EL2KGAS Mach 3 Tech Sheet

Balboa Instruments
System PN 54671

System Model # SS-EL2KGAS-G

Software Version # 32

EPN # 2472

Base PCBA – PN 55313
PCB EL2000 – PN 22896 Rev B
HEX File – 10011432

Base Panels
ML900 – PN 52654-01
ML700 – PN 52649-01

Template used: 40573-v32_A.pdf 04/15/2008
54671_97_D.pdf 06/09/2008

BALBOA water group

System Revision History

System PN	EPN	Date	Requested By	Changes Made
54671	2472	06.26.2007	Balboa	Initial release using software v29
54671	2472	07.30.2007	Balboa	Release using software v30
54671	2472	05.02.2008	Balboa	Software update to v32
54671	2472	06.04.2008	Balboa	a) Revise photo to gas (p 1). b) Update / add Setup 1, 2, & 3: relay, sensors & modify terminals, add wires & descriptions (pp 5, 6, & 7). c) Add Circ Pump references (J2) on Setups 1, 2 & 3, to dip switch table on p 8.

Basic System Features and Functions

Main Board Power Requirements

- 240VAC, 60Hz, 48A, Class A GFCI-protected service (Circuit Breaker rating = 60A max.)
- 4 wires (hot, hot, neutral, ground)

System Outputs

Setup 1 (As Manufactured)

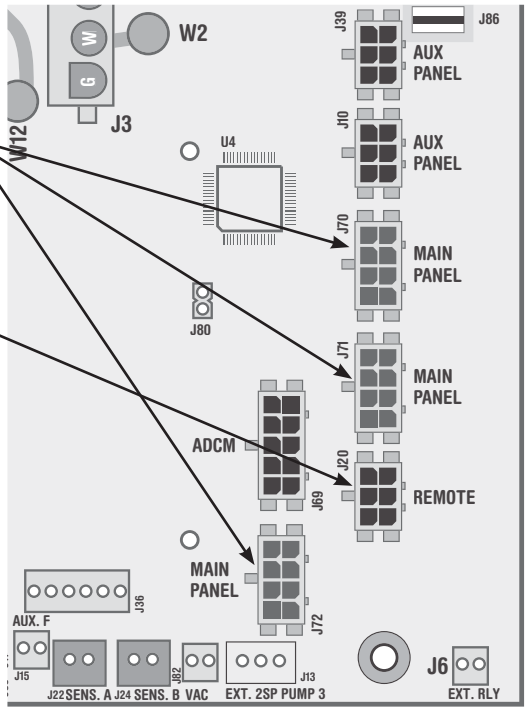
- 240V Pump 1, 2-Speed
- 240V Pump 2, 1-Speed
- 240V Blower, 1-Speed
- 120V Ozone
- 12V Spa Light
- 120V AV (Stereo)
- Support Gas Heater (Must be UL listed)

Optional Devices

- 240V Circ Pump

Additional Options

- Full Feature Dolphin Remote
  and Spa-only Dolphin Remote
- Spa Monitor
  Connects to Main Panel terminal J70 or J71 or J72
- IR or RF Dolphin Receiver Module
  Connects to Remote terminal J20
- Ozone Generator
  Connects to terminal J9
- MoodEFX Lighting
  Connects to Spa Light terminal J12
- FiberEFX Lighting
  Connects to Spa Light terminal J12
- Stereo System
  Connects to A.V. terminal J4



Persistent Memory and Powering Up

Any time you change DIP Switches or Software Configuration Settings that affect parameters the user can change (any filter settings, set temperature default, Celsius vs Fahrenheit, 12-hour vs 24-hour time, reminders suppression, etc), you must reset Persistent Memory for your DIP Switch or Software Configuration Settings changes to take effect. You should also reset Persistent Memory after loading a new file into a board (using the ESM, purchased seperately).

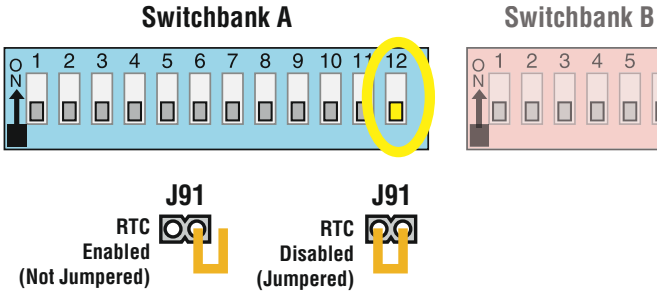
To reset Persistent Memory:

- Power down.
- Set A12 ON (See illustration below).
- Power up.
- Wait until "Pr" or "PRIMING MODE" is displayed on your panel. Note: If "CFE" appears see section below.
- Set A12 OFF. (This can be done safely with power on if you use a non-conductive tool such as a pencil to push the switch back to the OFF position. Otherwise, power down before setting A12 OFF)
- Power up again (if you powered down in the previous step).
- For all other power ups, leave A12 OFF.

About Persistent Memory and Time of Day Retention:

This system uses memory that doesn't require a battery to store a variety of settings. What we refer to as Persistent Memory stores all the User Preferences, as well as all the filter settings, the set temperature, and the heat mode.

Persistent Memory is not used for Time of Day. Time of Day needs to be "kept running" (not just stored) while the power is off, so a separate Real Time Clock feature (on all models except the EL1000) keeps track of Time of Day while the unit is off. Time of Day Retention, and Time of Day Retention alone, is controlled by the J91 jumper. J91 must be set according to main system panel used.



CFE message on power up:

If "CFE" appears before (and instead of) "Pr" or "PRIMING MODE", you have not configured DIP Switches and/or Software Configuration Settings in a valid manner. This must be corrected before you can reset Persistent Memory.

The switch numbers, jumpers, or configuration settings displayed after "CFE" are ones with which the system has found a configuration problem. For example:

- "CFE A5 b2" would mean that the combination of how you've set A5 and how you've set B2 is not supported on this system.
- "CFE J99" would mean that there is a problem with jumper J99
- "CFE P3.1 bL.1" would mean that the combination of how you've set pump 3 for 1-speed and blower for 1-speed is not supported on this system.
- "CFE P3._ bL._" would mean that the combination of how you've set DIP switches which have been assigned to pump 3 and blower is not supported on this system.

Power Up Display Sequence

Upon power up, you should see the following on the display:

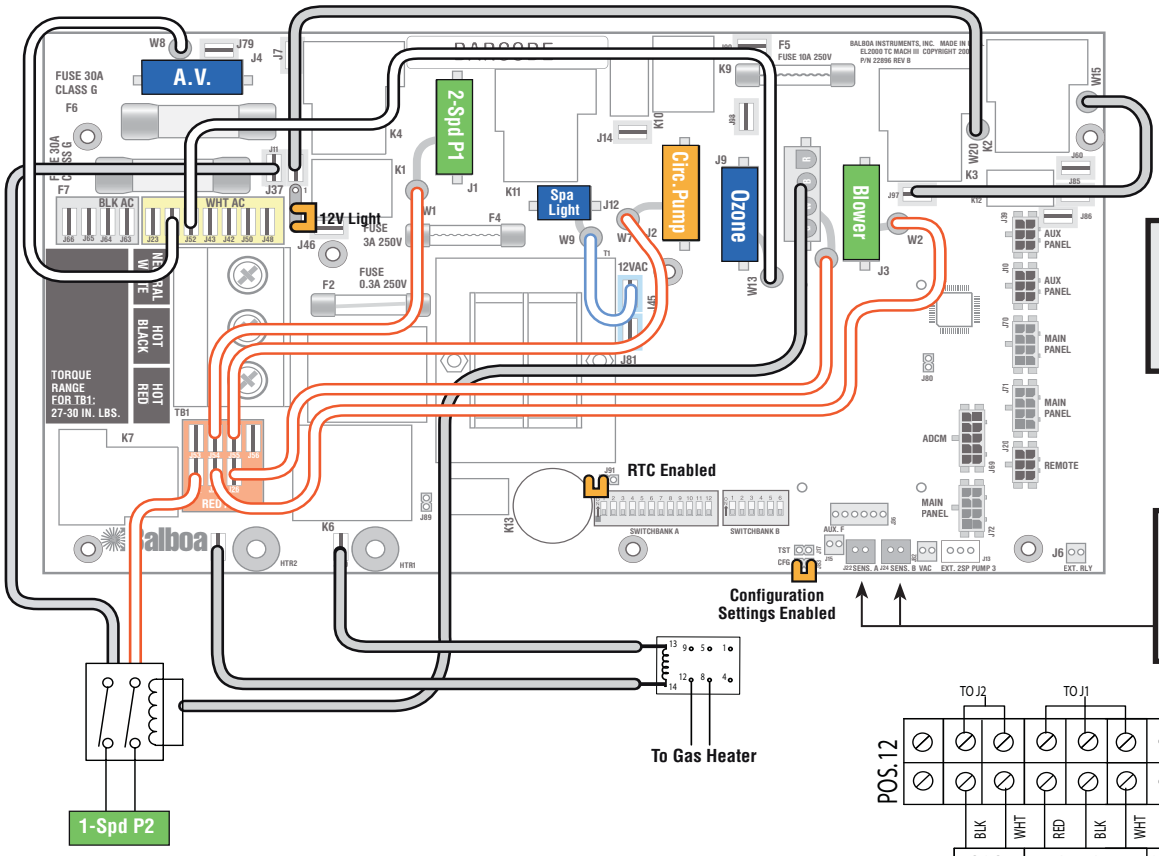
- Three numbers in a row, which are the SSID (the System Software ID). The third display of these numbers is the Software Version, which should match the version of your system. For example, if these three numbers are 100 134 26, that is a Mach 3 EL8000 at version 26.
- If there is a Configuration Error, the CFE message (see above) will appear at this point (and none of the messages below will display). Otherwise what comes next is:
- An indication of either the input voltage detected (EL1000/EL2000), or the heater wattage range supported (EL8000/GL2000/GL8000).
  - Heater wattage display: "1-3" means the system supports a heater from 1 kW to 3 kW. "3-6" means the system supports a heater from 3 kW to 6 kW. "3-3" means the system supports a 3 kW heater only. (These ranges may be modified slightly in the case of special heaters, which the next bullet covers.)
  - Input voltage display: A system showing "240" supports 3 kW to 6 kW heaters. A system showing "120" supports the very same heaters, although at 120V those heaters will function at only 1/4 of their 240V rated wattage. (The system shows only either "240" or "120" as a general indication of input voltage; it does not show the actual input voltage.)
- If your system is using a special type of heater, a display such as "H 6" may appear next. If your system is using the generic Balboa heater, no heater type display will appear.
- "Pr" or "PRIMING MODE" will appear to signal the start of Priming Mode.

At this point, the power up sequence is complete. Refer to the User Guide for the ML Series panel on your system for information about how the spa operates from this point on.

Wiring Configuration and DIP Settings

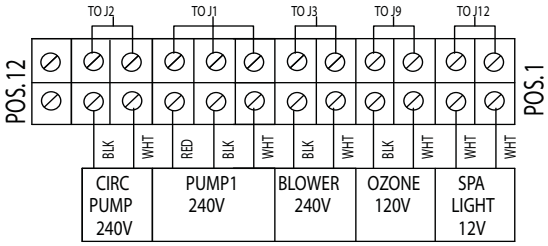
Setup 1 (As Manufactured)

- 240V Pump 1, 2-Speed
- 240V Pump 2, 1-Speed
- 240V Blower, 1-Speed
- 240V Circ Pump (Optional)
- 12V Spa Light
- 120V Ozone
- 120V A\V (Stereo)
- ML900 or ML700 Main Panel
- Gas Heater with Contactor Control

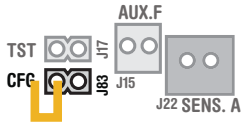


For 240V Circ Pump Option, set A9 & A10 according to the table on page 8.

Sensors must be mounted together in plumbing from tub going **into** heater.



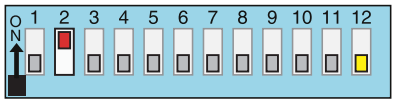
WARNING: Main Power to system should be turned OFF BEFORE adjusting DIP switches.
WARNING: Persistent Memory (A12) must be RESET to allow new DIP switch settings to take effect. (See Persistent Memory page)



When the Logic Jumper is not installed on J83 (CFG), DIP Switch Settings are enabled.
DIP Switches will then operate as shown below.

SSID #
100
114
32

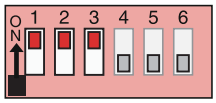
Switchbank A



A1, Test Mode OFF
A2, High Amp
A3, Filter by Time
A4, 12 Hr Time
A5, Degrees F
A6, Short Timeouts

A7, Cleanup Cycle OFF
A8, 1Hr O_3 Supress OFF
A9/A10, No Circ Pump
A11, O_3 w/ P1 Low and P1 is 2-Spd
A12, Memory Retained

Switchbank B



B1, Pump 2 1-Speed
B2, Pump 2 Enabled
B3, Blower Enabled
B4, No Fiber/Wheel
B5, Pump 3 Disabled
B6, Panel Scrunching OFF

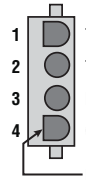
J37

J91

Wiring Color Key

- 120 Volt Connections
- 240 Volt Connections
- Black AC Jumpers
- 12 Volt Connections
- Relay Control Wires

Board Connector Key



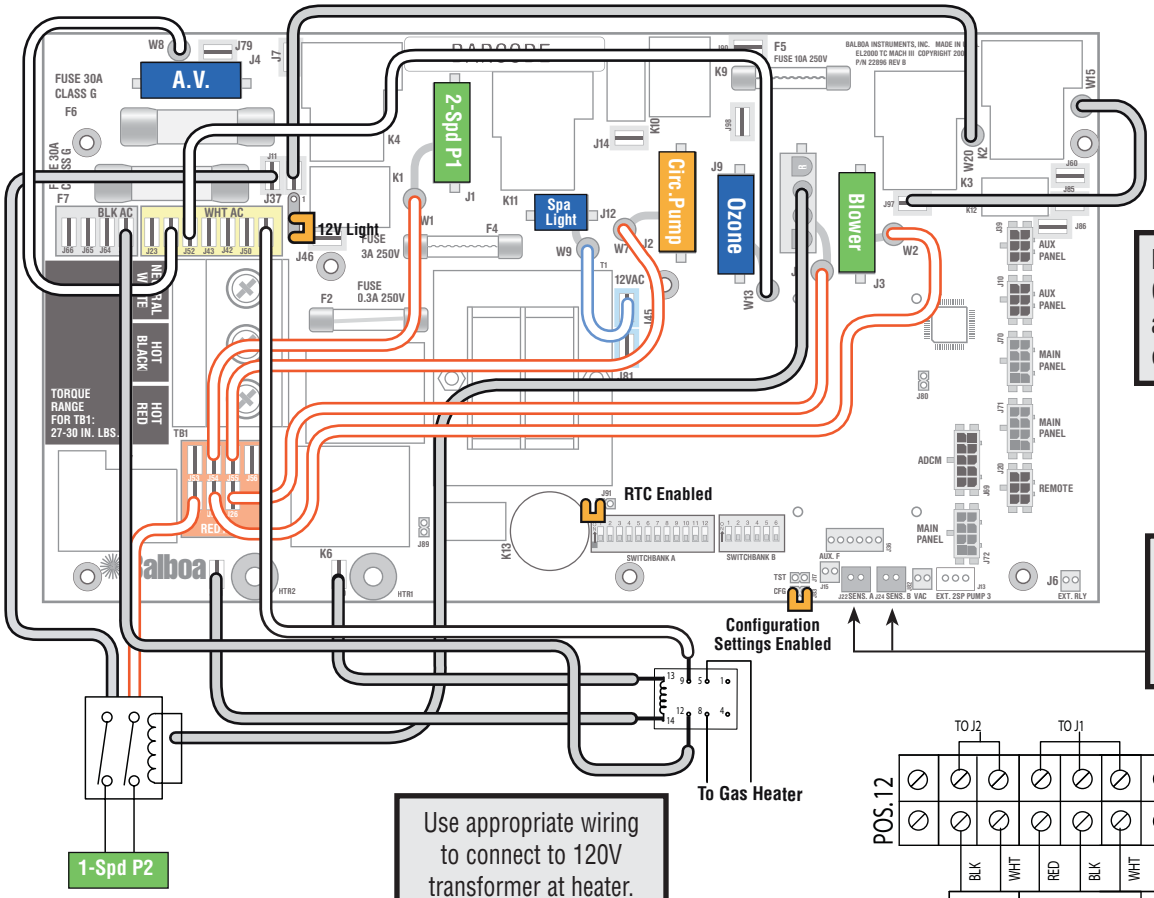
1 Typically Line voltage
2 Typically Line voltage for 2-speed pumps
3 Neutral (Common)
4 Ground

Note flat sides in connector

Wiring Configuration and DIP Settings

Setup 2

- 240V Pump 1, 2-Speed
- 240V Pump 2, 1-Speed
- 240V Blower, 1-Speed
- 240V Circ Pump (Optional)
- 12V Spa Light
- 120V Ozone
- 120V A\V (Stereo)
- ML900 or ML700 Main Panel
- Gas Heater with 120V Control



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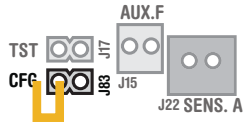

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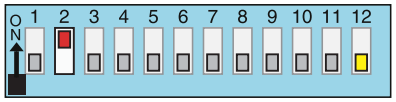
100
114
32

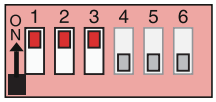
Switchbank A



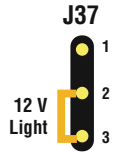
A1, Test Mode OFF
A2, High Amp
A3, Filter by Time
A4, 12 Hr Time
A5, Degrees F
A6, Short Timeouts

A7, Cleanup Cycle OFF
A8, 1Hr O_3 Supress OFF
A9/A10, No Circ Pump
A11, O_3 w/ P1 Low and P1 is 2-Spd
A12, Memory Retained

Switchbank B



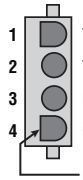
B1, Pump 2 1-Speed
B2, Pump 2 Enabled
B3, Blower Enabled
B4, No Fiber/Wheel
B5, Pump 3 Disabled
B6, Panel Scrunching OFF



Wiring Color Key

- 120 Volt Connections
- 240 Volt Connections
- Black AC Jumpers
- 12 Volt Connections
- Relay Control Wires

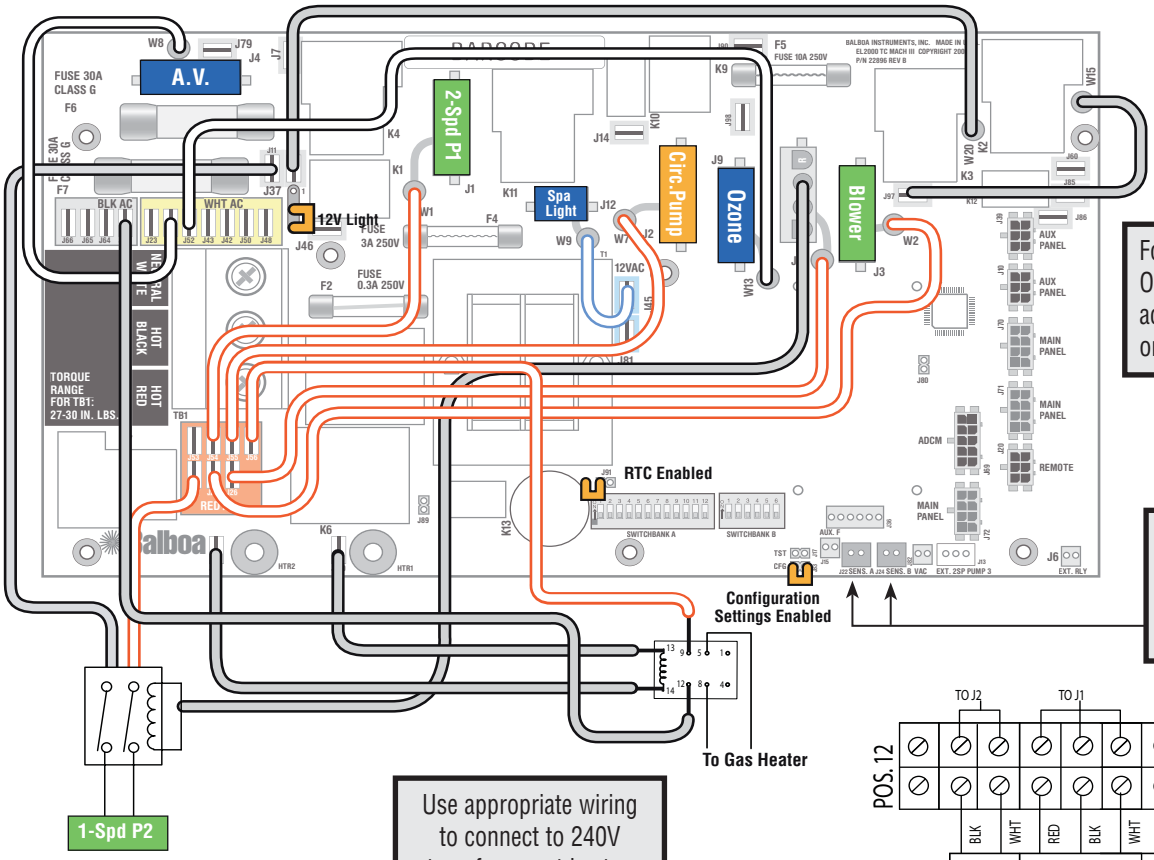
Board Connector Key



Wiring Configuration and DIP Settings

Setup 3

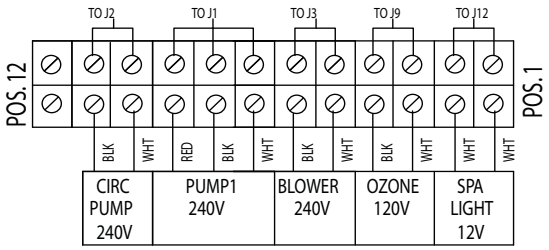
- 240V Pump 1, 2-Speed
- 240V Pump 2, 1-Speed
- 240V Blower, 1-Speed
- 240V Circ Pump (Optional)
- 12V Spa Light
- 120V Ozone
- 120V A\V (Stereo)
- ML900 or ML700 Main Panel
- Gas Heater with 240V Control



For 240V Circ Pump Option, set A9 & A10 according to the table on page 8.

Sensors must be mounted together in plumbing from tub going **into** heater.

Use appropriate wiring to connect to 240V transformer at heater.



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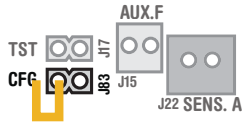

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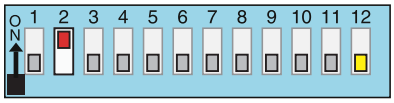
SSID #
100
114
32

Switchbank A



A1, Test Mode OFF
A2, High Amp
A3, Filter by Time
A4, 12 Hr Time
A5, Degrees F
A6, Short Timeouts

A7, Cleanup Cycle OFF
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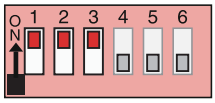
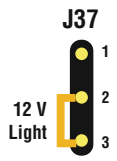
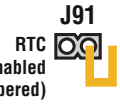
A9/A10, No Circ Pump
A11, O_3 w/ P1 Low and P1 is 2-Spd
A12, Memory Retained

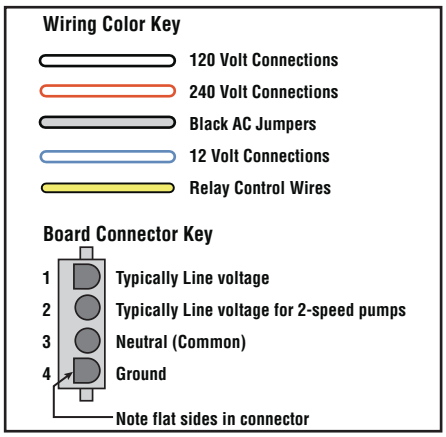
Switchbank B



B1, Pump 2 1-Speed
B2, Pump 2 Enabled
B3, Blower Enabled
B4, No Fiber/Wheel
B5, Pump 3 Disabled
B6, Panel Scrunching OFF







DIP Switches and Jumpers Definitions

WARNING:
- Setting DIP switches incorrectly may cause abnormal system behavior and/or damage to system components.
- Refer to Switchbank illustration on Wiring Configuration page for correct settings for this system.
- Contact Balboa if you require additional configuration pages added to this tech sheet.

DIP Switchbank A Key

A1 . . . . . Test Mode (normally Off)

A2 . . . . . In "ON" position, heater can run while any/all high-speed pumps or blowers are running (High amperage)

. . . . . In "OFF" position, heater is disabled while any high-speed pump or blower is running (Low amperage)

A3 . . . . . In "ON" position, filter cycles are programmed by duration for non-time capable panels

. . . . . In "OFF" position, filter cycles are programmed to start and end times for time capable panels

A4* . . . . . In "ON" position, displays time in 24 hours (military\European time)

. . . . . In "OFF" position, displays 12 hour time

A5* . . . . . In "ON" position, displays temperature in Celsius

. . . . . In "OFF" position, displays temperature in Fahrenheit

* Sets default for user preferences - only applies when persistent memory is reset (A12 On) during power-up

A6 . . . . . In "ON" position, Equipment timeout 30 minutes (4 hours for Pump 1-Low)

. . . . . In "OFF" position, Equipment timeout 15 minutes (2 hours for Pump 1-Low)

A7 . . . . . In "ON" position, Cleanup Cycle – 30 minutes after spa use/timeout, Pump 1-Low & Ozone or Circ Pump and Ozone run for 1 hour

. . . . . In "OFF" position, no Cleanup Cycle

A8 . . . . . In "ON" position, Ozone suppression for one hour after pump/blower button press

A9 and A10. . . . . See **Table** for Circ Pump Behavior settings

A11 . . . . . In "ON" position

(non-circ mode operation) Pump 1 is two-speed, Ozone is ON in Filter & Cleanup Cycles only

(in any circ mode) Pump 1 is one-speed, Ozone is ON with circ pump

. . . . . In "OFF" position

(non-circ mode operation) Pump 1 is two-speed, Ozone is ON with Pump 1-Low

(in any circ mode) Pump 1 is two-speed, Ozone is ON with circ pump

A12 . . . . . Persistent memory reset (normally off) (used when spa is powering up)

A9	A10	Circ Pump Behavior
OFF	OFF	No Circ Pump or Circ Pump not plumbed w/heater
ON	OFF	24 Hours
OFF	ON	24 Hr w/3°F Shut-Off
ON	ON	Acts like Pump 1-Low (Filter Cycles, Polls)

DIP Switchbank B Key

B1 . . . . . In "ON" position, single-speed Pump 2

. . . . . In "OFF" position, two-speed Pump 2

B2 . . . . . In "ON" position, Pump 2 enabled

. . . . . In "OFF" position, Pump 2 disabled

B3 . . . . . In "ON" position, Blower enabled

. . . . . In "OFF" position, Blower disabled

B4 . . . . . In "ON" position, Fiber and Wheel instead of Spa Light

(if A9 & A10 are both OFF, Fiber uses J2 connector; if either A9 or A10 is ON, X-FOW Kit required to run Fiber)

. . . . . In "OFF" position, Spa light enabled

B5 . . . . . In "ON" position, Pump 3 enabled (Jets 3 replaces Blower on Aux panel)

. . . . . In "OFF" position, Pump 3 disabled

B6 . . . . . In "ON" position, Alternate Panel layout (ML900 scrunching enabled - ML550 / 700 Jets 3 replaces Blower)

. . . . . In "OFF" position, Normal Panel layout

Jumpers

J37 Jumper on Pins 1 and 2 will power one leg of J12 (Spa Light) at 120 Volts AC.
Jumper on Pins 2 and 3 will power one leg of J12 (Spa Light) at 12 Volts AC.
Note: W9 controls voltage on the other leg of J12 and must be set for the same voltage.

J91 Jumper on 1 Pin only enables Real Time Clock function; use with time capable panels.
Jumper on Pins 1 and 2 disables RTC function; use with non-time capable panels.

Ozone Connections

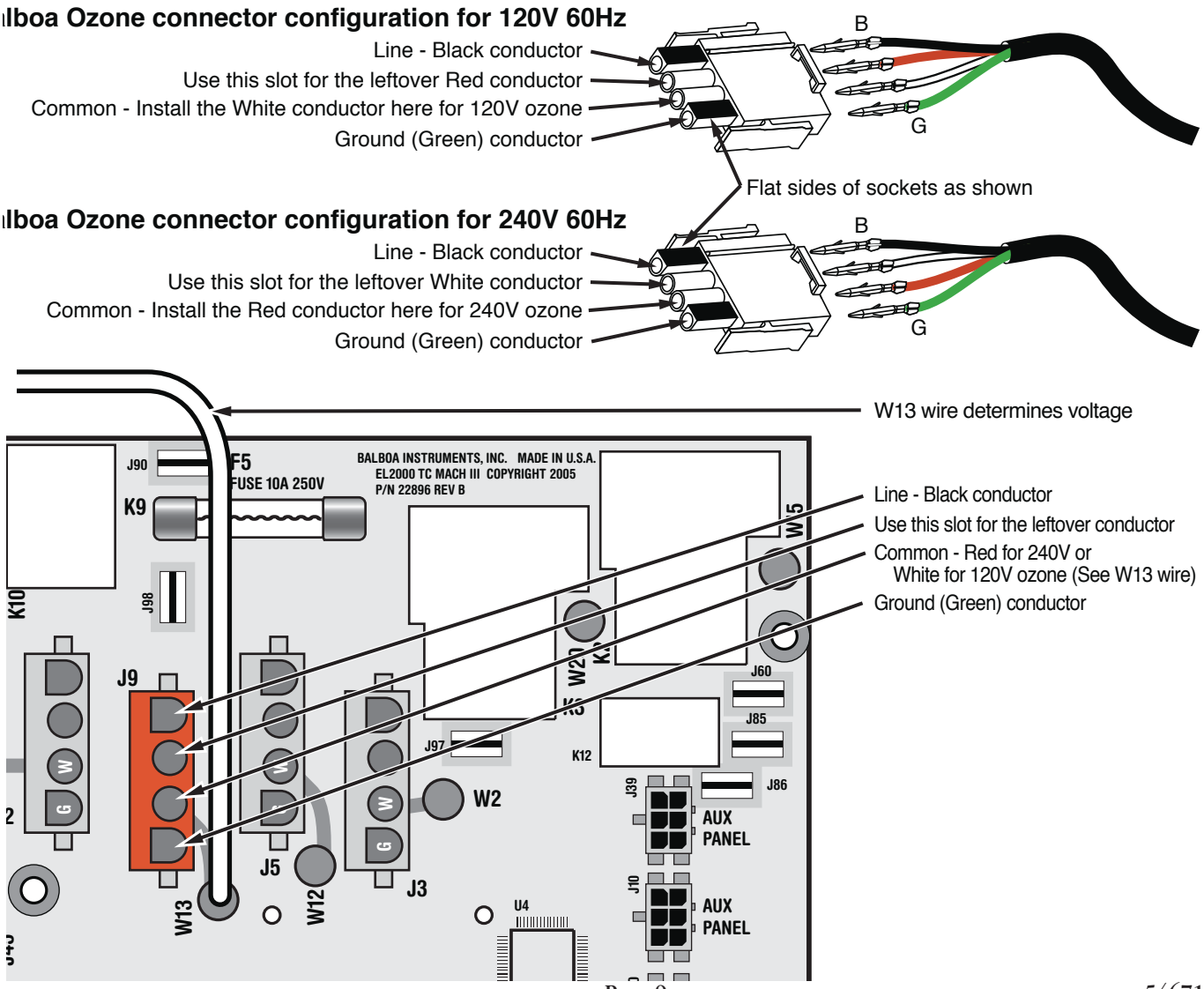
Ozone Connector Voltage: The EL circuit board is factory configured to deliver a preset voltage (120V or 240V) to the on-board ozone connector (J9). See the ratings table on the wiring diagram attached to the cover of the enclosure for the configured voltage. For 240V output W13 connects to Red AC and for 120V output W13 connects to White AC.

The voltage to the ozone connector can be changed in the field if required. W13 just needs to be set for the required voltage.

Balboa Ozone Generator: If the board is set up to operate a 120V ozone generator, the connector on the ozone generator is likely to be configured correctly, but should be compared to the illustration below.

If a 240V ozone generator is required, be sure the red wire in the ozone cord is positioned in the connector next to the green ground wire as described below.

Note: A special tool is required to remove the pins from the connector body once they are snapped in place. Check with your Balboa Account Manager for information on purchasing a pin-removal tool.



Panel Configurations

TIME CAPABLE

Note: RTC jumper (J91) on Main PCBA must be OFF (1 pin only)

ML900
PN 52654-01 with Overlay PN 40026
• Connects to Main Panel terminal J70, J71, or J72

ML700
PN 52649-01 with Overlay PN 11281
• Connects to Main Panel terminal J70, J71, or J72