

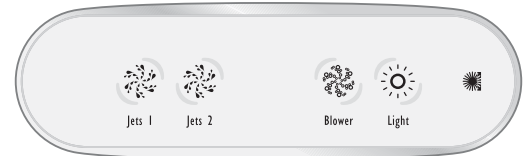
# EL SERIES (Mach 1) CONTROL WITH ML900 PANEL

The ML900 panel can be used with the EL8000, EL5000, and EL2000 systems. This reference card lists all features that are available for this panel. If your spa is not fully equipped, the panel buttons on your spa control may not be laid out as shown or respond as described in this document.

The pump responsible for heating and filtration (pump 1 low on non-circ systems, or the circ pump on circ systems) will be referred to simply as the pump.

Timeouts refer to a preset length of time that a function is programmed to operate before shutting off automatically. Certain conditions (filters or freeze) can cause a function to operate longer, while faults can cause a function to operate for a shorter length of time. The system keeps track of timeouts regardless of other conditions occurring.

In multi-button sequences, if buttons are pressed too quickly in sequence, they may not register.



Example of one Auxiliary Panel available

## Initial Start-up

When your spa is first actuated, it will go into Priming mode (after displaying some configuration information). **Please see the M-7 Installation Instruction Manual for complete instructions on Power-up and Pump Priming.** The Priming mode will last for up to 4 minutes and then the spa will begin to heat the spa and maintain the water temperature in the Standard mode. You can exit Priming mode early by pressing “Warm” or “Cool.”

## Icon Legend

	Heat Icon - Indicates different stages of heating.		Fiber-Optic Light Icon - Spins when the wheel is on; stands still when wheel is off.
	Jets Icon - Spins fast on high speed; spins slow on low speed.		Light Icon - On dim, the LCD will show the center circle plus one quarter of the light beams. Half of the light beams will show on medium brightness, and all of the light beams will show on bright.
	Blower Icon - Biggest in highest speed; smallest in lowest speed.		

## 1. Setting the Time

Once the spa has been properly connected the first time (every power up on the EL2000), notice the “Time” icon appearing on the screen.

<b>Press</b>		<b>Then</b>	
<b>Select</b> the hour by pressing		<b>Or</b>	
	<i>(Each press changes the time by 1 hour)</i>		
<b>Press</b>		<b>to enter.</b>	
<b>Select</b> minutes by pressing		<b>Or</b>	
	<i>(Each press changes the time by 1 minute)</i>		
<b>Press</b>		<b>to exit the time setting procedure and enter the optional filter cycle programming. (Exits programming on some EL2000 systems.)</b>	
<b>Press</b>		<b>to exit programming.</b>	

## 2. Optional Filter Cycle Programming

You are not required to set filter cycles; however, it is an option available to you. To change the filter cycle settings:

Press “Time” “Mode/Prog” “Mode/Prog” “Mode/Prog” within 3 seconds. You will see the “SET FILTER 1” and a flashing “START TIME” icon appear on the display.

Press “Up” or “Down” to choose the filter start time hour. Enter the hour by pressing “Mode/Prog”. Press “Up” or “Down” to choose the filter start time minutes. Each press changes the start time by 5 minutes.

Enter the minutes by pressing “Mode/Prog.”

Press “Mode/Prog” to see the “SET FILTER 1” and a flashing “END TIME” icon. Adjust the time as done above.

Press “Mode/Prog” to see the “SET FILTER 2” (PM cycle) and a flashing “START TIME” icon. Proceed as above.

Press “Mode/Prog” to see “SET FILTER 2” and a flashing “END TIME” icon. Adjust the time as done above.

Pressing “Mode/Prog” will enter the new filter cycle times into the system and display the current water temperature.

*Pressing “Time” at any time during this programming sequence will save the values entered up to that point and exit programming.*

If you would like to select **continuous filtration**, set the filter 1 start and end times to be the exact same time.

## Temp Set (80°F - 104°F / 26.0°C - 40.0°C)

The start-up temperature is set at 100°F/37.5°C. The last measured temperature is constantly displayed on the LCD.

**Note that the last measured spa temperature displayed is current only when the pump has been running for at least 2 minutes.**

## Warm / Cool

Press the “Warm” or “Cool” button once to display the set temperature. Each time either button is pressed again, the set temperature will increase or decrease depending on which button is pressed. After three seconds, the LCD will automatically display the last measured spa temperature.

## Time

When time hasn't been programmed, the TIME icon flashes. To set the time, press “Time” then “Mode/Prog.” Use the “Warm” and “Cool” buttons to adjust time. See previous page for more detailed instructions. *(Time settings on EL2000 systems are not preserved in the event of power loss; time will have to be reprogrammed upon each power up.)*

If your spa has an optional pH/ORP sensor (not available on EL2000 systems), pressing “Time” twice will display the current pH level; pressing it three times will display the current ORP.

## Mode/Prog

This button is used to switch between standard, economy, and sleep modes. Press “Mode/Prog” to enter mode programming, press “Cool” to cycle through to desired mode (LCD flashes until confirmed), then press “Mode/Prog” to confirm selection.

**Standard mode** maintains the desired temperature. Note that the last measured spa temperature displayed is current only when the pump has been running for at least 2 minutes. The “STANDARD” icon will display until the mode is changed.

**Economy mode** heats the spa to set temperature only during filter cycles. The “ECONOMY” icon will display until mode is changed.

Pressing “Jets 1” while in Economy mode puts the spa in **Standard-In-Economy mode**, which operates the same as Standard Mode, then reverts to Economy Mode automatically after 1 hour. During this time, a press of the “Mode/Prog” button will revert to Economy Mode immediately.

**Sleep mode** heats the spa to within 20°F (11°C) of the set temperature only during filter cycles. The “SLEEP” icon will display until mode is changed.

## Standby Mode

Pressing “Warm” or “Cool” then “Jets 2” will turn off all spa functions temporarily. This is helpful when changing a filter. Pressing any button resets the spa.

## Jets 1

Press the “Jets 1” button once to turn pump 1 on or off, and to shift between low and high speeds if equipped. If left running, the low speed turns off after 2 hours and the high speed turns off after 15 minutes.\*

On non-circ systems, the low speed of pump 1 runs when the blower or any other pump is on. It may also activate for at least 2 minutes every 30 minutes to detect the spa temperature (polling) and then to heat to the set temperature if needed, depending upon mode. When the low speed turns on automatically, it cannot be deactivated from the panel; however, the high speed may be started.

## Jets 2 (optional on EL5000 and EL2000)

Press the “Jets 2” button once to turn pump 2 on or off, and to shift between low and high speeds if it is a two-speed pump. If left running, the pump will turn off after 15 minutes.\*

## Jets 3 (available on EL8000 only)

Press the “Jets 3” button once to turn pump 3 on or off, and to shift between low and high speeds if it is a two-speed pump. If left running, the pump will turn off after 15 minutes.\*

## Blower

1-speed operation: on/off;

2-speed operation: med/hi/off; or

3-speed operation: lo/med/hi/off.

If left on, the blower will automatically turn off after 15 minutes.\*

## Mister (optional)

Press the “Mister” button (or “Option” button if your system is equipped with a mister but your panel does not have a mister button) to turn the Mister on and off. If left on, the mister will automatically turn off after 15 minutes.\*

## Option (when not used for Mister)

Press the “Option” button to turn optional equipment (such as TV or Stereo) on and off (with no timeout), or to operate some types of TV lifts.

## Invert

Press the “Invert” button to change the numbers in the display to read upside down. Another press returns the display to its normal right-side-up display.

## Light (optional if fiber wheel is installed)

Press the “Light” button to turn the spa light on and off, and to shift between dim and bright settings if your light is dimmable. On dim, the LCD will show center circle plus one quarter of the light beams. Half of the light beams will show on medium brightness, and all of the light beams will show on bright.

## Fiber (optional)

If a fiber-optic light with wheel is installed, press the “Fiber” button once to start the light and wheel, press it again to stop the wheel, and then again to turn the light off. The fiber icon stands still when the fiber optic light is on by itself, and rotates when the color wheel is also on.

Both spa light and fiber-optic light can be used simultaneously on the EL8000 and EL5000 systems. If either light is left on, it will automatically turn off after 4 hours.

*Fiber with wheel is not available on EL2000. Use the “Light” button if your fiber-optic system is on/off only (no separate wheel stop).*

## Circ Pump (optional)

If your system is equipped with a circ pump, it may be configured to work in one of two different ways:

1) The circ pump operates continuously (24 hours) with the exception of turning off for 30 minutes at a time when the water temperature reaches 3°F (1.5°C) above the set temperature (most likely to happen in very hot climates).

*On certain configurations, the circ pump stays on continuously, regardless of water temperature.*

2) The circ pump will come on when the system is checking temperature (polling), during filter cycles, during freeze conditions, or when another pump is on.

## Preset Filter Cycles

On all systems, the pump and the ozone generator\*\* will run during filtration. At the start of each filter cycle, the blower will run on highest speed for 30 seconds to clean out the air channels. The lowest speed of pump 2 and pump 3 will run for 5 minutes; the mister will run for 5 seconds.

***(The following is specific to all systems that are programmed according time)***

There are two filter cycles per day. The start/end times of each cycle are programmable. To program, set time as instructed above, then press “Mode/Prog” to advance to the next setting (or to exit after the last setting). The default filter cycles are as follows:

The first filter cycle is automatically activated at 8:00 AM and operates the pump until 10:00 AM. The filter 1 indicator icon will light when filter 1 is running.

\*15-minute timeouts may be changed to 30 minutes and 2-hour timeouts may be changed to 4 hours on some models/installations.

The second filter cycle is automatically activated at 8:00 PM and operates the pump until 10:00 PM. The filter 2 indicator icon will light when filter 2 is running.

***(The following is specific to EL2000 systems that are programmed according to duration rather than time)***

The first filter cycle (“day”) begins 6 minutes after the spa is powered up. The second filter cycle (“night”) begins 12 hours later. Filter duration is programmable for 1-12 hours (F1-F12). The default filter time is 2 hours. To program, press “Warm” or “Cool,” then “Jets 1.” Press “Warm” or “Cool” to select the filter duration. Press “Jets 1” to select the number of filter cycles. The display will show “dn” (both “day” and “night” cycles); “d” (day cycle only); or “n” (“night” cycle only). Press “Warm” or “Cool” to adjust, then press “Jets 1” to exit the programming mode. For continuous filtration, use F12 and “dn.”

*Note: Some EL2000 systems are capable of being programmed by time rather than by duration (see Preset Filter Cycles section). On EL2000 systems with duration programming only, the spa powers up at 12:54, thus the first filter cycles begins 6 minutes later at 1:00. If you would like your spa to begin filtering at another time, you may change the clock to align with your preferred filter time, rather than the actual time of day.*

**Clean-up Cycle (optional)**

When the pump or blower is turned on by a button press, a clean-up cycle begins 30 minutes after the pump or blower is turned off or times out. The pump and the ozone generator\*\* will run for one hour.

**\*\*Ozone (optional)**

On most systems, the ozone generator (if installed) runs during filter cycles (except when pump 1 is operating at high speed on a non-circ system) and during clean-up cycles.

On some systems, the ozone generator operates whenever the pump runs.

If your system is configured with the optional ozone suppress feature, the ozone generator will turn off for 1 hour any time a function button (Jets 1, Jets 2, Blower, etc.) is pressed.

**Freeze Protection**

If the temperature sensors detect a drop to 44°F (approximately 6.7°C) within the heater, then the pump automatically activates to provide freeze protection. The equipment stays on until 4 minutes after the sensors detect that the spa temperature has risen to 45°F (approximately 7.2°C) or higher. In colder climates, an optional additional freeze sensor may be added to protect against freeze conditions that may not be sensed by the standard sensors. Aux freeze sensor protection acts similarly except with the temperature thresholds determined by the switch and without a 4-minute delay in turnoff. See your dealer for details.

**Locking the Panel**

Press “Time” “Jets 1” then “Warm” within 3 seconds. When locked, the PL indicator light will light. All buttons are frozen except the “Time” button. To unlock the panel, press “Time” “Jets 1” then “Cool.”

**Locking the Set Temperature**

Press “Warm” or “Cool” then “Time,” “Jets 1,” and “Warm” within 3 seconds to activate the lock. The TL indicator light will light when the set temperature is locked.

To unlock the set temperature, press “Warm” or “Cool” then “Time,” “Jets 1” and “Cool.”

**Diagnostic Messages**

Message	Meaning	Action Required
	No message on display. Power has been cut off to the spa.	
HTR TEMP LMT	“Overheat” - The spa has shut down. One of the sensors has detected 118°F (approximately 47.8°C) at the heater.	The control panel will be disabled until power returns. Spa settings and time of day will be preserved for 30 days with a battery backup on EL8000 and EL5000 systems; settings only are preserved until the next power-up on EL2000 systems. DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. Once the heater has cooled, reset by pushing any button. If spa does not reset, shut off the power to the spa and call your dealer or service organization.
SPA TEMP LMT	“Overheat” - The spa has shut down. One of the sensors has detected that the spa water is 110°F (approximately 43.3°C).	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. At 107°F (approximately 41.7°C), the spa should automatically reset. If spa does not reset, shut off the power to the spa and call your dealer or service organization.
FREEZE COND	“Ice” - Potential freeze condition detected.	No action required. The pumps and the blower will automatically activate regardless of spa status.
SENSOR A SERVICE REQ	Spa is shut down. The sensor that is plugged into the Sensor “A” jack is not working.	If the problem persists, contact your dealer or service organization. (May appear temporarily in an overheat situation and disappear when the heater cools.)
SENSOR B SERVICE REQ	Spa is shut down. The sensor that is plugged into the Sensor “B” jack is not working.	If the problem persists, contact your dealer or service organization. (May appear temporarily in an overheat situation and disappear when the heater cools.)
SENSOR SYNC	Sensors are out of balance. If displayed by itself, it may just be a temporary condition. If it also says “SERVICE REQ'D,” spa is shut down.	If the problem persists, contact your dealer or service organization.
HTR FLOW LOW	A substantial difference between the temperature sensors was detected. This could indicate a flow problem.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. If problem persists, contact your dealer or service organization.
LOW FLOW	Persistent low flow problems. (Occurs on the third occurrence of the “HTR FLOW LOW” message.) Heater is shut down, but other spa functions continue to run normally.	Follow action required for “HTR FLOW LOW” message. Turn spa off then back on again to restore heating capability.

## Diagnostic Messages (continued)

<i>HEATER MAY BE DRY-- WILL RETEST SHORTLY</i>	Inadequate water detected in heater.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. Press any button to reset.
<i>HEATER DRY SERVICE REQ</i>	Inadequate water detected in heater. (Displays on third occurrence of "HEATER MAY BE DRY - WILL RETEST SHORTLY" message.) Spa is shut down.	Follow action required for "HEATER MAY BE DRY - WILL RETEST SHORTLY" message. Spa will not automatically reset; you may press any button to reset.
<i>PRIMING MODE TAKES 4 MIN</i>	When your spa is first actuated, it will go into Priming mode.	See the M-7 Installation Instruction Manual for complete instructions on Power-up and Pump Priming. The Priming mode will last for up to 4 minutes and then the spa will begin to heat the spa and maintain the water temperature in the Standard mode. After the pump has been running for 2 minutes, the temperature will be displayed.
<i>--F or --C</i>	Temperature Unknown.	In Economy or Sleep mode, the pump may be off for hours outside a filter. If you wish to see the current spa temperature, either switch to Standard mode or turn Jets1 on for at least two minutes. Press any button to leave Standby Mode and return operation.
<i>----</i>	Temperature not current in Economy or Sleep Mode.	
<i>STANDBY MODE</i>	Standby Mode has been activated by pressing a button combination on user panel.	
<i>PH IS LOW RAISE PH</i>	pH is low.	Add pH increaser according to manufacturer's instructions.
<i>PH IS HIGH LOWER PH</i>	pH is high.	Add pH decreaser according to manufacturer's instructions.
<i>SANITIZER LOW</i>	Sanitizer is low.	Add sanitizer according to manufacturer's instructions.
<i>SANITIZER HIGH</i>	Sanitizer is high.	Remove spa cover and allow sanitizer to dissipate.

## Periodic Reminder Messages (Press the "Mode" button to reset a displayed reminder.)

Message	Frequency	Action Required
<i>CHECK PH</i>	Every 7 days	Test and adjust chemical levels per manufacturer's instructions.
<i>CK SANITIZER</i>	Every 7 days	Test and adjust chemical levels per manufacturer's instructions.
<i>CLEAN FILTER</i>	Every 30 days	Remove, clean, and reinstall filter per manufacturer's instructions.
<i>TEST GFCI</i>	Every 30 days	Test & reset GFCI per manufacturer's instructions. Drain and refill spa per manufacturer's instructions.
<i>DRAIN WATER</i>	Every 90 days	Drain and refill spa per manufacturer's instructions.
<i>CLEAN COVER</i>	Every 180 days	Clean and condition cover per manufacturer's instructions.
<i>TREAT WOOD</i>	Every 180 days	Clean and condition wood per manufacturer's instructions.
<i>NEW FILTER</i>	Every 364 days	Install new filter.

### Warning! Shock Hazard! No User Serviceable Parts.

Do not attempt service of this control system. Contact your dealer or service organization for assistance. Follow all owner's manual power connection instructions. Installation must be performed by a licensed electrician and all grounding connections must be properly installed.

