



Owner's Maintenance Manual

On the following pages you will find a troubleshooting guide to help you identify and solve problems that may arise and a glossary of terms to help you understand the terminology commonly used in the pool industry.

During the first two weeks, it is very important to brush the plaster surface, (floors, walls, steps and benches) as often as possible. We suggest 3 to 4 times a day for the first 3 days, twice a day for the next 4 days and at least once a day for the next week. We also suggest that you run the filter continuously until the water is clear. Continuous filtration helps speed up the elimination of plaster dust.

It can actually take 2 to 3 months before plaster can be considered cured. During this time dirt can cement itself to the plastered surface. Frequent brushing will prevent this. In addition, the brushing will further smooth and "polish" the surface and help to clean the plaster dust out of the pool.

Begin brushing with the brush at the tile line and then forcefully drive the brush downward along the pool walls and across the bottom, in the direction of the main drain. To help clear out the "dust" it's more effective to have the main drain open and the skimmer closed down while brushing. This can be done as follows:

Slide plate over opening in the float valve assembly, located in the skimmer.

IMPORTANT: Do NOT close skimmer off completely. This causes an insufficient intake of water into the pump, creating a situation known as cavitation.

Also, as soon as possible after start-up, we recommend you take a one quart sample of your pool water, in a clean plastic container, to a nearby pool chemical supply dealer for a complete water analysis. Follow the dealer's instruction for adjusting pH, total alkalinity and water stabilizing. It will be helpful to take along the swimming pool/spa data sheet completed, so they can use this information to guide you in application of chemical treatment.

Description and Function of Various Swimming Pool Components

Main Drain - Draws water from the deepest portion of the pool, ensuring more complete circulation. The main drain has large grate protecting the actual pipe opening to keep large objects from getting into the pump and strainer.

Return Openings - Returns (located in the pool walls) distribute clean filtered water throughout the pool. The adjustable fittings are ideally directed upward in a clockwise direction to keep the surface water moving towards the skimmer.

Skimmer - Draws water from the surface and removes floating debris by creating a skimmer action with the floating weir door located inside the front opening of the skimmer throat. The skimmer weir also prevents floating debris from escaping back into the pool area, once it has been drawn in to the skimmer throat.

Aerator - Provided as a water cooling device and to create fountain effects.

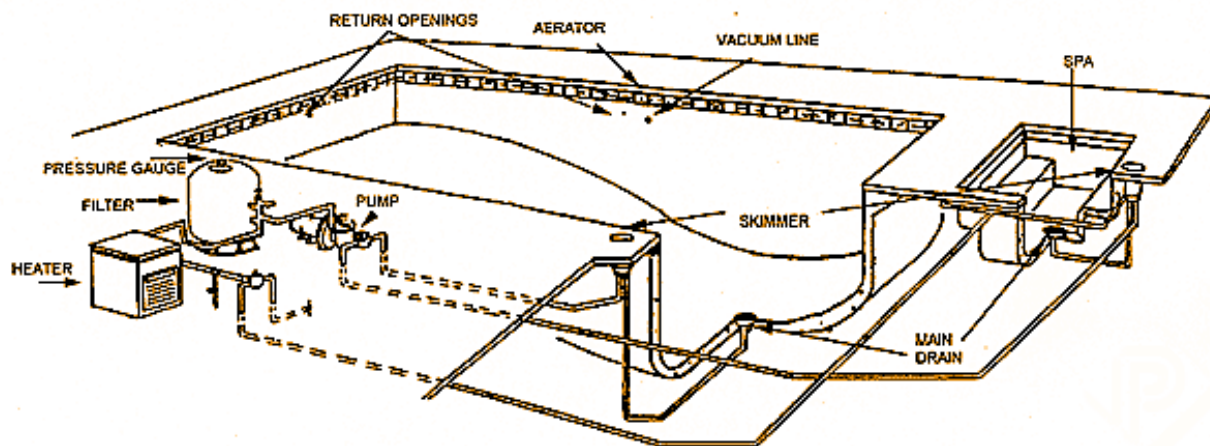
Gate Valve - Controls the amount of water going through the line. Turn left to increase flow, turn right to decrease.

Filter - Removes the dust, sand, grass, leaves, etc. by passing the water through a filtering material such as sand, diatomaceous earth or fabric cartridge. This material allows the water to pass freely through the minute opening, while retaining the debris in the filter.

Pressure Gauge - Located on top of the filter, is used as a guideline to measure the pressure in the filter.

Backwash Valve - Used to reverse the direction of water floating through the filter. It is the direction of flow that determines whether the filter is in normal operating or backwash operation.

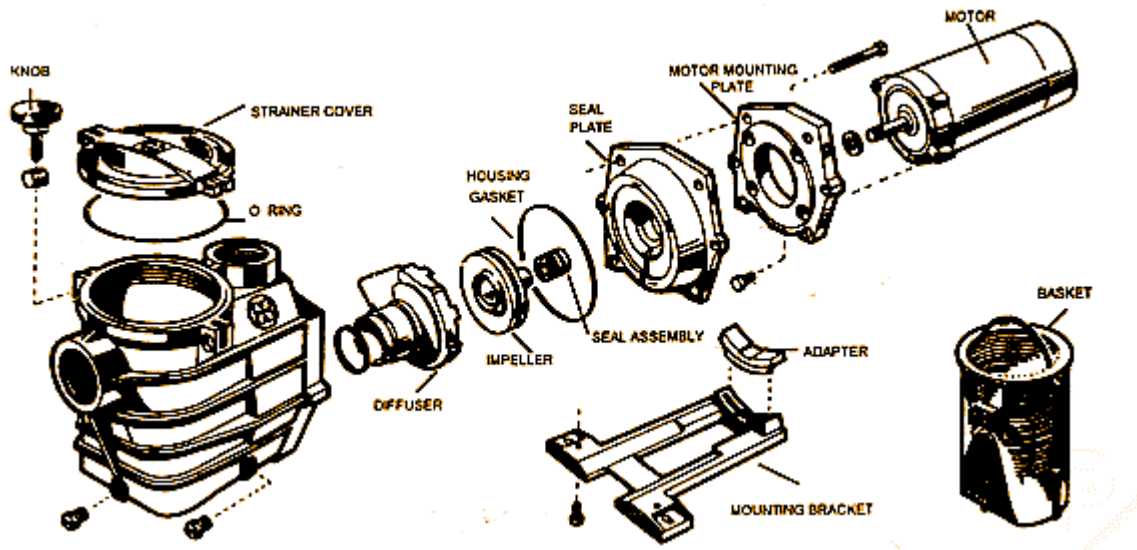
Pump and Motor - With the aid of the motor, the pump pulls water from the pool through the skimmer and main drain pipes, then forces it through the filter and back to the pool through the return openings.



Pump

To service the pump:

1. Turn off pump: remove pump lid.
2. Empty hair lint basket: replace.
3. Clean and lube "O" ring with a water repellent lubricant.
4. Replace lid: hand tighten. DO NOT OVER TIGHTEN!
5. Turn on pump switch.
6. Release air from filter, using the air relief valve. Leave valve open until a continuous stream of water flows from the valve opening, then close the valve.



Filter (Sand)

To filter:

1. Backwash valve must be locked in the (UP) position.
2. Turn on pump.
3. Release air from filter using air relief valve. Leave valve open until a continuous stream of water flows from the valve, then close the valve.

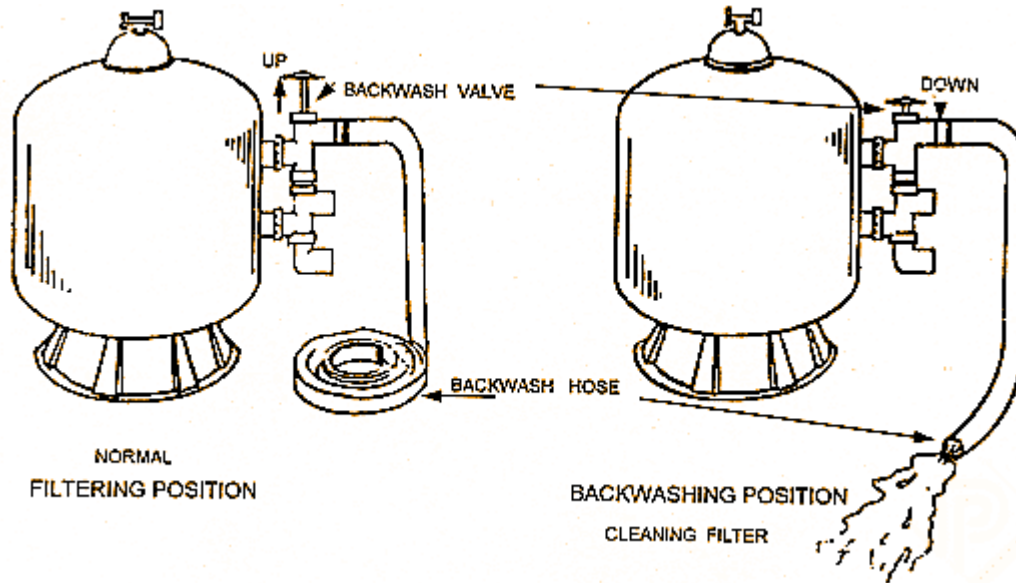
To Backwash:

Backwash the filter when reading on the pressure gauge reaches the psi reading for backwashing listed on your Pools and Spas Data Sheet.

1. Shut off the pump, and clean debris from pump and skimmer baskets.
2. Shift valve handle (DOWN) to the backwash position, and lock.
3. Start pump. Let the filter backwash until water appears clean through the transparent dome and the water runs clear out the backwash hose.

NOTE: Length of time of backwash will vary, depending on the degree of dirt built up in the filter.

4. Stop pump.
5. Shift valve handle UP to the filter position, and lock.
6. Turn pump on, and release air from filter.

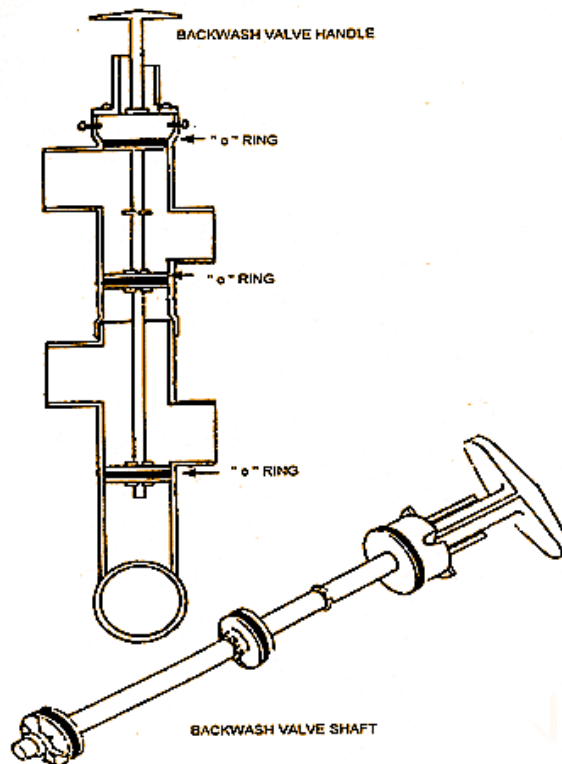


Backwash Valve

The backwash valve requires periodic lubricating with water resistant lubricant, about every two months.

If the handle is hard to lift, it is time to disassemble and lubricate.

1. Turn off pump.
2. Pull up up backwash valve and remove screws in the top.
3. Pull up the shaft with twisting motion to remove.
4. Lubricate "O" rings.
5. Apply a small amount of lubricant to the shaft to lubricate the internal "O" rings.
6. Replace shaft, and tighten screws in the top.



DE Filter

To Filter:

1. Backwash valve must be locked in the DOWN position. CAUTION: Never shift valve handle while pump is running.

2. Turn ON pump.

3. Release air from filter using the air release valve. Leave valve open until continuous stream of water flows from the valve opening, then close the valve.

4. Remove skimmer lid, mix recommended amount of DE in a bucket with some water, then pour in to the skimmer. The DE will be drawn into the filter and deposited evenly upon the grid elements. Remember that it is always best to use less DE than to use too much in order to prevent "bridging" between grids.

MANUFACTURER'S RECOMMENDATION FOR DE QUANTITIES

24 sq.ft. filter = 3 quarts

36 sq.ft. filter = 4 quarts

48 sq.ft. filter = 5 quarts

60 sq.ft. filter = 6 quarts

72 sq.ft. filter = 8 quarts

To Backwash:

Backwash the filter when the reading on the pressure gauge reaches the psi reading for the backwashing listed on your POOLS AND SPAS DATA SHEET.

1. Shut off pump, and clean debris from pump and skimmer baskets.

2. Shift handle (UP) to backwash position and lock.

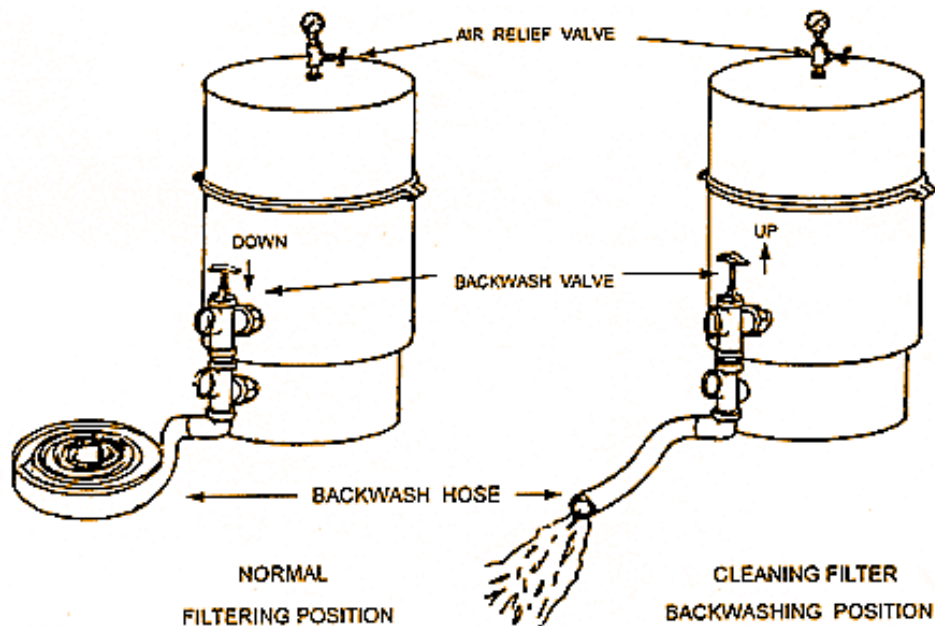
3. Start pump. Let the filter backwash until water appears clear out the backwash hose.

4. Stop pump.

5. Shift valve handle (DOWN) to filter position, and lock.

6. Turn pump on, and release air from filter.

7. Recharge with the recommended amount of DE, refer to step #4 under "To Filter"



Manual Cleaning of a DE Filter

At least once a year, or when pressure is 4 to 6 pounds higher than normal pressure after backwashing, the filter grid should be removed and cleaned. Backwash the filter before doing the following:

1. Turn pump off and open air relief valve. **IMPORTANT:** Be sure that all pressure is relieved from the filter tank before removing the clamp assembly.
2. Loosen each clamp nut alternately until the clamp can be removed. Remove the tank top.
3. Lift the entire grid assembly straight up off the upper piping assembly.

NOTE: Do NOT keep grid assembly in the sunlight more than two hours, as this will shorten the life of the grid cloth.

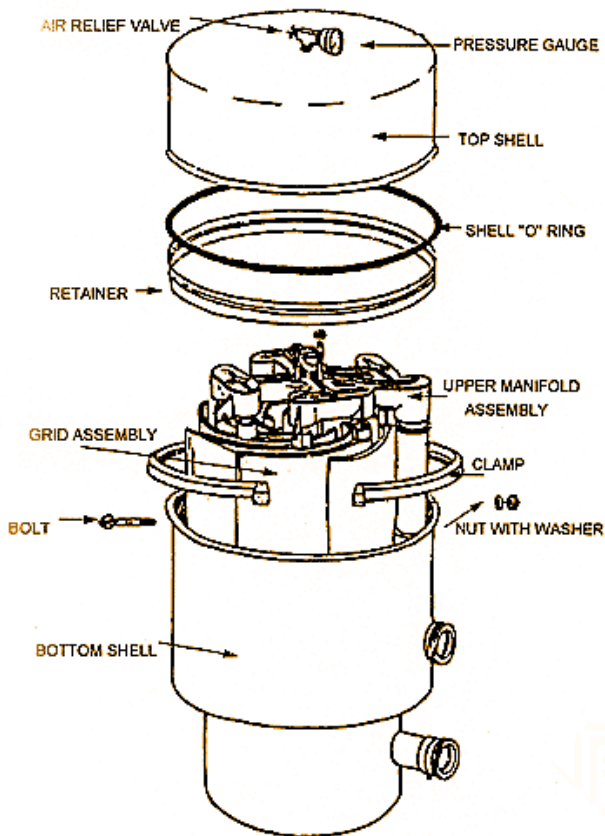
4. Hose the grid elements thoroughly. Grid can be cleaned as a whole unit with a high pressure hose or placed in a large plastic container filled with warm detergent solution. Scrub grid cloth with soft brush. In cases where calcium deposits are evident, soak the assembly in 4 part water to 1 part solution of muriatic acid for 20 to 30 minutes. Rinse clean and proceed with detergent scrubbing.

5. Inspect the grid cloth for tears and check both the small upper pipe "O" ring and large tank seals for any nicks. Lubricate with water repellent lubricant and clean "O" ring and tank seal seat areas. Any damaged components should be replaced.

6. Replace the grid assembly by setting the manifold opening directly over the connector pipe. Push down on the grid assembly to check to see that it is seated properly.

7. Position the tank seal and place tank top on the filter. The tank top should rest on the seal evenly.

8. Clean the inside of the tank clamp and replace. Tighten nuts on both sides alternately and evenly.



Cartridge Filter

To filter:

1. Turn on pump.

2. Release air from filter, using the air relief valve. Leave valve open until a continuous stream of water flows from the valve opening, then close the valve.

To clean:

1. Turn pump off.
2. Open air relief valve on top of filter and open drain cap on bottom. CAUTION: The air bleeder valve should always be open before releasing any clamp on the filter system.
3. Loosen knob, then remove clamp assembly and lid.
4. Remove the cartridge for cleaning.
5. Remove ny unscrewing the plastic cap with strainer.

6. Remove plastic washer and plastic cartridge adapter.

7. Remove cartridge by lifting upward.

8. The filter cartridge can be cleaned with a garden hose. Set hose for the highest velocity and direct spray at proper angle to remove dirt and debris. The cartridge can also be soaked in a solution of TSP cleaner.

9. Install clean cartridge over center pipe being certain it is centered over bottom adapter.

10. Replace the plastic cartridge adapter and plastic washer.

11. Replace the plastic cap with strainer, hand tighten only.

12. Clean tank "O" ring and place tank top on the filter. The tank should rest on the "O" ring seat area.

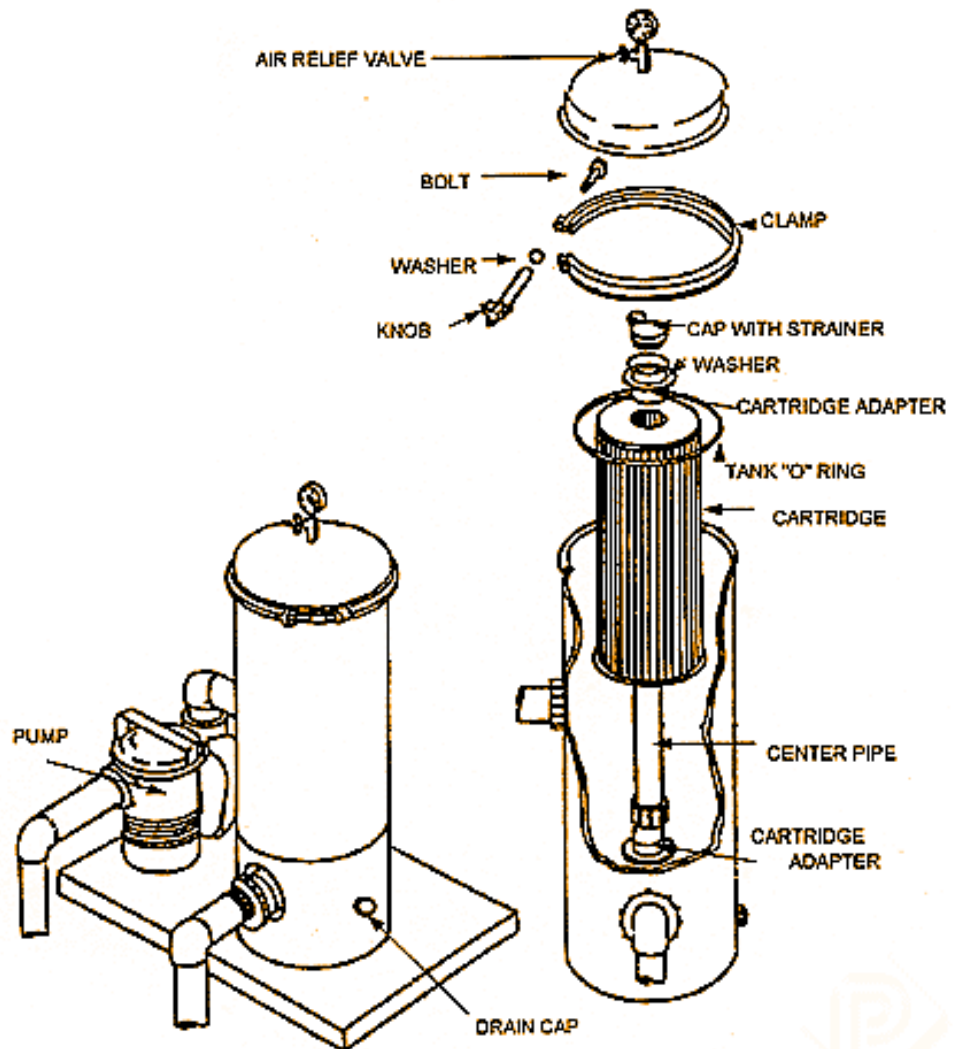
13. Position tank "O" ring and place tank top on the filter. The tank should rest on the "O" ring evenly.

14. Replace clamp band assembly with bolt and knob. Hand tighten only.

15. Replace drain cap.

16. The filter is now ready for operation. Refer to filtering operation to start new filtering cycle.

*We suggest you have an extra cartridge on hand.

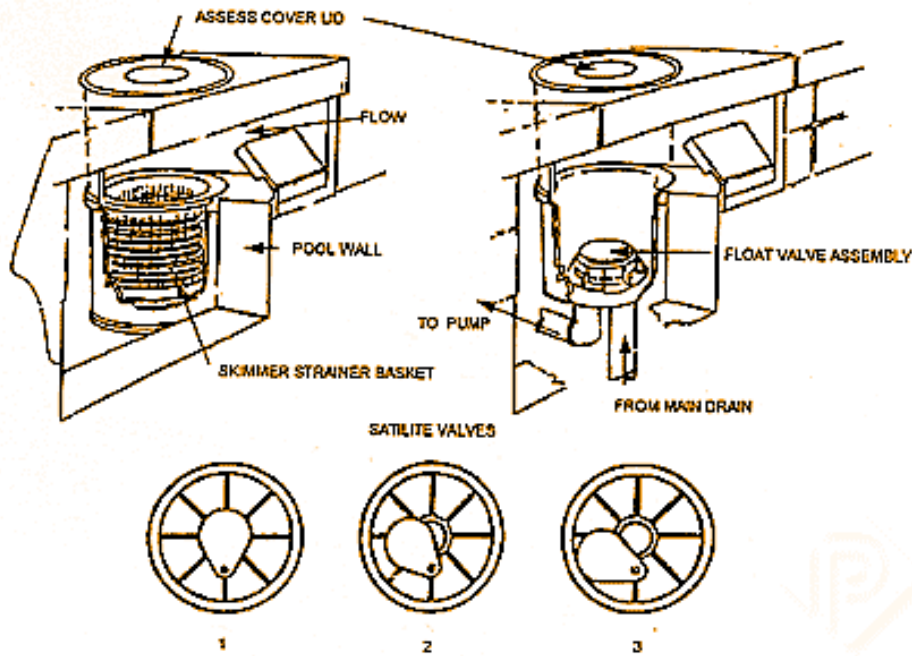


Skimmer

Flow to the pump (suction) is controlled by means of the plate under the float valve assembly. If obstruction to flow or evaporation occur, causing significant reduction of flow over the weir, the float will automatically snap shut.

This diverts all flow to the pump from the main drain and prevents possible loss of prime.

When the pump shuts off, the float will rise back to the top of the float valve assembly, allowing for normal operation if the flow or water level condition has been remedied.



Time Clock

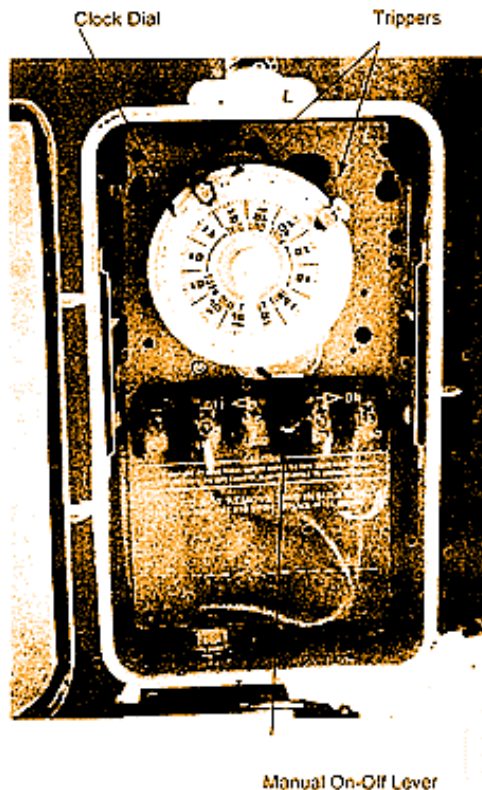
To set 'ON/OFF' time:

Loosen small nut on trippers. Hold trippers all the way in against edge of clock dial, pointing to the time, (AM. or PM.) when ON and OFF operations are desired. Tighten screws firmly.

To set time of day:

Pull clock dial outward. Turn in either direction and align current time of day on the clock dial to the time pointer. Do NOT move pointer.

NOTE: If you would like to turn the pump off while clock is operating, simply push the manual on-off level to "off".



Light

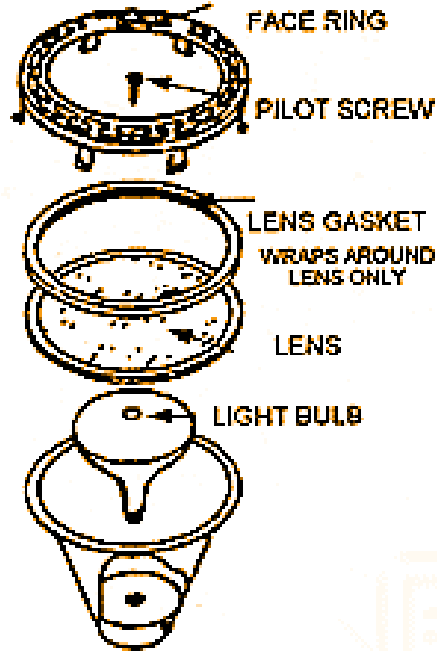
Brush your light frequently. Plaster dust, chemicals, etc. from your new plaster pool or spa can accumulate on the chrome face ring and react, leaving an unsightly residue.

Your light is equipped with a low water cutoff sensor, designed to keep fixture from overheating. It sometimes needs to adjust to its new environment - if your light cycles on and off, turn the light on and give it about 12 hours to adjust itself. The cycling will stop. If your spa is hotter than 104 degrees, your light will go off. This indicates the sensor is working.

Replacing the light bulb

1. Remove the pilot screw.
2. Tilt the top of the fixture forward, and lift up to remove from the pool wall.
3. Place the fixture on the deck.
4. Remove the screw holding the unit tension wire, located behind the face ring. The wire sits in the extensions on the backside of the ring.
5. With the wire removed, remove the lens gasket and lens.
6. Replace the bulb.
7. Reassemble the lens, gasket and ring, utilizing the unitension wire as it was assembled prior to replacing bulb.
8. Place fixture back into the light niche in the pool wall, with the top tilted forward, so the fixture catches on the lip of the niche.
9. Replace and tighten the pilot screw.

IMPORTANT!!! Before you reassemble the fixture, make sure there are absolutely NO drops of water or any moisture whatsoever inside the lens. This can cause water vapor to build up inside and cause the lamp to overheat and burn out.

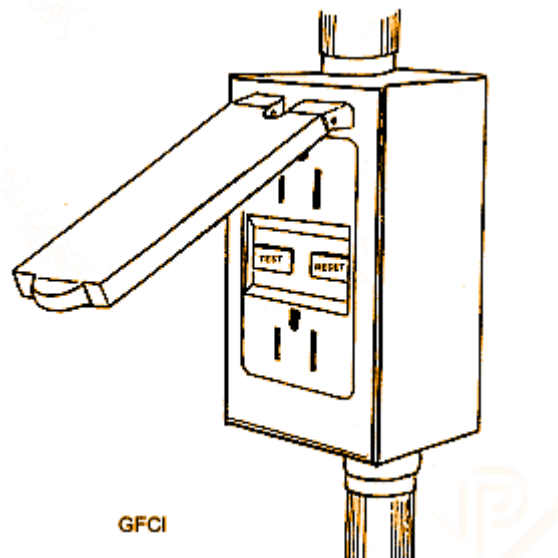


Ground Fault Circuit Interrupter (GFCI)

In conjunction with your light, there is a ground-fault circuit interrupter (GFCI), which limits the duration of any electrical fault current to the ground. This is an important safety device, and should be tested on a monthly basis to assure it is working properly.

To Test the GFCI:

1. Turn the pool light on. The circuit must be "live" for the test to work.
2. Press the TEST button in. If the GFCI is functioning, the RESET button will pop out: if not the GFCI is defective and a qualified serviceman should be contacted to replace it.



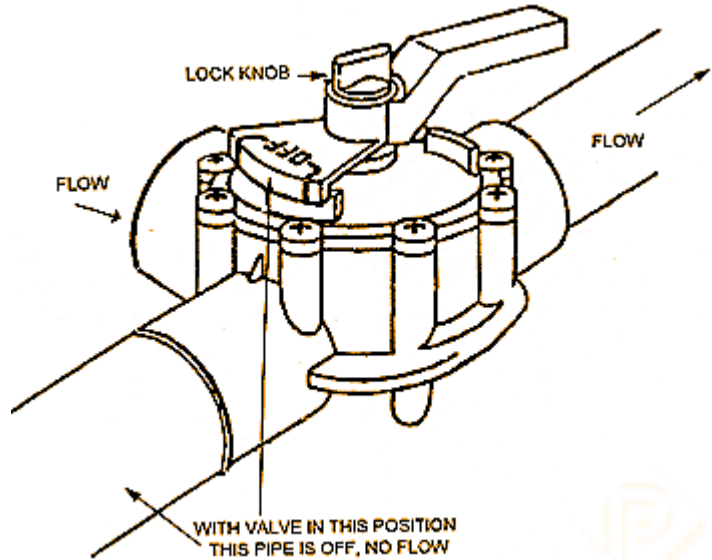
3 Way Valves

Three-way valves are used in situations that require the ability to control water flow and direction on two separate plumbing lines. Your three way valve connects one (1) inlet line and two (2) discharge lines.

TO OPERATE:

Loosen the lock knob to turn handle. The handle and the valve cover have interlocking teeth, so you must lift up slightly on the handle while turning to disengage. The OFF area on the valve handle represents the exact position of the internal valve diverter seal. This should be placed over the discharge pipe you want to close off.

By closing off the line, you direct water to the other discharge pipe, thus controlling the operation of such things as spillway skimmers, cleaning systems, spas, etc. In the event that you want to cut down on the amount of water going through a pipe: adjust more or less as desired. When you have found the desired setting, finger tighten the lock knob to secure the handle.



Aerator

The aerator will be more effective as a water cooling aid, if operating during the evening hours when air temperatures are lower.

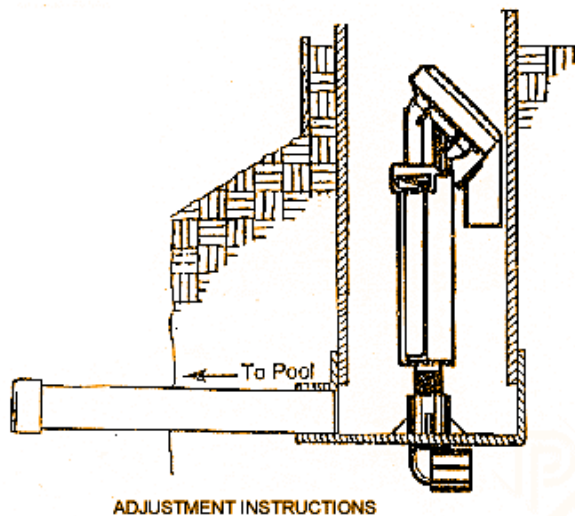
This also helps to keep evaporation loss to a minimum. Because the aerator utilizes the pool water, it will operate only while the pool pump is on.

To Operate: Turn gate valve: Left - ON. Right - OFF.

Automatic Water Leveler

If your pool or spa has been equipped with an automatic fresh water fill line, it has been adjusted to the desired water level at the initial start-up of your pool.

Remember, it is necessary that you leave the valve for the water leveler (located at the hose bib) open to supply the water leveling device with a constant source of fresh water.



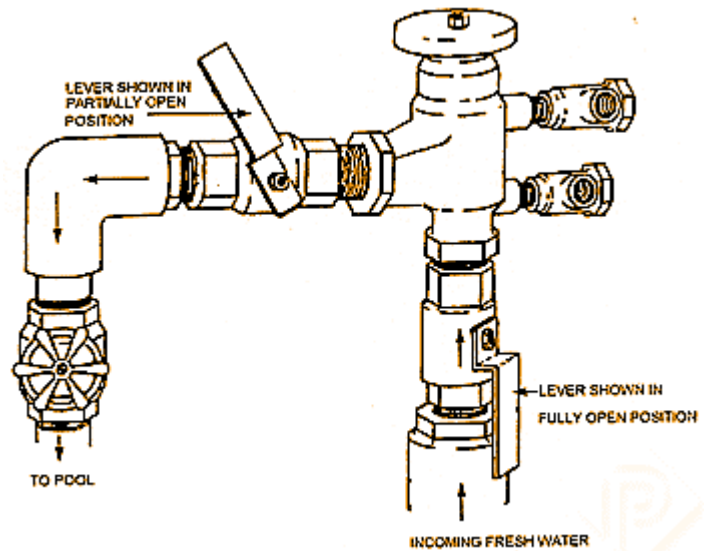
Vacuum Breaker

If your swimming pool or spa has come equipped with a fresh water fill line, there will be a vacuum breaker installed on the fresh water supply. The purpose of the vacuum breaker is to prevent back syphonage from the pool water or the fresh water supply. It consists of a single, spring loaded check valve and spring loaded air vent. Under normal operating conditions the check valve will open depending on the quantity of water flowing, and the poppet will seal the air vent. Under low pressure, the poppet will open the air vent, thus breaking any vacuum.

There is no necessary maintenance for the vacuum breaker, and in most cases, there should be no need to adjust the valves. In the event you need to control the flow, the lower valve or lever controls the incoming fresh water and the upper valve or lever controls water flow to the fill line. If the vacuum breaker has levers in lieu of gate valves, remember that when the lever is in line with the pipe it is fully open.

When the lever is perpendicular to the pipe, it is closed. Generally it is best when the incoming supply line is fully open (lower valve), the line to the pool is partially open (upper valve) and the gate is fully open.

Note that your particular situation may or may not have the gate valve plumbed in-line after the upper valve.



Air Blowers

Air blowers force air into the line, creating increased therapy action. If your pool or spa has come equipped with a blower, we recommend the running time be limited to approximately:

30 minutes for a spa 20 minutes for "Fun Bubbles"

Let the motor cool down 15 - 20 minutes before starting up again. Excessive use causes the motor to heat up and limiting the running time aids in protection against motor damage.

Therapies

Therapy heads are specially designed to allow air to be drawn in with the water through the wall fitting, creating the bubbling action that is found to be so relaxing to sore muscles.

Occasionally, a small pebble or stone may find its way into the air line and end up lodged in the orifice of the therapy head, reducing or even eliminating flow. If this should happen, the orifice must be removed so that the debris can be removed. You will need a 12" socket wrench with an extension in order to get to the orifice.

Place the socket over the orifice and turn to the left counter clockwise, a half turn. Once you have removed the orifice, let the pump run for a while to flush out any debris that was lodged in the pipe. Also check the orifice for debris that may have wedged itself into the opening.

Manual Vacuuming

Manual vacuuming works through the skimmer suction line, or in the case of semipublic pools, from a vacuum line. The cleaner itself consists of a vacuum head with wheels, a vacuum hose and a handle (pole). A freshly plastered pool should NOT be vacuumed during the first two weeks. The plaster is in the first stages of curing at this time, and vacuuming may cause damage to the plastered surface.

To vacuum your pool:

1. Check for normal operating pressure: if pressure reading is high, backwash the filter first. High pressure can indicate a dirty filter and may cut down on the suction required to properly vacuum the pool.
2. Empty the pump strainer basket, if it is full. The basket will need ample space to catch debris as it is vacuumed up.

NOTE: Both Steps #1 and #2 may need to be repeated during the vacuuming stage if the pool is extremely dirty and/or full of debris.

3. Remove the deck lid, basket and float valve assembly from the skimmer.
4. Attach the vacuum head to the pole. Connect the hose to the head, and place this assembly in the pool.
5. Rid the hose of air by submerging it or filling it with water by holding it over a return fitting. A garden hose may also be used to fill vacuum hose. Whichever means you choose, it is important to eliminate as much air in the hose as possible. This aids against the pump losing prime.
6. When all the air has been removed from the hose, cup your hand over the end to keep air from entering, then quickly place the free end of the hose into the suction line in the skimmer. This is the opening in the bottom of the skimmer furthest away from the water's edge.
7. Slowly move the vacuum head over the pool walls, bottom and steps until the pool is clean.
8. When you have completed vacuuming, disconnect the hose from the skimmer, and then remove the vacuum assembly from the water. By disconnecting from the skimmer first, you once again help to avoid losing prime in the pump, because you are eliminating the opportunity of introducing air into the plumbing lines.
9. Now turn off the pump and empty the pump strainer basket. Remember to lube the "O" ring on the lid, replace the lid and hand tighten and start pump again.

Water Chemistry

Filtration, chemical treatment and cleaning are the three essential methods of keeping your pool water clear, clean and free of bacteria. Proper water testing and maintenance not only insures sparkling clean pool water, but also protects the plaster, plumbing and equipment from possible corrosion, scale formation and staining. A clean inviting pool is not difficult to achieve. It just requires an understanding of the equipment, presented to you in the previous sections, and the water in your pool or spa, and the factors that influence both.

Treating the pool or spa with water chemicals maintains the balance, disinfects and keeps it clear. Because the formulation of chemicals varies between manufacturers, be sure to follow the instructions on the container.

TESTING YOUR POOL WATER

Test kits provide the information necessary to determine the chemical requirements of the water. A basic test kit will allow you to test for pH and chlorine levels. Other kits include these tests as well as test for alkalinity, combined and total chlorine, alkali and acid demands.

Each test kit contains instructions for performing these tests. To help you test accurately, remember these important guidelines:

1. Rinse test tubes before and after each test.
2. Avoid surface water when you fill the tube: take a sample from a depth of 12" to 18".
3. When adding the specified amount of reagent, mix gently - do NOT place your thumb over the top of the tube - body acid can effect reading.
4. Hold dropper bottle vertically and add required number of drops slowly, to make sure they are full drops.
5. Look at the color comparison against a light background, but not against the sun.
6. Store test kit in a cool, dark place.

Ideally, chlorine and pH tests should be performed daily, and in the first few weeks, with your newly plastered pool or spa, this is very important. During the summer months, after initial water balance, the test should be done no less than three times a week. In the winter, once a week should be sufficient. Remember to always check chlorine levels before and after heavy swimming loads, and following dust storms or any time water has been subject to large quantities of debris.

The shelf life of testing reagents is limited, and should be purchased new each season. OTO, used to test chlorine, is a strong acid, so avoid contact with skin, clothes or decking. Rinse immediately if any is spilled. Phenol red, used to test pH, is sensitive to hands, perspiration, pool water and air. Make sure you keep the container tightly capped when not in use. Particular care is needed to avoid touching the phenol red container and the sample test tubes. It should have a deep red color. If it turns orange, discard and replace it with a new bottle.

WATER BALANCE

Controlling the chemical balance of pool water is VITAL! The ideal range is slightly on the alkaline side, between 7.2 and 7.8 on the pH scale. If the pH is too high; chlorine is less effective in destroying bacteria and algae, water becomes cloudy, scale and staining can develop on the equipment and plaster very quickly. If the pH is too low; it will cause eye and skin irritation, corrosion of metal parts (especially heaters), etching and discoloration of the plaster. In newly plastered pools, it will be necessary to adjust your pH more frequently because of the tendency of new plaster to increase pH values during the curing period. Again, it is strongly advised to have a sample of your pool water professionally tested before administering chemicals.

TOTAL ALKALINITY AND pH

Alkalinity prevents wide variations in pH. Though pH is quickly controlled by adding chemicals, it can bounce around on the scale daily or even hourly. The fluctuation can be considerably lessened by adjusting the total alkalinity to within 80 to 125 ppm range.

If your test kit does not allow for a total alkalinity test, take a water sample to a nearby testing station. If the pool's alkalinity is high and the pH is over 7.8, add small doses of acid frequently to bring the pH down to 7.4. The pH will probably rise again. Continue the treatment until the water tests out consistently at 7.4 to 7.5 over a period of a few days. As the total alkalinity level approaches the correct range, the pH should be checked often to make sure it does not drop below 7.2 at anytime. Once the total alkalinity level has been reached, the pH will be "buffered" to a point where further acid control will be minimal.

CHEMICALS USED FOR CONTROLLING pH & TOTAL ALKALINITY

Muriatic acid (liquid) is the most commonly used chemical to lower pH and alkalinity. It stores well, and small amounts can adjust the pH significantly. However, if incorrectly applied, it can be very damaging. Add no more than one pint per 10,000 gallons of water at a time, and wait at least one hour before adding more acid. Handle it carefully to prevent splashing yourself or decking, and wash off any spills immediately. NEVER add acid through the skimmer. Always add acid when pump is running and try to place it in front of surface returns for rapid dilution.

Soda ash is an inexpensive quick acting method to raise the pH. The need to raise the pH is an occurrence commonly found in testing the water in a spa. This seems largely due to the fact it is a small body of water, and the introduction of too much acid is not properly controlled. Because pH readings lower than 7.2 are very destructive to equipment and plaster surfaces, keep a strict watch on the pH of all water, and especially spas.

Remember, equipment and material warranties are void when the damage caused is due to chemical imbalance.

DISINFECTING THE POOL WATER

Chlorine is definitely the most popular disinfecting agent. It is effective in killing bacteria and algae common in swimming pools. If properly used, it will remain in sufficient quantity called "residual chlorine", which effectively controls new algae or bacteria entering the pool water.

Chlorine also helps keep the water sparkling clear. Perspiration, urine, suntan lotion, hair spray, deodorant, etc. can dull the water. In sufficient quantity chlorine will absorb these particles and polish the water.

When you put chlorine in your pool, part of it will be used up at once, immediately killing algae and bacteria. Some of it must stay in the water until the next time you add chlorine. The amount that remains is the chlorine residual.

Pool water also contains ammonia nitrogen. Nitrogenous compounds, i.e. urine, perspiration and fertilizers used near the pool are the primary sources. Chlorine and ammonia combine to form chloramines, which cause burning eyes, skin irritation and the unpleasant "chlorine" odor, particularly strong if the pH is low. If you can smell "chlorine", there isn't enough residual chlorine in the water. Chlorine in an uncombined state is practically odorless.

The chlorine residual should never drop below 1.0 ppm. It can range up to 3.0 ppm or even a little higher, but 1.0 ppm is considered ideal. Chlorine residual is tested much the same way as pH. Follow the instructions in your test kit.

CHLORINE TYPES

Chlorine is available in almost every form. It comes in liquid, gas, granule and most convenient, a tablet form. Most swimming pool service companies recommend a tablet type made of trichlore-s-triazentrione, because of the high concentration of available chlorine.

Never toss tablets directly into the pool or spa because they leave yellowish stains on the plaster. Tablets are best for use in automatic chlorinators. Tablets can be placed in the skimmer basket if no automatic chlorine feeder is installed on your pool equipment or you may choose to purchase a container for the tablets that floats on the surface of the water, allowing the tablets to dissolve slowly. Whatever form of disinfectant you choose to use, always apply according to manufacturer's instructions.

SUPERCHLORINATION

Superchlorination involves adding 5 to 7 times the normal dose of chlorine to the pool water to "burn out" chloramines. This is easily accomplished by the direct manual addition of a pound of granular chlorine to each 10,000 gallons of water.

You will want to superchlorinate about every two weeks during the swimming season and possibly after heavy swimming loads or storms. Superchlorination should be done after sundown, since the ultra violet rays can destroy some of the chemical. Close the pool to swimmers until the chlorine residual drops to normal (1.0 to 3.0 ppm free chlorine).

STABILIZING/CONDITIONING YOUR POOL WATER

Stabilizers are chemical compounds added to pool water to prevent the rapid loss of chlorine by sunlight (ultra violet rays). Pools which are unstabilized use as much as 3 to 4 times more chlorine than is needed in a stabilized pool.

Cyanuric acid is the compound used to stabilize or condition the water. It is a semi-permanent additive, because it doesn't get used up, evaporate or wear out. Losses of cyanuric acid occur through splash out, backwash and leakage. The recommended level of cyanuric acid is 40 ppm. The test for this is referred to as a turbidity type test. Kits are available at pool supply stores or you can have the pool supply dealer test your water for you.

SPECIFIC WATER PROBLEMS

ALGAE

Algae are microscopic plants that grow in water. They enter into pool water through air currents. Free chlorine is an excellent algae killer and if there is a constant and adequate free chlorine residual (1.0 ppm) or more, algae growth is virtually non-existent.

There are three common types of algae: green, mustard, and black algae.

Green algae first appears as a green tint in the water and can spread very rapidly in a matter of hours. Green algae is easily destroyed by superchlorinating during the early stages of growth. If the superchlorinating does not clear up the problem, add a recommended amount of algaecide, following the directions on the label.

Mustard algae has a yellowish-green color and clings loosely to walls and steps. To treat mustard algae, brush the entire plaster surface of the pool and superchlorinate. Maintain a high chlorine residual, and apply a good algaecide. Remember, mustard algae brushes off plaster surface easily, but this does not destroy it.

Black algae does not generally show itself until it has a good start. It usually is first seen as a black spot about 1/4 inch in diameter. The spots most often appear first around the steps or in corners. The algae cells are so small they can actually penetrate the hairline cracks in the plaster and in the shotcrete behind the plaster. This is what makes black algae very difficult to kill.

To treat black algae, vacuum the pool so the spots are clearly seen. Remove the surface of the algae to speed up the killing process, by attaching a small stainless steel brush or pool block (pumice stone) to the pole and brushing the spots. Stainless steel brushes and pumice can be tough on the plaster surface, so always use them with care, trying not to mar the plaster surface. Next, superchlorinate and add algaecide at the recommended dosage rate for black algae.

SCALE

Scale is normally rough to the touch and grayish or light brown in color. It can appear on the walls and bottom of a pool. This situation is generally found in hard water areas. With proper pH and total alkalinity control, in addition to total hardness control, scale can be prevented from forming in your pool. Once a year, take a pool water sample to your pool supplies dealer and have it analyzed for hardness content. When it gets over 600 ppm, you should drain at least one third of the pool water, and refill it with fresh water. Ideal calcium hardness ranges from 200 parts per million to 400 parts per million.

STAINS

A pool surface can be stained by fertilizers, leaves, metal objects, algae, and mineral deposits. Too much acid added to the water at one time or too close to the skimmer can cause corrosion particles to appear as stains. Blue-green or turquoise stains are generally due to copper. The copper found in heater elements is dissolved in the water and deposited on the plaster.

Hairpins, toys, and other metal objects dropped into the pool should be removed immediately to prevent rust stains. Remember to maintain proper pH to help prevent these problems. Buffing ordinary stains with waterproof sandpaper may remove them. Use the sandpaper with as light of a touch as feasible to reduce chances of defacing the plaster surface.

Troubleshooting

PROBLEM	SOLUTION
<p>PUMP WILL NOT PRIME</p> <ol style="list-style-type: none"> 1. No water in strainer pot. 2. Strainer pot is not tight. 3. Damaged lid 'O' ring. 4. Water level below skimmer. 5. Pump basket or skimmer basket is clogged. 6. Air leak in suction line. 	<ol style="list-style-type: none"> 1. Fill pump with water from garden hose, then lube 'O' ring and replace lid. 2. Remove lid. Lube 'O' ring and hand tighten. 3. Replace lid 'O' ring. 4. Fill pool with water until it reaches the center of the tile line. 5. Empty basket and replace. 6. Check for loose packing nuts on suction side gate valves.
<p>LOW FLOW/HIGH PRESSURE</p> <ol style="list-style-type: none"> 1. Filter is dirty. 2. Restriction in return line. 	<ol style="list-style-type: none"> 1. Backwash filter or hose off cartridge. 2. Open any valve that may have closed.
<p>LOW FLOW/LOW FILTER PRESSURE</p> <ol style="list-style-type: none"> 1. Pump basket or skimmer basket is clogged. 2. Clogged impeller. 3. Air leak in suction line. 	<ol style="list-style-type: none"> 1. Empty basket and replace. 2. Remove debris from impeller. 3. Check for loose packing nuts on suction side gate valves. Check for dry grease cup on suction side 3 way Jandy valves.
<p>MOTOR DOES NOT TURN</p> <ol style="list-style-type: none"> 1. Power switch is off. 2. Circuit breaker has tripped. 3. Motor shaft is locked by bad bearing. 4. *Impeller is locked by debris. <p>* Always replace cracked or broken skimmer and pump baskets, as they are often the reason for closed impellers. If you continuously have a problem with the impeller clogging with fine debris such as hair or palm frond "strings", replace the basket with one that has a finer mesh. This should help cut down on the amount of debris getting through.</p>	<ol style="list-style-type: none"> 1. Turn power on at switch or time clock. 2. Check breaker and reset. 3. Call for service. 4. Remove debris from impeller.
<p>SKIMMER LID "BLOWS" OFF WHEN PUMP SHUTS OFF</p>	
<ol style="list-style-type: none"> 1. Back pressure in the suction line. 2. Internal automatic air-relief tube in filter is plugged. 	<ol style="list-style-type: none"> 1. Check for air pump lid, remove "O" ring and hand tighten. 2. Turn pump off and open air bleeder valve. (see IMPORTANT note below for your specific filter type)
<p>IMPORTANT: BE SURE THAT ALL PRESSURE IS RELIEVED FROM THE FILTER TANK BEFORE DISASSEMBLING!</p>	
<p>SAND FILTER: Remove dome. Pull the strainer cap from the tubing. Blow air through the tubing until all dirt is removed. Reinstall the strainer cap on the tubing. Lube the dome 'O' ring and replace dome. Do not lube threads which hold dome in place.</p>	
<p>DE FILTER: Remove band clamp and tank top. On the top of the grid assembly you will see the small strainer screen element. Remove and blow air through the element until all dirt is removed. Reinstall the strainer. Lube the 'O' ring, replace the tank top and band clamp.</p>	
<p>CARTRIDGE FILTER: Remove band clamp and tank top. Remove the strainer from the plastic cap located on the top of the cartridge assembly. Blow air through the element until all dirt is removed. Reinstall the strainer. Lube the 'O' ring, replace the tank top and band clamp.</p>	
<p>DIRT, CLOUDY WATER, OR SAND RETURNING TO POOL DURING THE FILTERING CYCLE</p>	
<ol style="list-style-type: none"> 1. Damaged cartridge or not assembled properly. (Cartridge Filter) 	<ol style="list-style-type: none"> 1. Remove cartridge from the filter, replace if damaged. Reassemble and replace in the filter tank.

2. Damaged grid or 'O' ring. (DE Filter)	2. Remove grid assembly and replace any damaged grid elements and/or upper piping assembly 'O' ring. Reassemble filter as described in "Manual Cleaning" for DE.
3. One or more of the lower laterals is damaged. (Sand filter)	3. Requires removal of the sand from filter. Recommend call for service.
BACKWASH VALVE DIFFICULT TO MOVE	
1. The internal 'O' rings require lubrication.	1. See BACKWASH VALVE maintenance section.
WATER FLOWS FROM THE BACKWASH LINE WHEN FILTER IS IN FILTRATION MODE	
1. Broken 'E' clip or damaged 'O' ring inside the backwash assembly.	1. See BACKWASH VALVE maintenance section.
LIGHT WON'T COME ON	
1. GFCI has tripped.	1. Press the reset button on the GFCI.
2. Breaker at main panel has tripped.	2. Reset the tripped breaker.
3. Turned off at the time clock.	3. Turn the light switch on manually.
4. Bulb has burned out.	4. See REPLACING THE BULB.
TIME CLOCK FAILS TO OPERATE	
1. Breaker at main panel has tripped.	1. Reset the circuit breaker.
TIME CLOCK MALFUNCTIONS	
1. Trippers out of position or missing.	1. All trippers must be pushed all the way in on the dial and screwed tight.
AUTOMATIC FILL LINE WON'T SHUT OFF	
1. Pool overflowing with water.	1. Remove lid to autofill and alternately lift up and push down on float about six or seven times. Follow instructions below.
Clear sand and rust from system. Remove valve TOP with a 1 /8 turn counter clockwise. While holding a container over the uncapped VALVE to prevent splashing turn water supply on and off a few times. Replace TOP by engaging lugs and rotating 1/8 turn clockwise. MAKE CERTAIN TOP IS TURNED TO THE LOCKED POSITION. VALVE MAY NOT TURN IF TOP IS NOT TURNED FULLY TO THE LOCKED POSITION.	
HEATER GOING ON AND OFF CONTINUOUSLY	
1. Dirty filter.	1. Backwash or clean cartridge.
2. Low water level in pool.	2. Raise water level.
PILOT WON'T LIGHT	
1. Low gas pressure.	1. Check gas supply.
HEATER LEAKING AT WELL/HEAT EXCHANGER	
1. pH too low (overacid).	1. Replace well/heat exchanger and maintain water chemistry properly.
POOL/SPA WON'T STAY HEATED	
1. Losing heat from the surface of the water.	1. Utilize a pool/spa cover to retain heat during the heating stage.
2. Blower pulling cold air into spa.	2. Shut off blower until spa is heated.
CHLORINE READING TOO HIGH/LOW	
1. Check - valve clogged.	1. Remove the tablet chamber from the bottom collar assembly. Gently unscrew the check valve from the bottom of the tablet chamber. Clean off the residue from the valve and replace. Lube the 'O' ring and replace the tablet chamber, hand tighten.
NOTE: If the check valve is constantly "gumming up", switch brands of tablets. Some manufacturers use heavy binders in the process of pressing the tablets which contribute to the problem.	

CHLORINATOR LEAKING AT FEED TUBING	
1. Tubing cracked /split.	1. Remove tubing, cut 1/4" from end of tube and replace.
HAZY, CLOUDY WATER	
1. Poor filtration or circulation.	1. Backwash filter or clean cartridge. Check valves for proper position during filtration.
2. High pH (greater than 8.0)	2. Adjust to 7.2 - 7.6 range.
3. Beginning stages of algae.	3. Adjust pH to 7.2 - 7.4 range, Superchlorinate, brush plastered surfaces vigorously. Extend filtering cycle. If this does not correct the problem after a day or so, you may need to use an algaecide.
4. Pool water chemistry out of balance.	4. Take sample of water to your pool supplies dealer for testing. Follow recommended procedures for adjusting.
BURNING OR RED EYES	
1. pH too low or too high.	1. Adjust pH to 7.2 - 7.6 range.
2. Chloramines.	2. Superchlorinate the pool.
COLORED STAINS ON PLASTERED SURFACE	
1. Corrosion caused by low pH.	1. Raise pH to 7.2 - 7.6 range. Have water sample tested for proper chemical balance. Repair or replace damaged equipment if required.
ROUGH DISCOLORED PLASTER/TILES	
1. Scale: Excessively hard water.High level of dissolved solids, high pH.	1. Have a sample of water tested for chemical balance and hardness. Adjust as required.

Glossary

ACID - A chemical which lowers the pH when added to the water.

ACID DEMAND - amount of acid required to lower pH and total alkalinity of pool water to correct level.

ALGAE - Microscopic aquatic plant life which can grow on pool surfaces or float freely in the water.

Though harmless, algae discolor the water and indicate improper sanitation.

ALGAECIDE - chemical used to kill or inhibit the growth of algae.

ALKALINITY - various chemicals and salts in the pool water that increase the pH.

AVAILABLE CHLORINE - free or combined chlorine used to disinfect pool water.

BACKWASHING - cleaning pool filter by reversing water flow.

BROMINE - chemical used for disinfecting spas mainly. (in the same family as chlorine).

CAVITATION - occurs in a pump when the flow of water from the suction lines is restricted. Commonly recognized by a rumbling noise in the pump. The water is actually boiling, which causes a vapor lock at the impeller.

CHLORAMINE - chemical compound of nitrogen and hydrogen that combines with free chlorine in pool water. Chloramine causes burning eyes, skin irritation, and chlorine odor.

CHLORINE - chemical used for disinfecting swimming pools.

CHLORINE DEMAND - The amount of chlorine required to destroy the bacteria in the pool water.

CHLORINE RESIDUAL - the amount of chlorine remaining in the pool water after chlorine demand has been satisfied.

CORROSION - chemical reaction that causes deterioration of metal.

CYANURIC ACID - (conditioner/stabilizer) acid used in pool water to prevent chlorine loss.

DIATOMACEOUS EARTH (DE) - a white powder that is manufactured from microscopic skeletons of diatoms.

DISSOLVED SOLIDS - calcium, copper salts, magnesium and other minerals that are suspended in the water.

DPD - a chemical reagent which reacts with active chlorine/bromine and turns the water sample pink.

FREE CHLORINE - basic chlorine, not combined with other chemicals, allowing it to be released immediately for disinfecting. This is usually the kind of chlorine used to superchlorinate.

HARDNESS - a measurement of dissolved solids in the water.

MURIATIC ACID - a dilute solution of hydrochloric acid used to lower alkalinity.

OTO - (orthotolidine) a chemical reagent which reacts with total chlorine/bromine, and turns the water sample yellow.

pH - used to describe the acid/alkaline balance in the pool water. A pH of 7 is neutral. pH values below 7 are acidic, values above 7 are basic. The recommended pH for pool water is 7.2 to 7.8. NEVER allow pH to drop below 7.0 or go above 8.0

PHENAL RED - a chemical reagent used to measure pH.

PPM- parts per million, the accepted measurement of a quantity of substance in water.

REAGENT - liquid or powder chemicals used to test concentrations of specific compounds in water.

RESIDUAL - the amount of a compound existing in water, usually expressed as parts per million.

SCALE - mineral deposits formed on pool surfaces, inside piping and on the filter as a result of high calcium hardness and high pH.

SODA ASH - sodium carbonate used to adjust the total alkalinity by increasing the pH.

SUPERCHLORINATION - heavy dose of chlorine added to pool water to "burn out or shock" nitrogen compounds when bacteria, algae or chloramine build-up cannot be reduced by normal treatment.

TOTAL ALKALINITY - (TA) the measurement of the alkaline chemicals in the water. TA acts as a pH buffer. Too high of a TA prevents easy adjustment of pH. Low TA causes pH to change and fluctuate widely. Proper pool TA is 100 - 125 ppm.

TOTAL DISSOLVED SOLIDS - the total of dissolved material in the water. High total dissolved solids in pool water (over 1500 ppm) can cause poor sanitizer efficiency, cloudy water and odors.