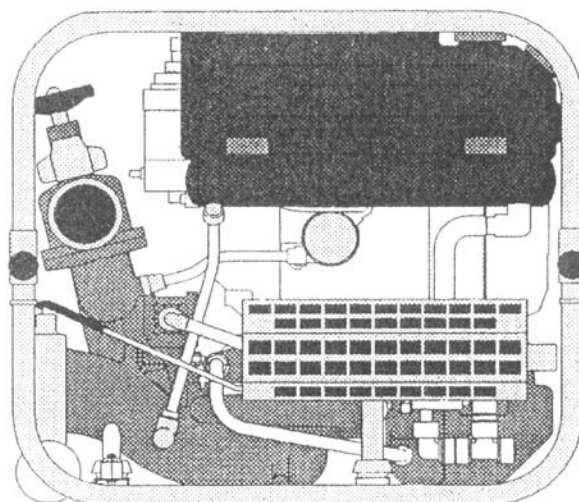




GP10/10 PORTABLE FIRE PUMP OPERATING MANUAL



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PORTABLE PUMPS

SAFETY-RELEVANT DATA

Thank you for purchasing a Godiva Pump.

Godiva Portable Pumps are designed to give safe and reliable service – however, BEFORE operation it is essential that the Operating Instructions are carefully read and understood.

A risk-assessment of the pump has been conducted with the following results:

MAINTENANCE

It is the responsibility of the user to ensure that the equipment is maintained in a safe operational condition, as per regulation 5 in the Provision and Use of Work Equipment Regulations 1998.

TRAINING

It is essential that Godiva pumps are operated **ONLY** by **TRAINED PERSONNEL**. Manufacturer's training can be obtained on application to Hale Products Europe Ltd., Charles Street, Warwick CV34 5LR, England. Tel: +44 (0)1926 623600.

ENGINE

When using Godiva pumps driven by a gasoline-powered engine, the following safety points **MUST** be observed:

- **DO NOT OPERATE** the unit close to flammable materials or structures.
- Keep **ALL UNTRAINED** people **AWAY** from the unit during operation.
- **PETROL** is extremely flammable and **MUST** be **HANDLED WITH CARE**.
- **DO NOT REFUEL** until the engine is cold.
- **DO NOT OVERFILL** the fuel tank. After refuelling **ENSURE** that the fuel cap is refitted.
- **DO NOT** refuel whilst smoking or allow sparks or flames into the refuelling area.
- Be careful **NOT TO SPILL** fuel; if any fuel is spilled, ensure that the area is dry **BEFORE** starting the engine. Godiva recommend refuelling when the engine is cold.
- **DO NOT** run the engine in an enclosed area as poisonous gases are given off which can cause injury.
- The exhaust system becomes **VERY HOT** during operation and **REMAINS HOT** for a time **AFTER** the engine has been stopped. **DO NOT TOUCH** the exhaust whilst the engine is hot.
- The starting system is driven by battery. Always connect the battery positive (+ve) cable **BEFORE** the negative (-ve) and disconnect the negative **BEFORE** the positive.
- Batteries produce **EXPLOSIVE GASES** so keep sparks, flames and cigarettes away.

NOISE

When running, the engine-driven portable pump is noisy so **EAR PROTECTION IS NECESSARY**.

MANUAL HANDLING

The Godiva Portable Pump design incorporates suitable lifting handles or points.

A manual-handling sheet is provided with each model.

The secondary starting method (hand-start) provided **MUST BE USED WITH CARE**. Follow the operating instructions provided.

S. Tudor
Engineering Manager
February 2001

IDEX
IDEX CORPORATION

NOTES

The FULL Pump Serial Number must be quoted on ALL communications.

- 1) **COOLING:** IT IS **VERY IMPORTANT** THAT A MINIMUM DIFFERENTIAL PRESSURE OF 3 BAR IS MAINTAINED IN THE PUMP UNIT TO ENSURE THAT SUFFICIENT PUMPED WATER IS BEING CIRCULATED THROUGH THE HEAT EXCHANGER TO PREVENT OVERHEATING OF THE ENGINE UNIT.
- 2) **DRY RUNNING:** This pump may only be run in a dry condition during the priming procedure, i.e. typically 30 seconds at approximately 5,200 r.p.m.

Warning: Care should be taken if exceeding these figures as terminal damage may occur to the gland-seal components if water is not present in the pump casing to both cool and lubricate these components.

3) ACCIDENTAL STARTING – PREVENTION

- a) While work is being carried out on the engine, pump or electrical Systems, disconnect the battery cables – See b) below, and the spark-plug leads.
- b) When working on the HONDA engine, make sure that **BOTH** the BATTERY and PULSER ROTOR connections are disconnected. Battery disconnection alone DOES NOT ensure the prevention of accidental engine starting as movement of the rotor will trigger the ignition. The pulser-rotor connections are located under the Capacitor Discharge Ignition (CDI) cover on the R.H. – side of the engine.

GENERAL

The terms “L.H.” (Left-hand) and “R.H.” (Right-hand) used in this book apply when the pump unit is viewed from the suction tube-end.

ACKNOWLEDGEMENT

We acknowledge with thanks the permission given by the HONDA MOTOR CO. LTD., to reproduce material from that company’s engine publications as necessary.

ASSOCIATED PUBLICATIONS

Publication	Part Number
Spare Parts Manual	GP/080/94
Workshop Manual	GP/078/94

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GENERAL DATA

ENGINE DATA

Engine	Honda BF45A (Modified)
Configuration	3-cylinder 4-stroke, OHC vertical crankshaft
Bore and Stroke	70 mm x 70 mm
Capacity	808cc (49.4 cu.in.)
Rated Power	6600 r.p.m. max.*
Idle Speed	950+/-50 r.p.m.
Valve Clearance – Inlet (COLD)	0.13 – 0.17 mm
– Exhaust (COLD)	0.21 – 0.25 mm
Battery (Low-Maintenance)	12 Volt 18 Amp Hr, Neg. Earth
Ignition Timing Range	5° – 32° BTDC
Spark Plug – Type	N.G.K. D7EA or equivalent
– Gap	0.6 – 0.7mm
Fuel Tank Capacity	14 litres
Fuel Pump	Diaphragm-type driven from camshaft.
Carburettors (Three)	Constant-vacuum type
Lubrication System	Pressure-feed and splash
Oil Sump Capacity (With Filter)	2.6 litres
(Without Filter)	2.0 litres
Oil Pressure (Engine at 80°C)	1.5 bar at 950+/-50 r.p.m.
Oil Filter	Honda screw-on disposable cartridge
Cooling System	Water circulation by engine pump with thermostat, heat exchanger, oil cooler and header tank.
Cooling Water Capacity	5.0 litres
Operating Temperature	72°C
Anti-Freeze	Ethylene Glycol-base
Starter – Electric	Electric starter 0.9kw (Inertia-type)
– Manual	Rope-wrap on flywheel

* Full throttle r.p.m.

PUMP DATA

Pump – Model	GP10/10
– Type	Single-stage, centrifugal.
Rated Output	1,000 litres at 10 bar and 3 m lift.
Pump Shaft Seal	Spring-loaded, self-adjusting, carbon-faced gland with silicon-carbide counterface.
Delivery Valves	Screw-down DIN-type (2-OFF).
Priming	Exhaust-gas ejector and automatic priming valve.
Thermal Relief Valve (Optional)	
Operating Temperature	42°C
Length (Cradle Handles Closed)	680 mm
Width	495 mm
Height (Complete Unit)	605 mm
Weight (With Battery, Oil Coolant and Fuel)	112 kg

ENVIRONMENTAL PROTECTION

It is **ILLEGAL** to pour engine oil and other contaminants on to the ground, down sewers and drains or into water courses.

Disposal of these **MUST** be made through **AUTHORISED** waste-disposal contractors to licensed waste disposal sites.

IF IN DOUBT contact the Local Authority for advice on disposal facilities.

HEALTH AND SAFETY

To avoid injury, Godiva recommends that operators should take **ALL** necessary precautions to safeguard themselves and others and to follow the operating procedures laid down in this book.

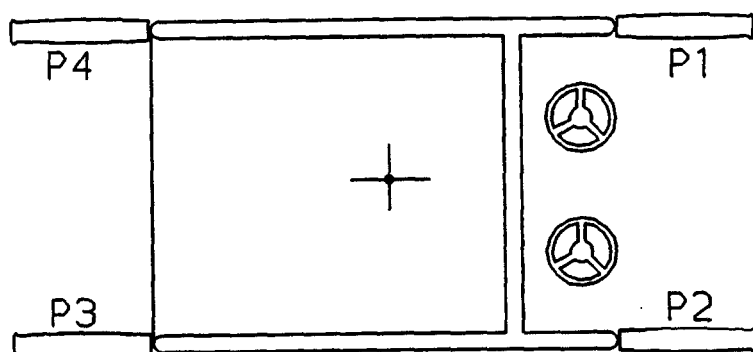
When handling gasoline, batteries or hot machinery:

- a) **DO NOT SMOKE.**
- b) **DO NOT EXPOSE** volatile fluids or battery gases to a naked flame.
- c) **DO NOT TOUCH** hot parts of machinery.
- d) **AVOID PROLONGED SKIN CONTACT** with fluids, especially if they are known to be, or are suspected of being, either corrosive or carcinogenic.
- e) **PROTECT THE EYES** as necessary.
- f) **DISCONNECT THE BATTERY** when working on the electrical system to avoid short-circuits.
- g) **DO NOT LIFT** heavy weights without suitable assistance.
- h) **DO NOT INHALE** fumes or gases.
- i) **DO NOT REMOVE** protective guards or shields.
- j) **DO NOT SPILL** fuel when refuelling – fuel vapour or spilt fuel can easily be ignited.
- k) **CLEAN UP IMMEDIATELY** any spilt fuel, oil or anti-freeze.
- l) **WASH YOUR HANDS IMMEDIATELY** after handling fuel, oil or anti-freeze.

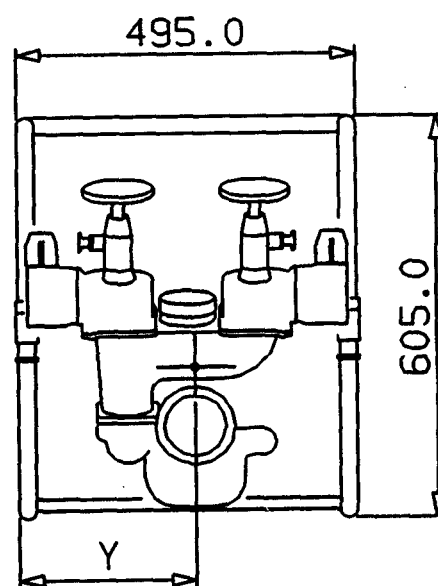
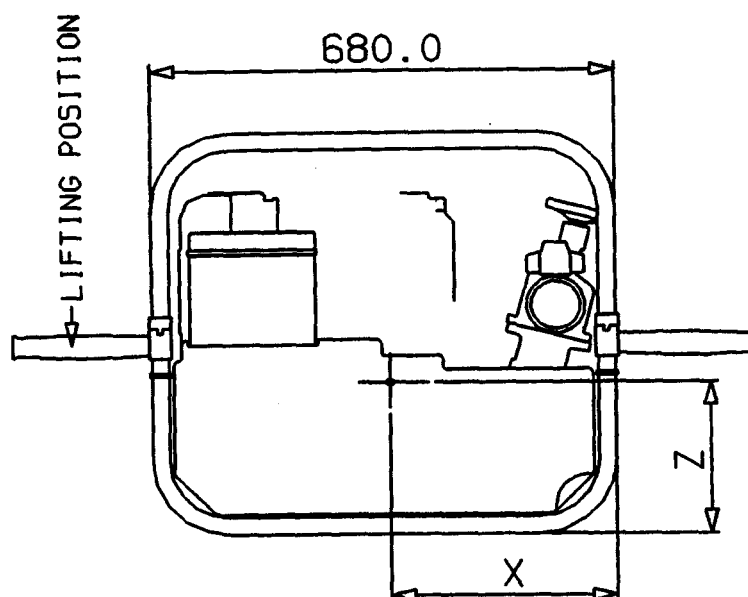
Further useful information regarding Health and Safety and the GP10/10 Portable Fire Pump is illustrated on the following page.

Gauges

Do not clean the glass surfaces of the gauges with abrasive or solvent cleaners. These will cloud the glass surface, use a mild detergent and water.



GODIVA RECOMMENDS TEAM LIFTING TO BE ADOPTED IF NO OTHER FORM OF LIFTING IS AVAILABLE. USE OF THE LIFTING FACILITIES THAT ARE PROVIDED ON THE UNIT IS STRONGLY ADVISED.



		DRY	WET
WEIGHT Kg		94	112
CENTRE OF GRAVITY mm	X	354.0	367.0
	Y	237.0	225.0
	Z	318.0	316.0
LIFTING FORCES Kg	P1	21.5	26.5
	P2	24.5	28.5
	P3	25.5	29.5
	P4	22.5	27.5

CONSTRUCTION MATERIALS		
PUMP CASING		ALUM.
IMPELLER		ALUM.
PUMP SHAFT		ST.STL
WEARING RINGS		FIBRE
MANIFOLD		ALUM.
CRADLE		ST.STL
ENGINE	HEAD	ALUM.
	BLOCK	ALUM.

NOTE! THE WET WEIGHT IS INCLUSIVE OF THE FULL CAPACITY OF ENGINE OIL, COOLING WATER, AND FUEL

GP10/10 Portable Fire Pump – General Information

RECOMMENDED LUBRICANTS, FUEL AND ANTI-FREEZE

ENGINE LUBRICANTS

STANDARD	AMBIENT TEMPERATURE	LUBRICANT VISCOSITY
SF/CC, CD	−20°C (−5°F) and above	10W/40

GASOLINE FUEL

Premium Grade Gasoline
with Minimum Research Octane Number of 86 (Unleaded*).

***NOTE:** The pump can be run on 4-star fuel but not for sustained periods as damage to exhaust valves and seats can result. Godiva therefore cannot accept responsibility for any claims resulting from sustained use of leaded fuel in this pump.

BATTERY

Fill the battery with accumulator sulphuric acid (electrolyte) of specific gravity 1.277 up to the upper acid level mark. Battery and acid should have a temperature of at least 10°C. In order to immediately achieve full battery performance, it is recommended to charge the battery briefly after filling with acid. Check the acid level after charging, and if necessary correct with more acid.

Distilled water should not be used for the initial filling of the battery, but can be used for subsequent topping up.

ANTI-FREEZE

Ethylene-Glycol base type

DESCRIPTION

PUMP

The Godiva GPI0/10 Model is a single-stage, centrifugal pump powered by a Honda engine:

The pump suction tube, volute, discharge valves, manifold and impeller are all manufactured from corrosion-resisting aluminium alloy, while the pump shaft is of stainless steel.

The impeller is hydraulically-balanced to reduce end-thrust and pumpshaft-sealing is accomplished by a spring-loaded, self-adjusting, carbon-faced gland running against a silicon-carbon counterface.

Optional extras for the GPI0/10 Pump are as follows:

- 1) TRV42 Thermal Relief Valve.
- 2) Floodlight assembly.
- 3) Remote Fuel Tank and Hose Assembly – 23.7-litre capacity.
- 4) Wheelbarrow Assembly
- 5) Axle & 2 Wheel Assembly

ENGINE

The modified Honda engine is an in-line, vertical crankshaft, 3-cylinder, 4-stroke unit with a belt-driven overhead camshaft and triple constant-vacuum carburettors.

Engine capacity is 808cc with 70mm bore and stroke.

The aluminium cylinder block, incorporating the crankcase, is fitted with cast-iron cylinder liners and a robust crankshaft is supported on four main bearings.

Aluminium pistons are used and the cylinder head is of heat-treated aluminium.

The electronic ignition system provides excellent starting characteristics and eliminates the need for any maintenance.

An electronic overspeed-and-engine protection system is also fitted. This actuates in the event of high coolant temperature or low oil pressure by progressively reducing the engine speed to 2,800 r.p.m. until the problem is solved, then returning gradually to the set speed.

INSTRUMENTS AND CONTROLS

Switches, gauges and controls fitted (See Fig. 1):

Compound Gauge (1)	Indicates vacuum in pump suction tube during priming.
Pressure Gauge (2)	Indicates pump unit water pressure.
Throttle Control (3)	Controls engine speed.
START Button (4)	Press – until engine starts.
Ignition Switch (5)	Toggle to LEFT for ignition ON. Toggle to RIGHT to switch OFF and to STOP the engine.
Choke Control (6)	Operation: FULLY OUT – Cold Engine Start MIDWAY – Warm-up FULLY IN – Choke Inoperative
Hours Meter (7)	Indicates TOTAL hours engine running time.
Coolant Temperature Lamp (8)	Indicates high engine coolant temperature.
Oil Pressure Lamp (9)	Indicates low engine oil pressure.
Panel Lamps (10)	Provides instrument panel and gauges illumination when ignition switch is in 'ON' position.
Primer Rod Control (11)	Pulling the control rod activates the pump priming system.
Lighting Socket (12)	Provides a power source for the optional flood light or for battery charging.

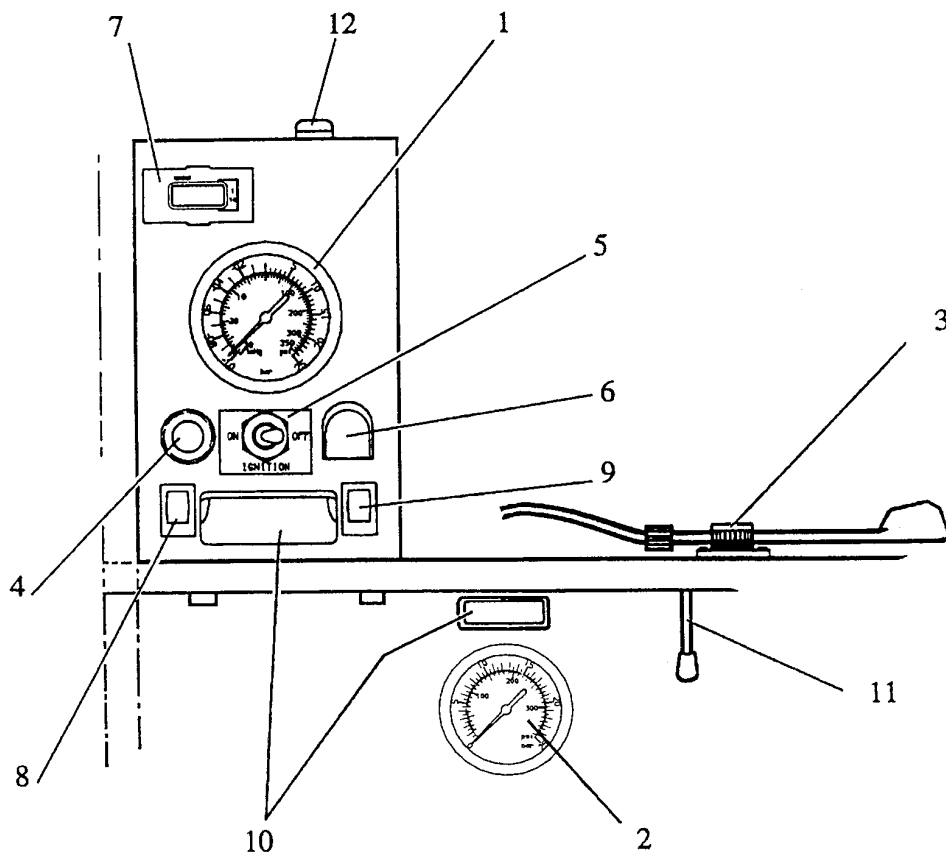


Fig. 1 Instruments, Gauges and Controls

COOLING SYSTEM

To enable normal operating temperatures to be maintained over extended running periods, a closed-circuit engine-cooling system is used.

The system incorporates a heat exchanger, oil-cooler and header tank.

Raw water is piped down from the volute through a strainer to the engine oil cooler, then on through the heat-exchanger tubes and returned to the suction tube.

The closed-circuit engine-cooling system takes coolant from the engine which is then passed through the heat exchanger where it comes into contact with the internal tubes containing the pumped raw water.

Note: The raw water and engine coolant do not come into direct contact but the heat transfer takes place through the walls of the internal tubes.

The coolant then passes through the coolant header tank and is returned to the engine water pump.

IMPORTANT NOTE:

It is VERY IMPORTANT that a DIFFERENTIAL PRESSURE OF 3 BAR is maintained in the pump unit to ensure that the pumped water is being circulated through the heat exchanger to prevent overheating of the engine unit.

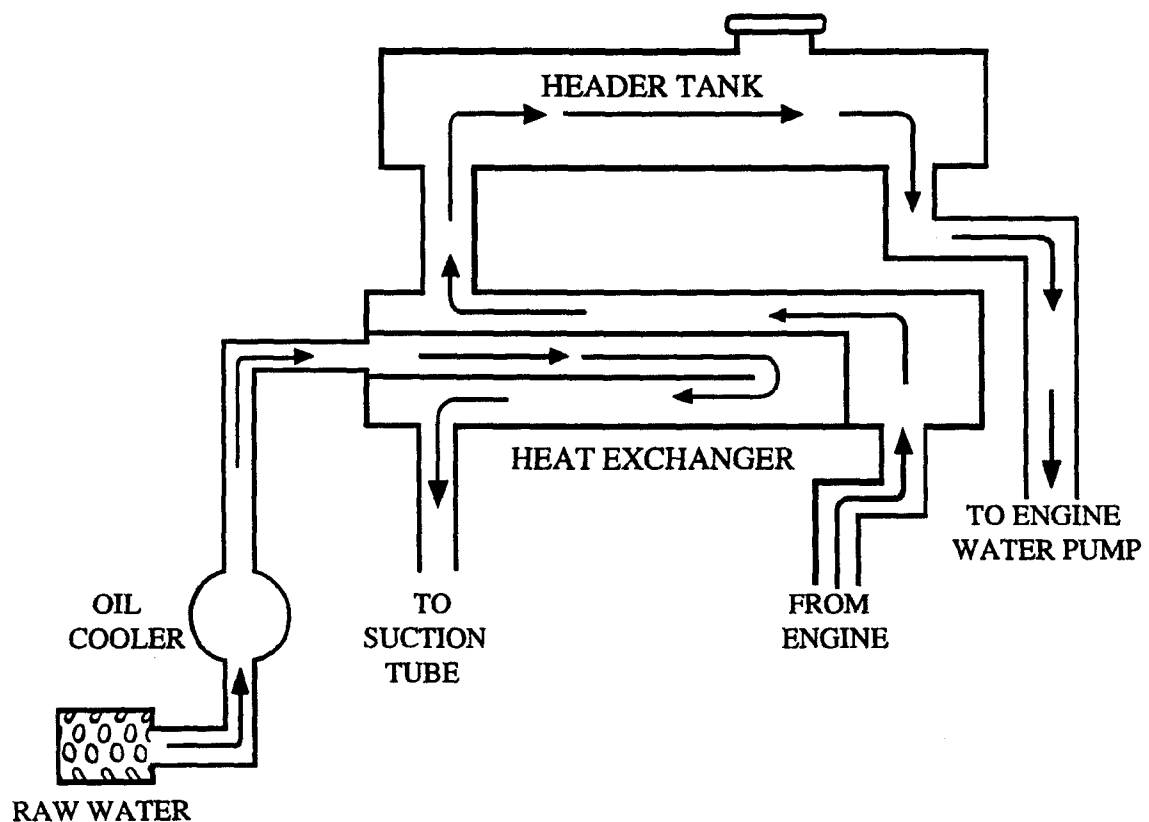


Fig. 2 Water and Coolant Circuit

DELIVERY VALVES

Screw-Down DIN-Type

By turning the handwheel counter-clockwise, the valve can be opened for the discharge of water.

When the valve is open and no water is being discharged, the valve seal is held against the volute discharge port by a spring in the valve body.

When the pump is priming, the valve seal acts as a non-return valve so that the prime is not lost.

The release knob allows the valve seal to be lifted higher than normal through the action of the handwheel being turned with the release knob pulled out.

Note: This operation is only carried out after the pump has been STOPPED.

This operation will allow the valve seal to be raised above the discharge port and enable water to drain past the valve from hoses and dry-risers.

PRIMING

An exhaust gas ejector-type priming system is fitted incorporating an automatic priming valve.

The priming system is activated by pulling the primer control rod to the limit of its travel with the engine throttle approximately 3/4 open.

When priming is complete, the control rod is released and returns to its normal position under the influence of a return spring.

Discharge of water is then controlled by the position of the engine throttle control and delivery-valve opening.

FLOODLIGHT UNIT (Optional)

The floodlight is located adjacent to the engine valve cover.

It may be raised to a height of 1,200mm measured from floor level, rotated through 360° and the actual lamp unit tilted through 90°.

The power-supply cable for the lamp plugs into a socket on the instrument panel.

The socket may also be used for battery-charging purposes.

PREPARING THE PUMP UNIT FOR RUNNING

Check the following points BEFORE starting the engine:

COOLING SYSTEM

The heat exchanger and header tank are mounted at the R.H-side of the engine.

Unscrew the filler cap of the header tank and, if necessary, add CLEAN water until the level is approximately 20mm below the bottom of the filler neck.

Use soft rainwater – if available – NEVER use dirty or contaminated water.

Use only anti-freeze suitable for aluminium engines and mix with water in the correct ratio * for the prevailing or expected minimum temperature. (See PROTECTION AGAINST FROST).

A compartment is incorporated in the header tank for the storage of the rope which can be used for manual back-up starting. (See STARTING THE ENGINE – Manual Back-Up Starting).

* Anti-freeze MUST be mixed in the proportions stated for the particular brand recommended.

ENGINE LUBRICATING OIL

The lubrication oil filler is positioned at the top of the engine valve cover.

Check the oil level every 5-HOURS RUNNING TIME or EVERY TIME that the unit is used. The oil dipstick is positioned on top of the engine oil sump at the L.H.-side of the engine.

To check the oil level proceed as follows:

IMPORTANT: BEFORE checking the oil level with the dipstick – ENSURE that the engine is SWITCHED OFF and that the unit is LEVEL

Note: THE OIL LEVEL CANNOT BE CHECKED WHILE THE ENGINE IS RUNNING.

Always allow the engine to stand for a few minutes after switching off so that the oil remaining around the engine may return to the sump.

Withdraw the dipstick, wipe clean, re-insert it and then withdraw it again to check the oil-level reading.

If the oil level is NOT up to the TOP mark of the dipstick, add fresh oil to the correct level. (See list of RECOMMENDED LUBRICANTS).

IMPORTANT: NEVER ALLOW THE LEVEL TO FALL BELOW THE BOTTOM MARK ON THE DIPSTICK.

Note: Do not over-fill when topping-up. Engine-sump capacity is 2.6 litres (inc. filter).

FUEL TANK

The fuel tank is mounted at the L.H.-side of the unit with a capacity of 14 litres.

Check that a sufficient quantity of fuel is present for the anticipated requirements.

No fuel tap is fitted due to the position of the fuel tank. Fuel is drawn from the tank by the engine fuel pump when the engine is running.

The fuel-level gauge is incorporated in the screw-on filler cap.

IMPORTANT: DO NOT USE LEADED FUEL – The ignition timing is set for the use of UNLEADED GASOLINE.

Note: The fuel tank is connected to the engine via a quick-release connector which can be unfastened to allow an external tank to be connected.

THERMAL RELIEF VALVE (Optional)

The raw-water pump system can incorporate a TRV42 Thermal Relief Valve.

Should the pump-water temperature exceed 42°C, the valve releases water via a transfer pipe into the silencer. The resultant excess vapour (steam) produced provides a visual indication of excess pump-water temperature. Alternatively the pipework may be modified to discharge the water to the ground.

Note: This situation can occur if the pump is left running for excessive periods of time with the hose-nozzle controls or the discharge valves in the closed position.

STARTING THE ENGINE

First, check the fuel, oil and water levels (See under PREPARING THE PUMP UNIT FOR RUNNING). Then pull the choke control **FULLY OUT** (Cold-Starting Position) – See Fig. 3.

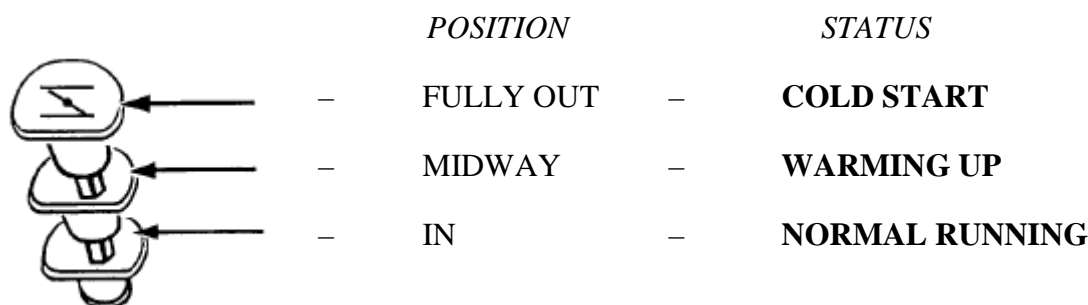


Fig. 3. Choke-control Positions

Open the throttle slightly.

Switch on the ignition by pushing the ignition-switch toggle to the **LEFT**.

To start the engine press the starter button on the control panel and release it as soon as the engine starts. The oil pressure light should extinguish immediately - if it does not: stop the engine and investigate the reason.

Note: When restarting a **HOT** engine, **DO NOT USE** the choke control – to do so may prevent the engine from starting.

IMPORTANT: **DO NOT** allow the pump to run in a **DRY** condition, except during the normal priming procedure.

Manual Back-up Starting

A compartment, integral with the coolant tank, is provided for the storage of the starter rope for emergency starting.

Release the flexible tab handle securing the flywheel cover and hinge back the cover to reveal the flywheel.

Unscrew the **RED** cap and withdraw the rope from the storage compartment. Ensure that the ignition switch is in the **OFF** position to prevent accidental starting.

Insert the knot of the rope into one of the cutaways in the periphery of the flywheel and wrap the remainder of the rope counter-clockwise around the flywheel in the groove provided.

Switch **ON** the ignition and open the throttle slightly.

Give the rope a sharp, but continuous pull to start the engine.

Return the cover to its closed position and secure it with the flexible tab handle.

WARNING: TAKE EXTREME CARE TO KEEP CLEAR OF THE ROTATING MACHINERY WHEN THE ENGINE STARTS.

Always replace the rope in the compartment provided and then refit the cap.

RUNNING THE ENGINE

If the engine is started with the intention of running it only for a short period, it is important that it reaches its normal operating temperature before being switched off.

This is to allow the corrosive condensate, generated during normal running of the engine and evaporating as the engine warms up, to be expelled from the system. These corrosive deposits if left in the system will cause deterioration of engine parts.

IMPORTANT: DO NOT allow the pump to be run DRY during the above procedure.

PRIMING THE PUMP FROM OPEN WATER

Set the pump approximately level – if necessary, use packing under the frame.

Remove the suction cap, connect the suction hose and close the delivery valves.

Ensure that the connection is tight and that the end of the suction hose, with strainer attached, is submerged to a sufficient depth below the level of the water supply.

If the suction hose-end is too near to the surface of the water supply, a vortex may form. Conversely, if the end of the suction tube is on the bottom (or even too near the bottom) then sand or gravel for example, may be drawn into the pump. In this situation, a basket filter should also be used.

We recommend that the use of those pumping positions resulting in any part of the suction hose being higher than the pump-suction connection are avoided – to prevent air pockets in the suction hose.

Priming

Pump priming is accomplished using the following method:

- 1) Start the engine and open the throttle approximately 3/4 of its travel.
- 2) Pull the primer operating rod out to its limit - there is no need to use excessive force.
- 3) Move the throttle-setting to give maximum smooth running and watch the gauges.
- 4) At the first positive 'flick' of the pressure gauge, release the primer rod.
- 5) Partially-open a delivery valve to release trapped air and ease back the throttle.
- 6) Fully-open the delivery valve(s) by turning the handwheel(s) counter-clockwise.

The pump will now be discharging water - pressure should be regulated by opening and closing the discharge nozzles and throttle as required.

Note: When pumping, GRADUALLY make adjustments to the engine speed - NEVER suddenly jerk the throttle either open or closed.

HYDRANT PUMPING

Remove the suction cap.

Connect the pump with a hydrant-to-suction adaptor.

Fully-open the delivery valves.

Start the engine and set the throttle control so that the engine is idling.

Turn on the hydrant.

Open the throttle only so far as is necessary to maintain the desired working pressure.

Note: The compound gauge needle MUST NOT be allowed to drop below zero, otherwise a vacuum will be created on the suction-side of the pump causing damage to the mains water supply or the collapse of the supply hose.

PROTECTION AGAINST FROST

As a precautionary measure when frost is first anticipated, drain the pump-volute casing by tipping the whole unit towards the suction-end, or remove the drain plug situated at the base of the volute casing. Then open the drain valve located on the volute.

Use an anti-freeze solution in the engine coolant system in the correct proportions stated for the particular brand recommended.

As the engine is constructed of aluminium alloy, it is essential that the anti-freeze solution is of the type suitable for use with this material.

If no anti-freeze is available, it will be necessary to drain the engine.

Always drain the cooling system while the engine is WARM.

IMPORTANT: NEVER attempt to run the engine without water.

Note: After draining, attach a 'WATER DRAINED' notice to warn others that the system must be refilled before restarting the engine.

MAINTENANCE

IMMEDIATELY AFTER USE

When the pump has been used to pump sea-water, contaminated or very dirty fresh water, flush it through thoroughly using FRESH, CLEAN water.

EVERY 5 HOURS RUNNING TIME (OR WEEKLY)

Oil Check

Check the engine oil level. To do this, carry out the following procedure:

- 1) Stop the engine and withdraw the dipstick, wipe it, re-insert it and again withdraw it.
- 2) Check if the oil is below the bottom mark on the dipstick. If necessary, add fresh oil to the correct level – See list of RECOMMENDED LUBRICANTS.

IMPORTANT: THE OIL LEVEL CANNOT BE CHECKED WHILE THE ENGINE IS RUNNING.

- 3) It is advisable to let the engine stand for a few minutes to allow oil circulating in the engine to drain back into the sump before checking on the dipstick to obtain a true reading.
Note: Ensure pump is on LEVEL GROUND before checking oil level.

Coolant Check

WARNING: NEVER remove the filler/pressure cap while the cooling system is HOT or with the engine RUNNING. Allow the pressure to reduce before unscrewing the cap and protect yourself against coolant or vapour.

Check the coolant level. To do this, carry out the following procedure:

- 1) Remove the filler cap from the header tank and, if necessary, add coolant to bring the level to approximately 20mm below the bottom of the filler neck.
- 2) Replace filler cap.

Note: ALWAYS top-up the solution of water and anti-freeze so as NOT to dilute the coolant ALREADY IN the system. NEVER add dirty or contaminated water.

Fuel Check

Check the level in the fuel tank by checking the fuel gauge on the tank filler cap.

IMPORTANT: DO NOT SMOKE OR USE A NAKED FLAME WHEN WORKING WITH GASOLINE.

**FIRST MONTH or 20 HOURS then
EVERY 200 HOURS RUNNING TIME OR EVERY 12 MONTHS
Whichever is the sooner**

Drain the engine oil – this should be carried out while the engine is WARM:

- 1) Remove the drain plug (located on the side of the sump) and drain out the old oil.
- 2) Refit the sump plug securely and then refill the sump with fresh oil – See list of RECOMMENDED LUBRICANTS.
- 3) Refill until the oil level is at the correct-reading mark on the dipstick. This will take approximately 2.0 litres, excluding the filter.
- 4) Renew the screw-on filter cartridge (oil capacity 0.6 litres).
- 5) Clean the spark plugs and, if necessary, adjust the gaps – the correct gap setting is 0.6 to 0.7mm. **Note:** Adjust the gap by bending the overhead electrode – NEVER the centre electrode.
- 6) Clean the spark-plug seating surfaces in the cylinder head, taking care that foreign matter does not enter the engine cylinder bores.

GENERAL CHECKS

- 1) Tightness of ALL pipe connections.
- 2) Electrolyte level in the battery – top-up if necessary.

WARNING: DO NOT SMOKE OR ALLOW A NAKED FLAME NEAR THE BATTERY WHEN EITHER CHECKING OR CHARGING IT – EXPLOSIVE GASES CAN BE RELEASED.

- 3) Check the inlet and exhaust-valve clearances with the engine COLD and adjust as necessary.

Gauges

Do not clean the glass surfaces of the gauges with abrasive or solvent cleaners. These will cloud the glass surface, use a mild detergent and water.

Tests and Fault-Tracing Charts

The following pages contain the important MONTHLY PUMP TEST and the FAULT-TRACING CHARTS for both the Pump and the Engine.

MONTHLY PUMP TEST

VACUUM TEST

- 1) Fit the suction-tube cap in position and close the delivery valves.
- 2) Start the engine and open the throttle.
- 3) Pull on the primer operating rod to activate the priming system.
- 4) When the vacuum reading of 0.75 – 0.80 bar is shown on the compound gauge, release the primer rod and stop the engine.
- 5) Note that the vacuum reading should not fall more than 0.033 bar in ONE minute.
If it does, carry out the following PRESSURE TEST.

PRESSURE TEST

The purpose of this test is to trace a vacuum leak.

- 1) Connect the pump to a water supply capable of exerting a pressure of 3.5 – 7.0 bar. This can be done by fitting an adaptor in the pump-casing drain hole and then connecting this to a hose by using a hydrant-to-suction tube adaptor.

Note: If pressurising through the drain hole, it will be necessary to fit the suction-tube blank cap.

- 2) With a delivery valve partially-open to allow air to escape, turn on the water supply.
- 3) When the pump casing is full of water, close the delivery valve and build the pressure to 3.5 – 7.0 bar.

If there are any leaks their location will be indicated by water seepage at those points.

Note: Fault-Tracing

Although it is outside the scope of this manual to give full instructions on the rectification of faults on the pump unit - and especially those on the engine unit, the following pages are presented in order that the user can ascertain the probable cause of any fault which may occur.

ENGINE FAULT-TRACING CHART

POSSIBLE FAULT		REMEDY
ENGINE WILL NOT START		
1.	Fuel tank empty.	Refill tank.
2.	Fuel pump not functioning.	Fit new fuel pump.
3.	In-line filter clogged.	Fit new filter.
4.	Water or impurities in fuel system.	Clean out fuel pump, fuel tank and fuel pipelines. Refill with fresh fuel.
5.	Blockage in fuel pipeline.	Disconnect and clear.
6.	Carburettor setting faulty.	Adjust carburettors.
7.	Carburettor flooding –	
	a) Over-choked	Release choke, turn engine over with the throttle wide open.
	b) Needle-valve sticking	Remove and clean needle-valve.
8.	Carburettor air vent blocked	Clean vent hole.
9.	Insufficient choke.	Check and correct.
10.	Throttle open too wide.	Check and close.
11.	Faulty spark plugs.	Fit new plugs.
12.	Plug leads loose, broken or incorrectly-fitted.	Examine and, if necessary, renew leads.
13.	Fuel pipe incorrectly fitted.	Check and rectify.
14.	Fuel pipe twisted or trapped.	Release and re-position.
15.	Position of plug leads incorrect.	Refit leads correctly.
16.	Ignition not switched ON.	Switch ignition ON
17.	Quick-release fuel connector disconnected	Reconnect connector

ENGINE MISSES AT LOW SPEEDS ONLY

POSSIBLE FAULT	REMEDY
1. Air leaks in system.	Check joints between: a) Cylinder head-and-intake manifold b) Carburettors-and-intake manifold.
2. Carburettor setting faulty.	Adjust carburettors.
3. Valve not seating properly due to: a) Incorrect valve clearance. b) Burnt or bent valve(s).	Check and adjust. Remove cylinder head and renew parts.

ENGINE MISSES AT ALL SPEEDS

1. Carburettor flooding.	a) Remove and clean needle valves. b) Check that floats are not punctured or damaged.
2. Faulty spark plugs.	Remove, clean and set plug points and, if necessary, fit new plugs.
3. Plug leads loose or damaged.	Examine and, if necessary, fit new plugs.
4. Plug-lead(s) insulation faulty.	Renew leads.
5. Faulty valve operation due to: a) Broken valve spring b) Valve sticking in guide. c) Incorrect valve clearance. d) Bent valve(s).	Examine and renew defective parts. Check and clean valve guide. Check and adjust. Remove cylinder head and fit new valve(s).
6. Weak mixture due to : Fuel filter being partially blocked.	 Renew fuel filter.

ENGINE MISSES AT HIGH SPEEDS ONLY

POSSIBLE FAULT	REMEDY
1. Faulty spark-plugs OR incorrect electrode(s) gap.	Remove, clean and set plug-electrodes gap. If necessary, fit new plugs.
2. Faulty valve operation due to: a) Incorrect valve clearance. b) Valve sticking in guide. c) Bent or badly-fitting valve – Defective valve(s) indicated by: ‘popping’ or spitting in the carburettor – inlet; ‘banging’ in the silencer – exhaust.	Check and adjust. Examine and renew defective parts. Examine and renew defective parts.

ENGINE LACKS POWER

1. Carburettors setting faulty.	Adjust carburettors.
2. Excessive carbon deposit.	Decarbonise engine.
3. Faulty valve operation due to: a) Incorrect valve clearance. b) Valve sticking in guide. c) Bent or badly-fitted valve.	Check and adjust. Examine and renew defective parts. Examine and renew defective parts.
4. Incorrect valve timing.	Check and rectify.
5. Spark plug-electrode gaps incorrect.	Remove, clean and, if necessary fit new plugs.

ENGINE RUNS HOT

POSSIBLE FAULT	REMEDY
1. Water level low in cooling system.	Refill and check all coolant hoses and clips for safety.
2. Air leaks in induction system.	Check the joints between: a) The cylinder head-and-intake manifold b) The carburettor-and-intake manifold. If necessary, fit new joints/tighten nuts.
3. Carburettor(s) setting faulty.	Adjust carburettor(s).
4. Choke in 'rich' position.	Return choke-control to correct position.
5. Defective heat exchanger or oil cooler.	a) Clear blockage (back -flush). b) Fit new heat exchanger or oil cooler.
6. Oil diluted or of incorrect grade.	Drain oil system and refill with correct grade of oil.
7. Faulty thermostat.	Test thermostat – renew if necessary.
8. Insufficient differential pressure in raw water system.	Increase pump pressure to minimum 3 bar differential.
9. Blocked strainer in raw water feed from manifold.	Remove strainer and clean.

DIFFICULT STARTING

1. Weak spark due to: a) Faulty spark plugs. b) Wet or fouled spark plugs.	Fit new spark plugs. Clean or renew.
2. Low compression.	Check for: a) Correct valve clearance. b) Loose cylinder head. c) Blown cylinder-head gasket. d) Loose spark plug(s). e) Damaged or burnt valves. f) Worn piston rings. g) Worn cylinder bores.

PUMP FAULT-TRACING CHART

DEFECT

REMEDY

HIGH VACUUM GAUGE READING RELATIVE TO SUCTION LIFT

Suction strainer choked.

Remove and clean.

FAILURE TO LIFT OR HOLD WATER

- | | | |
|----|---|---------------------|
| 1. | Suction-hose joints leaking. | Check and tighten. |
| 2. | Suction strainer not completely immersed. | Check and submerge. |
| 3. | Defective exhaust primer. | Check and rectify. |
| 4. | Leaking priming valve. | Check and rectify. |
| 5. | Delivery valve leaking. | Check and rectify. |

BROKEN JETS WITH 'AIR CRACKLE'

- | | | |
|----|--|--------------------------------|
| 1. | Suction strainer:
a) Not completely immersed.
b) Too near the surface of the water supply. | Check and submerge. |
| 2. | Slight leaks on suction-side of pump. | Check joints and tighten nuts. |

THERMAL RELIEF VALVE ACTUATES

- | | | |
|----|-------------------------|--|
| 1. | Pump water overheating. | Avoid prolonged pumping with closed nozzles. |
|----|-------------------------|--|

If the remedies presented here do not clear the fault, then proceed with the MONTHLY PUMP TEST as previously described.