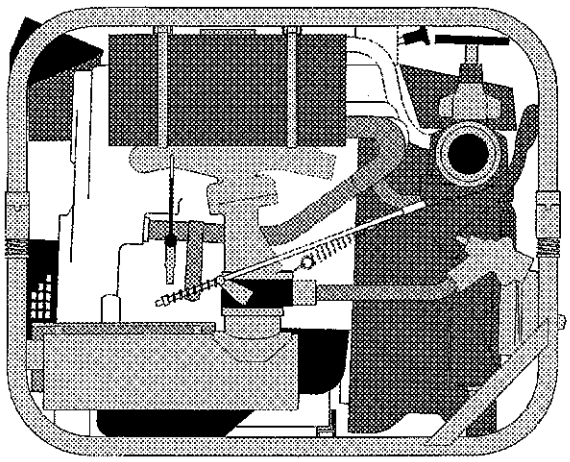
GODIVA IDEX CORPORATION

GP1600
PORTABLE FIRE PUMP

OPERATING MANUAL



GODIVA

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RE-ISSUED 1995 (3rd Edition) GP / 09 / 85

GODIVA

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:

TRAINING
It is ESSENTIAL that Godiva pumps are operated ONLY by TRAINED PERSONNEL.

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

* DO NOT OPERATE the unit close to flammable materials or structures.
* Keep ALL UNTRAINED people AWAY from the unit during operation.
* GASOLINE is extremely flammable and MUST be HANDLED WITH CARE.
* DO NOT refuel whilst smoking or allow sparks or flames into the refuelling area.
* DO NOT OVERFILL the fuel tank. After refuelling ENSURE that the fuel cap is refitted.
* 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, following the Operating Instructions.

IDEX CORPORATION

F.W.Mason
Engineering Manager
1st January 1995

CONTENTS

The pump serial number must be quoted in all communications

IMPORTANT NOTE

This pump may only be run in a dry condition during the priming procedure i.e. typically 30 seconds at approximately 2500 r.p.m. 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 cool and lubricate these components.

GENERAL NOTE

1) The terms 'Left-Hand' (L.H.) and 'Right-Hand' (R.H.) used in this book apply when the pumping unit is being viewed from the rear i.e. the pump suction tube end.

2) From pump no. 2000 a contactless electronic ignition system has been used. Any reference made in this Operating Manual to the contact breaker gap should be ignored for pumps after the above serial number.

GENERAL DATA

ENGINE DATA

Engine	Nissan (Modified)
Type of Engine	4 Cylinder, OHC
Firing Order	1,3,4,2.
Bore	68mm (2.68 in)
Stroke	68mm (2.68in)
Capacity	988 cc (60.3in^3)
Rated Power	37.5 Kw (50 BHP) at 4750 r.p.m.
Compression Ratio	9.5:1
Valve Clearance, Inlet, Cold	0,22mm (0.009in)
Valve Clearance, Exhaust, Cold	0,22mm (0.009in)
Battery (12 volts)	16 amp hour, negative earth

Valve Timing

Inlet Valve opens	11° BTDC
Inlet Valve closes	45° ABDC
Exhaust Valve opens	51° BBDC
Exhaust Valve closes	7° ATDC
Ignition Timing at	
Idling and Static	5 ± 2° BTDC
Spark Plug Type	BP 5ES
Spark Plug Gap	0,8 - 0,9mm (0.031 - 0.035in)
Contact Breaker Gap (up to pump no. 2000)	0,45 0,55mm (0.018 0.022in)
Fuel Pump	Mechanical, camshaft driven
Carburettor	Weber 34ICH
Sump Capacity	3.2 litres (5.5 pints)
Cooling	Water Pump and Heat Exchanger
Cooling Water Capacity	5.7 litres (10 pints)
Fuel Tank Capacity	13.6 litres (3 gallons)
Lubrication	Pressure fed and splash
Oil Filter	Nissan screw-on type
Starter	Electric Starter or Automatically Recoiled Rope
Oil Pressure Working	1200 r.p.m. 2 bar (28 lb/in^2)
	2000 r.p.m. 3 bar (43 lb/in^2)
	4000 r.p.m. 4 bar (57 lb/in^2)

PUMP DATA

Pump Model	GP1600
Type of Pump	Single stage, centrifugal
Pump shaft seal	Spring loaded, self adjusting carbon faced gland
Delivery valves	Screw down type
Number of delivery valves	Two
Priming	Exhaust gas ejector
Rated output	1600 litres per min at 8 bar ┐
	350 Imp g.p.m. at 114 p.s.i. ┘ at 1.5m (5ft) lift

RECOMMENDED LUBRICANTS

	AMBIENT TEMPERATURE	RECOMMENDED LUBRICANTS
ENGINE	-10°C (14°F) and above -20°C (-5°F) and above -30°C to +15°C (-20°F to +60°F)	15W/50, 20W/40, 20W/50 10W/30, 10W/40, 10W/50 5W/30

ENVIRONMENTAL PROTECTION

It is illegal to pour engine oil and other contaminants onto the ground, down sewers or drains, or into water courses.
Dispose of these through authorised waste disposal contractors to licenced waste disposal sites, or to the waste reclamation trade.

If in doubt,contact the Local Authority for advice on disposal facilities.

DELIVERY VALVES

By turning the handwheel anticlockwise the valve can be opened for the discharge of water. When the valve is open and no water is being discharged the valve seat 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 seat to be lifted higher than normal by turning the handwheel with the release knob pulled out. This operation is only carried out after the pump has stopped. It will allow the valve seal to be raised above the volute discharge port and enable water to drain past the valve from hoses and dry risers.

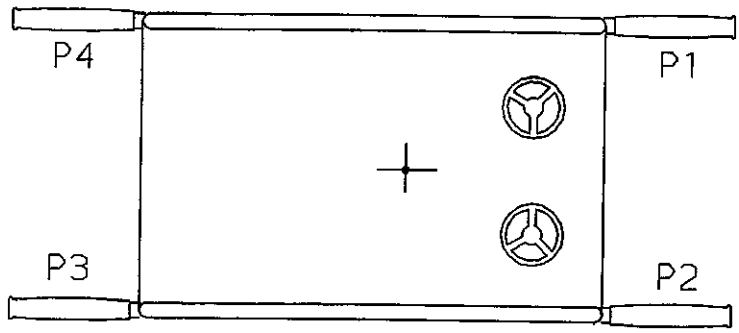
HEALTH AND SAFETY

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

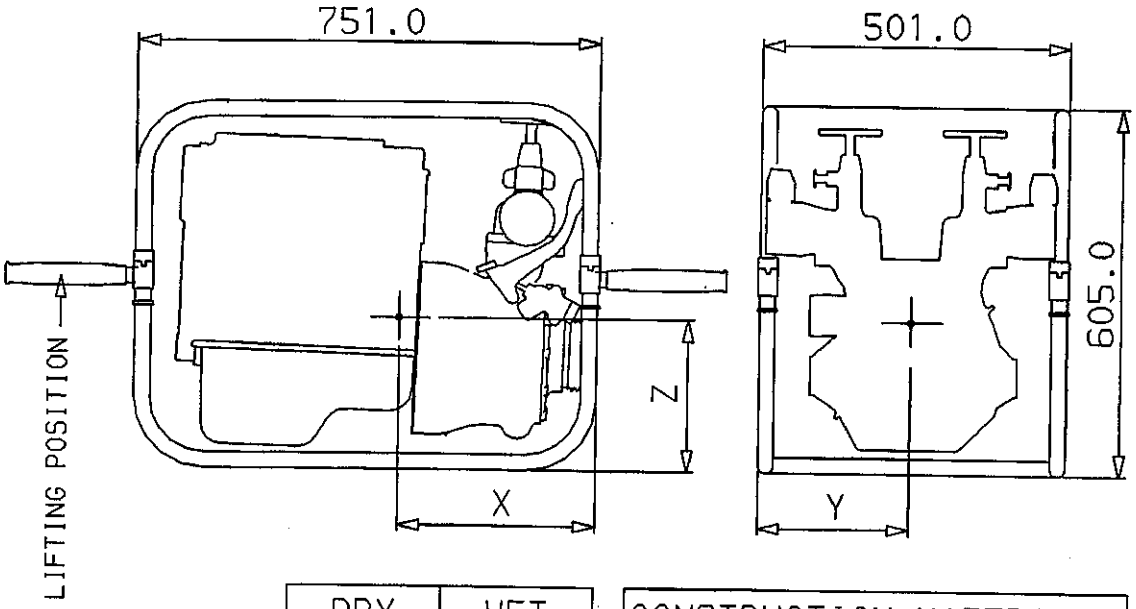
When handling gasoline, batteries, oil or hot machinery;

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 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.

The following two pages contain at-a-glance Health and Safety information.



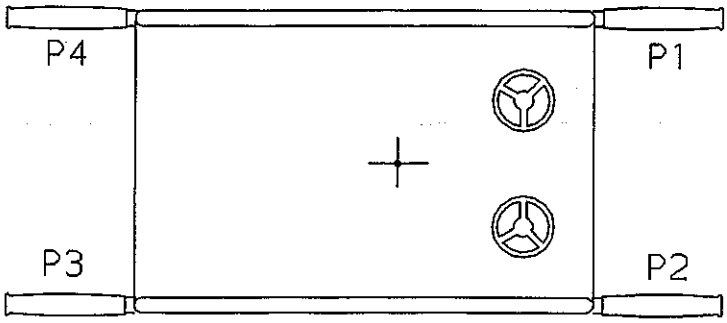
GODIVA RECOMMENDS TEAM LIFTING TO BE ADOPTED IF NO OTHER FORM OF LIFTING IS AVAILABLE. USE OF THE LIFTING FACILITIES THAT ARE PROVIDED ON THE UNIT IS STRONGLY ADVISED.



		DRY	WET
WEIGHT Kg		117	135
CENTRE OF GRAVITY mm	X	375.0	375.0
	Y	247.0	250.0
	Z	310.0	350.0
LIFTING FORCES Kg	P1	28.8	33.75
	P2	29.7	33.75
	P3	29.7	33.75
	P4	28.8	33.75

CONSTRUCTION MATERIALS		
PUMP CASING		ALUM
IMPELLER		ALUM
PUMP SHAFT		ST.STL
WEARING RINGS		GUNMETAL
SUCTION TUBE		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



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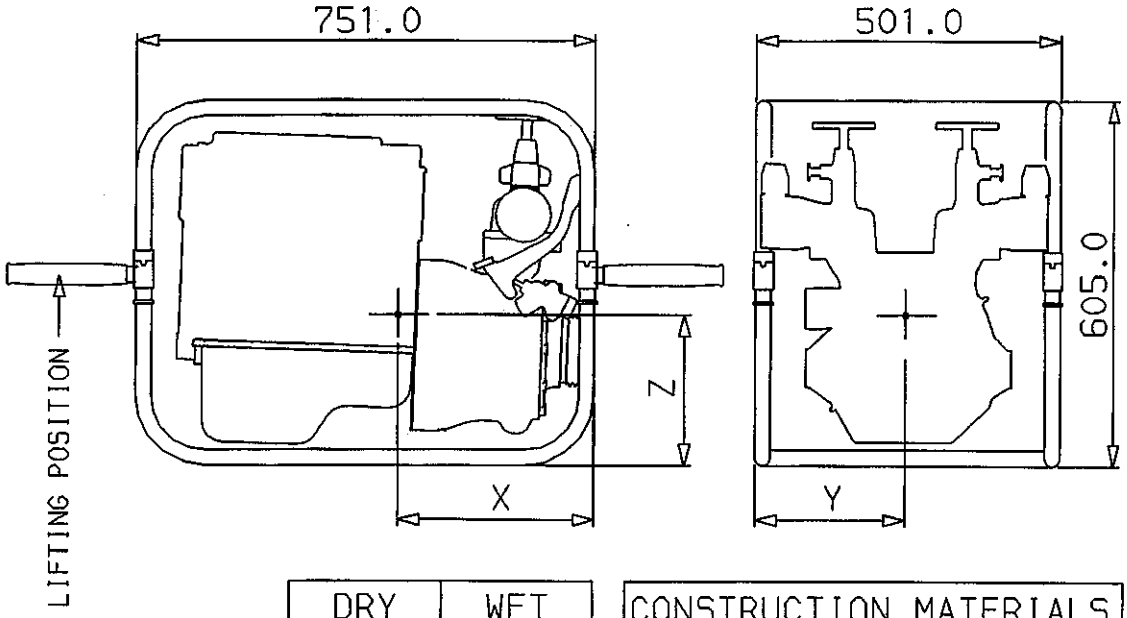


		DRY	WET
WEIGHT Kg		152	170
CENTRE OF GRAVITY mm	X	325.0	325.0
	Y	250.0	250.0
	Z	300.0	300.0
LIFTING FORCES Kg	P1	43.0	48.0
	P2	43.0	48.0
	P3	33.0	37.0
	P4	33.0	37.0

CONSTRUCTION MATERIALS		
PUMP CASING		GUNMETAL
IMPELLER		GUNMETAL
PUMP SHAFT		ST.STL
WEARING RINGS		GUNMETAL
SUCTION TUBE		GUNMETAL
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

DESCRIPTION

PUMP

The Godiva GP1600 Model is a single stage, centrifugal pump and is powered by a Nissan 988 cc engine. The pump suction tube, delivery valves, volute body and impeller are all made from either corrosion resisting aluminium alloy or gunmetal, while the pump shaft is in stainless steel. The impeller is hydraulically balanced to reduce end thrust. Pump shaft sealing is accomplished by a spring loaded, self adjusting carbon faced gland.

ENGINE

The modified Nissan engine is a four cylinder, 4 stroke, with overhead camshaft and Weber downdraught carburettor. The engine has a capacity of 988 cc (60.3 in^3), the bore is 68mm (2.68in) and the stroke being 68mm (2.68in). The cylinder block, which incorporates the crank-case, is made of corrosion resisting aluminium alloy and is fitted with cast in cylinder liners. A robust crankshaft is supported in five large bi-metal bearings. Aluminium pistons are used. The cylinder head is of heat treated aluminium.

COOLING SYSTEM

To enable normal, engine running temperatures to be maintained over the most extended running periods, a closed circuit heat exchanger is used. The system is completely automatic in action and enables anti-freeze to be used in winter.

Water is circulated by the engine water pump from the heat exchanger and passed to the cylinder block. After circulating through the engine, the water is returned to the heat exchanger. During pumping operations a constant supply of cold water is circulated through the internl coils in the heat exchanger via pipes connecting the heat exchanger to the volute body and the suction tube (see Fig. 1).

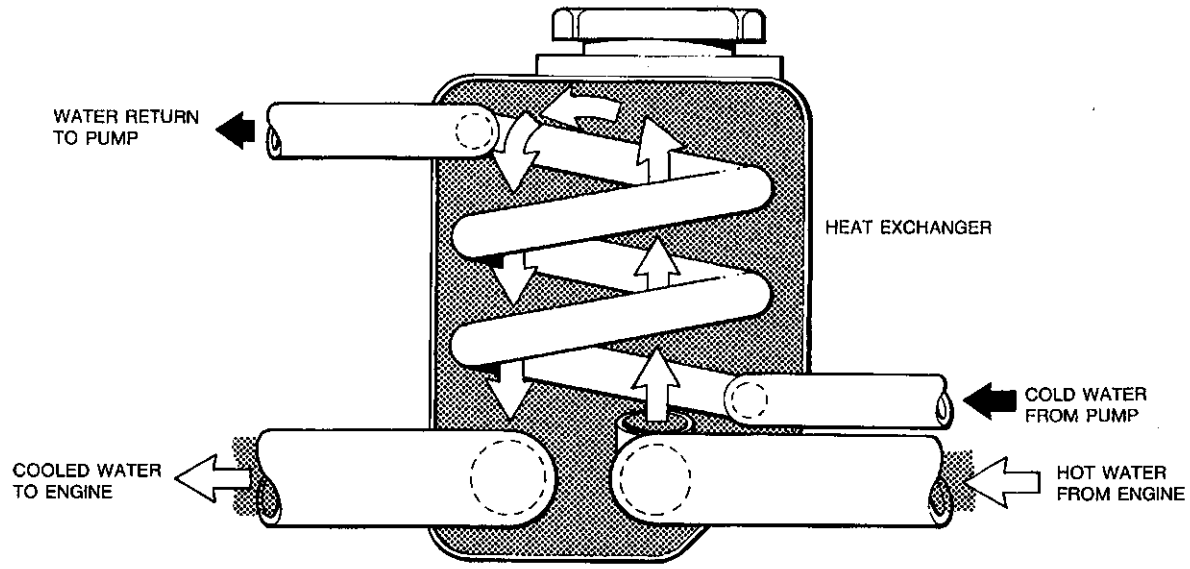


Fig. 1 Water circulation through heat exchanger

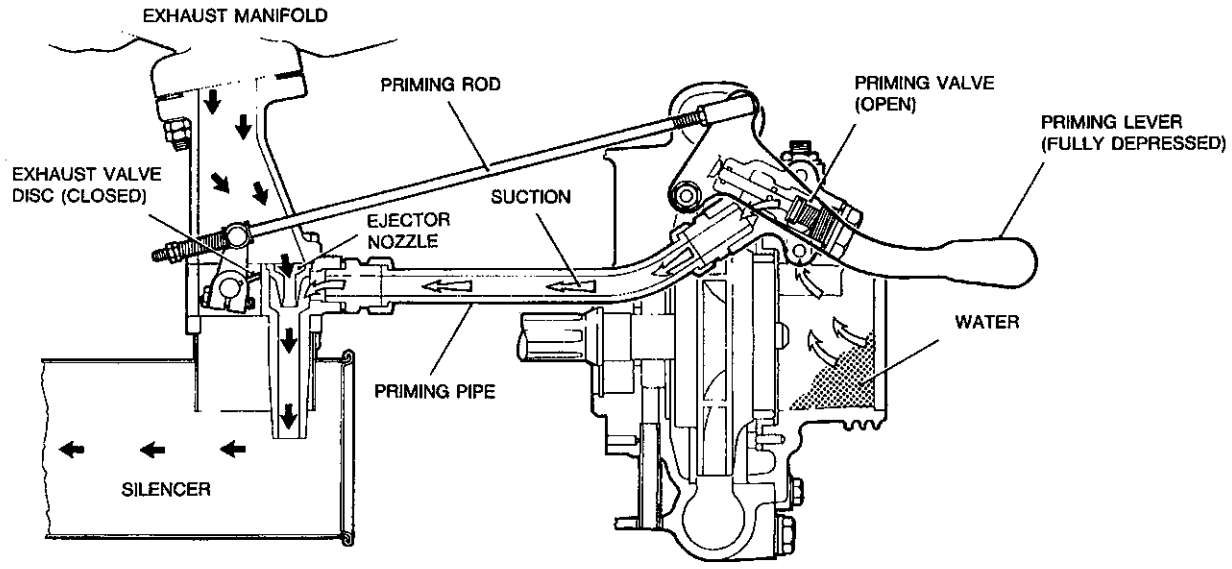


Fig. 2 Water and gas flow with priming valve open

PRIMING

Priming is by means of an exhaust gas ejector. The priming valve assembly is mounted on the left of the volute body, the priming lever is located above the valve assembly and below the delivery valve. The single operation of the priming lever opens the priming valve connecting the pump suction to the priming gas ejector, and simultaneously closes the exhaust butterfly valve. This action deflects the exhaust gases through the nozzle (see Fig. 2), thereby creating a vacuum in the pump and suction tube. When the water reaches the pump inlet, the impeller develops a pressure in the volute, which registers on the pressure gauge. When the priming lever is released, the priming valve assembly closes and the exhaust butterfly valve opens (see Fig. 3).

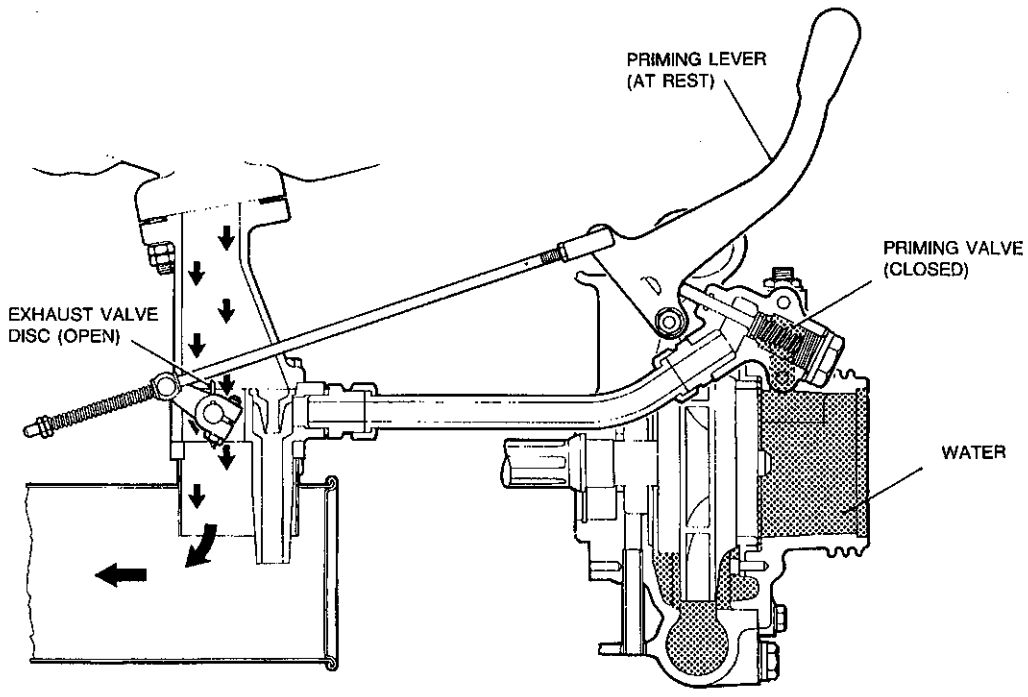


Fig. 3 Water and gas flow with priming valve closed

PREPARING THE PUMPING UNIT FOR RUNNING

Check the following points before starting the engine.

COOLING SYSTEM

The heat exchanger is situated on the left-hand side of the unit.
Remove the heat exchanger filler cap and if necessary add clean water until the level is approximately 12mm (1/2in) below the bottom of the filler neck. Use soft (rain) water if available - never dirty or contaminated water.
In winter or very cold conditions use an anti-freeze solution in the proportions detailed by the makers of the brand recommended. See Protection Against Frost.

ENGINE LUBRICATING OIL

The lubrication oil filler is positioned at the front end of the cam box cover on the engine. Check the oil level after every 5 hours running time, or every time the unit is used. To do this withdraw the dipstick (which is on the left-hand side of the engine), wipe it clean, re-insert it and again withdraw it. If the oil level is not up to the 'High' mark add fresh oil (see list of recommended lubricants) to correct level. Ensure the unit is level when checking the oil level.
The oil level cannot be checked while the engine is running. Always allow the engine to stand for a few minutes after switching off to allow oil circulating round the engine to return to the sump, before checking the level on the dipstick.
The capacity of the engine sump is 3.2 litres (5.5 pints).

FUEL TANK

The fuel tank is mounted on the right-hand side of the cradle. The tank capacity is 13.6 litres (3 gallons), which is sufficient for approximately one hour's running.

RUNNING THE ENGINE

If the engine is started with the intention of running it only for a short period, it is imporrtant that it is run under load until it has reached its normal operating temperature before switching off. This is to allow corrosive condensate which is generated during the initial running of the engine to evaporate as the engine warms up, and be expelled from the system. Left in the system, these corrosive deposits will cause deterioration of engine parts.

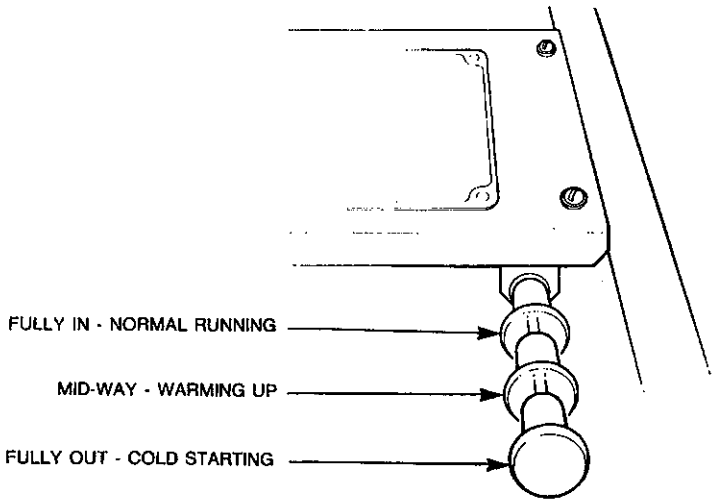


Fig. 4 Choke control positions

STARTING A COLD ENGINE

1. Check the fuel, oil and water levels as described under PREPARING THE PUMPING UNIT FOR RUNNING.
2. Pull out the choke control to its fully out position (Fig. 4).
3. Close the throttle control i.e. move the control lever downwards as far as it will go.
4. Switch on the ignition switch and press the starter button on the control panel, releasing it as soon as the engine fires.
5. To start the engine with the automatically recoiled rope starter, give the handle a sharp pull, it is not necessary to jerk the rope out to its limit. Do not let go of the handle and allow it to snap back; maintain your hold and allow the handle to recoil slowly. When pulling the starter handle, make sure that the rope remains in a straight line through the handle and rope guide. This will prevent unnecessary wear to the rope.
6. When the engine is running, its speed is controlled by the throttle lever.
7. As soon as the engine responds to the throttle without misfiring, push the choke control to its midway position (Fig. 4).
8. The choke control must be pushed fully in to the normal running position when the engine has warmed up (Fig. 4).

STARTING A WARM ENGINE

Carry out the same operations as for starting a cold engine, except that it is not necessary to pull out the choke control. Use of the choke control on a warm engine may prevent it from starting.

STOPPING THE ENGINE

To stop the engine, close the throttle control and turn the ignition switch to the 'OFF' position. If the engine has been running under load for some time, it is advisable to allow it to idle for a few minutes before switching off.

BATTERY CHARGING SOCKET
PORTABLE FLOODLIGHT SOCKET - IF FITTED

A twin pin, 6 amp battery charging socket is fitted on the underside of the battery carrier, protected by a blanking cap. When connected to a portable battery charger, this plug will enable the battery to be topped up or recharged if necessary.
The pump unit can be started and run using the recoil hand starter with the battery disconnected, but under no circumstances should the plug socket be connected to a battery charger when the battery is disconnected or removed. Serious damage to the Alternator will occur if this is attempted.

PORTABLE FLOODLIGHT

A base mounting to hold the floodlight post is located at the side of the battery cradle. The battery charging socket is also suitable to connect and illuminate this floodlight when required. Whilst the pump unit can be run with the battery disconnected, under no circumstances should the floodlight be used with the engine running and the battery disconnected.

PRIMING THE PUMP FROM OPEN WATER

1. Set the pump approximately level, if necessary using packing under the frame.
2. Remove the suction cap and connect up the suction hose, and close the delivery valves. Ensure that the connection is tight and that the end of the suction hose is submerged to a sufficient depth below the level of the water supply. It is recommended that pumping positions which necessitate any part of the suction hose being higher than the suction connection on the pump are avoided. Ensure that the cradle handles at the front of the pump are positioned outside the cradle to avoid the priming lever.
3. Start the engine.
4. Partly open the throttle, and press down the priming lever, using only sufficient force to move the lever through its full travel, increase throttle setting to give maximum smooth running speed and watch the gauges. The needle of the compound gauge will rise on the vacuum scale. When a constant vacuum reading is obtained, the pump pressure gauge will register a reading. At the first positive flick of the pressure gauge return priming lever to its normal position. Partially open a delivery valve and ease back the throttle lever.
5. Fully open the delivery valve by turning the handwheel anti-clockwise. The pump will now be discharging water, and the pressure should be regulated by opening and closing the discharge valve and the throttle as required.
6. When pumping, make adjustments to the engine speed **gradually**,NEVER suddenly jerk the throttle open or closed.

HYDRANT PUMPING

1. Remove the suction cap and connect the pump to the hydrant with a hydrant to suction adaptor.
2. Fully open the discharge valves.
3. Start the engine and set the throttle control so that the engine is idling.
4. Turn on the hydrant.
5. DO NOT OPERATE THE PRIMING LEVER WHEN THE PUMP IS CONNECTED TO A HYDRANT UNDER PRESSURE, OR WHEN RELAYING FROM ANOTHER PUMP.
6. Open the throttle so far as is necessary to maintain the desired working pressure, but 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 supply or the collapsing of the suction hose.

PROTECTION AGAINST FROST

As a precautionary measure when frost is anticipated, drain the pump volute casing by removing its drain plug situated at the front of the base of the volute casing and use an anti-freeze solution in the engine in the proportions given by the manufacturer of the 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 anti-freeze is not available, it is necessary to drain the engine. Always drain the cooling system while the engine is warm. After draining attach a 'Water Drained' notice to warn others that the system **must** be re-filled before re-starting the engine.

MAINTENANCE ATTENTION

IMMEDIATELY AFTER USE

1. Apply a little grease to the suction tube thread.
2. When the pump has been used to pump either sea water or very dirty water, flush it out thouroughly using fresh clean water.

EVERY 5 HOURS RUNNING TIME (or weekly)

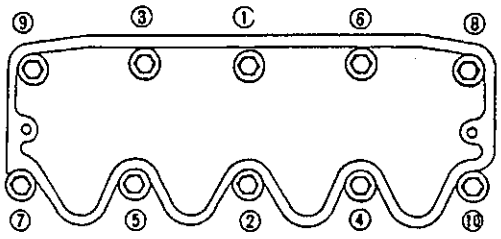
3. Check the engine oil level. To do this, stop the engine and withdraw the dipstick, wipe it, re-insert it and again withdraw it. If the oil level is below the 'HIGH' mark, add fresh oil (see list of recommended lubricants) to the correct level. The oil level cannot be checked while the engine is running, and it is advisable to let the engine stand for a few minutes to allow the oil circulating in the engine to drain back into the sump before checking on the dipstick to ensure a true reading. Ensure that the pump unit is on level ground before checking.
4. Check the cooling water level. To do this, remove the filler cap from the heat exchanger, and, if necessary, add clean water to bring the level to approximately 12mm (1/2 in) below the bottom of the filler neck. Use soft (rain) water if available - never use dirty or contami nated water.

WARNING: Never remove the cap while the engine is running, or until a few minutes after it has stopped to allow the pressure to reduce. Failure to observe these precau tions may result in serious scalding.

5. Check the fuel level in the fuel tank.

AFTER THE FIRST TEN HOURS RUNNING TIME

After the first ten hours running of a new engine, the cylinder head bolts and inlet and exhaust manifold nuts must be re-tightened, with the engine **cold.** Check the valve clearances and re-tightening the cylinder head bolts.



Torque settings:

Cylinder Head Bolts	58,3 - 63,7 Nm (43 - 47 lbf.ft.)
Inlet and Exhaust Manifold Nuts	16,2 - 20,3 Nm (12 - 15 lbf.ft.)

Check the inlet and exhaust valve clearances when the engine is **cold**, and adjust if necessary.

Inlet and Exhaust valve clearances	0,22 mm (0.009 in.)

EVERY 50 HOURS RUNNING TIME (or every 6 months whichever is the sooner)

6. Drain the engine oil. This should be carried out while the engine is warm. The sump drain plug is situated on the right-hand side of the sump. Remove the drain plug and drain out the old oil. Refit the sump drain plug securely and fill the engine with fresh oil (see list of recommended lubricants) until the oil level is the correct reading on the dipstick. This will take approximately 3.2 litres (5.5 pints).
7. Renew the oil filter element.

8. Lubricate the distributor contact breaker pivot post by removing the distributor cap and applying a spot of clean engine oil to the visable end of the post. Also smear a little light grease on the cam. Clean with a soft, dry cloth, the inside of the distributor cap and with a petrol moistened cloth, the electrodes and rotor arm. If the contact breaker points are burnt or blackened, clean them with a smooth file or with a fine emery cloth, afterwards wiping them with a petrol moistened cloth. Examine and if necessary adjust the contact breaker points. The correct setting is 0,45 - 0,55mm (0.018 - 0.022 in.). **Note.** Pump units no. 2000 - on use a contactless ignition system.
9. Check the tension of the camshaft timing belt. There should be approximately 2mm (0.08 in) free movement in the middle of the belt run. To check and adjust the timing belt refer to relevant section of workshop manual.
10. Clean the spark plugs and, if necessary, adjust the gaps. The correct gap setting is 0.8 - 0.9mm (0.031 - 0.035 in). Adjust the gap by bending the overhead electrode. Clean the spark plugs seating surfaces in the cylinder head, but take care that no foreign matter gets into the engine cylinder bores.
11. Check the tightness of all pipe connections.
12. Oil all linkages, including the priming control levers, using clean engine oil.
13. Check the level of electrolyte in the battery and top-up if necessary.

WARNING: Do not smoke or use a naked flame near the battery when checking or charging it, due to the release of explosive gases by the battery.

14. Check the inlet and exhaust valve clearances when the engine is cold, and adjust if neces sary. See 5 above for clearances.

MONTHLY PUMP TEST

VACUUM TEST

Screw the suction tube cap in position and close the delivery valves. Start the engine, open the throttle and push down the priming lever. When a vacuum reading of 0,75 - 0,80 bar (22 - 24 inches) is shown on the compound gauge, release the priming lever and stop the engine. The vacuum reading should now be maintained for at least 15 seconds. If it is not, carry out the PRESSURE TEST as below.

Should the pump prove to be incapable of developing a vacuum of 0,75 bar (22 inches) but it will hold whatever vacuum it does develop, then there must be a leak in the pipe between the priming valve and the ejector housing.

PRESSURE TEST

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

Connect the pump to a water supply which is capable of exerting a pressure of 3,5 - 7,0 bar (50 - 100 p.s.i.). This can be done by fitting an adaptor in the pump casing drain hole and then connecting this up to a hose or by using the hydrant to suction adaptor.

Turn on the water supply - a delivery valve must be partly open to allow the air to escape. When the pump casing is full of water, close the delivery valve and build up the pressure to 3,5 - 7,0 bar (50 - 100 p.s.i.). If there are any leaks then their locations will be shown by the seepage of water at those points.

FAULT TRACING

Although it is outside the scope of this book to give full instructions on the rectification of the faults on the engine and pump unit, the following comprehensive fault tracing chart is presented in order that the user can ascertain the probable cause of any fault which may occur.

ENGINE FAULT TRACING CHART

NO.	POSSIBLE CAUSE	REMEDY
ENGINE WILL NOT START		
1	Fuel tank empty.	Refill tank.
2	Fuel pump not functioning.	Repair or renew.
3	Fuel pump or carburettor filters clogged.	Remove filters and clean.
4	Water or impurities in fuel system.	Clean out fuel pump, carburettor, fuel tank and fuel pipe lines. Refill tank with fresh gasoline.
5	Blockage in fuel pipeline.	Disconnect and clear.
6	Carburettor setting faulty.	Adjust carburettor.
7	Carburettor flooding (over-choked).	Release choke, turn engine over with throttle wide open and ignition switch held in off position.
8	Carburettor flooding (needle valve sticking).	Remove and clean needle valve.
9	Choked carburettor jets.	Remove and clean jets.
10	Insufficient choke.	Check and correct.
11	Throttle open too wide.	Check and close.
12	Faulty sparking plugs.	Remove, clean and set points (Page 12). If necessary fit new plugs.
13	Plug leads loose, broken or incorrectly fitted .	Examine and if necessary fit new leads.
14	Faulty ignition switch.	Make sure that the switch is nt jammed in the 'stop' or 'off' position.
15	Dirty high tension pick-up terminal in distributor cap.	Examine and clean.
	Contact breaker points faulty or incorrectly adjusted.	Clean and adjust.
ENGINE STOPS SUDDENLY		
16	Fuel shortage, usually indicated by one or two re-starts before engine finally stops, or by spitting through carburettor.	Examine carburettor float chamber and ensure that there is fuel, if not, check that there is fuel in the tank, that fuel pump and carburettor filters are not clogged and that the fuel pump is functioning. If float chamber is receiving fuel, clean carburettor.
17	Ignition failure.	Test spark at plug points by removing plug, resting it on engine and observ ing spark when engine is turned slowly by hand. If the spark is weak or non-existant, check plugs and plug leads.
ENGINE MISSES AT LOW SPEEDS ONLY		
18	Air leaks in induction system.	Check the joints between the cylinder head and induction manifold and the carburettor and induction manifold. If necessary fit new joints and tighten nuts.
19	Carburettor setting faulty.	Adjust carburettor.

NO.	POSSIBLE CAUSE	REMEDY
20	Valves not setting properly due to:	
	(a) Incorrect tappet clearance.	Check and rectify.
	(b) Distortion.	Remove cylinder head and renew parts.
ENGINE MISSES AT ALL SPEEDS		
21	Carburettor flooding.	Remove and clean needle valve. Check that the float is not punctured or damaged.
22	Faulty sparking plugs.	Remove, clean and set plug points (Page 12). If necessary fit new plugs.
23	Plug leads loose or broken.	Examine and if necessary fit new leads.
24	Faulty valve operation, due to;	
	(a) Broken valve spring.	Examine and renew defective parts.
	(b) Valve sticking in guide.	Check and adjust.
	(c) Incorrect valve clearance.	Check and adjust.
25	Ignition timing incorrect.	Check and adjust.
26	Weak mixture owing to fuel pump and carburettor filters being clogged.	Remove filters and clean.
ENGINE MISSES AT HIGH SPEEDS ONLY		
27	Faulty spark plugs.	Remove, clean and set plug points (Page 12). If necessary, fit new plugs.
28	Faulty valve operation, due to;	
	(a) Incorrect valve clearance.	Check and rectify.
	(b) Valve sticking in guide.	Check and rectify.
	(c) Warped or badly fitted valve (defective inlet valve indicated by spitting in carburettor, defective exhaust valve by banging in silencer).	Examine and renew defective parts.
29	Fuel starvation, due to;	
	(a) Fuel pump faulty.	Repair or renew.
	(b) Fuel pump or carburettor filters choked.	Remove filters and clean.
30	Partial blockage in fuel pipe line.	Disconnect and clear.
BANGING IN SILENCER		
31	Carburettor setting faulty.	Adjust carburettor.
32	Faulty exhaust valve operation, due to;	
	(a) Incorrect tappet clearance.	Check and retify.
	(b) Valve sticking in guide.	Examine and renew defective parts.
	(c) Warped or badly fitted valve.	Examine and renew defective parts.
33	Faulty valve or ignition timing.	Check and rectify.
ENGINE SPITS THROUGH CARBURETTOR		
34	Weak mixture, due to;	
	(a) Air leaks in induction system.	Check the joints between the cylinder head and induction manifold and the carburettor and induction manifold. If necessary, fit new joints and tighten nuts.
	(b) Carburettor setting faulty.	Adjust carburettor.
	(c) Dirt or obstruction in fuel pipe line.	Disconnect and clean.
	(d) Fuel pump faulty.	Repair or renew.

NO.	POSSIBLE CAUSE	REMEDY
	(e) Fuel pump or carburettor filters clogged.	Remove filters and clean.
35	Faulty inlet valve operation, due to;	
	(a) Incorrect tappet clearance.	Check and rectify.
	(b) Valve sticking in guide.	Examine and renew defective parts.
	(c) Warped or badly fitted valve.	Examine and renew defective parts.
ENGINE LACKS POWER		
36	Carburettor setting faulty.	Adjust carburettor.
37	Excessive carbon deposits.	Decarbonise engine.
38	Faulty inlet valve operation, due to;	
	(a) Incorrect tappet clearance.	Check and rectify.
	(b) Valve sticking in guide.	Examine and renew defective parts.
	(c) Warped or badly fitted valve.	Examine and renew defective parts.
39	Faulty valve or ignition timing.	Check and rectify.
40	Spark plug gaps too wide.	Remove, clean and set points (Page 12). If necessary, fit new plugs.
ENGINE RUNS HOT		
41	Water supply low in heat exchanger.	Refill and check all water cooling connections.
42	Air leaks in induction system.	Check the joints between the cylinder head and induction manifold and the carburettor and induction manifold. If necessary, fit new joints and tighten nuts.
43	Carburettor setting faulty.	Adjust carburettor.
44	Choke control in rich position.	Return the choke control to correct position.
45	Ignition timing incorrect.	Check and adjust.
46	Defective heat exchanger.	Fit new heat exchanger.
47	Oil diluted or of incorrect grade.	Drain oil system and refill with correct grade of oil (Page 11).

PUMP FAULT TRACING CHART

1	High vacuum gauge reading relative to suction lift due to suction strainer being choked.	Remove and clean.
2	Failure to hold water, due to;	
	(a) Suction hose joints leaking.	Check and tighten.
	(b) Suction strainer not completely immersed.	Check and submerge.
	(c) Priming lever not fully depressed or throttle not fully open.	Check and correct.
	(d) Discharge valve leaking.	Check and rectify.
3	Broken jets with air crackle, due to;	
	(a) Suction strainer not completely immersed.	Check and submerge.
	(b) Slight leaks on suction side of pump.	Check joints and tighten nuts.

If the remedies shown above do not clear the fault, then carry out THE MONTHLY PUMP TEST which is described on page 12.