TROUBLESHOOTING GUIDE

CAUTION: Some tests require electrical skills because of the presence of high voltage. If you do not possess the electrical skills required to perform these tests, obtain the services of a qualified electrician.

In some tests, the danger of a fatal or serious shock hazard may be present. These tests are indicated by boldface times italic font [characters like these].

SYMPTOM	CHECK
THE LX220 POWER ON LIGHT DOES NOT LIGHT. (The SOLAR ON light is not ON when the LX220 is in the "Manual On" position.)	1. Push RESET button on LX220 Front Panel. 2. Check for tripped breaker at the main power panel. 3. Ensure that timers are turned on. ***4. Check for loose power wire nut inside LX220.*** ***5. Check for 220-vac power inside the LX220 with voltmeter.***
PCS1 FAN DOES NOT TURN ON. (Solar On light is On. Sensor Service Required lights are Off.)	1. Thermostat is set too low on LX220. Turn to maximum. 2. PCS1 is unplugged at attic outlet or power is missing. 3. Power is incorrectly wired at LX220. 4. LX220 relay is not activating; unplugged; or defective. 5. Internal motor thermal cutoff. Wait 15 minutes & retry. 6. Defective PCS1 power cord or plug. 7. Defective 5µf starting capacitor. 8. Defective Motor. 9. Defective Solar controller. ***10. Check for 220 vac at attic outlet with voltmeter.***

SYMPTOM	CHECK
MOTOR HUMS AND DOESN'T ROTATE FAN BLADE.	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. ***2. Disconnect power to check motor starting capacitor: Remove the two brown wires on the starting capacitor, which is located inside the venturi assembly. Connect the two wires together & insulate 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. Do not run motor with starting capacitor wires shorted for longer than 5 minutes. Replace defective part.***
PCS1 OR FILTER PUMP DOES NOT TURN OFF (Tapping the internal LX220 relay turns the system off.)	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. Over tightening 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. ***Caution: Dangerous power may be exposed near this relay. For safety purposes, turn all power off.***
VALVE OPERATOR ROTATES IN WRONG DIRECTION. ("Solar On" turns water off to PCS1.)	1. Valve operator plug is upside down. Check for "Pool" UP. 2. Valve was mis-staged as it was assembled. Reverse plug to "Spa" UP for correct operation or turn valve operator switch to other "ON". 3. Place switch on valve operator to its second "ON" position.

SYMPTOM	CHECK
VALVE OPERATOR DOES NOT ROTATE TO PROPER STOP POSITION. (Valve stops before it should.)	1. Internal limit switch needs adjusting. 2. Internal cam needs adjusting. 3. Internal mechanical stop needs adjusting. 4. Defective valve operator. Replace.
VALVE OPERATOR ONLY ROTATES IN ONE DIRECTION. (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.)	*TEST: Reverse plug on VOR to "Spa" UP. OR, Operate VOR Switch. On newer VOR's, switch to a different ON position. I.E. ON1 to ON2 or reverse.* *Result A: Valve still does not rotate.* 1. Defective limit switch mechanical stop inside of valve operator. 2. Defective internal limit switch inside of valve operator. 3. Defective limit switch circuit inside of valve operator. 4. Defective valve operator. *Result B: Valve now rotates in other direction.* This indicates that the valve operator is okay. 1. Defective solar controller.
VALVE OPERATOR ROTATES SLOWLY (Valve operator creeps and doesn't reach its end stops.)	1. Transformer plug to LX220 printed circuit board is reversed causing 12 volts at valve operator instead of the required 24 volts. 2. Defective valve operator.

SYMPTOM	CHECK
VALVE OPERATOR ROTATES ONLY WHEN THE SWITCH ON THE VOR IS FLIPPED	Valve operator rotates to stop positions but only when operated from the valve operator switch itself. ON1 to ON2 or ON2 to ON1. Turning the LX220 switch to manual ON or Automatic does not operate the valve. Sensor service lights are OFF. Power ON light is lit. 1. The LX220 is wired for 220 VAC operation but is supplied with 120 VAC.
WATER SENSOR SERVICE LIGHT IS ON	1. Shorted pool water temperature sensor. 2. Open water sensor. 3. Cable problem from LX220 to water sensor. 4. Loose screw at LX220 WTR terminals.
SOLAR SENSOR SERVICE LIGHT IS ON	1. Attic temperature sensor is connected in parallel with PCS1's internal float wires. Connect temp sensor in series with white wires. 2. Loose screw at LX220 SOL terminals. 3. Cable problem from LX220 to attic temperature sensor. 4. PCS1 is mounted upside down causing open float condition. 5. Leak detection float inside PCS1 is detecting excess water. 6. Leak detection float inside PCS1 is defective. 7. Shorted attic temperature sensor. 8. Open attic sensor.

SYMPTOM	CHECK
INSUFFICIENT HEATING (PCS1 does not appear to be heating the pool to a satisfactory temperature.)	1. Poor solar weather [No Sunshine]. 2. Pump Timer(s) out of sync with solar energy collection time. 3. Water flow valves to PCS1 are shut off. 4. Bypass valve operator does not route water to PCS1. VOR switch is in the wrong "ON" position or plug is upside down (older vor's). 5. Pool Cleaner water flow interfering with PCS1 water flow. 6. LX220 is not in "Automatic" mode. 7. LX220 Solar Controller does not supply power to PCS1. 8. PCS1 water flow and fan power are out of sync with each other. 9. Defective temperature sensor(s) or Open leak detection float. 10. Attic sensor located in the discharge air of the PCS1. 11. Attic sensor not located at the peak of the attic. 12. Defective fan motor on PCS1. 13. No airflow through unit's water coil. Coil facing the wrong direction. 14. Insufficient airflow caused by obstacles, coil too close to wall, etc. 15. PCS1 is located on the floor of a large standup attic. The PCS1 should be located as close to the peak of the attic as is possible. Heat rises in attics. 16. Short circuiting of the PCS1 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. 17. Poor location for the PCS1 inside of the attic. 18. Excessive pool water-cooling caused by attached waterfalls.

SYMPTOM	CHECK
PCS1 TURNS ON AT NIGHT OR TOO EARLY (No attic heat is available for the pool. The attic is cooler than the pool or the same temperature.)	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 PCS1 to cycle on]. Solution: Insulate the pipe around the water temperature sensor and cover with plastic to waterproof. 2. Sun heating causing water sensor to give false reading.
SHORT SEASON (The swimming season is not as long as you would like but the PCS1 is heating the pool.)	1. LX220 is not in "Automatic" mode. 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. 3. Solar heating capacity and pool heat retaining capacity are no longer adequate for the current season's weather. Solution: Use a backup heater to further extend the swimming season until the pool has to be winterized [if required].

SYMPTOM	CHECK
EXCESSIVE VIBRATION	1. Unbalanced fan blade. 2. Loose fan blade. 3. Loose motor mounting or cabinet hardware. 4. Lack of foam base for PCS1 to rest on. 5. Rigid mounting of PCS1 to building structure. *Mount PCS1 support platform to roof using chains. This eliminates amplification of vibration by the wood structure, which occurs when rigidly mounting platform.* 6. Contamination on fan blade causing imbalance. 7. Motor bearing defective. 8. Mounting may require rubber isolation dampening devices. 9. PCS1 mounted using rigid pipes that are not supported properly.
HIGH PRESSURE AT FILTER (Total pressure should be less than 22-27 lbs. in the typical installation with a clean filter.)	1. Backwash and clean filter. 2. Check position of valves within support system. Incorrectly positioned valves can restrict water flow and increase pressure with the system. 3. Contact pool servicer. Problem is not in PCS1 system.
POOR CIRCULATION (Pool water gets cloudy.)	1. Clean filter. 2. Check valve positions. 3. Check water flow rate from pump. 4. Check pump sizing. 5. Contact pool servicer. Problem is not in PCS1 system.

SYMPTOM	CHECK
HIGH ELECTRIC BILL	1. Check to see how many hours the filter pump is running. 2. Check the condition and size of the filter pump. 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. This combination maximizes solar collection and minimizes the energy required to accomplish it. 4. Problem is not the PCS1. It only draws 1.8 amps maximum and its energy use is easily determined within a range of $3.00 minimum to $20.00 Maximum per month depending upon local electricity rates. At 9¢ per kilowatt-hour and 10 hours per day, the PCS1 will cost an estimated $11.00 per month to operate. 5. Have an energy audit performed.

Factory Help

Still experiencing problems after the above tests? Call the factory at (763) 441-3440 for further assistance. Our FAX number is (763) 441-7174. We'll be glad to help address your questions. Thank you for learning about this exciting new pool heating technology. Free energy from your own hot attic really beats paying high natural gas costs to do the same amount of work!

You can also write to SolarAttic at 15548 95th Circle NE, Elk River, MN 55330 or reach us by email at info@solarattic.com.

Solar Without Panels!