

## FEATURES OF ECHO COLLECTION CONTROLS

**Piezo switch** - Pressing does not induce any movement in the switch so it is not prone to mechanical breakdown as other switches are. There is a small electrical charge induced by pressing the switch that signals the PC board to respond to the selection.

**Control Panel** - Red LED illuminates between the words *Status Heat* when the heater is in operation and briefly when power is first applied to the spa.

**Temperature Control** - There is a temperature control knob located on the left side of the control panel. Rotate the knob to select temperatures between 65° (the bottom of the blue end of the scale) and 104° (the top of the red end of the scale).

**Operating Theory** - The spa will seek to maintain whatever temperature is selected by the Temperature Control Knob. To do this it will automatically turn on the low speed pump and after the pressure switch indicates that there is circulation in the spa, power will be applied to the heater. **Any time that the spa water temperature drops below the temperature selected by the Temperature Control Knob the spa will turn on and apply power to the heater even if the Function Control Button has placed the spa in the OFF mode.** The only exception would be if the spa were connected to a 115V power source and it was operating in high speed. Powered by 115V, you can't have simultaneous operation of the high speed and the heater.

**Function Control Button** - From the OFF position, the Function Control Button operates the spa through four different modes. Pressing the button the first time will make the spa operate in low speed. Pressing it a second time will cause the light to come on while the motor continues to operate in low speed. Pressing it a third time will make the motor change from low to high speed while the light remains on. The fourth time you press the Function Control Button will cause the light to turn off while the high speed remains on. The fifth time you press the button, it will turn off.

**115V/230V Power Configuration (Jumper J8)** - Spas equipped with 2 pump/motors (**Z140 & Z150**) must be connected to a 230 volt power source. They can operate in either a 30 amp or 50 amp configuration and the heater works as a 5.5 kW heater. In the 230 volt / 50 amp configuration, jumper J8 is in the 50 position. This allows the spa to operate the heater and high speed at the same time. If for some reason there is less than 50 amps available, the spa may be operated in a 230 volt / 30 amp configuration. Jumper J8 is moved to the 20 position and the spa must be in low speed for the heater to operate. The spas equipped with 1 pump/motor (**Z110, Z115, Z120, & Z145**) are factory wired for 115 volt / 20 amp operation and come equipped with a GFCI power cord. In this configuration, the spa must be in low speed for the heater to operate and the heater works as a 1.3 kW heater. These spas may be converted to operate at 230 volts. Refer to the explanation above for 30 amp/50 amp explanation.

**Filter Cycles (Jumper J7)** - The spa is programmed to operate two filter cycles per day. The first filter cycle will start 1 hour after power is applied to the spa and the second will begin 12 hours after the start of the first cycle. Jumper J7 on the PC Board controls the duration of the cycles. In the "A" position, the filter cycles will each operate for 2 hours and in the "B" position they will operate for 5 hours each.

**Heater Characteristics and Safety Features** - Element resistance = 11 ohms  
120 volt / 20 amp = 1.3 KW  
240 volt / 30 or 50 amp = 5.5 KW  
Set range = 65 degrees to 104 degrees

When the temperature sensor detects temperatures of 112 degrees, the Status / Heat LED on the control panel will flash and the system will shut down. If the control system detects a malfunction of either the high limit sensor or the temperature sensor, the Status / Heat LED will flash. To reset the system after an over temperature condition, press the Function Control Button. The system will not reset if there is a malfunction of either of the sensors.

**Optional ozone management system** - The optional ozone generator is only powered during the filtration cycles. Pressing the Function Control Button during a filtration cycle will disable the generation of ozone for 1 hour (this feature is for people with skin sensitivity to ozone).

**Pressure Switch** - The spa is equipped with a pressure switch. This is used to detect whether or not there is sufficient water circulation in the plumbing to energize the heater. If there is a pressure switch malfunction, the Status / Heat LED on the control panel will flash.

## FEATURES OF ESSENCE COLLECTION CONTROLS

**Piezo switch** - Pressing does not induce any movement in the switch so it is not prone to mechanical breakdown as other switches are. There is a small electrical charge induced by pressing the switch that signals the PC board to respond to the selection.

**Control Panel** - Red LED illuminates between the words *Status Heat* when the heater is in operation and briefly when power is first applied to the spa.

**Temperature Control** - There is a temperature control knob located on the left side of the control panel. Rotate the knob to select temperatures between 65° (the bottom of the blue end of the scale) and 104° (the top of the red end of the scale).

**Operating Theory** - The spa will seek to maintain whatever temperature is selected by the Temperature Control Knob. To do this it will automatically turn on the low speed pump and after the pressure switch indicates that there is circulation in the spa, power will be applied to the heater. **Any time that the spa water temperature drops below the temperature selected by the Temperature Control Knob the spa will turn on and apply power to the heater even if the Function Control Button has placed the spa in the OFF mode.** The only exception would be if the spa were connected to a 115V power source and it was operating in high speed. Powered by 115V, you can't have simultaneous operation of the high speed and the heater.

**Function Control Button** - From the OFF position, the Function Control Button operates the spa through four different modes. Pressing the button the first time will make the spa operate in low speed. Pressing it a second time will cause the light to come on while the motor continues to operate in low speed. Pressing it a third time will make the motor change from low to high speed while the light remains on. The fourth time you press the Function Control Button will cause the light to turn off while the high speed remains on. The fifth time you press the button, it will turn off.

**115V/230V Power Configuration (Jumper J8)** - Spas equipped with 2 pump/motors (**Z140 & Z150**) must be connected to a 230 volt power source. They can operate in either a 30 amp or 50 amp configuration and the heater works as a 5.5 kW heater. In the 230 volt / 50 amp configuration, jumper J8 is in the 50 position. This allows the spa to operate the heater and high speed at the same time. If for some reason there is less than 50 amps available, the spa may be operated in a 230 volt / 30 amp configuration. Jumper J8 is moved to the 20 position and the spa must be in low speed for the heater to operate. The spas equipped with 1 pump/motor (**Z110, Z115, Z120, & Z145**) are factory wired for 115 volt / 20 amp operation and come equipped with a GFCI power cord. In this configuration, the spa must be in low speed for the heater to operate and the heater works as a 1.3 kW heater. These spas may be converted to operate at 230 volts. Refer to the explanation above for 30 amp/50 amp explanation.

**Filter Cycles (Jumper J7)** - The spa is programmed to operate two filter cycles per day. The first filter cycle will start 1 hour after power is applied to the spa and the second will begin 12 hours after the start of the first cycle. Jumper J7 on the PC Board controls the duration of the cycles. In the "A" position, the filter cycles will each operate for 2 hours and in the "B" position they will operate for 5 hours each.

**Heater Characteristics and Safety Features** - Element resistance = 11 ohms  
120 volt / 20 amp = 1.3 KW  
240 volt / 30 or 50 amp = 5.5 KW  
Set range = 65 degrees to 104 degrees

When the temperature sensor detects temperatures of 112 degrees, the Status / Heat LED on the control panel will flash and the system will shut down. If the control system detects a malfunction of either the high limit sensor or the temperature sensor, the Status / Heat LED will flash. To reset the system after an over temperature condition, press the Function Control Button. The system will not reset if there is a malfunction of either of the sensors.

**Optional ozone management system** - The optional ozone generator is only powered during the filtration cycles. Pressing the Function Control Button during a filtration cycle will disable the generation of ozone for 1 hour (this feature is for people with skin sensitivity to ozone).

**Pressure Switch** - The spa is equipped with a pressure switch. This is used to detect whether or not there is sufficient water circulation in the plumbing to energize the heater. If there is a pressure switch malfunction, the Status / Heat LED on the control panel will flash.

# FEATURES OF PINNACLE/QUANTUM CONTROLS

**Piezo switches** - Pressing does not induce any movement in the switch so it is not prone to mechanical breakdown as other switches are. There is a small electrical charge induced by pressing the switch that signals the PC board to respond to the selection.

**Control Panel** - Displays different icons on the panel to indicate the mode of operation (i.e. Pump 1, Pump 2, blower, light). The panel is illuminated with two bulbs that provide backlighting for better visibility at night.

**Digital Temperature Display** - Displays a constant readout of present water temperature. Press either the up or down arrow for a momentary (3 second) display of the temperature set point. This will not change the temperature setting, it will only initiate the display. Once the set temperature is displayed, pressing either the up or down arrow will change the temperature set point.

**Ozone management system** - The ozone generator is on 24 hours a day, running off the 24 hour circulation pump. Jumpering the pins of J-16 enables the display of the O<sub>3</sub> symbol on the display panel when the ozone generator is on. Pressing the jets, blower, or light button during a programmed filtration cycle will disable the generation of ozone for 1 hour (this feature is for people with a skin sensitivity to ozone).

**Economy/Standard Mode Selection** - In standard mode, the thermostat controls the operation of the spa to maintain the set water temperature. In economy mode, the spa will remain off unless the spa water temperature drops 20 degrees below the set temperature. At this point, the pump/motor and heater will turn on in order to bring the spa water temperature to within 15 degrees of the set temperature. There is a constant readout of the mode of operation on the display panel.

**Automatic default settings** -  
Temperature set point: 100 degrees  
Filtration cycles: 2:00 to 4:00 a.m. & p.m. (heater enabled)  
Mode: Economy  
Time of Day: 12:00 (noon)

**Time of Day** - Must be set to the current time of day by the user when the spa is installed, otherwise the default setting will govern the operation of the filter cycles (see default settings). Time can be displayed while the spa is in operation by pressing the time set button (button with clock face). The display of the time is momentary and will only be displayed for approximately 3 seconds.

**Automatic Time-outs** - After operating for a specific length of time (countdown begins from the last time the function button was pressed), the functions will turn off automatically. This is to prevent the equipment from running for indefinite periods of time if left unattended. The time-outs are listed below.

**3-Pump System:** Jet system 1 - 30 minutes  
Jet system 2 - 30 minutes  
Blower - 30 minutes  
Light - 4 hours

**Battery Back-up** - The system is equipped with a 9 volt NiCad battery. In the event of a power loss to the spa, the battery will provide power to the system's memory in order to retain the programmed information (time of day, heater set temperature, and filter cycles). The battery will only provide power for 20 - 30 minutes and it takes 48 hours to fully charge.

**Locks** - The control panel can be locked to prevent any of the control settings from being changed or to prevent use by others who don't know how to unlock the panel. The temperature can be locked by itself which allows the other controls to be changed but prevents the temperature settings from being changed.

**Filtration System** - The spa is continuously filtered for 24 hours a day using the low speed Tiny Might Pump. Because the Tiny Might Pump circulates the water all the time, the programmable filtration cycles are used to control other operations. The **Blower** will turn on for thirty seconds at the beginning of Filter cycle 1. Both **Jet Pumps** will operate for 5 minutes at the beginning of Filter Cycle 2. To economize by not running the heater at certain times, the heater may be turned off during either or both of the filtration cycles.

**30/50 Amp power configuration (Jumper J9)** - The spas can operate in either a 240 volt 30 amp or 240 volt 50 amp power configuration. In the 240 volt 50 amp configuration, jumper J9 is in the 50 position and all of the functions can be operated simultaneously (heater functions as a 5.5 kW heater). If for some reason there is less than 50 amps available at the circuit box, the system can be operated in a 240 volt 30 amp configuration. In this configuration, jumper J9 is in the 20 position and there is a restriction on which functions can operate simultaneously. The heater will operate at the 5.5 kW level, however, it will be turned off when high speed (jets) or blower modes are selected.

**Heater Characteristics and safety features** - Element resistance = 11 ohms  
240 volt 30/50 amp = 5.5 kW  
Set range = 80 degrees to 104 degrees  
Accuracy = +/- .5 degrees

When the temperature sensor detects temperatures of 112 degrees the flashing OH message is displayed. If the pump/motor is/are operating, the operation is interrupted until the water temperature falls to 110 degrees at which point the system will reset it self. If the high limit sensor detects water temperatures of 118 degrees, it will shut down the system. The SN1 error message will be displayed until the water temperature falls below that point and it will be replaced with the flashing OH message. There is no automatic reset after this error condition, the user must press one of the control panel buttons (jets, light, or blower) to reset the system.

**Automatic freeze protection** - If the high limit sensor detects that the water temperature has reached 40 degrees, it will signal the system to start the filter pump and circulate the water until the water temperature at the sensor reaches 45 degrees. Note that the heater is not operating, the water is just being circulated. This condition could be created by a failure of the temperature sensor (Sn3 error condition). If this condition exists, the system will not be getting accurate information as to the actual water temperature which the system responds to by disabling the heater. In extremely cold conditions, this could lead to freezing if the water is not circulated.

**Control panel messages** - They indicate warnings and alert to possible malfunctioning components.

- Pd** - Power to the spa has been cut off and the battery back-up is being used to preserve the settings.
- OH** - A malfunction has occurred allowing the spa water to reach 112 degrees. The system will reset when the temperature falls to 110 degrees.
- FLO** - When flashing, indicates that the pump/motor is operating but the pressure switch is not closed. This does not disable the system, only the heater. Possible causes could be dirty filters or something impeding the flow of water to the pump. When the FLO is on steady it indicates that the pressure switch is bad or out of adjustment. This would be noticed when the pump/motor was not operating yet the pressure switch is closed. This condition disables the system.
- COOL** - Water temperature has fallen to 20 degrees below the set temperature. This is a common condition for economy mode.
- ICE** - Water temperature of 40 degrees has been detected indicating a possible freeze condition. Pump will circulate water until sensor detects water temperature of 45 degrees.
- Sn1** - High limit sensor is not functioning or water temperatures in excess of 118 degrees has been detected.
- Sn3** - Water temperature sensor is not functioning or water temperatures in excess of 118 degrees has been detected.

**P.C. Board Jumpers** - Jumpers control the operation of the spa or the display of information on the control panel.

- Jumper J7 Filter Select** Has no effect on the Platinum Series spas.
- Jumper J9 50/20 Operation** Determines the system's response to simultaneous operation of heater and jets/blower in 20 amp, 30 amp, & 50 amp configurations. See 30/50 amp more complete explanation.
- Jumper J10 Pump Enable** Pins are jumpered for 1-pump systems and unjumpered for 2-pump systems.
- Jumper J11 pH Circuit display** Unused on Platinum systems. If the top 2 pins are jumpered, there is an alternate of the current water temperature and the *default* pH reading of 5.0.
- Jumper J16 Ozone Enable** When jumpered, the display of the O<sub>3</sub> symbol is enabled. This is displayed while the ozone generator is operating. Inhibiting the display by not jumpering the pins does not effect the operation of the ozone generator during the filter cycles.

# FEATURES OF PLATINUM SERIES CONTROLS

**Piezo switches** - Pressing does not induce any movement in the switch so it is not prone to mechanical breakdown as other switches are. There is a small electrical charge induced by pressing the switch that signals the PC board to respond to the selection.

**Control Panel** - Displays different icons on the panel to indicate the mode of operation (i.e. low speed/high speed, blower, light). The panel is illuminated with two bulbs that provide backlighting for better visibility at night.

**Digital Temperature Display** - Displays a constant readout of present water temperature. Press either the up or down arrow for a momentary (3 second) display of the temperature set point. This will not change the temperature setting, it will only initiate the display. Once the set temperature is displayed, pressing either the up or down arrow will change the temperature set point.

**Ozone management system** - The ozone generator is only powered during the programmed filtration cycles. Jumpering the pins of J-16 enables the display of O<sub>3</sub> on the display panel when the ozone generator is on. Pressing pump, blower, or light button during a programmed filtration cycle will disable the generation of ozone for 1 hour (this feature is for people with skin sensitivity to ozone).

**Economy/Standard Mode Selection** - In standard mode, the thermostat controls the operation of the spa to maintain the set water temperature. In economy mode, the spa will remain off unless the spa water temperature drops 20 degrees below the set temperature. At this point, the pump/motor and heater will turn on in order to bring the spa water temperature to within 15 degrees of the set temperature. There is a constant readout of the mode of operation on the display panel.

**Automatic default settings** -  
Temperature set point: 100 degrees  
Filtration cycles: 2:00 to 4:00 a.m. & p.m. (heater enabled)  
Mode: Economy  
Time of Day: 12:00 (noon)

**Time of Day** - Must be set to the current time of day by the user when the spa is installed, otherwise the default setting will govern the operation of the filter cycles (see default settings). Time can be displayed while the spa is in operation by pressing the time set button (button with clock face). The display of the time is momentary and will only be displayed for approximately 3 seconds.

**Automatic Time-outs** - After operating for a specific length of time (countdown begins from the last time the function button was pressed), the functions will turn off automatically. This is to prevent the equipment from running for indefinite periods of time if left unattended. The time-outs are listed below.

<b>2-Pump System:</b>	Filter pump/motor - 4 hours	<b>1-Pump System:</b>	Low speed (filter) - 4 hours
	Jet pump/motor - 30 minutes		High speed (jets) - 30 minutes
	Blower - 30 minutes		Blower - 30 minutes
	Light - 4 hours		Light - 4 hours

**Battery Back-up** - The system is equipped with a 9 volt NiCad battery. In the event of a power loss to the spa, the battery will provide power to the system's memory in order to retain the programmed information (time of day, heater set temperature, and filter cycles). The battery will only provide power for 20 - 30 minutes and it takes 48 hours to fully charge.

**Locks** - The control panel can be locked to prevent any of the control settings from being changed or to prevent use by others who don't know how to unlock the panel. The temperature can be locked by itself which allows the other controls to be changed but prevents the temperature settings from being changed.

**Programmable filtration cycles** - Two filtration cycles(filter 1 & filter 2) must be programmed to times convenient to the user or the default settings will be in effect. The blower operates for the first thirty seconds of each filtration cycle in order to circulate water through the blower channels to clean them out (help prevent algae growth). The ozone generator is powered only during the filtration cycles but can be disabled by pressing the jets, blower or light button on the control panel. If changes are made to the programmed times for the filter cycles, the clock (time set) must be advanced 24 hours in order for the changes to go into effect the same day they are made.

**30/50 Amp power configuration (Jumper J9)** - The 2-pump spas can operate in either a 240 volt 30 amp or 240 volt 50 amp power configuration. In the 240 volt 50 amp configuration, jumper J9 is in the 50 position and all of the functions can be operated simultaneously (heater functions as a 5.5 kW heater). If for some reason there is less than 50 amps available at the circuit box, the system can be operated in a 240 volt 30 amp configuration. In this configuration, jumper J9 is in the 20 position and there is a restriction on which functions can operate simultaneously. The heater will operate at the 5.5 kW level, however, it will be turned off when high speed (jets) or blower modes are selected. The 1-pump spas can operate in a 120 volt 20 amp configuration or the 240 volt 30 amp or 240 volt 50 amp configuration. In the 120 volt 20 amp configuration, jumper J9 is in the 20 position and the heater operates as a 1.3 kW heater. The heater will turn off if the high speed (jets mode) or the blower is selected. The above explanation of the 30 amp / 50 amp configuration applies to the 1-pump spas when they are wired for 240 volt operation. All Platinum Series spas are factory wired for 240 volt operation. The 1-pump spas may be field converted for 120 volt operation.

**Heater Characteristics and safety features** - Element resistance = 11 ohms  
 120 volt 20 amp = 1.3 kW  
 240 volt 30/50 amp = 5.5 kW  
 Set range = 80 degrees to 104 degrees  
 Accuracy = +/- .5 degrees

When the temperature sensor detects temperatures of 112 degrees the flashing OH message is displayed. If the pump/motor is/are operating, the operation is interrupted until the water temperature falls to 110 degrees at which point the system will reset itself. If the high limit sensor detects water temperatures of 118 degrees, it will shut down the system. The SN1 error message will be displayed until the water temperature falls below that point and it will be replaced with the flashing OH message. There is no automatic reset after this error condition, the user must press one of the control panel buttons (jets, light, or blower) to reset the system.

**Automatic freeze protection** - If the high limit sensor detects that the water temperature has reached 40 degrees, it will signal the system to start the filter pump and circulate the water until the water temperature at the sensor reaches 45 degrees. Note that the heater is not operating, the water is just being circulated. This condition could be created by a failure of the temperature sensor (Sn3 error condition). If this condition exists, the system will not be getting accurate information as to the actual water temperature which the system responds to by disabling the heater. In extremely cold conditions, this could lead to freezing if the water is not circulated.

**Control panel messages** - They indicate warnings and alert to possible malfunctioning components.

- Pd** - Power to the spa has been cut off and the battery back-up is being used to preserve the settings.
- OH** - A malfunction has occurred allowing the spa water to reach 112 degrees. The system will reset when the temperature falls to 110 degrees.
- FLO** - When flashing, indicates that the pump/motor is operating but the pressure switch is not closed. This does not disable the system, only the heater. Possible causes could be dirty filters or something impeding the flow of water to the pump. When the FLO is on steady it indicates that the pressure switch is bad or out of adjustment. This would be noticed when the pump/motor was not operating yet the pressure switch is closed. This condition disables the system.
- COOL** - Water temperature has fallen to 20 degrees below the set temperature. This is a common condition for economy mode.
- ICE** - Water temperature of 40 degrees has been detected indicating a possible freeze condition. Pump will circulate water until sensor detects water temperature of 45 degrees.
- Sn1** - High limit sensor is not functioning or water temperatures in excess of 118 degrees has been detected.
- Sn3** - Water temperature sensor is not functioning or water temperatures in excess of 118 degrees has been detected.

**P.C. Board Jumpers** - Jumpers control the operation of the spa or the display of information on the control panel.

- Jumper J7 Filter Select** Has no effect on the Platinum Series spas.
- Jumper J9 50/20 Operation** Determines the system's response to simultaneous operation of heater and jets/blower in 20 amp, 30 amp, & 50 amp configurations. See 30/50 amp operation for a more complete explanation.
- Jumper J10 Pump Enable** Pins are jumpered for 1-pump systems and unjumpered for 2-pump systems.
- Jumper J11 pH Circuit** Unused on Platinum systems. If the top 2 pins are jumpered, there is an alternate display of the current water temperature and the *default* pH reading of 5.0. When jumpered, the display of the O<sub>3</sub> symbol is enabled. This is displayed while the ozone generator is operating. Inhibiting the display by not jumpering the pins does not effect the operation of the ozone generator during the filter cycles.
- Jumper J16 Ozone Enable**

## FEATURES OF SELECT SERIES CONTROLS

**Piezo switches** - Pressing does not induce any movement in the switch so it is not prone to mechanical breakdown as other switches are. There is a small electrical charge induced by pressing the switch that signals the PC board to respond to the selection.

**Control Panel** - A button with a “jet” graphic enables low and high speed jet functions. The up/down arrow button is used to change the temperature set point of the heater and the light button turns the light on and off. The thermometer symbol illuminates when the heater is in operation.

**Digital Temperature Display** - Displays a readout of present water temperature. Press the up/down arrow button for a momentary (3 second) display of the temperature set point. This will not change the temperature setting, it will only initiate the display. Once the set temperature is displayed, pressing the up/down arrow button will change the temperature set point. The direction of temperature change (incrementing or decrementing) works on a toggle function. If the last time the temperature was changed it was incremented (raised), the next time the up/down button is pressed, the temperature will decrement (lower).

**Mode of Operation** - The operating control button, labeled: Low, High, Off, allows the user to manually select low speed or high speed operation. The spa will respond to the control button and sequence through Low speed, High speed or Off functions as the control button is depressed, with one exception. If the water temperature is lower than the set temperature point, when attempting to sequence from High speed to Off, the spa will not shut off. The spa will switch to Low speed while heating the water to the set temperature point. When the set temperature point is reached, the spa will shut off.. If the spa is operating in either the low or high modes, it will continue to operate in that mode even after the set temperature point is reached.

**Automatic default settings** - Temperature set point: 100 degrees  
Filter cycle: begins 1 minute after start-up and again 12 hours later,  
duration depends on position of jumper J-7

**Automatic Time-outs** - After operating for a specific length of time (countdown begins from the last time the function button was pressed), the functions will turn off automatically. This is to prevent the equipment from running for indefinite periods of time if left unattended. The time-outs are listed below.

Filter pump/motor - 4 hours  
Jet pump/motor - 30 minutes  
Light - 4 hours

**30/50 Amp power configuration (Jumper J9)** - The spa can operate in either a 240 volt 30 amp or 240 volt 50 amp power configuration. In the 240 volt 50 amp configuration, jumper J9 is in the 50 position and all of the functions can be operated simultaneously (heater functions as a 5.5 kW heater). If for some reason there is less than 50 amps available at the circuit box, the system can be operated in a 240 volt 30 amp configuration. In this configuration, jumper J9 is in the 30 position and there is a restriction on which functions can operate simultaneously. The heater will at the 5.5 kW level, however, it will be turned off when high speed (jets) mode is selected.

**Automatic freeze protection** - If the high limit sensor detects that the water temperature has reached 40 degrees, it will signal the system to start the filter pump and circulate the water until the water temperature at the sensor reaches 45 degrees. (Note that the heater is not operating, the water is just being circulated.) This condition could be created by a failure of the temperature sensor (Sn error condition). If this condition exists, the system will not be getting accurate information as to the actual water temperature and will respond by disabling the heater. In extremely cold conditions this could lead to freezing if the water is not circulated.

**Heater Characteristics and safety features** - Element resistance = 11 ohms  
240 volt 30/50 amp - 5.5 kW  
Set range = 80 degrees to 104 degrees  
Accuracy = +/- .5 degrees

When the temperature sensor detects temperatures of 112 degrees the flashing OH message is displayed. If the pump/motor is/are operating, the operation is interrupted until the water temperature falls to 110 degrees at which point the system will reset itself. If the high limit sensor detects water temperatures of 118 degrees, it will shut down the system. There is no automatic reset after this error condition; the user must press one of the control panel buttons (jets or light) to reset the system.

**Optional ozone management system** - The optional ozone generator is only powered during the filtration cycles. Pressing the pump or light button during a filtration cycle will disable the generation of ozone for 1 hour (this feature is for people with skin sensitivity to ozone).

**Filtration cycles** - The filtration cycle start times are established when power is applied to the spa. One minute after power is applied, the first filtration cycle starts. The second filtration cycle starts 12 hours after the first started. The duration of the cycles is determined by the position of jumper J7. In the "A" position, the cycles are for two hours; in the "B" position they last for five hours. The optional ozone generator is powered only during the filtration cycles but can be disabled by pressing the jets or light button on the control panel.

**Control panel messages** - They indicate warnings and alert to possible malfunctioning components.

- OH** A malfunction has occurred allowing the spa water to reach 112 degrees. The system will reset when the temperature falls to 110 degrees.
- FL** When flashing, indicates that the pump/motor is operating but the pressure switch is not closed. This does not disable the system, only the heater. Possible causes could be dirty filters or something impeding the flow of water to the pump. When the FLO is on steady it indicates that the pressure switch is bad or out of adjustment. This would be noticed when the pump/motor was not operating yet the pressure switch is closed. This condition disables the system.
- Sn1** High limit sensor is not functioning or has detected water temperatures in excess of 118 degrees.
- Sn3** Water temperature sensor is not functioning or has detected water temperatures in excess of 118 degrees.

**P.C. Board Jumpers** - Jumpers control the operation of the spa or the display of information on the control panel

- Jumper J7 Filter Select** Determines the length of the filtration cycles. A=2 hrs. & B=5 hrs.
- Jumper J9 50/20 Operation** Determines the system's response to simultaneous operation of heater and jets/blower in 20 amp, 30 amp, & 50 amp configurations. See 30/50 amp operation for a more complete explanation.

## FEATURES OF VECTRA CONTROLS

- **GFCI** - The spa is equipped with a Ground Fault Circuit Interrupter on the attached power cord. Test the spa with the power cord plugged in by pressing the **TEST** button. The **RESET** button should pop out, the indicator light should extinguish, and power to the spa should be interrupted. Press the **RESET** button. The indicator light will be lit and power to the spa will be restored. This should be done every time you use the spa.
- **Thermostat** - The spa is equipped with both an Adjustable Thermostat and a High Limit Thermostat. The Adjustable Thermostat allows the user to set the temperature of the spa water by rotating the adjustment knob. The High Limit Thermostat interrupts power to the heater in the unlikely event that the spa overheats. The High Limit Thermostat must be reset manually by pressing the reset button located on the face of the Control Box. Should it be necessary to reset the High Limit Thermostat, the Time Clock may also need to be set to the correct time.
- **Selector Switch** - Allows the user to choose between two modes of operation: *Timed Filtration and Heat* and *Timed Filtration and Auto Heat*. It is located on the face of the Control Box.
- **Time Clock** - The spa has a 24 Hour Time Clock mounted on the face of the Control Box. This is the means by which the filtration cycles are determined and controlled. The spa should be filtered at least 4 hours per day. This can be divided into two cycles. To choose the time for the cycles, press one tab outward for each fifteen minutes of filtration that is desired. Every tab between the beginning and end of the filtration cycle must be pressed outward. The Time Clock must also be set to the correct time of day. Align the correct time on the outer ring of the Time Clock with the arrow on the center of the Time Clock Face.
- **Magic Touch Control** - The *Whirlpool* button is located on the rim of the spa between the seats. It is used to activate the Whirlpool function. Pressing this button once will turn on the Whirlpool function. Pressing it a second time will turn off the whirlpool function and return the spa to the selected filtration mode..
- **Operation** - The spa's operating system is designed to automatically maintain a constant water temperature or to allow the spa to heat **only** during the timed filtration cycles. The position of the Selector Switch determines which mode of heat and filtration is operating.

***Timed Filtration and Heat*** - In this mode of operation, the spa will filter on low speed during the time/times selected on the Time Clock. If the water temperature is lower than the setting of the Adjustable Thermostat, the heater will operate during the filtration cycle **only**. This provides an economical means of operating the spa.

***Timed Filtration and Auto Heat*** - The spa will filter in low speed during the time/times selected by the Time Clock. In addition, the any time the water temperature drops below the setting of the Adjustable Thermostat, the low speed motor and heater will turn on in order to maintain a constant water temperature..