### **BP20MSSH Tech Sheet**

**Customer:** Balboa Water Group

**Part Number:** 56373 800 Incoloy

56448 825 Incoloy 56449 Titanium

Custom Box Overlay

Box Overlay Part Number N/A

UL System Model: BP20-BP20MSSH-AU

Software Version ID: M100\_220 V12

Software Version: 12.0

File Name: BP2000\_12.0\_BP20MSSH\_1.hex

Configuration Signature: 241941E4

Eng. Project Number: 3933

Base PCBA: 56374

Bare Board: 24082 D or E

Control Panels:

TP800 Software Version 2.9 and later
TP900 Software Version 2.9 and later
TP600 Software Version 2.6 and later

**Auxiliary Panels** 

See Page 19







# **System Revision History**

| Part # | EPN  | Date     | Originator | Changes Made                             |
|--------|------|----------|------------|--|
| 56373  | 3933 | 01-03-13 | BWG        | Initial release - BP2000 with MicroSilk® |
| 56448  |      |          |            |  |
| 56449  |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |
|        |      |          |            |  |

### **Basic Functions Setups 1-6**

#### **Power Requirements:**

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

#### **System Ouputs:**

| Pump 1       |               | 2-Speed<br>eater pump i<br>20 GPM thro   | •              | 15-minute timer for High Speed, 15-Minute timer for Low Speed |
|--------------|---------------|--|----------------|---|
| Pump 2       | 240VAC        | 2-Speed in Setups 1                      | 12A max<br>& 4 | 15-minute timer   |
|              |               | 1-Speed in Setups 2                      | 12A max<br>& 5 | 15-minute timer   |
| Pump 2 is no | t used in Set | ups 3 & 6                                |                |   |
| MicroSilk®   | 240VAC        | 1-Speed                                  | 12A max        | 30-minute timer   |
| Circ Pump    |               | 1-Speed<br>eater pump in<br>20 GPM thron | •              | Programmable Filtration Cycles + Polling                      |
| 0zone        | 120VAC*       |  | .5A max        | Slaved to Circ Pump in Setups 1-3, Independent in Setups 4-6  |
| Spa Light    | 10VAC         | 0n/0ff                                   | 1A max         | 240-minute timer.   |
| A/V (Stereo) | 120VAC        | Hot                                      | 5A max         | Always on   |
| Heater       | 5.5kW @ 24    | OVAC max                                 |                |   |

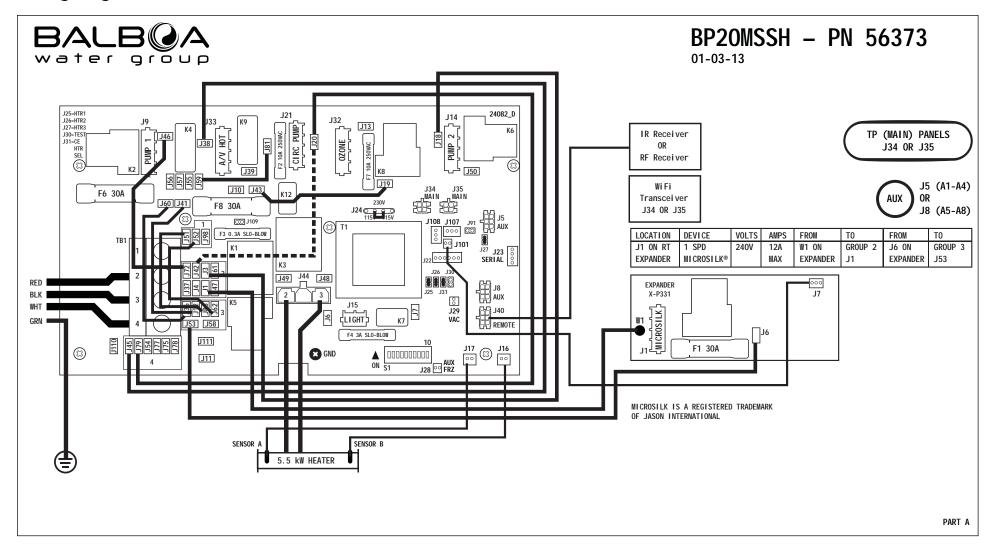
<sup>\*</sup>Both the Circ pump and Ozone can be converted to 240V, however they will be the same voltage after conversion. (Both 120V or both 240V.)

MicroSilk® is a registered trademark of Jason International



### **Hardware Setup**

### **Wiring Diagram**





### **Hardware Setup**

#### **Settings**

| LOCATION | DEVICE        | VOLTS    | MAX AMPS | FROM | T0          |
|----------|---------------|----------|----------|------|-------------|
| J9       | 2-SP PUMP 1   | 240V     | 12A MAX  | J46  | J72-GROUP 2 |
| J14      | 2-SP PUMP 2   | 240V     | 12A MAX  | J18  | J3-GROUP 2  |
|          | PUMP 2 LINE 1 | CONNECTI | ON       | J19  | J10         |
| J15      | SPA LIGHT     | 12V      | 1A       |      |             |
| J21      | CIRC PUMP     | 120V*    | 2A MAX   | J20  | J79-GROUP 4 |
| J32      | OZONE         |          | 1A       |      |             |
|          | CIRC AND OZON | E LINE 1 | J81      | J59  |             |
| J33      | TV / AV       | 120V     | 3A       | J38  | J78-GROUP 4 |
| J44      | HEATER        | 240V     | 5.5 kW   |      |             |

PUMP 2 IS 2-SPEED IN SETUPS 1 & 4
PUMP 2 IS 1-SPEED IN SETUPS 2 & 5
PUMP 2 IS NOT USED IN SETUPS 3 & 6

<sup>\*</sup> FOR 240V CIRC PUMP AND OZONE, CONNECT J20 TO J42 (IN GROUP 2)

| SETUP # | CIRC PUMP                         | PUMP 1  | PUMP 2  | MICROSILK® | TEMP SCALE                          |
|---------|-----------------------------------|---------|---------|------------|-------------------------------------|
| 1       | PROGRAMMABLE FILTRATION + POLLING | 2-SPEED | 2-SPEED | 1-SPEED    | ∘ <sub>F</sub> —— SYSTEM WILL BE II |
| 2       | PROGRAMMABLE FILTRATION + POLLING | 2-SPEED | 1-SPEED | 1-SPEED    | ∘ <sub>F</sub> SETUP #1             |
| 3       | PROGRAMMABLE FILTRATION + POLLING | 2-SPEED | NONE    | 1-SPEED    | °F                                  |
| 4       | NONE                              | 2-SPEED | 2-SPEED | 1-SPEED    | °F                                  |
| 5       | NONE                              | 2-SPEED | 1-SPEED | 1-SPEED    | °F                                  |
| 6       | NONE                              | 2-SPEED | NONE    | 1-SPEED    | °F                                  |
|         |                                   |         |         |            |                                     |
|         |                                   |         |         |            |                                     |
|         | ·                                 |         |         |            |                                     |
|         |                                   |         |         |            |                                     |
|         |                                   |         |         |            |                                     |

PUMP 1 LOW TIMEOUT IS 15 MINUTES.

MICROSILK IS A REGISTERED TRADEMARK OF JASON INTERNATIONAL

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



#### SWITCHBANK S1 OFF

#### SWITCHBANK S1 ON

| <b>■</b> A1 | TEST MODE ON                          |
|-------------|---------------------------------------|
| A2 -        | ADD 1 HS PUMP WITH HEAT               |
| <b>⋖</b> A3 | ADD 2 HS PUMPS WITH HEAT              |
| <b>⋖</b> A4 | ADD 4 HS PUMPS WITH HEAT              |
| <b>⋖</b> A5 | SPECIAL AMPERAGE RULE B               |
| <b>⋖</b> A6 | MEMORY RESET*                         |
| <b>⋖</b> A7 | NOT ASSIGNED                          |
| <b>≪</b> A8 | NOT ASSIGNED                          |
| <b>⋖</b> A9 | NOT ASSIGNED                          |
| ◀ A10       | NOT ASSIGNED                          |
|             | A2 ► A3 ← A4 ← A5 ← A6 ← A7 ← A8 ← A9 |

\*SWITCH # 6 SHOULD BE SET TO OFF UPON FINAL INSTALLATION.

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

FOR SUPPLY CONNECTIONS, USE CONDUCTORS SIZED ON THE BASIS OF  $60\,^\circ\text{C}$  AMPACITY BUT RATED MINIMUM OF  $90\,^\circ\text{C}$ .

TORQUE RANGE FOR MAIN TERMINAL BLOCK (TB1): 27-30 IN. LBS. (31.1-34.5 kg cm)

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.

TOTAL OUTPUT AMP DRAW NOT TO EXCEED MAX INPUT RATING OF SPA
USE EARTH GROUND CONNECTIONS AS INDICATED INSIDE THE SYSTEM ENCLOSURE

**BP20MSSH - PN 56373** 

01-03-13

PART B



# **Setup Reference Table**

| Setup # | Circ Pump                         | Pump 1  | Pump 2  | MicroSilk® | Temp Scale |
|---------|-----------------------------------|---------|---------|------------|------------|
| 1       | Programmable Filtration + Polling | 2-Speed | 2-Speed | 1-Speed    | °F         |
| 2       | Programmable Filtration + Polling | 2-Speed | 1-Speed | 1-Speed    | °F         |
| 3       | Programmable Filtration + Polling | 2-Speed | None    | 1-Speed    | °F         |
| 4       | None                              | 2-Speed | 2-Speed | 1-Speed    | °F         |
| 5       | None                              | 2-Speed | 1-Speed | 1-Speed    | °F         |
| 6       | None                              | 2-Speed | None    | 1-Speed    | °F         |

#### System is shipped in Setup 1

Pump 1 Low timeout is 15 minutes.



### **Changing Software Setups**

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

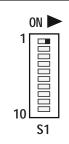
#### DANGER! HIGH VOLTAGE WILL BE ACCESSIBLE! SERVICE TECHNICIAN ONLY!

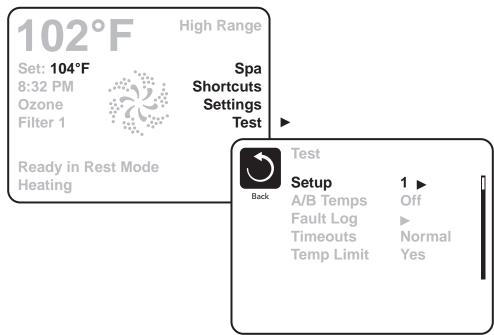
While the system is running, move DIP Switch 1 (on S1 on the Main circuit board) to ON. The system will enter Test Mode.

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.







# **Equipment Expansion**

| <b>Expansion Features</b> |            |      |  |  |  |  |  |
|---------------------------|------------|------|--|--|--|--|--|
| <b>Control Connection</b> | Default    | Fuse |  |  |  |  |  |
| Relay 1 (J101)            | MicroSilk® | 30A  |  |  |  |  |  |
| Relay 7/8 (J107)          | Undefined  | None |  |  |  |  |  |
| Relay 9/10 (J108)         | Undefined  | None |  |  |  |  |  |



### **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.

A4 In "ON" position, add four high-speed pumps (or 3 HS Pumps and Blower) with Heater.

A5 In "ON" position, enables Special Amperage Rule B. See Special Features section under Configuration Options for functionality with your system.

In "OFF" position, enables Special Amperage Rule A.

A6 Persistent memory reset (Used when the spa is powering up to restore factory settings as determined by software configuration).

A2, A3, and A4 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 and A4 in the OFF 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/A4 all off = No heat with any high-speed pump or blower.

Undesignated switches are not assigned a function.



### **Jumper Definitions**

| J109          | GFCI Test/Trip Enable  Note: This feature must be enabled in software as well.   | J109 🏻                    |
|---------------|--|---------------------------|
| J91           | Real Time Clock Enable/Disable  Note: This Jumper should NOT be shorted when the Control Panel can display time of day.  | J91 ©a                    |
| J30           | Do Not Use   |                           |
| J31           | Non Applicable for UL systems (Used only on CE systems)  | J31 🐉                     |
| J29           | Do Not Use   | J29 👸                     |
| J25, J26, J27 | Heater Type Settings.  Note: Factory Configured do not change.   | J27<br>J25 <b>2 2</b> J26 |
| J24           | Jumper on center two pins (230V) when heater is running at 240V.  Two Jumpers installed; one on left 2 pins and one on right 2 pins (115V) when heater is running at 120V. | J24 115 15V               |

#### 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.



#### **General Features**

| Feature                            | Default                |
|------------------------------------|------------------------|
| Pump 1 in Filter Cycle (Circ Only) | No                     |
| Pump 1 Low Timer                   | 15 Minutes             |
| General Pump Timer                 | 15 Minutes             |
| Blower Timer                       | 30 Minutes             |
| MicroSilk® Timer                   | 30 Minutes             |
| Mister Timer                       | 15 Minutes             |
| Light Timer                        | 240 Minutes            |
| Circ (when enabled)                | Programmable + Polling |
| Cleanup Cycle                      | 30 Minutes             |
| Cleaup as Preference setting       | Yes                    |
| 0zone                              | With Heater Pump*      |
| Ozone Suppression                  | OFF                    |
| Pump Purge                         | 60 Seconds             |
| Blower Purge                       | 30 Seconds             |
| Mister Purge                       | 5 Seconds              |





<sup>\*</sup> The heater Pump can be either a Circ Pump or Pump 1 Low.

#### **Temperature Features**

Feature Display Personal Perso

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 | <i>57</i> | 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 | <i>75</i> | 77 | 79 | 81 | 82 | 84 | 86 | 88 | 90 | 91        | 93 | 95 | 97 | 99 | 100 | 102 | 104 |    |  |

| Hi-Range Min. Set Temp | 80°F  |
|------------------------|-------|
| Hi-Range Max. Set Temp | 104°I |
| Hi-Range Default Temp* | 100°  |
| Lo-Range Min. Set Temp | 50°F  |
| Lo-Range Max. Set Temp | 99°F  |
| Lo-Range Default Temp* | 70°F  |
| Freeze Threshold       | 44°F  |

Temp Lock Type Temp + Settings



<sup>\*</sup>May be changed by end-user (if enabled)

#### **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* | OFF             |
| Filter 2 Start Hour*    | 08:00 (8:00 AM) |
| Filter 2 Duration*      | 15 Minutes      |
| Light Cycle             | Disabled        |
| Light Cycle Default*    | OFF             |
| Light Cycle Start Hour* | 21:00 (9:00 PM) |
| Light Cycle Duration*   | 15 Minutes      |



<sup>\*</sup>May be changed by end-user (if enabled)

#### **Reminder Features**

| Feature          | Default  |
|------------------|----------|
| Reminders Shown* | Yes      |
| Check pH         | 0FF      |
| Check Sanitizer  | 0FF      |
| Clean Filter     | 30 Days  |
| Test GFCI        | 65 Days  |
| Drain Water      | 100 Days |
| Change Cartridge | OFF      |
| Clean Cover      | 0FF      |
| Treat Wood       | 0FF      |
| Change Filter    | 365 Days |



<sup>\*</sup>May be changed by end-user (if enabled)

### **Special Features**

Feature Default

Special Amperage Rule A No Limitation

Special Amperage Rule B No Limitation

Drain Mode Disabled
Demo Mode Disabled
Automatic GFCI Test Disabled

Ozone Slaved to Heater Pump Yes in Setups 1-3

No in Setups 4-6

Dual Voltage Heater Always Input Voltage

Safety Suction Disabled



## **TP600 Panel Configuration**

### **Button Layout Table**

| Feature | 2 Pumps            | 1 Pump       |
|---------|--------------------|--------------|
| #       | Setups 1, 2, 4 & 5 | Setups 3 & 6 |
| A1      | Jets 1             | Jets 1       |
| A2      | Jets 2             | Undefined    |
| А3      | MicroSilk®         | MicroSilk®   |
| A4      | Up                 | Up           |
| A5      | Light 1            | Light 1      |
| A6      | Down               | Down         |
| B1      | Jets 1             | Jets 1       |
| B2      | Jets 2             | Undefined    |
| В3      | Light 1            | Light 1      |
| B4      | Heat On            | Heat On      |



#### **TP600**

55676-XX (no overlay - North America only) 50015-XX (no overlay - International)



# **TP800 Panel Configuration**

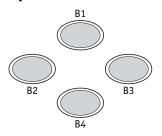
### **Button Layout Table**

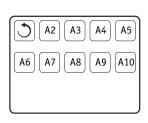
| Feature<br># | 2 Pumps &<br>Circ | 1 Pump &<br>Circ | 2 Pumps &<br>NO Circ | 1 Pumps &<br>NO Circ |
|--------------|-------------------|------------------|----------------------|----------------------|
|              | Setups 1 & 2      | Setup 3          | Setups 4 & 5         | Setup 6              |
| A1           | N/A               | N/A              | N/A                  | N/A                  |
| A2           | Jets 1            | Jets 1           | Jets 1               | Jets 1               |
| А3           | Jets 2            | MicroSilk®       | Jets 2               | MicroSilk®           |
| A4           | MicroSilk®        | Light 1          | MicroSilk®           | Light 1              |
| A5           | Light 1           | Invert           | Light 1              | Invert               |
| A6           | Invert            | (Circ Icon)      | Invert               | Undefined            |
| A7           | (Circ Icon)       | Undefined        | Undefined            | Undefined            |
| A8           | Undefined         | Undefined        | Undefined            | Undefined            |
| A9           | Undefined         | Undefined        | Undefined            | Undefined            |
| A10          | Undefined         | Undefined        | Undefined            | Undefined            |
| A11          | N/A               | N/A              | N/A                  | N/A                  |
| A12          | N/A               | N/A              | N/A                  | N/A                  |
| A13          | Undefined         | Undefined        | Undefined            | Undefined            |
| A14          | Undefined         | Undefined        | Undefined            | Undefined            |
| A15          | Undefined         | Undefined        | Undefined            | Undefined            |
| A16          | Undefined         | Undefined        | Undefined            | Undefined            |
| B1           | Jets 1            | Jets 1           | Jets 1               | Jets 1               |
| B2           | Jets 2            | Undefined        | Jets 2               | Undefined            |
| В3           | MicroSilk®        | MicroSilk®       | MicroSilk®           | MicroSilk®           |
| B4           | Light 1           | Light 1          | Light 1              | Light 1              |

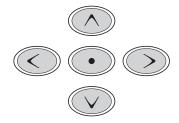


## **TP800 Panel Configuration**

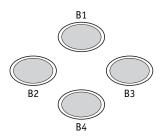
#### Spa Screen

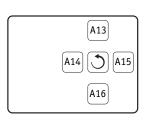


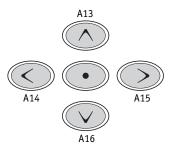




#### **Shortcuts Screen**







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

Button 1 is fixed.

Panel Part Number

Overlay Part Number

A Circ Icon will appear when a Circ Pump is configured using Setups 3, 4, 8, 9



## **TP900 Panel Configuration**

#### **Button Layout Table**

|             | -ayout labte      |                  |                      |                      |
|-------------|-------------------|------------------|----------------------|----------------------|
| Button<br># | 2 Pumps &<br>Circ | 1 Pump &<br>Circ | 2 Pumps &<br>NO Circ | 1 Pumps &<br>NO Circ |
|             | Setups 1 & 2      | Setup 3          | Setups 4 & 5         | Setup 6              |
| 1           | N/A               | N/A              | N/A                  | N/A                  |
| 2           | Jets 1            | Jets 1           | Jets 1               | Jets 1               |
| 3           | Jets 2            | MicroSilk®       | Jets 2               | MicroSilk®           |
| 4           | MicroSilk®        | Light 1          | MicroSilk®           | Light 1              |
| 5           | Light 1           | Invert           | Light 1              | Invert               |
| 6           | Invert            | (Circ Icon)      | Invert               | Undefined            |
| 7           | (Circ Icon)       | Undefined        | Undefined            | Undefined            |
| 8           | Undefined         | Undefined        | Undefined            | Undefined            |
| 9           | Undefined         | Undefined        | Undefined            | Undefined            |
| 10          | Undefined         | Undefined        | Undefined            | Undefined            |
| 11          | N/A               | N/A              | N/A                  | N/A                  |
| 12          | N/A               | N/A              | N/A                  | N/A                  |
| 13          | Jets 1            | Jets 1           | Jets 1               | Jets 1               |
| 14          | Jets 2            | Undefined        | Jets 2               | Undefined            |
| 15          | MicroSilk®        | MicroSilk®       | MicroSilk®           | MicroSilk®           |
| 16          | Light 1           | Light 1          | Light 1              | Light 1              |

A Circ Icon will appear when a Circ Pump is configured.



### **Auxilliary Panel Features on Bank 1\***

| Feature       | Default    |
|---------------|------------|
| Aux Button A1 | Jets 1     |
| Aux Button A2 | Jets 2     |
| Aux Button A3 | MicroSilk® |
| Aux Button A4 | Light      |

### **Auxilliary Panel Features on Bank 2\***

| Feature       | Default    |
|---------------|------------|
| Aux Button A5 | Jets 1     |
| Aux Button A6 | Jets 2     |
| Aux Button A7 | MicroSilk® |
| Aux Button A8 | Light      |

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

Bank 2 consists of J8 on the Main Circuit Board.

Aux Connection Splitter PN25257 may be required.



#### **Auxilliary Panel Features**

#### AX10 Panels on Bank 1\*

| No O/L | 52803                     |   |  |
|--------|---------------------------|---|--|
| No O/L | 52804                     |   |  |
| No O/L | 55805 Controls MicroSilk® | $\blacktriangleright$                         |  |
| No O/L | 52806                     |   |  |
|        | No O/L<br>No O/L          | No O/L 52804 No O/L 55805 Controls MicroSilk® | No 0/L 52804  No 0/L 55805 Controls MicroSilk® ▶ |

#### AX10 Panels on Bank 2\*

|                     | 52803 | No O/L | A5, AX10A1 |
|---------------------|-------|--------|------------|
|                     | 52804 | No O/L | A6, AX10A2 |
| Controls MicroSilk® | 52805 | No O/L | A7, AX10A3 |
|                     | 52806 | No 0/I | A8. AX10A4 |

### Call Customer Service for additional information about Auxiliary Panels.

| Auxiliary Panel Part Number |  |
|-----------------------------|--|
| Overlay Part Number         |  |

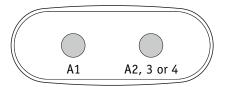
\*Bank 1 consists of J5 on the Main Circuit Board.

Bank 2 consists of J8 on the Main Circuit Board.

Aux Connection Splitter PN25257 may be required.

#### AX20

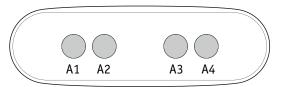
| AX20 A1A2 | No O/L | 52800 |
|-----------|--------|-------|
| AX20 A1A3 | No O/L | 52801 |
| AX20 A1A4 | No O/L | 52802 |



AX20 Auxiliary Panel plugged into Bank 1 will operate A1 + A2, A3 or A4. AX20 Auxiliary Panel plugged into Bank 2 will operate A5 + A6, A7 or A8.

#### **AX40**

AX40 No 0/L 52799

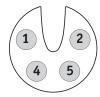


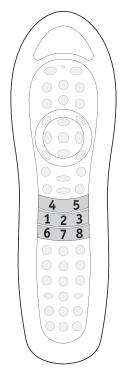
AX40 Auxiliary Panel plugged into Bank 1 will operate A1 + A2, A3 and A4. AX40 Auxiliary Panel plugged into Bank 2 will operate A5 + A6, A7 and A8.



#### **Remote Panel Features**

| Feature          | Default    |
|------------------|------------|
| Remote Button A1 | Jets 1     |
| Remote Button A2 | Jets 2     |
| Remote Button A3 | MicroSilk® |
| Remote Button A4 | Undefined  |
| Remote Button A5 | Light      |
| Remote Button A6 | Undefined  |
| Remote Button A7 | Undefined  |
| Remote Button A8 | Undefined  |





**Remote Panel Part Number** 

Overlay Part Number

