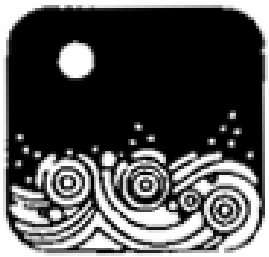


Carefree
CLEARWATER LTD.

INSTALLATION
AND
CHEMISTRY MANUAL

Carefree
CLEARWATER LTD.
Alternative Water Purification

P.O. Box 204, Cornelia, GA 30531 • (706) 778-9416 •Fax (706) 778-0423
E-mail: info@carefreeclearwater.com • Website: www.carefreeclearwater.com

Congratulations on your purchase of the Carefree Clearwater Purification System. We are confident you will enjoy the many benefits of using the Carefree Clearwater ionizer for many years to come.

A few words about ionization:

Your ionization water treatment equipment eliminates algae and bacteria by releasing small amounts of copper and silver into the water. Atomic particles of these elements are called ions because they are electrically charged and in a free, uncombined state. This hi-tech method of water purification was sophisticated by NASA to keep drinking water fresh aboard spacecraft.

These ions work to disrupt the enzyme balance of algae and bacteria. The dead micro-organisms form a mass large enough to be trapped by the pool filter. They are washed out of the pool when the filter is backwashed. This process is achieved without danger to multi-celled plants and animals.

In contrast, chlorine and bromine oxidation chemicals destroy algae and bacteria by chemically decomposing them. Unfortunately, these oxidants are particularly harsh and have undesirable side effects.

Before you install your ionizer, read the "Outline" page, and send in your warranty registration certificate. This is important! If factory service is necessary and a registration form was filed within the 30 day period, it would not be necessary to submit proof of purchase to obtain service under your warranty.

Please see the Table of Contents for this manual whenever you have questions. Seek the advise of your Carefree Clearwater dealer if you don't understand. Remember, Carefree Clearwater dealers, not dealers untrained in ionization systems, can provide proper advise about your equipment and pool.

Dealers who do not handle our equipment are almost always untrained and unskilled in the proper methods of dealing with ionized pools. Unfortunately, following the suggestions of untrained personnel may result in damage to your pool or equipment and affect your warranty.

More comprehensive publications about pool and spa maintenance are available but keep in mind these are usually written for chlorine or bromine sanitation. Please follow this manuals recommendations for water chemistry and maintenance.

Where to obtain chemicals you need:

Order all Carefree Clearwater products from your dealer. If your dealer does not handle these products, Carefree Clearwater will direct ship these to you.

Ion Test Kit or Replacement Reagent
Replacement Anode

You may use Total Alkalinity Up (sodium bicarbonate) whenever you need to increase total alkalinity (TA). To lower TA or pH, use liquid or dry acid. These can be purchased at your favorite pool store.

TABLE OF CONTENTS

Chemistry Section

OUTLINE OF IONIZATION START UP & CONVERSION

I. BALANCE WATER CHEMISTRY

	PLASTER	VINYL	104 DEGREE SPA
Total Alkalinity	80 – 90 ppm	70 – 90 ppm	70 – 80 ppm*
PH	7.2 - 7.6	7.2 - 7.6	7.2 - 7.6*
Calcium	225 - 250 ppm	175 - 225 ppm	100 - 125 ppm*
Chlorine	1 - 2 ppm	1 - 2 ppm	1 - 2 ppm
Algicide	Normal Dose	Normal Dose	None

Do not attempt to install the ionizer until the water chemistry has been balanced! This is critical for any sanitizer to work properly but especially important for a successful ionizer installation.

It's a good idea to test the makeup water so you know what will be added to the pool/spa. Ex: If makeup water is high in iron, Ca or TA, adjustments will need to be made to pull the iron out and lower Ca & TA. Also test pool/spa water for cyanuric acid (stabilizer or conditioner) and dilute to remove or at least lower to 30 ppm.

Once the water chemistry has been adjusted to the recommended levels, installation can begin. Be sure to maintain a 1 - 2 ppm chlorine or bromine residual while waiting for the ions to get up to 0.3 ppm. Also, pools may need to use a non metallic algicide.

II. INSTALL CONTROLLER UNIT (1200 Series Prewired for 220)

Wire to pump power supply.
Replace elbow or straight section of plumbing to install Ion Chamber Tee

III. REDUCE CHLORINE or BROMINE to 0.2 ppm once ions are at 0.3 ppm.

IV. OXIDIZE every week or as needed. See "Table of Oxidizers"

V. TEST TA, pH & ION LEVEL after oxidizing since chemicals affect water balance.
Regular testing of pH twice a week and TA twice a month is important. Check ion level once every week or two.

***See New Spas section on proper water balance.**

THIS IS A VERY GENERAL OUTLINE! PLEASE CONSULT MANUAL FOR DETAILED INFORMATION AND EXPLICIT INSTRUCTIONS.

EQUIPMENT INSTALLATION & OPERATING PROCEDURES

Installing the ionizer water treatment system requires very little in the way of special tools or special skills and should be accomplished in less than two hours. Please adjust water chemistry appropriately before beginning the installation. See Water Chemistry Section of this manual. Also read entire installation instructions before beginning.

TOOLS YOU WILL NEED - NOT SUPPLIED:

- · Slip Joint Pliers that will open to 2 3/4" for screwing in the anode
- · Hack Saw for cutting PVC pipe
- · Small & Medium size blade screw drivers
- · PVC Primer & Cement for plumbing
- · Teflon Tape to seal anode in ion chamber
- · Flexible 1/2" PVC Conduit from power supply to ionizer (Optional)
- · 4 Screws or Machine Bolts: No. 10 Round or Pan Head 1 to 1 1/2" length for mounting Model 1200 ionizer
- · Washers: (4) no. 8 – 10, flat – for Controller mounting screws or bolts

CONTENTS SUPPLIED:

- · Electronic Controller
- · 2 Brackets w/ Screws for Mounting Electronic Controller
- · Wire/Cord: Type SJOW; 16 AWG stranded/2 conductors +ground: AC power
- · Owner's Manual
- · Ion Test Kit
- · PVC Ion Chamber Assembly
    - · Anode Assembly
    - · Wire/cord: Type SJOW; 18 AWG stranded/2 conductors for anode
    - · PVC/NSF Tee for anode
    - · PVC/NSF Reducer Bushings

INSTALLING THE ION CHAMBER ASSEMBLY

Before beginning the installation, turn off the power at the circuit breakers. Make sure circuit breakers to all pool/spa equipment are off before continuing. Also make sure you have all the tools and supplies you need.

Install the Ion Chamber assembly as shown in Figure 1 by cutting an elbow section of PVC pipe and replacing with the Ion Chamber PVC Tee. Note that while the Ion Chamber is pictured in the return water line, it may be installed on either side of the filter but not before the pump. The anode may require more frequent cleaning if the Ion Chamber is installed before the filter. You may want to install socket unions on either side of the chamber to make gluing the pipe easier.

INSTALLING THE ION CHAMBER ASSEMBLY Continued .....

Mount the Ion Chamber and anode parallel to the ground - in other words horizontally. Allow room for anode removal for periodic servicing. Inserting the anode in the ion chamber is explained later.

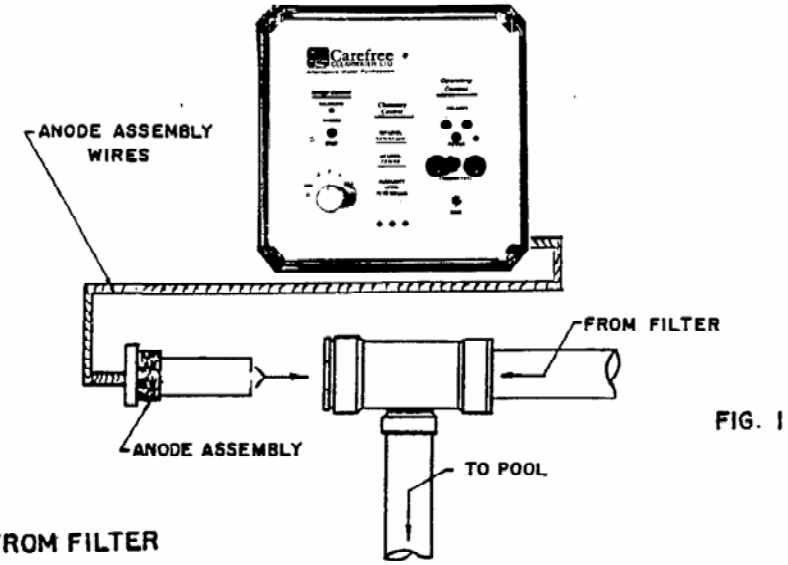


FIG. 1

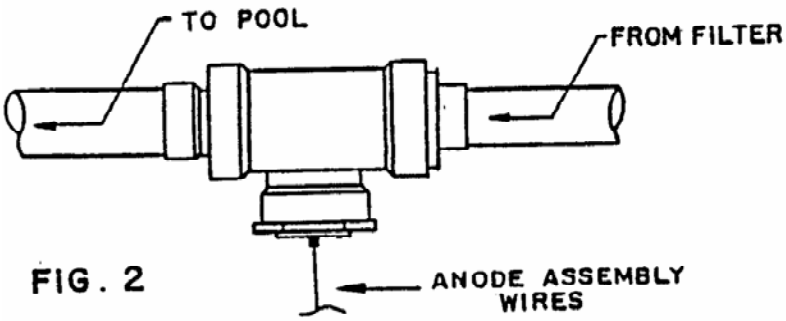


FIG. 2

CAUTION: Figure 1 and Figure 2 are top views - looking straight down on the Ion Chamber. This is not a side view.

Installing the ion chamber in an elbow configuration gives the best self cleaning action for the anode. However the ion chamber can be mounted in-line so that the water stream passes by the anode not at a right angle. (See Figure 2)

MOUNTING THE ELECTRONIC: CONTROLLER

While wire lengths are not critical to the operation of the system, location of the electronic Controller should be given careful consideration for several reasons:

1) The Model 1200 Controller must be connected either directly to the pump motor or to the pump timer. A location near these and ion chamber would be best. Locate the Model 1100 plug in unit within 3 feet of an outdoor rated GFCI receptacle.

MOUNTING THE ELECTRONIC CONTROLLER Continued.....

2) As a rule, whenever possible electrical equipment should be mounted to avoid exposure to direct sunlight and weather.

3) Of course, the location must allow sufficient clearance to open the 1200 front cover, permitting access to equipment controls.

CAUTION: To avoid possible electroplating or electrical shock all equipment with any metal parts (pool ladders, electrical equipment etc.) must be grounded to a common ground. The ground should include a copper rod driven into the earth to satisfy electrical grounding requirements appropriate for the pump and other equipment. This ground should have been installed when the pump and other pool equipment were installed.

The plug in 110 VAC Model 1100 should only be connected to grounding type receptacle, protected by ground fault circuit interrupter (GFCI) and installed at least 10 feet from inside wall of pool. Check your local electrical codes for this and all requirements.

With the screws provided, attach the mounting brackets onto the sides of the Controller. To mount the 1200 Controller, use four #10 screws or machine bolts with a round or pan head about 1" to 1 1/2" in length. If mounting into masonry, use plastic anchors with screws. Mark the four holes, predrill, insert plastic anchors then mount Controller. If space is restricted on the sides of the controller, the mounting bracket may be used on the top omitting the bottom bracket. The Model 1100 is mounted using the two No. 8 hex head/slotted self tapping screws.

WIRING THE MODEL 1200 CONTROLLER

All Carefree Clearwater Model 1200's are factory PREWIRED for use with 220 AC Volts. Use a meter to determine whether your supply AC voltage is 110 or 220 volts.

Do not use 110 Volts unless converted according to the 110 AC Volts Conversion instructions on the next page. If 110 AC Volts is supplied to a prewired 220 AC Volt Unit without converting it, the lights on the Controller will operate but the pool will not ionize due to the improper wiring. If a unit is converted to 110 Volt and 220 Volt power is accidentally supplied, this will blow the 1/2 amp fast blow fuse and may damage the equipment.

Sometimes it is advisable that the system be wired so that it is controlled by a Ground Fault Interrupter (GFCI) circuit. We recommend that all 110 VAC systems be tied to a GFI. As a rule, the pump will already be wired into a GFI if it is operating on 110 VAC. In this case, wiring the Electronic Controller into the circulating pump or pump timer could establish a GFCI circuit for the ionizer as well. In any event, check your local electrical codes for this and all requirements.

The equipment will be powered by the circulating pump so that the ionizer will operate only when the circulating pump is operating and the main power switch is on for the ionizer.

A 10 ft. length of SJOW watertight UL 16 gauge, 3 conductor wire is factory wired into the Controller. The installer should cut this cord to the proper length for AC power connection. Either flexible or rigid conduit may be used to environmentally isolate the AC power supply cord - or the power cord may be used without conduit if the optional UL watertight cord grip (supplied) is used.

If conduit is used: Cut the AC power cord to the proper length leaving enough for end connections and turns of the cord pathway. Slip the AC power cord through the conduit, and terminate at the Controller.

If conduit is not used: Cut the AC power cord to the proper length leaving enough for end connections and turns of the cord pathway.

On the Model 1200, it is very important that the cover be closed and sealed at all times when access to the control panel is unnecessary even in indoor installations. It is equally important that no water or moisture of any kind be sealed inside the controller or under the controller cover. The controller is watertight and sealing the cover with moisture inside will cause severe damage to the equipment.

CONVERSION TO 110 AC VOLT SERVICE FOR MODEL 1200 SERIES

The Model 1200 series are prewired for 220 vac service. These units can be switched to accept either 115 or 220 vac by means of a small slide switch accessed directly in the faceplate control panel. Figure 3 illustrates a typical 1200 panel. The access hole is centered just below the “Alkalinity Level” information.

To switch to 115 vac, insert a small flathead screwdriver in the hole at the center of the front control panel, located about 1.5 inches from the bottom. Caution: Do not push downward. That could permanently damage the slide switch. The action on this switch is left and right. Gently push the slide switch control to the left until it clicks or stops. (The slide switch travel is only about ¼ inch).

Do not attempt to open the panel for any reason. There are no serviceable parts inside. Opening may result in personal injury and damage to your equipment and voids all warranties. Several parts inside are sensitive to electrical and mechanical action. The fee to reinstate a voided warranty is $125 plus the cost of repairs and service.

COMPLETING THE INSTALLATION: INSERTING & WIRING THE ANODE

Using teflon tape, wind the tape around the PVC threads seven times before inserting into the Chamber. Only tighten enough to prevent leaks. Remember, you are going to remove and clean it periodically. Occasionally replacement will be necessary.

CAUTION: If the ion chamber is installed in a straight section of pipe rather than an elbow, the anode must be positioned in the ion chamber so that water flows between the two bars instead of directly against either of the two elements. Do not install anode so that one element is up-stream from the other. Before inserting into the Ion Chamber, make a line across the top of the anode between the electrical terminals to indicate the position of the bars. Some anode assemblies are shipped with this reference line already marked.

Attach the terminals to the anode. Apply a metal compatible silicone sealant to connectors to prevent corrosion. Finally tie up any loose or hanging cables to make a neat appearance and to prevent someone from tripping over them.

STARTING UP & OPERATING THE 1200 SYSTEM - CHECK OUT CONTROLS

Before starting the Model 1200 ionizer, check to make sure that the installation is complete and that all fittings are tight. Take a few moments to familiarize yourself with the controls shown in Figure 3.

CAUTION: If necessary to replace 1/2 Amp Fast Blow fuse, turn off power source to ionizer before attempting otherwise electrical shock can result.

Open the clear front cover and make sure that the main power switch is in the OFF position. Set the circulation pump timer switch to the "manual on" position so that the pump will run continuously until the water is fully ionized to 0.3 ppm ions and is operating normally.

Next, turn on the circuit breakers to start the pump motor. Check the installation for water leaks at the new joints.

Rotate the ionizer control switch on the Electronic Controller to the C position (Calibrate). Set the main power switch to the ON position.

The red power LED should light. Watch the polarity LED's to make sure they alternately light every 35 to 45 seconds. Polarity switching may not begin until five minutes after the system has been started.

CALIBRATE 1200 CONTROLLER FOR NEW ANODE

Balance water prior to calibration (See chemistry section). Avoid shooting chemicals through the skimmer which may coat the anode. Failure to balance water may prevent proper ionization, interfere with the calibration process or prevent polarity from switching.

With the ionizer control switch rotated into the C position, use a small screwdriver to make the adjustment through the calibrate hole on the inside metal cover. Find the adjustment screw.

Fig 3

Normally with properly balanced water turning the control knob to the C position turns the anode ok light on. If however the light does not come on, turn adjustment screw a few rotations in either direction until the light comes on. Try rotating counter clockwise first. Once the light is on, turn two complete 360 degree turns counter clockwise to set the calibration point. (This is a multi-turn screw and cannot be damaged by infinite rotations).

This completes the calibration procedure. The anode okay LED should be lit each time the ionizer control switch is rotated to the C position. CAUTION: Do not attempt to recalibrate until a new anode is installed. Calibration will help determine when the anode requires replacement or cleaning.

Periodically, the operator should rotate the ionizer control switch to the Calibrate position to determine the condition of the anode. When the LED is out, service of the anode is indicated. The anode should then be removed and cleaned. (This procedure is explained later.) When the anode okay LED will no longer light after cleaning, the anode may need replacing. Continue to use the anode until ions are no longer generated.

OPERATING THE SYSTEM

Before turning on the 1200-R ionizer, make certain that the pool water is properly prepared according to the water chemistry section of this manual. Be sure to maintain a 1 - 2 ppm chlorine residual daily until the ion level is 0.3 ppm.

Rotate the ionizer control switch to the maximum position. Run the pump 24 hours a day until the pool is fully ionized. For a 20,000 gallon pool this usually takes 3 to 5 days. Test the ion level daily and once the level is 0.3 ppm rotate the control switch to minimum or level 2 depending on your gallonage. See chart below.

ION OUTPUT POWER SELECTION FOR MODEL 1200-R POOLS

Pump Hours	Gallons of Pool Water 12,000 - 20,000	20,000 - 35,000	35,000 - 45,000
8-9	MIN TO 2	2 TO 3	3 TO MAX
9-11	MIN TO 2	2 TO 3	3 TO MAX
12-13	MIN TO 2	2 TO 3	3 TO 4
14-15	MIN	2 TO 3	3 TO 4
16-17	MIN	MIN TO 2	2 TO 3
18-19	MIN	MIN TO 2	2 TO 3
20-21	OFF TO MIN	MIN TO 2	2 TO 2
22-24	OFF TO MIN	MIN	MIN TO 2

To determine your pool gallonage:

1) Rectangular: Length(ft) X Width(ft) X Average Depth(ft) X 7.5 = Gallons
Ex: 32' X 16' X 5.5' X 7.5 = 21,120 Gallons
2) Oval : Short Diameter(ft) X Long Diameter(ft) X Av. Depth (ft) X 5.9=Gallons
3) Round: Diameter(ft) X Diameter(ft) X Av. Depth (ft) X 5.9 = Gallons

Once your ion level has reached 0.3 ppm, check it again a week later. If it is low, rotate the ionizer control switch up one position. If it is high, turn the ionizer off until the ion level falls to 0.3 ppm. You may need to lower the power setting previously set. Repeat this procedure weekly until the ion level stabilizes and a normal position for your pool is established. Then testing is usually necessary only twice monthly. Adjust ionizer output periodically if necessary.

It is very important that the cover be closed and sealed at all times when access to the control panel is unnecessary even in indoor installations. It is equally important that no water or moisture of any kind be sealed inside the controller wiring housing or under the controller cover. The controller is watertight and sealing the cover with moisture inside will cause severe damage to the equipment.

ANODE WEAR

Different conditions affect anode wear. The power setting on the unit determines how quickly the anode will be used up. With the Model 1200-R, most 20,000 gallon pools are started up on power level max, run 24 hours per day for 3 to 5 days then cut back to minimum or level 2 and run 8 - 12 hours a day. The projected anode life in an average size 15,000 gallon pool is 2 to 4 pool seasons. (A pool season is 4 to 5 months).

The demand of a pool environment, bather load, water chemistry, how long the pump is run per day, the power setting on the unit and how it is started up all affect the anode life. The more the unit is run, the more ions are generated and can be tested in the water. Any level over 0.3 ppm of ions is really a waste of the anode and is not necessary to keep the pool sanitary.

If pools are left uncovered and run during the off season, lower the power output on the ionizer, decrease the pump run time and maintain only a 0.15 to 0.2 ppm ion residual since the demand is far less. Or to get a longer anode life, cut the ionizer off when the pool is not being used in the off season. Enough of the ion residual will last for a few months. Oxidize with chlorine once a month or whenever the water gets dull.

HOW TO CLEAN ANODE

Periodically, the anode must be removed and cleaned or replaced. Indications that the anode needs servicing are either difficulty in maintaining a proper ion level or the anode okay light is out when the control knob is rotated to the C position on the 1200 series units. On a new installation if the ion level drops after a couple of weeks, clean the anode. This indicates the anode has been cleaning up the water.

The anode generally needs to be cleaned once every year. A green coating on the anode is a normal condition of a working anode but as the coating builds up it will prevent proper ionization over time. Pools with high calcium and or high TDS may require more frequent cleaning. A heavily coated anode may indicate excessive calcium or other mineral hardness. Check and adjust water chemistry as necessary. If the anode is more than 75% worn, it may require replacement. Continue to use the anode until the ions are no longer generated.

Using a wide mouth 2 3/4" wrench, unscrew the anode from the ion chamber and dry off. Use a flat file then sandpaper to remove the coating particularly in between the bars. This is where the ions are created and it is important for it to be free of any build up. It is not necessary to clean the anode elements to shiny, bare metal. An alternative cleaning method is to put the metal part only of the anode in a mild acid solution. (Put three parts water in a bucket then add one part muriatic acid). Scrub with steel wool and a screwdriver or scraper particularly between the bars. Next rinse the anode and wipe off especially in between the bars. Wrap teflon tape around the PVC threads of the anode seven times then screw into the ion chamber. Refer to the “Installation: Inserting & Wiring The Anode". Do not recalibrate a used anode assembly.

Wiring the 1100 Electronic Controller

The 1100 series may be either 115 vac plug in units or 230 vac units designed for permanent wiring in connection with your pump timer. The 115 vac units have plugs and three feet of cord. The 230 vac units have no plugs and approximately six feet of cord.

Please verify your AC power source as either 110 or 220 VAC. Using a voltmeter measure AC volts from the black (hot) to the white (neutral) wire.

CAUTION: Risk of Electric Shock. Do not attempt to open or remove the cover of the Electronic Controller to modify wiring or for any reason. There are no user serviceable parts inside. Opening may result in personal injury and damage to the equipment and voids all warranties. The fee to reinstate a voided warranty is a maximum of $125 plus the cost of repairs and service.

The plug in 1100 unit should operate only when the pump is operating. This can be achieved by using a plug in timer or cutting off the plug and wiring the unit directly to the pumps power supply.

The power cord may be used without conduit since the cord grip and cord are UL listed watertight devices; however, the installer should be careful to terminate the power connection in an approved watertight outdoor rated receptacle. See “Completing the Installation: Inserting and Wiring the Anodes”.

STARTING UP THE 1100 SYSTEM

Before turning on the ionizer make certain the pool water is properly balanced according to start up instructions in this manual. Check to make sure the installation is complete and all the fittings are tight.

Set the circulation pump timer switch to the manual “on” position (or remove trippers) so that the pump will run continuously until the ion level is 0.3 ppm. Next turn on the circuit breakers to start the pump motor. Check the installation for water leaks at the new joints.

Rotate the output power control (adjust power) on the Electronic Controller from minimum/zero output (full counter clockwise) to maximum output (full clockwise). Note the power lights indicate from 10 to 100% power output as the control is rotated clockwise. If the power output control is full clockwise and only the 10% light (or none) is illuminated, the anode circuit has an open connection somewhere.

Watch the polarity light to make sure it alternately lights every 90 seconds. The light will illuminate when the unit is first turned on, then go on and off every 90 seconds as the polarity switches.

As the anodes become worn or require cleaning, the Electronic Controller will no longer be able to maintain its output power. Eventually, only the 10% light (or none) will illuminate even with the power control set to maximum. This is your anode check circuit and indicates the need for replacement or cleaning. Simply follow the instructions for removing and cleaning the anode. (It also indicates the possibility of a break in the anode circuit such as a disconnected anode wire etc.).

If the power output lights will no longer illuminate after cleaning the anode, order a Carefree Clearwater replacement anode. For maximum economy, the current anode may be used until a 0.3 ppm ion level can no longer be maintained.

Use genuine Carefree Clearwater anodes only. These are electrically matched to your equipment. Substituting other anodes may damage and overheat your equipment and will void your warranty.

OPERATING THE 1100 SYSTEM

A pool or spa must be balanced prior to ionization (see water chemistry section). Maintain a 1 – 2 ppm chlorine residual until the ion level is 0.3 ppm. Outdoor pools may want to use a non metallic algicide. Adjust water balance as needed.

To start up pools, set circulation pump to run continuously and run ionizer on 80% – 100% to bring ion level up to 0.3 ppm. Use your test kit to test ion level daily until 0.3 ppm is achieved. Depending on your gallonage, this could take anywhere from one to five days. Ex: A 10,000 gallon pool may take two days. Then decrease power output to the lowest setting that will maintain 0.3 ppm level. Return pump run time to normal. Ex: An 8 hour pump run time for a 10,000 gallon pool may need to be run at 30% - 50% power level.

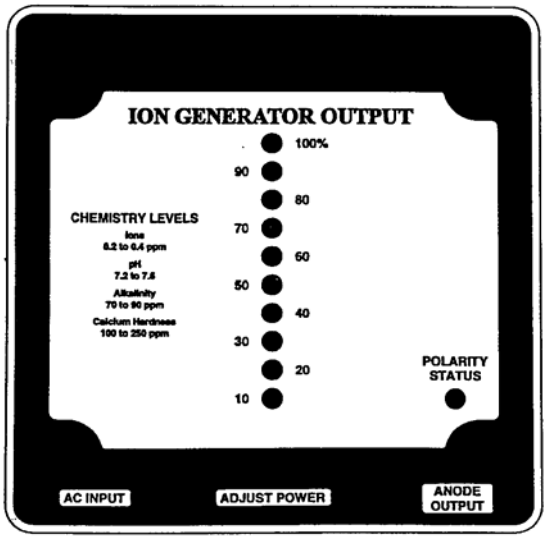
Now that your pool is ionized, you must determine the proper ionizer output power to maintain a 0.3 ppm ion level. This procedure is simple for both pools or spas:

Measure the ion level every other day. If the level appears to be dropping, increase ion output 10%. If it's going up, decrease ion output 10%. Continue this procedure until 0.3 ppm is maintained for one week without further adjustment, then testing your ion level is only necessary every other week.

For spas, run system on 80% to bring ion level up to 0.3 ppm. Use your test kit to test ion level every 15 to 30 minutes until 0.3 ppm is achieved. Ex: A 400 gallon spa may take 1 hour to 1 1/2 hours to initially ionize to 0.3 ppm. Then lower power output and run as needed to maintain proper ion level. Follow procedure above for determining proper power setting.

If you use your spa a couple of times a week and the system is wired into the high speed pump, you may need to run the system on a higher power setting. If the system is wired into a timer, it may need to be run 30 to 60 minutes a day on a lower power setting.

Spas should be oxidized after each use. See “Table of Oxidizers” in the water chemistry section. Residential Spas need to be drained every 60 to 90 days due to total dissolved solid build up.



TROUBLESHOOTING TYPICAL 1100 INSTALLATION PROBLEMS

SYMPTOM	POSSIBLE PROBLEMS	SOLUTION
No lights come on. Unit shuts down when power switched on.	Did not measure AC volts input to unit. Wired 220 vac to 110 vac unit or vice versa.	Check AC power into unit. Verify unit power type. Correct wiring & restore power.
Power lights above 40% will not come on.	Anode connections bad. Water hardness or TDS too low.	Check anode circuit to make certain all connections are free of rust, corrosion, dirt, grease, films, etc. Check water for TDS and calcium hardness. Raise if either are too low.
Only 10% power light comes on when power is turn full clockwise.	Internal fuse needs resetting.	Turn power control to zero. Cut off power to unit. Wait 30 seconds. Cut power back on to unit then slowly power output to 80% -no higher .
	Anode circuit not properly connected. Anode needs cleaning or replacing. Water not circulating through ion chamber around anodes.	Make sure water circulating pump is on. Make sure that anode chamber is properly installed so that water surrounds the anode. Check anode circuit to make certain all connections are free from rust, corrosion, dirt, grease, films, etc. Clean between anode elements. Check continuity between each anode tip and its screw terminal.

INSTALLING A NEW ANODE

Wind teflon tape around the anode PVC threads seven times before inserting into the Ion Chamber. Only tighten enough to prevent leaks. Remember, you are going to remove and clean them periodically. Occasionally replacement will be necessary.

CAUTION: If the ion chamber is installed in a straight section of pipe rather than an elbow, the anode elements must be positioned in the ion chamber so that water flows between them instead of directly against either of the two bars. Do not install anode so that one element is up-stream from the other. Before inserting into the Ion Chamber, make a line across the top of the anode between the electrical terminals to indicate the position of the bars.

Attach the factory crimped on female insulated spade connectors to the anode. Apply a metal compatible silicone sealant to connectors to prevent corrosion.

CALIBRATE 1200 CONTROLLER FOR NEW ANODE

Balance water prior to calibration. Avoid shooting chemicals through the skimmer which may coat the anode. Failure to balance water may prevent proper ionization, interfere with the calibration process or prevent polarity from switching.

Cut on the pool pump. Water must be flowing through the ion chamber for the calibration procedure. Rotate the ionizer control switch on the Electronic Controller to the C position (Calibrate). Set the main power switch to the ON position.

With the ionizer control switch rotated to the C position, use a small screwdriver or alignment tool to make the adjustment through the calibrate hole on the inside metal cover. Find the adjustment screw.

Normally with properly balanced water turning the control knob to the C position turns the anode ok light on. If however the light does not come on, turn adjustment screw a few rotations in either direction until the light comes on. Try rotating counter clockwise first. Once the light is on, turn two complete 360 degree turns counter clockwise to set the calibration point. (This is a multi-turn screw and cannot be damaged by infinite rotations.)

This completes the calibration procedure. The anode okay LED should be lit each time the ionizer control switch is rotated to the C position.

CAUTION: Do not attempt to recalibrate until a new anode is installed. Calibration will help determine when the anode requires replacement or cleaning.

Periodically, the operator should rotate the ionizer control switch to the Calibrate position to

determine the condition of the anode. When the LED is out, service of the anode is indicated. The anode should then be removed and cleaned. See "How To Clean Anode". When the anode okay LED will no longer light after cleaning, the anode may need replacing.

I. PREPARING FOR IONIZATION

In order for any type of sanitizer to work properly, water balance must first be achieved, then installation/operation of the equipment.

A. CONVERTING A POOL FROM CHEMICALS TO IONIZATION

Before operation of your ionization system, the following steps must be taken to insure successful conversion of the pool from chemicals to ionization.

1. Test and treat the water according to the table below:

Recommended Levels While Converting from Chlorine, Bromine or Baquacil to Ionization

==========

	Required Level for Balanced Pool	**Source Make Up Water from tap**
Total Alkalinity (TA):		**TA** _____
Concrete Plaster (Marcite)	**80 - 90 ppm**	
Vinyl, Fiberglass, Acrylic	**70 - 90 ppm**	
pH	**7.2 - 7.6**	**pH** _____
Chlorine/Bromine	**1 - 2 ppm**	**Chlr** _____
Calcium Hardness (CA):		**Ca** _____
Concrete Plaster (Marcite)	**225 - 250 ppm**	
Vinyl, Fiberglass, Acrylic	**175 - 225 ppm**	
104 Degree Spas	**100 - 125 ppm***	***See NEW SPAS Section**
Cyanuric Acid, Stabilizer	**None is required in an Ionized Pool**	

Test the TA, pH, and chlorine or bromine with your pool test kit. Take a water sample of your pool and source makeup water to your pool supply store to have tests made for cyanuric acid (stabilizer or conditioner), calcium, the presence of iron, manganese, and copper. If these metals are already present, it will be necessary to identify their source and treat the water accordingly. (See Starting Up with the Presence of Iron, Manganese & Copper)

Write down your test results on the previous page's chart. You should consider draining some pool water and refilling with fresh water to dilute as necessary if the cyanuric acid level exceeds 30 ppm. If the calcium hardness exceeds 300 ppm - consider refilling as necessary with water which tests below these levels - perhaps from a water softener. Care must be taken when using a water softener to fill pool water since the low levels of calcium are corrosive. Consult your local pool store or dealer.

Skim leaves, etc. from pool surface. Clean skimmer baskets and brush entire pool. Remove stains. Clean the pump's leaf trap.

Vacuum pool and backwash the filter if the pressure is up. Proceed to "Start Up Procedure - Balancing Water Chemistry" if your sanitizer is not Baquacil or Softswim.

B. TAKING A POOL OFF BAQUACIL OR SOFTSWIM

The following procedure (recommended by ICI the manufacturer of Baquacil) is necessary since Baquacil or Softswim is not compatible with any other sanitizing system. Baquacil must be completely removed in order to have satisfactory results with chlorine, ionization or any type of sanitizer.

The easiest, quickest and best way to remove Baquacil is to drain a pool. Consult the builder to make sure the pool can structurally be drained or to find out if there is a high water table in which case draining would be prohibited.

After draining, change out the filter sand or cartridge and refill the pool. If it's a DE filter refill the pool then change out the DE. Adjust water chemistry (TA 80 ppm, pH 7.2 - 7.6, CA 175 - 225 ppm for vinyl or CA 225 - 250 ppm for plaster) and chlorinate. Scrub the walls. Baquacil residue will be impregnated in the pool surface, plumbing and filter so keep chlorinated for a week to burn out any remains of Baquacil. Also make sure the bottom drain is not clogged.

If draining is not possible, add as much fresh makeup water as possible to dilute the Baquacil level. The more this step is repeated the easier the following procedure will be! Bypass Heater. Lower pH to 7.0. If metals are present, sequester with a chlorine compatible chelator. Shock with Non-Chlorine Oxidizer 4 lbs./10,000 gallons and filter continuously. A clear green, brown or yellow water condition will occur.

The next day superchlorinate by adding 2 pounds of Calcium Hypochlorite per 10,000 gallons to buckets of water and disperse evenly around the pool. Do not dry broadcast Cal-Hypo or any chlorine chemical.

Continue to superchlorinate daily for 7 - 10 days filtering at least 12 hours a day. Change out the filter sand or filter media when this procedure is completed and colored water does not occur when chlorine is added. If daily shocking is not done for this 7 - 10 day period, a colored water condition will occur every time chlorine is added to the pool. This is caused by a chemical reaction with the Baquacil and the chlorine.

Once colored water conditions no longer occur and a blue color to the water has been restored, the filter media has been changed and the water chemistry has been adjusted to our recommendations (TA 80 ppm, pH 7.2 - 7.6, CA 175 - 225 ppm for vinyl or Ca 225 - 250 ppm for plaster), the ionization installation can begin.

You may need to clean the anode after a week or so since Baquacil is imbedded in plastics (PVC plumbing, liner, filter parts etc) and can coat the elements. If the ion level is hard to maintain after a week or so this is a pretty good indication a Baquacil coating has occurred. Turn the control knob to the C position to see if the anode ok light comes on in which case the anode does not need cleaning.

Another alternative changeover procedure is to use GLB X-Change product to remove the Baquacil 1-800-445-2059. Lower the Baquacil to 20 ppm first, then use chlorine tablets in the skimmer and finally clean the filter is their procedure.

II. START UP PROCEDURE - BALANCING WATER CHEMISTRY

Once any necessary adjustments have been made for lowering cyanuric acid, calcium hardness or removing iron etc., balance the other water chemistry values. Begin first by adjusting TA, then pH, Ca and finally chlorine or bromine. A 1 - 2 ppm chlorine or bromine residual must be maintained until the copper ions are at 0.3 ppm. In order to maintain a chlorine residual during start up, put chlorine tablets in the skimmer while the pump is running continuously.

A. TOTAL ALKALINITY (TA)

Control of TA is essential for maintenance of pH - it acts as a buffer to pH controlling fluctuations in pH. If the TA is too high, scaling and temporary staining will occur. If the TA is too low, pH cannot be controlled and the water is corrosive which may also cause temporary staining.

High Total Alkalinity or any high factor in water balance (High pH, High Calcium, High Temperature) causes scaling conditions. High TA, pH, or Ca can cause cloudy water due to things coming out of solution like calcium etc. This is why scale is notorious for forming in heater headers from high temperature precipitating calcium into calcium carbonate (scale).

Since things precipitate out with high TA or pH or Ca, it's important to maintain water balance. Stains can occur by neglecting water balance causing iron, manganese, calcium, organic pollutants and other metals to precipitate out. Lowering and maintaining TA at the 70 - 80 ppm range will usually pull fresh discolorations from these sources back into solution. Keeping the pH in the 7.2 range will further assist in pulling stains out.

DECREASING TOTAL ALKALINITY

1. The TA may need to be brought down slowly over a period of days. If too much acid is added the pH may drop below 7 which will require soda ash to increase the pH which also increases TA. It is better to add a small amount of acid daily bringing the TA down slowly than to add to much acid and have to bring the pH up.

A pool owner should never add more than 1 quart (4 Cups) of muriatic acid or 2 1/2 pounds of dry acid per 10,000 gallons per day. A pool industry professional can add up to 2 quarts (or 5 pounds) per 10,000 gallons each 4-6 hours.******* Consult the acid dosage chart in your test kit.

Test for TA once daily and repeat these steps as needed until the recommended level is attained. If you have source water that is lower in Alkalinity, it may be easier to drain some of the high TA water from the pool and add the source water to decrease alkalinity.

RULES OF THUMB: SPECIAL PROCEDURES

Lowering Total Alkalinity! If you want to lower Total Alkalinity with less effect on pH, pour muriatic acid in the deep end away from fixtures, ladders, main drain etc. in one spot. If the TA is very high, full strength acid should be used without diluting.

Lowering pH with less effect on Total Alkalinity! If you want to lower pH and Total Alkalinity, add it evenly by pouring diluted acid around the entire pool's perimeter.

******* Since acid is heavier than water, always insure good mixing by brushing the bottom of the pool surface so the acid won't settle on the surface and damage it! Always add acid to water - Never water to acid or it could explode or off gas causing dangerous fumes. Dilute acid in three parts water. Please insure good mixing by brushing for 5 minutes where the acid is added. Run the pump continuously and Never put acid in or near the skimmer or main drain! Never run pool equipment with a pH lower than 7. This is very corrosive and will dissolve anything it comes in contact with.

TO LOWER TOTAL ALKALINITY USING MURIATIC ACID

Desired Decrease in PPM	Gallons In Pool					
	1,000	5,000	10,000	15,000	20,000	25,000
10 PPM	0.26cup	1.3cups	1.3pts.	1.95pts.	2.6pts.	3.25pts.
20 PPM	0.52cup	1.30pts	1.30qts	1.95qts	2.60qts	3.25qts.
30 PPM	0.78cup	1.95pts	1.95qts	2.93qts	3.90qts	1.22gals
40 PPM	1.04cups	1.30qts	2.60qts	3.90qts	1.3gals	1.63gals
50 PPM	1.3cups	1.63qts	3.25qts	1.22gals	1.63gals	2.03gals
60 PPM	1.56cups	1.95qts	3.90qts	1.46gals	1.95gals	2.44gals
70 PPM	1.82cups	2.28qts	1.14gals	1.71gals	2.28gals	2.84gals
80 PPM	1 pint	2.60qts	1.3gals	1.95gals	2.60gals	3.25gals
90 PPM	1.17pts	2.93qts	1.46gals	2.19gals	2.93gals	3.66gals
100 PPM	1.30pts	3.25qts	1.63gals	2.44gals	3.25gals	4.06gals

TO LOWER TOTAL ALKALINITY USING DRY ACID

Desired Decrease in PPM	Gallons In Pool					
	1,000	5,000	10,000	15,000	20,000	25,000
10 PPM	0.16lbs	0.80lbs	1.60lbs	2.40lbs	3.20lbs	4.00lbs
20 PPM	0.32lbs	1.60lbs	3.20lbs	4.80lbs	6.40lbs	8.00lbs
30 PPM	0.48lbs	2.40lbs	4.80lbs	7.20lbs	9.60lbs	12.00lbs
40 PPM	0.64lbs	3.20lbs	6.40lbs	9.69lbs	12.90lbs	16.00lbs
50 PPM	0.80lbs	4.00lbs	8.00lbs	12.00lbs	16.00lbs	20.00lbs
60 PPM	0.96lbs	4.80lbs	9.60lbs	14.40lbs	19.20lbs	24.00lbs
70 PPM	1.12lbs	5.60lbs	11.20lbs	16.80lbs	22.40lbs	28.00lbs
80 PPM	1.28lbs	6.40lbs	12.80lbs	19.20lbs	25.60lbs	32.00lbs
90 PPM	1.44lbs	7.20lbs	14.40lbs	21.60lbs	28.80lbs	36.00lbs
100 PPM	1.60lbs	8.00lbs	16.00lbs	24.00lbs	32.00lbs	40.00lbs

INCREASING TOTAL ALKALINITY

1. Determine how much Total Alkalinity Up (sodium bicarbonate) to add to increase TA to 70 - 90 ppm. Add 1 1/2 pounds of TA Up per 10,000 gallons of water to raise TA 10 ppm. (See chart on next page). [Note: If pH is below 7, increasing the TA first will also increase pH].

RAISING TOTAL ALKALINITY WITH TA UP

Desired Increase in PPM	Gallons In Pool					
	1,000	5,000	10,000	15,000	20,000	25,000
10 PPM	0.15lbs	0.75lbs	1.50lbs	2.25lbs	3.00lbs	3.75lbs
20 PPM	0.30lbs	1.50lbs	3.00lbs	4.50lbs	6.00lbs	7.50lbs
30 PPM	0.45lbs	2.25lbs	4.50lbs	6.75lbs	9.00lbs	11.25lbs
40 PPM	0.60lbs	3.00lbs	6.00lbs	9.00lbs	12.00lbs	15.00lbs
50 PPM	0.75lbs	3.75lbs	7.50lbs	11.25lbs	15.00lbs	18.75lbs
60 PPM	0.90lbs	4.5 lbs	9.00lbs	13.50lbs	18.00lbs	22.50lbs
70 PPM	1.05lbs	5.25lbs	10.50lbs	15.75lbs	21.00lbs	26.25lbs
80 PPM	1.20lbs	6.00lbs	12.00lbs	18.00lbs	24.00lbs	30.00lbs
90 PPM	1.35lbs	6.75lbs	13.50lbs	20.25lbs	27.00lbs	33.75lbs
100 PPM	1.50lbs	7.50lbs	15.00lbs	22.50lbs	30.00lbs	37.50lbs

2. Mix TA Up in a bucket of water until dissolved. Do not add more than about 5 pounds in a four hour period for each 10,000 gallons of water. Pool water will be cloudy for a while after adding this. Run pump continuously while adding chemicals.

3. Test for TA and repeat these steps as needed until the recommended level is attained.

Note: If TA exceeds 100 ppm, the potential for temporary discoloration or tinting of the pool water or surface is increased.

B. CONTROL OF pH

The pH is a measure of the water's acidity or lack of it. It literally means potential for releasing hydrogen ions. The pH range is 0 to 14. Seven is neutral. Below 7, water tends to be corrosive.

Above 7.8, water tends to stain and form scale deposits. The ideal range for ionization equipment is 7.2 to 7.6. At sustained pH's of 7.8 or higher or TA exceeding 100 ppm, temporary tinting of the pool surface may occur.

INCREASING pH:

Remember Total Alkalinity must be in proper range before pH can be adjusted. If pH is lower than 7, bring TA up first which will also increase pH. If further increase of pH up is needed, do a base demand test to determine the correct amount of pH up (soda ash) to add. (Note: the addition of soda ash will also increase the total alkalinity. 1 pound of soda ash in 10,000 gallons of water adds about 13 ppm to the total alkalinity).

Except for extraordinary situations where the pH is extremely low, add not more than one pound of soda ash (sodium carbonate) in a four hour period per 10,000 gallons water. Run pump continuously.

Thoroughly dissolve in a bucket of water and disperse around the pool. Brush bottom of pool. Not all the soda ash will go into solution and will need to be vacuumed up later. Clean filter to avoid further elevation of pH.

Test for pH. Repeat these steps until attaining the recommended level.

DECREASING pH:

With pump running continuously, add acid, not more than one quart of muriatic acid or 2 1/2 pounds of dry acid per 10,000 gallons in a 24 hour period. Do an acid demand test with your test kit to determine the amount of acid to add.

Test for pH daily and repeat these steps until attaining the recommended level. If you want to lower pH and alkalinity, walk the diluted acid around the pool's perimeter. Pouring acid in one spot has more effect on TA with less effect on pH. See Total Alkalinity Section for directions on using acid.

C. CALCIUM HARDNESS (CA)

The calcium level determines if the water is hard or soft. If the calcium level is over 300 ppm, add fresh makeup water low in calcium to decrease. If the calcium level is low, increase to insure proper ionization and to avoid corrosive water conditions. For vinyl liner pools, calcium levels should be 175 - 225 ppm and for plaster pools calcium levels should be 225 - 250 ppm. Calcium levels over 300 ppm may cause scaling conditions. Dissolve a small portion of the calcium chloride in a bucket of water and disperse around pool. Repeat as needed and brush pool. The maximum calcium addition at one time is 6 lbs./10,000 gallons in a 6 hour period. Remember when dissolving chemicals, always add chemical to water. NEVER add water to chemicals.

The bucket of water may heat up if too much calcium chloride is added at one time. If the bucket of water with the calcium chloride mixed into it is left unattended, it could melt the bucket. This is why calcium chloride is used to melt snow because of the heat it generates!

RAISING CALCIUM HARDNESS WITH CALCIUM CHLORIDE

Increase in PPM	Gallons in Pool 1,000	5,000	10,000	15,000	20,000	25,000
10 PPM	2 oz.	10 oz.	1.25lbs	1.75lbs	2.5 lbs	3.25lbs
20 PPM	4 oz.	1.25lbs	2.5 lbs	3.75lbs	5 lbs	6.25lbs
30 PPM	6 oz.	1.75lbs	3.75lbs	5.5 lbs	7.5 lbs	9.5 lbs
40 PPM	8 oz.	2.5 lbs	5 lbs	7.5 lbs	10 lbs	12.5lbs
50 PPM	10 oz	3 lbs	6.25lbs	9.5 lbs	12.5lbs	15.75lbs
60 PPM	12 oz	3.75lbs	7.5 lbs	11.25lbs	15 lbs	18.75lbs
70 PPM	14 oz	4.25lbs	8.75lbs	13 lbs	17.5lbs	22 lbs
80 PPM	1 lb	5 lbs	10 lbs	15 lbs	20 lbs	25 lbs
90 PPM	1 lb	5.5 lbs	11.25lbs	17 lbs	22.5lbs	28 lbs
100 PPM	1.25lbs	6.25lbs	12.5 lbs	18.75lbs	25 lbs	31.25lbs

III. NEW SPAS

The easiest way to balance spa water is to use a pH Control product. This eliminates having to increase the Total Alkalinity and the Calcium hardness in a freshly filled spa and constantly staying on top of the fluctuating pH. Upon filling a spa, add the pH control product then shock with dichlor and start the ionizer. If you are located in an area with hard water, use GLB Rendezvous "pH Magic". In hard water areas, avoid the following products which will turn the spa water milky white: Robarb's pH Perfect, Leslies pH Lock or Leisure Time pH Balance. If you have low calcium supply water, you may use these brands: Robarb's pH Perfect, Leslies pH Lock or Leisure Time pH Balance. These pH chemicals can only be used in freshly filled spas. If you do not use this type of product, balance water to the previously mentioned parameters for spas and care will need to be taken in maintaining pH on a frequent basis.

NEW POOLS

During new pool startup or freshly filled pools, often acid must be added daily for weeks to bring the pH down. Caution should be taken to make certain that TA is maintained; otherwise, controlling pH could be almost impossible - especially in a gunite/plaster pool.

Consult with your plaster pool builder about daily maintenance of a new plaster pool. Test your source water for iron, manganese, and other metals and remove. Daily brushing of the pool walls is extremely important to keep dust and dirt from settling on the surface. Do not use a wheel type vacuum since it may compress this curing surface. Also be careful not to gouge or score the new plaster with the vacuum. Clean the cartridge filter or backwash the filter as needed while plaster is curing. When the filter's pressure increases 8 - 10 psi, backwash or clean. This removes the plaster dust and keeps it from clogging the filter.

Balance the water chemistry and chlorinate for a few weeks prior to ionizing. Acid may need to be added daily. New plaster surfaces leach alkali compounds during curing causing increases in pH. Wait to install the anode in a new plaster pool otherwise it will be coated with plaster dust. Use a 1/3 dose of a sequestering or chelating metal remover such as Vanson Chemical's Ion Aid, Bioguard's Metal Magnet or Aqua Chem Stain & Scale Control. Adjust water chemistry first before starting up the ionizer. Stay on top of chemistry while plaster is curing.

NEW POOLS Continued.....

You may need to clean the anode elements after a week or so since precipitated calcium carbonate can coat them. If the ion level is hard to maintain after a week or so, this is a pretty good indication a coating has occurred which is preventing proper ionization. A blue/green copper sulfate coating on the anode is normal but severe coatings prevent ions from being made. On the Model 1200, turn the control knob to the C position to see if the anode ok light comes on in which case the anode does not need cleaning. If the anode ok light does not come on, see "How to Clean Anode".

IV. TESTING & ION LEVEL CONTROL

See the installation manual for instructions on installing and maintaining the appropriate ion level. After balancing the water, run pump 24 hours a day and run ionizer on the maximum power setting with a 1 - 2 ppm chlorine residual for 4 days or 96 hours to bring ion level up to 0.3 ppm in a 20,000 gallon pool. If a 1 - 2 ppm chlorine residual is not maintained during initial start up the ions will be used up as they are generated. This is also a likely time for algae if no sanitizer is maintained.

With the Model 1200 bringing the ion level up to 0.3 ppm free ions on power level max usually takes 2-3 days for 10,000 gallons, 3-4 days for 20,000, 4-5 days for 30,000, 5-6 days for 40,000 gallons. The silver ions are adjusted properly when the copper ions test correctly. Cut unit back to level 2 for a 20,000 gallon pool once ions are 0.3 ppm. Note: You must use your test kit DAILY to test the ion level when the equipment is set at higher output levels to prevent overdosing.

Using the formula provided in your instruction manual, determine the number of days recommended for initial start up. Usually three to four days are needed. If longer periods seem to be necessary based upon your testing, you may be looking through the side of the test tube rather than the top, have unbalanced water - low calcium or low TDS, forgot to maintain a 1 - 2 ppm chlorine residual while building up the ion level or have high pH, have a metal removal product in the water, the anode elements may need cleaning, or you may have a loose wire at the anode or have a bad electrical connection. See "Ion Test Directions" below and "How To Clean Anode".

When the test shows the proper ionization level, refer to the installation manual for the table indicating the proper power level for your pool and set the system for normal operation. With the Model 1200-R on a 20,000 gallon pool, power level 2 is sufficient for a 10 hour pump run time. This is a technology where less is better. Over ionizing only causes premature anode wear and 0.3 ppm ion level is ideal for sanitizing the pool water. It may be better to oxidize more frequently than run the ionizer at a higher setting.

A. ION TEST DIRECTIONS

Testing for ions is different than the typical yellow OTO test for chlorine and most other water chemistry tests. Most tests require looking through the side of the test tube. This is where the ion test is different! Looking through the side of the test tube is the biggest cause of inaccurate readings. Be sure to look down through the top of the test tube with the cap removed.

Store your test kit indoors in a cool dark place (not in pump house). We recommend replacing your reagents yearly for accurate results. Discard test tube contents immediately after testing (not in pool).

INSTRUCTIONS FOR THE ION TEST

1. Rinse the sample cell with the water to be tested and fill to the 10 ml mark. The bottom of the meniscus should rest on the 10 ml mark.

2. Add 5 drops of the **Ion Test Reagent A** to tube. Cap and invert to mix. Remove the cap and add 5 drops of **Ion Test Reagent B**. Cap and invert to mix.

3. Insert test tube into holder. **Wait 3 minutes** for color development.

4. Remove cap and place the test tube bottom flat on the color chart center. Match the color by looking down into the tube (not through the side).

5. Do this test in indirect light not bright sunlight for accuracy.

6. After testing, immediately dispose of the test tube contents (not in the pool).

7. Rinse the test tube and cap. Store indoors in a cool dark place.

0.7 - 1.0 ppm or higher	Overionized. Cut off ionizer. Add fresh makeup water to dilute ions to 0.3 ppm level. Then run ionizer at a lower power setting and/or less hours per day. Most pools are run on the minimum or level 2 position.
0.5 ppm	Cut off ionizer until ions are 0.3 ppm.
0.3 ppm	Optimum level. 0.3 - 0.4 ppm recommended range.
0.1 ppm until	Not enough Ions! Maintain a 1 - 2 ppm chlorine residual Ions are 0.3 ppm!

B. REGULAR TESTING AND MAINTENANCE OF ION LEVEL

Unlike chlorine and bromine, copper and silver ions will not evaporate from heat, nor do they dissipate by the sun's ultraviolet rays. Instead, they remain suspended in the water until they are spent and deionized by algae or bacteria. This is one of the reasons ionization is a more economical and a superior sanitizer!

After the initial start up and adjustment period, ion level need only be tested once every week or two. However, you should test and adjust pH twice a week. This is critical to the proper operation of your ionization equipment. Total Alkalinity is even more critical and should be tested at least twice monthly.

When testing the water, do not take a water sample near a return water line or too soon after adding chemicals. Draw the sample near the deep end. Wash the test tube with the pool water first. Turn the tube upside down to trap air inside and turn right side up about 18 inches below the surface.

For convenience, keep a clean 10 - 12 ounce bottle handy to draw pool water samples. Assuming that you'll be testing pH, Total Alkalinity and ion level each time, you can avoid returning to get a new sample for each test.

When filling any test tube to the mark line, the meniscus or the bottom of the surface bubble of water should rest at the mark line. Also when using reagents hold the bottle vertical to get the same size drops each time. This must be done accurately for it represents the entire body of pool water in a very small test tube sample. Store all test kits and reagents in a cool dark place. (An air conditioned home’s cabinet is ideal; Do not store in a hot garage or pump house).

Note: Maintain a 0.3 ppm ion level, a 7.2 to 7.6 pH and the proper TA and calcium hardness levels. In addition, treat any other contaminants in the pool water if necessary. Failure to follow these instructions can result in a discoloration of some pool surfaces.

V. CHEMICAL SAFETY AND PRECAUTIONS

1. Never mix two types of chemicals. This includes adding a second chemical to pool water before the first chemical was brought into solution. As a general rule, the time required would be at least four hours if introduced into the pool and the pump running continuously. Observe directions for the specific type of chemical and consider the limits of the pump circulation system.

2. Add the chemical to water, not water to chemical. If you get this wrong, you could have an explosion - especially with muriatic acid or potent chlorine chemicals.

3. Do not add acid or chlorine through the skimmer.

4. As a rule, you should dilute and predissolve a chemical before adding it directly into the pool. NEVER DRY BROADCAST CALCIUM HYPOCHLORITE (HTH) OR ANY GRANULAR CHLORINE PRODUCT. WHEN CALCIUM OR LITHIUM HYPOCHLORITE SETTLE ON THE POOL SURFACE, IT WILL CAUSE STAINING! Keep a 5 gallon plastic bucket and a wooden stirrer around for this purpose. Pour the dissolved solution directly into the water as you walk around the pool. The consequences of adding concentrated and/or undissolved chemicals can range from wasting the chemicals to personal injury or permanent damage to your pool or circulation system.

VI. CHEMICALS YOU SHOULD NOT ADD TO AN IONIZED POOL

1. Never use copper based algicides or any copper based chemicals as a regular maintenance chemcial.

2. Never use any Baquacil or Softswim products even the vinyl liner cleaner. It contains sequestering agents that will tie up the copper ions. Do not attempt to ionize a pool containing any Baquacil or Softswim. Baquacil/Softswim are not compatible with any other sanitizing systems. Remove all Baquacil/Softswim from the pool in accordance with special instructions in this manual.

3. Regular use of a stain and scale control product is generally not needed except in white plaster pools. Use a 1/3 dose once a month in white plaster pools to avoid discolorations during periods of high pH or improper water balance. Ex: Aqua Chem Stain & Scale Control, Metal Magnet by Bioguard, Pool Stain Treat by United Chemical, or Sequa-Sol by GLB.

4. Do not use <u>undissolved</u> granular chlorine. NEVER DRY BROADCAST GRANULAR CHLORINE. IT WILL STAIN THE POOL SURFACE WHERE IT SETTLES. Do not use an oxidizer with cyanuric acid (conditioner or stabilizer) such as trichlor or dichlor as a regular maintenance chemical to avoid cyanuric acid buildup.

5. Do not use raw chlorine stabilizer, conditioner or cyanuric acid.

6. Avoid calcium based chemicals unless trying to increase calcium hardness.

VII. FILTRATION

The purpose of a filter is to remove fine particles of dirt and debris that are held in suspension from the water. The filter enables you to use the same pool water over a long period of time. Make certain your filter is operating properly and backwash as the pressure increases 8 -10 psi or as per manufacturers recommendations.

Pump run time is important to provide adequate filtration and circulation. The pump should be run at least ten hours per day during the swimming season. This is what insures good water quality.

VIII. TROUBLESHOOTING WATER PROBLEMS

A. CLOUDY WATER - WHAT TO DO:

• Check the filter. It may need backwashing or the filter media needs changing. Increase the pump run time to 24 hours a day until water clears.

• Check the water chemistry and balance appropriately. Any one of these factors or a combination thereof can cause cloudy water:

- High pH - Add acid & adjust to 7.2 - 7.4
- High Total Alkalinity - Add acid & adjust to 70 - 90 ppm (80 - 90 for plaster pools)
- High Calcium - Add fresh makeup water that is low in calcium.
- Low Calcium - in a plaster pool the water will pull calcium from the pool surface clouding the water to satisfy its hunger for calcium. Test and increase calcium to proper levels.
- High Total Dissolved Solids - TDS doubles in a pool every year. If the pool can be drained (structurally ok & not a high water table), do so every 3 to 5 years with water that is low in TDS. If not, freshen with a foot a week for 5 weeks or 6 inches a week for 10 weeks.
- High Cyanuric Acid - Add fresh make up water to dilute.

• Algae: Balance water Chemistry, Brush Pool Surfaces, Shock the pool water with an unstabilized form of chlorine, Brush again, Vacuum and Backwash filter.

• Excessive Rain, a Windy Day, High Bather load can dump tons of organic matter in the pool. Vacuum and Oxidize accordingly.

• Adding chemicals when balancing water can cause water to cloud temporarily. Usually running the pump for 24 hours is the solution if the filter is in good condition.

• It may be time to Oxidize!

B. TABLE OF OXIDIZERS

All pools whether ionized or chemically treated require regular shocking. The ionization process maintains superior water quality using minimal halogen levels. However it is generally a good idea to oxidize excess organic debris after a rain storm, heavy bather loads such as pool parties, whenever leaves, pollen or other debris have been in pool or when the water becomes dull or loses some of its sparkle. Check and adjust pH prior to oxidizing and brush entire pool. Below are some of the products that can be used.

UNSTABILIZED CHLORINE CHOICES

CALCIUM HYPOCHLORITE (65% Available Chlorine) Use 6 oz. per 10,000 gallons. This product adds calcium to the water so you may not want to use it if the calcium level is over 275-300 ppm. Take a Large Bucket of water & mix in 3 oz. at a time. Stir vigorously to dissolve. Any residue in bottom of bucket, add more water & stir. REMEMBER, ALWAYS ADD CHEMICALS TO WATER. NEVER put chemicals in a bucket and then add water. This could cause an explosion! Also NEVER broadcast in dry form in a pool. This may cause a stain where it settles! This product has a pH of 11.8 so check water chemistry after using.

LITHIUM HYPOCHLORITE (35% Available Chlorine) Use 12 oz. per 10,000 gallons. Mix in a bucket of water and stir to dissolve. This product will not increase calcium hardness and it has a pH is 10.7.

HOUSEHOLD BLEACH Use 10 Cups per 10,000 gallons. Chlorox, Purex or any generic bleach (sodium hypochlorite) is only 5% available chlorine. Mix in a bucket of water and disperse around pool. You'll get better results from Cal Hypo or Lithium Hypo. It's pH of 13 is high so always check water chemistry.

POOL STORE LIQUID CHLORINE Use 4 Cups per 10,000 gallons. This is 9 -12% sodium hypochlorite and is 2 or 3 times more concentrated than household bleach. Since it has a pH of 13, be sure to check water chemistry. Mix in a bucket of water and disperse around pool.

If using a chlorine product to oxidize, don't add an amount that will create a reading over 3 ppm and avoid using stabilized chlorine like dichlor or trichlor to prevent cyanuric acid buildup.

If maintenance has been neglected and the water has become cloudy, chlorine will give faster, quicker acting results than a Non-Chlorine Oxidizer. With cloudy water check the filtration system, backwash if necessary, and adjust water balance before oxidizing. Factors that cause cloudy water are high pH, high TA, high Ca, low Ca, high Cyanuric Acid, high TDS, high bather load, rain and poor filtration.

NON-CHLORINE OXIDIZERS

Non-Chlorine Oxidizers are a good quick touch up chemical which allow you to swim shortly thereafter and are also good for shocking to break apart chloramines.

POTASSIUM PEROXYMONOSULFATE (42%) Use 1 Cup or 8 oz's per 10,000 gallons. This type of Non-Chlorine Oxidizer is found at any pool store. Dry broadcast around pool's perimeter and brush pool. It may have a pH of 3.4 or it may be pH buffered and have a pH of 6.8 - 7.0. Avoid overdosing such as 1 lb. of Non-Chlorine oxidizer per 10,000 gallons since this heavily oxygenates the water and could possibly cause an algae bloom.

HYDROGEN PEROXIDE (27% Solution) Use 1 gallon per 10,000 gallons. Mix in a bucket of water then disperse around pool. This is available from some pool stores.

WATER CLARIFIERS

ROBARB's SUPER BLUE is a highly concentrated water clarifier. Only use 1 oz. per 5,000 gallons. If more is used it will cloud the water since it is so concentrated. Mix in a bucket of water and pour the majority in the deep end then walk remainder around pool's perimeter. It will polish the water and you will be able to go longer in between oxidizing. Other clarifiers are also available but make sure they do not tie up or pull out metals.

ENZYME PRODUCTS are good supplements to breakdown oils and excess organic waste while decreasing oxidizing demand. This product can be purchased at your local pool supply.

SPA OXIDIZING

Spas are unique environments. One person using a spa is equivalent to 300 people in a residential pool. While soaking in a spa, the hot water strips the skin of oils, and dissolves deodorant, moisturizer, hairspray, cosmetic's, soap from bathing suits etc. causing the water to become cloudy. After using a 400 gallon spa, you will need to oxidize or breakdown these contaminants with:

1 Teaspoon Dichlor
then
1 Tablespoon Non-Chlorine Oxidizer (Potassium Monopersulfate)

C. ALGAE

Out of the thousands of algae species, 40 to 50 varieties have been found in swimming pools or spas. They most often occur in water where leaves or debris remain, in warm water, after rain or wind storms and on hot, sunny days or when the pH is high. Use an algicide as a regular maintenance product to prevent algae during high demand periods. Also using an algicide will cut down on the amount of oxidation needed.

Algae must be eradicated when first noticed or it will become more resistant and harder to remove. One of the first signs of algae is slippery feeling to the pool walls then cloudy water. If it is left unattended to, it could stain the pool surface.

The green algae are the easiest to destroy, then yellow algae, while black algae are the most difficult. Black algae grows roots into the plaster and also develops a bio shield which must be broken open with a brush to allow the ions, algicide and chlorine to penetrate it to kill it.

The ionization process is effective in the removal of most types of algae. However, no sanitizer can guarantee you'll never have an occasional algae bloom. Also some algae are so stubborn that the additional aid of chlorine shocking is needed.

Treatment for visible algae includes: (1) Adjust pH to 7.2 - 7.4 and Total Alkalinity to 80 - 90 ppm. (2) Set pump to run continuously (3) Brush Pool Walls and Bottom of pool to allow chemicals to penetrate algae (4) Superchlorinate by adding 1 lb. of Calcium Hypochlorite for each 10,000 gallons of pool water (See Table Of Oxidizers) (5) Brush walls and entire pool surfaces again (6) Vacuum to waste if possible (7) Backwash (8) Maintain a 1 - 2 ppm chlorine level, brush, vacuum & backwash daily until gone. A second shocking would be beneficial to make sure all the invisible algae has been oxidized.

While there are thousands of algae species, there are also numerous algicides. When selecting an algicide suitable for ionized pools, remember NOT TO USE COPPER BASED ALGICIDES. Most green algae can be eliminated within 24 hours by shocking with chlorine. Predissolve chlorine in buckets of water before putting in the pool.

In selecting a good algicide, here are some basic guidelines. The algicide should contain: a polymer that shields the algae cells against sunlight; a chemical preparation that opens up the cell so the algicide can get to it; a non-detergent wetting agent which makes it easier to dissolve substances in water without foaming. Of course, the active algicide ingredient should be a proven killer effective against the most common algae.

As a class of algicides, the polymeric algicides are among the most compatible with ionization systems. They are very effective against mustard and green algae as well as excellent algae preventatives. Swimming is okay within an hour of use.

One possible source of algae can be inadequate or malfunctioning filtration system. When you vacuum, does the filter trap suspended matter or chew it up and spew it back into the pool? If it is, you couldn't find a better way to cultivate algae. Repair or upgrade your filter system.

If you have experienced a period without the proper amount of ions in the water, this is a likely time for algae to develop. Always maintain a 1 - 2 ppm chlorine residual in the water until the ions are up to 0.3 ppm. If there isn't enough sanitizer in the water, bacteria may develop providing food for the algae to grow. This is a good time to do a little extra preventative maintenance before an algae bloom. Brush walls, vacuum etc. and maintain the proper sanitizer level: 1 - 2 ppm chlorine residual until the ions are generated up to 0.3 ppm.

D. UNABLE TO GET ION READING

1) Check water chemistry. Adjust to proper levels (see pg 2). Calcium hardness is important because low calcium and low TDS levels reduce conductivity of the water preventing proper ionization. High calcium and high TDS levels cause scaling conditions which can coat the anode preventing ionization.

After balancing the water, run pump 24 hours a day and run ionizer on the maximum power setting with a 1 - 2 ppm chlorine residual for 4 days or 96 hours to bring ion level up to 0.3 ppm in a 20,000 gallon pool. If a 1 - 2 ppm chlorine residual is not maintained during initial start up the ions will be used up as they are generated.

2) The anode may be coated even on a new install particularly if chemicals have been poured down the skimmer. Clean the anode. See "How To Clean Anode" directions.

3) Improper testing. See "Ion Test Kit Directions" and be sure to look down through the top of the test tube not the side. Also you may need a new reagent.

4) If there is a sequestering, chelating, scale or metal removal product in the water, it could be removing the ions or interfering with the test. Run the unit at the normal power setting for your gallonage. This product will dissipate from chlorine levels over 1 ppm, sunlight and filtration.

5) Verify a good electrical connection at the anode with a multimeter. See directions in the Installation Manual.

E. ION LEVEL TOO HIGH - .4 PPM OR HIGHER

(1) Turn ionizer off until ions go down to 0.3 ppm. Make sure ionizer is set at the proper level for your pool - usually min or level 2 - before resuming operation.

(2) If ion level is 0.5 ppm or higher, cut off ionizer. In a white plaster pool with an ion level over 0.7 ppm, add fresh makeup water to lower the ion level to 0.3 ppm.

F. GREEN TINTED WATER

This is generally due to a rapid change in water chemistry after a rain storm or improper water balance. The resulting water can be a pretty clear emerald green color. Check pH and TA then lower with acid. Iron can cause a green tint to the water so check all metal levels and lower or remove if necessary. The cause may also be poor filtration so check the filter pressure and backwash if necessary.

If a green tint continues after adjusting water balance, predissolve one pound of calcium hypochlorite for each 10,000 gallons of water, and disperse around the pool. Run pump continuously. The natural water tint should be restored in 4 to 24 hours.

G. METALLIC / MINERAL, ALGAE & BACTERIA STAINING

All pools - both chlorinated and ionized pools - are subject to staining. One of the most frequent sources of stains is calcium carbonate or scale. It is caused by high pH, high Total Alkalinity, High Calcium, or even high temperature. Scale is a hard whitish substance like chalk that is extremely difficult to remove from a pool surface even with a knife. This white deposit soon turns the color of whatever comes in contact with it - Brown: iron or dirt; Black: manganese or algae; Green or Yellow: algae or iron; Turquoise: precipitated copper. Rough scale deposits can also clog pipes, filters, heaters and cause serious equipment damage.

As long as the water chemistry menu is followed staining generally will not occur. Discolorations usually have only been a concern in white unpainted plaster pools and are seldom seen in a vinyl, fiberglass, or painted or epoxy coated plaster pools.

If a pool tends to stain, use 1/3 dose of a stain and scale control product on a monthly basis. This will help prevent metals from coming out of solution during periods of high pH or improper water balance. Also NEVER dry broadcast a granular chlorine product. Stains will occur where it settles on the pool surface. Always mix in a bucket of water. See "Table of Oxidizers".

In the event a tinting does occur, Test Make Up Water and Pool Water for iron, copper and complete chemistry readings (pH, TA & Ca) to determine source. Fresh discolorations can sometimes be pulled immediately out by lowering the pH to 7.2, adjusting Total Alkalinity to 70 - 80 ppm, and brushing the surface.

If stains are localized in certain spots, simply pouring muriatic acid in those areas where the stains are and brushing will remove them. Even rubbing a trichlor stick on a stained spot will also remove any discoloration.
If a pool is completely stained: Cut off ionizer. If ion level is high, add fresh make up water to dilute to 0 ppm. This is done by draining 2 feet of water and adding fresh water and repeating until no ion level is detected. Test all chemistry levels and adjust TA to 70 ppm & pH to 7.2. This is essential to redissolve any stains.

Once the Total Alkalinity is 70 ppm & pH is 7.2, use Aqua Chem Stain & Scale Control, Bioguard's Metal Magnet, or Sun Products Scale & Iron Remover. These are HEDP chemical compounds which are the most effective. Use 1 quart per 10,000 gallons. This procedure should be done at night for optimum results. Brush the pool walls prior to using the Metal Magnet. Cut the pool off. When the water is completely still, pour the Metal Magnet around the walls of the pool. It will cling to the walls and slide down the surface to the bottom. Let the Metal Magnet sit on the surfaces undisturbed overnight. The next morning cut on filter. Daily brushing until the stains are gone and adjustments for 70 TA & 7.2 pH are necessary to completely remove the stains. Additional dosages of Metal Magnet may also be necessary to completely remove discolorations. Use Bioguard's Sparkle Up Filter Aid to pull out the sequestered metals and to prevent further staining. Backwash when the filter pressure increases 8 to 10 psi.

IRON STAINING: Iron is the most reactive metal causing staining at very low levels even 0.1 ppm. If iron is present in the source makeup water, when adding fresh water to the pool put a chlorine tablet in the skimmer and add the water directly into the skimmer while the pump is running. This will precipitate out 70% of the iron into the filter. If the iron level in the supply water is over 0.1 ppm, use Bioguard's Sparkle Up Filter Aid in addition to the chlorine tablet in the skimmer to trap all the iron in the filter. Backwash when the filter's pressure increases 8 - 10 psi.

BACTERIA STAINING: Bacteria spores are introduced to the soil when a vinyl liner is changed out or during periods of excessive rain. When a liner is replaced, the surface should be treated to prevent bacteria growth behind the liner. The mildew bacteria travel with the ground water table and require three things to survive - water, darkness and a food source which is the liner. The bacteria actually get into the plasticizer of the liner. They do not cause harm to the liner but discolor it usually leaving a brown black or grey black color. When the water table goes down, the bacteria usually go with the water table.

To our knowledge there is no current process or method of eradicating this mildew problem from the pool water side. Very high levels of chlorine or bromine have shown moderate success in temporarily bleaching the dark surface discolorations. This does not however treat the source of the problem behind the liner.

Apparently the only prevention is laying down 4 or 6 mil polyethylene behind the liner to prevent this bacteria coming in contact with the liner via the ground water or from untreated soil. The bacteria can not penetrate the polyethylene plastic since it has no plasticizer. Sometimes simply waiting for the water table to lower may remove the bacteria. Once it has penetrated the liner, it is recommended to pull the liner out and treat the soil. Oxidizing the liner and regular brushing may eventually remove the stain after the ground has been treated and plastic has been laid down. A new liner may also have to be installed.

Bio-Chem (901) 767-1752 manufactures a pool stain shield that is applied to the walls and bottom of an in-ground pool. It is painted on the pool bottom and sides prior to the liner installation which prevents groundwater from coming in contact with the liner.

IX. WINTERIZING AN IONIZED POOL

(1) Balance water chemistry. See chemistry section. Use a non-metallic algicide. Run filter continuously.

(2) Make sure ion level is 0.3 ppm.

(3) Oxidize with 1 pound Calcium Hypochlorite per 10,000 gallons dissolved in a bucket of water. Run Filter for 8 hours.

(4) Cover Pool.

(5) If draining plumping lines, make sure ionizer is off.

Copper and silver ions do not dissipate from heat and sunlight like chlorine and other halogens do. This is one of ionizations strongest benefits and this is why winterizing is so economical. If freezing is not a consideration or a FREEZE GUARD is installed, you can run the ionizer occasionally to maintain a 0.3 ppm residual in the off season months.

X. OPENING UP AN IONIZED POOL

(1) Balance water chemistry. See chemistry section.

(2) Oxidize with 2 pounds Calcium Hypochlorite per 10,000 gallons dissolved in a bucket of water.

(3) Brush and Vacuum Pool. Backwash as needed.

(4) Clean the anode. “See How to Clean Anode”.

(5) Maintain a 1 - 2 ppm chlorine residual until Ions are 0.3ppm. See "Operating the System" in the manual.

XI. HOW TO CLEAN ANODE

Periodically, the anode must be removed and cleaned or replaced. Indications that the anode needs servicing is either difficulty in maintaining a proper ion level or the anode okay calibration light is out when the control knob is rotated to the C position on the 1200 series units. On the Model 1100, the output power lights will no longer go to the 100% power LED when the power knob is rotated to the maximum position. On a new installation if the ion level drops after a couple of weeks, clean the anode. This indicates the anode has been cleaning up the water and lowering the TDS.

The anode generally needs to be cleaned once every year. Pools with high calcium and/or high TDS may require more frequent cleaning. Heavily coated anode bars may indicate excessive calcium or other mineral hardness. Check and adjust water chemistry as necessary. If the anode is more than 75% worn, it may require replacement. Continue to use the anode until ions can no longer be maintained at 0.3 ppm.

Using a wide mouth 2 3/4" wrench, unscrew the anode from the ion chamber and dry off. Use a flat file then sandpaper to remove the coating particularly in between the bars. This is where the ions are created and it is important for it to be free of any build up. It is not necessary to clean the anode elements to shiny, bare metal. An alternative cleaning method is to put the metal part only of the anode in a mild acid solution. (Put three parts water in a bucket then add one part muriatic acid). Scrub with steel wool and a screwdriver or scraper particularly between the bars.

Next rinse the anode and wipe off especially in between the bars. Wrap teflon tape around the PVC threads of the anode seven times then screw into the ion chamber. Silicon anode connectors to prevent corrosion.

XII. ANODE WEAR

Different conditions affect anode wear. The power setting on the unit determines how quickly the anode will be used up. Most 20,000 gallon pools are started up on the maximum power setting for 3 to 5 days then cut back to a lower power setting and run 8 -12 hours a day. The projected anode life in an average size 15,000 gallon pool is 2 to 4 pool seasons. A pool season is 4 to 5 months.

The demand of a pool environment, bather load, water chemistry, how long the pump is run per day, the power setting on the unit and how it is started up all affect the anode life. The more the unit is run, the more ions are generated and can be tested in the water. Any ion level over 0.3 ppm is really a waste of the anode and is not necessary to keep the pool sanitary.

If pools are left uncovered and run during the off season, lower the power output on the ionizer, decrease the pump run time and maintain only a 0.15 to 0.2 ppm ion residual since the demand is far less. Or to get a longer anode life, cut the ionizer off when the pool is not being used in the off season. Enough of the ion residual will last for a few months. Oxidize with chlorine once a month or whenever the water gets dull.

XIII. STARTING UP AN IONIZED POOL WITH THE PRESENCE OF IRON, MANGANESE OR COPPER

Iron is the most reactive metal usually causing brown and yellow stains. Manganese generally turns water black or purple when oxidized. To remove these metals prior to installation, sequester the water with Bioguard's Metal Magnet (or metal removal product) and use Bioguard's Sparkle Up in the filter so these metals can be backwashed out of the pool.

If copper is present in the pool at 0.3 ppm, start up the ionizer on the minimum power setting after balancing the water. If the copper level is higher, add fresh makeup water that does not have metals present or use Bioguard's Metal Magnet and Sparkle Up to lower or remove.

If metals are in the source water, put a chlorine tablet and the hose in the skimmer when adding fresh makeup water. This will remove 70% of the metals via the filter and prevent adding excessive metals to the pool.

XIV. WHY BALANCE A POOL?

The main purpose of proper water balance is for the protection of the bathers, the pool, and its equipment!!! Proper water balance must be maintained no matter what type of sanitizer is used. First get a professional test kit and start with Total Alkalinity.

If **Total Alkalinity** (the total number of alkaline or salt compounds) isn't properly maintained, the pH will tend to bounce. In an ionized pool, a TA range of 70 - 90 ppm is recommended. TA acts as a buffer for pH.

> LOW TA is corrosive and will etch plaster and damage pool equipment. pH tends to be low with low TA.
>
> HIGH TA - scaling will occur depositing a hard white or colored residue on the pool surfaces, in plumbing pipes, and in equipment like the heat exchanger. Scale is the precipitation of calcium carbonate. pH tends to go high with high TA.

pH (potential hydrogen - the total number of H+ or OH- ions): The pH scale measures the acid-alkaline balance of pool water. Any pH value below 7.0 is considered acidic and any pH value above 7.0 is considered basic or alkaline. A pH range of 7.2 to 7.4 is recommended for pools since this is the pH of our eye tissue.

LOW pH - will produce acidic or corrosive water. It can damage pool equipment, pipes, fixtures, etch & stain pool plaster, irritate eyes & nose of swimmers. If pH is below 7, the pool water can eat away at the pump, fixtures, and the heater header dissolving and adding mass amounts of metals into the pool.

HIGH pH - scaling and cloudy water will occur.

Calcium determines if the water is hard or soft. Calcium levels should be 225 - 250 ppm in plaster pools, 175 - 225 ppm in vinyl liner pools and 100 - 125 ppm in 104 degree spas. See “New Spas” for proper chemistry parameters.

HIGH CA - scaling occurs. When this white residue is deposited on the pool surface, algae and dirt can penetrate this porous scale material leaving behind stains usually a grey or brown crust. Severe scale in plumbing can clog the pipes decreasing the flow, circulation, efficiency of filtration and causing strain on the pump. It can also cause calcification of the sand filter media turning it into a hard substance like concrete and of course in order to have a successful pool, you must have good filtration and circulation!

LOW CA - The water becomes aggressive and will seek to pull the calcium out from the plaster pool surface until the water is satisfied. Obviously this causes great damage to a marcite plaster pool surface. Low Ca also produces corrosive water that will eat away at metal parts, ladders, equipment, lights, and any pool surface etc.

Total Dissolved Solids - Every year the total number of dissolved solids in a pool more than doubles. It is recommended to drain a pool (if possible) every 3 to 5 years. TDS increases due to evaporation and all the chemicals put into a pool. Eventually the water becomes saturated and even proper water chemistry won't produce good results. If a pool can not be drained due to the water table or will structurally collapse or has a balloon liner etc., then draining a foot a week for 5 weeks or 6 inches a week for 10 weeks will help freshen up the water.

If a pool has previously been on a salt chlorine generator, the TDS will need to be lowered to below 1000 ppm to prevent possible discolorations.

Remember one of the main purposes of proper water balance is the protection of the pool and it's equipment!!!!

High pH, TA, Ca, or temperature all lead to scaling.

Low pH, TA, Ca, or temperature lead to corrosive water.

If one or more of these factors (pH, TA or Ca) are above the proper range and the remaining factors are in the proper range, the water will scale.

If one or more of these factors (pH, TA or Ca) are below the proper range and the remaining factors are in the proper range, the water will corrode.

If all factors are in the proper range, the water is balanced.

POOL WATER NEEDS TO BE BALANCED IN ORDER TO MAINTAIN A GOOD POOL ENVIRONMENT NO MATTER WHAT THE SANITIZER!!!

POOL CHEMISTRY GUIDELINES

VINYL, FIBERGLASS & ALL OTHER SURFACES:

Suggested Chemistry Levels		Action Required to Correct Chemistry: To Raise	To Lower
pH	7.2 - 7.6	Add Soda Ash	Add Acid
TA	70 - 90 ppm	Add Sodium Bicarbonate	Add Acid
Calcium	175 - 225 ppm	Add Calcium Chloride	Add Fresh Makeup Water that's low in calcium
Ion Level	0.3 ppm	Run Ionizer Longer or Turn Dial Up 1 Level (Consult Manual) Clean Anode Maintain 1 ppm chlorine until Ions are 0.3 ppm	Shut Off Unit. If Over 0.7 ppm, add Fresh Makeup Water to Dilute
TA			Keep pH & in line

PLASTER POOLS (GUNITE, CONCRETE, MARCITE SURFACES)

Suggested Chemistry Levels		Action Required to Correct Chemistry: To Raise	To Lower
pH	7.2 - 7.6	Add Soda Ash	Add Acid
TA	80 - 90 ppm	Add Sodium Bicarbonate	Add Acid
Calcium	225 - 250 ppm	Add Calcium Chloride	Add Fresh Makeup Water that's low in calcium
Ion Level	0.3 ppm	Run Ionizer Longer or Turn Dial Up 1 Level (Consult Manual) Clean Anode Maintain 1 ppm chlorine until Ions are 0.3 ppm	Shut Off Unit If Over .5 ppm, add Fresh Makeup Water to Dilute
TA			Keep pH & in line

SPA CHEMISTRY GUIDELINES

104 DEGREE SPAS:

Suggested Chemistry Levels		Action Required to Correct Chemistry: To Raise	To Lower
pH	7.2 - 7.6*	Add pH Increaser	Add Acid
TA	70 - 90 ppm*	Add Sodium Bicarbonate	Add Acid
Calcium	100 - 125 ppm*	Add Calcium Chloride	Add Fresh Makeup Water that's low in calcium
Ion Level	0.3 ppm	Run Ionizer Longer or turn Dial up 1 level (Consult Manual) Clean Anode Maintain 1 ppm chlorine until Ions are 0.3 ppm	Shut Off Unit. If Over .7 ppm, add Fresh Makeup Water to Dilute Keep pH & TA in line

* Avoid increasing if using a pH Perfect type product

90 DEGREE SPAS (SWIM SPAS) - SEE POOL CHEMISTRY

Suggested Chemistry Levels		Action Required to Correct Chemistry: To Raise	To Lower
pH	7.2 - 7.6	Add Soda Ash	Add Acid
TA	70 - 90 ppm	Add Sodium Bicarbonate	Add Acid
Calcium	175 - 225 ppm	Add Calcium Chloride	Add Fresh Makeup Water that's low in calcium
Ion Level	0.3 ppm	Run Ionizer Longer or Turn Dial Up 1 Level (Consult Manual) Clean Anode Maintain 1 ppm chlorine until Ions are 0.3 ppm	Shut Off Unit If Over .7 ppm, add Fresh Makeup Water to Dilute Keep pH & TA in line

MULTIMETER TEST FOR 1200-R

This test is sometimes done to verify a good electrical connection to the anode and to determine the power output of the Controller. This test must be done while the pump is running, water is flowing through the Ion Chamber and the anode wires are connected to the anode. Coated anode elements and varying water chemistry will give different readings than those listed below.

Put the multimeter on the 10 DC Volt Scale. You can test the output at the anode screws.

Turn the control knob of the ionizer to the C or Check Circuit . “Anodes OK” position and take a reading by putting 1 multimeter probe per screw on the anode. Continue to log readings on the different power settings. Note as the polarity switches the needle on the gauge will go below zero - switch the probes on the screws when this happens in order to get a reading.

Position C = 1 - 1.2 DC Volts

MINIMUM or Position 1 = 1 -1.2 DC Volts Output

Position 2 = 2.6 - 3 DC Volts Output

Position 3 = 4.1 – 4.7 DC Volts Output

Position 4 = 5.6 - 6.3 DC Volts Output

MAXIMUM or Position 5 = 7 - 7.9 DC Volts Output

You may have different readings due to varying Total Dissolved Solid levels which creates a different conductivity to the water. Coated anode bars may also give unusual power output readings. Clean the anode with a flat file and sandpaper particularly in between bars. See cleaning instructions. After cleaning retest.

If there is a broken wire, the reading will be 0 DC Volts at the anode. If one of the wires isn't properly connected, then the open circuit reading may be over 20 - 24 DC Volts at the anode.

A multimeter should also be used to verify if a power source is 110 or 220 Volts. Ex: If a prewired 220 V unit is connected to a 110 V power source, the lights will flash but the pool will not ionize properly until it is switched over to 110 V operation.

MULTIMETER TEST FOR 1100

This test is sometimes done to verify a good electrical connection to the anode and to determine the power output of the Controller. This test must be done while the pump is running, water is flowing through the Ion Chamber and the anode wires are connected to the anode. Coated anode elements and varying water chemistry will give different readings than those listed below. Put the multimeter on the 10 DC Volt Scale. Test the output at the anode screws.

Turn the power control knob counter clockwise to the zero or 10% output position. Take a reading by putting 1 multimeter probe per screw on the anode. Continue to rotate the power control knob clockwise to 100% power and log readings of the different power settings. Note as the polarity switches the needle on the gauge will go below zero - switch the probes on the screws when this happens in order to get a reading.

10 % = .5 DC Volts Output	60 % = 3.09 DC Volts Output
20 % = 1.7 DC Volts Output	70 % = 3.38 DC Volts Output
30 % = 2.1 DC Volts Output	80 % = 3.6 DC Volts Output
40 % = 2.5 DC Volts Output	90 % = 3.9 DC Volts Output
50 % = 3.0 DC Volts Output	100 % = 4.1 DC Volts Output

You may have different readings due to varying Total Dissolved Solid levels which creates a different conductivity to the water. Coated anode bars may also give unusual power output readings. Clean the anode with a flat file and sandpaper particularly in between bars. See cleaning instructions. After cleaning retest.

If there is a broken wire, the reading will be 0 DC Volts at the anode. If one of the wires isn't properly connected, then the open circuit reading may be over 20 - 24 DC Volts at the anode. A continuity test can be done with the anode to make sure there is not a break in between the anode screw and the anode element itself.

If the unit power lights only go to a maximum of 10% or only 50% when rotated full clockwise, the anodes may need cleaning or replacing, the calcium hardness may need increasing or the internal fuse may need resetting (See Troubleshooting 1100 Chart). Clean the anodes. Continue using the anode until an ion level can no longer be maintained at 0.3 ppm. Also verify a good electrical connection at the anode. If the connectors have become corroded, replace and retest anode condition with the unit power lights.

The model 1100 has an internal resettable fuse. If it should blow, the proper way to reset it is to set power output to 10%, disconnect the power source for 30 seconds, start up at only 10% power then slowly increase to your proper power setting.

A multimeter should also be used to verify if a power source is 110 or 220 Volts.

Warranty Registration Certificate

All questions must be answered and this certificate must be mailed within 30 days of purchase to validate warranty. This will also enable us to provide you with helpful information about your equipment in the future.

Your Name _____ Phone (_____) _____
Street Address _____ Fax (_____) _____
City _____ State _____ Zip _____ Email _____
Purchased from (Dealer Name) _____ Date _____
Dealer Address _____
Model # _____ Serial # _____ Phone (_____) _____
Installed By _____ Phone (_____) _____

Where is this equipment used? (Circle two of the following)
Residential Commercial Industrial Application Other (specify) _____
Pool Spa Decorative Fountain Cooling Tower Other (specify) _____
Water source used for this equipment? (Circle one) Well City/County
Describe its taste and smell: _____
Why did you purchase this equipment? _____

How did you hear about our equipment? (Circle each that apply)
Friend Store Mail Internet Newspaper or Magazine Ad Yellow Pages
How would you rate your dealer's service & follow up? (Circle one) A B C D F
Please supply water chemistry from sample taken today:

	Pool, Spa, Ftn or other	Tap or Other Water Source
Total Alkalinity (TA)	_____ ppm	_____ ppm
Calcium Hardness	_____ ppm	_____ ppm
Iron	_____ ppm	_____ ppm
Copper	_____ ppm	_____ ppm
pH	_____	

Gallons in spa, pool, fountain or application? _____ Its age? _____
Type of surface? (Circle one) Plaster Vinyl Painted Fiberglass Other _____
What has been used to sanitize the water in the past year? (Circle one)
Chlorine Bromine Baquacil/Softswim Ozone Other (specify) _____
Estimate annual cost of above sanitizer? $ _____
Was your water balanced before the ionizer was turned on? _____

- Circle each of the responses below that apply -

Did your dealer explain how to: (1) use the equipment (2) test the ion level (3) oxidize
Have there been any of the following conditions in the past two years?
(1) Cloudy water (2) Algae (3) Objectionable odor (4) Stains
Which of the above problems do you feel is the worst? _____
Have users experienced any of the following in the past two years?
(1) Allergic reaction to pool or spa water? (2) Hair or skin dry or rash?
(3) Hair discolored or bleached? (4) Swimwear or plants damaged by water?
Which of the above is most important to you? _____

Mail this certificate to:
Carefree Clearwater, Ltd.
2778 Cumberland Blvd # 383 • Smyrna, GA 30080-3048

LIFETIME AGREEMENT

Limited Warranty

Carefree Clearwater, Ltd. will, at its option and at its expense, repair inoperative equipment or replace it with equipment of equal value and type and return it to you for the lifetime of the original owner, as specified in the current Supplemental Customer Service Agreement.

To validate this agreement, the Registration Certificate must be completed and returned to Carefree Clearwater, Ltd. within 30 days from the installation date.

Carefree Clearwater, Ltd. is not responsible for damages of any kind, including incidental and consequential damages. Some states do not allow the exclusion or limitation on incidental or consequential damages, so this limitation may not apply to you.

Any implied warranty arising under state law will be limited in duration to ten days from the date of sale. Some states do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you.

If you are sending equipment to Carefree Clearwater, Ltd., send it freight prepaid, to 2778 Cumberland Boulevard - No. 181; Smyrna, GA 30080; Attention: Factory Service.

This is the exclusive remedy available from Carefree Clearwater, Ltd. This agreement gives you specific legal rights, and you may also have other rights which vary from state to state.

Supplemental Customer Service Agreement

The Registration Certificate must be complete and returned to Carefree Clearwater, Ltd. within 30 days from the installation date at which time your water treatment equipment will be certified under warranty against all defects in workmanship and materials for one year, beginning from the date of installation, as specified below.

From year two through five, purchaser may be required to pay for the actual cost of repairs or replacement to a cumulative maximum of $125 ($295 for 1200-C models) during the entire period, regardless of the number of repairs. There are no charges for parts or labor during the first year.

Beginning with the sixth year, purchaser may be require to pay for the actual cost of repairs or replacement to a cumulative maximum of $235* during each 5-year period ($295* for 1200-C models), regardless of the number of repairs. [*Adjusted annually with the Consumer Price Index after year five.]

This agreement does not cover dealer services, on-site service calls or periodic replacement of expendable items such as anodes or fuses.

In addition, the agreement is void under any of the following conditions which may apply: Installation of anodes not designed or approved by Carefree Clearwater for this model, improper installation, improper grounding, non-compliance with appropriate safety codes, opening of the equipment chassis, repair of alteration by persons other than those authorized by Carefree Clearwater, Ltd., failure to observe operating and maintenance instructions, abuse, water leakage, lack of reasonable care and maintenance, vandalism, change of equipment ownership, acts of God, damage caused by other equipment, or attempts to tamper with the equipment serial numbers or with its internal electrical or mechanical parts.

Purchaser is responsible for all costs incurred in the removal and reinstallation of equipment and in shipping to Carefree Clearwater for repairs.

Dealers may offer additional service contracts to supplement this equipment agreement, providing specific on-site services, non-warranty technical support and maintenance calls.

Outside of the continental U.S., purchaser pays shipping to/from Carefree Clearwater and any require fees, customs or duties.

February 1993

POOL LANGUAGE DEFINITIONS

Acid A chemical such as liquid muriatic acid (hydrochloric acid) or dry acid (sodium bisulfate) used to lower the Total Alkalinity (TA) and the pH of the pool water.

Acid Demand The amount of acid required to lower pH or TA.

Alga (Algae, p.) An aquatic plant that grows rapidly in pool water when a combination of warm temperature, high organics and lack of sufficient sanitizing agents exist. The most common groups of algae are yellow, green and black.

Algicide A chemical designed to kill or prevent the growth of algae.

Anode The copper/silver elements which fit into the pool plumbing and are connected to the ionization equipment controller. These will wear out and are replaceable.

Baking Soda (Sodium bicarbonate) A chemical used to raise the Total Alkalinity (TA) of pool water with little affect on pH.

Bromine A red-brown gas of the halogen family, generally used for pool sanitation containing 35% chlorine to activate it.

Calcium Hardness A measure of the calcium salts dissolved in water.

Calcium Chloride Increases the calcium level of a pool to protect the pool surfaces from corrosive effects of the water. One pound of 80% calcium chloride will increase hardness by 8 ppm in 10,000 gallons.

Calcium Hypochlorite A powder or tablet form of chlorine that contains 65% available chlorine. See "Table of Oxidizers".

Chloramines Chemical compounds formed when chlorine comes in contact with bather wastes such as sweat, oils, hair spray, deodorants, urine and other organic wastes. Chloramines are not effective as sanitizers and produce burning eyes, skin irritation and strong chlorine odors.

Chlorine A yellow-green gas of the halogen family generally used in pool sanitation in solid or liquid compounds. Pure gaseous chlorine is sometimes used in large commercial pools.

Chlorine Demand Amount of chlorine necessary to destroy the various impurities in the water.

Chlorine, Free The amount of chlorine available for sanitizing after the initial chlorine demand of the water has been met.

Copper A good algicide. See "Ionization" below.

Conditioner Also referred to as cyanuric acid or stabilizer. A chemical holding agent or buffer that retards the dissipation of chlorine due to heat and sunlight. Extends the life of the chlorine. Not needed in an ionized pool.

Cyanuric Acid See "Conditioner" above.

Dichlor (Sodium dichloro-s-triazinetrione) Quick dissolving granular chlorine. Avoid using on a regular basis in ionized pool to prevent cyanuric acid buildup. 58% of Dichlor is isocyanuric acid.

Electrode See Anode.

Electrolysis An electrochemical reaction sometimes causing a black stain around metal fixtures or on the plaster. It is commonly caused by power lines located too close to the pool, two dissimilar metals being plumbed together, and/or ungrounded pool fixtures.

Hardness The amount of calcium and magnesium dissolved in the water.

H T H See "Calcium Hypochlorite" above.

Ionization (as it applies to ionization as a pool sanitizer) The process of releasing small amounts of copper and silver ions into the water. Atomic particles of these elements are called ions because they are electrically charged and in a free uncombined state.

These ions work to disrupt the enzyme balance of algae and bacteria. The dead micro-organisms then cling together until they accumulate a mass large enough to be trapped by the pool filter. They are washed out of the pool when the filter is backwashed. This process is achieved without danger to multi-celled plants and animals.

Lye See "Sodium Hydroxide"

Muriatic Acid (Hydrochloric acid) Liquid acid used to reduce the pH and Total Alkalinity (TA). Also used to "acid wash" pool plaster to remove stains and scale.

Neutralizer (Sodium thiosulfate) A chemical used to counteract the oxidizing effect of chlorine in order to increase the accuracy of pool water tests.

O T O A chemical reagent used to test the chlorine level in water.

Oxidizer A chemical which burns up organic material in the pool water.

Potassium Peroxymonosulfate A non chlorine oxidizer that removes organic material, contaminants and chloramines in pool water without raising chlorine levels as required in superchlorination.

pH A measure of the pool's water acidity or lack of it. It literally means potential for releasing hydrogen ions. The pH range is 0 to 14. Seven is neutral. Below 7, water tends to be corrosive. Above 7, water tends to form scale deposits and stains. The ideal range for ionization equipment is 7.2 to 7.4. At pH's over 7.8, metallic staining may occur. The pH is raised with soda ash and lowered with acid.

Phenol Red A chemical reagent used in the test for pH.

PPM Abbreviation for "parts per million". A unit of measurement used when testing water.

Scale (Calcium carbonate buildup) A precipitate that results from chemically imbalanced pool water - high pH, high TA, high Calcium or high temperature. Scale is a hard whitish substance like chalk that is extremely difficult to remove from a pool surface even with a knife. This white deposit soon turns the color of whatever comes in contact with it - Brown: iron or dirt; Black: manganese or algae; Green or Yellow: algae or iron; Turquoise: precipitated copper. Rough scale deposits can also clog pipes, filters, heaters and cause serious equipment damage.

Shock The addition of pool chemicals in larger-than-normal amounts in order to eliminate unusual pool water conditions such as infestations of algae, the presence of chloramines or colored water.

Silver A good biocide. See "Ionization".

Soda Ash (Sodium Carbonate) A chemical used to raise pH. At normal pH's, soda ash affects Total Alkalinity (TA) only slightly.

Sodium Bisulfate (Dry Acid) A chemical used to lower pH and TA.

Sodium Hydroxide Lye (Caustic Soda) used to increase pH significantly with much smaller increases in Total Alkalinity than when using soda ash.

Sodium Hypochlorite An unstabilized liquid chlorine containing an excessive amount of salt. See "Table of Oxidizers".

Stabilized Chlorine See "Dichlor" and "Trichlor".

Stabilizer See "Conditioner" above.

Stain A tinting or discoloration of the pool surface caused by improper water chemistry - high pH, high TA, high CA, high Cyanuric Acid or high metal levels. See "Metallic/Mineral and Algae Stains" in manual.

Superchlorination An extra large dose (7 to 10 times the combined chlorine level) of chlorine used to reach breakpoint chlorination and free up the combined chlorine into free chlorine.

Total Alkalinity TA acts as a buffer to pH controlling fluctuations in pH. Control of TA is essential for maintenance of pH. If the TA is too high, scaling and staining will occur. If the TA is too low, pH cannot be controlled and the water is corrosive which may also cause staining. TA is lowered with acid and raised with sodium bicarbonate.

Total Dissolved Solids Every year the total number of dissolved solids in a pool more than doubles. It is recommended to drain a pool (if possible) every 3 to 5 years. TDS increases due to evaporation and all the chemicals put into a pool. Eventually the water becomes saturated and even proper water chemistry won't produce good results. If a pool can not be drained due to the water table or will structurally collapse or has a balloon liner etc., then draining a foot a week for 5 weeks or 6 inches a week for 10 weeks will help freshen up the water.

Trichlor (Trichloro-s-triazinetrione) A slow dissolving type of chlorine available in both granular and tablet form. Avoid using on a regular basis in an ionized pool to prevent cyanuric acid buildup. 55% of every trichlor tablet is isocyanuric acid.

Notes