Certification Exhibit

FCC ID: Z9O-FAS1543-02
IC: 10060A-FAS154302

FCC Rule Part: 15.209, 15.231, 15.249
ISED Canada Radio Standards Specification: RSS-210

ACS Project: 16-2065

Manufacturer: Ecolab, Inc.
Model: FAS1543-02

User Manual

Patient Safeguard System™ Installation Tool Directions for Use

For Use With
FAS1543 (PSS Installation Tool)

DOC8022 Revision A

ECOLAB®
HealthCare Division

Table of Contents

Table of Figures

Reference Documents

DOC1037 – Patient Safeguard System Hub Directions for Use
DOC1046 – Patient Safeguard System Healthcare Worker Badge User Guide
DOC1048 & DOC8033 – Patient Safeguard System Patient Bed Installation
DOC1054 – Patient Safeguard System SmartLink Dispenser Beacon Module Installation Maintenance and Repair Manual
DOC8043 – Patient Safeguard System Dashboard Directions for Use

Abstract

The Function of this document is to instruct the user in the proper use of the PSS Installation Tool (FAS1543).

Revision History

Revision	Date	By	Description
0	01/28/16	AJS	Initial Release
A	06/09/16	AJS	Changed the Function of the Range Adjust Mode and Bed/Stretcher Mode. Removed USB Mode.

1.0 Introduction to the Patient Safeguard System (PSS)

The Patient Safeguard System is a state of the art wireless hand hygiene reminder system designed to enable best practices for proper hand hygiene in a healthcare facility. Multiple studies from organizations like the World Health Organization (WHO) and the Centers for Disease Control (CDC) have repeatedly demonstrated that proper hand hygiene leads directly to improved infection control and a reduction in Healthcare Associated Infections (HAI). The PSS is a cost-effective, energy efficient, robust and easily installed system for coaching healthcare workers (HCWs) to always wash or sanitize their hands before and after patient contact. The system can be divided into three parts, hardware components, the Bentley Wireless Network and the Dashboard web-based application.

1.1 Hardware Components

The PSS is built on individual components or devices that work in concert to deliver real-time individual hand hygiene status to HCWs and near real-time statistics for both onsite and offsite monitoring of current and historical hand hygiene compliance data. Currently, the components of PSS are the HCW Badge, the Dispenser Beacon and the Bed Beacon.

1.1.1 Healthcare Worker Badge
The Badge is a wireless device worn by the HCW to provide real-time notification of the HCW's current hand hygiene status. Notification is provided by both visual and audible alerts. The Badge is responsible for determining, maintaining and transmitting the current hand hygiene status of the HCW to other PSS components.

1.1.2 Dispenser Beacon
The Dispenser Beacon is attached to or embedded within a soap or sanitizer dispenser. Its function is to communicate with the Badge worn by the HCW when the dispenser is activated (dispense event), collect dispense event data from that Badge and then transmit the collected data to a network where it will ultimately be sent to an offsite server for processing and archiving.

1.1.3 Bed Beacon
The Bed Beacon, along with its external or internal (newer models) low frequency antenna is mounted to a patient bed. Its function is to communicate with the Badge worn by the HCW when the HCW comes in close proximity with the patient bed (bed event), collect bed event data from that Badge and then transmit the collected data to a network where it will ultimately be sent to an offsite server for processing and archiving.

1.2 Bentley Wireless Network

Bentley is a wireless mesh network used to transport event data collected by Dispenser Beacons and Bed Beacons to the offsite server for processing and archiving. Bentley is composed of two types of devices, Hubs and a Gateway.

1.2.1 Hubs
Hubs are installed throughout a healthcare facility and communicate with nearby Bed Beacons and Dispenser Beacons. When an event is generated by a Beacon, it broadcasts the event data to the nearest Hub. The Hub then receives the event data and rebroadcasts it to the Gateway (if it is in range) or the next nearest Hub where the data is passed from Hub to Hub until it reaches the Gateway.

1.2.2 Gateway
The Gateway receives event data generated by Dispenser Beacons or Bed Beacons directly, if they are in range, or from Hubs which act as repeaters. The Gateway then transmits the event data to an offsite server via cellular modem for processing and archiving.

1.3 Dashboard and Offsite Server

The Dashboard is a web-based application running on a designated offsite server. It is responsible for collecting, processing and archiving onsite Dispenser Beacon and Bed Beacon event data sent by the onsite Gateway. The Dashboard provides a user interface which allows access to hand hygiene data, statistics and reports compiled from event data originating at the healthcare facility.
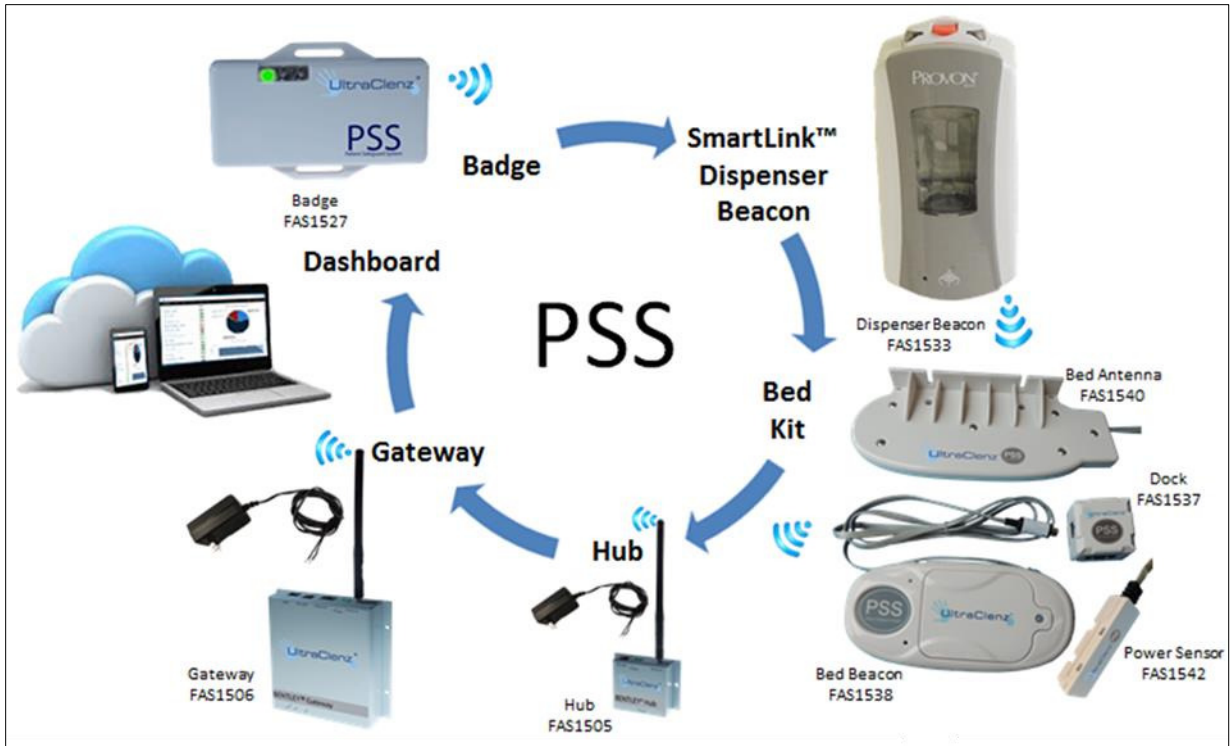
System A
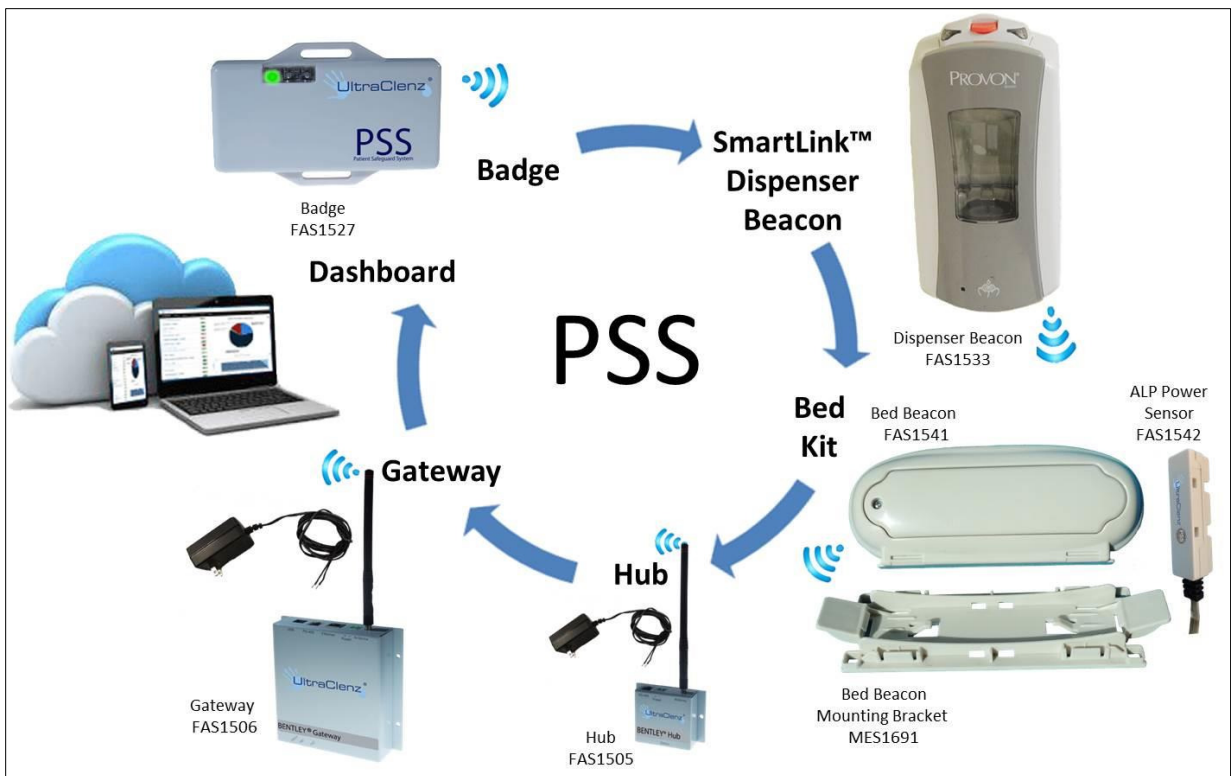
System B

2.0 Purpose of the PSS Installation Tool

The purpose of the PSS Installation Tool (FAS1543) is to ease the tasks of installing and maintaining the Patient Safeguard System™ (PSS). The Tool displays the address of all Beacons, but for more modern Beacons (System B), it can also display the firmware revision, battery level, range setting, and the bed / stretcher setting. The Tool also can be used in the testing of the range of a Beacon and the Beacon's communication to the Bentley network. The Tool can be used to adjust the range of more modern Beacons (System B). Also, the Tool can be used to switch more modern Bed Beacons from Bed mode to Stretcher mode (System B). In addition, the Tool can be used to test the Bed Beacon's peripherals, the PSS Badge and the functioning of the Bentley Network.

3.0 Features of the Tool

Figure 1 - FAS1543 Beacon Installation Tool's Features

Power Switch: The Power Switch is used to turn the Tool **on** and **off** when using battery power.

Peripheral Connector: The Peripheral Connector is used to connect either an external Antenna (FAS1540) or an AC Line Sensor (FAS1542) for testing. This connector will also accept a cable (CBL1033) to a Dock Box (FAS1537) and test both the external Antenna and AC Line Sensor at the same time.

3 Indicator LEDs: The LEDs are used to indicate the state of the communications between the Tool and the Beacon.

Display: The Display is used to display information about the last device the Tool has completed communications with. The Display is also used to indicate what mode the Tool is currently in.

Up Key: The Up key is used to increase the Beacon's range when in "Range Adjust" mode, or to toggle Bed and Stretcher modes in "Bed/Stretcher" Mode, and to navigate in the Menu.

Down Key: The Down key is used to decrease the Beacon's range when in "Range Adjust" mode, or to toggle Bed and Stretcher modes in "Bed/Stretcher" Mode, and to navigate in the Menu.

Menu Key: The Menu key is used to enter the Tool's Menu.

Select Key: The Select key has three functions. The first function is to select a Menu item when in the Menu. The second function is to turn the display on to read the information on the Display when in the "Beacon", "Bentley", and "Range Adjust" modes. The Select key is also used to begin a test in "Badge" mode.

Battery Compartment: The Tool is powered by two AA alkaline batteries placed in the battery compartment.

4.0 Operation with System A

4.1 Boot Post

When the power is turned on, the Tool will display the message "Booting", all three indicator LEDs will flash in sequence as the Tool performs an internal power on self-test, and the audible alert will beep for about 1 second. This is normal and provides feedback that the display, all three LEDs, and the audible alert are functioning properly. The Tool will then go into the last mode it was in before being powered down and is ready to be used.

4.2 Changing Modes

To change the mode that the Tool is in, press the Mode key, then use the Up and Down keys to navigate to the desired mode. Next press the Select key and the Tool will enter the desired mode.

4.3 Turning the Display Back On

The power supply for the display interferes with the Tool's radios and is turned off to allow the radios to communicate with Beacons. If the Tool's batteries are drawn down below a certain level, the display will go blank when the power supply is turned off. Pressing the Select key will turn the display on for a brief time allowing it to be read, but turning the radios off for that time period.

4.4 Beacon Communications Testing

The communications between a Beacon and a Badge can be tested with the Tool (the Tool emulates a Badge). The Tool is placed in Beacon mode and the three indicator LEDs give an indication of the quality of the communications at the range that the Tool is held from the Beacon (a Dispenser will have to be activated with the Tool in range). The green LED will light if the Tool detects a 125 KHz signal but the signal is corrupt in some manner. The yellow LED will light if the 125 KHz signal is found to be correct. The red LED will light when the Beacon and Tool correctly complete a communications cycle (both the 125 KHz and 2.4 GHz radios have worked correctly). The Tool will then display the Beacon's address. The Select key can be pressed to turn the display on for a brief period so the results can be read.

4.5 Testing a Beacon's Bentley Communications

The Tool can be used to check the operation of a Beacon's Bentley radio by placing the Tool into Bentley mode, then placing the Tool in the field of an active Beacon (a Dispenser Beacon must be activated). The Tool will only respond to a Beacon five times while in Bentley mode to keep the Beacon from flooding the network with messages. The next step is to use the dashboard's "Search" function to look up the Badge ID # 0A 00 00 01 and check if the "Device", date and time match the Beacon's address, and the time it was activated. The Select key can be pressed to turn the display on for a brief period so the results can be read.

4.6 Testing Peripherals

The Tool can be used to verify the operation of the AC Sensor (FAS1542) and the external Antenna (FAS1540). Please refer to the following two sections on the proper procedures to use.

4.6.1 Testing the AC Sensor (FAS1542)

To test the AC Sensor, please use the following steps.
   1.   Place the Tool in the Peripheral Test Mode.
   2.   Connect the AC Sensor that is to be tested directly to the Tool.
   3.   Place the AC Sensor on a power cord that is plugged into an outlet.

4. Read the Tool's Display;
   a. If the Display reads "Both Pass", the AC Sensor Fails.
   b. If the Display reads "Antenna Pass", the AC Sensor Fails.
   c. If the Display reads "AC Sensor Pass", the AC Sensor is good.

4.6.2 Test the Antenna (FAS1540)

To test an Antenna, please use the following steps
1. Place the Tool in the Peripheral Test Mode.
2. Connect the Antenna to the Tool.
3. Read the Tool's Display;
   a. If the Display reads "Antenna Pass", the Antenna is good.
   b. If the Display reads "AC Sensor Pass", the Antenna Fails.
   c. If the Display reads "Both Pass", the Antenna Fails.

Note: see also Section 4.9.5

4.7 Testing the PSS Badge

To test a Badge, the Tool must be placed into Badge mode. Press the Select key with the Tool in range of only one Badge. The Tool will begin a testing sequence of the radios that takes about four seconds to complete. The Tool indicates when the testing is complete by flashing an LED; green if the Badge passed the tests and red if the Badge failed the tests. The display will then show the Badge's address, Badge's battery percentage, and the status of the Badge's radio tests.

4.8 Testing the Bentley Network

The Tool can be used to determine if the Bentley Network has coverage at a particular location. Place the Tool in Network mode and hold the Tool at the location in question, then press the Select key. The Tool will then generate one PSS Event. Next, go to the dashboard's "Search" page and enter the address 1E000001 under the device and select PSS Events from the event list. Click the Search button and the dashboard should display an event that has an ET (Event Time) that corresponds to when the Tool's Select key was pressed. From the dashboard, the relative strength of the Tool's signal can be judged by looking at the dashboard's SS (Signal Strength) for that event. If the Signal Strength is below 50, an additional Hub may be required (Please consult DOC1037 PSS Hub Directions for Use).

4.9 Modes

The Tool has eight modes of operation. The first is Beacon mode that can be used to retrieve information about a Beacon. The second is Bentley mode that can be used along with the dashboard to test the Beacon's communication with the Bentley Network. The third is the Range Adjust mode, this mode does not work with System A. The Fourth is the Bed/Stretcher this mode also does not work with System A. The Fifth is the Peripheral Test that is used to verify the operation of the Bed Beacons' add-on devices. The sixth is the Badge mode and is used to test the functioning of a PSS Badge. The seventh mode is the Network mode and can be used to test the Bentley Network directly with the use of the dashboard. The eighth is the Menu mode and is used to select what mode the Tool is in. Also, information about the Tool can be obtained in this mode.

4.9.1 Beacon Mode

Figure 2 – Display in Beacon Mode, System A

Beacon mode is used by approaching a Bed Beacon with the Tool or by having the Tool in range of a Dispenser Beacon when it is activated. The green LED will light if the Tool detects a 125 KHz signal but the signal is corrupt

in some manner. The yellow LED will light if the 125 KHz signal is found to be correct. The red LED will light when the Beacon and Tool correctly complete a communications cycle (both the 125 KHz and 2.4 GHz radios have worked correctly). The Tool will then display the Beacon's Address. If the radios are active, the Tool's display may be too dim to see. To correct this, press the Select key and the Tool will turn off the radios and turn the display on for 5 seconds.
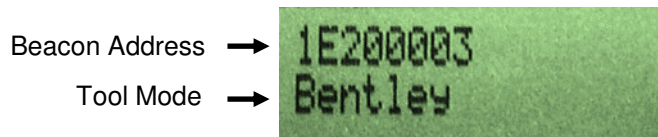
4.9.2 Bentley Mode

Beacon Address ➡️ `1E200003`
Tool Mode ➡️ `Bentley`

Figure 3 – Display in Bentley Mode, System A

Bentley mode is used to test the 433 MHZ radio that is used by a Beacon to communicate with the Bentley Network. The Tool will only respond five times to Beacons in this mode then the Tool will automatically switch to Beacon mode, this is done to prevent the Tool from flooding the network with extra messages. The dashboard will have to be checked to verify that the Beacon's message has worked its way through the Bentley Network successfully. The dashboard is checked by using the "Search" function and searching for the Beacon's address or searching for a Badge address of 0A000001. If the radios are active, the Tool's display may be too dim to see. To correct this press the Select key and the Tool will turn off the radios and turn the display on for 5 seconds.

4.9.3 Range Adjust Mode

Range Adjust mode does not work with System A.

4.9.4 Bed/Stretcher Mode

The Bed/Stretcher mode does not work with System A.

4.9.5 Peripheral Test Mode
The Peripheral Test Mode is used to test one of the two peripherals that can be attached to a Bed Beacon if they are plugged into the peripheral connector. The Tool will display one of the two following screens indicating that the peripheral named has passed the test. If the top line of the display remains blank, the peripheral has not passed the test and has failed.

`Antenna Pass` ⬅️ Test Results
Tool Mode ➡️ `Peripheral Test`
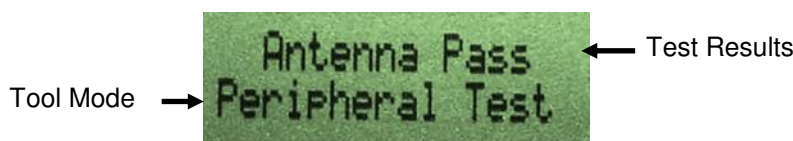
Figure 4 – Display of a Passing Antenna, System A

`AC Sensor Pass` ⬅️ Test Results
Tool Mode ➡️ `Peripheral Test`
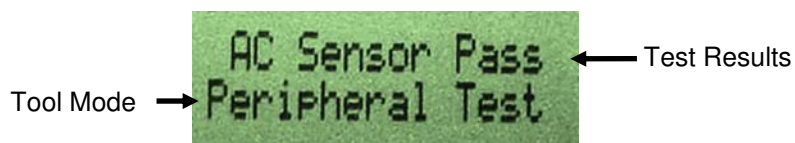
Figure 5 – Display of a Passing AC Sensor, System A

4.9.6 Badge Mode
Badge mode is used to check the operation of a PSS Badge. When the Select, key is pressed, the Tool will communicate with a single Badge that is in range (only one Badge may be in range of the Tool during the test). The Tool will then display the Badge's address, battery level as a percentage, and the results of a communications test of the Badge's 125 KHz and 2.4 GHz radios. At the end of the communications test (this can take up to four seconds) the Tool will flash a green LED if the Badge passed the communications test and a red LED if the Badge failed the communications test. The minimum range between the Tool and Badge should be at least 40 inches when the Badge passes the Tool's test.

Badge Address → `0A004F2B        95%` ← Badge Battery Percentage
Tool Mode → `Badge           Pass` ← Results of Badge Communications Test

Figure 6 – Badge Mode Display, System A

4.9.7 Network Mode

Network mode is used to test the integrity of the Bentley Network in a facility. When in this mode, pressing the Select key will cause the Tool to transmit a PSS Event over the Bentley Network, the green LED will light letting the user know that a message has been sent. Using the dashboard, the relative strength of the signal can be judged.

4.9.8 Menu Mode

Menu mode can be reached from any other mode by pressing the Menu key. The Up key and Down key are used to navigate through the Menu. The Select key is used to enter the displayed mode. There are eight modes that can be selected. Menu Mode is indicated by a blinking curser on the display.

1. Beacon mode (see section 4.9.1)
2. Bentley mode (see section 4.9.2)
3. Range Adjust mode (see section 4.9.3)
4. Bed/Stretcher mode (see section 4.9.4)
5. Peripheral Test mode (see section 4.9.5)
6. Badge mode (see section 4.9.6)
7. Network mode (see section 4.9.7)
8. Tool Info mode (see section 4.9.9)

4.9.9 Tool Info Mode

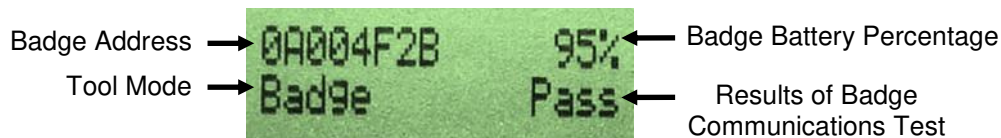Tool Firmware Revision → `v4.00  Batt 119%` ← Tool Battery Level
`About Tool_`
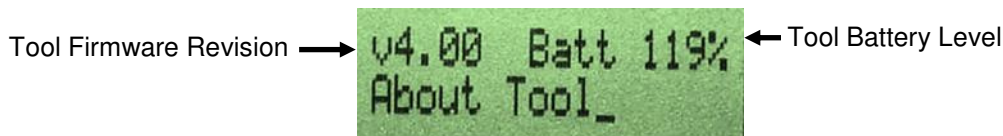
Figure 7 – Display in Tool Info Mode (First Screen), System A

Antenna Resonant Frequency → `125.0 KHz, C=13` ← Capacitor Used
Axis Identification → `X Axis Tuning_`

Figure 8 – Display in Tool Info Mode (Second Screen), System A

Selecting Tool Info mode will allow the viewing of information about the Tool. The first screen displays the Tool's firmware revision and battery level as a percentage. Screens two through four give information about the tuning of the antennas for the Tool's 125 KHz receiver. Pressing the Menu key will return the Tool to the main menu.

4.10 Replacing the Batteries

Open the battery compartment on the back of the Tool by sliding the battery door towards the bottom end of the Tool. Remove both old AA alkaline batteries from the battery compartment and discard. Place two new AA alkaline batteries in the battery compartment following the diagram inside the battery compartment. Replace the battery door back on the Tool by sliding the door towards the middle of the Tool.

5.0 Operation with System B

5.1 Boot Post

When the power is turned on the Tool will display the message "Booting", all three indicator LEDs will flash in sequence as the Tool performs an internal power on self-test, and the audible alert will beep for about 1 second. This is normal and provides feedback that the display, all three LEDs, and the audible alert are functioning properly. The Tool will then go into the last mode it was in before being powered down and is ready to be used.

5.2 Changing Modes

To change the mode that the Tool is in, press the Mode key, then use the Up and Down keys to navigate to the desired mode. Next press the Select key and the Tool will enter the desired mode.

5.3 Turning the Display Back On

The power supply for the display interferes with the Tool's radios and is turned off to allow the radios to communicate with Beacons. If the Tool's batteries are drawn down below a certain level, the display will go blank when the power supply is turned off. Pressing the Select key will turn the display on for a brief time allowing it to be read, but turning the radios off for that time period.

5.4 Beacon Communications Testing

The communications between a Beacon and a Badge can be tested with the Tool (the Tool emulates a Badge). The Tool is placed in Beacon mode and the three indicator LEDs give an indication of the quality of the communications at the range that the Tool is held from the Beacon (a Dispenser will have to be activated with the Tool in range). The green LED will light if the Tool detects a 125 KHz signal but the signal is corrupt in some manner. The yellow LED will light if the 125 KHz signal is found to be correct. The red LED will light when the Beacon and Tool correctly complete a communications cycle (both the 125 KHz and 2.4 GHz radios have worked correctly). The Tool will then display the Beacon's address, Beacon's battery level as a percentage and the Beacon's firmware revision. The Select key can be pressed to turn the display on for a brief period of time so the results can be read.

5.5 Testing a Beacon's Bentley Communications

The Tool can be used to check the operation of a Beacon's Bentley radio by placing the Tool into Bentley mode, then placing the Tool in the field of an active Beacon (a Dispenser Beacon will have to be activated). The Tool will only respond to a Beacon five times while in Bentley mode to keep the Beacon from flooding the network with messages. The next step is to use the dashboard's "Search" function to look up the Badge ID # 0A 00 00 01 and check if the "Device", date and time match the Beacon's address, and the time it was activated. The Select Key can be pressed to turn the display on for a brief period of time so the results can be read.

5.6 Adjusting a Beacon's Range

The Tool can be used to adjust the range of a Beacon by placing it into the Range Adjust Mode. The Tool must first complete a communications transaction with the Beacon to get the Beacon's current range setting; this means that a Dispenser Beacon will need to be activated before the range setting can be read. Then, use the Up key to increase the Beacon's range setting and the Down key to decrease the Beacon's range setting. The Tool will send the updated range setting to the Beacon with the next complete communications transaction with the Beacon; a Dispenser Beacon will need to be activated. The Select key can be used to turn the display on allowing the Beacon's current range setting to be read, the Up and Down keys also turn the display on allowing the new range setting to be read.

5.7 Changing a Beacon's Bed / Stretcher Mode

To make changes to a Bed Beacon's Bed/Stretcher mode (this mode determines if the AC Sensor (FAS1542) is required for the Beacon to operate correctly) use the Tool's Bed/Stretcher mode. The Tool's display will show the Beacon's mode and address. The Tool requires a completed communications transaction to load the Bed Beacon's current mode (the display will read "Bed" to use an AC Sensor and "Stret" to not use an AC Sensor). Then use the Up and Down keys to toggle the Tool in between Bed and Stretcher modes. The Tool requires that a final communications cycle be completed to transfer the new setting to the Bed Beacon. The Select key can be

used to turn the display on allowing the Beacon's current Bed/Stretcher mode to be read. The Up and Down keys also turn the display on allowing the new mode to be read.

5.8 Testing Peripherals

The Tool can be used to verify the operation of the AC Sensor (FAS1542). To test the AC Sensor, please use the following steps.
1. Place the Tool in the Peripheral Test Mode.
2. Connect the AC Sensor that is to be tested directly to the Tool.
3. Place the AC Sensor on a power cord plugged into an outlet.
4. Read the Tool's Display;
     a. If the Display reads "Both Pass", the AC Sensor Fails.
     b. If the Display reads "Antenna Pass", the AC Sensor Fails.
     c. If the Display reads "AC Sensor Pass", the AC Sensor is good.

5.9 Testing the PSS Badge

To test a Badge, the Tool must be placed into Badge mode. Press the Select key with the Tool in range of only one Badge. The Tool will begin a testing sequence of the radios that takes about four seconds to complete. The Tool indicates when the testing is complete by flashing an LED; green if the Badge passed the tests and red if the Badge failed the tests. The display will then show the Badge's address, Badge's battery percentage, and the status of the Badge's radio tests.
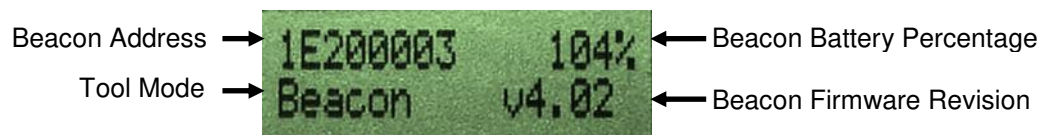
5.10 Testing the Bentley Network

The Tool can be used to determine if the Bentley Network has coverage at a location. Place the Tool in Network mode and hold the Tool at the location in question, then press the Select key. The Tool will then generate one PSS Event. Next, go to the dashboard's "Search" page and enter the address 1E000001 under the device and select PSS Events from the event list. Click the Search button and the dashboard should display an event that has an ET (Event Time) that corresponds to when the Tool's Select key was pressed. From the dashboard, the relative strength of the Tool's signal can be judged by looking at the dashboard's SS (Signal Strength) for that event. If the Signal Strength is below 50, an additional Hub may be required (Please consult DOC1037 PSS Hub Directions for Use).

5.11 Modes

The Tool has eight modes of operation. The first is Beacon mode that can be used to retrieve information about a Beacon. The second is Bentley mode that can be used along with the dashboard to test the Beacon's communication with the Bentley Network. The third is the Range Adjust mode that is used to make adjustments to the range settings of the Beacon. The Fourth is the Bed/Stretcher mode that is used to enable or disable the Beacon's requirement for an AC Sensor. The Fifth is the Peripheral Test that is used to verify the operation of the AC Sensor. The sixth is the Badge mode and is used to test the functioning of a PSS Badge. The seventh mode is the Network mode and can be used to test the Bentley Network directly with the use of the dashboard. The eight is the Menu mode and is used to select what mode the Tool is in. Also, information about the Tool can be obtained in this mode.

5.11.1 Beacon Mode

Beacon Address → `1E200003    104%` ← Beacon Battery Percentage
Tool Mode → `Beacon    v4.02` ← Beacon Firmware Revision

Figure 9 – Display in Beacon Mode, System B

Beacon mode is used by approaching a Bed Beacon with the Tool, or by having the Tool in range of a Dispenser Beacon when it is activated. The green LED will light if the Tool detects a 125 KHz signal but the signal is corrupt in some manner. The yellow LED will light if the 125 KHz signal is found to be correct. The red LED will light when the Beacon and Tool correctly complete a communications cycle (both the 125 KHz and 2.4 GHz radios

have worked correctly). The Tool will then display the Beacon's address, the Beacon's battery level as a percentage, and the Beacon's firmware revision. If the radios are active, the Tool's display may be too dim to see. To correct this press the Select key and the Tool will turn off the radios and turn the display on for 5 seconds.

5.11.2 Bentley Mode

Beacon Address ➔ `1E200003`
Tool Mode ➔ `Bentley`
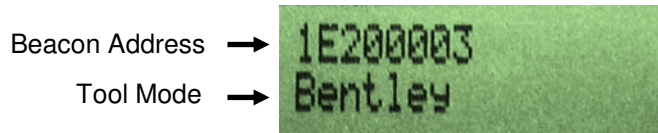
Figure 10 – Display in Bentley Mode, System B

Bentley mode is used to test the 433 MHZ radio that is used by a Beacon to communicate with the Bentley Network. The Tool will only respond five times to Beacons in this mode, and then the Tool will automatically switch to Beacon mode. This is done to prevent the Tool from flooding the network with extra messages. The dashboard will have to be checked to verify that the Beacon's message has worked its way through the network successfully. The dashboard is checked by using the "Search" function and searching for the Beacon's address, or searching for a Badge address of 0A000001. If the radios are active, the Tool's display may be too dim to see. To correct this press the Select key and the Tool will turn off the radios and turn the display on for 5 seconds.

5.11.3 Range Adjust Mode

Beacon Address ➔ `1E200003    R=01` ⬅ Beacon Range Setting
Tool Mode ➔ `Range Adjust`

Figure 11 – Display in Range Adjust Mode, System B

Range Adjust mode is used to change the range settings of the Beacons. The Tool will display the current range setting of the last Beacon it communicated with. If the radios are active, the Tool's display may be too dim to see. To correct this press the Select key and the Tool will turn off the 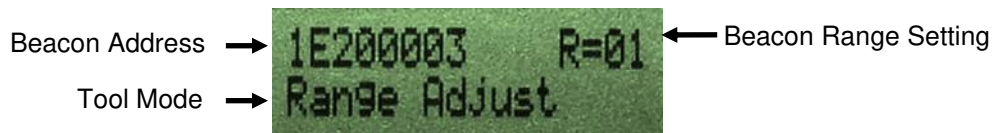radios and turn the display on for 5 seconds. If either the Up key or the Down key is pressed the Tool will then lock onto the last Beacon it communicated with. The Up key and Down key are then used to change the range setting of the Beacon, when the desired range setting is displayed, pressing the Select key will cause the Tool to transmit this setting to the Beacon it has locked onto, when the communication process is successfully completed the Yellow and Red LEDs will flash. If any other Beacon is in range the tool will not send the command for it to change its range setting. If the Tool has locked onto the wrong Beacon or if it is not desired to change the range setting of a Beacon the Tool can be unlocked by pressing the Menu key and reselecting Range Adjust mode and no changes will be made.

5.11.4 Bed/Stretcher Mode

The Bed/Stretcher mode is used to change the part of a Bed Beacon's configuration that requires the Beacon to check for a power detect signal from the AC Sensor (FAS1542) before the Bed Beacon transmits to any Badges present. The Tool first must communicate with a Bed Beacon to get the Beacon's current Bed/Stretcher setting. If the radios are active, the Tool's display may be too dim to see. To correct this press the Select key and the Tool will turn off the radios and turn the display on for 5 seconds. If either the Up key or the Down key is pressed the Tool will then lock onto the last Bed Beacon it communicated with. The Up and Down keys are then used to toggle the setting. Pressing the Select key will cause the Tool to transmit this setting to the Bed Beacon it has locked onto, when the communication process is successfully completed the Yellow and Red LEDs will flash. If any other Bed Beacon is in range the tool will not send the command for it to change its Bed/Stretcher setting. If the Tool has locked onto the wrong Bed Beacon or if it is not desired to change the Bed/Stretcher setting of a Bed Beacon the Tool can be unlocked by pressing the Menu key and reselecting Bed/Stretcher mode and no changes will be made.
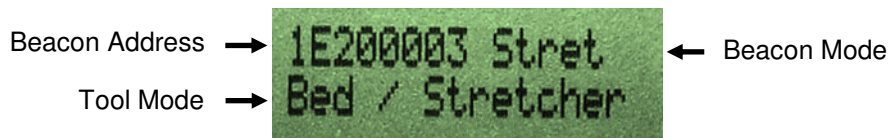
Beacon Address → `1E200003 Stret` ← Beacon Mode
Tool Mode → `Bed / Stretcher`

Figure 12 – Display in Bed/Stretcher Mode, System B

5.11.5 Peripheral Test Mode
The Peripheral Test Mode is used to test the AC Sensor.

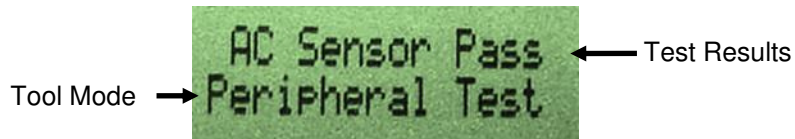`AC Sensor Pass` ← Test Results
Tool Mode → `Peripheral Test`

Figure 13 – Display of a Passing AC Sensor, System B

To test the AC Sensor, connect it to the Tool. If it passed, the Tool will display "AC Sensor Pass". If the AC Sensor failed, the top line of the display will remain blank.

5.11.6 Badge Mode
Badge mode is used to check the operation of a PSS Badge. When the Select key is pressed, the Tool will communicate with a single Badge that is in range (only one Badge maybe in range of the Tool during the test). The Tool will then display the Badge's address, battery level as a percentage, and the results of a communications test of the Badge's 125 KHz and 2.4 GHz radios. At the end of the communications test (this can take up to four seconds) the Tool will flash a green LED if the Badge passed the communications test, and a red LED if the Badge failed the communications test. The minimum range between the Tool and Badge should be at least 40 inches when the Badge passes the Tool's test.
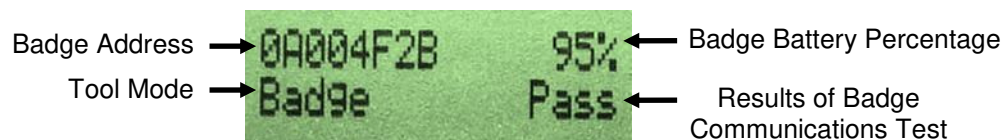

Badge Address → `0A004F2B        95%` ← Badge Battery Percentage
Tool Mode → `Badge          Pass` ← Results of Badge Communications Test

Figure 14 – Badge Mode Display. System B

5.11.7 Network Mode
Network mode is used to test the integrity of the Bentley Network in a facility. When in this mode, pressing the Select key will cause the Tool to transmit a PSS event over the Bentley Network, the green LED will light letting the user know that a message has been sent. Using the dashboard, the relative strength of the signal can be judged.

5.11.8 Menu Mode
Menu mode can be reached from any other mode by pressing the Menu key. The Up key and Down key are used to navigate through the Menu. The Select key is used to enter the displayed mode. There are eight modes that can be selected. Menu mode is indicated by a blinking curser on the display.

1. Beacon mode (see section 5.11.1)
2. Bentley mode (see section 5.11.2)
3. Range Adjust mode (see section 5.11.3)
4. Bed/Stretcher mode (see section 5.11.4)
5. Peripheral Test mode (see section 5.11.5)
6. Badge mode (see section 5.11.6)
7. Network mode (see section 5.11.7)
8. Tool Info mode (see section 5.11.9)

5.11.9 Tool Info Mode

Tool Firmware Revision ➡️ `v4.00  Batt 119%`
`About Tool_` ⬅️ Tool Battery Level
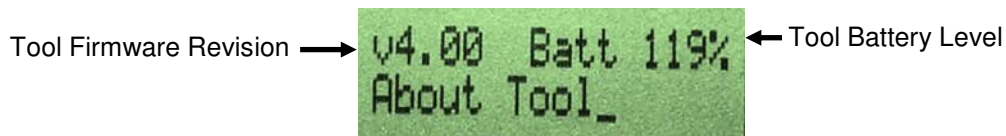
Figure 15 – Display in Tool Info Mode (First Screen), System B

Antenna Resonant Frequency ➡️ `125.0 KHz, C=13` ⬅️ Capacitor Used
Axis Identification ➡️ `X Axis Tuning_`

Figure 16 – Display in Tool Info Mode (Second Screen), System B

Selecting Tool Info mode will allow the viewing of information about the Tool. The first screen displays the Tool's firmware revision and battery level as a percentage. Screens two through four give information about the tuning of the antennas for the Tool's 125 KHz receiver. Pressing the Menu key will return the Tool to the main menu.

5.12 Replacing the Batteries

Open the battery compartment on the back of the Tool by sliding the battery door towards the bottom end of the Tool. Remove both old AA alkaline batteries from the battery compartment and discard. Place two new AA alkaline batteries in the battery compartment following the diagram inside the battery compartment. Replace the battery door back on the Tool by sliding the door towards the middle of the Tool.

6.0 Troubleshooting

6.1 The Tool's display will not turn on when the Select key is pressed

   A.   Ensure that the Power Switch is pressed down on the right side.
   B.   Replace the two AA alkaline batteries.

6.2 Beacon events do not appear on the dashboard

   A.   Ensure that the Tool is in the Bentley mode. The Beacon will not send an event over the network if the Tool is in any other mode.
   B.   Ensure that the Beacon is working. This can be done by putting the Tool in Beacon mode and testing the Beacon.
   C.   Ensure that the network is working. This can be done by putting the Tool in Network mode and testing the network connection at the Beacon's location.

7.0 Cleaning the Tool

The Tool should be cleaned by wiping with a soft cloth. A mixture of 90% water and 10% chlorine (bleach) or water and mild detergent (dish soap) may be used. The cloth should be damp but not wet. Only the exterior of the Tool may be cleaned. Do not attempt to clean the interior of the Tool as this will damage the Tool's circuitry. Do not use abrasive cleaners or cleaning products in aerosol cans as they will damage the Tool's finish.

Appendix A - Certification and Safety Approvals

FCC Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help."

WARNING: Changes or modifications not expressly approved by Ecolab, Inc could void the user's authority to operate the equipment.

RF EXPOSURE:
"This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter."

Industry Canada

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter (IC: 10060A – FAS154302) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (IC: 10060A – FAS154302) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Magnetic Loop Antenna
Printed-F antenna, 6.3 dBi
Helical antenna, 1.9 dBi

Appendix B - Warranty

This device is warranted against defective materials and workmanship for two years from the date of purchase.

Equipment covered by this warranty will be repaired or replaced in the United States and Canada, WITHOUT CHARGE, except for shipping and handling, by our Factory Service Center.

When returning equipment for warranty service, you must first call your distributor's **Warranty Service Department** for your Return Merchandise Authorization Number (RMA). The RMA must be on your return label and the shipping charges must be pre-paid and a copy of your receipt must be enclosed. Equipment should be returned to Ecolab Customer Service, 1201 Jupiter Park Drive, Jupiter, FL 33458.

This warranty covers all defects incurred from normal use of the equipment and does not apply in the following cases:

   a. Loss or damage to the equipment due to abuse, mishandling, accident or failure to follow installation or use instructions.

   b. If the equipment is defective as a result of leaking batteries.

   c. If the equipment has been serviced or modified by someone other than our authorized agents.

 THE AFOREMENTIONED IS IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT SHALL THE VENDOR BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT OR SPECIAL DAMAGES OR LIABILITY, TRANSPORTATION, INSTALLATION OR SUBSTITUTION COSTS, DELAYS, OR FOR ANY OTHER DAMAGES, COSTS, OR EXPENSES INCURRED, IRRESPECTIVE OF HOW THEY OCCUR. THIS WARRANTY SHALL NOT EXTEND TO ANY OTHER PERSON OTHER THAN THE ORIGINAL PUCHASER OF THIS EQUIPMENT OR THE PERSON FOR WHOM IT WAS PURCHASED AS A GIFT.

This warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state. This warranty is given with respect to equipment purchased in the United States.