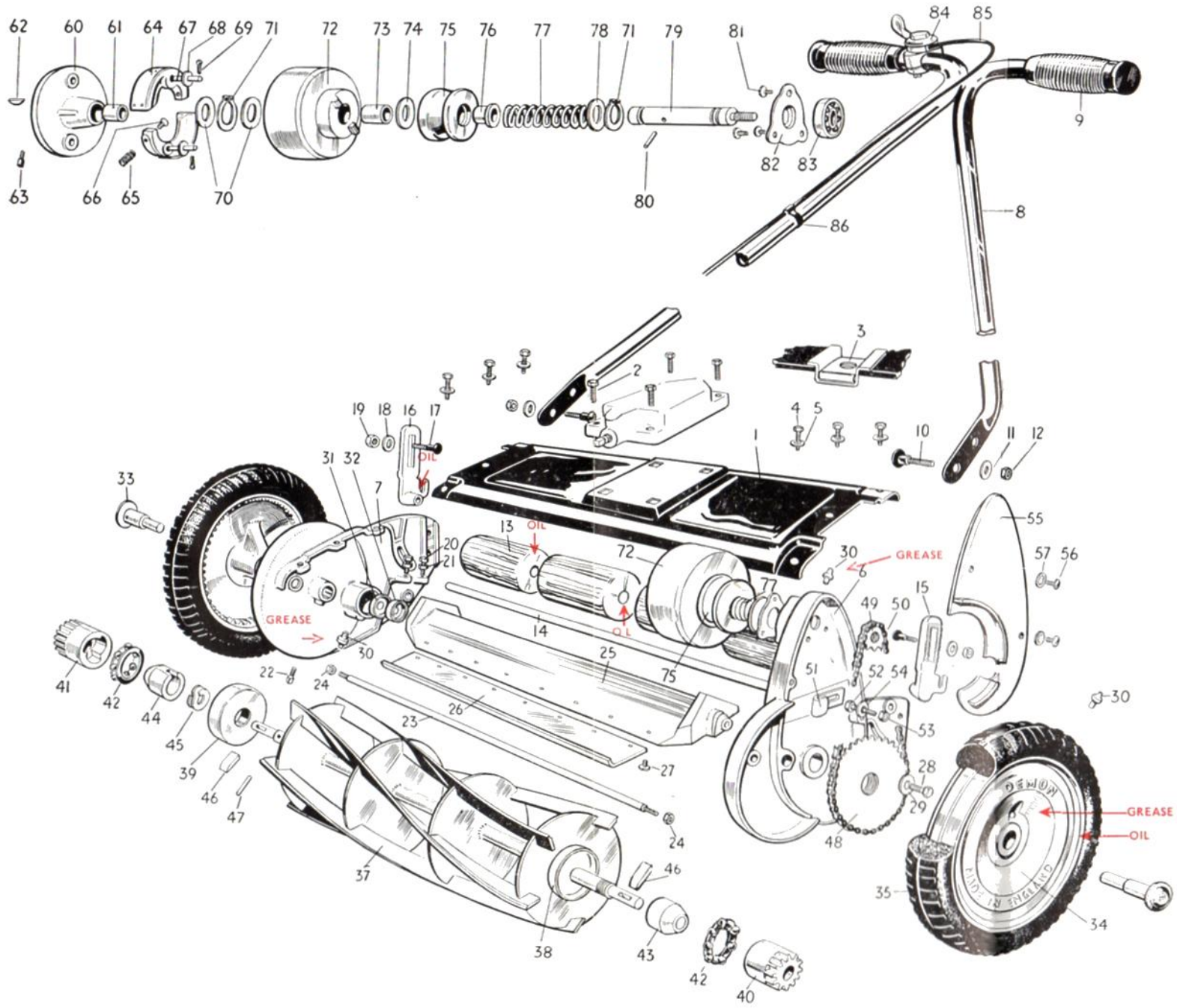
DEMON MOTOR MOWER SPARE PARTS LIST.

Ref. No.	Description.	Part No.	No. per set
FRAME ASSEMBLY			
1.	Engine Platform	L.3924	1
2.	Engine Fixing Screws	91279	4
3.	Spire Grip Nuts	SM/D/10/2/7	4
4.	Screw for fixing Engine Platform	91255	6
5.	Washer for fixing Engine Platform	L.3843	6
6.	Sideplate L.H.	L.3911	1
7.	Sideplate R.H.	L.3912	1
8.	Tubular Handle	L.4430	1
9.	Handle Grip	L.3933	2
10.	Bolt for Tubular Handle	98287	2
11.	Washer for Tubular Handle	93715	2
12.	Nut for Tubular Handle	93256	2
13.	Wood Roller	L.3931	4
14.	Wood Roller Spindle	L.3923	1
14a	Split Cotter Pin (not illustrated)	L.4085	1
15.	Roller Bracket L.H.	L.4745	1
16.	Roller Bracket R.H.	L.4746	1
17.	Bolts for Roller Bracket	98287	2
18.	Washer for Roller Bracket	93715	2
19.	Nut for Roller Bracket	93256	2
20.	Screw for Soleplate	94813	4
21.	Locknut for Soleplate	93034	4
22.	Screw for Wheel Pin	L.4645	2
23.	Tie Rod	L.3921	1
24.	Nut for Tie Rod	NT/D/26/11/2	2
25.	Soleplate	L.3913	1
26.	Bottom Blade—Lipped	L.3938	1
27.	Screw for Bottom Blade	L.3854	8
28.	Screw for Soleplate	94112	2
29.	Washer for Soleplate	93634	2
30.	Grease Nipple	L.3989	5
31.	Cup	L.3922	2
32.	Oil Seal Sub. Assembly	L.3925	2
33.	Wheel Pin Sub. Assembly	L.4650	2
34.	Driving Wheel	L.3932	2
35.	Rubber Tyre	L.2399	2
36.	Split Cotter Pin	L.4651	2
CYLINDER ASSEMBLY			
37.	Cylinder Sub. Assembly	L.3934	1
38.	Shroud, Short (L.H.)	L.4008	1
39.	Shroud, Long (R.H.)	L.4009	1
40.	Pinion L.H.	L.131	1
41.	Pinion R.H.	L.180	1
42.	Ball Retainer	L.3957	2
43.	Cone, Fixed, L.H.	L.3928	1
44.	Cone, Free, R.H.	L.3927	1
45.	Thackeray Washer for Cone, R.H.	L.4064	1
46.	Pawl, Rectangular	L.378	2
47.	Mills Pin	L.4131	1
CHAIN ASSEMBLY			
48.	Sprocket, 36 teeth	L.3939	1
49.	9-Tooth Driving Sprocket	L.4701	1
50.	Chain, complete with Con. Link	L.3961	1
51.	Chain Adjuster	L.4025	1
52.	Bolt for Chain Adjuster	91772	1
53.	Nut for Chain Adjuster	93256	1
54.	Washer for Chain Adjuster	93615	1
55.	Chain-case Cover	L.3920	1
56.	Screw for Chain-case Cover	L.4019	2
57.	Washer for Chain-case Cover	L.3843	2

Ref. No.	Description.	Part No.	No. per set
CENTRIMATIC ASSEMBLY			
60.	Clutch Backplate	L.3918	1
61.	Bush for Backplate	L.3958	1
62.	Woodruffe Key for Clutch Backplate	L.3845	1
63.	Screw for Clutch Backplate	L.3846	1
64.	Clutch Shoe Sub. Assembly	L.5319	2
65.	Clutch Spring	L.3756	2
66.	Screw for Clutch Shoes	L.4037	2
67.	Mills Pin	L.3725	2
68.	Washer for Clutch Backplate	93515	2
69.	Split Pin for Clutch Backplate	L.3847	2
70.	Clutch Thrust Washer	L.3953	2
71.	Circlip for Clutch Spindle	L.4063	2
72.	Clutch Drum	L.3919	1
73.	Bush for Drum	L.3959	1
74.	Thrust Washer for Clutch	L.4054	1
75.	Sliding Dog... ..	L.3929	1
76.	Bush for Sliding Dog	L.4053	1
77.	Spring for Sliding Dog	L.3999	1
78.	Thrust Washer	L.3954	1
79.	Clutch Spindle	L.4716	1
79a.	Nut for 9-tooth Sprocket (not illustrated)	L.2946	1
80.	Knurled Pin	L.4426	1
81.	Screw for Bearing Cover	L.3329	3
82.	Bearing Cover	L.3926	1
83.	Clutch Shaft Bearing	L.3730	1
84.	Control Lever	E.3686	1
85.	Cable	E.4132	1
86.	Cleat for Cable	L.3840	1
87.	Grass Catcher, not illustrated	L.4640	1
88.	Handle Clip, not illustrated	L.4648	1

The above list to be read in conjunction with
MOWER ASSEMBLY ILLUSTRATION.

Mower Assembly Illustration



The
Suffolk Industrial Engine

Type 75 G.14
Models 1a & 1b

DESCRIPTION & INSTRUCTIONS
for Operation and Maintenance

I. DESCRIPTION.

II. OPERATION INSTRUCTIONS.

1. Preparation for use.
2. Starting the engine when cold.
3. Starting the engine when hot.
4. Speed Regulation.
5. Lubrication.
6. Ignition.
7. Stopping the engine.
8. Some causes of failure to start.

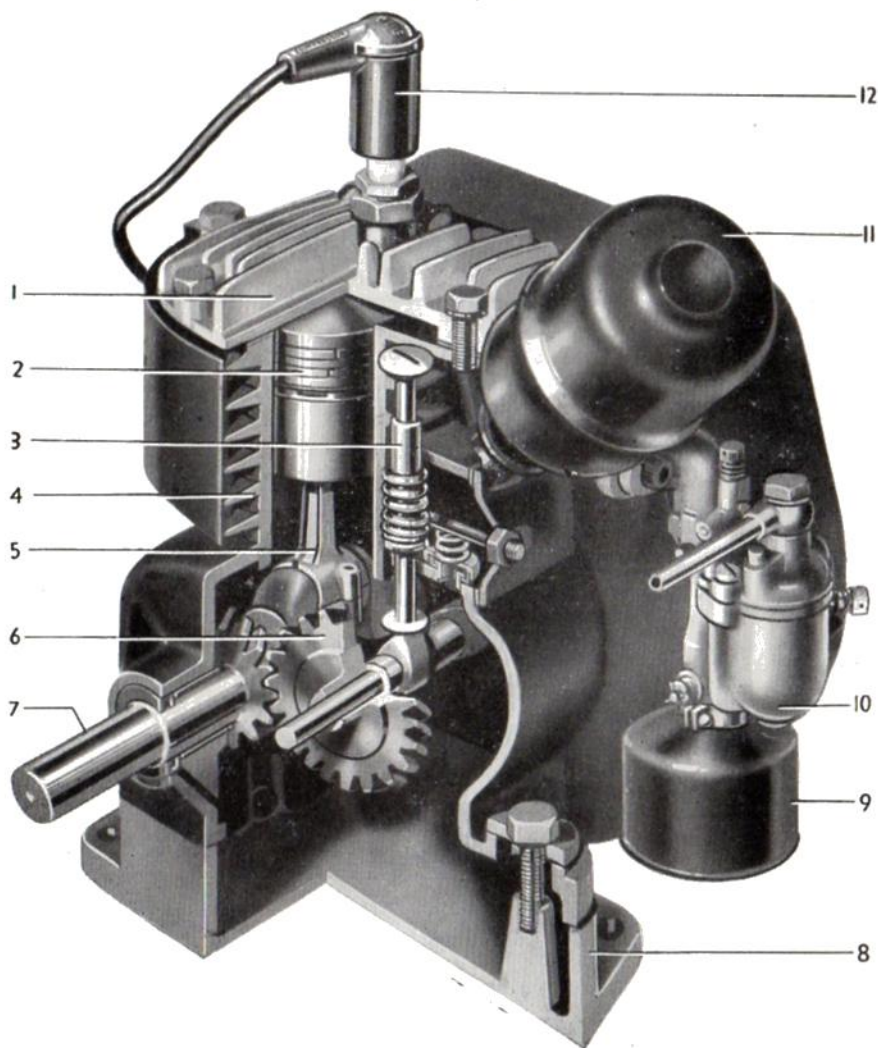
III. MAINTENANCE & REPAIRS.

1. Magneto Description.
2. Magneto Service Instructions.
3. Carburetter Description.
4. Carburetter adjustments and maintenance.
5. Control Cable adjustments.
6. Engine dismantling.

The Suffolk Industrial Engine

Type 75 G.14

Models 1A, 1B



1. CYLINDER HEAD
2. PISTON
3. VALVE ASSEMBLY
4. CYLINDER BLOCK

5. CONNECTING ROD
6. VALVE TIMING GEAR
7. CRANKSHAFT
8. SUMP

9. AIR FILTER
10. CARBURETTER
11. SILENCER
12. SPARKING PLUG

The Suffolk Industrial Engine

Type 75 G.14

Models 1a & 1b

I. DESCRIPTION.

Engine	Petrol, four stroke, single cylinder, air cooled.
Cylinder Dimensions.	Bore, 50.8 millimetres. Stroke, 38.1 millimetres Cubic Capacity, 75 c.c.
H.P.	1.1 at 3,000 revolutions per minute.
Valves.	Mushroom. Side valve.
Valve Clearances.	Exhaust .015. Inlet .007. Inlet valve opens 2 degrees after Top Dead Centre. With above valve clearances the correct opening and closing of the valves will follow.
Camshaft.	One piece helical gear driven.
Piston.	Material, low expansion aluminium alloy. 1 Com- pression Ring, 1 Scraper Ring, 1 Oil Control Ring. Gudgeon Pin fixing by 2 circlips.
Connecting Rod.	Material, aluminium alloy. Big end bearing, plain and direct on crankshaft.
Crankshaft	Material, Steel Forging. Dia. of take off—.75 in.
Main Bearings.	Steel backed white metal lined.
Ignition.	MAGNETO, FLYWHEEL TYPE. TIMING, 22 degrees before top dead centre. DRIVE direct main shaft. SPARKING PLUG, size 14 m.m. dia. Three eighths inch reach.
Carburetter.	Zenith 13TCA.
Lubrication System.	Special 'Oil-mist' method.
Fuel Tank Capacity.	1½ pints.
Fuel Consumption.	.8 pints per H.P. hour.
Overall Weight.	28 lbs.
Rotation.	Clockwise, looking at starting pulley.
Method of fixing.	By four bolts 5/16 in. dia. in base at 6 3/8 in. by 3 1/8 in. centres.
Overall Dimensions.	Height—13 1/2 in. max. Width—12 in. max. Breadth—12 in. max.

II. OPERATION INSTRUCTIONS.

1. PREPARATION FOR USE.

See Para. II 1, Page 2

2. TO START ENGINE WHEN COLD.

See Para. II 3, Page 5

3. TO START ENGINE WHEN HOT.

See Para. II 4, Page 7

4. SPEED REGULATION.

The speed of the engine is controlled by the lever at the end of the cable attached to the carburetter.

An automatic governor (3) is fitted which will maintain a constant speed whether the engine is running light or under load, according to the setting of the control lever. Adjustment to this device should not be attempted unless absolutely necessary.

See Illustration on Page 6

5. LUBRICATION.

Complete lubrication of all working parts of the engine including valves, etc., is automatically ensured by the special 'oil-mist' method, whereby it is unnecessary to add upper cylinder lubricant.

The crank case should always be kept full of oil.

Do not remove the oil plug whilst the engine is running.

After every 30 hours running and preferably when the engine is hot, drain the oil by unscrewing the lower of the two square-headed plugs in the sump at the base of the engine. Flush out with flushing oil (not paraffin). Make sure drain plug is replaced and tightened before refilling with fresh lubricating oil.

6. IGNITION.

Ignition is fixed. If the magneto is removed for any reason, mark the relative position of engine and magneto in order that the timing should not be altered.

The magneto is timed to spark at 22 degrees before top dead centre.

7. TO STOP ENGINE.

Turn off petrol. This will not stop engine at once since there will still be some petrol in the carburetter to be used before the engine finally receives no fuel. A little economy in petrol may be obtained by turning off the petrol a few minutes before requiring engine to stop.

To stop the engine quickly in the event of an emergency, press the Ignition Cut-out Switch on to the top of the Sparking Plug and keep pressed until the engine stops.

8. FAILURE TO START.

If after a reasonable number of trials the engine should not start, this may be due to one or more of several causes, such as :

(a) Lack of petrol through tap not being turned on or fuel supply choked, or failure to flood carburetter.

(b) Too much petrol through excessive flooding causing too rich a mixture and wet sparking plug. If so, remove and dry plug. Turn engine over smartly a few times by hand with control lever closed. This will expel excessive petrol vapour. Replace plug.

(c) Control lever open too wide. One quarter to one third is correct.

(d) Poor spark arising from dirty plug. Remove and clean plug and adjust points. Gap should be .020 in.—.022 in.

(e) No spark. Remove plug and place plug body on top of cylinder with cable attached and turn starting pulley smartly. There should be a spark at the points of the plug. If not, clean and adjust gap between points. Also check that plug cable is in good condition.

(f) Lack of petrol can sometimes result from dirty filter at junction of petrol pipe and carburetter. Remove plug No. 1 (see *Illustration on Page 24*) at top of float chamber, lift out filter gauze carefully and wash in petrol. Replace filter gauze and screw back union. Do not overtighten.

Make sure that fibre washers are replaced correctly.

If after all above items have been checked, the engine still will not start, the following examination will be required :

(g) Carburetter.

If it is suspected that foreign matter may have entered carburetter, remove screws from lid of float chamber and remove float. Then clean out float chamber and needle seat.

For more detailed instructions, see section on Carburetter Maintenance.

(h) Magneto.

If after examining sparking plug and its cable, there is still no spark, remove the flywheel cover and check magneto.

See section on Magneto Service Instructions.

(j) Cylinder Compression.

Lack of compression may be caused by :

(i) Insufficient valve clearance. There should be a clearance of .015 in. between exhaust valve stem and cam and .007 in. between inlet valve stem and cam throughout the closed period of the valves respectively.

(ii) Valves sticking. Remove valve chest cover to see if valve stems are moving their full distance as engine is turned over.

If not, remove cylinder head, clean away any foreign matter under valve head, on valve stem and free the valve.

(iii) Joint between cylinder and head of cylinder not tight. This is not likely to occur unless the cylinder head has been removed and replaced incorrectly, or replaced with a faulty gasket.

III. MAINTENANCE & REPAIRS.

1. MAGNETO DESCRIPTION.

The Flywheel Magneto produces a high spark output at low speeds for easy starting, and maintains a maximum spark output over a wide timing range.

It consists of two main parts : a FLYWHEEL and a STATOR PLATE. The Flywheel contains in its rim a permanent magnet of special alloy.

The Stator Plate contains the H.T. Coil mounted on a laminated core, the condenser and the breaker mechanism, all of which are easily accessible.

2. MAGNETO SERVICE INSTRUCTIONS.

If the engine fails to start, and there is indication that the magneto is at fault, the following procedure should be adopted.

(a) Disconnect the H.T. lead from the spark plug, and hold it about $\frac{1}{8}$ " away from some unpainted portion of the engine. Turn the engine over smartly and a spark should jump this gap.

If no spark is visible, then

(b) Remove the magneto cowling by unscrewing the cowling fixing screws, and withdrawing the cowling complete with petrol tank, after first disconnecting the petrol pipe from the carburetter.

(c) Remove the flywheel. Unscrew the hexagon nut (L.H. thread) at the end of the crankshaft and draw off the starting pulley. If the Flywheel will not withdraw easily, grasp it firmly and while attempting to pull it off,

tap the end of the crankshaft with a mallet. Be careful not to damage the thread. Make sure that there are no metallic particles inside the flywheel.

(d) Check that the H.T. cable is not broken, disconnected from the coil, or damaged in any way. Also check other wiring.

(e) Check that the contact breaker points are clean.

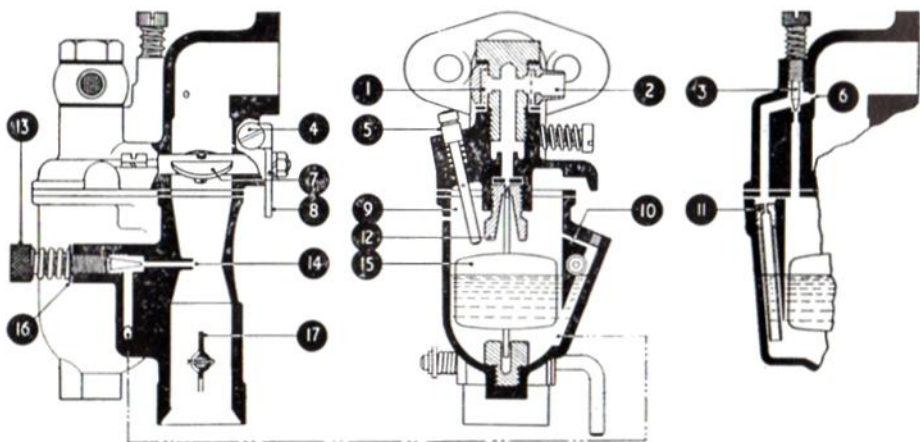
Turn the engine over until the points are fully open. Measure the opening with a feeler gauge. This opening should be .018"-.020". If the points need adjusting, loosen the large screw which locks the breaker plate and move the latter to give the correct opening by turning the small screw, which is eccentric. Then lock the large screw. Check the opening.

The breaker points setting should only be adjusted in the manner described; at no time should the fixed contact be loosened to provide adjustment.

If either the fixed or moving points at any time need replacement, it is recommended that both be replaced at the same time.

(f) A weak or faulty condenser can be detected by badly burnt or pitted points, or a continuous blue spark across the contacts when running. A small white spark is normal. The condenser can be removed by undoing the screws holding the clamp and disconnecting the leads from it.

3. CARBURETTOR DESCRIPTION.



The 13TCA carburettor shown above has a high non-flooding angle in all directions, and consists of two principal castings. The upper portion or throttle body incorporates the right angle inlet bend and the fixing flange which is bolted directly on to the inlet port of cylinder; the lower portion consists of the float chamber (or bowl) and the air intake. The choke tube is cast integrally as part of the air intake.

Fuel Supply and Metering System.

Fuel entering the petrol elbow (2) is filtered by the gauze screen (1) and passes through needle seating (12) into the bowl (9). The combined float and needle (15) will rise and close the seating, cutting off further supplies of petrol when the correct level is reached in the bowl (it is not intended that this level should be altered). A tickler or flooder (5) is provided to enable the float to be depressed, and as a result the fuel level will be raised in order to assist starting when cold. A small overflow hole in the bowl above the normal fuel level prevents excessive flooding.

High Speed Operation.

Fuel metering at high engine speed is controlled by an adjustable main jet. The outlet of the main jet discharge tube (14) is placed at the restricted portion of the choke tube which forms part of the bowl. The main jet adjusting screw (13) has a tapered end which enters the tube (14), thus controlling

the quantity of fuel passing into the choke tube. The volume of petrol/air mixture passing into the engine is controlled by the butterfly throttle (7) which in turn is operated by the throttle lever (8). A small air-bleed hole (10) is provided in the main jet system ; air from the bowl is used for this purpose.

Idle Operation.

The slow running channel carries petrol from the combined jet and dip tube (11) to the small idling hole (6) on the engine side of the throttle. Air for slow running is taken from inside the carburetter, and is controlled by the vertical adjusting screw (3). Turning this screw clockwise enriches the slow running mixture and vice versa.

Easy Starting.

This is ensured by the air strangler or choke (17) and during very cold weather the tickler (5) can also be used. When the engine has been switched off a short period it is not usually necessary to use the choke when restarting ; it may, however, be an advantage to use the tickler in order to ensure an immediate fire when the engine is turned over.

4. CARBURETTER ADJUSTMENTS AND MAINTENANCE.

Adjusting Main Jet.

The main jet adjustment (13) is set by the engine manufacturer and should not be altered without good reason. This adjustment is always somewhat sensitive on small engines, consequently it should not be altered more than one-eighth of a complete turn until the effect of any such adjustment has been carefully noted. (The shallow notch in the head is provided only to indicate the position of the screw). Always make this adjustment with the engine under load at normal full speed with the throttle wide open. It is not satisfactory to adjust the main jet when the engine is running light on the speed governor with the throttle nearly closed. Turning the screw (13) clockwise, will reduce the fuel flow and weaken the mixture supplied to the engine. Turning it anti-clockwise will increase the flow and provide a richer mixture. **DO NOT FORCE THE SCREW INTO ITS SEATING AS THIS WILL DAMAGE THE TAPER** thereby making correct adjustment extremely difficult. If the setting is too weak it will result in lack of power and possibly overheating of the cylinder, together with poor pick up or cutting out when the load is applied. Do not attempt to operate on a very lean mixture, as better performance and fuel economy will be obtained if the mixture is set for full power. An excessively rich mixture will produce black smoke from the exhaust and may cause rapid carbon formation in the cylinder head and on the piston crown. Carbon will also quickly form on the sparking plug points, resulting in difficult starting. The head of adjusting screw (13) is drilled for a locking wire, and a small drilled lug on the bowl is provided for the other end of the wire. The washer (16) prevents fuel leaking from the head of the screw. Screw (13) should be set at about $1\frac{1}{2}$ complete turns in an anti-clockwise direction from the fully closed position.

Adjusting Idle Speed.

The throttle stop screw (4) should be turned clockwise to increase the idle speed. Conversely, turning anti-clockwise will reduce the speed at which the engine runs with the throttle in the closed position. It is usual to set the idling speed at 1000-1100 r.p.m. Smooth idling is ensured by regulating the mixture screw (3), the head of which is drilled for locking wire. In case of difficulty in obtaining satisfactory idling, make quite sure the gasket between the bowl and the barrel is in good condition and that the attachment flange on the barrel portion is perfectly flat. A thin gasket should always be used at this flange joint. Screw (3) should be set about $\frac{3}{4}$ of a complete turn in anti-clockwise direction from the fully closed position.

General.

Flooding may be caused by excessive engine vibration, dirt in the needle seating, a bent float needle, or possibly by the tickler (5) sticking down and depressing the float. Should the flooding continue after cleaning and checking the carburetter, the next step is to fit a new float and needle (15) and needle seating (12) as this part is subject to wear as a result of engine vibration. Periodically check and clean the filter gauze in the banjo fixing the petrol pipe to the carburetter. It is not intended that the petrol level should be altered.

5. CONTROL CABLE ADJUSTMENT.

The control lever is connected to the carburetter by the cable (4) which is located in the carburetter manifold by the ferrule (5). If after considerable use it is found that the cable has stretched, adjustment can be made by loosening the anchor screw (6) pulling the cable through the hole in the anchor and retightening the screw. This adjustment should be made with the control lever in the closed position and the throttle control spring (7) fully expanded.

See Illustration Page 6

6. ENGINE DISMANTLING.

1. Disconnect plug lead from sparking plug.
2. Remove sparking plug.
3. Disconnect petrol elbow from top of carburetter float chamber.
4. Remove cowl complete with petrol tank.
5. Remove air vane governor from magneto backplate and disconnect from throttle link.
6. Remove carburetter assembly at joint between inlet manifold and cylinder block.
7. Remove magneto flywheel, woodruff key, contact breaker cam, and cam spring.
8. Remove cylinder head and cylinder cowl.
9. Remove magneto stator plate, drawing plug lead through rubber grommet in magneto backplate.
10. Remove engine sump.
11. Remove big end setscrews, locking strip, oil splasher, and big end bearing cap.
12. Remove piston and connecting rod complete by drawing upwards through cylinder.
13. Remove rings from piston, one circlip and gudgeon pin.
14. Remove magneto backplate.
15. Remove crankshaft.
16. Remove valve chest cover, breather retaining spring and crankcase breather.
17. Compress valve springs and remove cotter pins.
18. Remove camshaft by tapping out camshaft spindle TOWARDS magneto end of engine with a brass drift.
19. Remove tappets.

TO RE-ASSEMBLE, REVERSE THE ABOVE PROCEDURE.

ENGINE SPARE PARTS LIST.

Parts Common to Models ra and 1b

Ref. No.	Description.	Part No.	No. per set.
1.	Cylinder Head	E.3507	1
2.	Washer for Cylinder Head	93514	6
3.	Set-Screws for Cylinder Head	96100	6
4.	Cylinder Head Gasket	E.3546	1
5.	Cut-out Switch (not illustrated)	E.3969	1
6.	Spark Plug... ..	E.3808	1
7.	Washer for Spark Plug	E.3809	1
8.	Piston	E.3513	1
9.	Gudgeon Pin	E.3517	1
10.	Wire Circlips	E.3518	2
11.	Compression Ring	E.3514	1
12.	Scraper Ring	E.3515	1
13.	Oil Ring	E.3516	1
14.	Cylinder Block	E.3506	1
15.	Valve Seat Insert—Exhaust	E.3534	1
16.	Exhaust Valve Guide	E.3532	1
17.	Inlet Valve Guide	E.3533	1
18.	Inlet Valve and Exhaust Valve	E.3526	2
19.	Valve Spring Cotter Pin... ..	E.3531	2
20.	Inlet Valve Spring	E.3529	1
21.	Exhaust Valve Spring	E.3528	1
22.	Valve Spring Retainer	E.3968	2
23.	Cylinder Cowl	E.3562	1
24.	Paper Gasket for Flywheel Magneto Backplate	E.3859	2
25.	Camshaft Spindle	E.3525	1
26.	Camshaft Spindle Retaining Plug	E.3559	1
27.	Crankshaft	E.3524	1
28.	Key for Magneto Flywheel	E.3597	1
29.	Washer for Crankshaft	93515	1
30.	Nut for Crankshaft (left-hand thread)	93401	1
31.	Cam Spring (see Magneto)	E.5052	1
32.	Main Bearing	E.3536	2
33.	Oil Seal	E.3813	2
34.	Breather Baffle	E.3561	1
35.	Drive Screw for Breather Baffle	E.3814	1
36.	Tappets	E.3535	2
37.	Camshaft	E.3510	1
38.	Washer for Crankcase Breather	E.3594	1
39.	Body	E.3555	1
40.	Disc Valve	E.3557	1
41.	Breather Cap	E.3556	1
42.	Breather Retainer Spring	E.3558	1
43.	Stud for Valve Chest Cover	E.3544	1
44.	Baffle for Valve Chest Cover	E.3560	1
45.	Gasket for Valve Chest Cover	E.3549	1
46.	Cover for Valve Chest	E.3543	1
47.	Washer for Stud	93513	1
48.	Nut for Stud	93013	1
49.	Connecting Rod	E.3520	1
50.	Big End Bearing Cap	E.3521	1
51.	Oil Splasher	E.3522	1
52.	Locking Strip	E.3523	1
53.	Screws for Big End Bearing Cap	94111	2
54.	Sump Casting	E.3509	1
55.	Paper Gasket for Sump	E.3547	1
56.	Washer for Bolt—Asbestos	E.3749	1
57.	Collar for Bolt	E.3566	1
58.	Bolt for Sumps	91312	1
59.	Dowels for Sump	E.3819	2
60.	Setscrew for Sump	94113	1
61.	Washer for Setscrew and Bolt	E.3821	2

Ref. No.	Description.	Part No.	No. per set.
62.	Drain Plug... ..	E.3822	1
62a.	Filler Plug	E.4276	1
62b.	Dip Stick for Filler Plug (not illustrated)	E.4275	1
63.	Flywheel Magneto Backplate	E.3508	1
64.	Screw for Fixing Fan Governor Brackets	95259	2
64a.	Washer for Fixing Fan Governor Brackets	93510	2
65.	Screw for Flywheel Magneto Cowl	96039	4
66.	Washer for Flywheel Magneto Cowl	93513	2
67.	Grommet	E.3826	1
68.	Screw for Flywheel Magneto Backplate	94075	4
69.	Washer for Flywheel Magneto Backplate	E.3828	4
70.	Cam—Contact Breaker		1
71.	Flywheel	See Magneto	1
72.	Starter Pulley	E.3552	1
73.	Flywheel Magneto Cowl	E.5788	1
75.	Pressed Steel Screw Cap	E.3589	1
76.	Washer for Petrol Tap	E.3829	1
77.	Petrol Tap	E.3593	1
78.	Nut for Fixing Screw—Tank	NT/D.086	3
79.	Washer—for Tank	93513	3
80.	Fixing Screw for Tank	94513	3
81.	Inlet Manifold	E.3511	1
82.	Stud for Throttle Lever	E.3565	1
83.	Nut for Throttle Lever	NP/U.106	1
84a.	Washer for Throttle Lever	93510	1
85.	Throttle Lever	E.3564	1
86.	Screw for Throttle Lever	95278	1
87.	Gasket for Inlet Manifold	E.3551	1
88.	Screw for Carburetter Assembly	93402	2
88a.	Screw for Inlet Manifold (not illustrated)	96075	2
89	Spring Washer for Inlet Manifold and Carburetter Assembly	93713	4
90.	Carburetter	E.5416	1
91.	Gasket for Carburetter	E.3550	1
93.	Securing Clip for Air Cleaner	E.3581	1
94.	Screw for Securing Clip	95275	1
95.	Nut for Securing Clip	93231	1
96.	Air Cleaner Assembly	E.3570	1
97.	Fan Governor and Governor Blade Assembly	E.3538	1
98.	Throttle Link	E.3545	1
99.	Governor Spring	E.3964	1
100.	Elbow for Exhaust Silencer	E.3567	1
101.	Exhaust Silencer	E.4000	1
102.	Lock Nut for Exhaust Elbow	E.3568	1
103.	Starter Rope (not illustrated)	L.3620	1
106.	Control Lever (not illustrated)	E.3686	1
108.	Petrol Elbow (not illustrated)	E.5417	1

NOTE—On some models, Exhaust Elbow, Ref. No. 100 is incorporated with the silencer

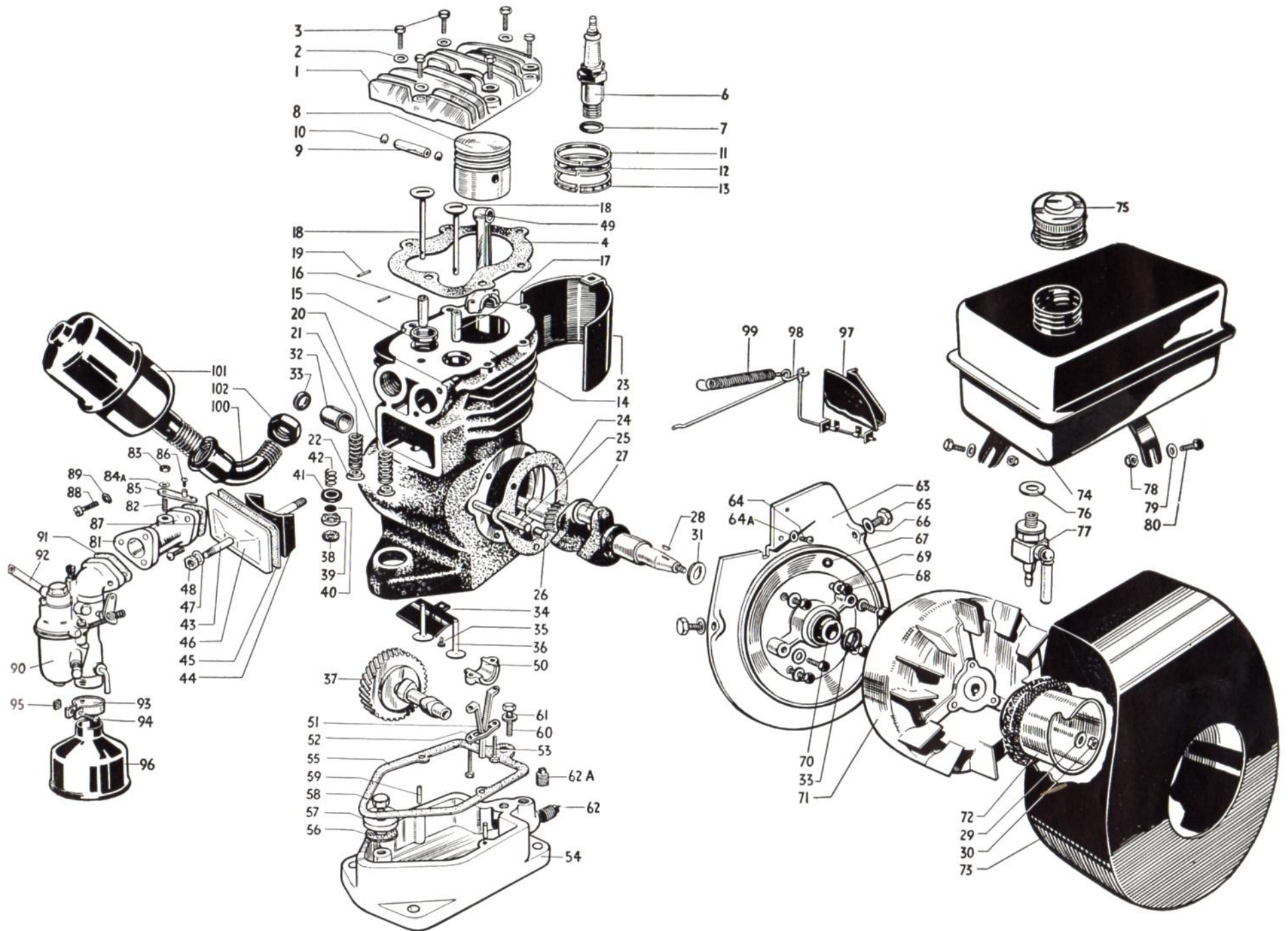
Parts peculiar to Model 1a

74.	Petrol Tank	E.3805	1
92.	Petrol Tube (not illustrated)	E.3693	1
107.	Cable (not illustrated)	E.3853	1

Parts peculiar to Model 1b

74.	Petrol Tank	E.4046	1
92.	Petrol Tube (not illustrated)	E.4061	1
104.	Elbow for Air Cleaner (not illustrated)	E.4136	1
105.	Screw for Elbow for Air Cleaner (not illustrated)	E.4137	1
107.	Cable (not illustrated)	E.4132	1

Engine Assembly Illustration

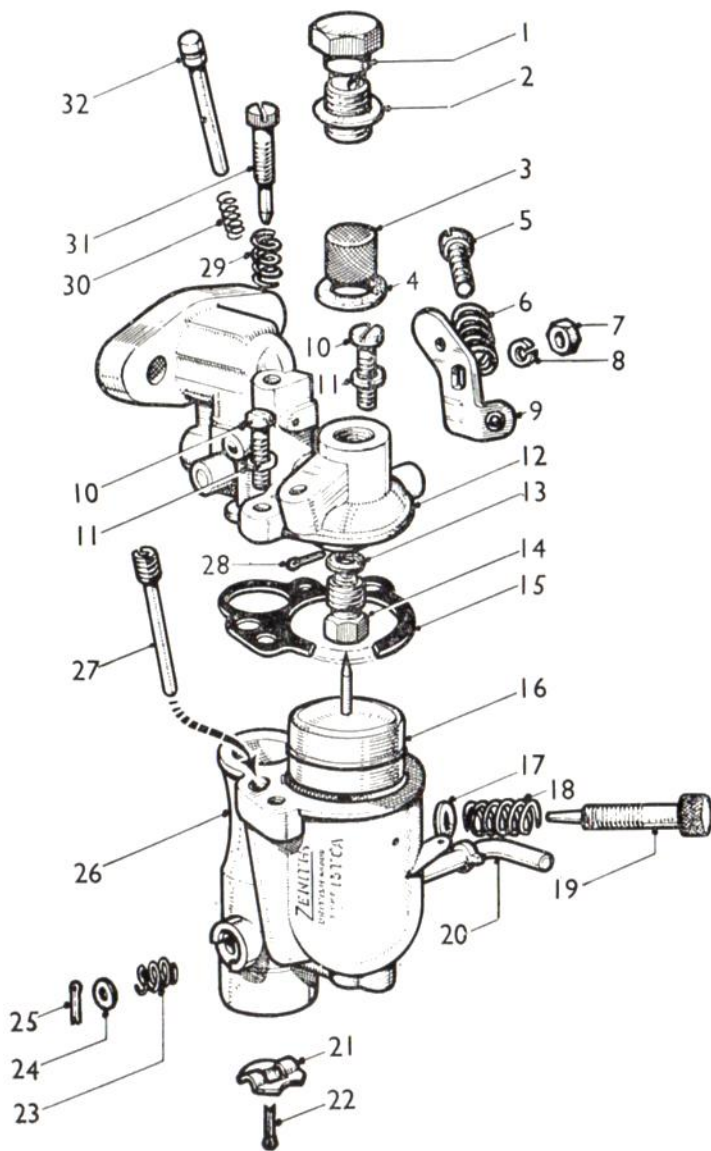


SPARE PARTS LIST FOR ZENITH CARBURETTER.
TYPE 13.TCA. C1433C.

Ref. No.	Description.	Part No.
1.	Plug for Petrol Elbow	013891
2.	Washer for Ref. No. 1	11007
3.	Filter Gauze	013893
4.	Washer for Ref. No. 1	11007
5.	Throttle Stop Screw	015547
6.	Spring for Ref. No. 5	08539
7.	Nut fixing Throttle Lever	P-16639
8.	Spring Washer for Ref. No. 7	04692
9.	Throttle Lever	015824
10.	Screw fixing Bowl to Barrel (2 off)	07967
11.	Spring Washer for Ref. No. 10 (2 off)	015536
12.	Carburetter Barrel (assembled with Throttle, Throttle Spindle, Throttle Lever and Tickler)	017075
13.	Washer for Needle Seating	08523
14.	Needle and Seating	016465
15.	Gasket (Bowl to Barrel)	015532
16.	Float and Needle Assembly	016620
17.	Washer for Adjustment Needle	16709
18.	Spring for Adjustment Needle	09846
19.	Adjustment Needle	013637
20.	Strangler Spindle	015530
21.	Strangler Flap	013635
22.	Split Pin fixing Ref. No. 21	05370
23.	Friction Spring	013650
24.	Retaining Washer for Ref. No. 23	08860
25.	Split Pin	05370
26.	Carburetter Bowl	017042
27.	Slow Running Tube	015461
28.	Split Pin for Tickler	05890
29.	Spring for Air-regulating Screw	015458
30.	Spring for Tickler	015454
31.	Air-regulating Screw	015457
32.	Tickler Stem	016469

This list to be read in conjunction with
EXPLODED ILLUSTRATION OF CARBURETTER on Page 24

Carburettor Illustration



MAGNETO SPARE PARTS LIST

Part No.	Description	No. per Set
E5010	Flywheel	1
E5013	Clip for condenser	1
E5014	Adjuster Plate	1
E5019	Inspection Cover	1
E5020	Eccentric Rivet	1
E5021	Screw for Condenser Clip	2
E5022	Breaker Arm and Contact	1
E5026	Contact Point and Bolt	1
E5027	Nut for E5026	1
E5028	Washer for E5026	2
E5030	Screw, Locking Adjusting Plate	1
E5031	Washer for E5030	1
E5032	Spring Retainer	1
E5033	Breaker Spring	1
E5034	Washer	2
E5035	Wire and Sleeving	1
E5037	Condenser	1
E5038	Cam Sleeve	1
E5039	Coil	1
E5041	Screw for E5019	2
E5042	Washer for E5041	2
E5047	Pad—Lubricating	1
E5049	Lead—High Tension	1
E5051	Grommet Rubber	1
E5052	Wave Washer	1
E5053	Stator Assembly	1

This list to be read in conjunction with
MAGNETO ASSEMBLY ILLUSTRATION on Page 26

Magneto Assembly Illustration

