

Installed - Liddystone. N.H.

Instr. Bk. 35 (2nd Edn.)

INSTRUCTIONS

Stuart Engines

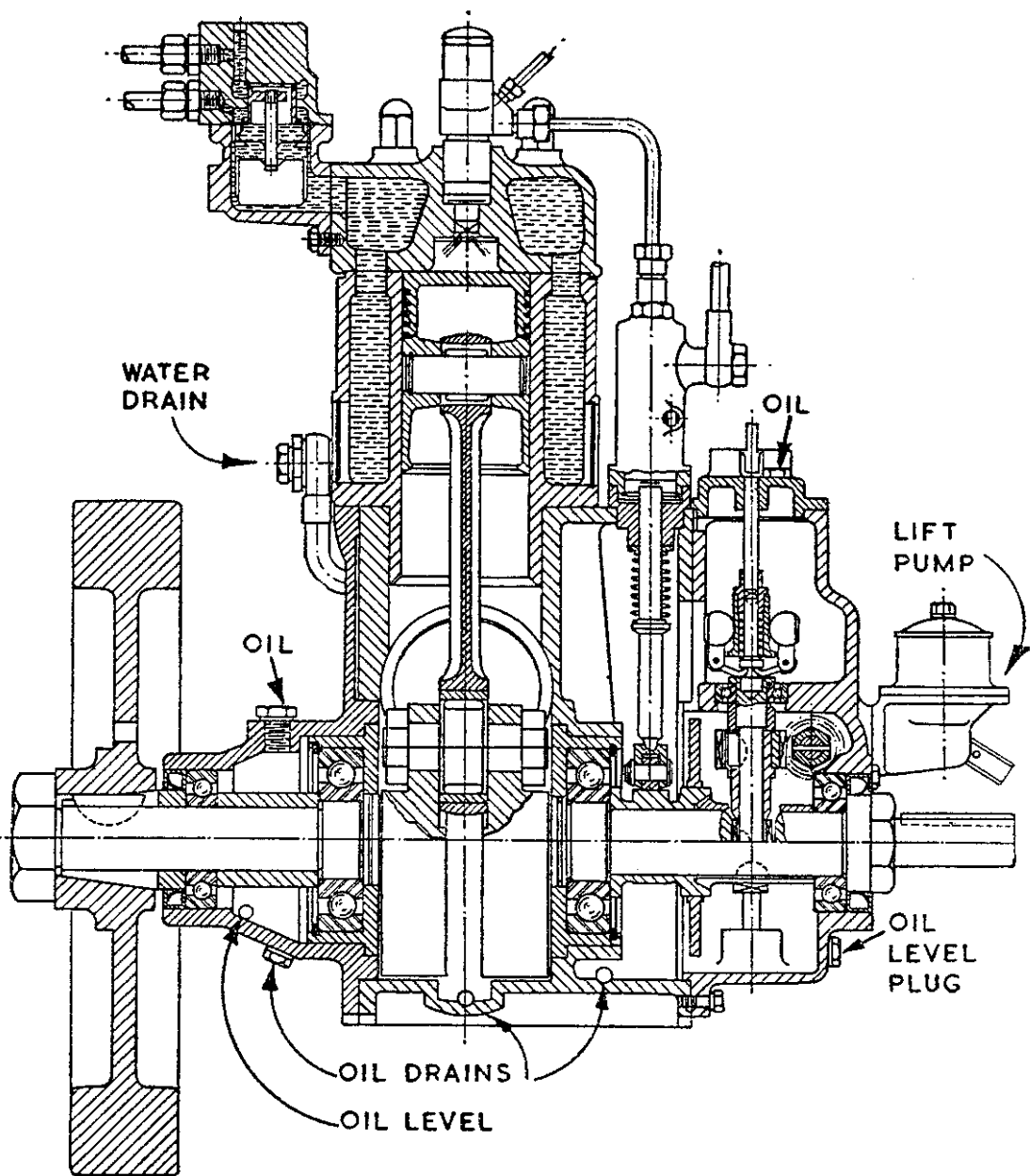
Diesel Type H

Price
1/6

This Book must
accompany Engine

No: H.....

*In all correspondence quote the Engine
Number*



Bore, $2\frac{3}{4}$ -in.; Stroke, 4-in. Cubic Capacity, 389 c.c.

Compression Ratio, 17 : 1

Injection Pressure, 1800-2000-lb./sq. in.

120-140 atmospheres

IN ALL CORRESPONDENCE QUOTE

THE ENGINE NUMBER



BEFORE OPERATING THE ENGINE for the first time it would be well to look through this book and the instruction books issued by the makers of the fuel injection equipment. It may save quite a lot of trouble.

Fuel System

1 Fuel : Light Diesel Oil or Gas Oil.

Storage of fuel. Fuel oil bought in bulk should be allowed adequate time to settle before transferring to the service tank. Then any water in the oil will settle. The draw-off pipe should be a little above the bottom of the storage tank and there should be a drain plug at the lowest point to enable sludge and water to be drawn off occasionally.

The need of **cleanliness throughout the fuel system** cannot be too strongly emphasised. Before installing them all fuel pipes should be thoroughly washed out with clean paraffin or fuel oil.

The service tank may be above or below the lift pump as may be more convenient.

The A.C. lift pump draws fuel from the service tank and delivers it through the filter to the injection pump. It maintains a pressure at the injection pump of about 5-lbs. per sq. in. to ensure regularity of injection—particularly essential in a small engine.

Leakage pipes from the injector and pump drain into a small container.

2 Venting the fuel system

Before starting for the first time, and whenever the fuel system has been allowed to run dry or has been dismantled, it must be "vented." Loosen the screw on top of the filter and operate the priming lever on the lift pump until fuel containing no air bubbles issues; then tighten it. Next unscrew the connection on top of the pump, remove the delivery valve holder and lift out the valve and spring. Operate the priming lever so that fuel wells out of the top of the pump. Replace the delivery valve, spring and holder, and reconnect the pipe. The air in the pipe to the injector is dispelled by rotating the engine a few times.

Lubrication

3 Suitable oils are Vacuum Delvac 520, Shell CX20, Wakefield Deusol CR20. These are detergent oils of S.A.E. 20 viscosity rating. Straight mineral oils promote a more rapid rate of carbon deposit.

The governor case and flywheel-end bearing housing should be filled with the same oil up to the level of the oil level plugs.

There are two sight feed indicators on top of the duplex lubricating oil pump. The outer indicator shows the amount of oil going to the cylinder, while the other shows the flow to the crankcase and connecting rod. Each indicator should pass

seven drops per minute when the engine is running at 1,500 r.p.m. and fully warmed up. Set for 6 drops per minute for a speed of 1,250 r.p.m. Instructions on adjustment are in para. 17.

From time to time oil should be applied to the fuel injection pump plunger guide through the inspection window.

Cooling System

4 Tank Cooled Installations.

A thermostat on the cylinder head impedes the flow of water until the temperature reaches 120°—140°F. (49°—60°C.), when it opens sufficiently to keep the temperature constant.

The standard tank holds 39 gallons. In tropical conditions a larger tank will be necessary. The temperature of the water in the tank should never rise above 140°F. (60°C.).

5 Marine Installations.

A circulating pump, pumps water from the seacock and strainer to the bottom of the cylinder at the rate of approximately $\frac{1}{2}$ gallon per minute at 1,500 r.p.m. The thermostat on the cylinder head has two outlets; through the upper one water returns to the seacock, and through the lower goes to waste.

When the engine is started most of the water returns to the seacock, whence it is pumped back to the cylinder, which therefore warms up rapidly. As working temperature is approached the thermostat valve opens and allows water to flow to waste, the temperature of the engine being maintained at the correct value. The vent pipe is connected to one of the three holes at the top of the seacock, the other two being plugged. If the seacock is not vertical the pipe must be connected to the uppermost hole. The vent pipe, the top well above the engine, should be as nearly vertical as possible, not less than 45° from the horizontal or the pump may fail to prime itself.

Exhaust System

6 A two-stroke engine is somewhat sensitive to restrictions, so follow the recommended arrangement as closely as possible, avoiding unnecessary bends in the pipes. It must never be possible for water (a product of combustion) to lie in the exhaust pipe.

The length of pipe between engine and silencer should be about 4-ft. 6-in. (not less than 4-ft., not more than 6-ft.). The length of the tail pipe beyond the silencer is not critical, say 3-ft. to 6-ft. or even more.

Starting

7 Before attempting to start for the first time vent the fuel system as described above. Venting will also be necessary if the engine has been allowed to run out of fuel, or if any part of the fuel system has been dismantled since the last run. See that fuel tank and lubricating oil tanks are full and that the drain pot is empty.

8 **By Hand.**

Open the compression release valve and crank the engine slowly, with the other hand on the fuel injection pipe until pulsations in this pipe, indicating injection, are felt. This happens almost at once, provided there is no air in the system. If it does not, venting is necessary—see para. 2.

Close the compression release valve, swing the starting handle against compression and let it go back against compression of the other side. After one or two swings in this way the engine can be swung right over compression and given several quick turns, when it should start.

9 **Electrically.**

Open the compression release valve, pull the starting knob right out; as soon as the engine is turning, close the compression release valve. When the engine fires release the starting knob. If it fails to fire in 15 seconds, feel the injection pipe to check whether injection is occurring. If it is not, see para. 2.

Immediately after starting make sure that both lubricating oil pumps are delivering oil.

10 **Difficulty in starting.**

If the engine does not start easily, either by hand or electrically, hold the knob on the pump rack to the left whilst rotating the engine. This permits a slight excess of fuel over normal maximum to be pumped and assists in getting the first explosion. Release the knob as soon as the engine fires.

If the engine is still difficult to start remove the compression release valve and pour a teaspoonful of lubricating oil into the cylinder, to seal the rings and increase compression. This may be necessary if the engine has been standing for a long time and the cylinder walls are dry. An unlikely cause of failure to start is a broken leaf-spring in the air valve, see para. 22.

Stopping

- 11 Stop by pushing the knob on the fuel pump rack to the right.

Frost

- 12 If there is risk of freezing drain the cylinder by removing the plug in the banjo union, which connects the delivery pipe to the cylinder and leave the plug out. Loosen the suction pipe union on the pump.

Maintenance

- 13 Keep the engine and equipment clean. It is only when this is done that leaking joints and connections will be seen and put right. Remember, pressures in the fuel pipes are very high and fuel oil is terrible stuff to "creep."

Before carrying out maintenance or repairs it is strongly advised that a preservative for the hands, such as "Rosalex," be rubbed over them, for some skins are very sensitive to fuel oil.

A spare nozzle and holder should always be available and special care taken that they are in perfect condition. Obviously it is best to replace a nozzle which needs attention by the spare, and recondition the defective one at leisure.

For a diesel engine to give good service it must be mechanically sound. Signs of wear should be attended to at once. For instance, in time the big end bearing will wear and if allowed to get slack to an excessive amount the connecting rod may touch and eventually fracture the crankcase, for necessarily clearances are very fine. Occasionally put the piston at about $\frac{1}{2}$ -stroke and rock the flywheel slightly to check whether wear is apparent.

Routine Maintenance

14	Examine fuel injector	}	Monthly
Examine exhaust port			
Check sight-feeds of lubricating oil pump ..			
Examine fuel filters and clear dirt and water from storage tank	}	Every three months	
If there is an air filter, clean and re-oil			
Decarbonise			
Check lubricating oil level in governor case and bearing housing			

These periods may vary; they are based on assumed running the engine four hours a day and reasonably clean fuel oil.

An engine in good condition and giving good performance should show a little bluish smoke in the exhaust. This is burnt lubricating oil.

Black smoke is unburnt fuel oil and, if this is at all dense, it indicates that everything is not quite right. Always judge the density of smoke against the sky or a white card. A change of load will always produce black smoke momentarily.

Fuel consumption is a good guide. An engine developing 3 b.h.p. or $1\frac{1}{2}$ kilowatts at 1,500 r.p.m. should consume almost exactly $\frac{1}{2}$ pint of fuel per b.h.p. hour, or $1\frac{1}{2}$ pints per hour.

Troubles

- 15 **Loss of power, heavy knock, smoky exhaust.** Any of these indicate that the engine needs attention.

Ask the following questions :—

(a) Load. Is it excessive?	see para. 16
(b) Lubricating oil pump. Is delivery of oil correct?	” ” 17
(c) Fuel injector. Is it in good condition?	” ” 18
(d) Is the exhaust system clear?	” ” 20
(e) Is the fuel filter dirty?	” ” 21
(f) Are any leaves in the air valve broken, and if there is an air filter, is it clean?	” ” 22
(g) Does the engine need decarbonising?	” ” 24
(h) Are piston rings due for replacement or is the piston worn?	” ” 25
(i) Has the fuel pump timing slipped?	” ” 26

16 **Excessive load.**

Reduce to the rated output, or less if the engine is in poor condition.

17 **Lubricating Oil Pump.**

The flow through each indicator (see para. 3) must be set when the engine is thoroughly warm. To adjust, loosen the locknut and turn the screws, one at each side of the pump. Clockwise reduces the flow; anti-clockwise increases it. After adjustment tighten the locknuts.

18 **Fuel Injector.**

A dirty injector, or one not in perfect condition, is the most common cause of unsatisfactory performance.

It is best to attend to the injector regularly—say every month, whether the engine shows signs of the need or not.

Remove the injector and pipe complete and attach again so that the injector hangs over the side of the engine.

Hold a piece of paper under the nozzle and turn the engine over by hand so that the paper is sprayed by fuel. Take care that your bare hand is not sprayed—the pressure is so high that the skin would be penetrated.

The needle valve should open and close sharply—there must be no dribble.

The spray must be similar in direction and quantity from each of the three holes. If one is blocked (wholly or partially) or there are signs of dribble, fit the spare injector and recondition the original one without delay.

19 **Cleaning.** Absolute cleanliness is essential—the minutest particle of dirt can do great damage.

Remove the nozzle from the holder by unscrewing the capnut. The needle valve is removed from the nozzle with the fingers; both it and the bore of the nozzle should be examined for signs of carbon deposit or discolouration. If the nozzle holes are blocked clean them with the pricker, very gently to avoid breaking the slender wire. Both nozzle and needle valve should be allowed to soak in clean paraffin, and the needle valve should then be cleaned with a brass wire brush and finally polished with

a clean soft rag. Reassemble the needle valve in the nozzle while immersed in clean paraffin and work the two together until they are quite free. **On no account attempt to grind in the needle valve.**

Detailed instructions are in the handbook of the makers of injection equipment.

Unless you have access to a nozzle testing outfit do **not** interfere with the setting of the injector spring as you will not be able to reset it to the correct release pressure.

20 **Cleaning the Exhaust.**

Carbon may build up in the exhaust port. The rate at which this happens may vary, but experience will show how often it needs attention. Scrape out the carbon with a screwdriver, the piston being at the bottom of stroke.

The whole exhaust system needs attention at more infrequent but regular intervals.

Loss of power and smoky exhaust give warning.

Decarbonising is described in para. 24.

21 **Fuel Filter.**

The fuel filter comes to pieces when the cap-nut is undone. Clean the filter body. If the element is excessively dirty discard it and fit a new one. It is useless to wash the element in paraffin or petrol; this merely transfers dirt to the delivery side and makes matters worse.

22 **Air Valve.**

If starting is difficult it is possible that one of the leaf-springs in the air valve has broken. A broken spring would also slightly affect the power output. When attempting to start, should vapour issue from the valve, a broken spring is indicated.

When the engine is running, blow-back through the valve may be felt.

To renew a leaf-spring :—

Remove the air valve from the crankcase, take off the nut holding the valve assembly together and remove top and bottom endplates. Carefully slide the inner sleeve out of the outer one; the leaf-springs will spring out of their slots. Broken ones must be replaced. To reassemble, slide the inner sleeve into the outer sleeve until the edge of the latter just overlaps the first ring of slots. Slip a spring into each of the slots; they will be held in position by the end of the outer sleeve. Slide the outer sleeve further over the inner one and repeat for the other rings.

After fitting new leaves the engine will not give full power for a time. It takes a few hours for them to bed in.

23 **Air Filter.**

Engines which work in a dusty atmosphere can be fitted with air filter of the oil impregnated fabric type. At regular intervals the fabric element should be removed, washed in petrol and re-oiled.

Decarbonising

24 Drain, disconnect water pipes, injection pipes and oil pipe, remove the cylinder head and cylinder, and at once wrap a cloth round the connecting rod to prevent things falling into the crankcase. Clean the cylinder head and top of the piston. See that the rings are free; if there is much carbon in the grooves carefully remove the rings and clean the grooves with a brass brush. Be careful that the rings are put back in the same grooves. The piston may be removed from the connecting rod by taking out one of the circlips which retain the piston pin in the piston and pushing out the pin. Take great care that none of the thirty needle rollers in the small end are lost. A roller dropped into the crankcase and not retrieved means a smashed crankcase.

Put the piston back on the pin the same way round as it was before. It will be noticed that there are two sets of locking pins in the ring grooves. These are offset, and when the piston is the right way round they lie nearer the exhaust port; the side of the piston towards the exhaust is marked "E."

Scrape out the exhaust port, remove the transfer passage doors and clean out the inlet ports and passages, and examine the condition of the cylinder bore. Clean the exhaust pipe and silencer. Pipes are best burnt out on a blacksmith's forge.

25 Wear of Piston Rings, Piston and Cylinder.

Loss of power may indicate worn rings and that replacement of them is necessary.

Before fitting a new ring its gap must be checked by inserting it in the cylinder and using a feeler gauge; file the ends of the ring until the gap is correct. Recommended gaps are: top ring 0.012-in.; second ring 0.010-in.; third ring 0.008-in.; fourth and fifth rings 0.006-in.

After fitting a a new ring the engine should be run light for several hours.

The piston (unless damaged) is not likely to need replacement before wear of the cylinder is such that regrinding and fitting oversize piston is necessary.

A ridge round the cylinder at the top of ring travel indicates wear.

Standard oversized pistons and rings are + .010 and + .020-in.

When fitting a piston be sure that it does not rise above the top of the cylinder, and is not more than .010-in. below the top when the crankshaft is at Top Dead Centre. Check with a straight-edge; if necessary pack the cylinder up by inserting an extra joint between cylinder and crankcase.

Timing the Fuel Pump

26 The pump timing is set by the makers so that the spill port closes at 21° before Top Dead Centre. On the rim of the flywheel there are two marks; one, "TDC" (top dead centre), and

another 21° ($2\frac{5}{8}$ -in. measured on the rim of the flywheel) in advance of TDC; the latter mark corresponds to spill port closure or "injection point" and is marked "I.P."

To check the timing, remove the fuel injection pipe, delivery valve holder, delivery valve and spring. Now replace the delivery valve holder and operate the priming lever of the A.C. lift pump, when fuel will flow out of the top of the delivery valve holder. Slowly rotate the engine in the direction in which it normally runs until the fuel ceases to flow; this is the point at which the pump spill port closes and delivery begins. At this point I.P. should be at Top Dead Centre, i.e. directly opposite the vertical groove in the top of the crankcase door. Check by laying a straight-edge along the mark on the flywheel.

The timing is not very critical, and if it is within 2° ($\frac{1}{4}$ -in.) of the correct position there is no need to alter it.

27 To Set the Timing.

Take off the top of the governor case and remove the governor spindle. By gently turning the engine in a clockwise direction, looking at the flywheel, removal is assisted.

Remove the starting clutch by loosening the grub screw and tapping it off the shaft. The nut on the crankshaft is now accessible, and when this is loosened the fuel pump cam can be moved. Insert a bar and rotate the engine until the oil thrower fixed on the cam comes up against the bar. Rotating the crankshaft and holding the cam stationary, the latter can be set so that spill port closure occurs at the right moment. The nut is then tightened, the timing checked and the parts reassembled in reverse order.

Dynamos

28 Ball bearings require attention every twelve months. Fill the races with soft grease; don't over-fill.

If grease exudes into the machine, wipe it off; on no account allow it to get on to the brush gear or commutator.

If there is any sparking at the brushes, or the dynamo fails to generate, make sure that the brushes are not sticking in their guides. After a considerable amount of running, the brushes may need replacement. The new brushes should be bedded down on to the commutator by passing a strip of fine glass cloth beneath them, clothside against the commutator. Pass the cloth half-way around the commutator and draw backwards and forwards a few times to hollow out the face of the brush to a good fit on the commutator. If there are "undercuts" between the bars of the commutator, see that they are free of dirt. If the sparking cannot be stopped by cleaning the commutator and brushes, it is advisable to call in a competent electrician.

Keep the machine clean. Frequently blow through the field coils and armature with a pair of bellows to clear away dust.

When new brushes are required it is best to send to us for them as it is most important that the correct grade of brush is used.

Switchboards

29 Before carrying out any work on the engine, dynamo switch must be "Off." If dynamo or wiring is having attention, fuses should be withdrawn

Never run the plant with the dynamo switch "Off."

In the event of failure in the electrical system, withdraw and examine fuses. If these have fused, renew with the correct size of fuse wire. Other electrical repairs should be undertaken by a competent electrical engineer.

A switchboard diagram is inside the case.

30 **The Cut-out.** If it does not cut-in when the plant is started, gently move the shunt regulator to "raise voltage" when it should operate. Failure may be due to dirty commutator, stuck dynamo brushes or to the dynamo fuse having blown.

See to the dynamo and fuse. Test the dynamo by connecting a lamp across the brushes. If these are in order:—

Open dynamo switch and take out dynamo fuse.

See that the contact blade moves freely and check gap between contact blade and carbon block. This should be .020-in. This is adjusted by the fibre nut on top of the armature, but before adjusting make sure that no dirt or dust has got between the contacts.

A visiting card is about .010 in. thick and writing paper about .003 to .005 in. thick.

Press down blade and see that it contacts squarely with contact block without rocking. When pressed down a "feeler" .005-.008-in. thick should pass between armature and both poles of the electro-magnet.

If the gap is correct either the tension spring is too tight or the shunt coil on the electro-magnet has failed. Reduce the tension of the spring very slightly. If the cut-out does not function after 2 turns of the adjusting nut there is an electrical defect, either a connection damaged or a coil burnt out, needing replacement.

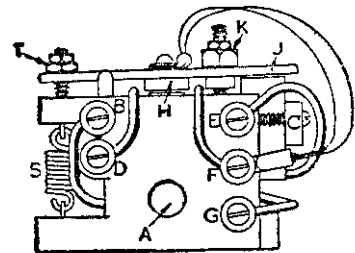
In such case remove the cut-out from the switchboard. The following instructions are for the electrical engineer doing the overhaul:

1.—See that contact blade is free on knife-edge and that knife-edge and vee are undamaged. Contact face of the blade and of carbon block must be clean and flat.

2.—Place feeler gauge .005 to .008-in. thick across pole-pieces and, closing armature thereon, fit the carbon block. It should make contact practically all over—anyway—contact must not be on one corner. The carbon block must be firmly clamped. Then remove the gauge.

3.—Place feeler gauge .020 between armature and carbon block. Screw the fibre nut which limits movement of armature into contact and tighten the locknut.

4.—Set "lights" switch "off" Close dynamo switch, turn shunt regulator to left ("raise voltage") and start. As the engine runs up to speed the cut-out should close. If it does not, stop, set dynamo switch "off" and ease tension of cut-out spring. Then try again. Always stop and open dynamo switch when making the adjustments. Now slow the plant down by closing the throttle by hand. The ammeter should fall to about 1 amp. discharge and then return to zero as the cut-out opens. If the minus reading is more than 1 amp. increase tension.



A is the ampere coil; voltage coil is behind.
H armature. J contact blade.
K fibre nut. C carbon block and clamp. S tension spring. T adjusting nut.
B and D are bridged. B connected to inner lead of volt coil and G to outer lead
F to inner lead of amp. coil and D to outer lead. E to carbon block. Connect D to dynamo + and shunt regulator. E to lights + top (terminal). G to dynamo—and dynamo fuse.

Solderless Pipe Unions

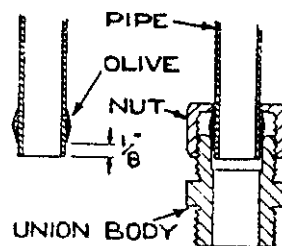
31

Thread nut on pipe.

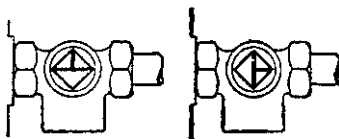
Push olive on pipe until $\frac{1}{8}$ -in. of pipe projects.

Place pipe in the union, see that it is quite square with the union, and screw down the nut. Don't bend pipe close to the union—leave at least half-an-inch straight.

If, after continued use, the union leaks, replace olive by a new one. Cut off pipe and old olive and fit a new one on fresh part of pipe.

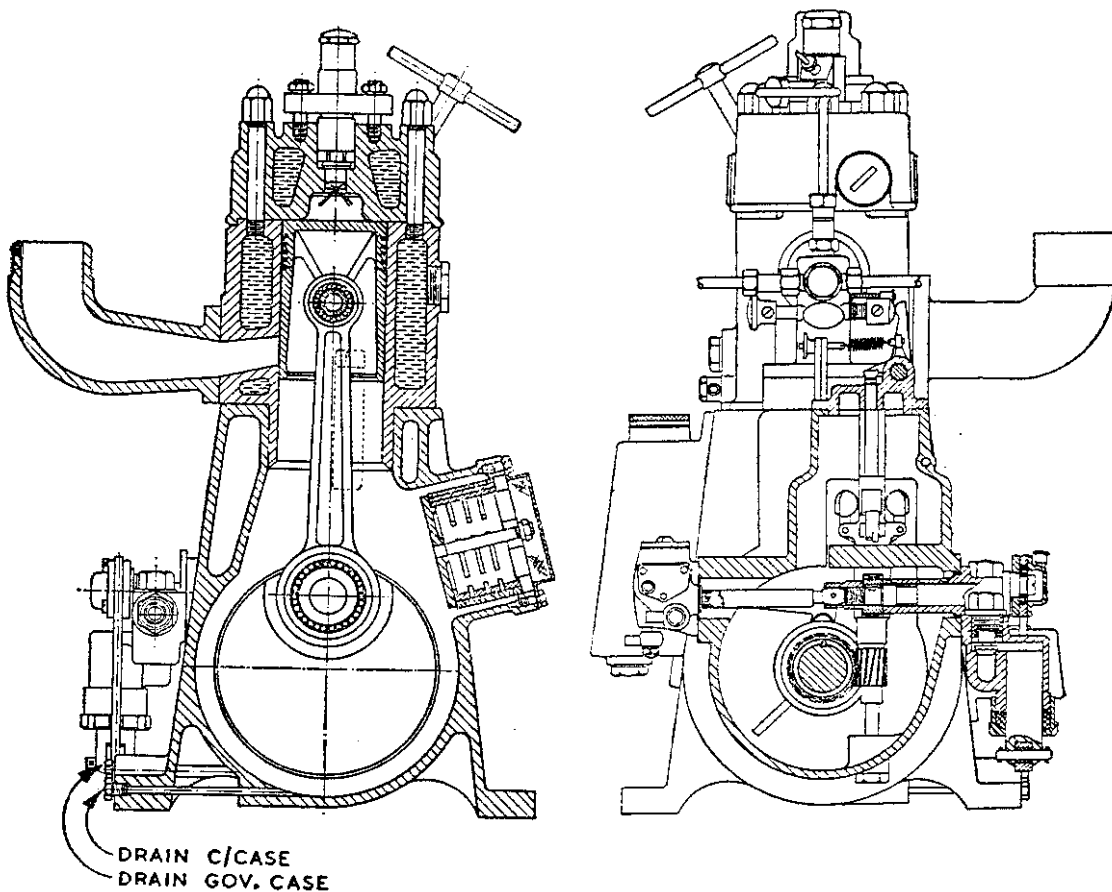


THREE-WAY COCK



WORKING POSITION.

DRAIN CYLINDER.



DRAIN C/CASE
DRAIN GOV. CASE

SPARE PARTS

Please read carefully

Always give engine type and number which will be found on the nameplate, on the cylinder flange and on the crankcase beside the fuel pump. This is most important to ensure that the correct parts are sent. Order by both name and number unless telegraphing, when number only may be used. Give address very clearly, also nearest station when ordering parts too large to be sent parcel post. **Cash with order unless approved ledger account has been opened. Otherwise we will send C.O.D. to avoid delay.** Prices include postage in the case of the smaller parts; heavy parts sent carriage forward are marked "rail."

When sending Engine or part for repair, attach a label to it with Engine No. and your name and address.

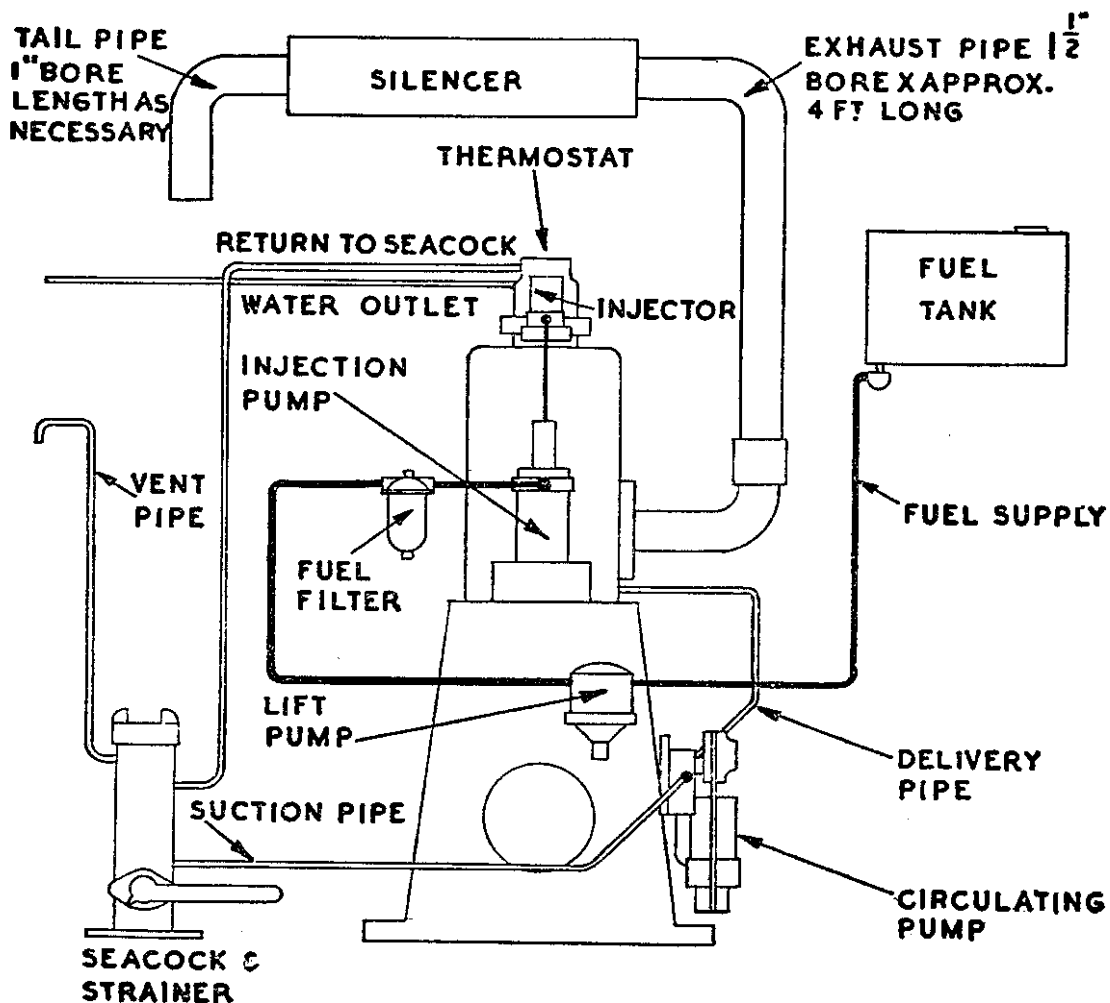
PRINCIPAL SPARE PARTS

£	s.	d.	Part No.		Rail
7	10	0	10559	Cylinder	
7	10	0	10503Y	(Marine)	
4	0	0	9579	Head	
	9	6	9274	Compression Valve	
15	0	0	10504	Thermostat	
15	0	0	10562Y	(Marine)	
	8	0	10547	Housing	
	8	0	10550	Head	
	9	6	10549Y	(Marine)	
	1	6	4321	Union Body (2)	
	6	0	9282	Cylinder Studs Long (4)	
	3	0	9272	Short (4)	
	2	6	5484	Cap Nuts (8)	
	1	0	2989Y	Drain Plug and Washer $\frac{1}{4}$ " gas (in Banjo Union)	
	1	0	2991	Water Jacket Plug and Washer, $\frac{3}{8}$ " Gas	
	2	0	9273	Head Plug, $\frac{3}{4}$ " Gas (3)	
		6	2988	Plug and Washer, $\frac{1}{8}$ " Gas	
	2	0	357	Transfer Port Door, Flywheel Side	
	2	0	358	Governor Side	
	5	6	214	Exhaust Elbow, or	
	5	0	227	Exhaust Outlet (Straight)	
1	15	0	10463	Piston	
	3	6	10575	Top Ring	
	10	0	10506	Lower Rings (4)	
	7	6	5355	Pin	
		6	5358	Circlips (2)	
3	0	0	6149	Connecting Rod (without Bearings)	
1	7	6	5356	Top Needle Bearing	
	11	6	5354	Bottom Roller Race	
	8	6	5145	Rollers (30)	
	17	6	5338	Crankpin and Inner Roller Race	
	4	0	5351	Nuts (2)	
4	0	0	10519	Crankshaft, Flywheel End	
5	0	0	10520	Governor	
1	5	0	MJI $\frac{5}{8}$	Ball Bearing (2) ($1\frac{5}{8}$ " \times 4" \times $\frac{15}{16}$ ")	
	13	6	LJI $\frac{3}{8}$	" " (2) ($1\frac{3}{8}$ " \times 3" \times $\frac{11}{16}$ ")	
	5	0	5597	Circlip (2)	
	15	0	10536	Main Bearing Housing (2)	
	3	0	10516	Compression Collar (2)	
	1	6	10517	Washer (2)	
	4	6	10518	Ring (2)	
<i>For renewal of Crankpin Assembly send Con.-Rod and Crankshaft with Ball Bearings on it to the Makers</i>					
17	10	0	6148	Crankcase Complete	Rail
	1	0	2988	Drain or Filler Plug and Washer, $\frac{1}{2}$ " Gas	
	1	0	2990	" " " " " "	
	1	6	2991	" " " " " "	
4	0	0	6163	Flywheel	Rail
		6	54250	Key	
	10	0	6167	Collet	
	2	0	5349	Nut	
	4	0	5361	Bearing Distance Sleeve (length $2\frac{1}{8}$ ")	
5	0	0	5616A	Air Valve Complete	
	10	0	5616	Outer Sleeve	
2	10	0	5615	Inner Sleeve	
	7	6	5618	Spring Leaves (15)	
	10	0	6166	Bottom Plate with Stud and Nut	
	12	6	6165	Top Plate	

£	s.	d.	Part No.	
	15	0	5670	Air Valve Cover
	1	0	31401	" " " Screws (4)
1	5	0	10623	Air Filter complete
	7	6	10624	" " element
	7	6	7255	Oil Seal (2)
2	15	0	10602A	Cam with Oil Thrower
2	7	6	5328	" Lock and Governor Driving Spiral Gear
	17	6	54070	Spiral Gear Key
	3	6	6403	Rocker
	3	6	5583	" Pin
	3	6	5340	" Roller
	3	6	5582	" " Pin
	16	0	5584	Tappet
	1	0	7043	" Spring
1	0	0	6178	" Guide and Fuel Pump Base
2	0	0	5346	Governor Spindle
	8	6	LJT $\frac{5}{8}$	" Ball Bearing ($\frac{5}{8}$ " \times $1\frac{9}{16}$ " \times $\frac{7}{16}$ ")
	15	0	5329	" Spiral Gear (Driven)
		6	54020	" " " Key
		6	5578	" " " Nut
	3	6	5348	" Collar (Length $1\frac{7}{8}$ ")
	2	6	5347	" " (" $\frac{5}{8}$ ")
	15	0	5784	" Spiral Gear Driving Lub. Pump
		6	54100	" " Key
	10	0 (set)	2629	" Weights (4)
	1	0 (set)	2790	" " (Pins (4))
	2	6	2630	" Push Rod
		6	2954	" " " Spring
	2	0	5870	" " " Bush
	1	6	5379	" Extension Rod
	12	6	368	" Cover
	3	6	345	" Rocking Lever
	3	0	10534	" " " Spindle
		6	7207	" External Spring
	1	0	4699	" " " Nuts and Screws
	1	0	5674	" " " Pillar
	1	6	367A	Fuel Pump Rack Cap (right end)
		6	10545	" " " Spring
	1	0	10535	" " " Knob (left end)
2	7	6	10532	Pump, Lubricating Oil
	1	6	10565	" Union Cap-nut (3)
	12	6	5785	" Spiral Gear (Driven)
		6	54030	" " " Key
	6	6	9533	" " " Shaft
	7	6	6329	" " " Bearing
	2	6	5367	" Driving Nut
	4	6	10530	" " Shaft and Sleeve
		6	5579	" " " Pin
		6	07310	" Screw (Length $1\frac{3}{4}$ ")
		6	07300	" " (" $\frac{1}{2}$ ")
	8	6	6349	Tank, Lubricating Oil
	2	6	5759	" Filler Cap
	1	6	2991	" Drain Plug and Washer $\frac{1}{2}$ " Gas
	4	0	7428	Oil Pipe with Banjo Unions, Tank to Pump
	5	0	7429	" " " " " Pump to Crankcase
	5	0	10509	" " " " " Pump to Cylinder
	2	0	8400	Banjo Bolt
		6	8079	" " Washer (2)
		6	10567	" " Inner Washer, $\frac{7}{16}$ " hole (3)
		6	10566	" " Outer Washer, $\frac{3}{8}$ " hole (3)
	8	6	6335	Starting Clutch Gov. End
		6	7415	" " Key

£	s.	d.	Part No.		
		6	3576	Starting Clutch Grub Screw	
		7	5669	" Handle	
1	15	0	7069	Silencer, Steel Tube Type	Rail
3	5	0	3281	Water Tank, 48" x 17", 39 galls.	Rail
		2	9735	Water Pipes, Engine, Top	
		3	8108	" " " Bottom, with 1 Elbow	
		2	9736	" " Tank Top	
		5	9737	" " Bottom, with 2 Elbows	
		2	9223	" " Rubber Hose, Top	
		1	9224	" " " Bottom	
		1	0 (pair) 7189/1	" " " Clips	
1	5	0	3289	Three-way Cock	
1	5	0	3290	Fuel Tank, Rectangular Steel (2 gall.)	
		3	7223	" " Filler Cap	
		14	0	" Tap and Filter complete	
		1	6	" Filter Bowl only	
		5	6	" Pipe and Union, Tank to Filter (3')	
		5	6	Overflow Pipe and Union, Injection Pump to Tank (3'). Extra per ft. 1/-	
10	0		1994	Coupling Ring on Flywheel	
		1	0 (set) 02504	" " Screws and Washers (3)	
		15	0	" on Dynamo	
		2	6	" Driving Pins (16)	
10	0		5228	" Flexible Disc	

**FUEL & EXHAUST SYSTEMS TYPE H, HY,
& WATER COOLING SYSTEM TYPE HY.**



FUEL PUMP EQUIPMENT

£	s.	d.	Part No.	
2	10	0	10569	Injector Nozzle and Valve
1	15	0	10570	" " Holder
5	0	0	10605	" Pump
	10	6	10572	Cleaning Pricker
	2	0	10573	" " Refills (6)
		3	10574	Copper Washer for Nozzle
1	5	0	8619	Fuel Lift Pump
	3	0	8833	" " " Push Rod
	1	6	10557	" " " Union Cap-nut
2	0	0	10505	Filter, complete
	6	6	10515	" Element
	6	0	10603	" Connection
10	0	0	7427	Injection Pipe with Nuts to Injector
	4	0	10510	Pipe and Unions from Lift Pump to Filter
	2	6	10523	Union Banjo Bolt
	3	0	10513	Spill Pipe, ($\frac{3}{16}$ ") Injection Pump
	3	6	10514	Drain Pipe, Injector
	2	6	364	" Pot
	1	6	2991	Pot Plug and Washer, $\frac{1}{2}$ " Gas

CIRCULATING PUMP

1	10	0	8827	Pump Body
	12	6	8828	Spiral Gear Shaft, Driving Pump
	5	0	1498	Banjo Link
	3	6	LNJ $\frac{1}{2}$	" Ball Bearing ($\frac{1}{2}$ " \times $1\frac{1}{8}$ " \times $\frac{1}{4}$ ")
	1	0	2345	Ball Bearing Inner Washer
	1	0	2346	" " Screw
	2	0	1678	" " Grease Cap
		6 (set)	2262	" " " " Screws (2. B.A. 3)
	1	0	4253	" " Greaser
	5	0	3976	Plunger
		6	3977	" Pin Split Pins
	3	6	1499	Gland
	1	0	4254	" Packing
	1	6 (each)	4224	Valve (2)
	1	6 (each)	1603	" Cap (2)
	4	0	7416	Water Pipe with Banjo Union (to Engine)
	1	6	10507	" " Banjo Bolt (on Cylinder)
	1	6	5263	Banjo Bolt on Pump
		3	5599	" " C. and A. Washer (4)
2	10	0	356A	Seacock and Strainer with Scoop
	3	0	9578	" Strainer only
	2	6	9705	" Cap
	5	0	140	" Scoop
	3	0		" Vent Pipe (2' of $\frac{1}{4}$ ") and Union
10	0	0	4830	Water Pipe ($\frac{3}{8}$ " dia.) for Inlet, Outlet and Bypass from Thermostat to Seacock, 10' in all. Per foot extra 1/-
		9	4319	Union Nut (2 per pipe)
		6	4320	" Olive (2 per pipe)
	3	0	1766	Water Outlet Skinfitting Body
	1	0	4040	" " " Washer
	1	0	4052	" " " Locknut

JOINTS

£ s. d. Part No.
10 0 .. 7192

Complete Set:—

Cylinder Head (9291), 3/-; Cylinder Base (10500), 6d.; Exhaust Outlet (9293), 6d.; Crankcase, Flywheel End (5752), 1/-; Governor End (5751), 1/-; Governor Case Top Cover (5753), 3d.; Injection Pump Base (5754), 3d.; Air Valve (2) (5762), 6d. pair; Air Valve Cover (5763), 6d.; Lubricating Pump (5765), 3d.; Oil Tank Cap (5764), 4d.; Circulating Pump (10560), 3d.; Rubber Ring for Ball Bearing Housing (2) (8538), 1/- each; Cylinder Port Door (2) (10527), 4d. pair; Thermostat Housing (9590), 4d.; Thermostat Head (10502), 3d.; Lift Pump (8857), 4d.

TOOLS

All Bolts are B.S.F. Standard. The heads take Whitworth Standard Spanners of one size smaller. That is $\frac{5}{16}$ -in. B.S.F. and $\frac{1}{4}$ -in. Whitworth are the same size.

Supplied with Engine

£	s.	d.	Part No.	
		9	2280	Spanner, $\frac{3}{16}$ " \times $\frac{1}{4}$ "
1	0		2282	" $\frac{5}{16}$ " \times $\frac{3}{8}$ "
1	3		2284	" $\frac{7}{16}$ " \times $\frac{1}{2}$ "
1	6		2301	" $\frac{9}{16}$ " \times $\frac{5}{8}$ "
		9	2309	" 2 B.A.
5	0		6404	Ring Spanner, $1\frac{1}{8}$ " and $1\frac{1}{2}$ "
1	0		2297	Grub Screw Key (Lighting Plants)

Special Tools

10	0	..	7431	Tool for removing and fitting piston pin
2	0	..	10625	Crankpin Assembly Nut



STUART GREEN ENAMEL

Small tin ($\frac{1}{4}$ pint) 2/6 Large tin ($\frac{1}{2}$ pint) 4/-

Funnel, with water-proof gauze filter, 7/6
Packing and Postage extra, 6d.