

# Installation and Operating Instructions



## SolarAttic® Swimming Pool Heater

Pool Convection System Two™

U.S. Patents 5,014,770 5,452,710 5,746,653

SolarAttic PCS2™



# Table of Contents

- 1. Introduction to SolarAttic .....1**
  - Solar Without Panels .....1
  - Basic Operation .....1
  - Description of Technology .....1
  - Automation .....1
- 2. Consider Before Installation .....1-2**
- 3. Cautions & Warnings .....3-5**
- 4. Installation .....5-13**
  - ABC’s of Installation .....5
  - Locate the SolarAttic PCS2 .....5
  - Retrofit Support System .....5-6
  - Basic Plumbing Diagram .....7
  - Power The PCS2 .....8
  - Internal Wiring Diagram .....9
  - Automation Wiring Diagram .....10
  - Float Wiring Diagram .....11
  - Compool LX220 Circuit Board .....12
  - Compool LX220 Power Center .....13
- 5. Operation .....14**
- 6. General Service Notes .....15**
- 7. Spring Start Up .....15**
- 8. Winterization .....16-17**
- 9. Winter Freeze Warnings .....17**
- 10. Unattended Pools .....17-18**
- 11. Repairs .....18**
- 12. System Troubleshooting .....18**
  - Troubleshooting Guide .....19-23
- 13. Safety Certification Label .....24**
- 14. Specifications .....25**
- 15. Warranty .....26**

# 1. Introduction to SolarAttic

**SOLAR Without PANELS:** SolarAttic, Inc. has engineered the Pool Convection System 2 to heat your swimming pool using your attic and roof as a source of free energy. When your attic gets hot, the SolarAttic Swimming Pool Heater can add six weeks on to each end of your swimming season and can raise your pool temperature 10-15 degrees over a non-heated state. That means your family can enjoy the swimming pool without having to pay high heating bills. You get the benefits of solar pool heating without roof mounted solar panels.

## **BASIC OPERATION:**

The simplified graphic diagram to the right shows how the PCS2 works.

When the sun shines, the roof acts as a large solar collector. Heat accumulates inside the attic.

The PCS2 safely uses this attic heat to warm your pool. It eliminates the need for solar roof panels. AND, as it heats your pool, it cools your home! This house cooling effect can lower air conditioning costs 25% or more.

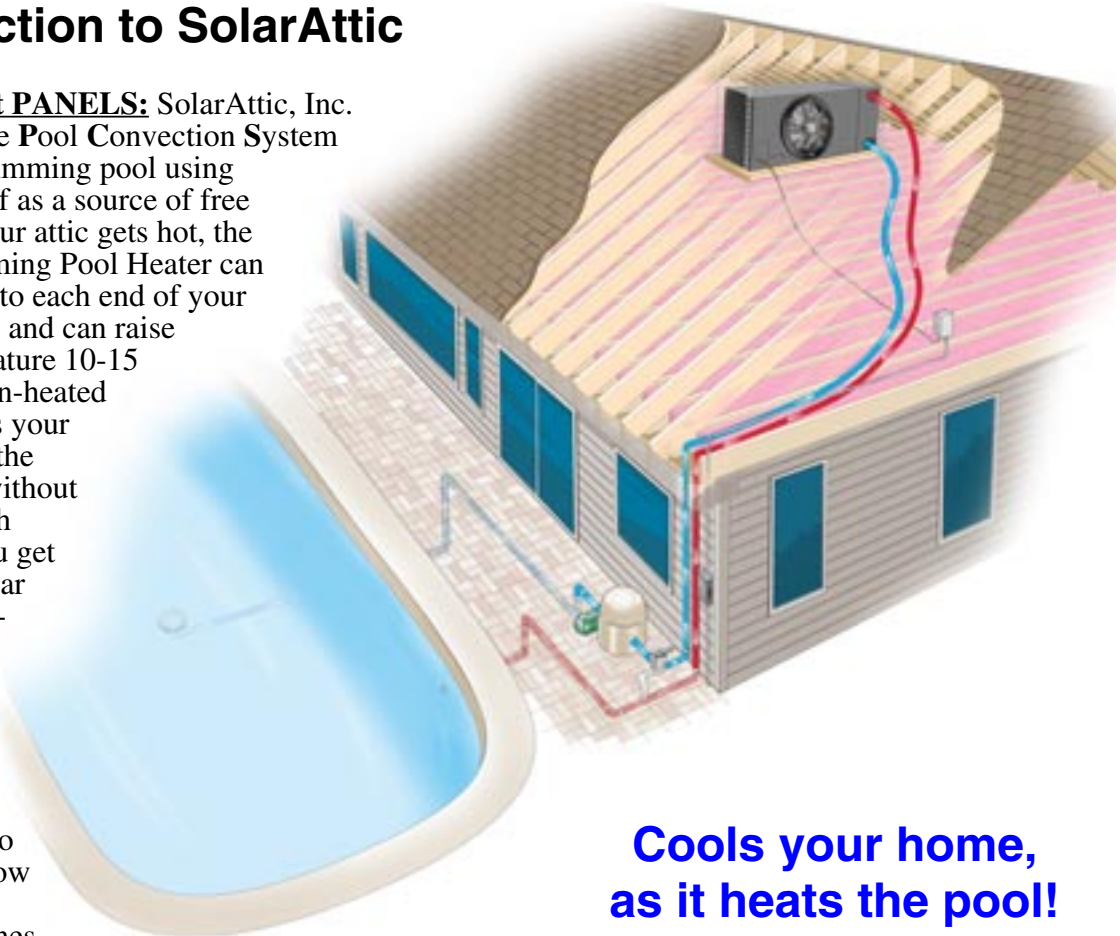
**DESCRIPTION OF TECHNOLOGY:** Solar radiation strikes the roof and reaches the attic through a process called “conduction.” The SolarAttic pool heater is physically located inside the attic and then transfers this solar radiation from the attic air into the swimming pool’s water through a process called “forced air convection.”

**AUTOMATION:** Full Automation is achieved by using an optional solar controller. When the attic is 8° [LX220] warmer than the pool and the pool needs heat, the solar control automatically routes water up to the PCS2 and turns it on. The solar control can also synchronize the pool pump turning it on at the same time. Temperature sensors sense the pool and attic temperatures. The pool owner sets the desired pool temperature setting and maximum heat extraction in the attic occurs automatically. Note: The pool pump must be turned on during the time the PCS2 is turned on to effect heat transfer.

# 2. Consider Before Installation

The following items should be considered prior to any installation.

1. Heat rises in a hot attic. Locate the PCS2 as high in the attic as is practical.



**Cools your home,  
as it heats the pool!**

2. Airflow through the PCS2 is important. Do not obstruct air going in or out of the unit.
3. Recirculating the air within the attic works well for heat transfer. Locate the PCS2 within the middle 1/3 of the attic. Do not locate near an end wall where the unit's airflow will become obstructed or short circuited.
4. Heat is drawn into the coil and cooler air is discharged from the fan. If the PCS2 is located slightly off center along the attic ridge, make sure the coil side of the unit is facing the longest portion of the attic.
5. Suspending the PCS2 shipping platform using chains will minimize noise amplification caused by wood trusses. Therefore, do not rigid mount the PCS2 to the roof structure in areas where noise is a concern.
6. The attic sensor can be cooled by the air discharge of the PCS2. Locate the attic sensor at the peak of the attic and out of the airflow of the unit. This prevents erratic on and off cycling caused by the cooling effect of the discharge air. Note: The discharge air of the PCS2 [fan side of unit] can run 20-30 degrees fahrenheit cooler than the intake air [coil finned side of unit]. All performance criteria was developed on the basis that the attic temperature sensor would sense the PEAK attic temperature. That is the temperature at the very apex of the attic where the roof sections join. If this sensor is lowered from the actual attic peak, performance can be dramatically reduced.
7. The pool water sensor can be influenced by the sun and rain. Shelter the pool water sensor as much as is possible. It can even be insulated if necessary with fiberglass or other materials. Midnight rain "cooling" the pool sensor can fake the solar control out into thinking the pool needs heat. It can also cause erratic on and off conditions if not protected properly.
8. The ground can "SINK" heat away from pipes going to and from the PCS2. Insulate or wrap all underground pipes so dirt (the ground) does not contact the pipes directly. Simple bubble wrap over the pipes that prevent the "wet ground" from coming into direct contact with the horizontal buried pipes is usually sufficient. It is not necessary to insulate vertical above ground pipes.
9. Use 2" pvc pipe on long pipe runs to reduce friction losses and on all pools with a pool pump greater than one horsepower in size.
10. Do not over tighten the wing nut on the relay in the Compool LX220 solar control on Automated systems. It can cause the relay to malfunction.
11. The mechanical stress caused by unsupported pipes can crack glued pvc joints. Support all pipes in and outside of the attic with straps or C-clamps that keep the weight of the pipes off of all joints and union connections.
12. If excessive heat is a local concern, cpvc pipe can be used instead of pvc pipe. All external PVC piping should be painted to avoid deterioration from sunlight. Flex pvc pipe can be used in the attic to avoid cementing joints in a closed and confined area. This will provide a continuous length of pipe inside the attic without joints except at the unit.

### 3. Cautions & Warnings

The following notes are CAUTIONS & WARNINGS designed to inform you of the existence of areas of potential injury and hazard. These notes help to prevent personal injury and fatalities. They will also help prevent damage to the SolarAttic Swimming Pool heater, swimming pool systems or to the house.

#### **MAKE SURE YOU READ AND UNDERSTAND THESE CAUTIONS & WARNINGS!**



**CHILDREN CAUTION:** SHARP EDGES ON THE SOLARATTIC POOL HEATER CAN CAUSE CUTS OR INJURIES. THIS IS NOT A PRODUCT THAT CHILDREN SHOULD BE ALLOWED TO TOUCH. THEIR NATURAL CURIOSITY CAN RESULT IN INJURY OR ACCIDENT. **\*\*KEEP ALL CHILDREN AWAY FROM THIS PRODUCT TO PREVENT CUTS, INJURIES OR ACCIDENTS\*\***



**ELECTRICAL DANGER:** THIS PRODUCT USES 115 VAC POWER AND CAN CAUSE A FATAL INJURY IF SERVICED BY INEXPERIENCE PEOPLE. THIS MANUAL ASSUMES THAT AN EXPERIENCED ELECTRICIAN IS BEING EMPLOYED. ALL ELECTRICAL WIRING MUST BE DONE IN ACCORDANCE WITH LOCAL, STATE AND NATIONAL ELECTRICAL CODES.



**PLUMBING CAUTION:** THIS PRODUCT REQUIRES PVC CEMENT WELDING AND THIS MANUAL ASSUMES AN EXPERIENCED PLUMBER IS BEING EMPLOYED. DO NOT ACCEPT ANY LEAKING PVC JOINTS. DO NOT “LEARN” PVC CEMENT WELDING ON THE EXPENSIVE POOL VALVES PURCHASED. DAMAGE TO THE VALVES FROM POOR PVC WELDING IS NOT COVERED BY THE MANUFACTURERS WARRANTY. ASSEMBLE THE VALVES AND PIPES BEFORE ACTUAL WELDING TO MAKE SURE THE JOINTS FIT PROPERLY. THIS INSURES YOUR PARTS ARE READY FOR PERMANENT CEMENTING.



**PLUMBING CAUTION:** DO NOT USE DRAIN-WASTE (HOUSE SINK OR DRAIN) PVC FITTINGS (45° OR 90° ELBOWS, STRAIGHT SXS FITTINGS, ETC.) ON YOUR POOL’S SUPPORT SYSTEM RE-ASSEMBLY. USE SCHEDULE 40 PVC OR CPVC FITTINGS. THE DRAIN-WASTE PVC FITTINGS DO NOT HAVE THE SAME DEPTH OF PVC PIPE PENETRATION, WHICH COULD RESULT IN THE POOL’S PVC PIPE POPPING AWAY FROM THE SHORTER DRAIN-WASTE PVC FITTING (ELBOW, ETC.).



**FIN CAUTION:** THE FINS ON THE WATER COIL ARE SHARP AND CAN CAUSE A RAZOR- LIKE CUT IF YOUR HAND OR ARM COME INTO CONTACT WITH THEM. TAKE APPROPRIATE CARE DURING INSTALLATION AND DO NOT COME INTO DIRECT CONTACT WITH THE FINS OF THE COIL. IF THE COIL FINS ARE ACCIDENTALLY DAMAGED, THEY CAN BE “COMBED” STRAIGHT WITH A FIN COMB [10 FINS PER INCH].



**AIR MOVING ASSEMBLY CAUTION:** THE PROTECTIVE GRILLE AND OTHER PARTS OF THE AIR MOVING ASSEMBLY, INCLUDING THE FAN BLADE AND MOTOR HAVE SHARP EDGES WHICH CAN CUT YOUR FINGER OR HANDS. EXERCISE CAUTION WHEN HANDLING, REMOVING OR INSTALLING ANY PART OF THE AIR MOVING ASSEMBLY.



**FAN CAUTION:** DO NOT OPERATE THE MOTOR WITH THE AIR MOVING ASSEMBLY REMOVED. THE PROTECTIVE GRILLE IS TO PREVENT HARM WHILE THE FAN IS OPERATING. UNPLUG THE SOLARATTIC POOL HEATER DURING SERVICE AND ENSURE THAT THE FAN BLADE HAS STOPPED ROTATING. IF THE FAN BLADE HAS BEEN CHANGED, ENSURE THAT THE NEW BLADE IS TORQUED DOWN TO 120 INCH POUNDS AND THAT LOCTITE HAS BEEN APPLIED TO THE THREADS OF THE LOCKING SCREW.



**MOTOR CAUTION:** DO NOT OPERATE THE MOTOR FOR AN EXTENDED TIME WITHOUT THE FAN BLADE ATTACHED. THE MOTOR IS A “TOTALLY ENCLOSED AIR OVER” MOTOR [TEAO] AND THE AIRFLOW OVER THE MOTOR FROM THE FAN BLADE PROVIDES COOLING FOR THE MOTOR. OPERATING THE MOTOR WITHOUT THE FAN BLADE ATTACHED WILL LEAD TO THE MOTOR OVER HEATING AND A THERMAL CUTOFF OF THE MOTOR [INTERNALLY].



**TEKS SCREW CAUTION:** DO NOT REPLACE ANY SELF-TAPPING #10-1/2 TEKS SCREW USED ON THE REAR COIL SIDE WITH ANY SHEET METAL SCREW GREATER THAN ONE-HALF INCH (1/2”) IN LENGTH. DOING SO CAN DAMAGE THE WATER COIL BY PUNCTURING ONE OF THE COIL’S WATER PIPES OR MANIFOLDS. AS A GENERAL RULE, DO NOT USE ANY SHEET METAL SCREW GREATER THAN 1/2 INCH IN LENGTH ON THE SOLARATTIC POOL HEATER.



**WEIGHT CAUTION:** THE PCS2 WEIGHS ABOUT 168 LBS CRATED AND 142 LBS UNCRATED. IN ADDITION, THE UNIT IS BULKY. CAUTION SHOULD BE TAKEN WHEN LIFTING THE UNIT SO AS NOT TO TWIST FROM THE WAIST OR TO PLACE A BURDEN ON THE LOW BACK. NO ATTEMPT SHOULD BE MADE TO LIFT THE UNIT ALONE. TWO OR MORE MEN SHOULD BE PRESENT. ATTEMPTING TO LIFT OR HANDLE THE PCS2 ALONE CAN LEAD TO PHYSICAL INJURY. NOTE: THE PCS2 FILLED WITH WATER WEIGHS ONLY 163 LBS.



**POOL CHEMISTRY CAUTION:** AN IMPROPERLY MAINTAINED POOL WILL TURN ACIDIC VERY FAST AND DAMAGE ALL OF THE POOL’S SUPPORT EQUIPMENT INCLUDING THIS HEATER. MAINTENANCE OF POOL WATER CHEMISTRY IS A SERIOUS RESPONSIBILITY OF OWNING A SWIMMING POOL. LOCATE ALL CHEMICAL DISPENSERS DOWNSTREAM FROM THE PCS2.

NOTE: IF YOUR POOL WATER IS CRYSTAL CLEAR, DRINKABLE AND DOES NOT SMELL OF CHLORINE -- YOU HAVE THE RIGHT POOL CHEMISTRY. CHECK WITH YOUR LOCAL POOL CHEMICAL DEALER IF YOUR POOL DOES NOT HAVE THESE ATTRIBUTES!



**BUILDING CODE CAUTION:** INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL, STATE AND NATIONAL BUILDING CODES TO PREVENT ANY INJURY, FATALITIES OR DAMAGE TO EQUIPMENT.



**INSTALLATION DANGER:** USE ADEQUATE VENTILATION WITHIN THE ATTIC IF YOU PLAN TO CEMENT PVC JOINTS. PVC CEMENT FUMES CAN BE TOXIC IN THE ATTIC AND CAN LEAD TO HEALTH PROBLEMS OR INJURY. COMPLETE ALL ATTIC INSTALLATION TASKS IN THE MORNING WHEN HEAT BUILD UP IS MINIMAL TO PREVENT HEAT STROKE OR OTHER INJURY. NOTE: A CONTINUOUS LENGTH OF FLEX PVC PIPE CAN BE USED IN THE ATTIC TO MINIMIZE PVC CEMENTING IN THE CLOSED ATTIC ENVIRONMENT.



**INSTALLATION CAUTION:** SOME LOCAL BUILDING CODES REQUIRE THAT A SMITTY PAN BE INSTALLED UNDER ANY ATTIC EQUIPMENT FOR ADDITIONAL PROTECTION FROM ATTIC EQUIPMENT FAILURE. NOTE: A SMITTY PAN IS AN EXTRA WATER COLLECTION TRAY PLACED UNDER ATTIC EQUIPMENT THAT IS TAPPED AND CONNECTED TO A HOSE TO DRAIN EXCESS FLUIDS OUTSIDE.

NOTE: SMITTY PANS CAN USUALLY BE PICKED UP AT LOCAL PLUMBING SUPPLIERS. THEY CAN ALSO BE BUILT BY ANY SHEET METAL FABRICATOR. A SMITTY PAN INSTALLATION IS RECOMMENDED AS AN ADDED LAYER OF PROTECTION FOR ANY INSTALLATION WHERE THERE IS A HIGH DEGREE OF CONCERN FOR MAXIMUM PROTECTION AGAINST POTENTIAL FAILURE OF ATTIC EQUIPMENT.



**SERVICE DANGER:** UNPLUG THE SOLARATTIC POOL HEATER BEFORE ATTEMPTING ANY SERVICE! FAILURE TO UNPLUG THE UNIT PRIOR TO ANY SERVICE CAN LEAD TO SERIOUS INJURY OR DEATH. SERVICE SHOULD NOT BE ATTEMPTED BY AN INEXPERIENCED TECHNICIAN WITHOUT FIRST READING THIS ENTIRE MANUAL!



**SERVICE CAUTION:** DO NOT CREATE A SITUATION THAT WOULD ALLOW POOL WATER TO BE INADVERTENTLY ROUTED TO DISCONNECTED ATTIC PIPES. IF THE SOLARATTIC POOL HEATER IS DISCONNECTED FROM THE ATTIC PIPES, DISCONNECT THE PUMP AND REMOVE THE VALVE CONTROLS AND HANDLES DURING SERVICE. OR RECONNECT A BYPASS PIPE IN PLACE OF THE SOLARATTIC POOL HEATER DURING ITS REMOVAL. FAILURE TO OBSERVE THIS CAUTION CAN LEAD TO SUBSTANTIAL WATER DAMAGE.

---

## 4. Installation

Installation of the SolarAttic Pool Heater involves three basic steps:

- A) Locate the SolarAttic Pool Heater in the attic.
- B) Connect the SolarAttic Pool Heater to the pool's support system.
- C) Connect the SolarAttic Pool Heater to power or Automation equipment.

### LOCATE THE POOL HEATER IN THE ATTIC

The PCS2 is the second generation SolarAttic Pool Heater. It has been reduced in size and depth to make installation in the attic easy. While physically reducing the size, SolarAttic has maintained the 60,000 Btu/hour nominal rating of the original PCS1 pool heater. The PCS2 is expected to fit directly through 95% of all existing attic access panels. If needed, the entire air moving assembly can be removed by unplugging it and removing the four bolts that secure it to the front panel. This reduces the box dimension to 16x22x46 inches if required. The unit can be further disassembled by removing sheet metal screws. Therefore, it can be completely disassembled for extremely small access openings and re-assembled within the attic with nothing more than a battery operated drill and a 5/16 hex driver bit.

Before physically locating the SolarAttic Pool Heater inside the attic, it is a good idea to take the right service panel off and install the mating pvc fittings to the 2 inch male pipe threads. When mating pvc female fittings to the copper pipe threads, we recommend using silicone sealant and allowing the joints to properly cure for 24 hours before placing them into use.

Locate the pool heater inside the attic. The shipping crate base can be used as a mounting platform and simple hardware chain can be used to suspend the unit from the apex of the attic. Do not rigid mount the PCS2 to the roof structure as wood amplifies vibration and can produce noise. In addition, some flexibility is needed for normal winterization of the system in areas where the pool is winterized. Once fully installed, there should be little or no noise or vibration from within the house.

Remember to center the unit and locate it as high as possible inside the attic. This completes the first step. The pool heater now has to be plumbed and powered.

### RETROFIT SUPPORT SYSTEM

Connect the SolarAttic Pool Heater to the pool's plumbing. The existing pool pump is sufficient to move water to and from the pool in 99% of all installations. Retrofitting the support system is the most difficult part of plumbing the PCS2. The reason for this is the generally rigid and permanent nature of the typical PVC type support system's plumbing. This usually means having to carve up the PVC pipe and not being able to salvage and reuse the fittings and in some cases the valves also. The good part about PVC type support systems is that PVC pipe, fittings and general purpose valves are relatively cheap and can be purchased in many hardware, plumbing and building stores. If you have a PVC support system that needs to be retrofitted, plan on redoing the entire plumbing layout.





**CAUTION:** If you are in an area that freezes, it is common to find a gate valve on all lines going to the swimming pool. These are the pool's main drain line, the pool's return line and the pool's skimmer line. In some instances, there may be more than just these three lines [such as two skimmer lines, etc.]. Do not remove these valves -- they will be needed to winterize your swimming pool. In some cases, they may have to be removed and later reinstalled.

Plan on connecting the new valves and PCS2 to the valves and pipes leading to the swimming pool. When it comes to the filter and pump, simply rearrange these as you reconstruct the support system's plumbing.

In the case where copper pipes and brass valves have been used, they can be reused. If copper or brass has been used, you will need to mate these to pvc pipe which is generally done using a metal to rubber "mission" coupling that adapts directly to the outside dimensions of both pipes involved. Example: 1 1/2 inch copper pipe has a different O.D. [outside diameter] than 1 1/2-inch PVC pipe. The appropriate union to couple these pipes will have a rubber insert that matches their different sizes.

The typical bypass valve is 2" PVC and can be reduced down to 1 1/2" by using a "reducing bushing". Some PVC valves accept both 1 1/2" and 2" PVC fittings directly. NOTE: Be sure to read the valve manufacturers instructions. Also, it may be easier to use sections of rigid 2" PVC pipe for installing the bypass valve in the pool's support system. This would include using some 2" PVC fittings.

NOTE: If a manual system is installed, a hand operated three-way bypass valve can be used. These valves can be fully automated at a later date if desired. However, bypass valves generally will require the same manufacturer's automation equipment if fully automated at a later date. I.E. Different valve manufacturers use different valve operators [VORs] to mechanically move the valve. As such, a given Compool valve is unlikely to adapt properly to a Jandy valve operator, etc. A manual bypass valve can be obtained from your local dealer if desired.

The PCS2 inlet and outlet lines go to the attic. Having the support system located in a convenient spot for easy attic access is a good strategy. Support systems located far away from the attic can be relocated closer by extending the pool's support piping. Extremely long pipe runs will require added horsepower from the pool's pump. If your pump is inadequate for the added lift to the attic, it will reduce the flow of water and result is poorer filtration and it may thermally cut itself off from over heating.

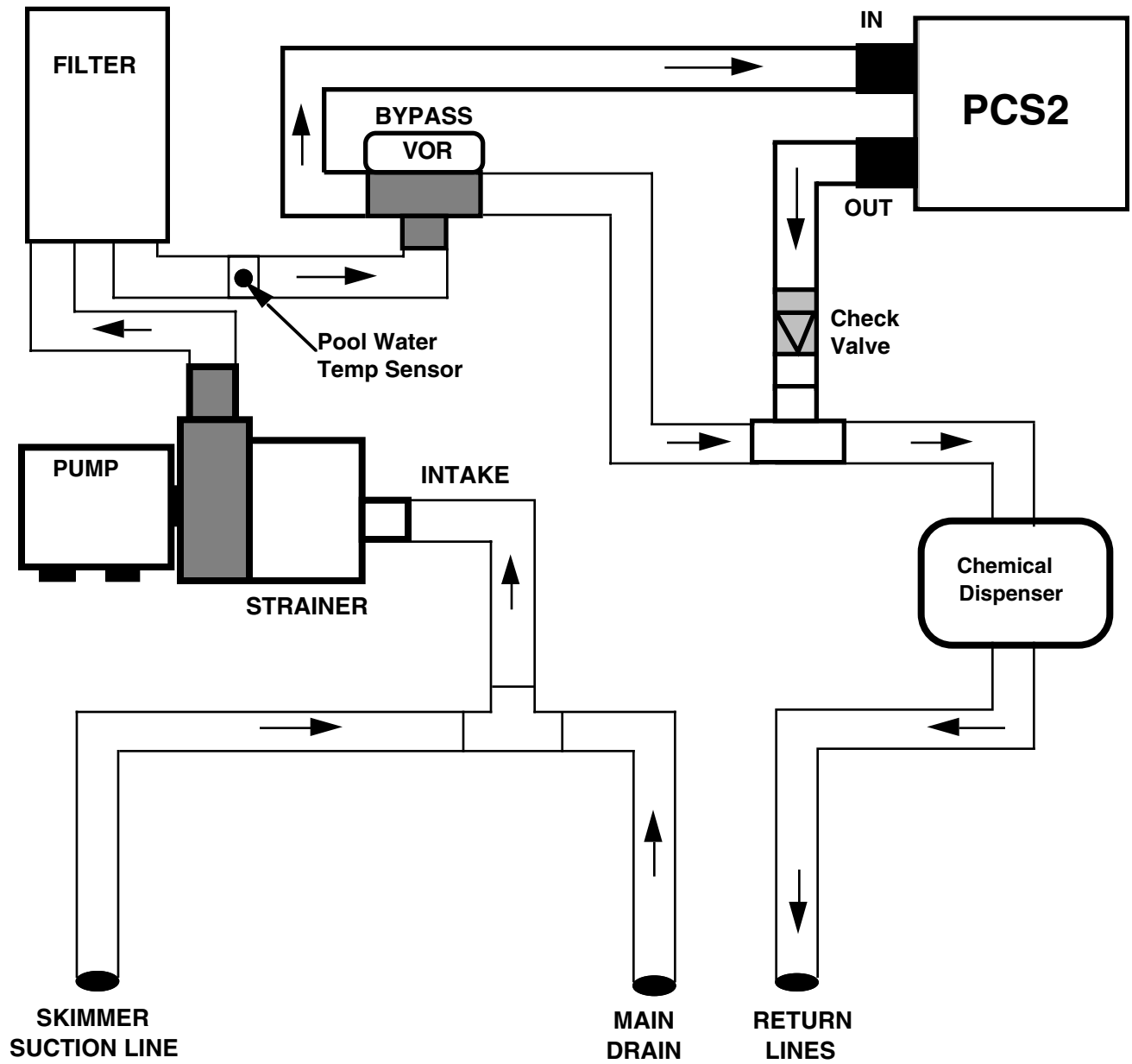
NOTE: Do not upgrade your pump simply because it feels hot! Your pump will feel "too hot" to touch by hand under normal operating conditions. If you are building a new pool and installing the PCS2 at the same time, there is no expense associated with retrofitting the support system.

NOTE: Additional specialty plumbing and wiring diagrams are available at [www.solarattic.com](http://www.solarattic.com) and inside the PCS1 Technical Manual, which can be freely downloaded as needed. The PCS1 Manual has indepth information concerning solar theory and heat transfer performance curves. Everything in the PCS1 Manual applies to the PCS2 with the exception of the electrical wiring. The PCS1 is a 220-240 vac system and it requires different wiring considerations. However, the PCS2 is a 110-120 vac system and simply plugs into any standard household electrical outlet. The nomenclature 110 vac, 115 vac and 120 vac all refer to the same standard household power and are used interchangeably in documents.

The diagram on the next page is the basic plumbing diagram for the SolarAttic Pool Heater.

**PLUMB THE POOL HEATER AS DESIRED.**

# Basic Plumbing Diagram



## POWER THE PCS2

The final step in the installation is supplying power to the SolarAttic Pool Heater. The PCS2 is supplied with a power cord that plugs into any standard 120 vac electrical outlet. In the simplest installation, an outlet is wired to a manual switch and power is turned on as desired. The PCS2, however, is capable of cooling as well as heating. Operating the system manually will not optimize the heat for the pool and its resultant cooling for the home. If, for example, the manual system is turned on when the pool is actually warmer than the attic, the attic will be warmed and the pool will be cooled. Therefore, automation is highly recommended.

Following a simple manual on/off switch is the use of an attic temperature switch set to power the unit when the attic reaches a certain temperature. This will produce semi-automated operation. However, the heat extraction process will still not be optimized.

To optimize heat extraction requires full automation. This can be achieved with a variety of optional solar control systems. Wiring diagrams for the Compool LX220 control are included in this manual as an example.

Page 9 shows the “INTERNAL ELECTRICAL WIRING” diagram and it is presented here for reference purposes. Please note the location of the motor starting capacitor. If the motor fails to start, it might be the starting capacitor. However, failure of the capacitor is rare.

Page 10 shows the “AUTOMATION WIRING DIAGRAM.” This diagram shows full automation wiring using the LX220 or similar control. Among the wiring features shown are the following: a) the pump is powered through the solar control thus synchronizing water and air flow to the attic unit; b) A manual on switch is wired to power the pump when the solar control is turned off; and, c) a timer is shown to enforce a minimal amount of filtration time during inclement weather when the sun does not shine. Note: Heat transfer cannot occur unless both air flow and water flow are present at the PCS2.

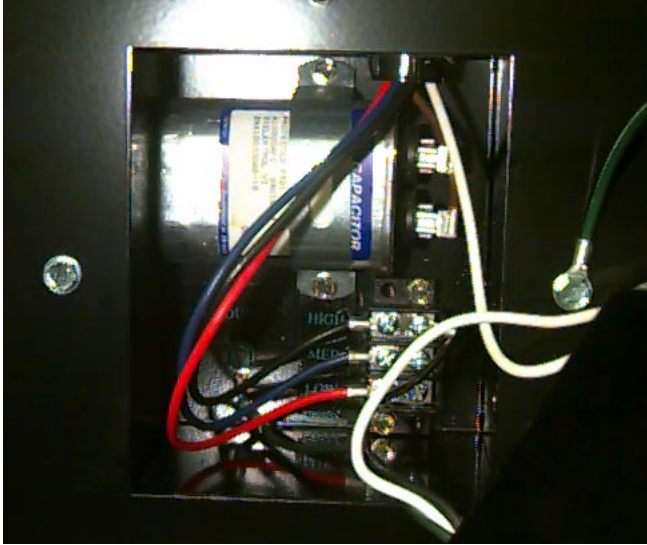
Page 11 shows the “FLOAT WIRING DIAGRAM” and how to wire the internal float switch in SERIES with the attic 10K ohm temperature sensor. Note: Place the attic sensor above the PCS2 and out of the air flow. The discharge air of the PCS2 can cool the sensor down causing erratic cycling on & off of the unit. Therefore do not locate the sensor where it can be influenced by the airflow of the PCS2.

Page 12 shows the “COMPOOL LX220 CIRCUIT BOARD” and how to connect the sensors and plugs inside the LX220 controller.

Page 13 shows the “COMPOOL LX220 POWER CENTER.”

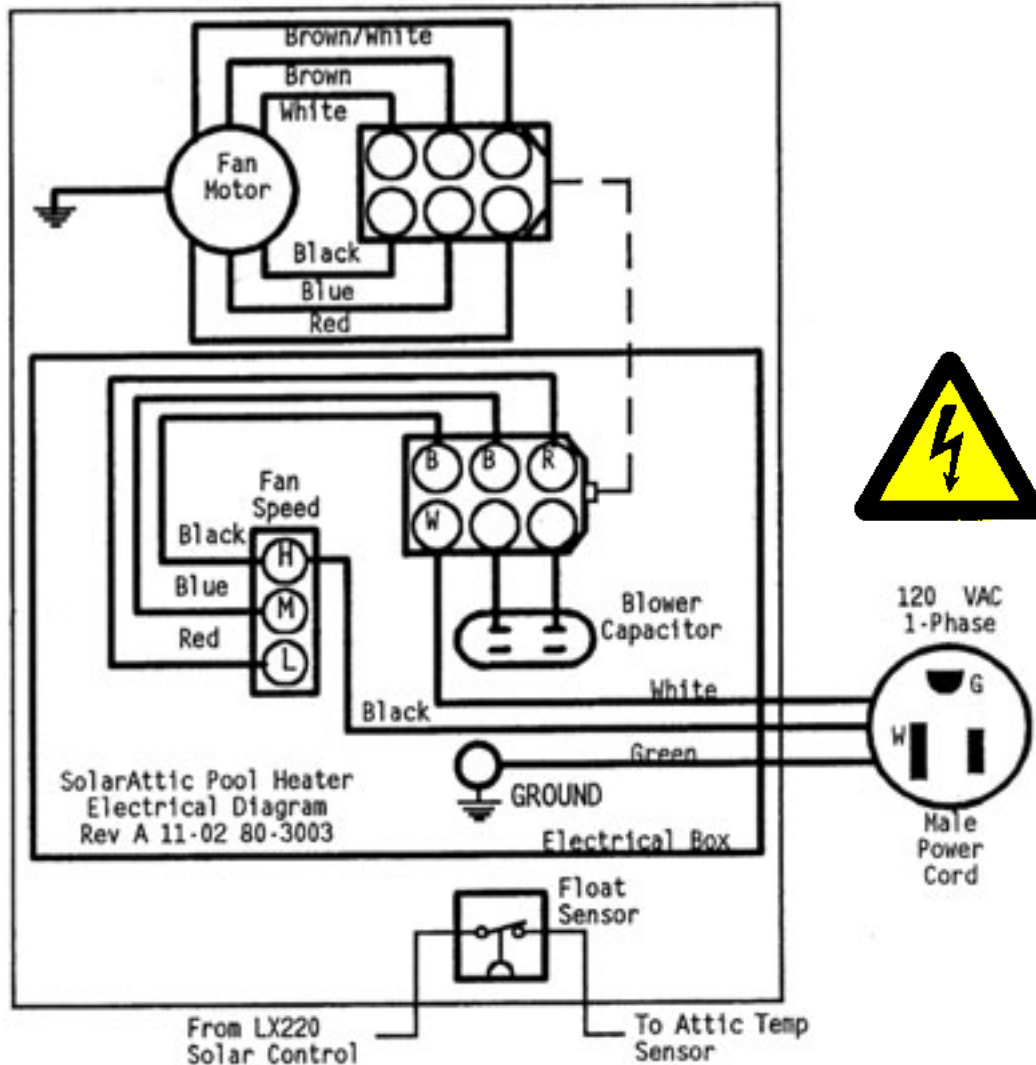
Use the above pages and the Automation instructions you received with your optional solar controller to complete the wiring of the SolarAttic Pool Heater PCS2.

YOUR INSTALLATION SHOULD NOW BE COMPLETED.

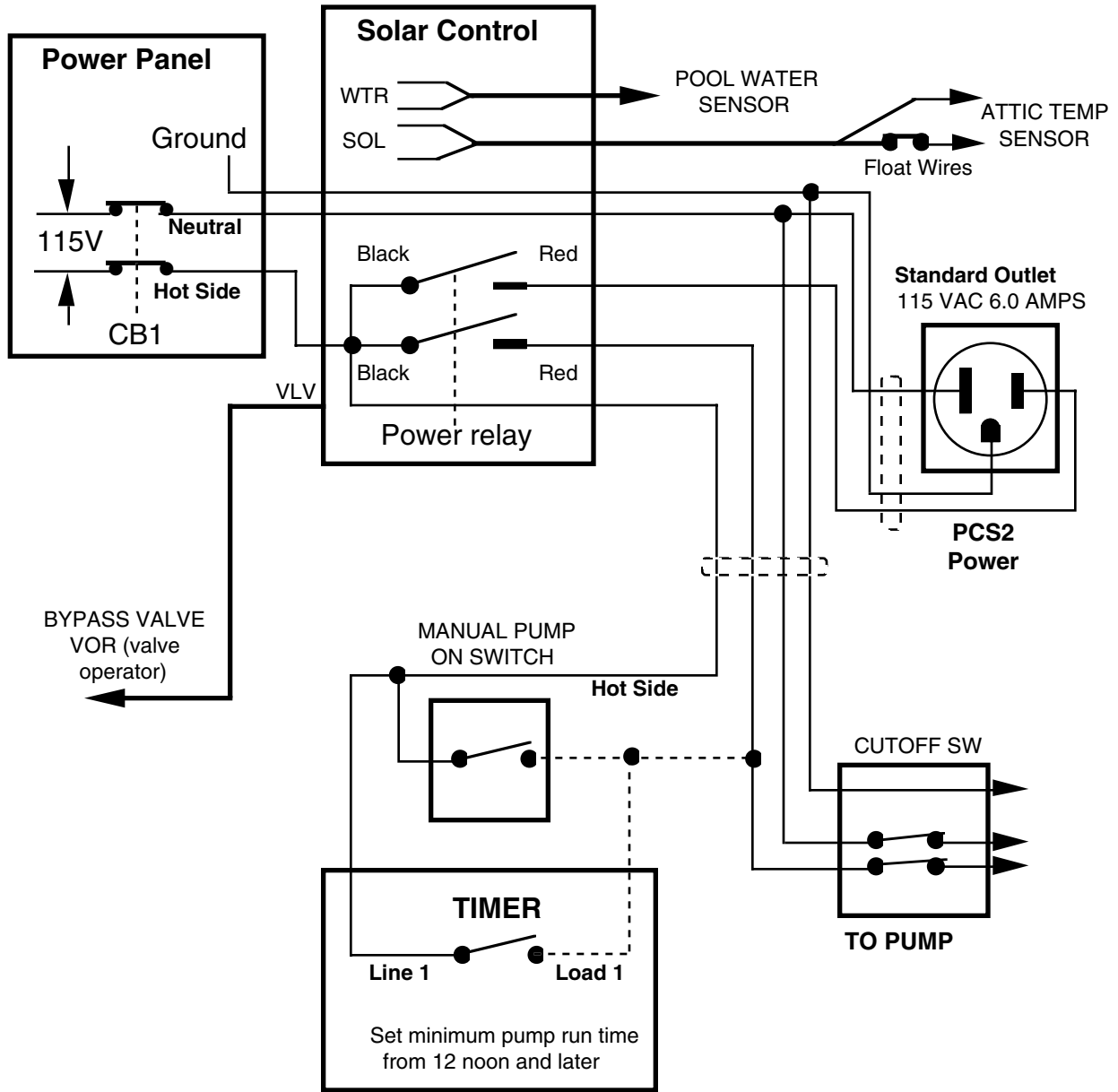


## Internal Electrical Wiring

The small access panel on the left side of the PCS2 is where internal electrical components reside. The power cord emerges from this panel. Inside is a 15 microfarad 370 vac motor starting capacitor and the motor speed terminal block. The motor is wired at the factory to high speed. Optional medium and low speeds slow down the rotation and will also lower both noise factors and heat transfer rates.



# Automation Wiring Diagram



Note: Most timers have a manual on switch.

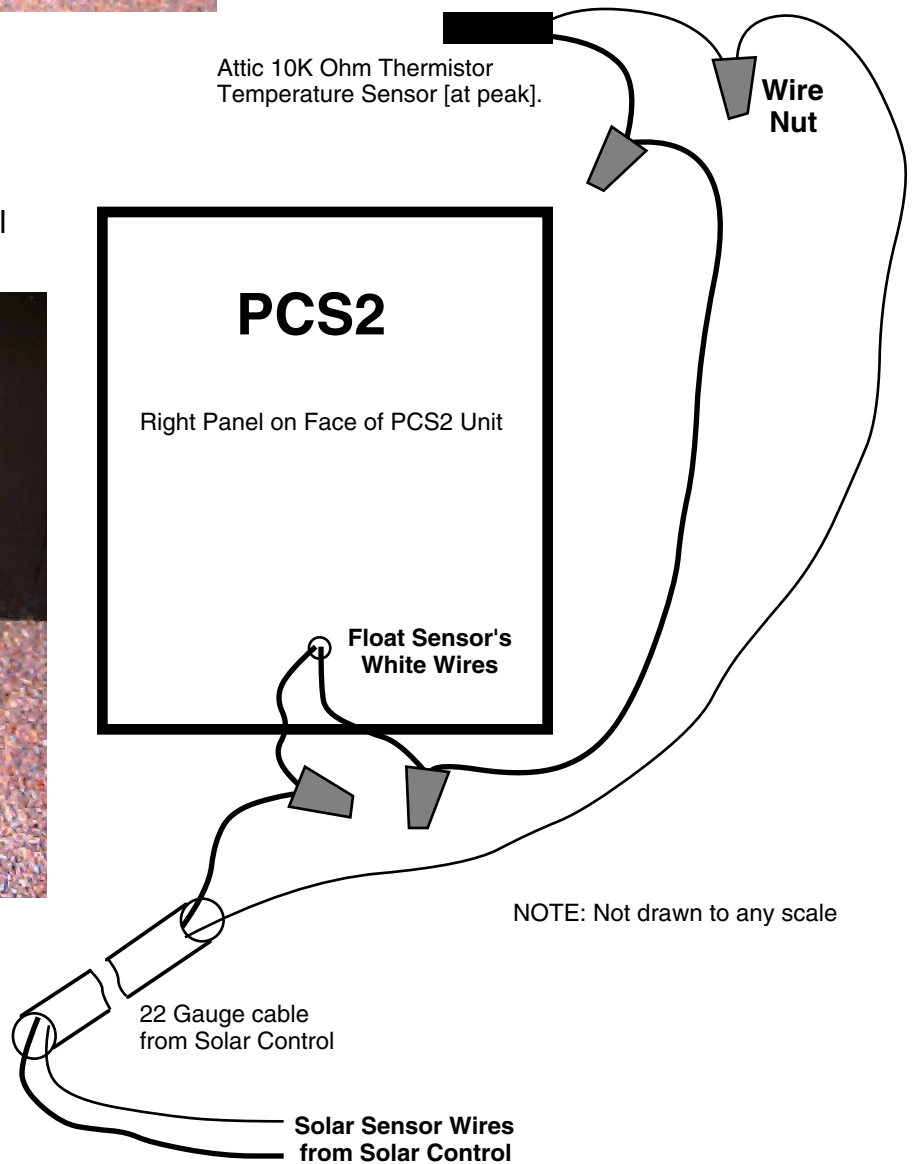




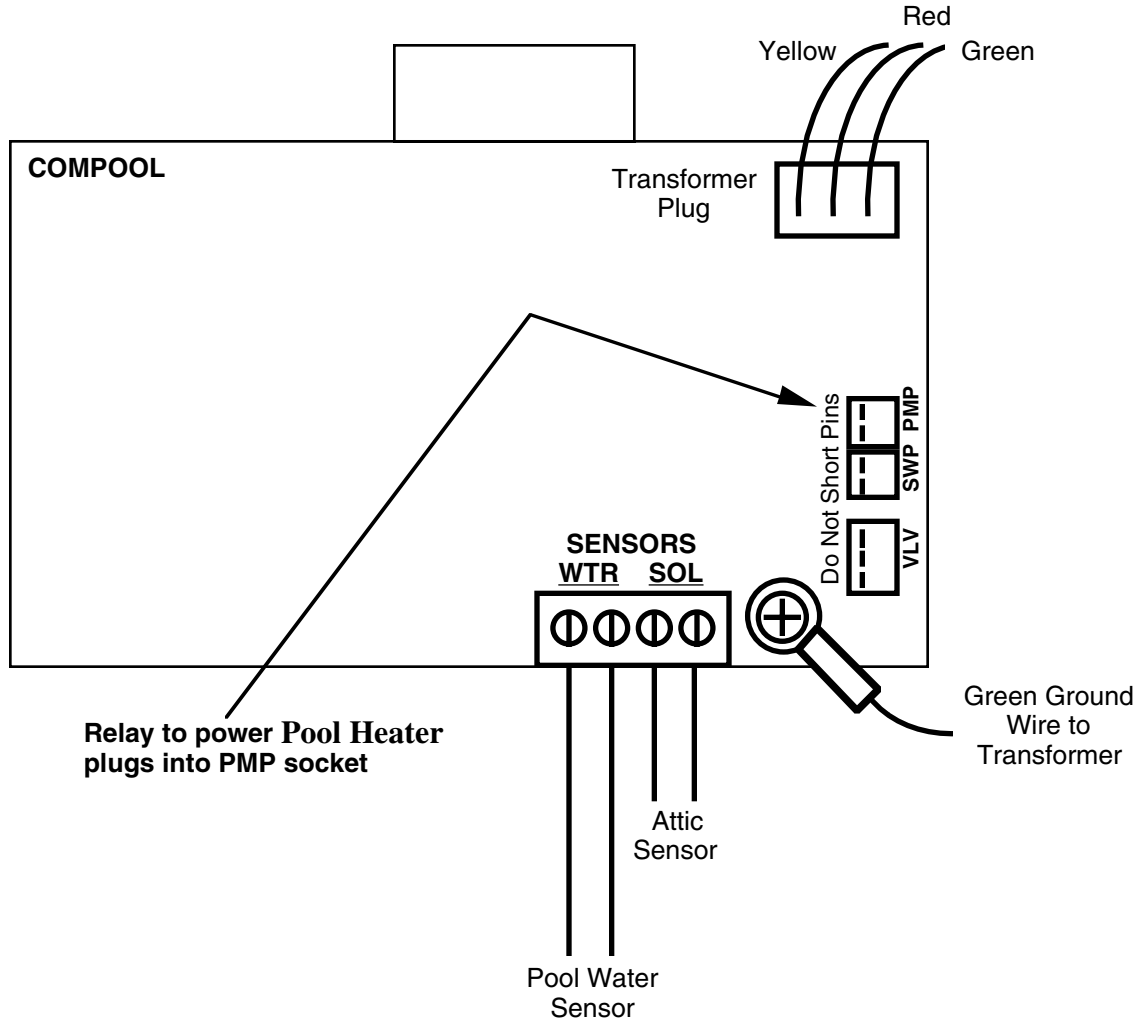
## Float Wiring Diagram

The Auto system is equipped with an internal float located on the right side of the PCS2. If the base pan ever has excess condensate or water, the float will rise and open the circuit to the attic temperature sensor. The optional solar control interprets this as a cold attic and shuts down the PCS2. A solar sensor service required light is illuminated on the face of the LX220 controller. Note: Unit must operate in automatic mode for the internal float to work.

Photo below shows float panel opened up. Float is shown.



# Compool LX220 Circuit Board



## Compool LX220 Connections

**PMP Socket:** Plug the Power Relay into this socket.

**SWP Socket:** Plug the optional sweep [pool cleaner] pump relay into this socket.

**VLV Socket:** Plug the bypass valve operator into this socket.

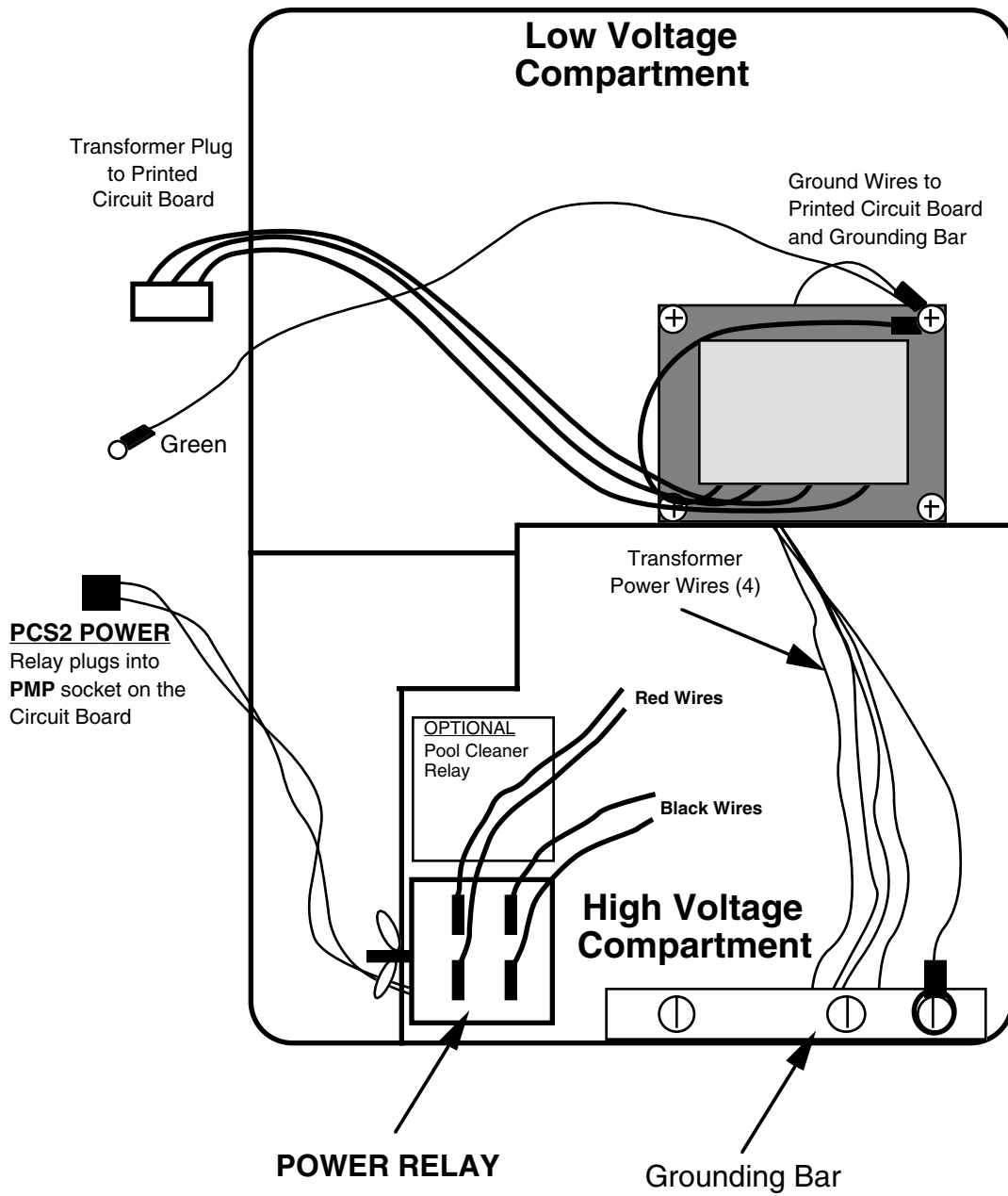
**WTR Terminals:** Connect the pool water temperature sensor wires here.

**SOL Terminals:** Connect the attic temperature sensor wires here.

**Power Plug:** The three wire keyed plug from the power transformer plugs into this socket.

**Green Ground Lug:** Ensure that the green ground screw with lug is connected.

# Compool LX220 Power Center





# 5. Operation

## MANUAL INSTALLATION

In this installation, a manual bypass valve is installed after the filter pump and is used in conjunction with a manual power switch. To turn the pool heater ON, simply requires that the power be turned on and that water be routed to the PCS2.

To turn the system OFF, you reverse the process turning the power switch off and the bypass valve to bypass the pool heater. It is a good idea to limit water flow through the PCS2 to only when it is actually being used. That is the reason for the bypass valve. It enables you to use the pump for filtration when you do not want to use the SolarAttic pool heater.

NOTE: In this type of installation, the owner decides when the attic is warmer than the pool. Use of a temperature sensor in the attic can help make this an intelligent decision. Wireless digital thermometers are relatively inexpensive at Radio Shack stores. Turning the pool heater on when the pool is warmer than the attic will warm the attic and cool the pool. This is the opposite of what is desired.

## SEMI-AUTOMATED INSTALLATION

In this installation, an attic temperature switch is used in conjunction with the SolarAttic Pool Heater to limit its ON time to only when the attic reaches a certain fixed temperature. One or more timers can be used to control the pump and/or the attic power. However, the bypass valve must be either manually turned on or otherwise automated. The exact nature of the installation will determine how you turn the system on and off.

## AUTOMATED INSTALLATION

In both of the above installations, maximum heat extraction is limited by human intervention or semi automated devices like switches or timers. However, heat extraction can be easily maximized and automated by way of an optional solar controller like the Compool LX220. Once installed, operation is simple and straight forward.

SET the thermostat on the LX220 to its full clockwise location or maximum temperature setting. This will ensure that maximum heat extraction will occur when the LX220 is in AUTO mode. While the dial is calibrated in degrees F, there is a notorious difference between what the temperature dial reads and what the typical pool thermometer at 18 inches of depth reads. Therefore, with the setting at maximum, use the pool thermometer you have to determine when it is too warm. Simply back down the temperature setting to a position that “feels” comfortable to you in the pool and disregard the dial setting itself. Your objective is to have an automatically warmed pool that is comfortable. Without a complex temperature gauge installation throughout the pool and attic, it becomes an engineering task to determine what the “real” temperature is. However, determining what is a comfortable temperature to you is an easy task.

To turn ON the SolarAttic PCS2, simply place the LX220 mode switch in either the AUTO or ON position. Note: The LX220 “ON mode” is a manually on setting that is useful for testing. However, it does not use the pool and attic temperature sensors or the internal float protection switch. For full automation and maximum heat extraction, ensure that the LX220 mode switch is set to AUTO.

To turn OFF the SolarAttic PCS2, simply place the LX220 mode switch in the OFF position.

## 6. General Service Notes

The PCS2 is generally maintenance free and requires only occasional inspection to ensure that everything is working properly. Here are some suggestions:

1. Inspect the PCS2 coil annually during spring startup or fall winterization for any accumulation of dust or debris from attic environment. Vacuum any accumulated dust off of the coil fins. This is not normally a problem.
2. Any time service is performed inside the PCS2, disconnect power first.
3. If there is a trouble with full automation, inspect to ensure proper operation of the float. This is indicated by the float being free to move. If the float switch was defective [open], the automatic mode of the LX220 would not work. Also, the “solar sensor service required” light on the LX220 control panel will be ON. No debris or obstruction of the float should be present during this examination. The float is accessed by removing one 5/16 hex screw on the right side of the front of the unit. See page 11 for float details.
4. Do not lubricate the motor.
5. During startup, listen to the fan and motor. There should be mostly airflow sound associated with the fan. No bearing noise should be apparent. If so, the motor may need to be changed. Note: This is a rare occurrence.
6. Some evidence of a small amount of condensate will be present in the form of a water stain in the interior of the PCS2 base pan. This is normal.
7. **CAUTION:** When working on the PCS2 where the inlet and/or outlet union(s) will be disconnected, ensure that (A) the bypass valve is in the “OFF” position bypassing the PCS2; (B) the controller is “OFF”; (C) the valve operator ON1, OFF & ON2 switch is in the OFF position; and, (D) the manual handle for the bypass valve is removed. These precautions, along with disabling the pool pump, will prevent the pool water from accidentally being routed up to the attic during service. When finished, ensure that the VOR is returned to the same ON1 or ON2 position it was in before you turned it to the OFF position for proper valve operation.



## 7. Spring Startup

1. Make a visual check of the plumbing for any deterioration or problems.
2. Visually inspect the fan blade for position on the motor. The fan should be 100% on the motor’s shaft. The fan’s hub should not protrude past the end of the motor’s shaft.
3. Check the PVC unions on the PCS2 inlet and outlet. They should be tight. Do not over tighten as they could crack.
4. Perform other pool startup chores.
5. Restart system and inspect attic for any sign of plumbing leaks.
6. System is ready to use for the season.

## 8. Winterization

1. Winterize pool with air as you normally would. Make sure that power is off to the SolarAttic pool heater and that the pump is disconnected.
2. Blow air through the PCS2 pipes until all water is removed.
3. Perform all other winterization chores.
4. Make sure all pipes by support system are drained completely or they will freeze and bust. Any suspect pipes having “trapped” water should have a hole drilled and a plug installed for winter draining.
5. Remove the PCS2’s outlet and inlet unions. Tilt the opposite side up two inches and drain any coil water into a pan. Next, tilt the inlet/outlet side up two inches followed by a second tilt of the opposite side for draining any additional coil water into the pan. Repeat this process until no water drains from the PCS2.
6. Pour 1/2 to 1 gallon of RV [recreational vehicle] non-toxic antifreeze into the bottom of the PCS2. Note: This dilutes any residual “trapped” water still remaining within the coil and insures no freeze damage. This is the same type of antifreeze used in the pool’s pump and skimmers during the winterization process!
7. Reinstall the outlet and inlet unions.
8. The PCS2 is winterized.



**CAUTION:** Failure to follow Step #6 above can lead to water coil damage! Even after Steps #1-5, the PCS2 water coil could still retain a small amount of residual water that is “trapped” within the bottom of the coil. The non-toxic “RV” antifreeze [available at local hardware stores] dilutes any residual water and prevents winter freeze damage. Winter freeze damage is totally preventable and is not covered under the PCS2 Warranty. It is the owner’s responsibility to have the system winterized.

### Bypass Valve Consideration

In the process of winterization, air is blown through all of the pipes to eliminate water inside of the pipes [and all valves]. The bypass valve should be exercised in both directions a few times to eliminate all of the water within the valve. This can be accomplished using the manual on/off function of the LX220 or by manually turning the valve in both positions [with valve motor removed]. This should eliminate all water inside the bypass valve.

There have been two reported incidents of cracked bypass valves during spring start-up. The bypass valves were found to be cracked along the underside of the valve. This indicates that water was inside the valve during a freeze. This was probably the direct result of either: A) An improper winterization effort; or, B) A bypass valve that is installed in such a position to either “trap” or “collect-back” water into its base. After the pipes have been drained, a small amount of trapped water or moisture may still be present in some of the pipes or valves depending upon how the system is plumbed. If the bypass valve represents such a “trap” or a “collection point” for residual drain-back within the plumbing, it may cause damage to the valve. Water that freezes needs expansion space.

Two approaches can be used to eliminate this type of “plumbing” problem: 1) Install a small drain hole, valve or pitot tube near the bypass valve to drain off any water that could get trapped, drain-back or accumulate back into [or at] the bypass valve. An examination of the plumbing should reveal if any trapped water or drain-back of moisture would be accumulated inside of the bypass valve. OR, 2) Remove the valve operator, top screws and internal valve diverter. Inspect for water accumulation after winterization. There shouldn’t be any. Non-toxic antifreeze can be poured into the valve if desired. Note: #1 is a common approach used in swimming pool plumbing.



**CAUTION:** The bypass valve should be installed in such a way that moisture or water does not get trapped into the valve or is allowed to drain-back or accumulate inside the valve’s body after winterization. This can create damage to the valve during the winter freeze cycle. Also, improper winterization of the valve will lead to damage.

## 9. Winter Freeze Warnings

Not all swimming pools require the winterization process as described on the preceding page. For example, swimming pools located in Northern Florida and elsewhere do not require this winterization process. These pools are not located in “hard-freeze” locations [like Minnesota].

However, in some areas that do not winterize the pool, there is still the possibility of a period of one or more days when temperatures below freezing are occurring [or being forecasted] by prevailing weather. OR, you may be simply late in getting around to winterizing your pool. What do you do in such an instance?

The standard operating procedure in such an instance is to keep the pool’s filtration pump running during this brief period of freezing temperatures. This also pertains to the PCS2. You should keep water running through the PCS2 during this period of time.

### Temporary Freeze Warning: Operating Procedure

1. Ensure that the pool’s pump is manually ON.
2. Ensure that the bypass valve is manually ON.
3. Keep water flowing through the pool’s pipes and the PCS2 until freezing temperatures are no longer present or a threat. If a prolonged period of hard freeze is present, winterization may be required.



**CAUTION:** Failure to keep water running [flowing] in such an instance can result in damage to the pool’s plumbing, support system and the PCS2.

## 10. Unattended Pools

Sometimes it may be necessary to leave your pool unattended for an extended period of time. For example, this could be a two-week vacation or any other situation where the pool will be left alone and unattended. In such a situation, the pool’s water chemistry is a serious concern for the pool owner.



**CAUTION:** Leaving pools unattended for an extended period of time can lead to poor pool water chemistry. This can then lead to an acidic pool condition which is capable of eating [etching] away the metal throughout your pool’s support system equipment. This includes the PCS2.

One simple solution is to always have someone, who knows what they are doing, maintain your pool water chemistry during this period of time. A second solution is to use automatic chemical dispensing equipment while you are away. Equipment you trust and is capable of maintaining your pool's water chemistry while you are away.

**WE RECOMMEND:** That the PCS2 be turned off when the pool will be left unattended for extended periods of time. This can be accomplished by turning the LX220 controller to the "OFF" position. Additional security can be obtained by turning the ON1, OFF & ON2 switch on the valve operator motor to the OFF position and then removing the motor and its handle. Before restarting the PCS2, ensure that the pool's water chemistry has been restored to the proper Ph balance along with all other chemical levels. Ensure that the pool is not in an acidic condition.

**Following the instructions and precautions in Sections 6-10, will extend the life of your SolarAttic pool heater.**

---

## 11. Repairs

Since the PCS2 is generally maintenance free, there is little to repair on the system. Most operating problems encountered will relate to the control systems used in the system.

In the event repair of the PCS2 is required, the unit has been designed for ease of service. For example, virtually all electrical components are accessible from the front of the unit. The entire assembly can also be completely dismantled using only four tools: a) a portable drill; b) a 5/16 hex head bit; c) a No. 2 phillips bit; and, d) a 3/8 inch box wrench.

The following main service tasks each require less than 15 minutes time:

- A. Remove and replace the entire air-moving assembly with a 3/8 box wrench.
- B. Remove and replace the starting capacitor with a portable drill, 5/16 hex bit and No. 2 phillips bit.
- C. Remove and replace internal float assembly with a portable drill and 5/16 hex bit.

The only remaining item to replace on the PCS2 would be the water coil. Depending upon the attic installation, the water coil may be easier to replace inside or outside of the attic. Note: The water coil in the PCS2 has been designed for a 20 year life span assuming the pool water chemistry is properly maintained. Therefore, the longevity of the pool heater is primarily in the hands of the pool owner.




## 12. System Troubleshooting


Section 12 is a trouble shooting guide and it assumes that a fully automated system is installed.



**CAUTION:** Some tests require electrical skills because of the presence of high voltage. The danger of a fatal or serious shock hazard may be present. These tests are indicated by boldface times italic font [*characters like these*] coupled with an international warning symbol. If you do not possess the electrical skills required to perform these tests, obtain the services of a qualified electrician.

# Troubleshooting Guide


Symptom	Check These Items
<p><b>THE LX220 POWER ON LIGHT DOES NOT LIGHT</b></p> <p>(The SOLAR ON light is not ON when the LX220 is in the “Manual ON” position.)</p>	<ol style="list-style-type: none"> <li>1. Push RESET button on LX220 Front Panel.</li> <li>2. Check for tripped breaker at the main power panel.</li> <li>3. Ensure that timers are turned on.</li> <li>4. <b>Check for loose power wire nut inside LX220.</b></li> <li>5. <b>Check for 120 vac power inside the LX220 with a voltmeter.</b></li> </ol> 
<p><b>PCS2 FAN DOES NOT TURN ON [Doesn't rotate]</b></p> <p>(Solar On light is ON. Sensor Service Required lights are OFF.)</p>	<ol style="list-style-type: none"> <li>1. Thermostat is set too low on the LX220. Turn it to the maximum clockwise position.</li> <li>2. PCS2 is unplugged at attic outlet or power is missing.</li> <li>3. Power is incorrectly wired at LX220.</li> <li>4. LX220 relay is not activating; unplugged; or defective.</li> <li>5. Internal motor thermal cutoff. Wait 15 minutes for it to cool off &amp; retry.</li> <li>6. Defective PCS2 power cord or plug.</li> <li>7. Defective 15µf 370 vac starting capacitor.</li> <li>8. Defective Motor.</li> <li>9. Defective Solar controller.</li> <li>10. <b>Check for 120 vac at attic outlet with voltmeter.</b></li> </ol> 
<p><b>MOTOR HUMS AND DOESN'T ROTATE FAN BLADE</b></p>	<ol style="list-style-type: none"> <li>1. Turn power off for 15 minutes and check again in case of thermal overload. If motor is okay, it will restart after it has cooled down.</li> <li>2. <b>Disconnect power to check motor starting capacitor: Remove the two brown wires on the starting capacitor, which is located inside the electrical panel. Temporarily connect a new capacitor to the two wires &amp; insulate the terminals with electrical tape. Turn the power on and see if the motor now turns. Result A: Motor turns. This indicates that the starting capacitor is defective. Result B: Motor still hums. This indicates a defective motor. Test assumes that the motor is cool to touch and has not been thermally overloaded. Replace defective capacitor and reassemble.</b></li> </ol> 

<p><b>PCS2 OR FILTER PUMP DOES NOT TURN OFF</b></p> <p>(Tapping the internal LX220 relay turns the system off.)</p>	<ol style="list-style-type: none"> <li>1. Relay's wing nut is too tight. Loosen the relay's mounting wing nut so that the wing nut is just holding relay in place. Overtightening of the wing nut can close the gap between the relay's contacts. This can cause the relay to operate and appear like the system is turned on.</li> </ol> <p><b>Caution: Dangerous power may be exposed near this relay.</b></p> 
<p><b>VALVE OPERATOR ROTATES IN THE WRONG DIRECTION</b></p> <p>(“Solar On” turns water off to PCS2.)</p>	<ol style="list-style-type: none"> <li>1. Valve was mis-staged as it was assembled. Turn valve operator switch to other “ON” position. I.E. From ON1 to ON2 or vice versa.</li> </ol>
<p><b>VALVE OPERATOR DOES NOT ROTATE TO PROPER STOP POSITION.</b></p> <p>(Valve stops before it should.)</p>	<ol style="list-style-type: none"> <li>1. Internal limit switch needs adjusting.</li> <li>2. Internal cam needs adjusting.</li> <li>3. Internal mechanical stop needs adjusting.</li> <li>4. Defective valve operator. Replace.</li> </ol>
<p><b>VALVE OPERATOR ROTATES IN ONE DIRECTION ONLY</b></p> <p>(Valve rotates to ON position but will not rotate to OFF. POWER ON and SOLAR ON lights are both on. Sensor Service Required lights are both OFF.)</p>	<p>TEST: Reverse the VOR Switch. ON1 to ON2 or vice versa.</p> <p><u>Result A: Valve still does not rotate.</u></p> <ol style="list-style-type: none"> <li>1. Defective limit switch mechanical stop inside of valve operator. Loose screw on stop, etc.</li> <li>2. Defective internal limit switch in valve operator.</li> <li>3. Defective limit switch circuit in valve operator.</li> <li>4. Defective valve operator.</li> </ol> <p><u>Result B: Valve now rotates in other direction.</u> This indicates that the valve operator is okay.</p> <ol style="list-style-type: none"> <li>1. Defective LX220 circuit board or internal wiring.</li> <li>2. Defective solar controller.</li> </ol>
<p><b>VALVE OPERATOR ROTATES SLOWLY</b></p> <p>(Valve operator creeps and doesn't reach its end stops.)</p>	<ol style="list-style-type: none"> <li>1. Transformer plug to LX220 printed circuit board is reversed causing 12 volts at valve operator instead of the required 24 volts.</li> <li>2. Defective valve operator.</li> </ol>

<p><b>VALVE OPERATOR ROTATES ONLY WHEN VOR SWITCH IS FLIPPED</b></p> <p>(Valve operator rotates to stop positions but only when operated from the valve operator switch itself. Turning the LX220 switch to Manual ON or AUTO does not operate the valve. Sensor service lights are OFF. Power ON light lit.)</p>	<ol style="list-style-type: none"> <li>1. The LX220 is wired for 220 vac operation but is supplied with 120 vac.</li> </ol>
<p><b>WATER SENSOR SERVICE LIGHT IS ON</b></p>	<ol style="list-style-type: none"> <li>1. Shorted pool water temperature sensor.</li> <li>2. Open water sensor.</li> <li>3. Cable problem from LX220 to water sensor.</li> <li>4. Loose screw at WTR terminals in LX220 control.</li> </ol>
<p><b>SOLAR SENSOR SERVICE LIGHT IS ON</b></p>	<ol style="list-style-type: none"> <li>1. Attic temperature sensor is connected in parallel with PCS2's internal float wires. Connect temperature sensor in series with PCS2 white wires.</li> <li>2. Loose screw at LX220 control SOL terminals.</li> <li>3. Cable problem from SOL terminals in LX220 control to the attic temperature sensor.</li> <li>4. PCS2 is mounted upside down causing open float condition.</li> <li>5. Leak detection float inside PCS2 is detecting excess water and has opened the attic temperature circuit.</li> <li>6. Leak detection float inside PCS2 is defective [open circuit vs. closed circuit switch].</li> <li>7. Shorted attic temperature sensor [ohmmeter reads a shorted condition across disconnected sensor wires].</li> <li>8. Open attic sensor [ohmmeter reads infinity across disconnected sensor wires].</li> </ol>
<p><b>INSUFFICIENT HEATING</b> (PCS2 does not appear to be heating the pool.)</p>	<ol style="list-style-type: none"> <li>1. Poor solar weather [No Sunshine].</li> <li>2. Pump Timer(s) out of sync with solar energy collection time.</li> <li>3. Water flow valves to PCS2 are shut off.</li> <li>4. Bypass valve operator does not route water to PCS2. VOR switch is in the wrong "ON" position.</li> <li>5. Pool Cleaner water flow interfering with PCS2 water flow. OR, low water flow to PCS2.</li> <li>6. LX220 is not in "AUTO" mode.</li> <li>7. LX220 control does not supply power to PCS2.</li> <li>8. PCS2 water flow and fan power are out of sync with each other.</li> <li>9. Defective temperature sensor(s) or Open internal float circuit (prevents auto mode from activating).</li> </ol> <p style="text-align: right;"><i>List is continued in next page right column &gt;&gt;&gt;&gt;</i></p>



	<ol style="list-style-type: none"> <li>10. Attic temperature sensor is located in the discharge air stream of the PCS2.</li> <li>11. Attic sensor not located at the peak of the attic.</li> <li>12. Defective fan motor on PCS2.</li> <li>13. No airflow through unit's water coil. Coil is facing the wrong direction inside the attic.</li> <li>14. Insufficient airflow caused by obstacles, coil too close to wall, etc.</li> <li>15. PCS2 is located on the floor of a large standup attic. The PCS2 should be located as close to the peak of the attic as is possible. Heat rises in attics.</li> <li>16. Short circuiting of the PCS2 airflow. Unit is mounted in such a way that air discharged from the face recirculates back to the intake of the coil. Thus the coil does not take in heated air on a regular basis: instead, it recycles cooler discharged air.</li> <li>17. Poor location for the PCS2 inside of the attic.</li> <li>18. PCS2 Fan Set at Medium or Low Speed</li> <li>19. Excessive pool water cooling caused by an attached waterfalls. It masks performance of PCS2 or offsets the heat gains of the PCS2. Waterfalls on a pool can have a dramatic cooling effect on pool temperature.</li> </ol>
<p><b>PCS2 TURNS ON AT NIGHT; TURNS ON TOO EARLY OR TURNS ON TOO LATE</b></p> <p>(No attic heat is available for the pool. The attic is cooler than the pool or the same temperature. Or, the attic is warmer than the pool, but the PCS2 does not turn ON)</p>	<ol style="list-style-type: none"> <li>1. Pool water temperature sensor exposed to cooling winds, rain, etc. giving the LX220 a false indication of cold water temperatures [the attic falsely appears much warmer than the pool causing the PCS2 to turn ON]. Solution: Insulate the pipe around the water temperature sensor and cover with plastic to waterproof.</li> <li>2. Sun heating water sensor causing it to give a false reading, which fakes out solar control electronics.</li> </ol>
<p><b>SHORT SEASON</b> (The swimming season is not as long as you would like but the PCS2 is heating the pool.)</p>	<ol style="list-style-type: none"> <li>1. LX220 is not in "AUTO" mode.</li> <li>2. Heat loss opportunity exceeds heat gain opportunity. I.E. The pool is uncovered and the nights are cold causing excessive heat loss, which is not recovered during the solar day. Solution: Use a pool blanket or cover to eliminate the excessive heat convection losses, which occur directly from the surface of the pool. This will allow the pool to retain the free solar heat and extend the swimming season. This can be an important factor at the front and back ends of the swimming season.</li> <li>3. Solar heating capacity and pool heat retaining capacity are no longer adequate for the current season's weather. Solution: Use a backup heater located down stream from the PCS2 to further extend the swimming season until the pool has to be winterized [if required].</li> </ol>

<p><b>EXCESSIVE VIBRATION</b></p>	<ol style="list-style-type: none"> <li>1. Unbalanced fan blade.</li> <li>2. Loose fan blade.</li> <li>3. Loose motor mounting or cabinet hardware.</li> <li>4. Mounting may require foam base for PCS2 to sit on.</li> <li>5. Rigid mounting of PCS2 to building structure.</li> <li>6. Contamination on fan blade causing imbalance.</li> <li>7. Motor bearings defective.</li> <li>8. Unusual mounting may require rubber isolation dampening devices.</li> <li>9. PCS2 mounted using rigid pipes that are not supported properly.</li> <li>10. <b>TEST: Set fan speed to Medium or Low and observe results. Improvement may indicate motor or motor mounting problems.</b></li> </ol> 
<p><b>HIGH PRESSURE AT FILTER</b> (Total pressure should be less than 22-27 lbs. in the typical installation with a clean filter.)</p>	<ol style="list-style-type: none"> <li>1. Backwash and clean filter.</li> <li>2. Check position of valves within support system. Incorrectly positioned valves can restrict water flow and increase pressure with the system.</li> <li>3. Contact pool servicer. Problem is not in PCS2 system.</li> </ol>
<p><b>POOR CIRCULATION</b> (Pool water gets cloudy.)</p>	<ol style="list-style-type: none"> <li>1. Clean filter.</li> <li>2. Check valve positions.</li> <li>3. Check water flow rate from pump.</li> <li>4. Check pump sizing.</li> <li>5. Contact pool servicer. Problem is not in PCS2 system.</li> </ol>
<p><b>HIGH ELECTRIC BILL</b></p>	<ol style="list-style-type: none"> <li>1. Check to see how many hours the filter pump is running.</li> <li>2. Check the condition and size of the filter pump.</li> <li>3. Wire the filter pump to the LX220 power relay and use a minimum runtime timer to ensure that only a minimum filtration time is achieved. Place LX220 in AUTO mode. This combination maximizes solar heat collection and minimizes the energy required to accomplish it.</li> <li>4. Problem is not the PCS2. It only draws 6.0 amps maximum and its energy use is easily determined within a range of \$7.00 minimum to \$20.00 per month maximum depending upon local electricity rates. At 9¢ per kilowatt-hour and 10 hours per day, the PCS2 will cost an estimated \$18.63 per month to operate.</li> <li>5. Have an energy audit performed.</li> <li>6. Problem is not in the PCS2 system if it is working.</li> </ol>

## 13. Safety Certification Label



### Model & Serial Number

The model number and serial number are printed on the safety certification label in the top two left rectangles opposite the CSA safety symbol. For example, in the label shown at the right:

**Model: PCS2-0**

**Serial: A02120001**

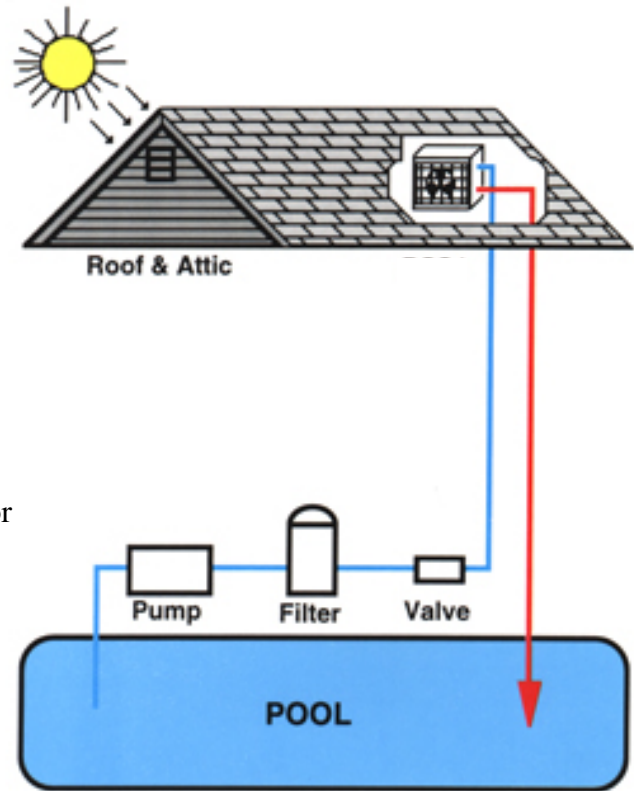


The SolarAttic PCS2 swimming pool heater is proudly manufactured in the USA by ECONAR Energy Systems Corporation at their manufacturing facility in Appleton, Minnesota. On the left side of the PCS2 [coil side view], you will find the Canadian Standards Association (CSA) label. The ECONAR manufacturing facility is a CSA approved facility and the products they manufacture receive regular CSA physical reviews during each year to maintain their safety certifications. When you buy the PCS2, you can have full confidence that the SolarAttic product is manufactured under the highest safety certification criteria. In addition to CSA certification, virtually all electrical components are UL Listed.

## 14. Specifications

## SOLAR Without PANELS

- Pool Sizes: Up to 1000 square feet or 35,000 gallons
- Up to 70,000 gallons with FlowReversal™ valves
- Nominal BTU Rating: 60,000 BTUs/hour @  $\Delta 32^{\circ}\text{F}$   
I.E. Pool water input  $72^{\circ}\text{F}$  & Attic's Peak @  $104^{\circ}\text{F}$
- BTU Transfer Range: 20-150,000 BTUs per hour
- Attic space required: 3 ft min height to peak; and, square ft of attic equal to or greater than pool sq ft
- Attic access: Fits through all standard trusses
- Minimum access opening: 17"x 23"
- Can be disassembled for smaller access openings
- Size: 22"H x 16"D x 46"W [w/o motor assembly]
- Weight: ~142 pounds Filled Weight: ~163 pounds
- Shipping Crate Size: 28"H x 24"D x 48"W
- Crated Weight: 168 pounds
- Power: 115 vac 6.0 amps @ Full Load
- Operating Cost: \$9-18 per month @ 9¢ per KW/hour
- U.L. Listed: All components except cabinet parts
- RPM 1645 @ High Speed / 3 Speed Adjustable Motor
- Plumbing Connections: 2" Male Pipe Threads
- Pressure Drop: 4-6 PSI typical
- Air Flow Rate: 2600 SCFM
- Water Flow Rate: Range 15-65 GPM
- Optimal Water Flow Rate: 40-50 GPM
- Modes: Manual Off & On
- Automatic Operation: Optional Solar Control
- Proudly Manufactured in the USA by  
ECONAR Energy Systems Corporation
- CSA Approved



The words SolarAttic and PCS2 are trademarks of SolarAttic, Inc., Elk River, Minnesota. The word ECONAR is a trademark of ECONAR Energy Systems Corporation, Elk River, Minnesota. The word FlowReversal is a trademark of Mark Urban, Tustiin, California. These specifications are subject to change without notice. ECONAR's manufacturing crew is shown on the back of this manual.



## U.S. Patents

5,014,770

5,452,710

5,746,653

Photo to left shows a crated  
PCS2 ready to ship.

July 24, 2003 Rev D Manual

## 15. Warranty

# SolarAttic, Inc. Limited Warranty-PCS

All Pool Convection System (PCS) pool heaters are warranted to be free from manufacturing defects for a period of thirty-six (36) months from the date of first consumer installation or fifty-four (54) months from the date of shipment from the factory, whichever occurs first. The consumer must complete and return the warranty registration card and provide a receipted bill of sale as proof of warranty period within 30 days from the date of installation. Without registration and proof of purchase date, the warranty begins on the date of shipment from the factory. This Limited Warranty covers parts and labor to correct manufacturing defects only. It does not cover incidental fin damage nor any corrosive damage to heat transfer coils caused by improperly maintained chemical levels in pools. Ph levels outside the 7.2 to 7.6 range voids warranty. Use in Ocean or Sea water pools voids warranty. Use in pools utilizing salt, as a source of chlorine, does not void warranty. All chemical dispensers must be plumbed downstream. Dispensing pool chemicals directly into the pool heater voids warranty. Failure to properly winterize the pool heater in areas with freezing temperatures voids warranty. This warranty does not cover winter freeze damage, normal maintenance, labor charges for removal or installation of parts, transportation charges to the factory or for any other service calls or repairs.

Corrugated fins are used on the heat transfer coils for improved efficiency. They are waffled in appearance and not straight. Fin bending that has been combed with a fin tool does not affect performance and is not considered a manufacturing defect. Our obligation under this warranty is limited to the repair or replacement, at our factory, of any part which, upon our examination, has proven to be defective. Correction of such defects by repair or replacement (at our option) and return freight via lowest common carrier, shall constitute fulfillment of SolarAttic's obligation. This warranty does not apply to those products which, in SolarAttic's judgment, have been altered or repaired outside of our factory or by unauthorized factory representatives, subjected to misuse, negligence, accident, corrosive atmospheres, or operating beyond the limits of our design.

THIS WARRANTY CONSTITUTES THE BUYERS SOLE REMEDY. IT IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WHERE CIRCUMSTANCES CAUSE REMEDY EXPRESSED HEREIN TO FAIL OF ITS ESSENTIAL PURPOSE, SOLARATTIC, INC.'S LIABILITY SHALL NOT IN ANY EVENT EXCEED THE ORIGINAL PURCHASE PRICE. IN NO EVENT, SHALL SOLARATTIC, INC. BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, WHETHER THE THEORY BE BREACH OF THIS OR ANY OTHER WARRANTY, NEGLIGENCE, OR STRICTLY TORT. DISPUTES ARISING UNDER THIS AGREEMENT SHALL BE GOVERNED BY APPLICABLE MINNESOTA LAW. THE VENUE FOR ALL DISPUTES IS SHERBURNE COUNTY, MINNESOTA.



Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

Date of Installation \_\_\_\_\_

Installer \_\_\_\_\_

\_\_\_\_\_

# Notes

# Notes



# **SolarAttic, Inc.**

Elk River, Minnesota 55330  
[www.solarattic.com](http://www.solarattic.com)

© 2003 - All Rights Reserved