LM8 – Low Maintenance System User Manual

BALBOA
water group

Important Notices

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END USER WARNING

This Installation Manual is provided solely to aid qualified spa service technicians in installing spas with control systems manufactured by Balboa Water Group. Balboa controls have absolutely no end user serviceable parts. Balboa Water Group does not authorize attempts by the spa owner/user to repair or service any Balboa products. Non-qualified users should never open or remove covers, as this will expose dangerous voltage points and other dangerous risks. Please contact your dealer or authorized repair center for service.

GFCI COMPLIANCE

- It is required by code to install a Ground Fault Circuit Interrupter (GFCI) in the supply power for a spa. This device will trip the breaker if there is an unsafe electrical condition caused by a malfunctioning component or even the slightest short to ground.
- Note: Connect the control system only to a circuit protected by a Class A GFCI mounted at least 5' (1.52M) from the inside walls of the spa/hot tub and in line of sight from the equipment compartment.
- Refer to NEC (National Electrical Code), 2005 Edition, Article 680 for more information.

WARNINGS: DANGER! RISK OF ELECTRIC SHOCK!

- All electrical work must be performed by a qualified electrician and must conform to all national, state, and local codes.
- Before making any electrical connections, make certain that the Main Power breaker from the house breaker box has been turned off.
- Do not attempt service of this control system. Contact your dealer or service organization for assistance.
- Do not permit any electric appliance, such as a light, telephone, radio, or television within 5' (1.5m) of a pool or spa.
- Follow all owner's manual power connection instructions.
- Installation must be performed by a licensed electrician and all grounding connections must be properly installed.
- No user serviceable parts.
- Water temperature in excess of 38°C may be injurious to your health.
- Disconnect the electrical power before servicing.
- Keep access door closed.

CAUTION

- Test the ground fault circuit interrupter before each use of the spa.
- Read the instruction manual.
- Adequate drainage must be provided if the equipment is to be installed in a pit.
- To ensure continued protection against shock hazard, use only identical replacement parts when servicing.

WARNING

- Water temperature in excess of 38°C may be injurious to your health.
- Disconnect the electrical power before servicing.
- Keep the pack enclosure closed unless being serviced by a qualified serviced technician.

Table of Contents

Introduction to the LM8 System

Thank you for choosing Balboa Water Group's LM8 - Low Maintenance System. The LM8 system incorporates the following features and benefits.

ADVANCED TECHNOLOGY

- All equipment and features are controlled from topside panel
- Heater management system eliminates flow and pressure switches
- All logic and control functions for the entire spa are contained in a single module
- Artificial intelligence saves energy
- touch panel
- Self-testing diagnostics
- Self-monitoring
- Informative end user messages
- Optional modules available for:
  a) Audio FM tuner in a single chip and 100W of music power without excessive heat, and
  b) LED module with various dimming LED programs - including LEDs with music; modules available for Sloan lighting systems.
  c) The lighting system can accommodate 12VDC or 12VAC.

USER FRIENDLY

- The touch screen is the only required customer interface
- Sensors that provide real time status of current draw, timers for the Blower, Jets, Lights, Flow rate, and GPM
- Automatic control of over heating, cold plumbing, and stale water in pumps
- Special features include Economy and Auto Heat Modes, 12/24 hr time, degrees in F or C, and Lock Spa (child lockout).
- A quick Setup screen and Status screen

RELIABLE DESIGN

- Redundant connections (topside, sensors, transformer, LEDs)
- Redundant, gold plated, card edge connectors
- Higher rated part spec's (relays, capacitors, resistors, transformer)
- Extended factory testing of all control functions and special features
- UL, CSA, CE

BUILT-IN TECH SUPPORT

- Continuous self testing (motors, heater, sensors, modules)
- Green/yellow/red status on topside shows replacement needs for any spa component
- Immediate identification of miswiring or failed components

SIMPLE, INEXPENSIVE REPLACEMENTS

- Major control functions separated into modules, which can be replaced without opening pack
- Module replacement costs less than replacing fully populated main boards.

THEORY OF OPERATION

- Artificial Intelligence is used to turn the heater on just when the water temperature drops 1 degree F (not 48 times per day). The off time is constantly adjusted, based on nearness to target. Benefits are energy savings and less wearing of the pump.
- Since there is no sensor in the water, the water temperature is reported only after the pump is run for at least 30 seconds and the rate of temperature change is zero.
- A flow test is run before each heater usage. With the pump off, the heater is tested for 6 seconds. Then the rate of cooling is measured when the pump is turned back on. Gallons/minute can be calculated.
- To protect against loss of flow, the heater is turned off anytime the temperature in the heater increases by a rate of more than 2 degrees/minute. This takes only seconds, and is therefore safer than other systems.
- An overheat condition does not display an error message. Instead, the heater will be locked off (until power is reset) and the high temperature that was reached will be displayed on the Status Screen for technician review.

CONTROL SYSTEM OVERVIEW

- Fully Integrated and Self Contained
- Modular Functions
- Built-in Self Test
- Advanced Heater Management System
- High Reliability/Low Maintenance Design
- Touch Screen Top Side
- Five Issued/Pending Patents in the design

Overview

AUTOMATIC FUNCTIONS

1. The most important function of the spa control is to safely manage the heater. Normally the heater is turned on whenever the filter pump is running and the water temperature is 1 degree less than the set temperature. Once on, the heater will stay on until the water temperature is 1 degree more than the set temperature.
2. The heater will be forced to stay off if there is not an adequate flow of water through the heater. This is determined by performing a flow test prior to each heater activation. If the flow of water is too low to cool the heater 2 degrees in less than a minute, following a 6 second heater test, the heater will not be allowed on and the statues screen will appear showing a flow rate less than 6 gal./min.
3. The heater will also be forced off if too many motors are running for the size of the circuit breaker.
4. Anytime the water in the spa is 112F or more, all pumps are shut down. The pumps can be used again only when the water temperature has dropped to 104F.
5. If the water passing through the heater is 118F, or more, the temperature display is locked on the display and the heater and all pumps are held off until a manual reset (circuit breaker) is accomplished. The blower will be turned on to assist in cooling of the water.
6. Anytime the heater element (while off) falls to a temperature of 48F, it is presumed that the spa's plumbing may be in danger of freezing. All pumps and the blower are turned on for 1 minute. If the heater element sensor is still 48F or less after 1 minute, the blower and pumps are turned off and the heater is turned on to raise the water to 60F. If for some reason (flow) the heater can't be turned on, the pumps will continue to run until the temperature of the water reaches 49F.
7. Once a day, at 10 am, any pump or blower that hasn't been running in the last 24 hours is turned on for 15 seconds to purge stale water.
8. All components are automatically timed out, as follows:
   Pumps – 30 minutes
   Blower – 30 minutes
   LEDs – 4 hours
   Audio – 1.5 Hours

HOME SCREEN

The main screen will be referred to the "home" screen. The on screen GUI shows icons. Shown counter clockwise are the following icons, starting with the No. 1 pump: Pump 1, Pump 2, Blower (optional Pump 3), Temperature, Setup, Audio, Lighting, Inverse Screen.

- Use the "pump 1", "pump 2", or "blower" buttons to activate the desired component.
  a) If the button is blue, it means the component is off.
  b) If the button is green, it means that it is activated.
  c) If the button turns red, that means there is some sort of a problem associated with that component (low current, blown fuse, disconnected, etc.)
  d) If the area is blank, that equipment has not been installed
- Below the icons is a white status bar that appears, and shows the amount of time used and that is left.
- Center screen shows temperature in degrees Fahrenheit (or Centigrade), and time. All conditions can be changed.
- From any screen that allows for adjustments, a "Back" button will take you to the previous screen.
- At the bottom of the screen, a status is given of what is occurring. For example "Circulating" may show.

Timing Status Bar Located Below Icons

- Pump 1 timing is nearing end of time cycle.
- Pump 2 is not activated.
- Blower cycle has just turned on.
- Light cycle has approx. 90% time left.
- Audio cycle has approx. 80% time left.

Operation Screens

PUMP AND BLOWER SETTINGS

Turn on Jet 1, Jet 2, and Blower by pressing the appropriate button. If you have a two speed pump installed in Jet 1 position, the first press activates Jet 1, speed one; second press activates Jet 1, speed two. The green button designates ON. A red colored icon means that there's a problem with the equipment.

Two speed bars within the icon will position themselves High or Low showing the speed selected.
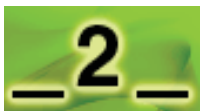

BLOWER

The settings for the Blower are: ON and OFF. The ON color is Green. The OFF color is blue.

ICON COLORS AND SPEED BARS

| PUMP 2, LOW SPEED | PUMP 2, HIGH SPEED | PROBLEM WITH PUMP 1 |

SETTING THE TIME

Home > Setup > Time Set

Once inside the TIME SET screen, set the hour and minutes. Select your preference. Then use the back button when you are finished. To choose either standard time or military time, use the 12/24 button. To return to the Setup menu and save the time setting, select the Back button. Note: In the case of a power failure, the time will return to the 12PM default mode.

MAINTENANCE SCREEN

Home > Setup > Maint

The Maintenance screen allows you to program how many days before maintenance reminders show up.

Within the Maint screen, choose the Reminder by using the up and down arrows, and then how many days before the Reminder will show up. Press the Save button. When finished, use the Back button to exit.

TEMPERATURE SELECTION

Home > Setup > Temperature > Select [Set Temp]

To adjust the water temperature of your spa, access the temperature setting screen. Select the Temp button on the home menu screen.
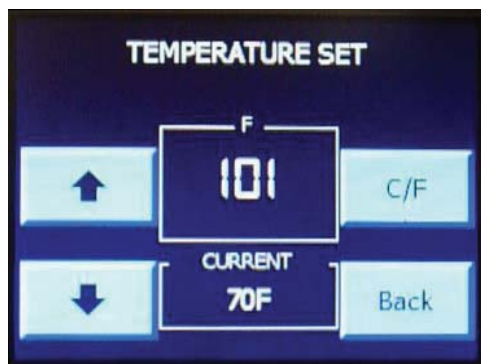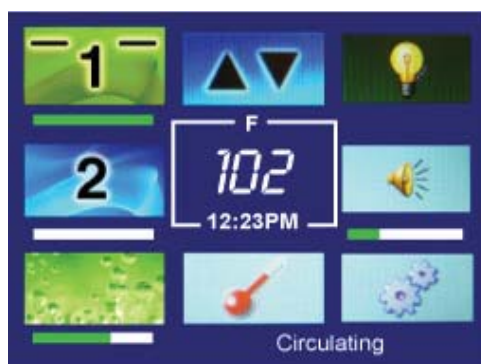
To select the desired water temperature of your spa, press the Up or Down arrows. To return to the home menu, select the Back button.

Water temperature is maintained to +/- 1 degree of the set point. When the water reaches the set point plus one degree, the heater will shut off. When the water drops to 1 degree below the set point, the heater will turn back on. Whenever there is a need for heat, the system will conduct a FLOW TEST prior to turning the heater on. **This test runs approximately 1 minute, during which this time no pumps can be controlled from the touch screen menu.** If the test is successful, the heating pump will turn on.

STATUS SCREEN

Home > Setup > Data

The Status screen provides a quick way to view information on the spa water temperature, flow rate, frequency, current, and voltage.
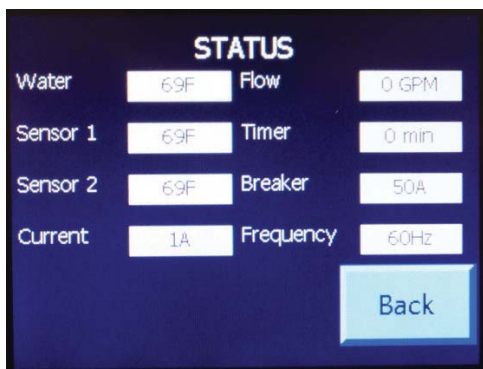

LOCKING THE DISPLAY SCREEN

Home > Setup > Lock/Unlock

Locking the display screen deactivates all of the buttons on the display, so that nothing is unintentionally activated or changed. Once locked, the screen will instantly go to screen saver.

To unlock the display screen, press on the screen (if screen saver is active), the Setup menu screen appears. The Button that was previously "Lock" is now "Unlock." Press Unlock, and then press the Back button.
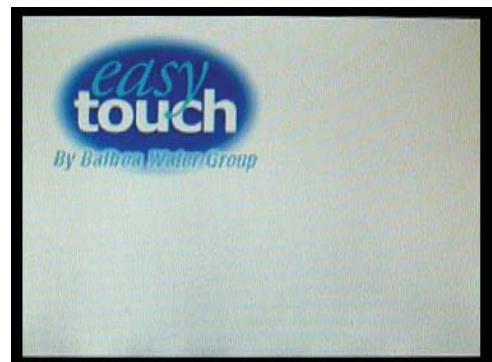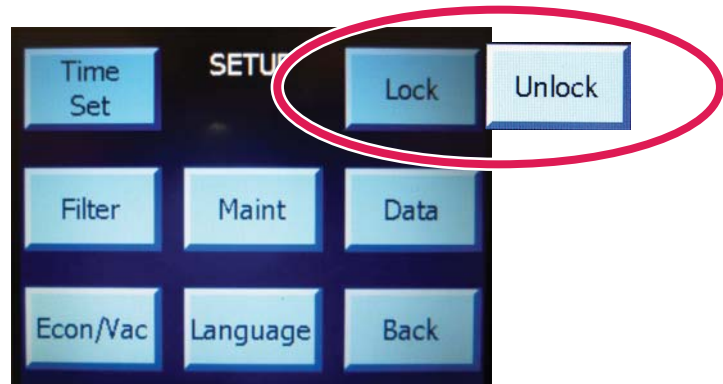
TEMPERATURE UNITS SETTING

Home > Setup > Temperature > Select [Temp Units]

To have your temperature display in Celsius or Fahrenheit, activate Temp Units by using the Temp button. Then use the arrows to toggle between F or C. Once the preference is made, use the Back button to go Home.

SCREENSAVER

The screensaver activates after approximately 10 minutes of no user interaction. A blank white screen will appear.

INVERTING THE DISPLAY

Inverting the display screen allows you to adjust the menus easily whether you are in or out of your spa. To invert the display, select the "INVERT" button on the main menu screen.

FILTRATION SETTINGS

Home > Setup > Filter

The filtration cycles, duration, and start and stops times are adjusted within the Filtration Screen. Once within the screen, scroll to choose the start time. Press On/Off to turn the cycle on. Scroll to the desired stop time, then press On/Off for the stop cycle time. Repeat for additional filter cycles.

To review your filtration settings, scroll through the screen using the Up and Down arrows and observe at what times the filtration times are scheduled to turn on and off. To clear the menu, press Clear All. To set filtration at 24 hours, select Select All.
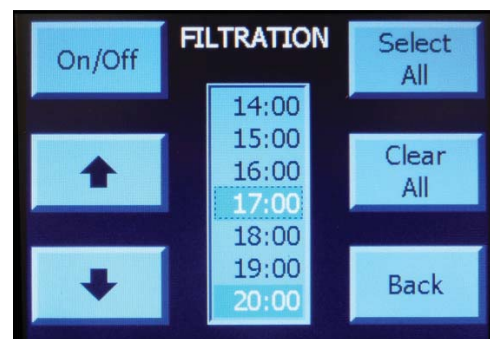
VACATION MODE & ECONOMY MODE

Home > Setup > Econ/Vac

Green is activated; blue is off.

- Economy Mode: Economy mode simply sets the temperature back by 20°F as long as it is on.

- Vacation Mode: Vacation mode does the same thing except that you can select the number of days for the setback.

- Daily Button: Daily only has an effect when in Economy mode. It repeats the economy cycle every day instead of just once. You can set the number of hours that economy mode will run from the time that the mode was set. After that it will add the 20° back.

- Vacation days overtake the Economy setting. Once the vacation set time has expired, the spa will return to the settings previously set prior to activating. If you plan to use the spa soon after returning home, set the number of days to one less than you will be gone so that the spa temperature will be back to normal by the time you plan to return.

- The Daily button doesn't affect the filtration setting.

Accessories and Optional Modules

Attention: Audio and LED Lighting require modules for operation. Be sure that the system is powered down completely before removing or inserting any modules into the system. If the system is still powered up while removing or inserting any module, irreparable damage may occur to the module, the mother board, or the panel.

AUDIO

Home > Audio

The Speaker icon takes you directly to the Audio screen. Press On/Off to activate the audio system. The button is green when activated. Press again to turn off the audio. The On/Off button is blue when the audio system is Off.

- Use the FM/MP3 button to choose between FM radio or an MP3 Player.
- If FM is chosen, then the Tune/Bass button allows you to select a radio station.
- To adjust the volume, use the up and down arrows.
- Return to the home menu screen by selecting the Back button.

LED LIGHTING

Home > Lighting

The Light Bulb icon takes you directly to the Lighting screen. Press On/Off to activate the lighting system. The button is green when activated. Press again to turn off the lights. The button is blue when the lighting system is Off.

Use the up/down buttons to choose the color or light patterns from the scrolling Color menu.
If Music is chosen, then the light synchronizes with the music.
To adjust the intensity of the lighting, select the Dimmer up/down buttons.
Return to the home menu screen by selecting the Back button.
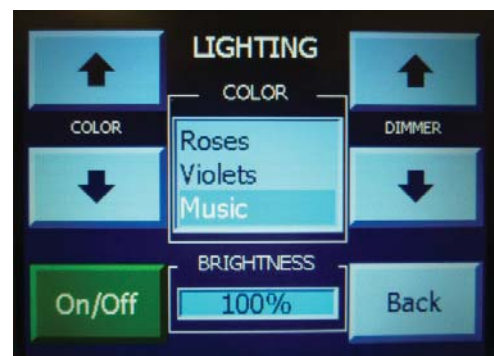
LM8 CONTROL MODULES

The **Red Control Module** manages all Logic Functions:
1. Keeps time of day
2. Reports water temperature
3. Saves settings in flash memory
4. Translates messages from Touchscreen and activates Relay Board
5. Times out Pumps, Lights, and Audio
6. Safely maintains Heater Function
7. Monitors Sensor Health
8. Backup Processor also watches for Heater or Sensor problems

The **Yellow / Green LED Module** provides colors and intensity selected at Topside.

The **Green Audio Module** tunes FM from Topside Commands and delivers 100W of Music.

Blank green modules are placeholders.

NOTE ON CHANGING COMPONENTS

When changing modules or panels, be sure that the system is powered down completely before removing or inserting any modules or panels into the system. If the system is still powered up while removing or inserting any module or panel, irreparable damage may occur to the module, the mother board, or the panel.

Panel Balboa LM8, Part No. 57126-03
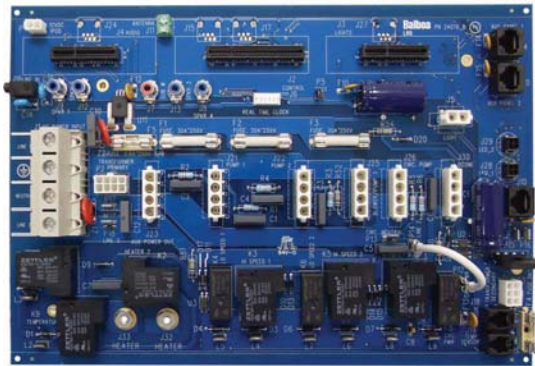
57139 Board Balboa LM8000 LR6

LM LED Sloan 2X Module
Yellow / Lime Green
Part No. 57143

Blank Module
Dark Green / Dark Green
Part No. 35006-G

Audio Sub Module
Lime Green / Lime Green
Part No. 57141

Balboa Control Module LEIMFG

Part No. 57130-01

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