How to get into the "Service Mode"

Service Mode: to provide the spa service person and spa manufacturing more function capability in order to test, setup, or troubleshoot spa problems. This mode is intended for people with spa knowledge and therefore requires a special combination to enter.

- The user can access this mode through **Menu > Service Mode**.
- With the Service Mode highlighted, the user needs to press the Menu button, then press Up button, and finally press Down button to enter Service Menus.
- The combination keys need to be entered within 5 seconds from the last button pressed, otherwise the sequence needs to start over again.
- If a wrong button is pressed during the sequence, the combination key needs to start over.
- The following are functions available inside Service Mode:
    - **Equipment Test**: the equipment test or spa test is similar to Demo Mode, except the timing is longer. This is used by manufacturing to test their spa system after it is put together in the final line.
        - When user starts the equipment test:
            - Menu will exit to Main screen immediately
            - The system light and options (if selected in configuration) will turn on if not already on.
            - 5 seconds after light on, the first pump Low is on
            - Every 1 minute following, the next pump Low will turn on
            - One minute after all pump Lows are on, the first pump Low will switch to High speed
            - Every 1 minute following, the next pump Low will switch to High speed and pump High will set to run for 5 minutes
            - One minute after all pump High are on, if the system has a blower and ozone then both blower and ozone will turn on
            - Five minutes after all devices are turned on, all devices will get turned off, except the heat related pump will switch to Low speed.
            - Equipment test is finished
        - After equipment test is completed, the system will do a poll to check for water temperature and take appropriate action (Refer to **Water Temperature Checking** section for more detail)

    - **System Default**: allow the user to reset all user settings to default manufacturer's settings
        - Reset User setting can be done through selecting Default in this menu and pressing Return
        - When executed, the controller will reset all user settable values from the user menu to default values from the manufacturer
        - After resetting the values, the controller will reboot by itself and come back up in Priming Mode
        - All values settable under service mode will not get reset and will stay the same

- **System Logged**: ability to display the last 100 events that happened in the system. Through events logged, service may be able to determine the root cause of the problem.
    - Event shows date and time in one line and the event in the next line
    - Due to the screen having an odd number of lines, the software needs two screens to display a completed 5 events. Therefore the user sees the first 2.5 events logged in one screen and another 2.5 events in another.
    - The event logged displays in the order of last-in, first-out display
    - Push Down button twice to show the next 5 logged
    - Display screen will not timeout for 1 minute
    - If less than 100 events, end of the log will display a blank
    - If more than 100 events, the newest event will overwrite the oldest event
    - Events cannot be cleared unless the user reprograms the controller software.

- **Spa Light**: this screen allows spa manufacturers to select the type of spa light that they install in the spa.
    - There are 3 choices for spa light
        - On/Off: light for normal standard spa lighting. Software just turns on or off the triac output.
        - Dimmable: provides 5 levels of dimming for the light. Software will divide the 60Hz or 50Hz cycle to 5 different zones for minimum and maximum light intensities. Appropriate zone will turn on depending on the dimming level the user selected.
        - Color LED (for J&J color LED light): provides the user the ability to select a specific color every time they turn on the light. A special software interface with J&J color box for color selection was implemented for the ability to select specific color.
    - Default setting for this option is set to on/off light
    - The Spa Light setting set by the manufacturer will be saved in flash memory when the button is pressed and remembered even if the system is powered off and on.
    - This setting does not get reset by System Default and can only be changed through this menu

- **Configuration Page selection**: due to feature add-ons after implementing a communication protocol that only has a maximum of 16 configurations. This screen is added to provide the ability to expand more configurations in the future. Now the software can have up to 256 x 16 = 4096 configurations if needed. Currently the configuration page is limited to 4 pages with a total of 64 configurations.
    - The Spas Manufacturer will select a page number from 1 to 4 where their specific configuration for the spa is located.
    - The selected configuration page will save to the controller after the Return button pressed and remembered even if the system is powered off and on.
        - A new 16 configurations will be loaded to memory accordingly

        - The current system configuration prior to the change configuration page is no longer valid. If the system is powered off and on at this time, a wrong configuration may be loaded to the system.
        - The user must go to configuration to select the desired configuration from the new configuration page
    - Default setting for this option is set to page 1
    - This setting does not get reset by System Default and can only change through this menu

- **Configuration selection**: allow spas manufacturers to select a specific configuration that matches with their spas. To make the controller board a generic item for all manufacturers, the controller software only saves the configuration page number, configuration number, and the configuration specific details like pump1 2 speed, blower, light, etc. Panel software stores all available configurations. Spa manufacturers will set the configuration that they want for their model through the panel and these will be saved to the controller.
    - The Spa Manufacturer will select a configuration number from 1 to 16 where their specific configuration for the spa is located.
    - The selected configuration page will save to the controller after the Return button is pressed and remembered even if the system is powered off and on.
        - A system reboot will happened if the new configuration number and configuration details successfully send down to the controller
        - At controller power on, a new specific configuration detail and number will be sent from the controller to the panel to tell the system how to configure and how the panel button functionality should be mapped
        - The Panel will use the new configuration and button map layout as its software from now on
    - Default setting for this option is set to configuration Page 1,#13
    - This setting does not get reset by System Default and can only change through this menu
    - Timeout time for this screen is set for 1 minute before return to Main screen

- **Temperature Display**: this screen will display raw values of the 3 sensors S1, S2, and S3 reading
    - The 3 values will display in Fahrenheit degrees only (even with Celsius display in the Main screen)
    - The 3 values displayed are not truncated. For example, 73.67°F is displayed, and not 73°F like shown in the Main screen
    - The values will get updated every 5 seconds regardless of the heat related pump status
    - Display screen will not timeout for 5 minutes

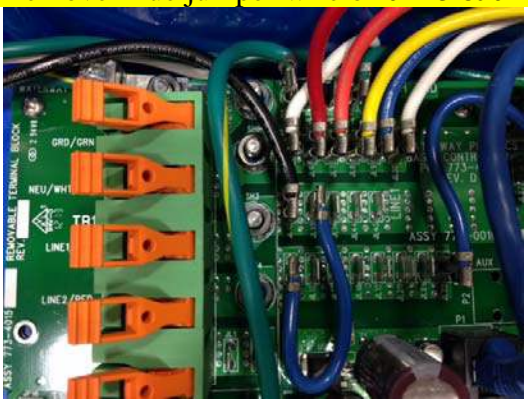
- **Aux Button Map**: the auxiliary panel is a potential future addition panel for Spa Manufacturers. There is no software in the auxiliary panel and the panel can have from one to six auxiliary buttons depending on the manufacturing. Therefore this

screen provides the ability for spa manufacturers to assign their specific button to a specific function of the spa

- The user will select from Aux Button 1 to Aux Button 6 for mapping
- Each button can be mapped to one specific device, like Light, Pump1 to Pump6, Blower, and Option 1 to Option 4
- The user can map 2 buttons to the same function if needed
- The controller will use this information and take appropriate action when there is an aux button pushed
- Default setting for this mapping is set to Aux1=Light, Aux2=Pump1, Aux3=Pump2, Aux4=Blower, Aux5=Pump3, Aux6=Pump4
- This setting does not get reset by System Default and can only change through this menu

- **Heating setup**: this screen allows the Spa installer person to set a condition that prevents a circuit breaker trip. A typical circuit breaker can only handle a certain amperage before it is tripped. The setting in this menu allows software to calculate and limit the number of pumps in high speed that the user can operate with the heater turn on.
  - Pump High: to select total amperage for a pump on high speed
  - Heater: to select which KW Heater is currently used in the system
  - Rating: to select what type of circuit breaker that user has in their location.
    - Selection of x16 amps is for Europe and will have a different rule. This will not allow Pump 1 in High speed with Heater on. Pump 2 to 6 on High speed will not affect the heater.
  - Default setting for this option is set to Pump = 17amps; Heater = 5.5 KWatts; and Circuit breaker rating = 40 amps (Only allow one High speed pump on with heater on)
  - The Heat setting set by the manufacturer will be saved in flash memory when the button is pressed and remembered even if the system is powered off and on.
  - This setting does not get reset by System Default and can only change through this menu
  - 50Hz only: CONVERT from a 1 phase to 2 phase's power for 2 X 16A circuit breaker.

    1- Remove Blue jumper wire on JL13 & JL15 (next to TB1 circuit board)



↖Blue Jumper wire between JL13 & JL15

2- Connect power to TB1
    a- Ground wire goes to “GRD/GRN”
    b- Neutral wire goes to “NEU/WHT/BLU”
    c- Hot wire goes to “LINE1/BLK”
    d- Hot wire (from 2nd phase) goes to “LINE2/RED”
    e- Hot wire (from 3rd phase) goes to “LINE3/BRN”. This phase for DB1 or DB2 circuit board only.

- **Option Timer selection**: this is a special feature for Waterways controller. In the majority of the configuration, there is a spare connector available and unused. The optional timer is assigned to this output and this can only be used if enabled by the manufacturer. Currently, this option is not mapped to any panel button (unless requested by the manufacturer), therefore the user can control it through a programmable timer.
    - User will select an option output from 1 to 4 depending on the configuration
    - If the option is selected, the user can start using the feature through **Menu > Option Timer**.
    - Default setting for this is none.
    - If the user changes configuration, this option will reset to none.
    - This setting does not get reset by System Default and can only change through this menu.