MS50U Tech Sheet

Customer: **Master Spas**

Part Number: 59355-01   825 Incoloy 4.0kW "3S" heater

Custom Box Overlay   ☐

Box Overlay Part Number   N/A

UL System Model: BP501-MS50U-AS

Software Version ID: M100_201 V47.0

Software Version: 47.0

File Name: BP501_47.0_MS50U_ALTHR.hex

Configuration Signature: 55C2DACD

Eng. Project Number: 5563

Control Panels (See later pages for more information):

spaTouch™2	Any generic version (version 2.0 or later required for bba™2 fully integrated functionality; version 2.19 or later required for CHROMAZON3™ support)
Icon spaTouch™	Any generic version (version 3.36 or later required for bba™2 fully integrated functionality)
Menued spaTouch™	Any generic version (version 2.8 or later required for bba™2 integrated functionality)
TP800	Version 3.1 and later (Version 3.13 or later required for bba™; version 4.11 or later required for bba™2 integrated functionality)
TP600	Version 2.7 and later (Version 2.12 or later required for bba™/bba™2 On/Off control via menu)

BALBOA
water group

System Revision History

Part #	EPN	Date	Originator	Changes Made
56510	4094	10-16-13	Customer	Convert MS35U to BP501, plus add 1-pump-no-light Setup and spaTouch™ support. Add GFCI Trip (but not GFCI Automatic Text).
56510-01	4610	10-15-15	Customer	Updated to latest software version, adding topside-intergrated bba™ support.
ZT000214	4610	10-22-15	Customer	Temporary PN for sample.
56510-01	4610	11-11-15	Customer	Approved for production.
56510-02	4779	10-12-16	BWG	Updated to latest software version, adding topside-intergrated bba™2 support. Released to production.
56510-03	4988	12-12-17	Customer	Updated software to latest version, which resolves the filter end time issue in the previous version, and which adds bba™/bba™2 On/Off support to TP600/TP400 Menus. Released to production..
56510-04	5007	02-09-18	BWG	Redesigned BP501 board.
56510-05	5208	03-28-19	Customer	Add Alternate High Range select DIP switch. Updated software also supports CHROMAZON∃™ & M8.
59355	5210	09-20-19	Customer	Add 4.0kW 825 Incoloy "3S" system PN.
59355-01	5563	06-23-21	BWG	Update with Wago terminal block. Discontinue non-"3S" heater system PN 56510-XX.

bba™ & bba™2 (Balboa Bluetooth Amp) connection is documented seperately.

bba™ is integrated into graphic display panels (TP800, TP900 and spaTouch™). With TP600/TP400, use the "BT" entry on the menu to toggle bba™ power On/Off.

bba™2 is integrated into graphic display panels (TP800, TP900 and spaTouch™). With TP600/TP400, use the "BT" entry on the menu to toggle bba™2 power On/Off.

BALBOA
water group

Basic Functions Setup 1 - 5

Power Requirements:

240VAC, 50/60Hz*, 48A, Class A GFCI-protected service (Circuit Breaker = 60A max.),
4 wires [hot, hot, neutral, ground]

*BP systems automatically detect 50Hz vs 60Hz. However, power frequency (50Hz vs 60Hz) is just one of many differences between North American (UL) and CE power, and it is because of these other differences that different BP systems must be used for UL vs CE territories. Also, there are a few countries that use CE power but 60 Hz (such as South Korea) which need CE systems, and a few countries that use UL power but 50 Hz which need UL systems.

System Ouputs:

Pump 1   240VAC*   2-Speed   12A max   15-minute timer (30-minute timer for P1 Low in non-circ setups only)
                         in Setups 1, 3, 5, this is the heater pump.
                         Must deliver 20 GPM through heater
                         1 Speed in Setups in Setups 2 & 4

Pump 2   240VAC   1-Speed   12A max   15-minute timer
                         Used in Setups 1 & 2

Circ Pump   240VAC*   1-Speed   2A max   24-hour with 3˚F shutoff (outside of filter cycles)
                         This is the heater pump in Setups 2 & 4.
                         Must deliver 20 GPM through heater

Ozone   240VAC*   .5A max   Slaved to Circ Pump in Circ Setups and to Pump 1 Low in Non-Circ Setups

Spa Light   10VAC   On/Off   2A** max   240-minute timer.
                         Not used in Setup 5

A/V (Stereo) 120VAC   Hot   4A max   Always on

Heater   4kW @ 240VAC max

*Pump 1, Circ Pump and Ozone must be the same voltage.

** 2A max limit is shared by On/Off Spa Light and CHROMAZON3™.

BALB◯A
w a t e r   g r o u p

Hardware Setup

Wiring Diagram for "3S" heater version

MS50U PN 59355-01
06-23-21

CONNECT ONLY TO CIRCUITS PROTECTED BY A CLASS A GFCI.

A DISCONNECTING MEANS MUST BE INSTALLED WITHIN SIGHT FROM THE EQUIPMENT AND AT LEAST 5 FEET (1.52 M) FROM THE INSIDE WALLS OF THE POOL, SPA, OR HOT TUB.

FOR SUPPLY CONNECTIONS, USE CONDUCTORS SIZED ON THE BASIS OF 60°C AMPACITY BUT RATED MINIMUM OF 90°C.

USE COPPER CONDUCTORS ONLY. EMPLOYER UNIQUEMENT DES CONDUCTEURS DE CUIVER. #6 AWG MIN. WIRE = 90°

AUX J5 (A1-A4)

TP (MAIN) PANELS J33 or J45

WIFI TRANSCEIVER J33 OR J45

CHROMAZONE™ J33 OR J45

OFF POSITION	S1 SWITCH #		ON POSITION
TEST MODE OFF	◀	1	TEST MODE ON
DON'T ADD 1 HS PUMP W/HTR	◀	2	ADD 1 HS PUMP WITH HEAT
DON'T ADD 2 HS PUMPS W/HTR	◀	3	ADD 2 HS PUMPS WITH HEAT
1 MIN HTR COOLDOWN (ELEC)	◀	4	5 MIN HTR COOLDOWN (GAS)
REGULAR HIGH RANGE	◀	5	ALTERNATE HIGH RANGE
STORE SETTINGS*	◀	6	MEMORY RESET*

*SWITCH # 6 SHOULD BE SET TO OFF UPON FINAL INSTALLATION. ALL UNUSED SWITCHES SHOULD BE OFF

LOCATION	DEVICE	VOLTS	MAX AMPS	FROM	TO
J8	2/1-SP PUMP 1	240V**	12A MAX		
J14	1-SP PUMP 2	240V	12A MAX	J32	AREA 3
J15	SPA LIGHT	10V	2A* (@10V)		
J21	CIRC	240V**	2A MAX		
J24	OZONE	240V**	0.5A		
	P1/CIRC/OZONE LINE 1 CONNECTION			J50,J51	AREA 3
J47	AV	120V	2A	J49	AREA 1
J46	HEATER	240V	4.0 kW		

**PUMP 1, CIRC AND OZONE ALL MUST BE THE SAME VOLTAGE.
* 2A LIMIT IS SHARED BY J15 SPA LIGHT AND CHROMAZONE™

TORQUE RANGE FOR HEATER CONNECTIONS: 30 TO 35 IN. LBS.

INSTEAD OF SETUP #1, THIS SYSTEM IS CONFIGURED IN SETUP #:

SETUP #	CIRC PUMP	PUMP 1	PUMP 2	LIGHT	TEMP SCALE
1	NONE	2-SPEED	1-SPEED	YES	°F
2	24HR/3F	1-SPEED	1-SPEED	YES	°F
3	NONE	2-SPEED	NONE	YES	°F
4	24HR/3F	1-SPEED	NONE	YES	°F
5	NONE	2-SPEED	NONE	NONE	°F

Balboa water group

Setup Reference Table

Setup #	Circ Pump	Pump 1	Pump 2	Light	Temp Scale
1	None	2-Speed	1-Speed	Yes	°F
2	24hr/3°F	1-Speed	1-Speed	Yes	°F
3	None	2-Speed	None	Yes	°F
4	24hr/3°F	1-Speed	None	Yes	°F
5	None	2-Speed	None	None	°F

System (and any replacement board) **is shipped in Setup 1**

BALBOA
water group

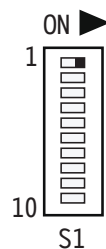# Changing Software Setups with spaTouch™ Icon-Driven Panels

Test Menu Access (S1, Switch 1 ON) *Service Technician ONLY.*

DANGER! HIGH VOLTAGE WILL BE ACCESSIBLE! SERVICE TECHNICIAN ONLY!

While the system is running, move DIP Switch 1 (on S1 on the Main circuit board) to ON. The system will enter Test Mode.
Moving DIP Switch 1 to OFF will exit Test Mode.

The example screens shown here are from the spaTouch 1 Icon-Driven Panel, but the screens on the spaTouch 2 Panel are similar. The main difference is that the spaTouch 2 display is wider.

To Change Software Setups:

While in Test Mode, press the indicated icons to move from screen to screen.
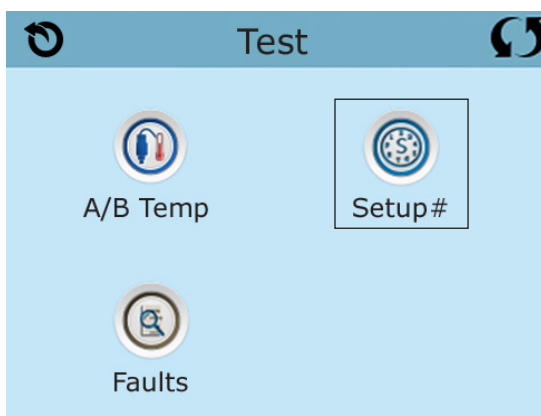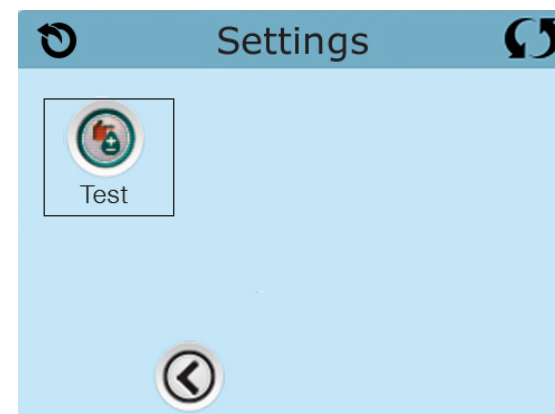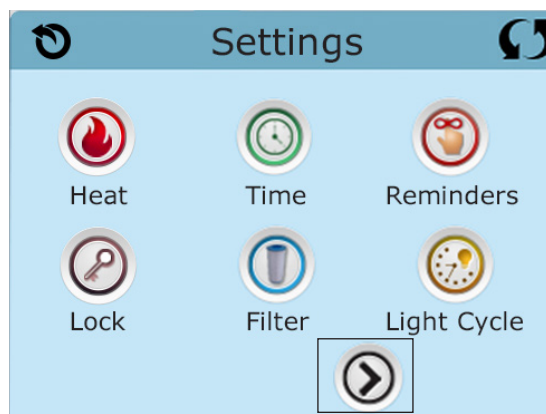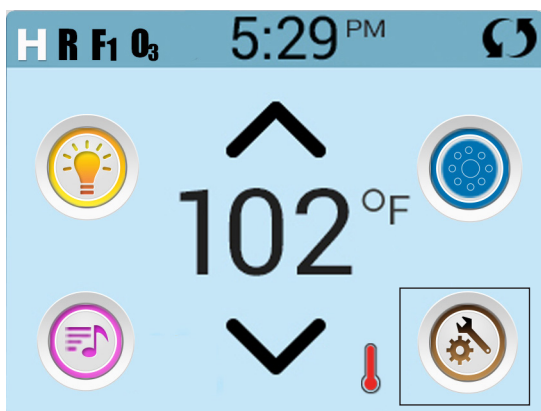
Once on the Setup Selection screen, press the Up or Down icon to select the desired Setup Number, then press the Check Mark icon to confirm and to have the spa restart.

After the system restarts, you may see a message that "The settings have been reset"; this is normal after changing Setups with DIP Switch 6 in the OFF position. Press "Clear" to dismiss this message.
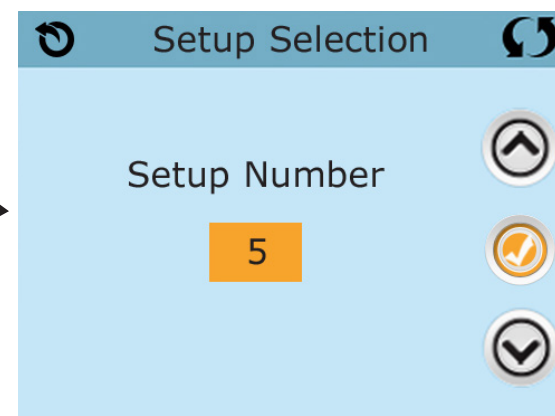
Changing Software Setups with TP800 / TP900 / spaTouch™ Menued Panel

Test Menu Access (S1, Switch 1 ON) *Service Technician ONLY.*

DANGER! HIGH VOLTAGE WILL BE ACCESSIBLE! SERVICE TECHNICIAN ONLY!

While the system is running, move DIP Switch 1 (on S1 on the Main circuit board) to ON.
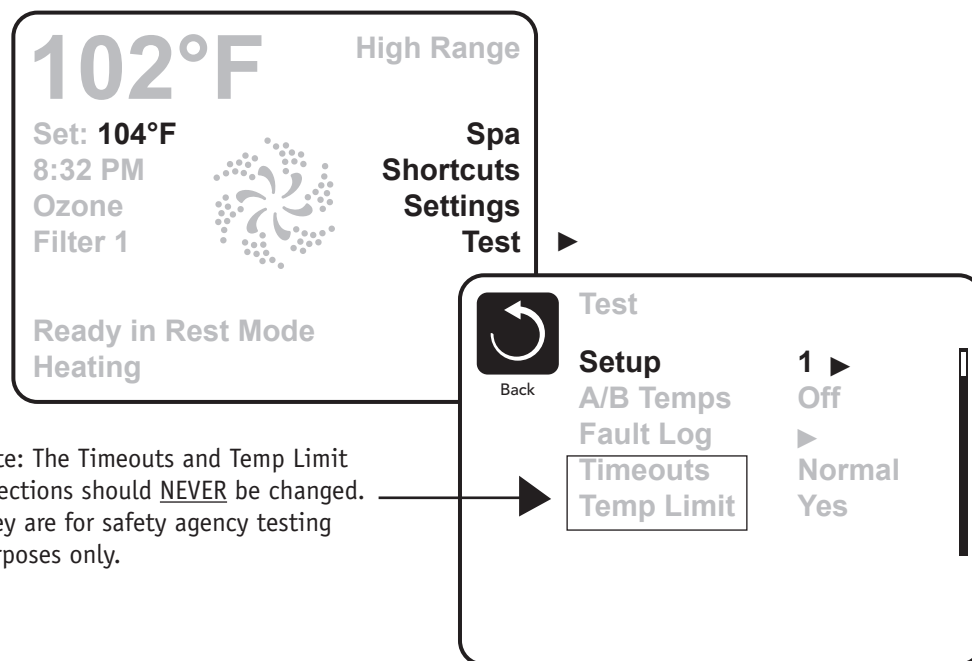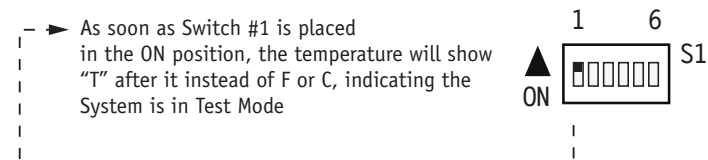The system will enter Test Mode.
Moving DIP Switch 1 to OFF will exit Test Mode.

Software Setups

Under the TEST Menu, the Setup screen will allow changing the Setup from 1 to any number established by the Manufacturer.
Changing the Setup may require wiring changes as well.

ON ▶

1

10

S1

102°F   High Range

Set: **104°F**   **Spa**
8:32 PM   **Shortcuts**
Ozone   **Settings**
Filter 1   **Test**   ▶

Ready in Rest Mode
Heating

Back

Test

Setup   **1** ▶
A/B Temps   Off
Fault Log   ▶
Timeouts   Normal
Temp Limit   Yes

Note: The Timeouts and Temp Limit selections should NEVER be changed. They are for safety agency testing purposes only.

BALBOA
water group

Changing Software Setups with TP600 / TP400

Test Menu Access (S1, Switch 1 ON) *Service Technician ONLY.*

DANGER! HIGH VOLTAGE WILL BE ACCESSIBLE! SERVICE TECHNICIAN ONLY!

While the system is running, move DIP Switch 1 (on S1 on the Main circuit board) to ON.
The system will enter Test Mode.
Moving DIP Switch 1 to OFF will exit Test Mode.

As soon as Switch #1 is placed in the ON position, the temperature will show "T" after it instead of F or C, indicating the System is in Test Mode

Software Setups

Under the TEST Menu, the Setup screen will allow changing the Setup from 1 to any number established by the Manufacturer. Changing the Setup may require wiring changes as well.

You will have 1 minute to complete the setup change after you manually exit Priming Mode. (Once familiar with the process, the Setup change should take less than 15 seconds.)

RUN	PMPS	PURG	AIR	-- -- -- --

When the panel displays RUN PMPS PURG AIR, press any Temperature button ONCE to exit Priming Mode.
You should see "---T" where the T indicates the system is in Test Mode.

-- -- -- °T
READY   RANGE
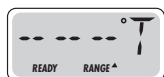
Continued on Next Page.

BALBOA
water group

Changing Software Setups with TP600 / TP400 Continued

Again, **You will have 1 minute** to complete the setup change after you manually exit Priming Mode.
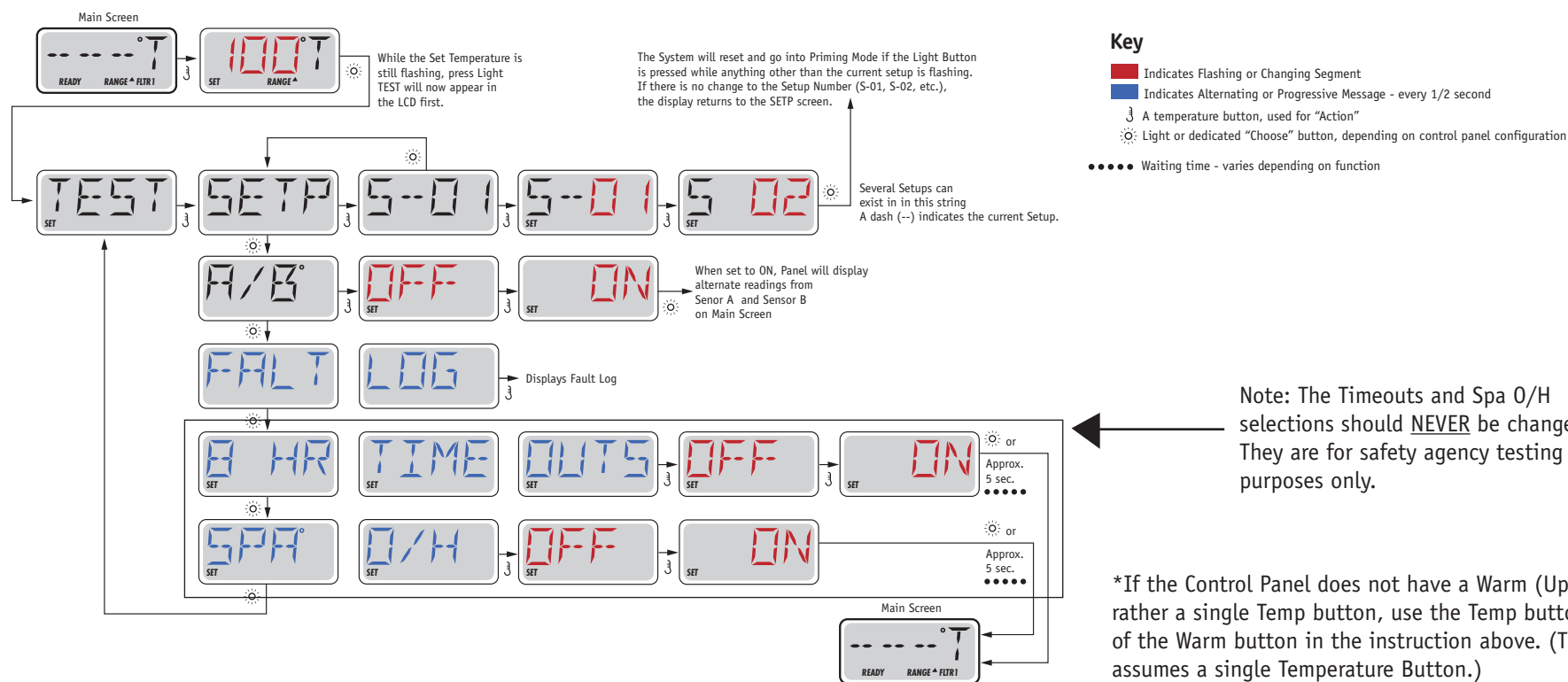
Immediately after exiting Priming Mode, press this sequence of buttons: Warm*, Light, Warm, Warm, Warm, Warm. Continue to press Warm until the diplay shows the Setup Number (S-01, S-02, etc.) you want to switch to. When the correct setup number is showing, press Light once, and the system will reset, using the newly-selected Setup from that point on.

Move DIP Switch 1 to the OFF position to take the spa out of Test Mode. °F or °C will replace °T.

Using a permanent marker, write the Setup number on the Setup label mounted inside the system lid (right). This is very important to any service person in the future who may need to replace a circuit board or system and needs to change the Setup on a replacement part while in the field.

NOTE: Changing the Setup may require wiring changes as well - refer to the wiring diagram or wiring diagram addendum.

THIS SYSTEM IS
CONFIGURED AS
SETUP #

Main Screen

While the Set Temperature is still flashing, press Light TEST will now appear in the LCD first.

The System will reset and go into Priming Mode if the Light Button is pressed while anything other than the current setup is flashing. If there is no change to the Setup Number (S-01, S-02, etc.), the display returns to the SETP screen.

Several Setups can exist in in this string A dash (--) indicates the current Setup.

When set to ON, Panel will display alternate readings from Senor A and Sensor B on Main Screen

Displays Fault Log

Key
- Indicates Flashing or Changing Segment
- Indicates Alternating or Progressive Message - every 1/2 second
- A temperature button, used for "Action"
- Light or dedicated "Choose" button, depending on control panel configuration
- ●●●●● Waiting time - varies depending on function

Note: The Timeouts and Spa O/H selections should NEVER be changed. They are for safety agency testing purposes only.

Approx. 5 sec.

Approx. 5 sec.

Main Screen

*If the Control Panel does not have a Warm (Up) button, but rather a single Temp button, use the Temp button in place of the Warm button in the instruction above. (The flow chart assumes a single Temperature Button.)

BALBOA
water group

Equipment Expansion

Expansion Features

| Control Connection	Default	Fuse
Relay 1/2 (J108)	None	N/A

BALBOA
water group

DIP Switch Functions

Fixed-fuction DIP Switches

A1   Test Mode (normally Off).

A2   In "ON" position, add one high-speed pump (or blower) with Heater.

A3   In "ON" position, add two high-speed pumps (or 1 HS Pump and Blower) with Heater.

A6   Persistent memory reset (Used when the spa is powering up to restore factory settings as determined by software configuration).
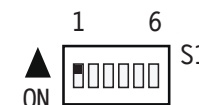
A2 and A3 work in combination to determine the number of high-speed devices and blowers that can run before the heat is disabled. i.e. A2 and A3 in the ON position will allow the heater to operate with up to 3 high-speed pumps (or two HS Pumps and Blower) running at the same time. Heat is disabled when the fourth high-speed pump or blower is turned on.

Note: *A2/A3 all off = No heat with any high-speed pump or blower.*

Assignable DIP Switches

A4   In "ON" position, enables a 5-minute cooldown for some gas heaters (Cooling Time B).
            In "OFF" position, enables a 1-minute cooldown for electric heaters (Cooling Time A).

A5   In "ON" position, High Range is replaced by Alternate High Range settings (see page 15)
            In "OFF" position, the regular High Range settings are used

Undesignated switches are not assigned a function.

BALBOA
water group

Jumper Definitions

J109	GFCI Test/Trip Enable/Disable	J109
	Note: *This feature must be enabled in software as well.*	

J30	Do Not Use

J31	Non Applicable on UL models	J31
	(Used on CE models only)	

J29   Heater Disable Switch Connection. If J29 is shorted by any means, the heater will not run until J29 is no longer shorted.   J29

If J29 is shorted during power-up "J29" will appear on the panel.
The message can be dismissed with a button press, and is the only control panel notification of J29 being shorted.
No message is displayed if J29 is shorted after power-up, but the heater will not run until J29 is no longer shorted.

J29 expects a switch closure (not a voltage) as the command signal.

In some areas, a local power company may offer discounts based on voluntary "power shedding" devices that may be installed in conjunction with the spa.

J25, J26, J27   Heater Type Settings.

                Note: *Factory Configured do not change.*

                                            J27

                                  J25   J26

J44   Jumper on center two pins (230V) when no neutral wire is used (240V-dedicated).   230V

         Two Jumpers installed; one on left 2 pins and one on right 2 pins (115V) when neutral wire is used.   J44

                                                                              115V   115V

Warning!

Setting DIP switches or jumpers 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.

BALBOA
water group

Replacement Parts

PCBA:

Main PCBA:	56942-02
Expander PCBA:	N/A

HEATER(s):

Plug + Click Heater Kit:	58442KIT 4.0kW 825 Inc "3S" heater
Temp Sensor Kit:	53605

CABLES: N/A

FUSES:

Part Number	Amperage*	Location
30136	30A	F5
26307	2A	F4, F7
26905	0.5A SLO	F6
26904	10A	F3

* The amperages shown above are only intended for identifying fuses on our boards. They are not complete descriptions of those fuses. Please use the part numbers at the left to order fuses directly from Balboa.

BALB**O**A
water group

BP501 Configuration Options

General Features

Feature	Default	
Pump 1 in Filter Cycle (Circ Only)	No	
Pump 1 Low Timer	*30 Minutes*	Applies in non-circ Setups (configurations) only
General Pump Timer	15 Minutes	
Blower Timer	15 Minutes	
Mister Timer	15 Minutes	
Light Timer	240 Minutes	
Circ (when enabled)	*24 hr with 3°F shutoff (outside of filter cycles)*	
Cleanup Cycle	*Disabled*	
Cleanup as Preference setting	*Yes*	
Ozone	With Heater Pump*	
Ozone Suppression	OFF	
Pump Purge	60 Seconds	
Blower Purge	30 Seconds	
Mister Purge	5 Seconds	
Purge Type	Serial - Pumps at lowest speed	

* The heater Pump can be either a Circ Pump or Pump 1 Low.

BALBOA
water group

BP501 Configuration Options

Temperature Features

Feature	Default
Temperature Display	°F

All temperatures must be specified in °F. The system converts °F to °C dynamically. If Celsius is required for default settings, choose a desired °C value that (after rounding) corresponds to a Fahrenheit value.

°C	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
°F	39	41	43	45	46	48	50	52	54	55	57	59	61	63	64	66	68	70	72

°C	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
°F	73	75	77	79	81	82	84	86	88	90	91	93	95	97	99	100	102	104

Feature	Default
Hi-Range Min. Set Temp	80°F
Hi-Range Max. Set Temp	104°F
Hi-Range Default Temp*	100°F
Lo-Range Min. Set Temp	50°F
Lo-Range Max. Set Temp	99°F
Lo-Range Default Temp*	70°F
Alternate Hi-Range Min. Set Temp	*50°F*
Alternate Hi-Range Max. Set Temp	*99°F*
Alternate Hi-Range Default Temp*	*85°F*
Freeze Threshold	44°F
Freeze Type	Rotating - Pumps at Lowest Speed
Temp Lock Type	Temp + Settings

*May be changed by end-user (if enabled)

BALBOA
water group

BP501 Configuration Options

Time Features

Feature	Default
Time Format*	12 Hour
Filter 1 Start Hour*	20:00 (8:00 PM)
Filter 1 Duration*	2 Hours
Filter Cycle 2 Default*	*ON*
Filter 2 Start Hour*	08:00 (8:00 AM)
Filter 2 Duration*	*2 Hours*
Light Cycle	Disabled
Light Cycle Default*	OFF
Light Cycle Start Hour*	21:00 (9:00 PM)
Light Cycle Duration*	15 Minutes
Cooling Time A	1 Minute
Cooling Time B	5 Minutes

May be changed by end-user (if enabled)

BALB○A
water group

BP501 Configuration Options

Reminder Features

Feature	Default
Reminders Shown*	No
Check pH	*OFF*
Check Sanitizer	*OFF*
Clean Filter	30 Days
Test GFCI	*65 Days*
Drain Water	*100 Days*
Change Cartridge	OFF
Clean Cover	*OFF*
Treat Wood	*OFF*
Change Filter	365 Days

May be changed by end-user (if enabled)

BALB●A
water group

BP501 Configuration Options

Special Features

Feature	Default
Special Amperage Rule A	No Limitation
Special Amperage Rule B	No Limitation
Drain Mode	Disabled
Demo Mode	Disabled
GFCI Trip	Enabled
Automatic GFCI Test	Disabled
Ozone Slaved to Heater Pump	*Yes*
Dual Voltage Heater	Always Input Voltage
Safety Suction	Disabled
Menu Style	*Simplified in Setups 1-4*
	Standard in Setup 5

BALB**O**A
w a t e r   g r o u p

TP800 Panel Configuration

Button Layout Table

Feature #	Setup 1	Setup 2	Setup 3	Setup 4	Setup 5
A1	N/A	N/A	N/A	N/A	N/A
A2	Jets 1	Jets 1	Jets 1	Jets 1	Jets 1
A3	Jets 2	Jets 2	Light 1	Light 1	Invert
A4	Light 1	Light 1	Invert	Invert	Undefined
A5	Invert	Invert	Undefined	(Circ Icon)	Undefined
A6	Undefined	(Circ Icon)	Undefined	Undefined	Undefined
A7	Undefined	Undefined	Undefined	Undefined	Undefined
A8	Undefined	Undefined	Undefined	Undefined	Undefined
A9	Undefined	Undefined	Undefined	Undefined	Undefined
A10	Undefined	Undefined	Undefined	Undefined	Undefined
A11	N/A	N/A	N/A	N/A	N/A
A12	N/A	N/A	N/A	N/A	N/A
A13	Undefined	Undefined	Undefined	Undefined	Undefined
A14	Undefined	Undefined	Undefined	Undefined	Undefined
A15	Undefined	Undefined	Undefined	Undefined	Undefined
A16	Undefined	Undefined	Undefined	Undefined	Undefined
B1	Jets 1	Jets 1	Jets 1	Jets 1	Jets 1
B2	Jets 2	Jets 2	Undefined	Undefined	Undefined
B3	Undefined	Undefined	Undefined	Undefined	Undefined
B4	Light 1	Light 1	Light 1	Light 1	Undefined

Buttons A1 - A10 are also used for the Spa screen on the spaTouch™ panel.

BALBOA
water group

TP800 Panel Configuration

Spa Screen

B1

B2   B3

B4

↺	A2	A3	A4	A5
A6	A7	A8	A9	A10

∧

< • >

∨

Shortcuts Screen

B1

B2   B3

B4

A13

A14 ↺ A15

A16

A13

∧

< • >

A14   A15

∨

A16
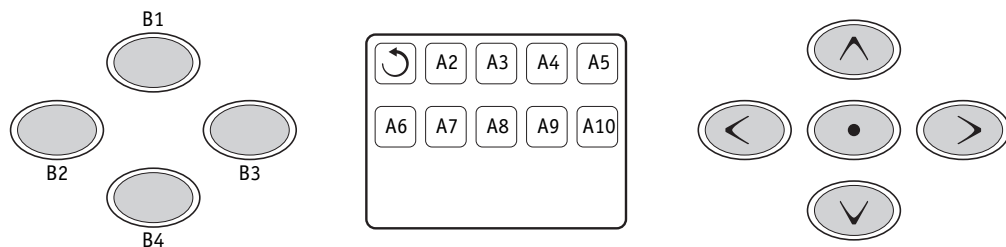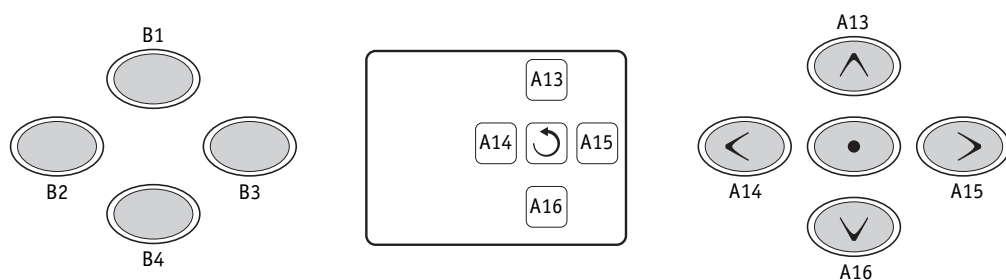
Note: *Buttons 11 and 12 are not used in this configuration.*

Button 1 is fixed.

BALB☉A
w a t e r   g r o u p

TP600 Panel Configuration

Button Layout Table

Button #	Setups 1 & 2	Setups 3 & 4	Setup 5
1	Jets 1	Jets 1	Jets 1
2	Jets 2	Undefined	Undefined
3	Invert	Invert	Invert
4	Up	Up	Up
5	Light 1	Light 1	Menu
6	Down	Down	Down
LED 1	Jets 1	Jets 1	Jets 1
LED 2	Jets 2	Undefined	Undefined
LED 3	Light 1	Light 1	Undefined
LED 4	Heat On	Heat On	Heat On

BALBOA
water group

BP501 Configuration Options

Auxiliary Panel Features on Bank 1*

Feature	Default
Aux Button A1	Jets 1
Aux Button A2	Jets 2
Aux Button A3	Undefined
Aux Button A4	Light

*Bank 1 consists of J5 on the Main Circuit Board.

Aux Connection Splitter PN 25257 may be required.

Buttons that are assigned to equipment that is
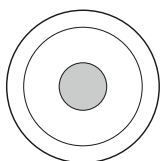not defined in a Setup will not do anything in that Setup.

BALBOA
water group

BP501 Configuration Options

Auxiliary Panel Features

AX10 Panels on Bank 1*

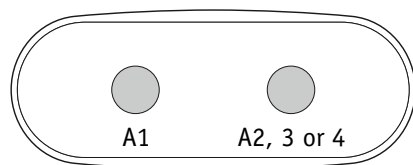|		
A1, AX10A1	No O/L	52803
A2, AX10A2	No O/L	52804
A3, AX10A3	No O/L	52805 ▶
A4, AX10A4	No O/L	52806

Call Customer Service for additional information about Auxiliary Panels.

*Bank 1 consists of J5 on the Main Circuit Board.

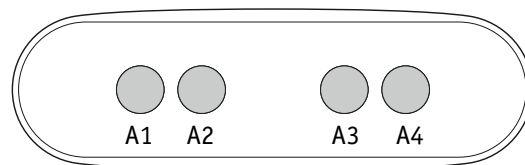**Aux Connection Splitter PN 25257 may be required.**

AX20

AX20 A1A2	No O/L	52800
AX20 A1A3	No O/L	52801
AX20 A1A4	No O/L	52802

A1   A2, 3 or 4

AX20 Auxiliary Panel plugged into Bank 1 will operate A1 + A2, A3 or A4.

AX40

AX40	No O/L	52799

A1   A2   A3   A4

AX40 Auxiliary Panel plugged into Bank 1 will operate A1 + A2, A3 and A4.

BALBOA
water group