

TŌYŌTŌMI

SERVICE MANUAL

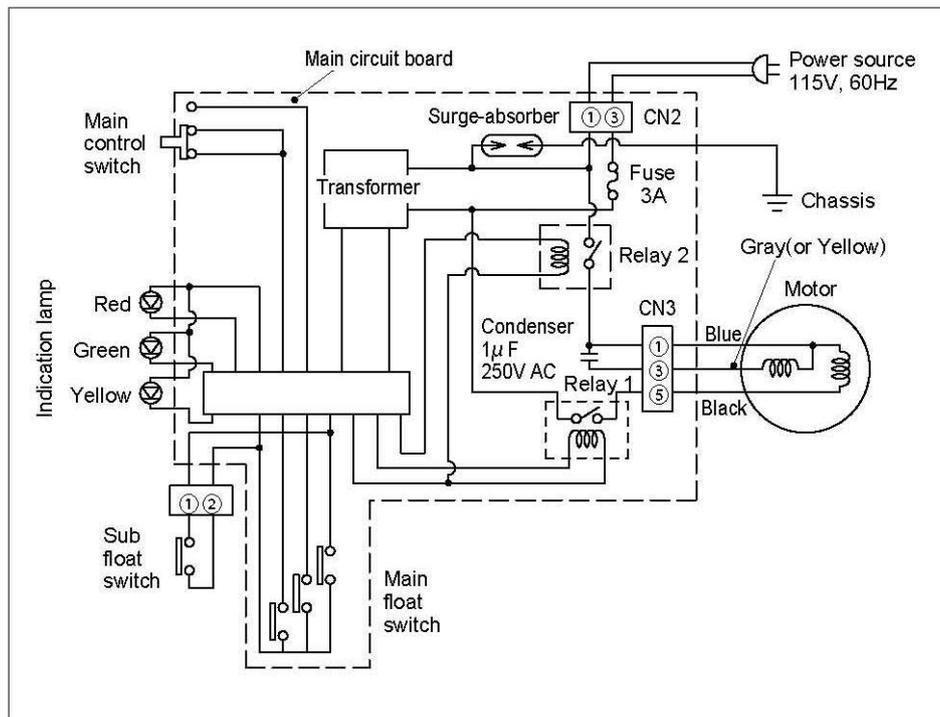
FUEL LIFTER PUMP

MODEL OPT-91UL

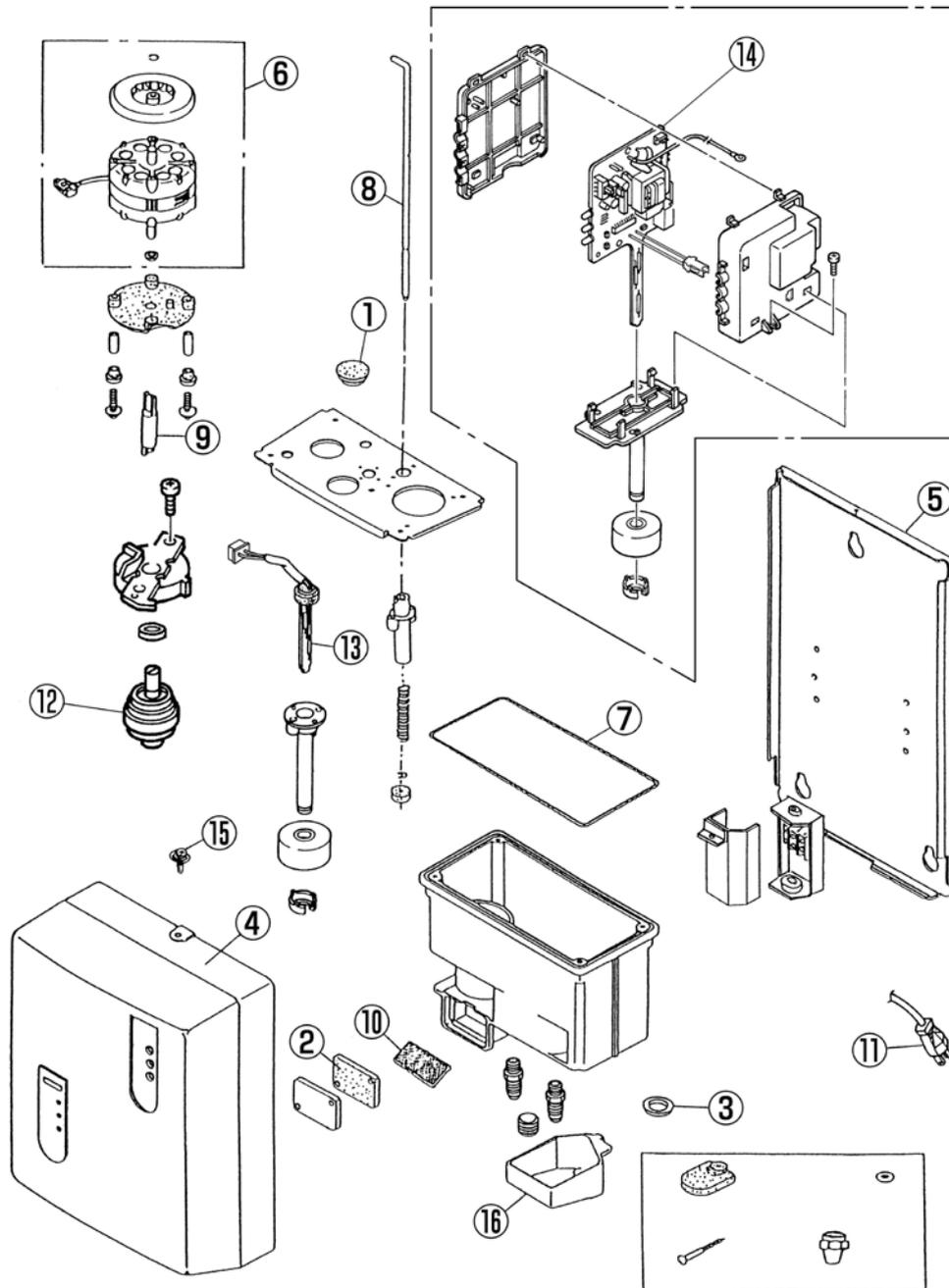
SPECIFICATIONS

PUMP TYPE	Suction (Head or fall type)
LIFTING HEIGHT (MAX.)	26 ft. (8m)
MAXIMUM HORIZONTAL DISTANCE	131 ft.
SUCTION CAPACITY	4 gal./h (15 L/H) at 20 ft. (6m)
INLET PIPE SIZE	3/8" O.D.
POWER SUPPLY	A/C 115V, 60Hz
POWER CONSUMPTION	16W
SUMP TANK CAPACITY	0.24 gal. (0.9 L)
DIMENSIONS	Width: 8" (202 mm) Depth: 4-1/4" (107.5 mm) Height: 10-7/8" (278 mm)
WEIGHT	7.1 lbs. (3.2 kg)
FUEL TYPE	ASTM D3699 1-K Kerosene or ASTM D396 No.1 or No.2 Fuel Oil

ELECTRIC CIRCUIT DIAGRAM



COMPONENT PARTS



<u>REF #</u>	<u>PART #</u>	<u>PART NAME</u>	<u>REF #</u>	<u>PART #</u>	<u>PART NAME</u>
1	20459824	Fuel opening cap	9	20459882	Drive shaft
2	20459852	Strainer gasket	10	20459850	Fuel strainer
3	20459880	Drain packing	11	20475535	Power supply cord
4	20477546	Cover	12	20459819	Pump assembly
5	20477529	Mounting plate	13	20477576	Switch circuit
6	20459837	Motor assembly	14	20477512	Main circuit board
7	20459815	O-ring (S150)	15	20459805	Cover screw
8	20459817	Outlet valve lever	16	20459825	Funnel

SPECIAL FEATURES

Capable of lifting fuel up to a height of 26 ft. (8 m):

Equivalent to the height of the third floor of average residences (including multistoried flats and buildings).

Fuel sump permits fuel supply without electric power:

The fuel sump contains approximately 0.17 gal (0.66 liters) that can be used even though there is a temporary power outage.

Automatic operation restored after power outage:

Operation is automatically restored after a power outage without manually resetting the unit.

Lifter stops automatically if without fuel supply:

The lifter is automatically stopped within a specified time after the fuel supply is disrupted. This will prevent the pump from being damaged. This condition may also indicate that the supply tank is empty.

Easy resumption of operation with the refueling button:

A refueling button re-establishes fuel supply to the lifter after the lifter has run out of fuel. Therefore, refueling (priming) can be done easily (except at the initial installation).

Double protection against overflow:

An abnormal oil level detection circuit positively stops the operation of the lifter if it does not stop at the upper limit fuel level. An overflow pipe can also be installed.

Intermittent operation:

The lifter only pumps as much fuel as is consumed. This helps reduce electric power consumption.

Silent design to ensure minimum noise:

The design and intermittent operation of the lifter ensure that it can be installed indoors without causing a noise disturbance.

Long service life with the rotary pump:

Use of a rotary pump ensures long service life of the lifter without malfunction.

SAFETY AND RELIABILITY

Highly reliable parts and components, various safety devices, and other protective features ensure safe operation of the lifter.

Abnormal fuel level prevention:

Fuel leaking from the unit is considered to be one of the most serious failures of a lifter of this type. The following redundant safety features are used to prevent this problem with the Toyotomi Fuel Lifter. A float switch continuously maintains the normal high and low fuel level range. If the lifter malfunctions and the fuel amount exceeds the normal high level, a high limit safety switch stops the motor to prevent the fuel from over-flowing. The red error lamp is also illuminated to call attention to this problem. The lifter will not automatically restart. To reset the unit, turn the operation switch off or disconnect the power cord and repair the malfunction before restarting the lifter.

Motor protection:

The motor provides power for the pump and will not operate if the pump gets stuck and locked during operation. To prevent damage to the motor a safety device shuts-off the motor after 30 minutes of continuous operation. Also, in the event that the motor becomes excessively hot, a high-temperature sensing device (a temperature fuse in the motor) terminates electric power to the motor.

Float switch:

A float switch consisting of three glass-enclosed reed switches provides highly reliable performance in adverse conditions such as moisture, dust, or harmful gas.

Lightning surge protection:

A varistor protects the lifter from damage due to abnormally high voltage that may be caused by lightning or from a power line surge and which would otherwise destroy the control circuits.

Protection from short:

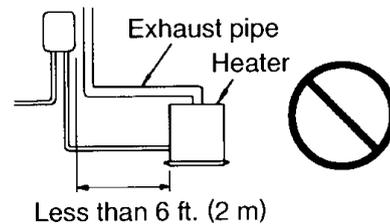
A fuse is used to protect the lifter from damage caused when voltage of 240V is applied or when part of the circuitry is subjected to a short.

INSTALLATION

SELECTING LOCATION

CAUTION: This lifter is for indoor use only. Check local codes and ordinances for permitted uses.

1. Select a safe and solid place to install the lifter.
2. Select a place easy to inspect and maintain.
3. Do not install the lifter less than six- (6) ft. (2m) from the heating appliance horizontally. Do not install the lifter near the exhaust pipe and the heat chamber of the heater.



4. Select a location away from direct sunlight and other heat sources.
5. Maintain the shortest fuel line possible by selecting a location that is as close as possible to the main fuel tank. If the fuel line to the main fuel tank is long, a properly located check-valve will eliminate a long wait for fuel delivery.

TIPS FOR SAFE INSTALLATION

Follow the safety tips below when installing the lifter.

1. Establish the height of the lifter as follows.
 - (a) The height between the main fuel tank valve and the bottom of the lifter:
26 ft. (8m) maximum
Locate the lifter as low as possible.

(b) Height between the floor level of the heater and the bottom of the lifter:

8-1/2 ft. (2.5m) maximum

(c) At least 16 in. higher than the heater fuel intake fitting.

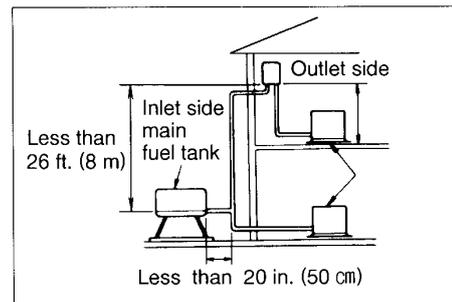
2. Max. length of the pipe between the main fuel tank and the lifter:

131 ft. (40m)

If more than 50 ft. (15m), 1/2 in. fuel line is recommended instead of 3/8" tubing.

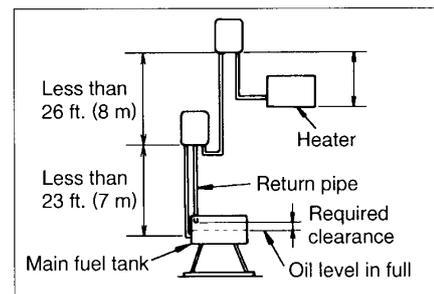
3. If one lifter is used to fuel to several heaters, about 1/3 of the total flow may be lost to internal resistance. If several heaters are to be used, preferably install the lifter at a midway point between those heaters.

4. If fuel is to be supplied from a main fuel tank by gravity flow to a heater on the first floor and another heater on the second floor will be supplied by a lifter, the branch point of the fuel line should be located as close as possible to the outlet of the main fuel tank.



5. Fueling with a series operating lifters:

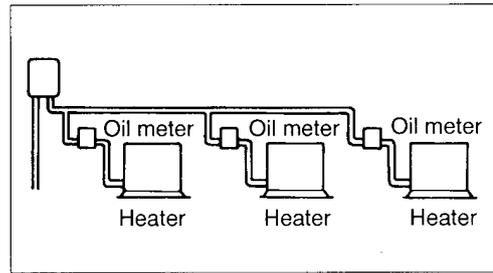
(a) This lifter is capable of pumping a maximum head of 26-ft. (8m). More height can be accomplished by using additional units in series. However, please note that when two or more lifters are connected in series, the fuel supply line (or head) to the upper lifter(s) must be approximately 3 1/3 ft. (1 m) longer (less)



than the fuel supply line (or head) for the unit below it. Thus if the upper unit is lifting the maximum head of 26 feet, the lower unit must only lift approx. 23 feet.

(b) An overflow fuel pipe (return pipe) must be used when operating lifters in series. The overflow fuel pipe must go to the main fuel tank and be installed so that there is clearance between the outlet of the overflow fuel pipe and the maximum oil level in the main fuel tank. A special part is also required in order to attach the overflow fuel pipe to the lifter. (#22744901)

6. No more than three oil meters should be used on the outlet line from the lifter. Air inside of the oil meter may expand due to a change in surrounding temperature and possibly cause fuel to flow back to the lifter.



CAUTION: If more than four meters are installed on the outline fuel line the lifter may leak fuel and create a hazard.

INSTALLATION OF THE LIFTER

1. Check the accessories before installing.

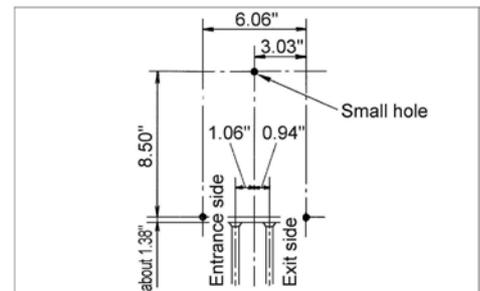
Mounting rubber (3)

Wood screw (3)

Washer (3)

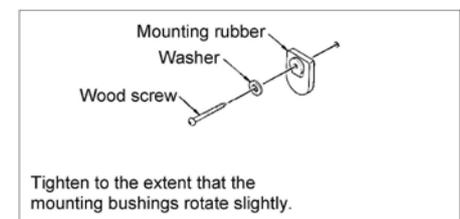
Flare nut (2)

2. Make three (3) small holes on the wall as per the mounting dimension diagram.

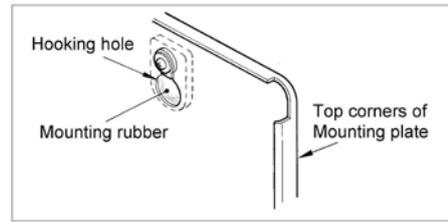


3. Attach the three (3) mounting rubbers to the wall with the wood screws and the washers.

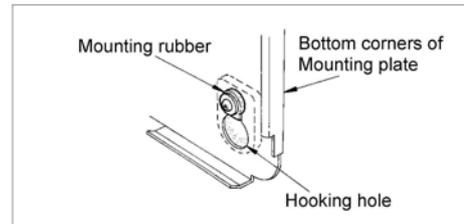
Do not tighten the mounting rubbers excessively.



4. Install the mounting plate over the mounting rubber cushions using the holes. Slide the mounting plate down.



5. Attach the three (3) screws securely. Be sure not to touch the motor's cooling fan or the control box with the screwdriver.

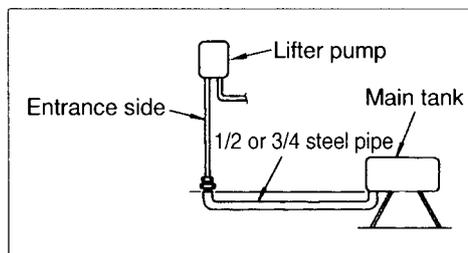


FUEL SUPPLY LINE

PRECAUTIONS

1. Use 3/8 in. (9.53 mm) outside diameter (O.D.) and not less than 0.032 in. (0.8 mm) thickness copper tubing.

Note: some local building inspection authorities may not accept Copper tubing as fuel line. Check local codes and ordinances for permitted use. In these instances, the fuel line may need to be made of wrought iron or steel.



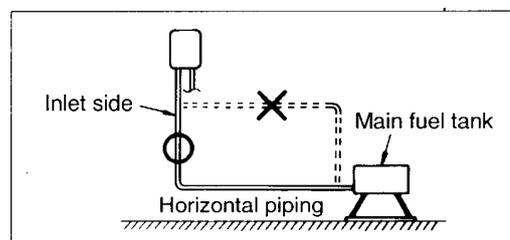
2. When cutting the copper pipe, be sure to use a tubing cutter and note the following:

- (a) Do not damage any part within 5/8 in. (15mm) of the cut surface.
- (b) Remove burrs from the cut surface completely.

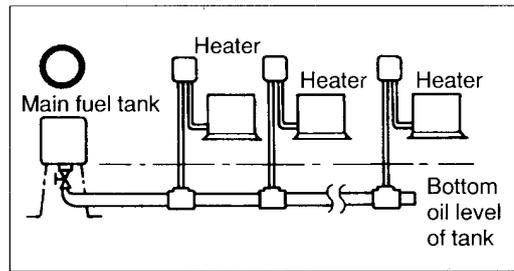
3. Be sure to bend the copper pipe before connecting it.

PRECAUTIONS

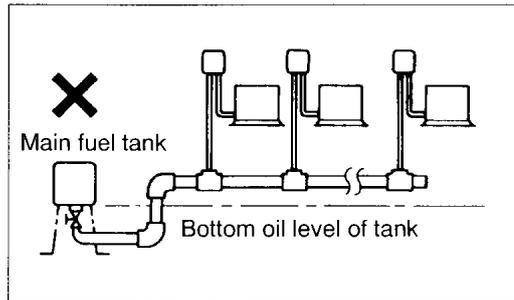
1. Install the horizontal pipe on the inlet side as low as possible up to the point which is in closest proximity to the lifter and from which the vertical pipe rises straight up to the lifter. If installing horizontal fuel line in other cases than above, carefully observe the following:



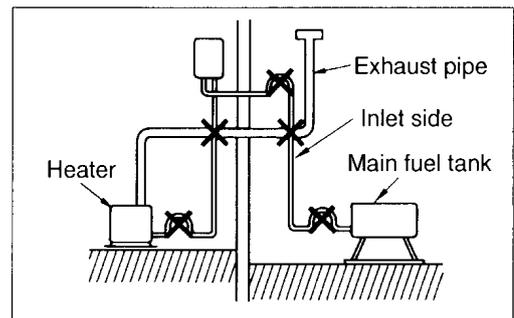
(a) When installing several lifters with one main fuel tank, install a large diameter horizontal pipe lower than the height of the bottom of the main fuel tank at each point at which the branch vertical pipes are connected to their respective lifters.



(b) If the large diameter horizontal line is installed higher than the bottom of the main fuel tank, the lifters will be overloaded and require an excessive length of time for suction or possibly cause be incapable of suction.



2. Be careful not to have any convex or concave bends in the line or sections of the line that might come in contact with heat and cause high temperature at those points.



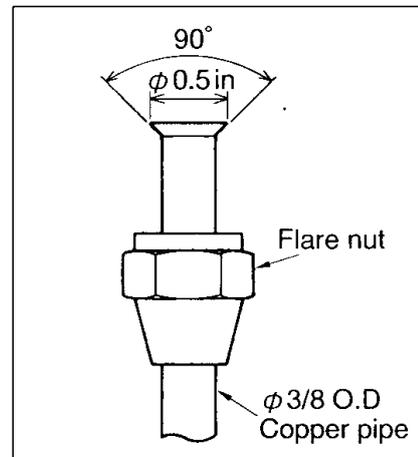
3. The amount of fuel in the outlet fuel lines must be less than 1.3 gallons (5 liters).

Note: Fuel inside the line may expand with high ambient temperature and cause fuel to be pushed back up to the lifter.

4. When inspecting the lines and joints for leakage, be careful not to cause any pressure rise inside the piping. Such pressure may cause the lifter to malfunction.

FLARING THE TUBING

1. Slide the flare nut provided onto the copper tube.
2. Flare the pipe with a good flaring tool.
Note: Be sure the flare is "CLEAN".
3. Push flared pipes against the joint nut and tighten the flare nut. Fasten the nut securely, but do not over-tighten.



CONNECTING COPPER PIPES

1. When connecting a copper tube to the main fuel tank from the top rather than from a bottom drain, leave 2 in. (5 cm) or more between the end of the fuel line and the bottom of the tank (so that it does not pump up water or sediment).
2. When connecting a copper tube to the lifter, use the following procedure:
 - (a) Cut the copper tubing to size and slip the flare nut onto the tubing.
 - (b) Flare the tubing by using a good flaring tool. Push the flared tubing against the joint nut fitting and tighten nut with the torque approx. 220-lbs. in. with two wrenches.

CAUTION: Flush the fuel line briefly with fuel before connecting to the lifter and make sure that fuel line is free from any particles from cutting the copper tubing.

OPERATION

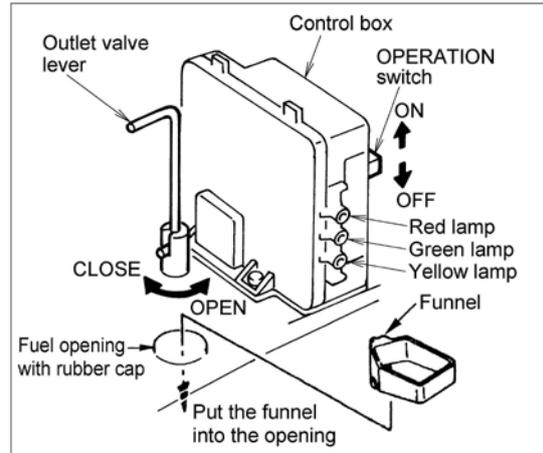
■ When operating the lifter for the first time after installing:

Before operating the lifter according to the following procedure, check the installation and fuel lines to be sure they are done as described in "INSTALLATION" and "FUEL LINE".

1. Remove the cover screw at the top of the cover and remove the cover by pulling it slightly forward.
2. Set the outlet valve lever to CLOSE, turn the operation switch to OFF, and insert the power plug into the outlet. The yellow lamp will flash to indicate insufficient oil level.

- Use the attached funnel to pour about 0.12 gallons (450 cc) of fuel into the fueling mouth. When the fuel sump is filled sufficiently, the green lamp will flash to indicate a normal oil level.

CAUTION: Use clean fuel only! Be sure there is no contamination such as dirt, water or particles of metal.



Note: If an excessive amount of fuel is

filled, the red lamp will flash to indicate excessive fuel. If this occurs set the outlet valve lever to OPEN and supply fuel to a heater until the normal fuel level is established.

- Turn the operation switch to ON. The green lamp will change from flashing to continuous and the motor will start operating.

CAUTION: Do not touch the motor fan! The motor fan will start when the operation switch is turned to ON.

Note: When first started the intake line contains air and a muted "THUMPING" sound will be heard. Once the line is filled with fuel the sound will cease.

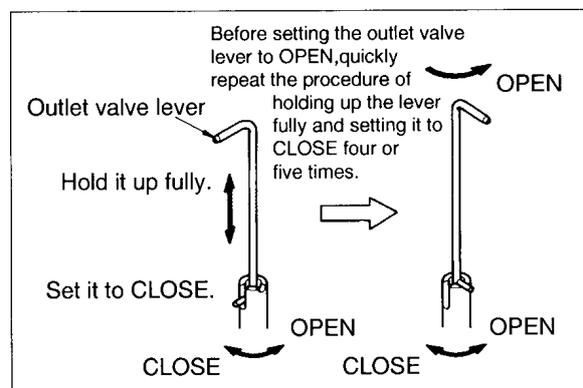
Note: When this sound does not stop until just before the motor stops, air is leaking into the fuel line. Check the line and all connections, especially the flares.

Note: When the lifter is installed correctly, a proper amount of fuel will be pumped up in about 5 to 12 minutes and then the motor will stop.

- Turn the outlet valve lever to OPEN.

CAUTION: When operating the outlet valve lever, be careful not to touch the motor fan.

- If the outlet line is longer than 33-ft. (10 m), open and close the outlet valve lever several times. When the motor starts rotating, set the outlet valve lever to CLOSE, and when the motor stops rotating, set it to OPEN.



- Before turning the outlet valve lever to OPEN, quickly repeat the procedure of holding up the lever fully and turning it to CLOSE four or five times.

This will help prevent air locks in the line.

- Be sure that fuel is not leaking from any part of the lifter as well as from the inlet/outlet lines and all joints.

6. Remove the funnel from the fueling mouth and store it in a secure place.
7. Plug the hole of the fueling mouth securely with the rubber cap.
8. Replace the cover and attach with cover screw. At this point, the lifter is ready supply fuel automatically to the heater.

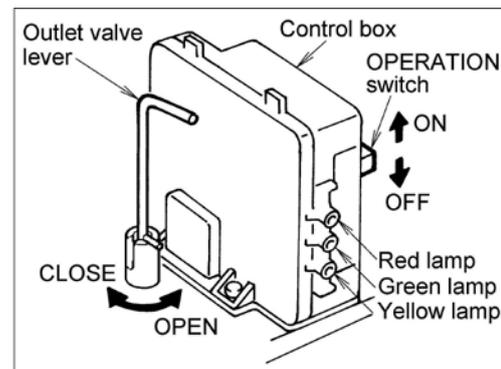
■ **When Restarting the lifter in the next season:**

1. Remove the cover screw and remove the cover.
2. Turn the outlet valve lever to CLOSE, turn the operation switch to OFF, and insert the power plug into the outlet.
3. Turn the operation switch to ON.

Note: If the red lamp comes on or flashes when the operation switch is OFF position, the motor does not rotate when turning the operation switch to ON.

Note: If the yellow lamp or green lamp flashes when the operation switch is OFF position, the green lamp will flash and the motor will start rotating to perform lifting for about 5 to 12 minutes when turning the operation switch to ON.

4. Turn the outlet valve lever to OPEN to supply fuel to heater.
5. Replace the cover and secure it with the cover screw.



MAINTENANCE

CAUTION: Be sure to turn the operation switch to OFF and disconnect the power plug before performing any checks or cleaning.

Note: Accumulations of dust and water may cause problems. Check and clean the lifter before using it.

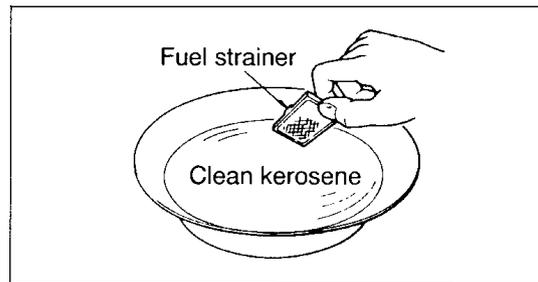
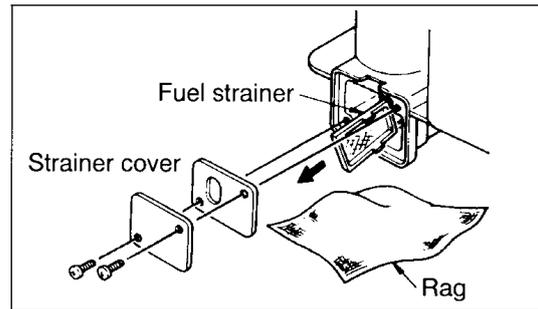
1. Cleaning

Remove the cover and remove any dust from around the motor.

2. Clean fuel strainer

If the fuel strainer is clogged, clean it in the following manner.

- (a) To catch the fuel that will drain out, place a rag or folded paper towel below the strainer cover.
- (b) Loosen the two (2) screws from the strainer cover and remove it.
- (c) Remove the fuel strainer and rinse with clean fuel.
- (d) Return the fuel strainer to its original position. Replace the strainer cover and replace the screws.
- (e) Wipe away any spilled fuel.
- (f) Be sure to confirm that there is no fuel leakage from the strainer cover.



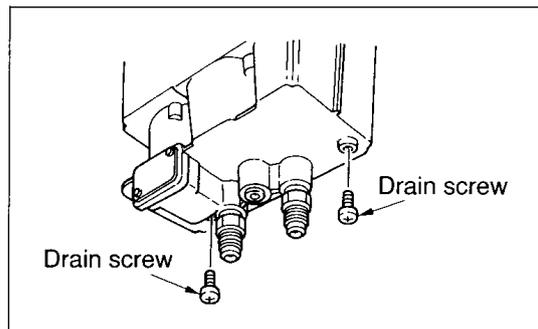
3. Draining the fuel sump

Water can collect in the fuel sump. Drain any water from the fuel sump prior to each season's start up.

- (a) Remove the two (2) drain screws at the bottom of the unit.

Note: To catch the fuel and water that will drain out, set a half-gallon container under the unit.

- (b) Water and fuel will be discharged together.
- (c) Tighten the two (2) drain screws.
- (d) Operate the lifter for a while to confirm that no fuel is leaking from the drain screws.



STORAGE

Preservation of the lifter:

- Use the following procedure to prepare the lifter for storage during the off season if it is to remain installed.

1. Disconnect the power supply plug from the receptacle.
2. Turn the outlet valve lever to "CLOSE".

- If the lifter will be stored disassembled:

1. Disconnect the power source plug from the receptacle.
2. Remove fuel from the unit in the procedures referred to "Draining the fuel sump". (See

Page 15.)

3. Mark the pipe joints and the nuts and then take them apart.
4. The lifter unit and relevant fuel lines should be covered with a piece of plastic to prevent dust or insects from entering.

When using the lifter in the next season:

- If the lifter has been stored as installed:

Restart the lifter in accordance with the procedures mentioned in the instruction of "When restarting lifter in the next season." (See Page 14.)

- If the lifter has been stored disassembled:

1. Securely reconnect the inlet and outlet fuel lines so that they will not leak.
2. The nuts that were marked when disconnected for storage should be fastened approximately 1/6 turn tighter.
3. Restart the lifter in accordance with the procedures that are mentioned in the "When operating lifter for the first time after installing." (See Pages 12, 13 & 14.)

Service information:

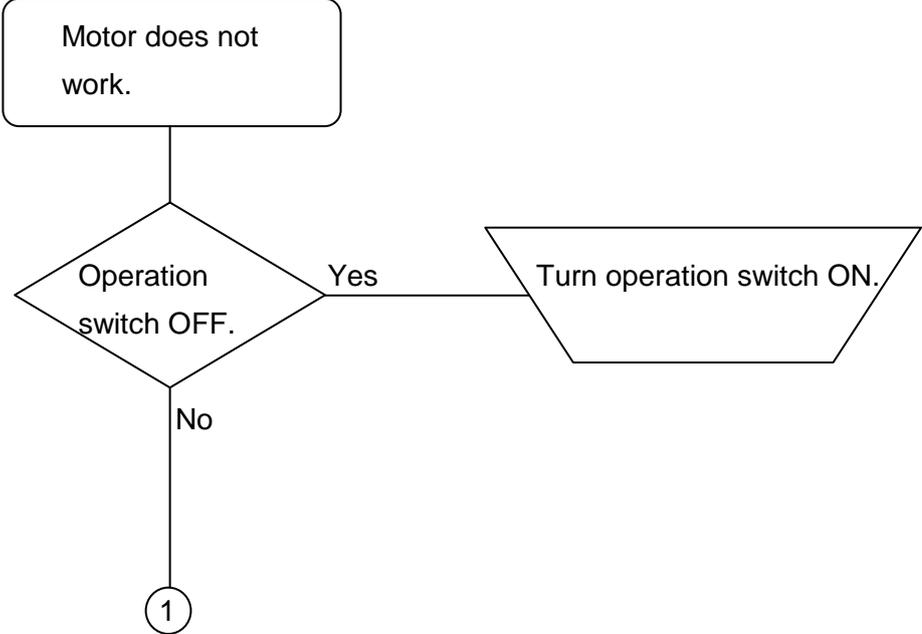
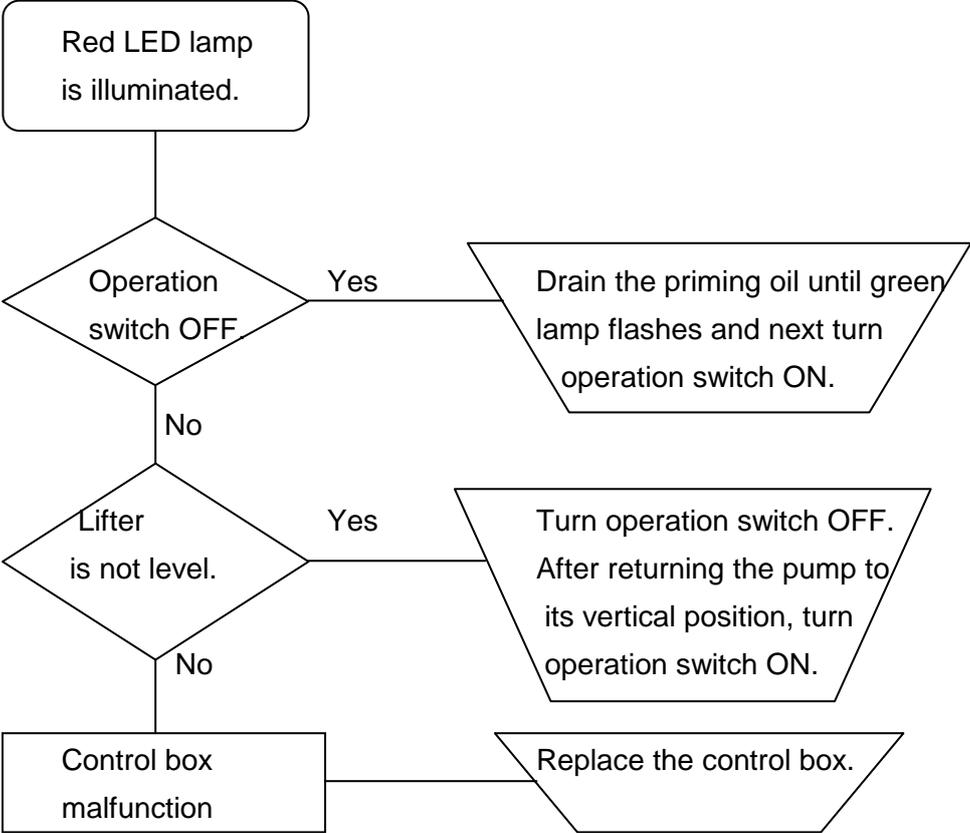
Any operational or functional trouble should be referred to your local dealer or distributor.

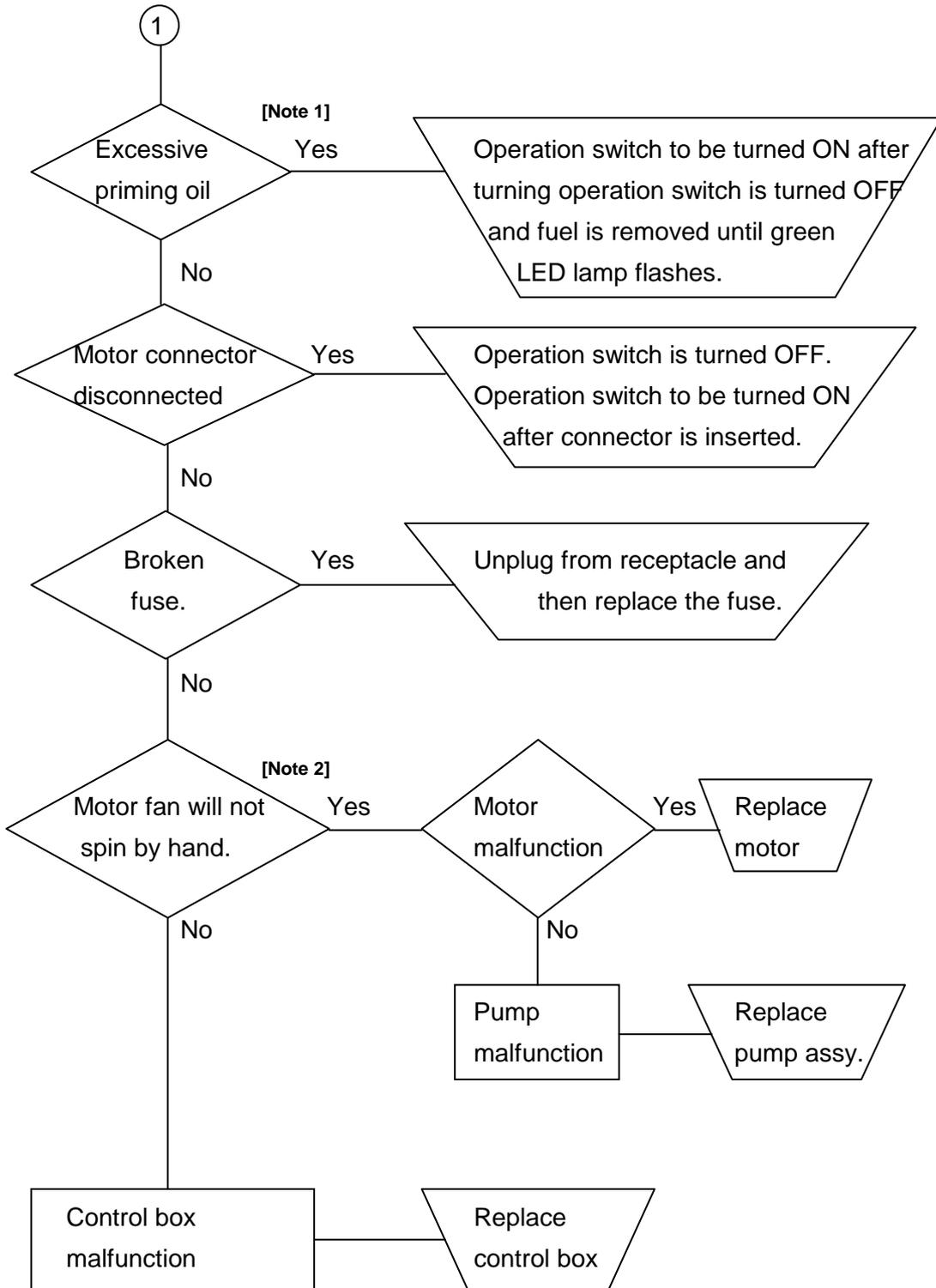
TROUBLESHOOTING

The following points should be checked before proceeding with detailed inspection.

1. Make sure that the power supply plug is securely connected to the receptacle and that AC115V is supplied.
2. Make sure that the main tank is filled with a sufficient amount of fuel and that the outlet valve is open.
3. Make sure that each fuel line connection is secure and without looseness or leakage.
4. Make sure that the lifter has been installed within specifications (a fuel supply line length of less than 40 meters, a head of less than 26 ft. (8 m), and a height difference of 20 in. (0.5 m) to 8-1/2 ft. (2.5 m) between the lifter and the supply level).

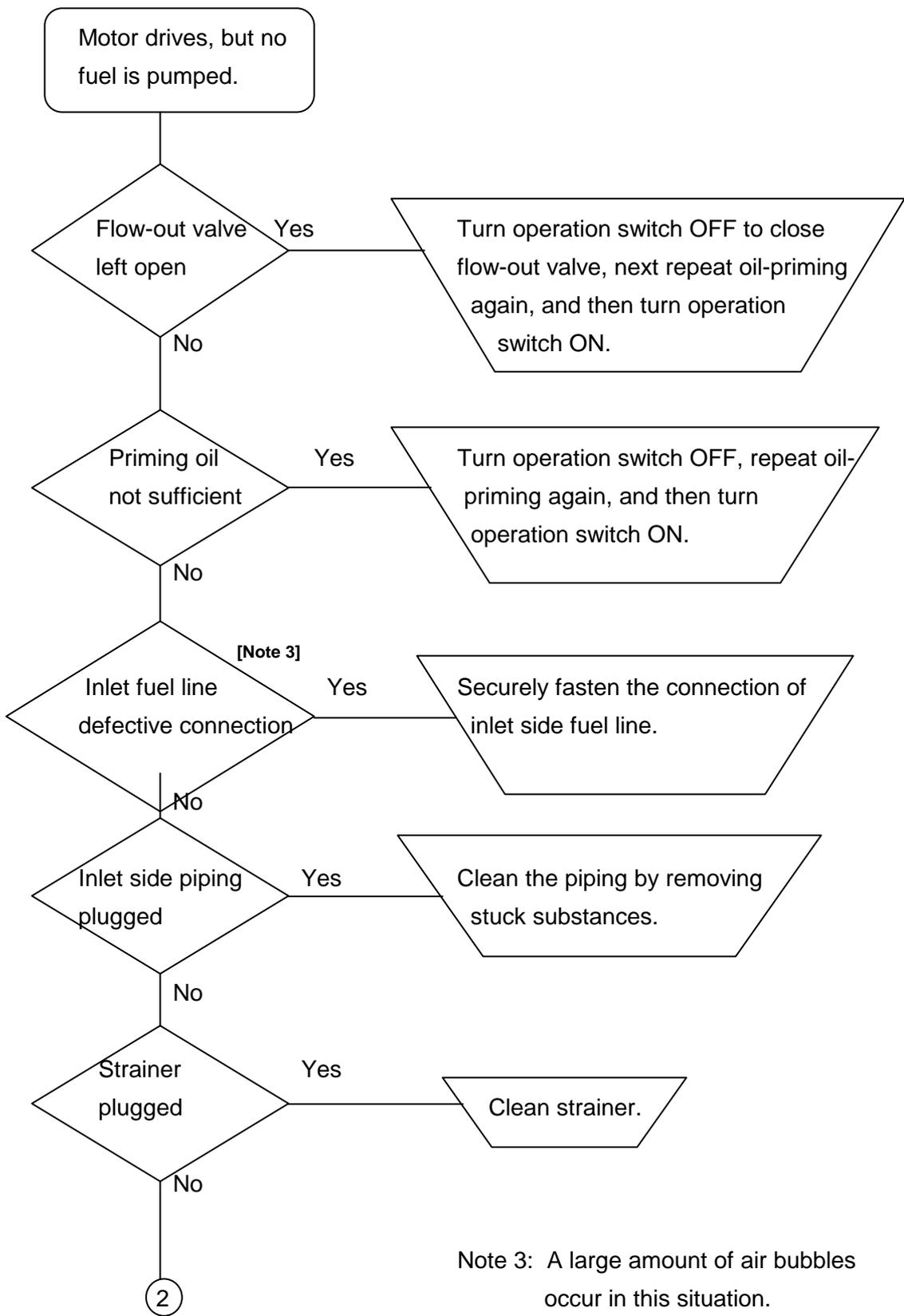
When installing:

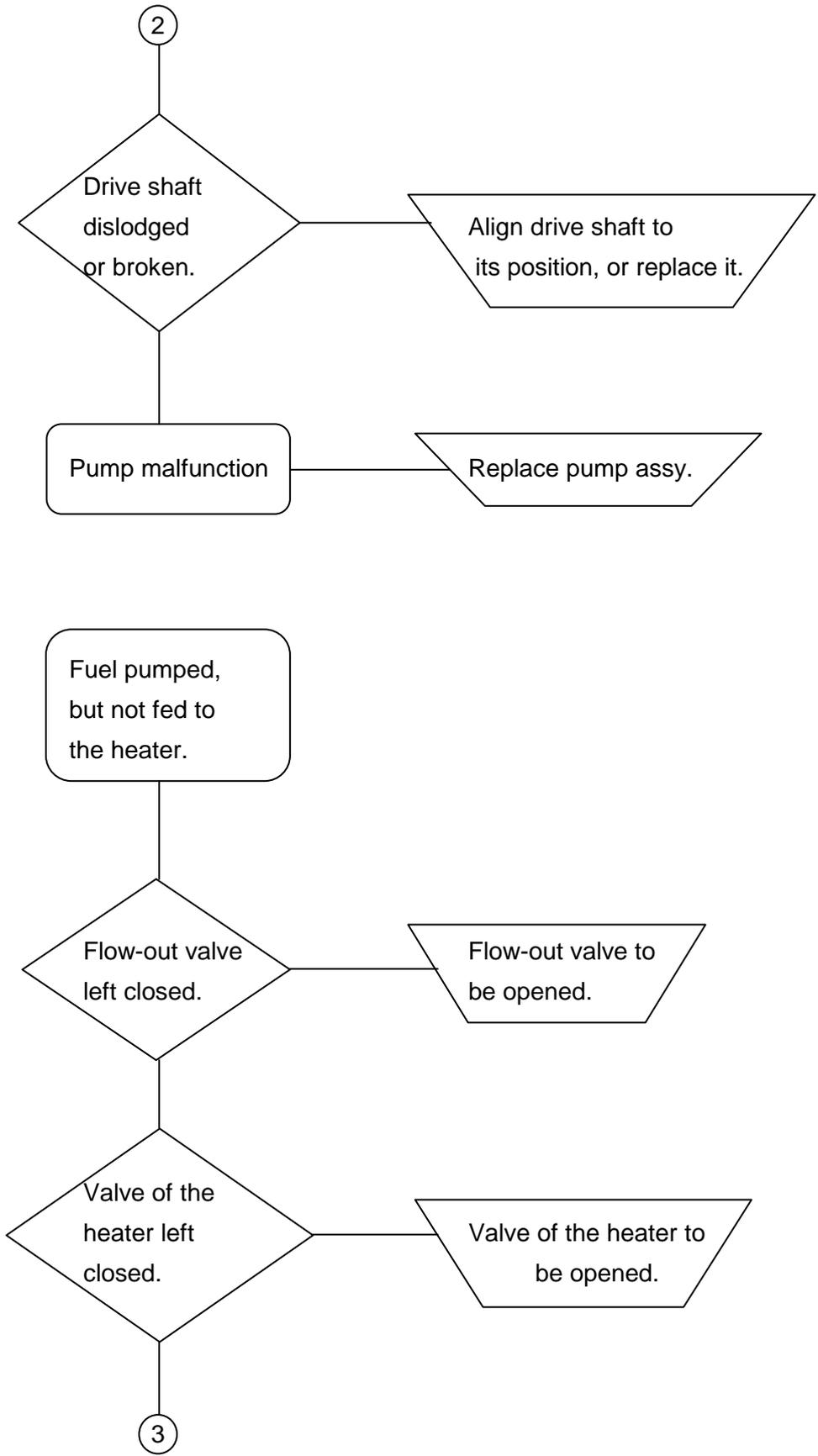


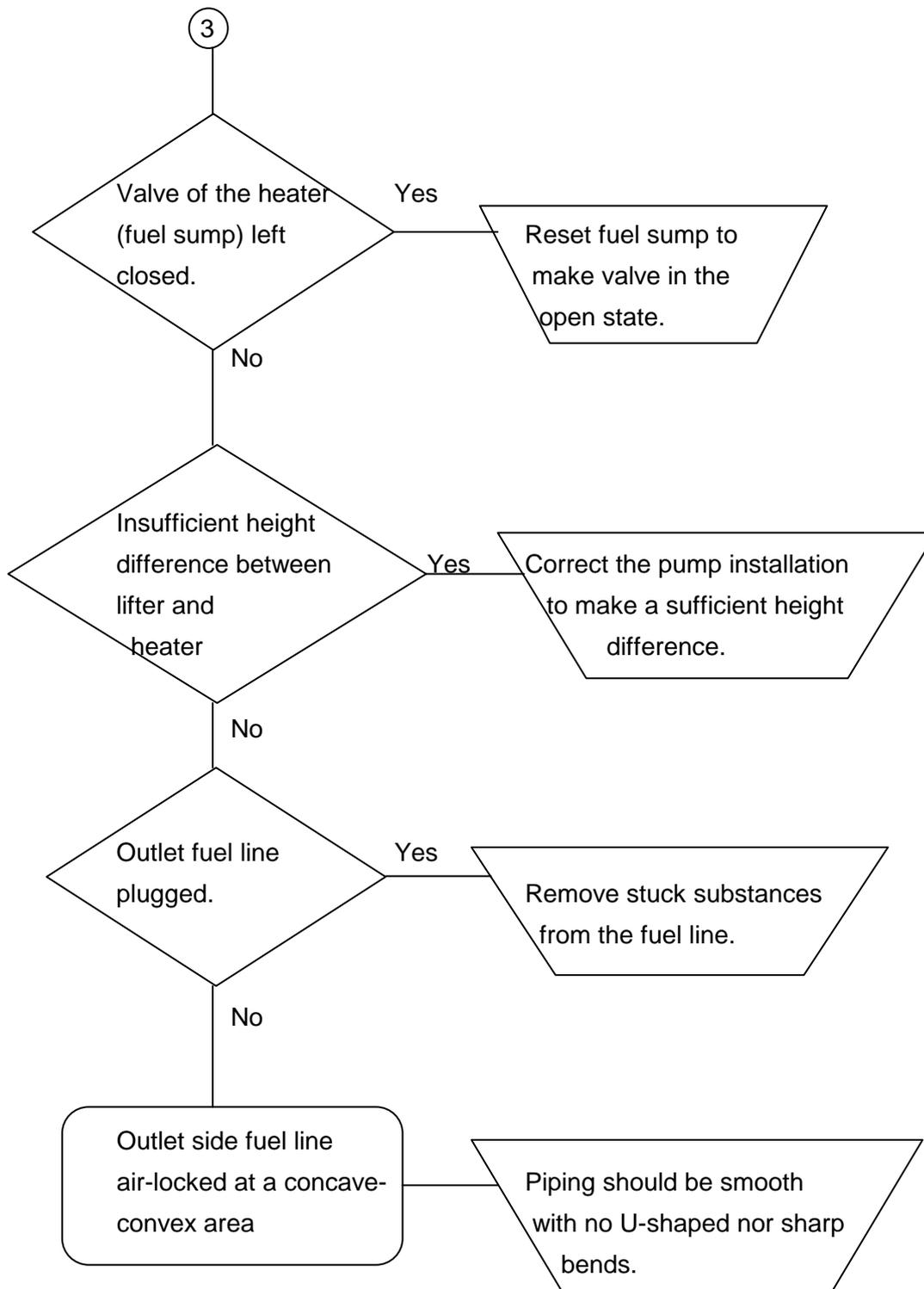


Note 1: If operation switch is turned OFF, but red LED lamp flashes or lights up, fuel has been fed excessively.

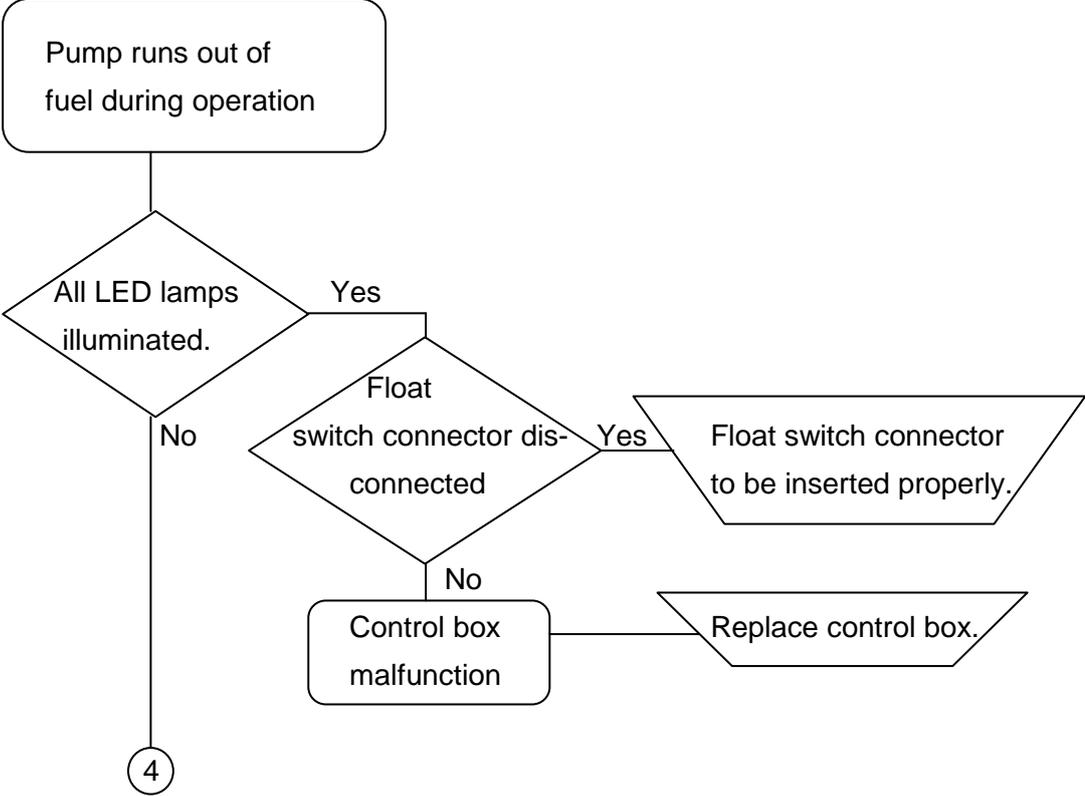
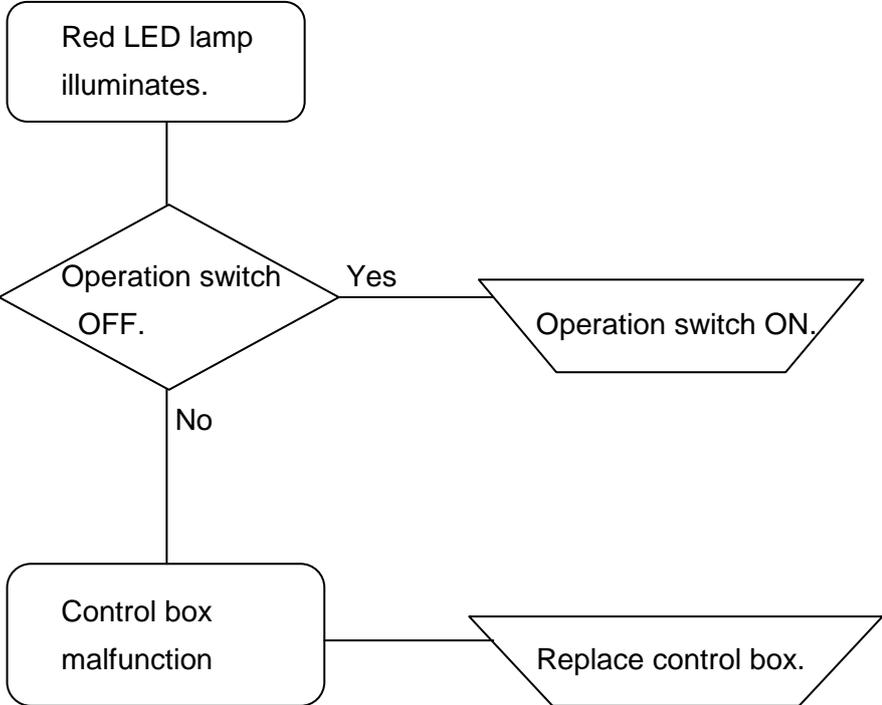
Note 2: Be sure to disconnect power source before turning motor fan by hand.



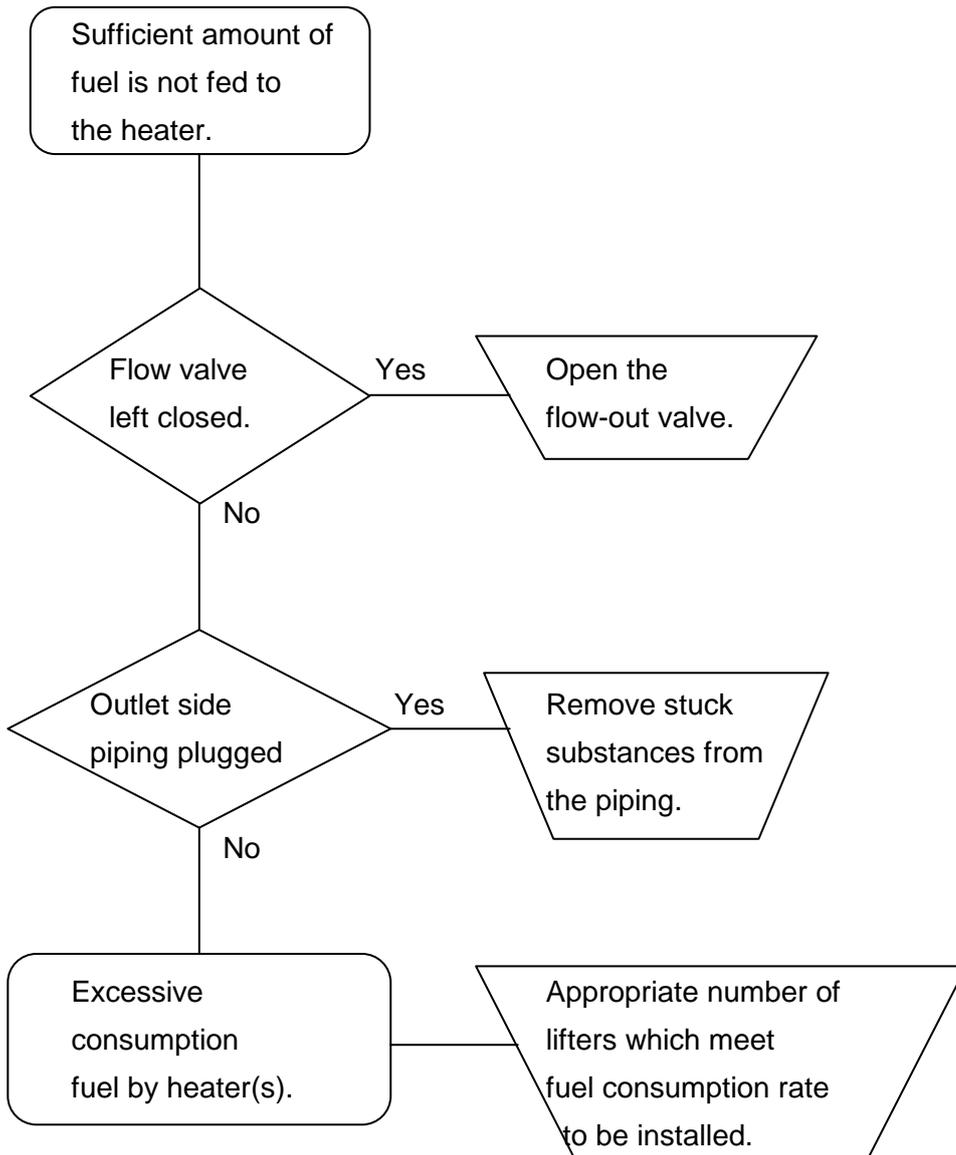


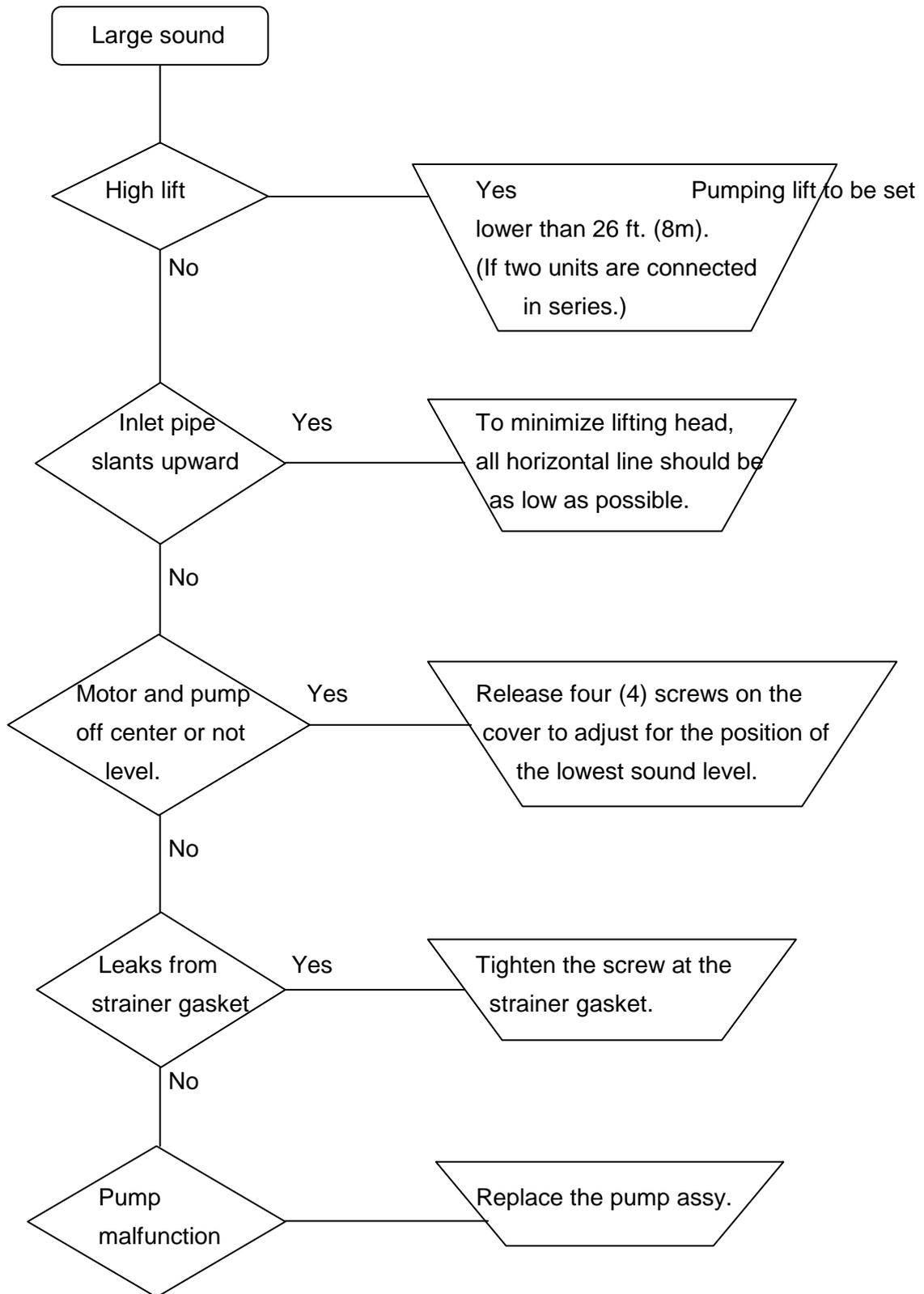


When using and in the beginning of the season:









OPERATING PRINCIPLES OF THE PUMP

- **Explanation of the principles:**

The pump used for the lifter is a rotary vacuum pump. It operates as follows: The motor rotates the rotor to create a vacuum to suck fuel. Fig. 1 illustrates the operation of the pump. When starting suction, the suction port is plugged with the rotor. The discharging process is started at the same time.

The shaded area shows fuel that has been sucked and will be discharged by the rotor into the lifter unit.

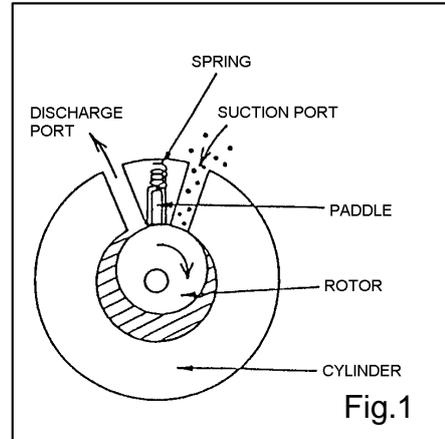
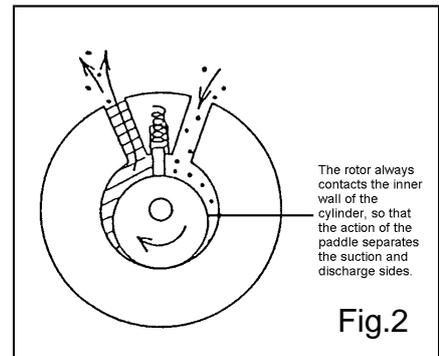
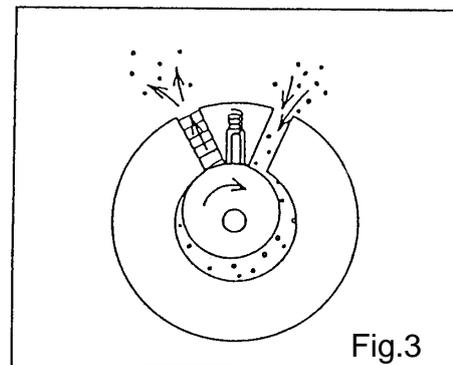


Fig. 2 shows the rotor that has turned 180° (half turn). The suction and discharge processes are divided by the rotor and paddle. Both processes are under way.



When the rotor turns further, the discharge port will be plugged with the rotor. The fuel that has been pumped by the foregoing process is completely discharged.



The operations shown in Fig. 1 to Fig. 3 are called one cycle. At 60Hz approximately 1,690 cycles are repeated by the lifter per minute while approximately 1,410 cycles are repeated at 50Hz. The amount of fuel that the pump sucks during one rotation is constant so the amount of fuel pumped changes as follows between 60Hz and 50Hz.

$$\frac{\text{Supply capability at 60Hz}}{\text{Supply capability at 50Hz}} = \frac{1,690 \times U\alpha}{1,410 \times U\alpha} = 1.2 \text{ times}$$

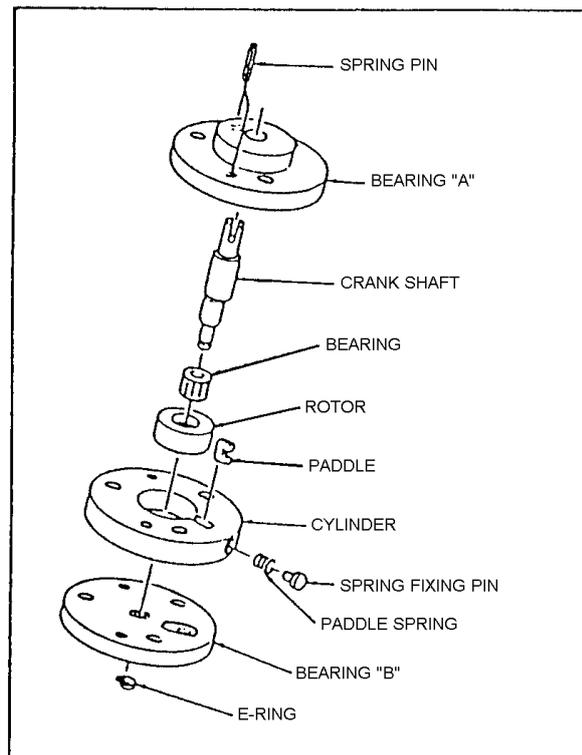
α : constant which is determined by head, viscosity, revolution, and suction resistance,

U: amount of fuel that is pumped by one cycle.

STRUCTURAL ILLUSTRATION:

The Pump is composed of the parts and components shown in the adjacent illustration.

The pump can be disassembled by removing the spring pins (2 pieces). No part is replaceable with any similar part made for other equipment. If any defective part is found, replace the entire pump.



HANDLING PRECAUTIONS:

The following precautions must be observed when using the pump.

(1) No idle operation permitted.

The term "idle operation" means that the pump is operated without being filled with fuel. Without fuel, all the components of the pump, such as the rotor, cylinders, and paddle, will rub each other, and may cause excessive friction wear or jamming.

After a long period without use, special precautions should be observed before trial operation of the pump or before restarting the operation. Make sure that the oil gauge shows an appropriate oil level before turning the power on.

(2) No other fluid may be used:

The pump is designed to utilize the lubrication and sealing characteristics of kerosene or #1 fuel oil. The use of other fluids, such as water, may cause extensive abrasion wear to the components of the pump after only a few days of operation. Since the bearings are especially made for a light fuel oil, they cannot be used for any other fluids.

(3) Precautions in the event of immersion in water:

If water enters the pump assembly it may cause excessive abrasion and will also freeze below 32°F (0°C). This will prevent pump operation. Sufficient care must be taken to prevent water from entering the pump assembly. Occasionally remove the drain screw on the bottom of the pump unit to drain out water.

(4) Care should be taken to prevent dust or tubing debris from entering the interior of the pump:

The pump will not function properly unless the paddle has contact with the rotor. If there is any clearance caused by a foreign substance between the paddle and its operating groove the paddle is not able to work. Special care is to be taken to prevent tubing debris from entering this groove. Advise your customers to inspect the strainer approximately once a year.

ELECTRIC COMPONENTS AND CIRCUITS

ELECTRIC COMPONENTS:

(1) Pump drive motor:

Type: Condenser run single-phase induction motor

Power source: 115V/60Hz

Condenser: $1.5\mu\text{F} \pm \frac{10}{5}\%$ 230WV

Number of poles: 4

Rated revolution: 1,690rpm \pm 5% (60Hz)

Temp. fuse operating temp: OFF at 259°F (126°C)

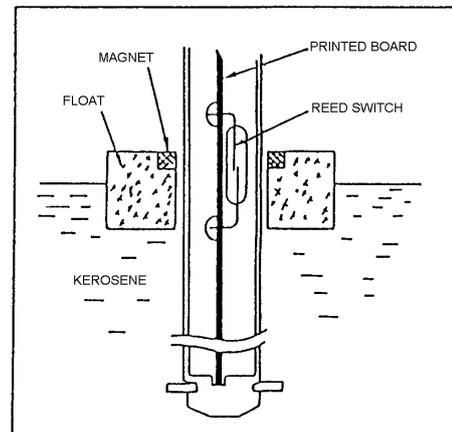
The condenser motor used for the lifter has a sufficiently large starting torque to pump fuel at any low temperature.

Therefore, the lifter is capable of stable operation for a long period of time within in a wide temperature range of between 4°F (-20°C) to 122°F (50°C).

The motor has a temperature fuse to protect it from being damaged if the operating temperature abnormally rises due to motor lock or electric short.

(2) Float switch:

The primary mechanism for controlling automatic operation of the lifter is a float switch. This switch consists of a plastic tube and a ring float that contains a magnet imbedded in the top. Inside the tube are three reed switches that are activated by the magnetic field of the ring float. These switches regulate the ON and OFF functions of the pump and are accurate within a fuel level of 1/16 to 3/16 in. (2 to 5 mm.)

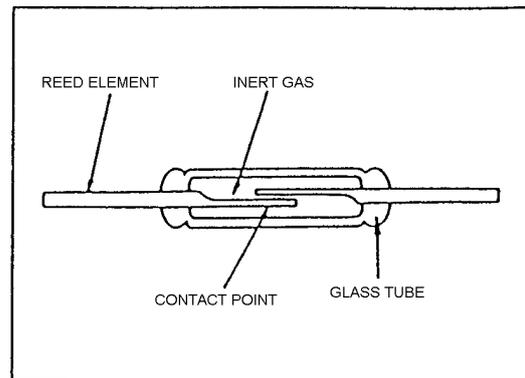


(3) Reed switch:

A reed switch is generally classified as one of two types: dry reed and mercury wetted. This lifter uses dry reed switches which consist of the following four components:

(1) glass tube, (2) sealed gas, (3) contact point, and (4) reed elements.

As shown in the figure, the two reed elements are sealed in an inert gas in the glass tube in which they are aligned with an air gap. These reed elements are magnetized. Therefore, when the reeds are influenced by a magnetic field produced by a magnet (float ring), their magnetic charges increase. When the strength of these effects is sufficient, the attracting



forces of the opposite magnetic poles of the reed elements will cause them to pull toward each other. When this attraction force exceeds the elasticity of the reed elements, the reed switch is closed. When the magnetic field is removed, the attracting forces are reduced and the elasticity of the reeds causes the switch to open.

A reed switch is classified into the following three types on their contact type.

- A: type(SPST).....Normal Open contact point
- B: type(SPST).....Normal Close contact point
- C: type(SPDT).....Common contact point

Type A (Normally Open) is used for the OPT-91UL.

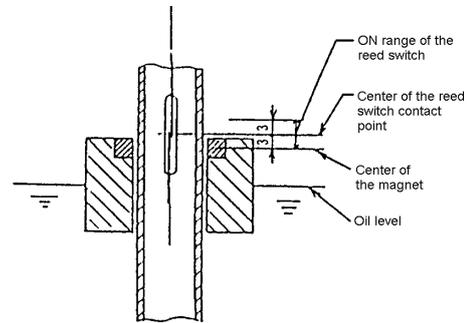
The A type switch consists of two low magnetic resistive reed elements that are enclosed in the glass tube. The two sections create a center gap and an off-center gap. The rhodium contact points have excellent melting resistance, stable contact resistance, and mechanical abrasion resistance. They offer well-balanced performance.

SPECIAL FEATURES:

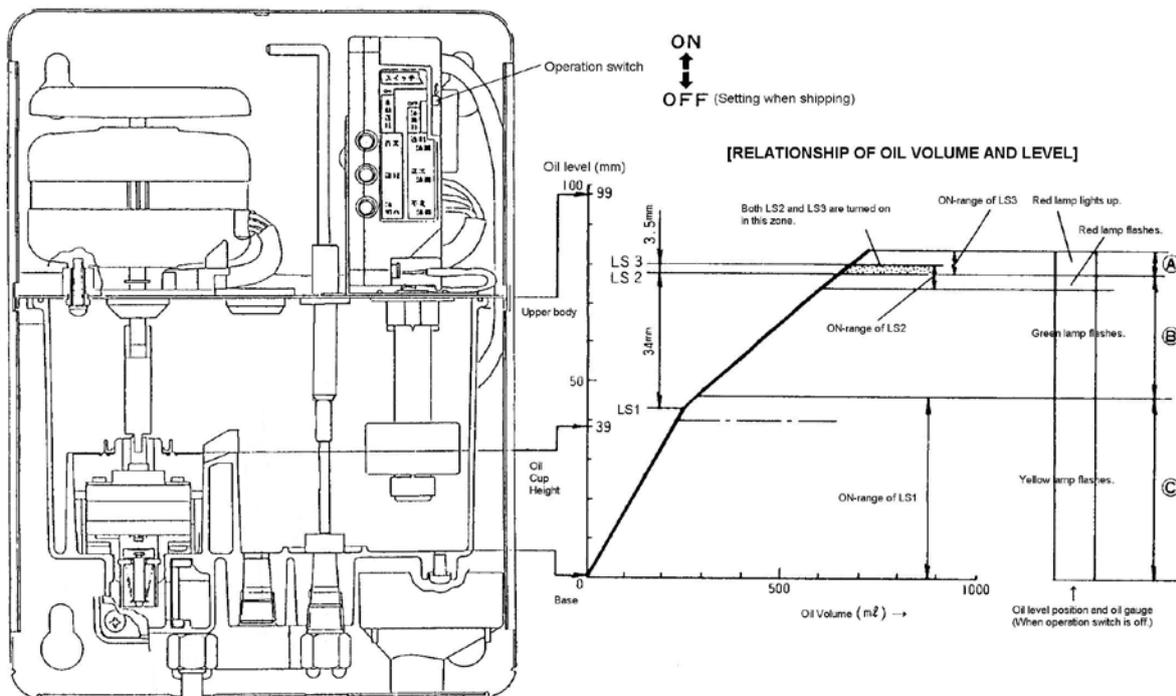
- (1) The switch is free from atmospheric influences since the contact points are sealed with an inert gas in the glass tube.
- (2) Neither adjustment nor maintenance is required.
- (3) The contact points provide long service life with stable functional characteristics.
- (4) Its permanent magnetic drive is reliable. A float in which a magnet is inserted operates the reed switch for the OPT-91UL.

EXPLANATION OF OPERATION OF OPT-91UL

1. The ON and OFF points of the reed switches and their relationship to the oil level are shown in the adjacent diagram.



2. The reed switches are turned ON (closed) when the center of the float ring magnet comes within 1/8 in. (3 mm) of the reed switch contact point and are turned OFF (open) when the float is more than 1/8 in. (3 mm) away. This equals a total activation range of 1/4-in. (6 mm).



AUTOMATIC OPERATION OF THE LIFTER (OPERATION SWITCH ON):

When the oil level is in range C, operation will be as follows:

1. If the fuel level is below the bottom of the switch (C) and the operation switch is turned ON, the pump will be activated and the green lamp will flicker. The first switch (LS1) is ON or closed at this point.
2. If the oil level rises to the bottom of the B range within 15 minutes of operation, the first switch (LS1) will go OFF (open) the green lamp will be solid, and the pump will continue pumping for another 15 minutes or until the second switch (LS2) is turned ON.

3. If the first switch (LS1) is not turned OFF within 15 minutes of operation, the pump will stop and the yellow lamp will flicker. This will prevent idle operation. The lifter may be reactivated by disconnecting and reconnecting the power cord or by turning the operation switch OFF and then ON.

Automatic (intermittent) operation in range B (The green lamp is ON):

1. If the second switch (LS2) is not turned ON within 30 minutes after the first switch (LS1) is turned OFF, the pump motor will stop and all the lamps (red, green and yellow) will flash.
2. Turn the operation switch OFF and then ON or by disconnecting and reconnecting the power cord will restart the unit.

If the oil level is in range A the unit will react in one of two possible ways:

1. If the second switch (LS2) does not work but the motor is still operating and the fuel level continues to rise, an additional "fail-safe" switch will be activated to stop the pump. The red lamp will illuminate. The fuel level must be lowered and the operation switch turned OFF and ON or the power cord unplugged and reconnected.
2. If the fuel level rises to the A range because fuel flow has reversed into the lifter but the motor is not operating, this will be considered normal and the lifter will remain in the automatic operation mode.