



Installation Manual

iBOS[®] Pro 6 Series



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Version 1.6



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iBOS® Pro 6 Series

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1. Introduction

1.1 System overview

This manual will give you all the information you need to install the iBOS® battery management system. Once installed this system will help create a smooth-running battery room and provide valuable management information on the batteries and chargers. Before getting into all the details of installation, a quick overview of how the system works may be helpful.

Once the system is installed, every charger will have a small monitoring device attached to it called a Sentinel™ that works on all voltages (12-80v). The Sentinel's™ basic function is to detect when the charger finishes charging and to tell the Control Box that a fully charged battery is now available for use. The Sentinel™ also detects when a battery is connected without the charger starting. After 24 hours in this state, the Sentinel™ will terminate and return the battery to the rotation, even though the battery was not charged, to avoid stranding the battery indefinitely. A charger no-start record will appear on the iBOSworld Web Service website indicating charger #, date and time.

All Sentinels™ are wired via a daisy chained bus into the Control Box which keeps track of all the charged batteries. The chargers are grouped into pools, one pool for each type/size of battery in the facility. One or more scrolling LED displays, mounted on the wall, or a wireless display, mounted on the battery changer, tells the operator which battery to pick next. The battery that is fully charged and that has been cooled down the longest will appear on the display, assuming there are no “charger no start” batteries. There is also a built-in shouter which announces a message in one of seven languages telling the operator when they have picked an incorrect battery. This enables the system to ensure proper battery rotation.

The procedure for the operators is:

- When a truck comes in for a new battery, the operator looks at the display for that pool.
- It will tell him/her which battery to take. For example, they may see a message like: “Take next REACH TRUCK battery from charger 102.”
- The operator goes to the slot marked “102” to get the battery for that type of truck.

The Control Box is also capable of sending data to a website where it can be analyzed, and reports are generated. These reports contain information necessary for keeping the battery selection process running smoothly and can be used to predict when a drift in process is due to too many/too few batteries, malfunctioning chargers, and operators following instructions improperly. The connection to the internet is either a standard direct network Ethernet or via cellular modem. The Ethernet method saves money over the cellular service but requires IT department approval and installation. The cellular modem requires a signal to a cell tower but can be a quick and reliable alternative.

Once data is being sent out, users who have the proper login permission can log into the website and see information about the performance of the battery room. This information can help determine if the site is running short of batteries or has too many, if all the chargers are working properly, and if the operators are correctly following the instructions.

1.2 Organization of this Manual

This manual has been divided into sections for each of the stages of an installation project:

- Section 2 – System components. This section is simply to help you get familiar with what the various parts of the system are and what they look like.
- Section 3 – Planning the job. When you are specifying a job, there are some useful guidelines that we have found to be helpful in initially specifying the system.
- Section 4 – Pre-installation. You have ordered the system and are ready to go on the installation trip. The steps in this section are invaluable in preparation for when you are on site. Our goal is that you only need to make one trip to complete the installation.

- Section 5 – Installing the hardware. Finally, the actual installation steps to get everything mounted and wired.
- Section 6 – Configuring the software. This is how you tell the Control Box the names of the pools, the charger numbers and other configuration information.
- Section 7– Final Inspection and testing
- Section 8– Troubleshooting
- Appendixes- on various topics to support the installation and your system understanding.

1.3 Contact Information

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 Fax: +61 2 9012-0383
 Email: Info@phlsci.com.au

1.4 Installation Outline

Once you get on site, the installation can be divided into three basic stages.

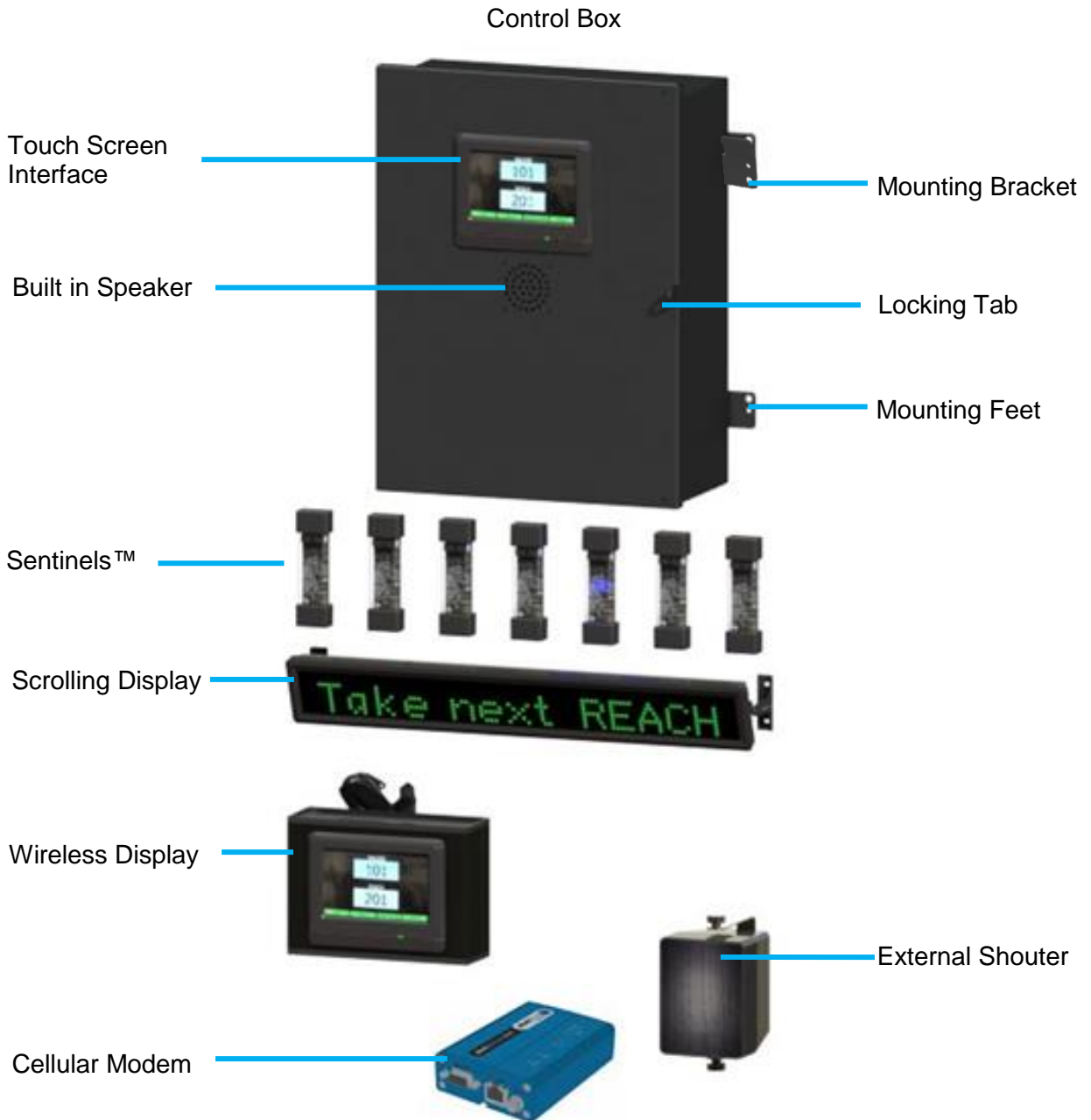
- I. Control Box and peripherals – This stage requires some knowledge of battery rooms and can involve some customer input.
 - a. Mount Control Box
 - b. Mount Scrolling Displays or Wireless Display
 - c. Mount External Shouter alarm (Optional)
 - d. Connect Ethernet (Installed prior to iBOS® installation, preferably) or cellular modem
 - e. Review battery pools and charger/battery slots
- II. Connecting chargers – This takes the longest time, is repetitive, and someone who is familiar with general electrician-type work can be trained quickly.
 - a. Wiring bridge from the Control Box to the 1st Sentinel™ of each bus.
 - b. Mounting Sentinels™ on each charger
 - c. Running the Sentinel™ Data Cable between Sentinels™
 - d. Label chargers and battery bays
- III. Testing and configuring the system – This step is probably the quickest (unless problems with wiring are found and must be fixed). It is also the most iBOS® specific.
 - a. Name pools
 - b. Configure chargers
 - c. Test upload capability
 - d. Set system for operations or running dark period
 - e. Operator Training

2. System Components

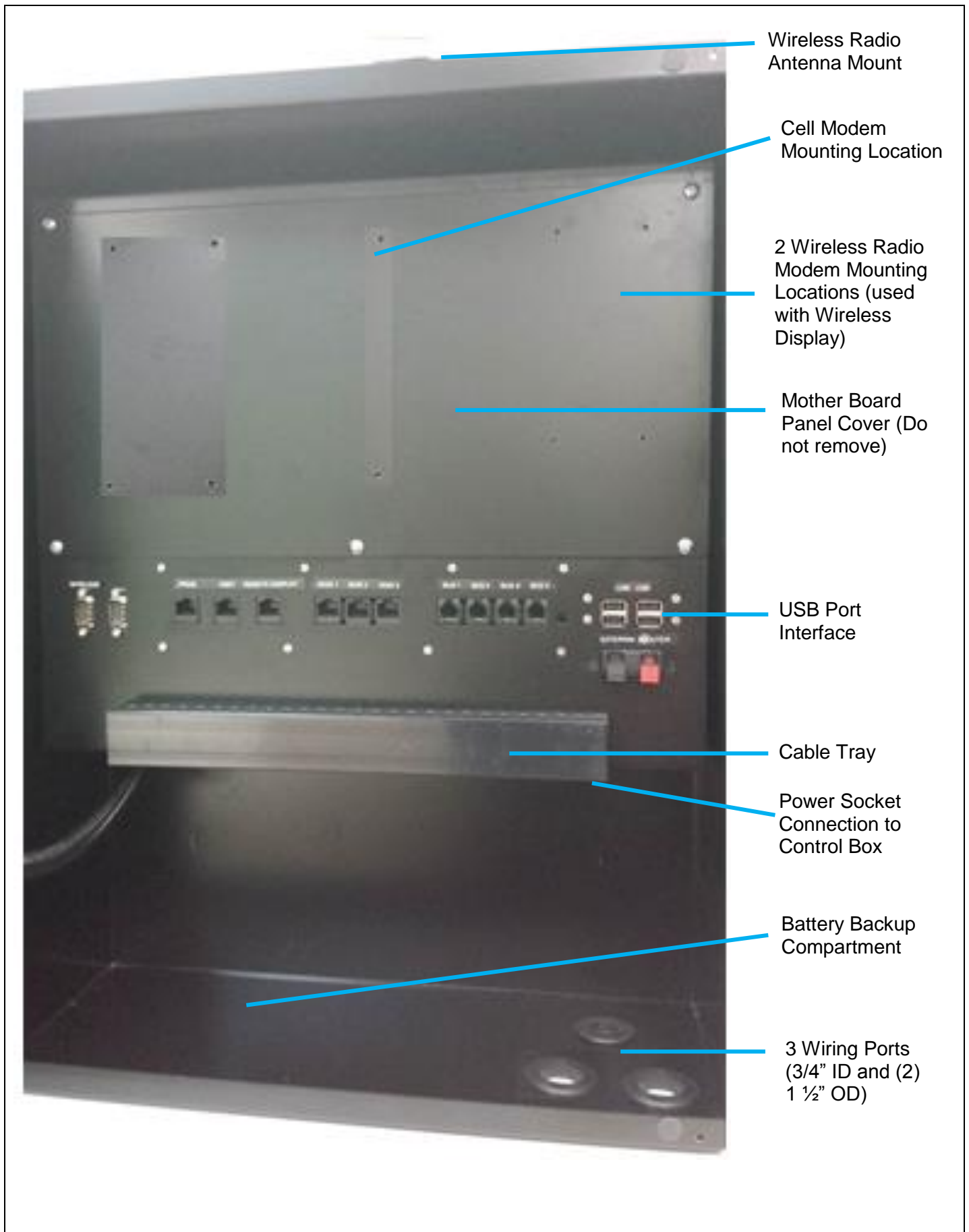
2.1 Individual Components

The iBOS® Pro 6 Series Control Box is manufactured in two versions:

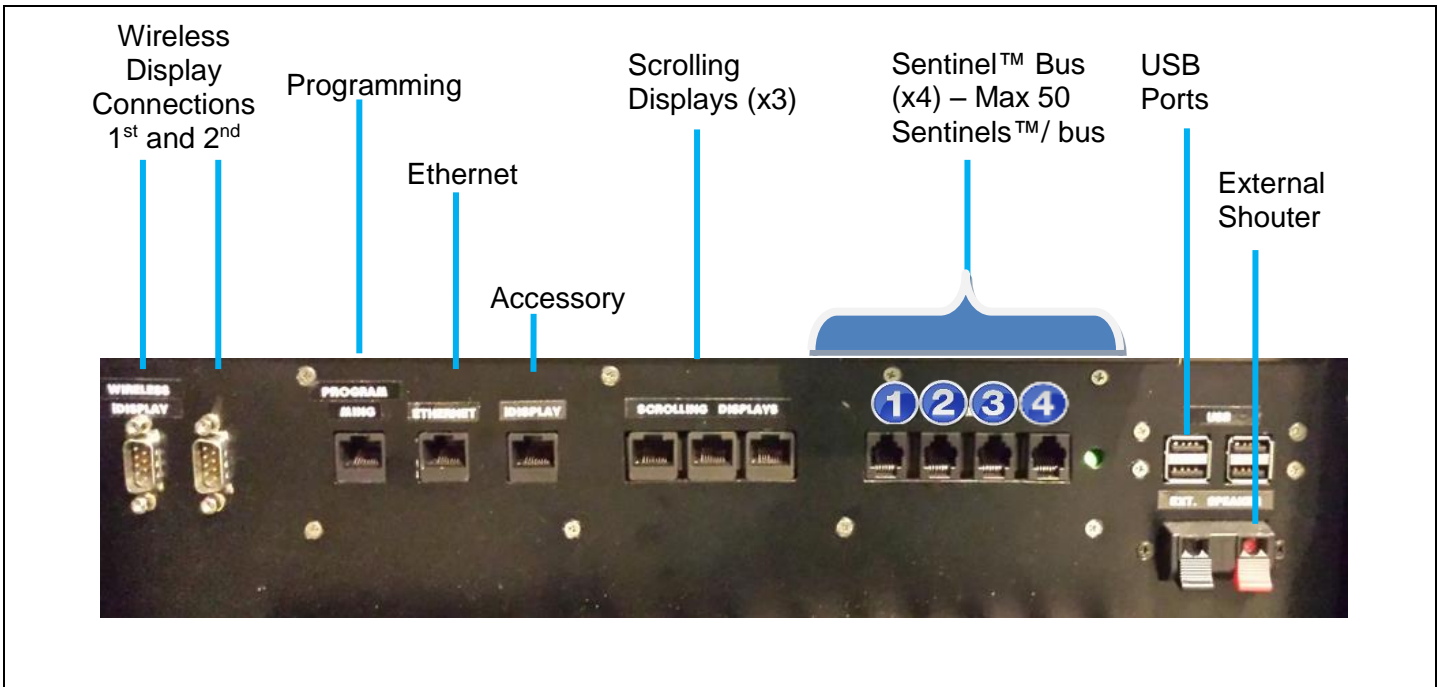
- BOS-CB6700 – can connect up to 200 Sentinels™ with Scrolling Displays or wireless display
- BOS-CB6710 – can connect a max of 350 Sentinels™ with wireless display
-



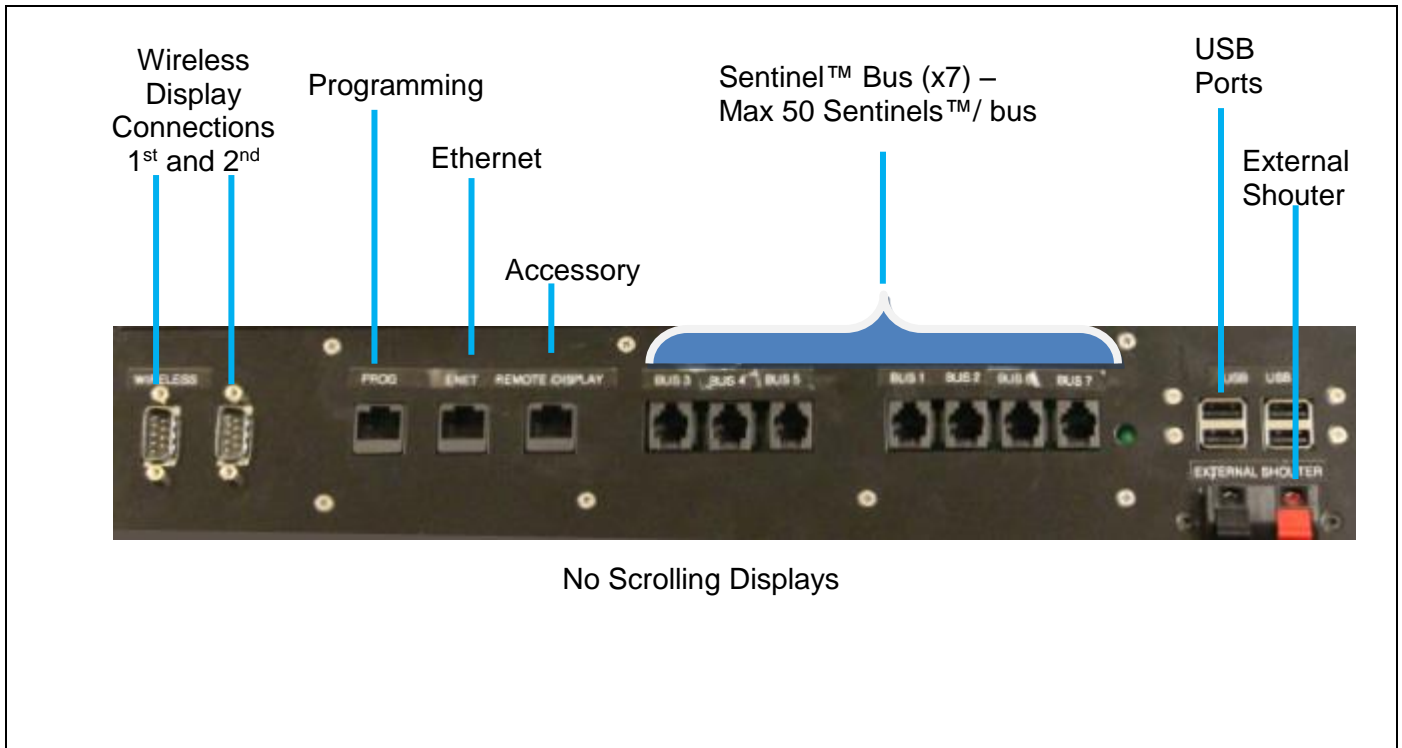
2.2 Control Box



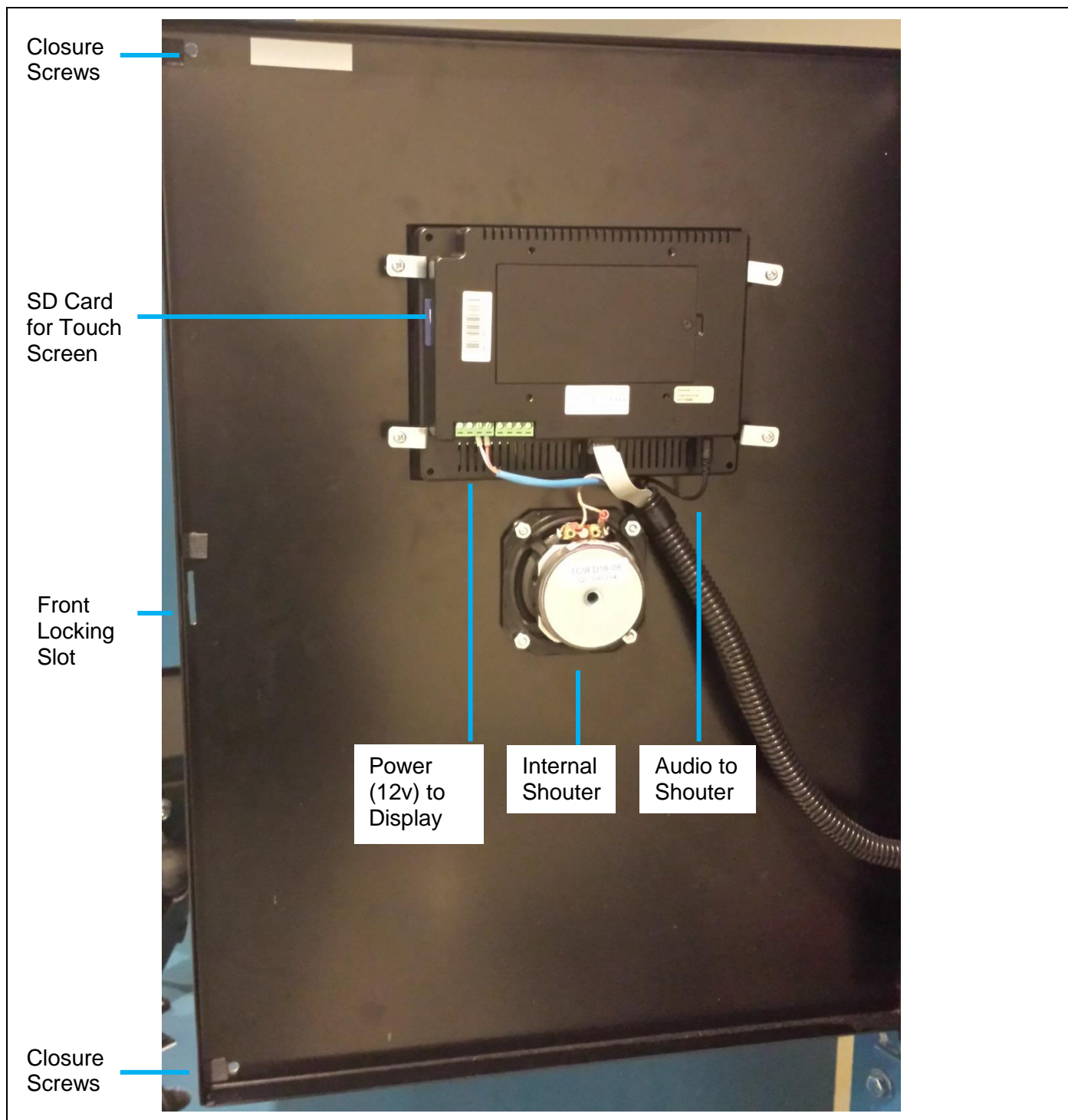
2.3 BOS-CB6700 Ports



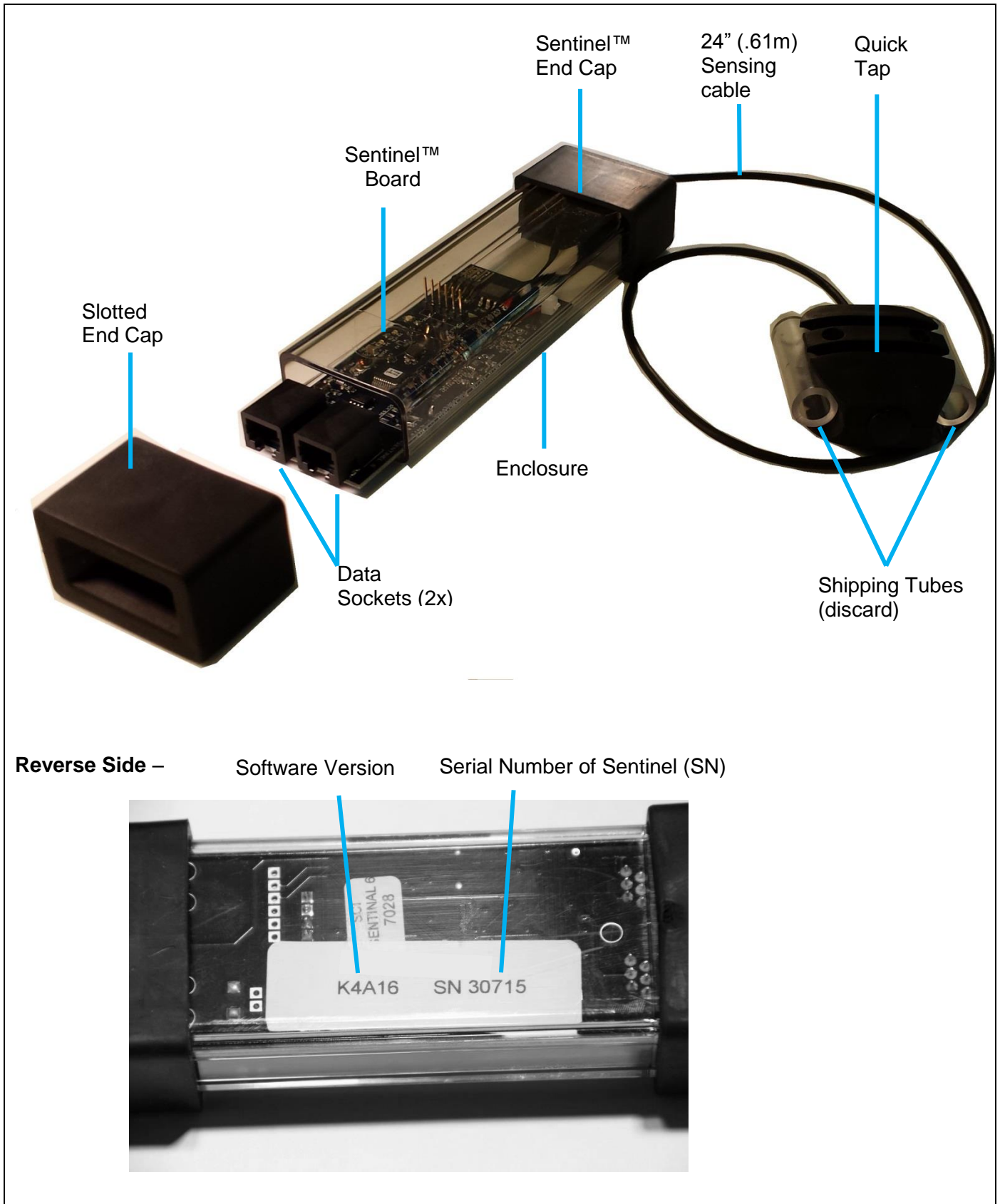
2.4 BOS-CB6710 Ports



2.5 Control Box Rear of Front Door



2.6 Sentinel™ BOS-SU6000 Anatomy



2.7 System Components

<p>Sentinel™ BOS-SU6000</p>	
<p>Scrolling Display BOS-DSPT</p>	
<p>Wireless Display BOS-WD6000</p>	
<p>Sentinel™ Data Cable and Coupler 25' (7.6 m) (CAT3) BOS-143</p>	
<p>Sentinel™ Data Cable and Coupler 100' (30.5 m) (CAT3) BOS-161</p>	

**Peripheral Data Cable
(CAT5e) and Coupler 50'
(15.2 m)**

BOS-200



External Shouter

BOS-SH6000

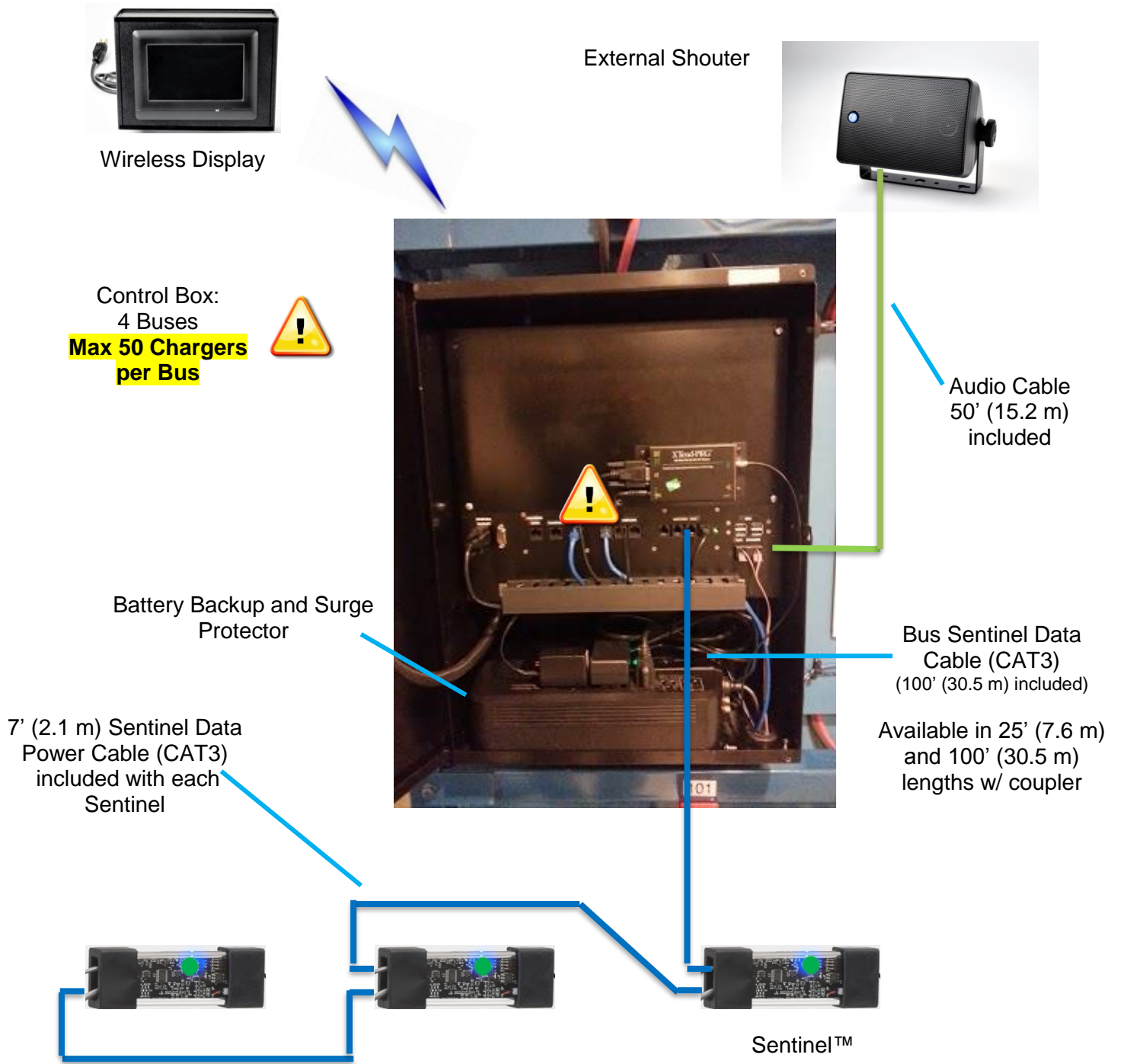


**Custom Sentinel™ Data
Cable Kit**

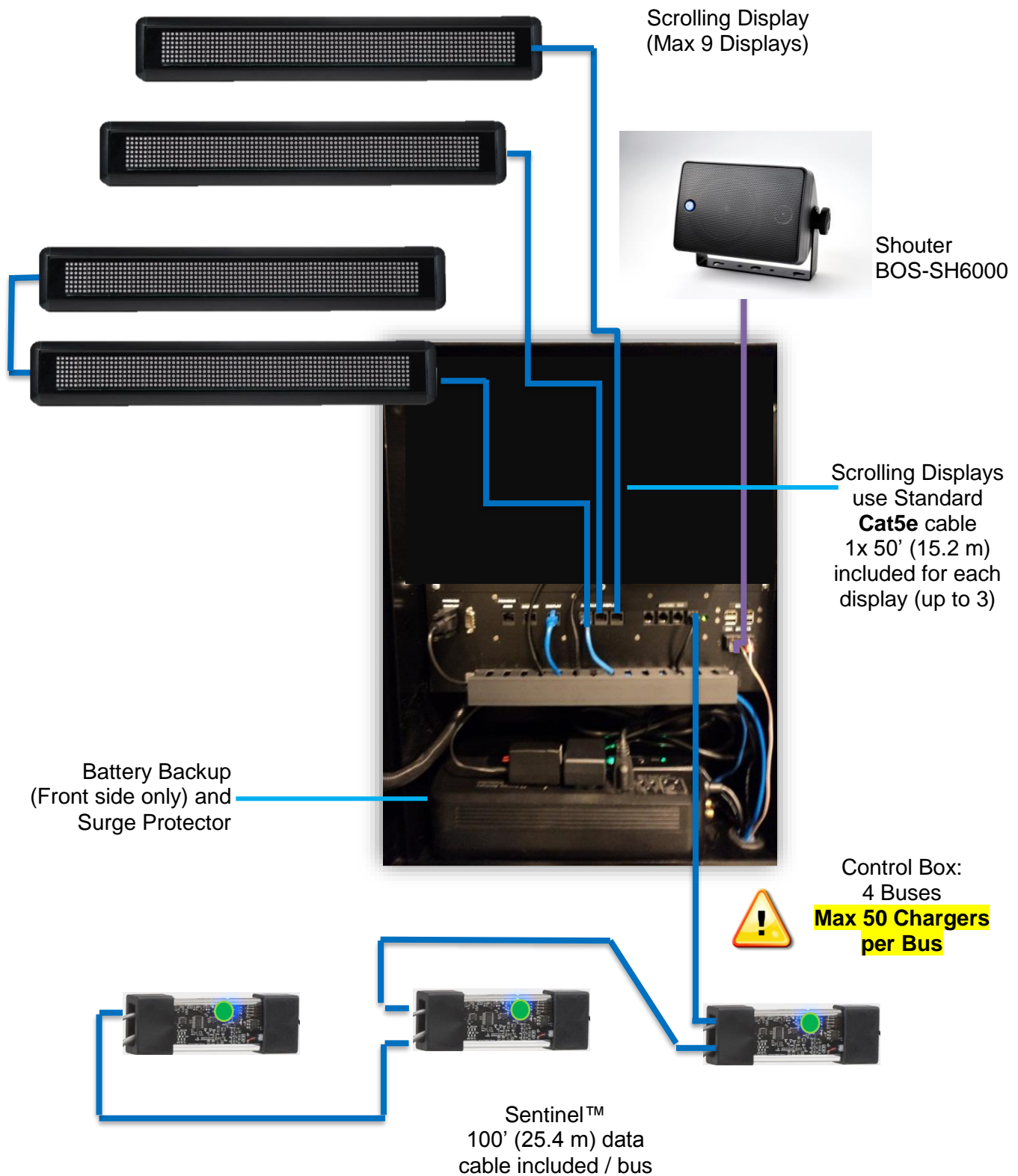
BOS-159



2.8 Wireless Display System Diagram



2.9 Scrolling Display System Diagram



3. Planning / Specifying Job

3.1 Decide on Pools

The first step is to make a list of all the pools in the facility. The groups of different kinds/sizes of batteries are put into pools. For example, all of the reach truck batteries would be considered one pool. All of the Pallet Jack batteries would be a different pool.

For example, if a distribution center has 12 chargers for pallet jacks, 9 chargers for reach truck batteries, and 7 for turret truck batteries, we would have 3 pools.

Pool 1 → "PALLET JACK" Pool 2 → "REACH TRUCK" Pool 3 → "TURRET"

As shown in this example there will always be at least one pool for each battery type/size in the facility. There can be more pools in some situations

If a distribution center has 2 battery changers you may want to configure 2 pools for each battery type. Assume that each battery changer has 40 chargers for pallet jacks and 25 chargers for reach trucks. You would probably want to set up 4 pools:

Pool 1 → "PALLET (LEFT)" Pool 2 → "REACH (LEFT)"
Pool 3 → "PALLET (RIGHT)" Pool 4 → "REACH (RIGHT)"

NOTE: The names of the pools need to be 13 characters or less.

3.2 Count Chargers in Each Pool

You will need one Sentinel™ for each charger. The Sentinels™ are universal voltage and work from 12v to 80v DC.

3.3 Wireless Display Location

(if applicable for your system)

- Wireless Display (BOS-WD6000) is normally mounted on the battery charger.
- Power Requirements:
 - o 110 / 220 VAC outlet

Surge protector is recommended. See appendix D- Display Protection.



- It can also be mounted on a wall or anywhere that is convenient.



(BOS-174 optional mounting bracket shown in use.)

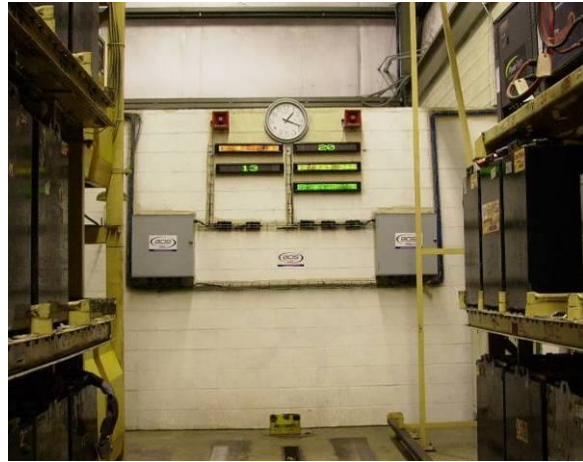


3.4 Scrolling Display Location

(if applicable for your system)

- The Scrolling Display shows which battery to take. The people who change the batteries must be able to see the display easily.
- **Method 1 Grouped**: locate all of the Scrolling Displays together, i.e. at the end of the battery changer bay. Many installers find it helpful to install the displays and shutters on a backboard before going to the site to make a very professional look and to make installation easier (Appendix C).
- **Method 2 Per Pool**: If you have two battery changers, the Scrolling Displays for each battery changer can be put in the bay for that changer.
- The Scrolling Displays can also be mounted near the pool for that display.

NOTE: It is highly recommended that each display is protected with a surge protector (see Appendix D).



Scrolling Displays mounted together (Method 1)



Displays mounted next to each pool of batteries (Method 2)

3.5 Control Box Location

Locate Control Panel in a clean, dry safe area:

- Near battery chargers.
- Close to the Scrolling Displays. Ideally less than a 50' (15.2 m) run for the display cable.
- Less than 6' (1.8 m) from an AC outlet
- Out of the way, so it won't be damaged by lift trucks or other moving objects
- At eye level for display for programming – Installing the hanger bracket at eye level will accomplish this.



Use appropriated anchors as dictated by the wall material you are mounting the Control Box (35 lbs. (15.9 kg))

- Where it won't obstruct anything
- Where it will be easy to run cable from the chargers.

3.6 Sentinel™ Data Cable Requirements

Data Cables are required to be run from the Control Box to the first Sentinel™ as well as from Sentinel™ to Sentinel™ for the rest of the chargers in a daisy chain method for a max of 50 Sentinels™ per Bus. Model BOS-CB6700 has 4 Buses with a system max of 200 Sentinels™ and model BOS-CB6710 has 7 buses with a system max of 350 Sentinels™. Using non-approved cable may not work and could void your warranty.

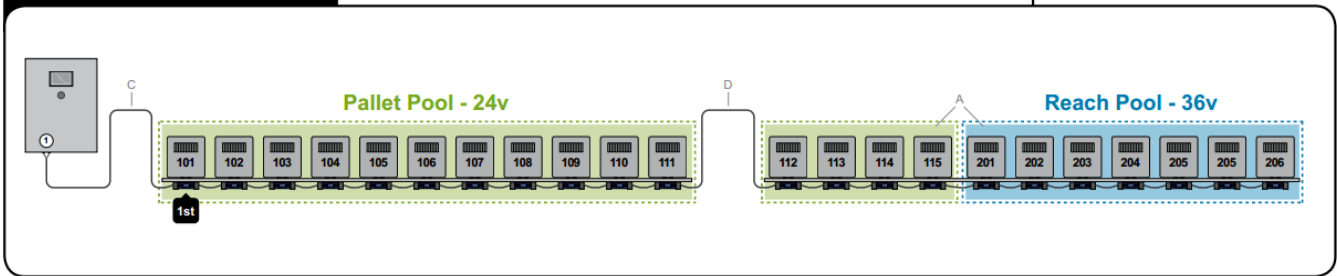
- 7' (2.1 m) Sentinel™ Data Cables (supplied with each Sentinel™)
- 25' (7.6 m) Sentinel™ Data Cables w/coupler (must be ordered) BOS-143
- 100' (30.5 m) Sentinel™ Data Cable w/coupler (1 per Bus is supplied with control box) BOS-161
- Custom Cable Kit (must be ordered) BOS-159

You need to purchase enough cable to reach the first Sentinel™ for **each Bus** you are using.

Here are some sample layouts of a typical battery room layout.

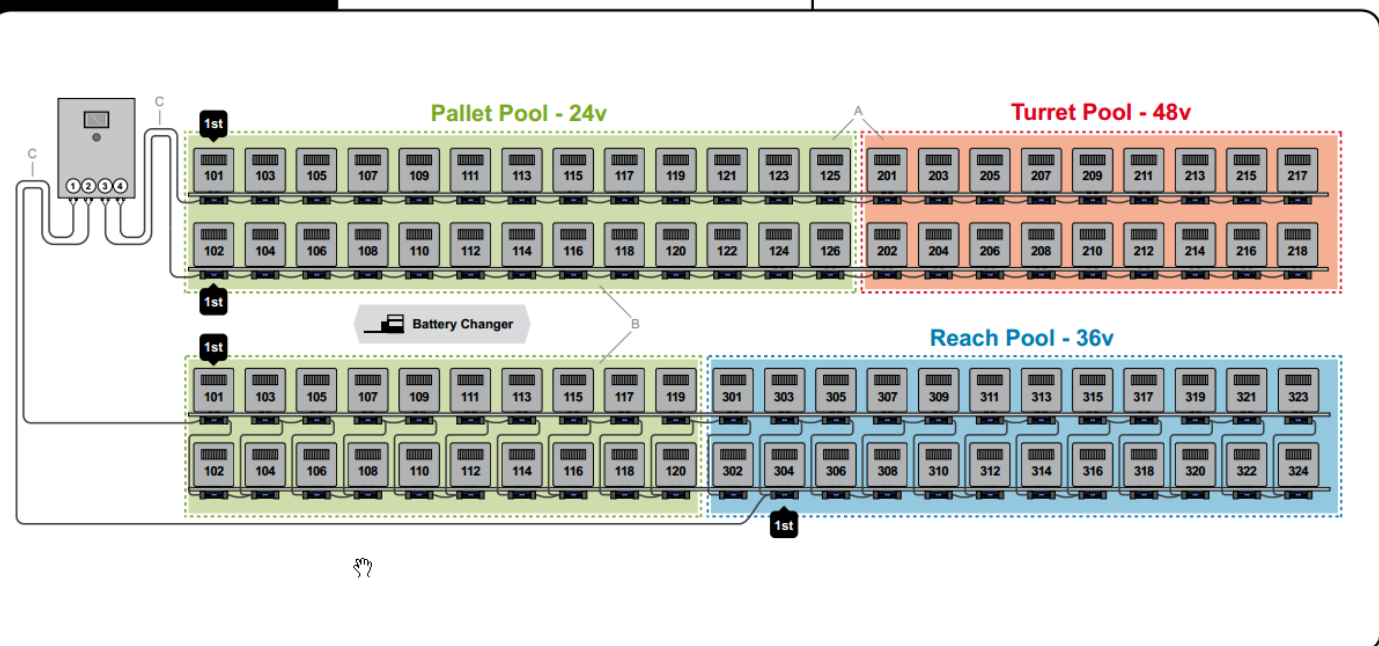
A BUS CONNECTS & POWERS UP TO 50 SENTINELS

1 Bus Set-up Example Single Side with Single-level Racking, Including Bridge



Sample 1: Layout 2 pool on one bus.

4 Bus Set-up Example Two Sides with Multi-level Racking



Sample 2: Layout - 3 pools on 4 Buses.

- (A) A single Bus can run multiple pools.
- (B) One Pool can span across multiple buses.
- (C) The distance from control box and the first Sentinel™ can vary as required.
- (D) Bridges can be installed between different racks with varied distances as required

These samples above show that you can mix voltages and pools on one bus. The limitation is that you can only have up to 50 Sentinels™ on one bus.



Two examples of Bus cabling are shown in the picture above:

Bus 1: 50' (15.2 m) of cable needed even though it was only 10' (3 m) from the Control Box to the first Sentinel™.

Bus 2: 100' (30.5 m) of cable needed even though it was only 30' (9.1 m) from the Control Box to the first Sentinel™.

Resources – Length of prepared data extension cable available: 25' (7.6 m), 100' (30.5m) and a bulk custom cable kit of 1000' (305 m).

3.7 Installation Service

We offer installation services. Having us come and do the installation along with you on your first job can help train you and ensure a successful first installation and many to follow.

4. Pre-Installation

These are items that should be done before installation begins.

4.1 Check data connection availability

You can save time on installation day if you make sure that everything is ready ahead of time for the data connection. In general, the customer does not have to supply much for you to be able to do the job. The most complicated thing the customer must supply is a way to connect the Control Box to the internet. There are two ways the Control Box contacts the website:

- Network connection – The Control Box can be plugged into a standard computer network jack (Ethernet RJ45) and can reach the internet through the customer's computer network. This generally requires coordination with the customer's IT department. Usually the IT department will have to configure the company firewall to allow communication from the Control Box to get to the website. If the customer is interested in this refer their IT department to Appendix C in this manual.
- Cellular Modem – BOS-133 – This unit will upload data to iBOSworld.com through the local cellular tower. The standard modem uses Verizon Wireless Service to upload iBOS® event data. You can verify a good signal is available using any Verizon based phone. If no signal is available in the battery room an outside antenna can be installed to get a signal. If you have no Verizon coverage in the location but have AT&T, you will need to make a special order, and we can set that up. Global coverage is by Vodafone and is also available. Note: Additional charges for cellular service are required.

4.2 Check power availability

The customer must supply 120 VAC/240 VAC for the Control Box and the display(s). Sometimes the system is installed using extension cords and the facility electricians come by later and install new A/C outlets after the locations of the Control Box and displays have been locked in.

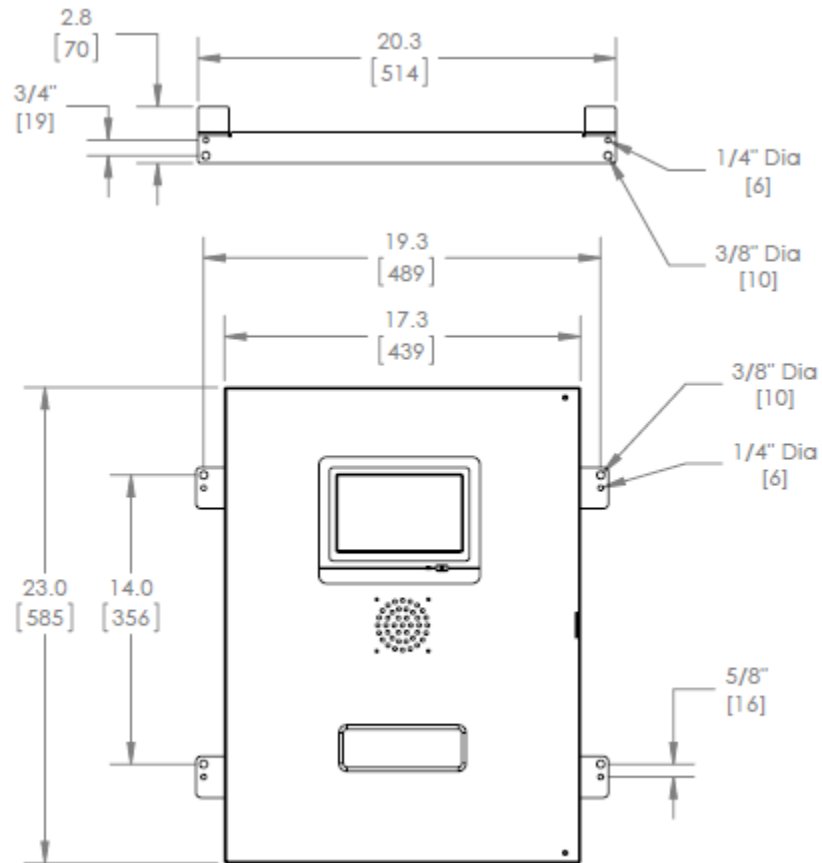
iBOS® Component Power Requirements		
	Voltage	Amperage
Control Box	110 - 220 VAC	1.3A
Wireless Display	110 - 220 VAC	0.9A
External Shouter	n/a	
Scrolling Display	110 - 220 VAC	1.8A
Cellular Modem	110 - 220 VAC	0.6A

Layout Planning Restrictions to Consider:

- Cord (audio cable) length included is 50' (15.2 m) long to Shouter. This can be replaced with a longer length of standard audio cable.
- Extension cords can be used, and surge protectors are highly recommended for Scrolling Displays.

4.3 Control Box Dimensions

Be sure that there is adequate clearance around the control box to connect cables. (Power, Ethernet, etc.)



4.4 Charger Configuration

To maximize system performance and avoid operator confusion, check the charger settings to ensure they are not programmed to

- Delay Start
- Delay Equalize Charge
- Cool Down delay

iBOS[®] will manage which battery to take next and maximize the cool down for the pool so delay settings are no longer needed and may create delays and confusion if left in place.

4.5 Pre-installation Phone Conference

Part of the service that Philadelphia Scientific[®] provides with each iBOS[®] is a pre-installation phone call. One of our experienced iBOS[®] technicians will verify receipt of the materials for your installation and review the Control Box set-up procedures. Finally, he or she will answer any questions about the iBOS[®] product and installation. This usually takes 30 minutes for a complex installation.

4.6 Useful Tools and Materials

There are some tools that are essential to have when installing an iBOS[®].

Tools and Supplies for Installation:

- Drill (for mounting the Control Box)
 - Cordless Drill (hammer-drill combo)
 - Hammer Drill bits

- Anchors (for mounting the Control Box)
- Level (for mounting the Control Box)
- 10 mm Nut Driver (Klein 630-10MM) (used to secure Scrolling Display to mounting brackets)
- Phillips Screw Driver (opening Control Box)
- Diagonal-Cutting Pliers (for snipping off the cable ties on the Sentinels™) (Klein D228-8)
- Multi-meter
- Ladders
- Flashlight (head mount lamps are helpful for 2 hand Sentinel™ mounting).
- Extension cords
- Other Items:
 - Vinyl stick-on numbers (for marking battery locations. 1" (25.4 mm) white number sets. 100 characters 10 each of 0-9. McMaster-Carr® part number 5752T545.)
 - Single-Channel or Uni-Strut® Slotted-Hole Channel, (for Sentinel™ Data Cable bridging from Control Box to 1 5/8" x 1 5/8", Zinc-Plated Steel Sold by the foot McMaster-Carr® part number 3310T201)

4.7 Pre-Install Checklist

Task	Status
Plan for location of Control Box: <ul style="list-style-type: none"> • Power to Control Box. • Proximity to chargers. • Protected from heavy traffic. • Plan for Sentinel™ Data Cable run to the 1st Sentinel™ in each bus. • Ensure enough Sentinel™ Data Cable (CAT3) is ordered. 	<input type="checkbox"/>
Gather all required tools and equipment: <ul style="list-style-type: none"> • Ladders and/or Scissor Lifts. • Power Tools – for mounting Control Box, etc. • Hand Tools – wire cutters, Phillips-head screwdriver. • Extension cords for temporary power. • Anchors for mounting components based on mounting wall. 	<input type="checkbox"/>
Additional items to purchase: <ul style="list-style-type: none"> • Get surge protection for the Scrolling Displays and/or Wireless Touch Screen (not included). 	<input type="checkbox"/>

5. Installing System Components

5.1 Installing Control Box

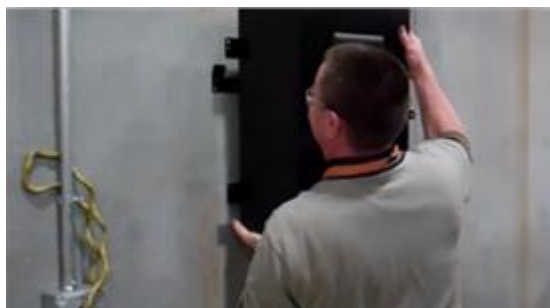
5.1.1 Install Mounting Bracket

- Secure the Mounting Bracket at eye level using one anchor screw. Ensure the Prongs are pointing up and out.
- Level the Mounting Bracket and then secure the other end in place.



5.1.2 Mounting the Control Box

- Simply slide the top support feet of the Control Box over the prongs of the Mounting Bracket. This holds the Control Box in place for you to continue install.



5.1.3 Securing the Control Box to Wall

- Level Control Box after mounting
- Secure the Control Box to the wall with four more screws as needed.



5.2 Installing the Battery Backup into the Control Box

5.2.1 UPS in Control Box

- Connect the leads on the back up battery inside the UPS to enable the battery back-up.
- Connect the Control Box's power cord to an outlet on the 'Battery Backup' side of the Battery Backup.



5.2.2 Route UPS Cable to Power

- Remove the grommets from the bottom port in the Control Box to allow for easier wiring of the UPS power cord.
- Thread the power cable of the Battery Backup through the bottom grommet and connect to power.



Power Cable

Grommets

5.3 Installing the Sentinel™

5.3.1 Run Sentinel™ Data Cable to 1st Sentinel™ of Each Bus

- Be sure to use only the supplied Sentinel™ Data Cable.
- If you are creating custom cable, see Appendix E.
- You may need to run a bridge to the 1st Sentinel™ of the bus from the Control Box as the Control Box is often mounted on the exterior wall and you need to reach the battery/charger rack safely.



- With 50 sentinels, you can go 300' (91.4 m) max to the first sentinel using the CAT3 (24 gauge) standard wire provided with each bus.
- The limiting factor is 19 Volts min voltage on the last Sentinel™. When the system is installed, you can look at the System Info screen to check if your lowest voltage on the bus is above the 19 Volt limit.

System Information

Last Event		Details				
Pool Number: 1		Yesterday's bus statistics:				
Pool Name: PALLET	Charger ID: 2307	Bus	Good	Bad	Forgiven	Flagged
Event: Battery Connect	Event Date: 8/1/2014	1	0	0	0	0
Event Time: 11:17 AM		2	0	0	0	0
		3	0	0	0	0
		4	0	0	0	0
		Bus statistics since Thu Jul 31 15:34:32 2014				
		Bus	Good	Bad	Forgiven	Flagged
		1	1	0	0	0
		2	1	0	0	0
		3	0	0	0	0
		4	0	0	0	0
		FTP Upload Interval Setting: Every 6 hours				
		Lowest Bus 1 voltage is 0.0 at unknown charger				
		Lowest Bus 2 voltage is 23.72 at unknown charger				
		Lowest Bus 3 voltage is 0.0 at unknown charger				
		Lowest Bus 4 voltage is 0.0 at unknown charger				
		Sentinel 10920 not reporting (charger , bus 2)				

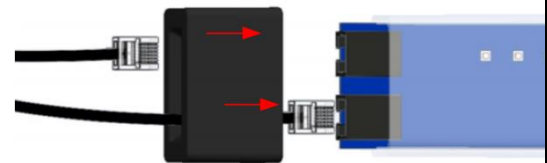
5.3.2 Connect Sentinel™ Data Cable to Sentinel™ Socket

Sentinel™ Wiring:

- Remove the Sentinel™, Sentinel™ Data Cable, and Mounting Tool (mounting squares and wire-ties) from the box.
- Remove the slotted end cap.
- Squeeze the end cap to open the slot and allow easier insertion of Sentinel™ Data Cables.

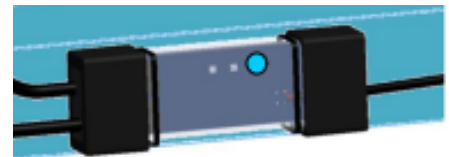


- Insert the Sentinel™ Data Cable into the socket with tab down.
- Connect the Sentinel™ Data Cable from the previous Sentinel™ (for all the Sentinels™ after the first in a pool) as well as a second Sentinel™ Data Cable for next Sentinel™ through the slotted end cap to either of the ports (independent of order).



Plug into either socket

- With the upstream sentinels™ connected to the powered Control Box, check the green LED which should be solid indicating power and communication.
- Slide the end cap back onto the Sentinel™.



5.3.3 Mount Sentinel™

- Mount on or near the charger in a visible, stable area for better LED identification and troubleshooting.
- Do not mount Sentinels™ inside chargers as some chargers (notably high frequency ones) have too much electrical noise inside the cabinet.
- It is best to use the cable ties to mount the Sentinel™ for maximum security.
- Note: When a battery is connected and the Sentinel™ is powered, the amber light should be illuminated.

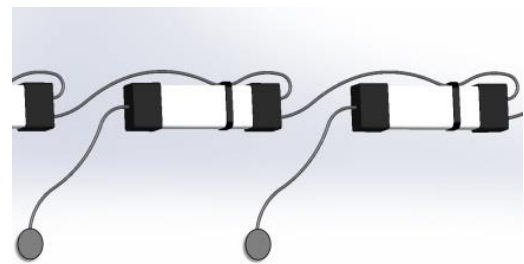


- Use the cable tie to **reduce stress** on the Sentinel™ Data Cable between Sentinels™ by securing the Sentinel™ Data Cable to the Sentinel™. Leave some slack on the cable in the loop.
- The RJ12 sockets on the board can be damaged if the Sentinel™ Data Cable is pulled forcefully.



Correct Strain Relief Technique

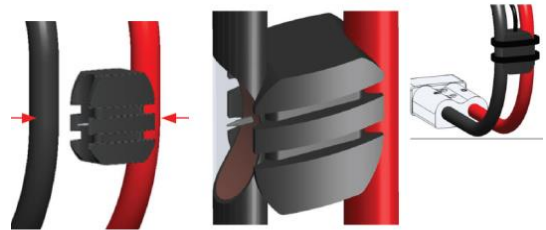
Note: Connect each Sentinel™ to the upstream unit to ensure all the connections are completed.



5.3.4 Connect Sentinel™ to charger

Make sure charger is turned off.

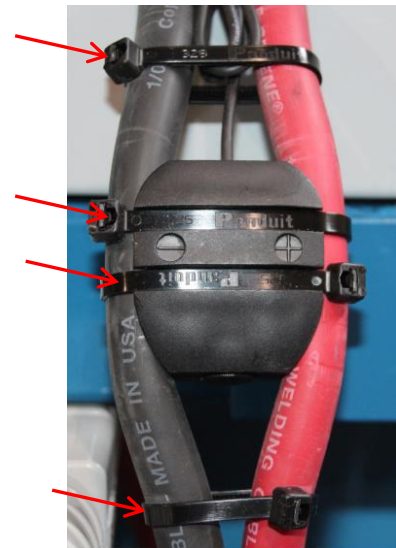
- Remove the tubing from the ends of the Quick Tap.
- Pull the charger cables apart from each other and insert the cable connector in between.
- Place the Quick Tap between the cables on the charger and squeeze.
- Keep the pins centered on the cable and push the cables fully to the bottom of the recess allowing the pin to completely penetrate the cable.
- ***Be careful to not bend the pins.***



Quick Tap Installation Diagram

- Ensure the charger cables are secure with **four wire-ties**.
- Verify the amber LED illuminates with a battery connected. If not, check that the pins on Quick Tap have not been bent during installation.

Note: if the connector is re-installed or replaced, do not use the same holes for the electrical connection. Better electrical connection is achieved by making a new set of holes.



5.4 Install Scrolling Display(s)

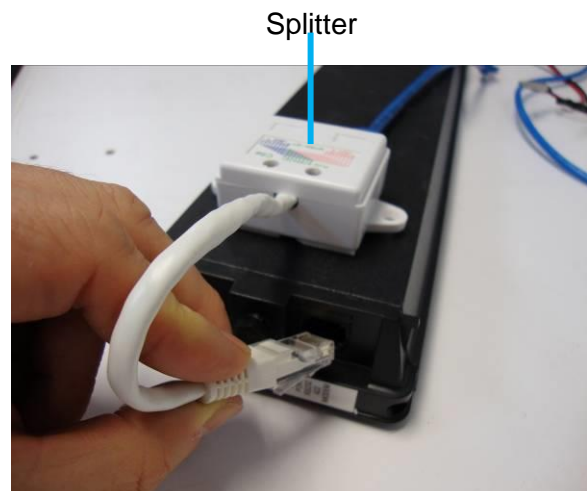
5.4.1 Install Scrolling Display

(if applicable)

- Attach to wall, charger rack, Uni-strut® bridge or any other available structure.
- 1 mounting bracket is attached to the side of each Scrolling Display.
- Many installers find that mounting the displays and the shouter on plywood prior to installation on the wall makes the installation process much easier.
- One display will be mounted for each pool.



- Plug the included splitter into the side of the Scrolling Display.
- Plug the cable from the Control Box into the splitter. If there is more than one pool, plug the 1-foot cable into the first display's splitter and the other end of the cable into the next display. If there is another display(s), plug the cable from the previous sign into the splitter and repeat the previous step.
- These splitters are attached to the back of each Scrolling Display.



- 50 ft. (15.2 m) Cat 5 cable is supplied with iBOS® Control Box that is configured for the first 3 Scrolling Displays.



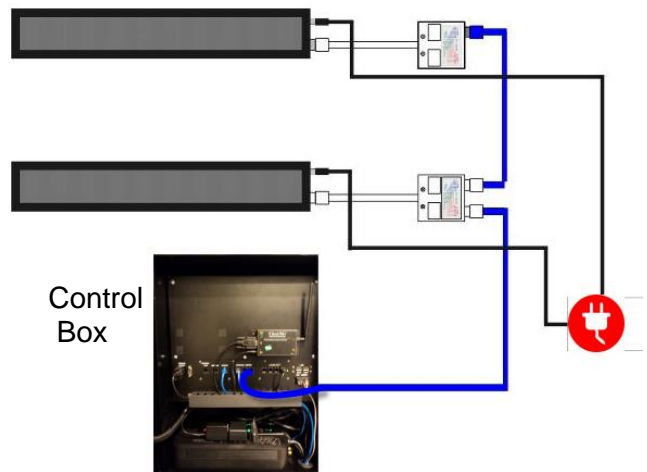
- Sign output ports are labeled on the Control Box. Use one for each Scrolling Display.



- Each Scrolling Display requires 110 / 220 VAC at 1.8 A.
- Use a surge suppressor
- 11' (3.4 m) Power cord and plug are included.
- Do not use an extension cord.
- Connect the transformer power jack into the side of the display unit.



- Diagram of a daisy chained Scrolling Display install.



5.4.2 Program Display Settings

- Each Scrolling Display must be programmed to show the correct pool. If this has been completed by the factory the Scrolling Displays will have a label indicating the pool number. Point the remote control at the sign and press the ESC key. The words SERIAL

ADDR will appear.

- Press the ENT key. The sign's number will appear (example: ADDR=1).
- At the top of the remote control, press the PREV or NEXT keys to lower or raise the number to correspond with the pool number associated to that sign.
- When the sign's ADDR number matches the pool number, press the ENT key.
- Press the ESC key. The words SERIAL ADDR will appear (if not, continue pressing the ESC key until SERIAL ADDR appears).
- Press the left arrow key on the remote control. The word BAUDRATE will appear.
- Press the ENT key. The sign's baud rate will appear (example: 9600).
- If the resulting number is not 9600, press PREV or NEXT keys to lower or raise the baud rate to 9600.
- Press the ENT key. The sign will exit its set-up mode automatically within 10 seconds.



Remote for Scrolling Display

5.5 Install Wireless Display

- Determine Mounting location in relation to a power source.



- Diamond Base Plate is useful for mounting to the exchanger dashboard and is included.



- Test location on the dashboard to ensure operator vision is not blocked and access to power is available.



- Flat Base Plate (BOS-174) (optional) is useful for mounting with U-Brackets and is an option to the dashboard mounting.



- Mount Base Plate to the selected mounting surface:
- Attach the Double Socket Assembly to 1" (25.4 mm) ball on base and display unit and tighten tension arm.
- NOTE: Always loosen the tension arm before adjusting position.



- The communication to the display comes from the RF Modem in the Control Box. The antenna on the Control Box should be positioned for best reception. Additional coax cable is included (BOS-163) to extend the position of the antenna for better reception.

For Unit operation see Section 7.



5.5.1 Wireless Display Antenna Install:

- Wireless Display unit comes with an antenna, a 30' (9.1 m) extension cable, and a magnetic mount. This can be attached to any external part of the Control Box.
- The antenna should not be placed near conduits.
- Check communication – see section 7.5 Wireless Communication Test.



**BOS-203 RF
Antenna Extension**

5.6 Label Battery Chargers and Bays

5.6.1 Number your chargers and bays

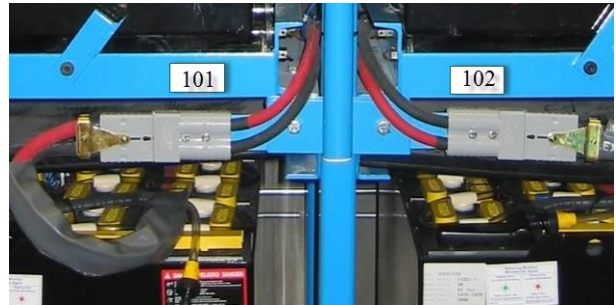
Every battery location needs a number so that the operator can find the right battery. These numbers should be clearly marked on the racks next to the battery location.

Example Chart: a three-high battery changer with 12 pallet batteries and 9 reach batteries.

Note: Sometimes your chargers and bays already have numbers that the customer is used to. You can use them if they are not longer than 6 characters. You can use letters and numbers. For example, the pallet battery locations could be labeled P1, P2, P3, etc. and the reach battery locations could be R1, R2, R3, etc.

We recommend **using three-digit numbers**. Start at 101 for the first charger in the first pool and 201 for the first charger in the second pool, etc.

Pallet				Reach		
101	102	103	104	201	202	203
105	106	107	108	204	205	206
109	110	111	112	207	208	209



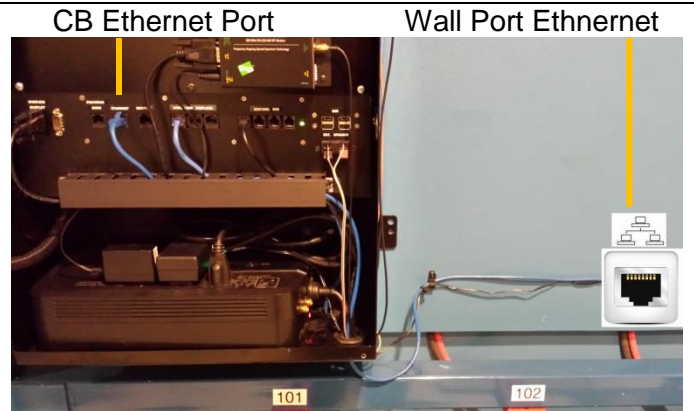
5.7 Data Uploads

An Internet connection is required for the iBOS® Pro 6 Series to deliver data and generate reports. There are two ways to connect the Control Box for uploads:

- 1) Ethernet directly to the Internet via a company's local network
- 2) Cellular Modem through wireless carrier to the Internet

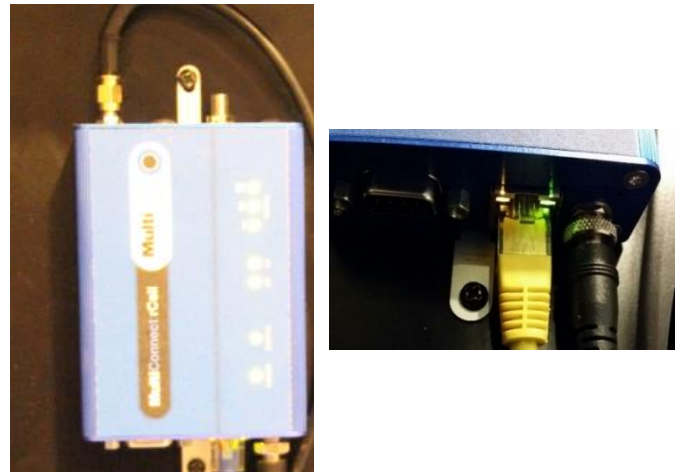
5.7.1 Ethernet

- A 50-ft (15.2 m) CAT5e Peripheral Data Cable is included with the Control Box for connection from the Ethernet jack labeled in the Control Box to the location's nearest Ethernet hub. If you need more than 50' (15.2 m), you will need to acquire additional CAT5e Peripheral Data Cable.
- A quick fact sheet is available in Appendix C if you need to give this to the IT department.



5.7.2 Cellular Modem (Optional)

- This option should be used if your network policy does not allow uploads through a company's local network.
- The cellular modem connects to the Ethernet port on the Control Box via the supplied 1' (305 mm) yellow CAT5 cable. Use the Automatic DHCP Settings on the controller when setting up.
- **For installation see "Cellular Modem Installation Manual" DOC0052**



5.8 Install External Shouter

- The external Shouter (Optional) should be mounted above the Control Box within the 50' (15.2 m) of provided audio cable.
- Connect the two leads into the audio spring close sockets (Red/Black).



- Disconnect the Shouter from the mount to mount the bracket then reconnect and adjust angle of sound.
- Volume is controlled via the touch screen settings. See section 6.7.



6. System Configuration and Settings

Click “Settings” and you will see these headings, from which you can set the following:

Settings			
Language	EN	Not Set	Settings Passcode
Date & Time	2013-08-06 14:49	Not Set	Maint Mode Passcode
Pools & Chargers	0 Pools 0 Chargers	0 Total Sentinels Assigned 0 of which are Non-Reporting	Sentinel List
Internet	FIXED		System Information

Navigation: Left Arrow, Up Arrow, Down Arrow, 1/2


Click the down arrow to get to the 2nd Settings screen

Settings			
Display Pools	1 through 9		Sentinel Outputs
Volume	Good Pick Volume = 3 Mispick Volume = 3	Long	Message Length
Communication Test		Pair 1 = 0 + 0 Pair 2 = 0 + 0 Pair 3 = 0 + 0 Pair 4 = 0 + 0	Link Pools
Quarantine			

Navigation: Left Arrow, Up Arrow, Down Arrow, 2/2

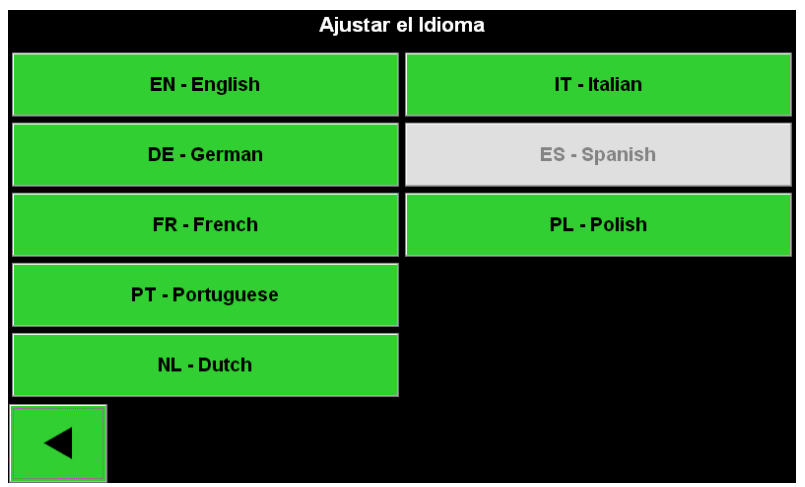
6.1 Language Setting

Set a **Language**. The language in white becomes the system language and will change the audio message and text on screens.

Set Language	
EN - English	IT - Italian
DE - German	ES - Spanish 
FR - French	PL - Polish
PT - Portuguese	
NL - Dutch	

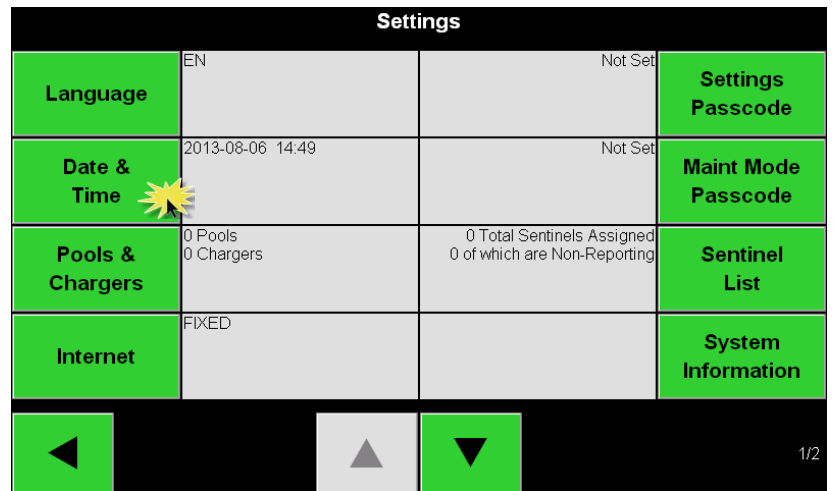
Navigation: Left Arrow

Note: When you change language all system settings also change to that language.



6.2 Date and Time Setting

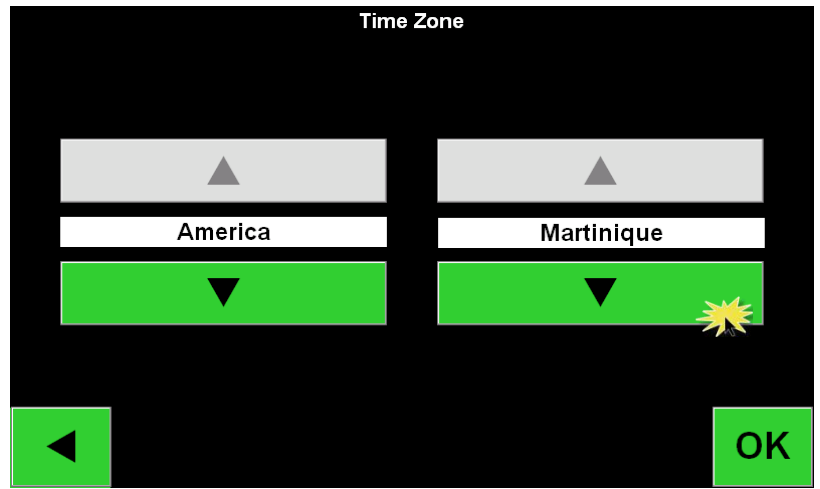
The system time is controlled by this feature. This should be checked to ensure the location time is correct. The default is set at the factory for EST. (-4GMT)



The system is currently set to EST Time Zone.

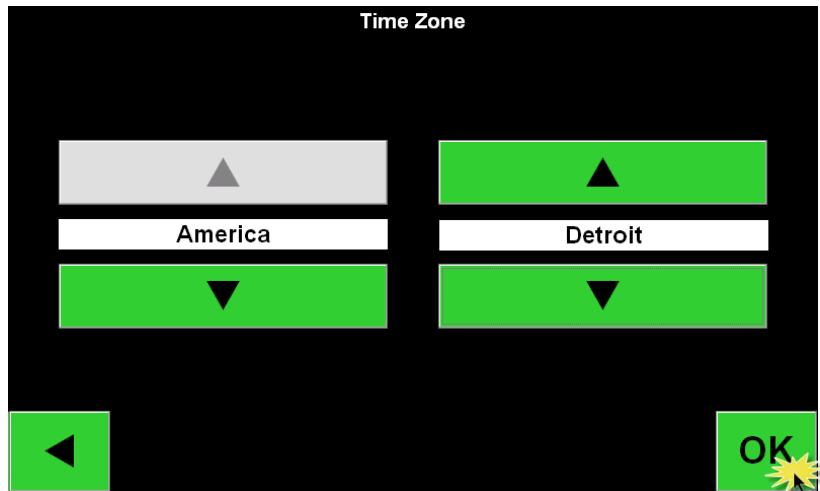


Select your local time zone.

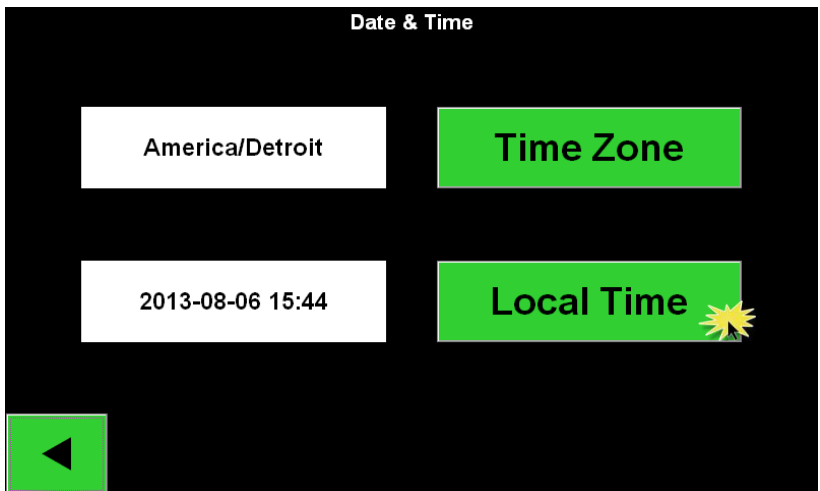


Then click ok.

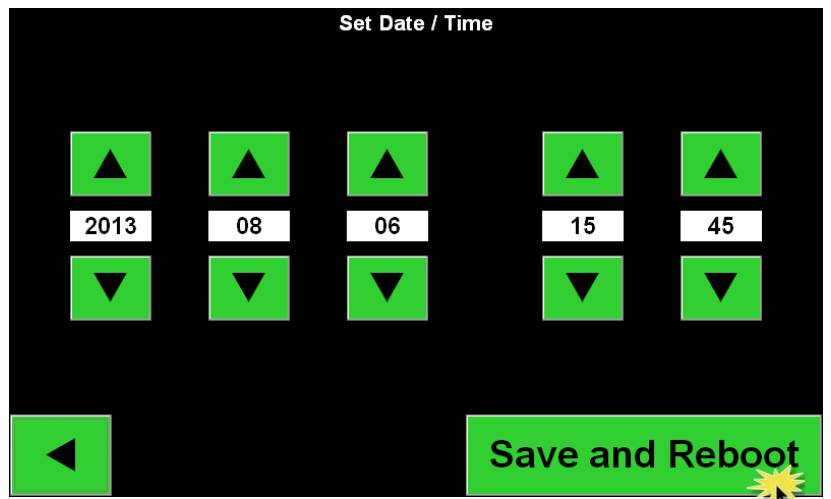
This will take you back to the time/date.



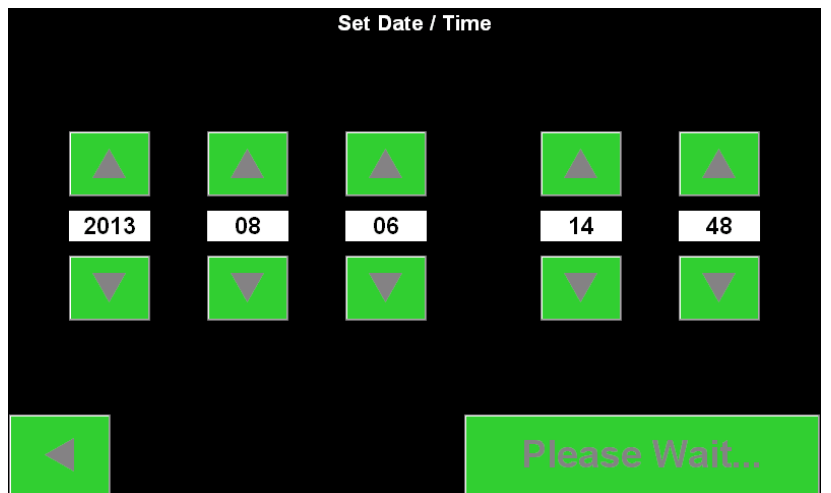
Set Local Time/Date



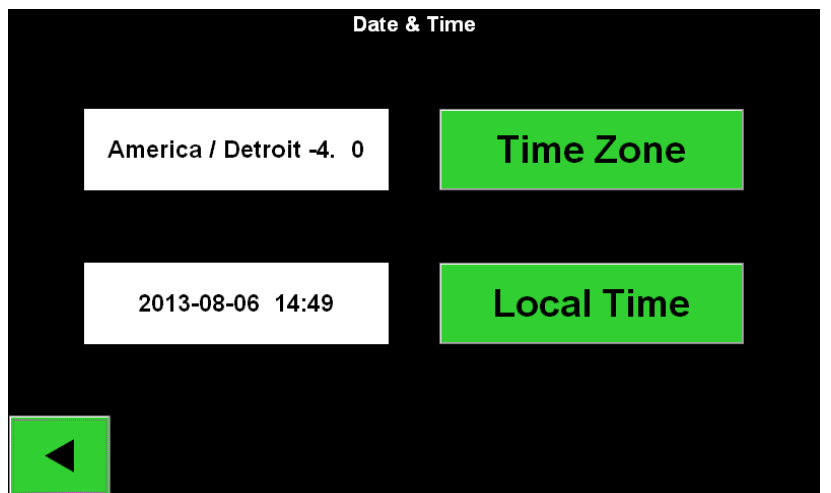
Adjust as needed, and then click “Save and Reboot”.



During system reboot, the touch screen will become temporarily grey and inoperable. Please wait for system to complete the time/date change.

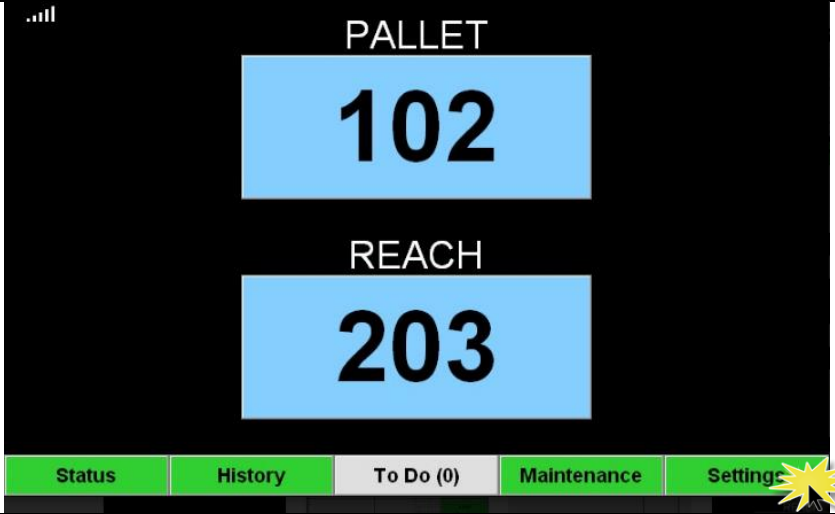


Time/Date is now reset.



6.3 Configuring Pools and Chargers

After the chargers are connected and labeled, they must be configured at the Control Box. The steps to follow to correctly configure pools and chargers are outlined below. (Default password is: "919191")

<p>To configure the chargers, click "Settings" on the Home screen.</p>																					
<p>Enter Default Password "919191" then click OK.</p>																					
<p>Click the "Pools and Chargers" key.</p>	 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">Settings</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Language</td> <td>EN</td> <td>Not Set</td> <td style="text-align: center;">Settings Passcode</td> </tr> <tr> <td style="text-align: center;">Date & Time</td> <td>2013-08-06 14:49</td> <td>Not Set</td> <td style="text-align: center;">Maint Mode Passcode</td> </tr> <tr> <td style="text-align: center;">Pools & Chargers</td> <td>0 Pools 0 Chargers</td> <td>0 Total Sentinels Assigned 0 of which are Non-Reporting</td> <td style="text-align: center;">Sentinel List</td> </tr> <tr> <td style="text-align: center;">Internet</td> <td>FIXED</td> <td></td> <td style="text-align: center;">System Information</td> </tr> </tbody> </table>	Settings				Language	EN	Not Set	Settings Passcode	Date & Time	2013-08-06 14:49	Not Set	Maint Mode Passcode	Pools & Chargers	0 Pools 0 Chargers	0 Total Sentinels Assigned 0 of which are Non-Reporting	Sentinel List	Internet	FIXED		System Information
Settings																					
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Pools & Chargers	0 Pools 0 Chargers	0 Total Sentinels Assigned 0 of which are Non-Reporting	Sentinel List																		
Internet	FIXED		System Information																		

Click on the first blank Pool key.

Set Up Pools & Chargers			
Pool #	Pool Name	Voltage	Charger Count
1		Set V	Add Charger (0)
2		Set V	Add Charger (0)
3		Set V	Add Charger (0)
4		Set V	Add Charger (0)
5		Set V	Add Charger (0)

Navigation buttons: Left arrow, Up arrow, Down arrow

Type in the name of the pool and click "OK."

Set Pool Name

PALLET

1	2	3	4	5	6	7	8	9	0
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	
Z	X	C	V	B	N	M	space	<<<	

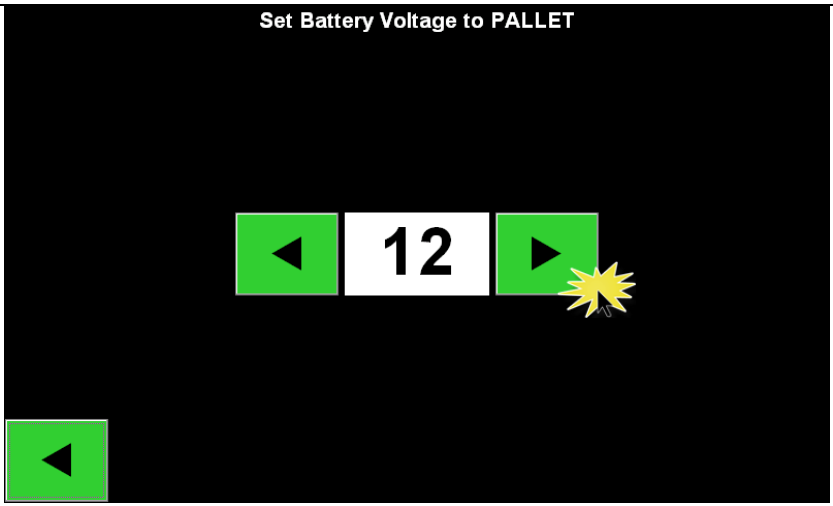
Navigation buttons: Left arrow, OK

Notice the Pool name is now set up. Click on the "Set V" button that corresponds to the pool's voltage.

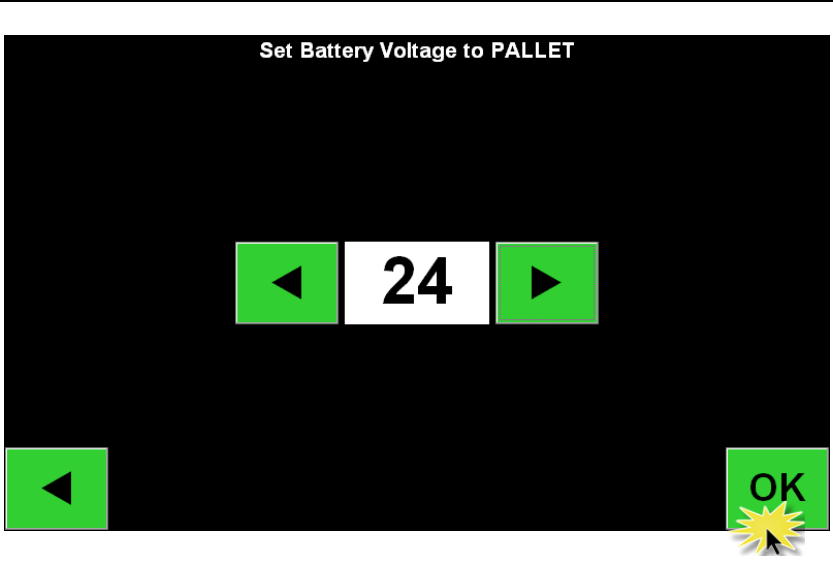
Set Up Pools & Chargers			
Pool #	Pool Name	Voltage	Charger Count
1	PALLET	Set V	Add Charger (0)
2		Set V	Add Charger (0)
3		Set V	Add Charger (0)
4		Set V	Add Charger (0)
5		Set V	Add Charger (0)

Navigation buttons: Left arrow, Up arrow, Down arrow

Click on arrow until you reach the correct pool voltage.



Click "OK".



The Voltage "24" now appears for the pool.

Now that we have named the pool and set the pool voltage we can add chargers to the pool.

Click on Add Charger.

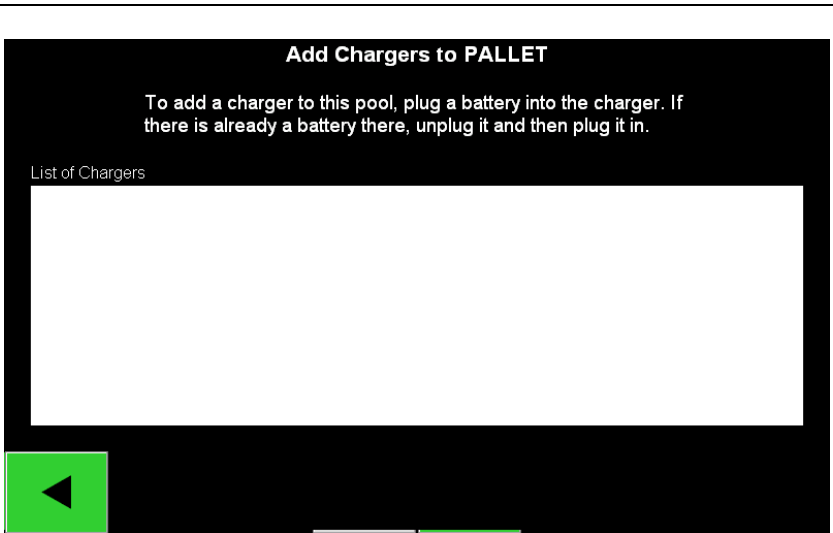
Note: (0) shows no chargers are assigned to this pool yet.

Set Up Pools & Chargers			
Pool #	Pool Name	Voltage	Charger Count
1	PALLET	24	Add Charger (0)
2		Set V	Add Charger (0)
3		Set V	Add Charger (0)
4		Set V	Add Charger (0)
5		Set V	Add Charger (0)

When you click on the Add Charger button, the Add Charger to Pool window will appear. You are now in the Wizard mode.

Next, go to the charger you want to add, note the charger number, then disconnect and reconnect the charger.

When you reconnect, the next screen will appear.



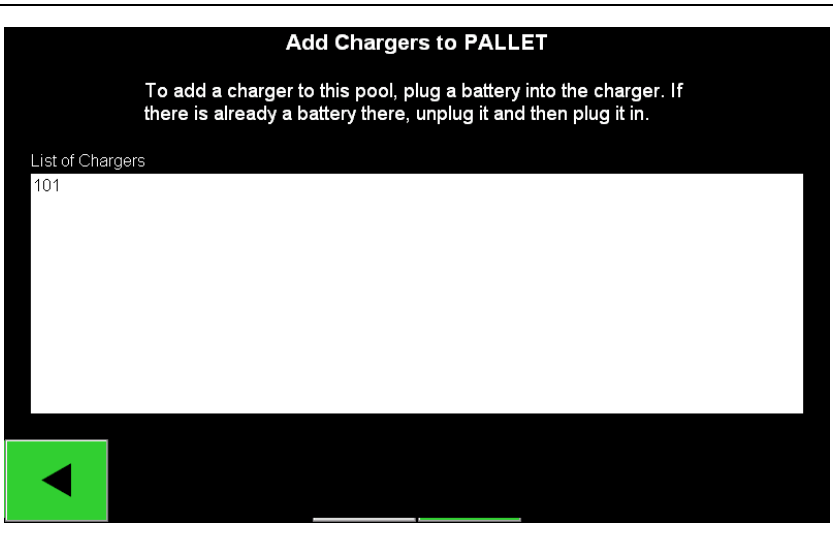
This screen will pop up when iBOS® detects the connected battery.



Entered the desired ID number and click "OK."



Repeat steps for the remainder of the batteries and chargers in the pool.



Set up additional pools and chargers in the same method.

Set Up Pools & Chargers			
Pool #	Pool Name	Voltage	Charger Count
1	PALLET	24	Add Charger (1)
2		Set V	Add Charger (0)
3		Set V	Add Charger (0)
4		Set V	Add Charger (0)
5		Set V	Add Charger (0)

Navigation buttons: Green left arrow, Gray up arrow, Green down arrow.

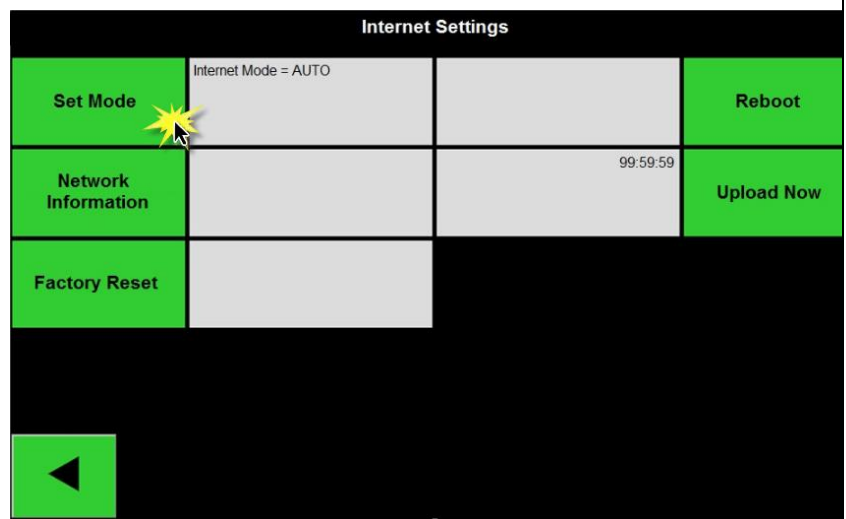
6.4 Configuring Internet Connections

Select the Internet button.

Settings			
Language	EN	Not Set	Settings Passcode
Date & Time	2013-08-06 14:49	Not Set	Maint Mode Passcode
Pools & Chargers	0 Pools 0 Chargers	0 Total Sentinels Assigned 0 of which are Non-Reporting	Sentinel List
Internet	FIXED		System Information

A yellow starburst icon is positioned over the 'Internet' button. Navigation buttons: Green left arrow, Gray up arrow, Green down arrow.

Select Set Mode.

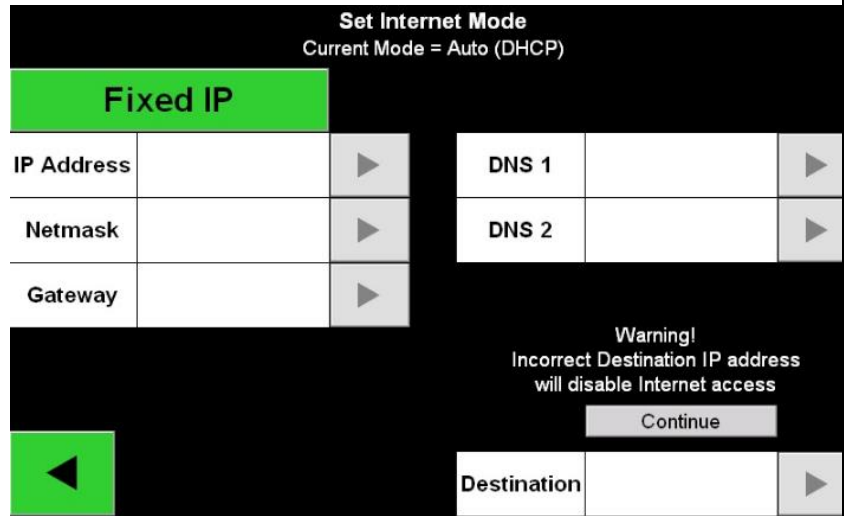


There are 2 options to set up the internet connection.

You can set up:

- **Automatic** (Dynamic) Use this setting with cell modem option.
- **Fixed IP** (Static IP) The address numbers need to be given to the installer from the site's network administrator.

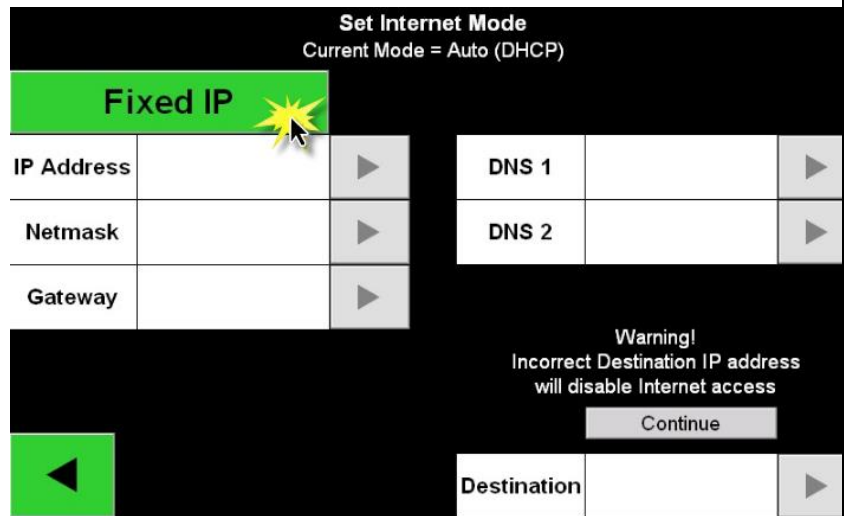
The screen to right shows Automatic and is the factory default.



If connecting through a corporate local network, get the assigned

- IP address
- Netmask
- Gateway

from the IT Dept., then press Fixed IP.



The green arrows will illuminate to the right allowing you to enter the data into each address.

Press the green arrow to the right of IP Address.

Set Internet Mode
Current Mode = Fixed IP

Auto (DHCP)

IP Address		▶	DNS 1		▶
Netmask		▶	DNS 2		▶
Gateway		▶			

Warning!
Incorrect Destination IP address
will disable Internet access

Continue

◀ **Reboot** Destination ▶

Enter numbers into IP address and click ok.

Do this also for both the Netmask and Gateway.

Enter IP Address

192.168.210.1

7	8	9
4	5	6
1	2	3
.	0	<<<

◀ **OK**

When data is entered click on the Reboot button to save the setting. The Control Box will reboot. Please wait for the Control Box to reboot. It will return to the Settings screen when complete.

Ensure that the Ethernet cable is connected to the appropriate live port. The Control Box will establish communications with the network at this time.

Set Internet Mode
Current Mode = Fixed IP

Auto (DHCP)

IP Address	192.168.210.1	▶	DNS 1		▶
Netmask	255.255.255.1	▶	DNS 2		▶
Gateway	192.168.0.0	▶			

Warning!
Incorrect Destination IP address
will disable Internet access

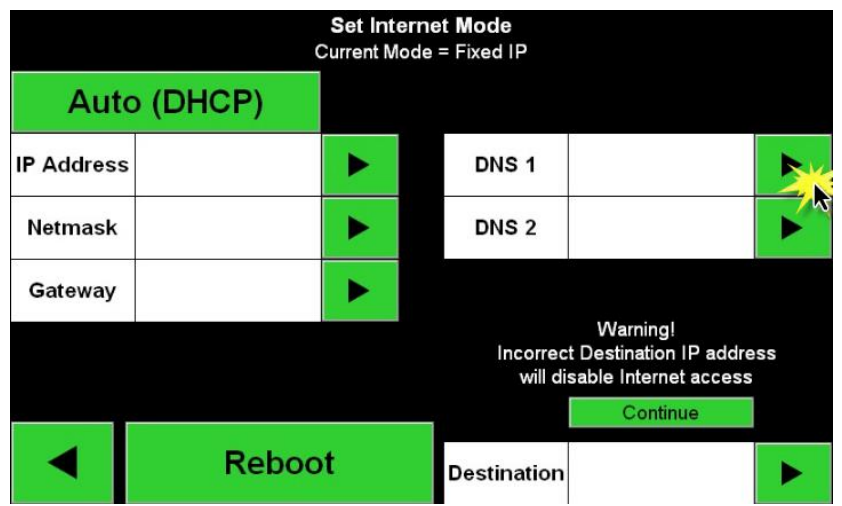
Continue

◀ **Reboot** Destination ▶

DNS settings should only be used by an experienced network administrator.

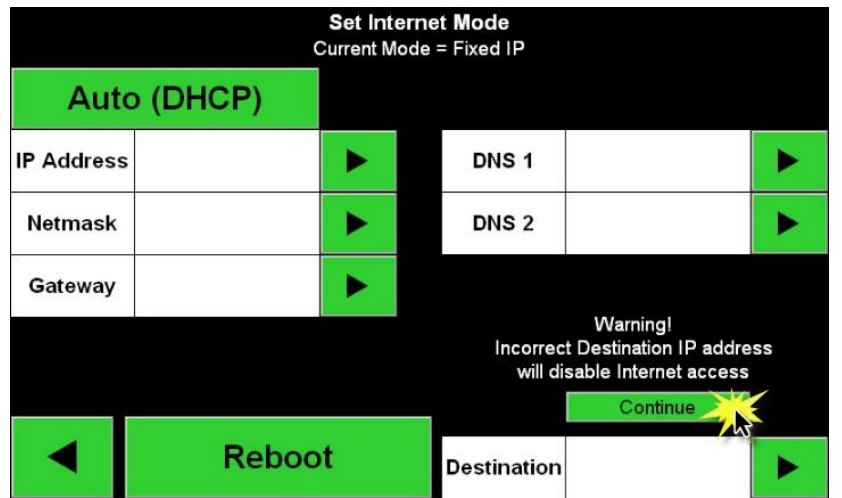
To set the DNS addresses, press the arrow to the right of DNS 1 or 2, enter the address, and press OK.

Press Reboot when complete.

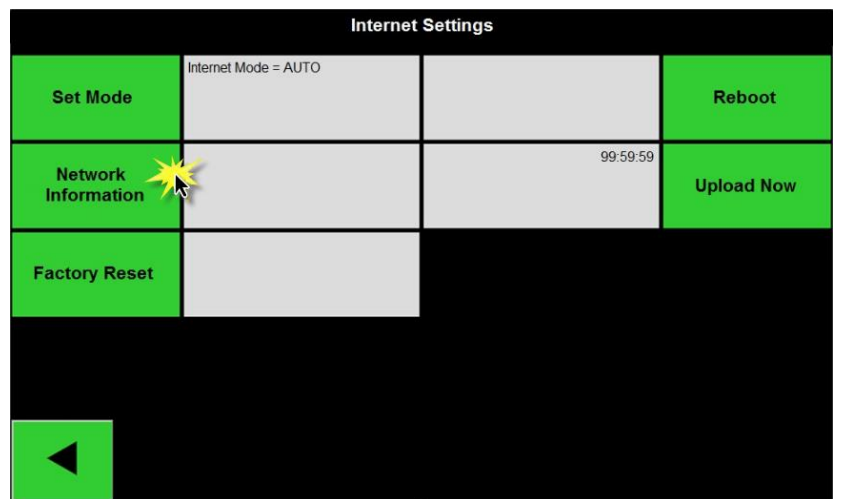


Destination IP address settings should only be used by an experienced network administrator.

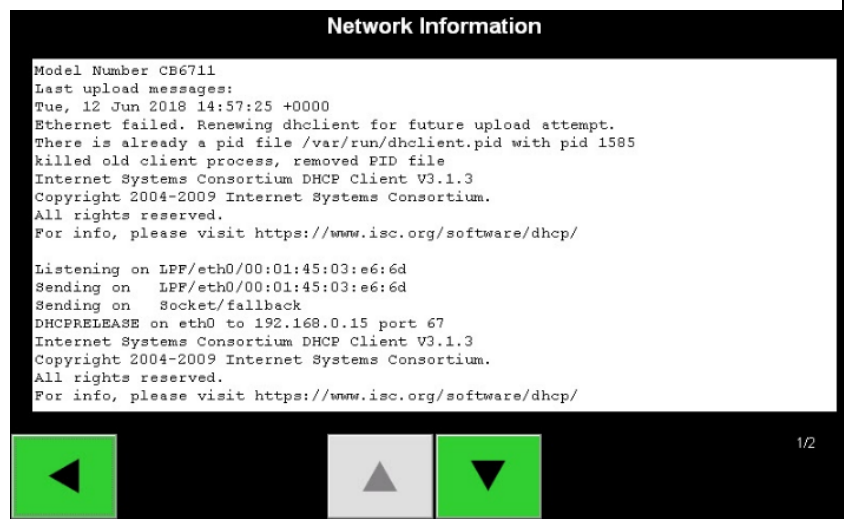
To set the Destination IP address, press Continue and the arrow to the right of Destination. Enter the address, press OK, and press Reboot.



Press Network Information to see upload details.



A Network Information screen will appear.

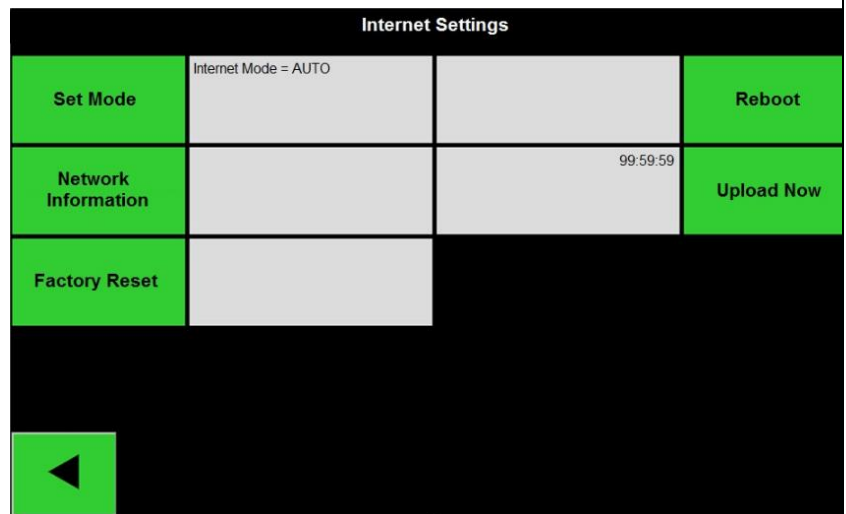


Other option on the Internet Settings Screen:

Press Reboot to restart the Control Box. This is a “soft” reboot that does not power down the Sentinels.

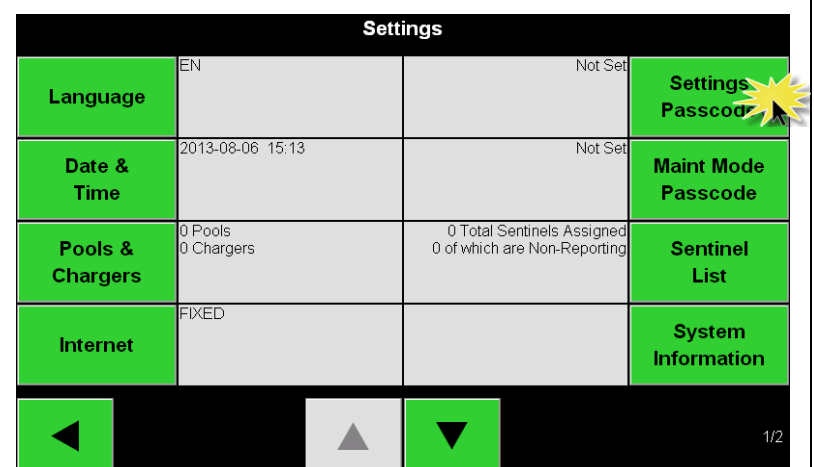
Press Upload Now to send the most recent data to iBOSworld.com.

Pressing Factory Reset will reset the Internet Settings to factory default settings.



6.5 Password Settings

To set a new system password, you may do so by clicking the “Settings” tab, then click “Settings Passcode” and enter your number.



The default passcode is 919191. If you would like to remove it during install leave it blank and then click ok.

It's recommended to reinstall the password before leaving the site.

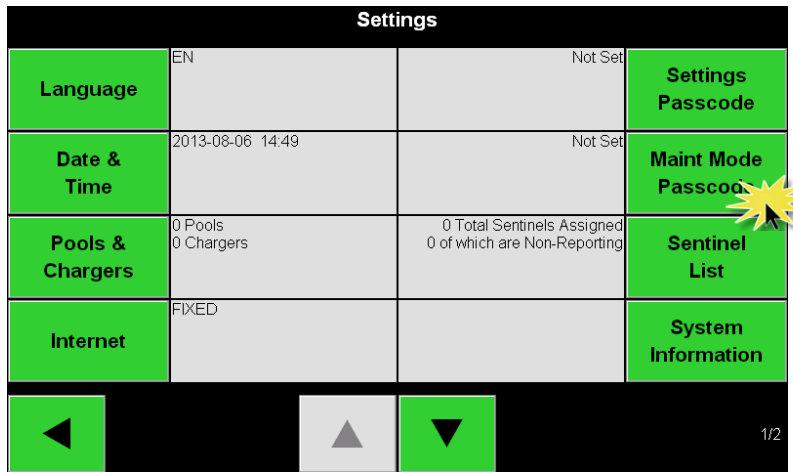
Password Recovery – the password can be recovered from Philadelphia Scientific® if lost by contacting us with the system Control Box serial number.



The Maintenance Mode Passcode is set in the same way.

The default passcode is 11111. If you would like to remove it during install leave it blank and then click ok.

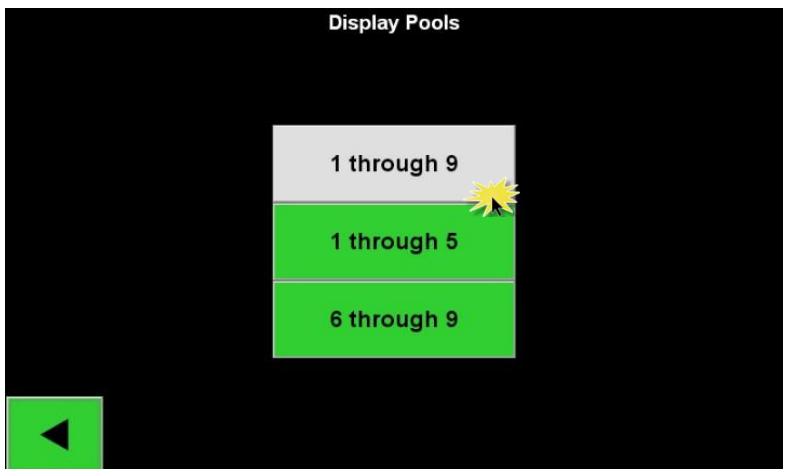
It's recommended to reinstall the password before leaving the site.



6.6 Display Pools

The touchscreen display can be set to display Pools 1-5, 6-9, or 1-9.

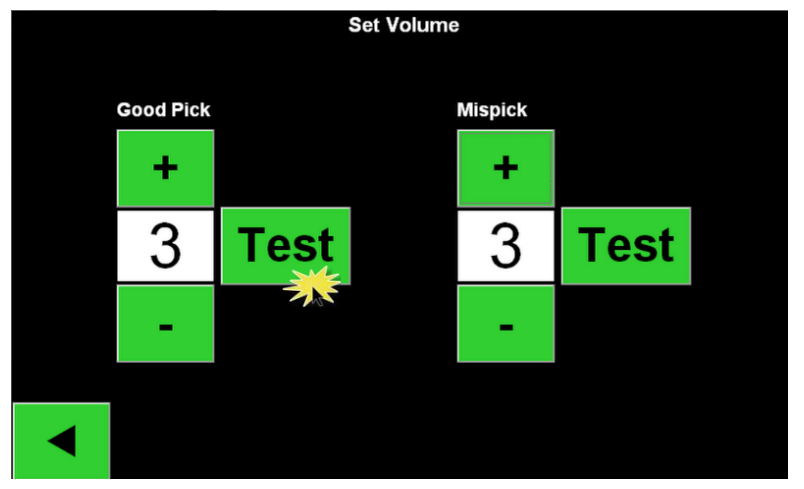
Typically, the control box is set to display Pools 1-9. If there are two battery extractors that work with two different sections of battery racking, one may be set to display Pools 1-5 while the other is set to display Pools 6-9.



6.7 Volume Adjustment

To set the system volume, press Volume and adjust up to 5 for max volume. To turn volume off adjust to zero. The good pick and the bad pick are independent settings.

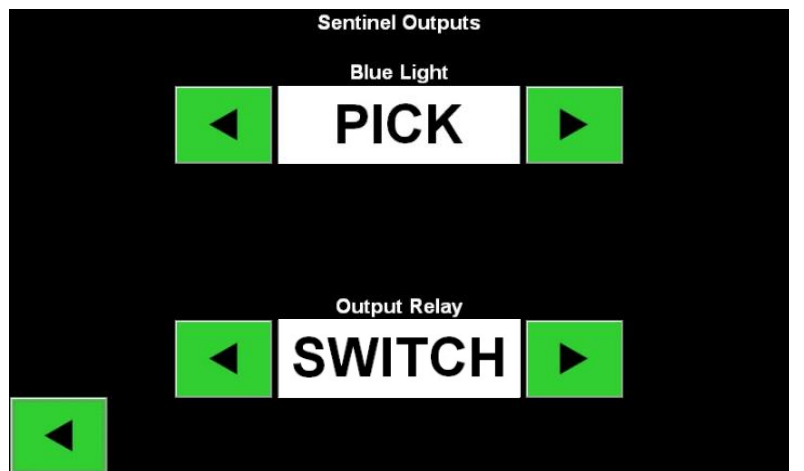
The test button will sound the alarm once.



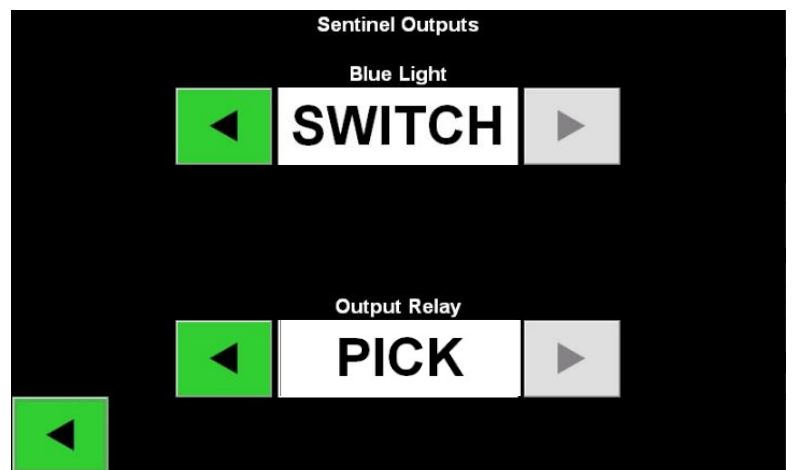
6.8 Sentinel Outputs

The Sentinel Outputs screen controls the function of the blue LED and the output relay on the Sentinel.

The blue light can be used as the pick light, the charger switch light, or turned off. An additional light can be attached to the output relay and can be used in the same way.



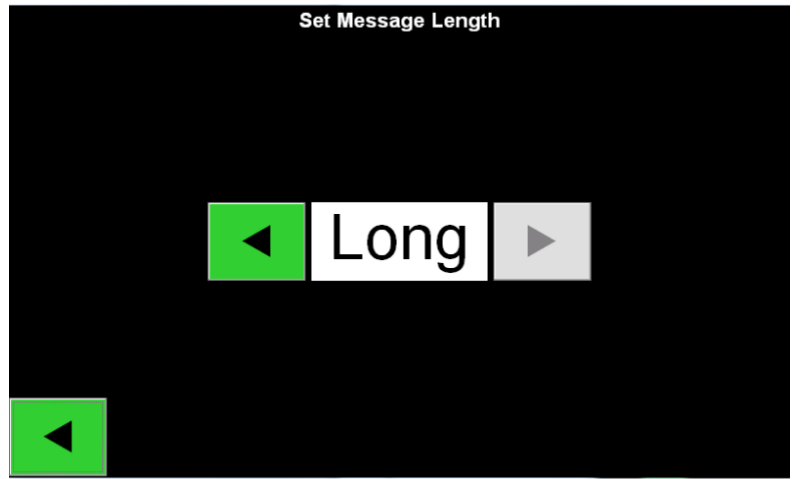
To change the function of the blue LED or output relay, use the arrows to scroll until you have reached the desired function.



6.9 Message Length

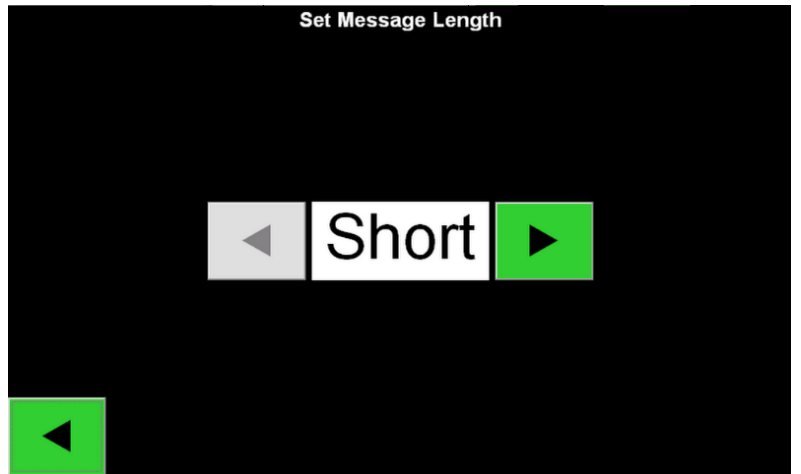
If you have Scrolling Displays you can change the length of the message from Long:

“Take Next Pallet battery / 102”



If you change the length of the output to Short, the sign output will be:

“Pallet / 102”



6.10 Linked Pools

6.10.1 Name the Pools

This allows the user to have a pool split into two sections. The result is seen on the website and is used with the iBOS® Traffic Cop™ module.

To set up linked pools first make the pool names the same and add a suffix like A/B, 1/2 or L/R or other useful way to split the pool. Our example uses A and B to differentiate the pools.

Set Up Pools & Chargers			
Pool #	Pool Name	Voltage	Charger Count
1	PALLET A	24	Add Charger (4)
2	PALLET B	24	Add Charger (3)
3		Set V	Add Charger (0)
4		Set V	Add Charger (0)
5		Set V	Add Charger (0)

6.10.2 Select Link Pools

Go to the 2nd page of the settings screen and select Link Pools.

Note that no pools are currently linked.

Settings			
Display Pools	1 through 9		Sentinel Outputs
Volume	Good Pick Volume = 3 Mispick Volume = 3	Long	Message Length
Communication Test		Pair 1 = 0 + 0 Pair 2 = 0 + 0 Pair 3 = 0 + 0 Pair 4 = 0 + 0	Link Pools
Quarantine			

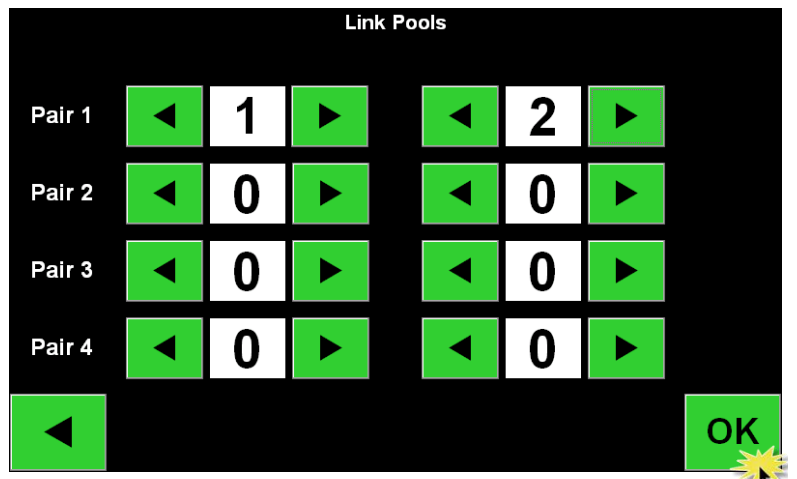
6.10.3 Set Pool Pairs

Use the arrows to select the pool numbers for the link pair.

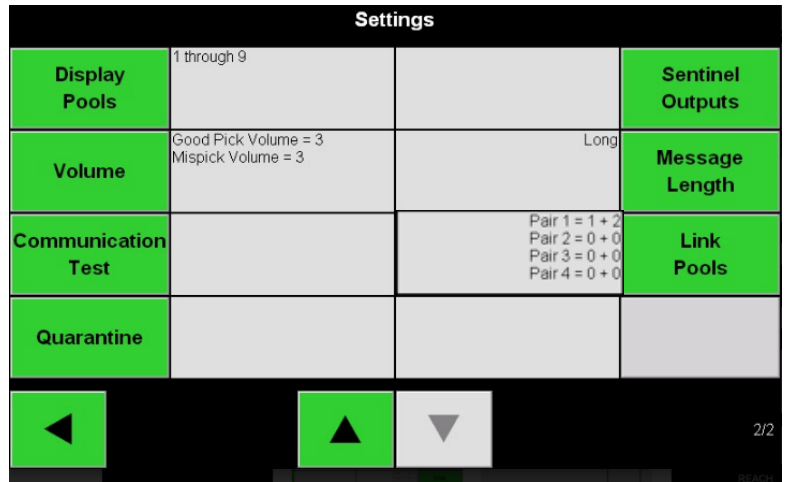
In our examples, we'll link pool 1 and pool 2. Note the pool numbers in gray under the Pool # in sec 6.10.1 define the pool number.

Link Pools						
Pair 1	◀	0	▶	◀	0	▶
Pair 2	◀	0	▶	◀	0	▶
Pair 3	◀	0	▶	◀	0	▶
Pair 4	◀	0	▶	◀	0	▶

Once set, click on the OK button to confirm and link the pools.



You have now successfully linked the pools 1 and 2. If you made a mistake, you can go back and unlink or change as needed.



6.11 Home Screen Display

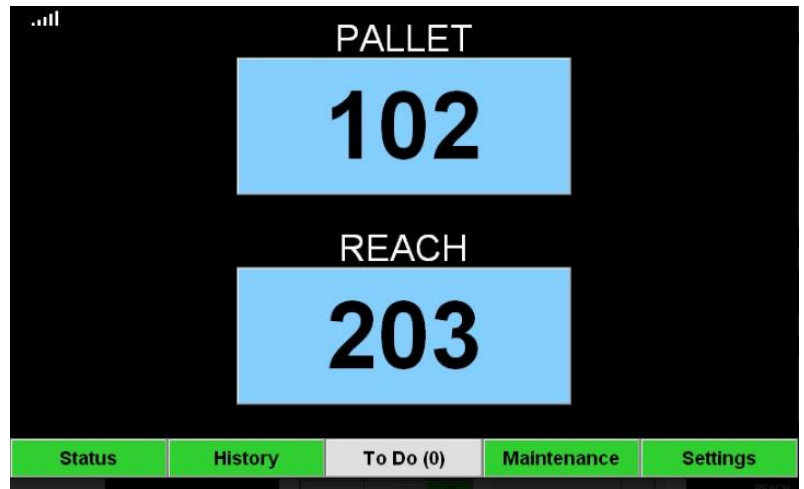
The home screen will automatically display up to 9 pools as you create new pools by naming them.

The upper left bars indicate if the display is communicating with the controller.

Note this is shown on both wired and wireless versions.

The (blue) boxes show the next battery to take for each of the pools.

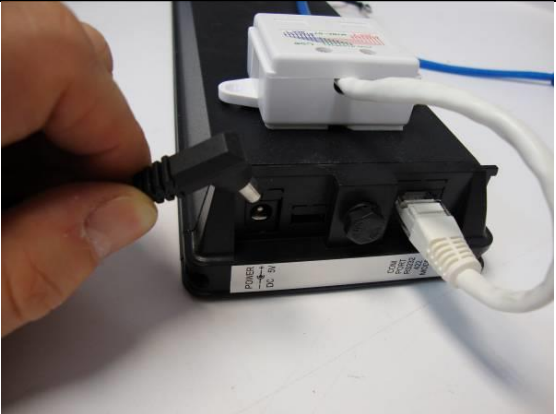



This screen is intended to remain on top during operation.



6.12 Running System Dark

To quantify the benefits of the iBOS® System, it is suggested that you begin with a benchmark period of two weeks where the system “runs dark.” This means that the system is gathering information but there is no battery selection guidance provided. This way you can tell what is *really* happening in your battery room, so you can compare the raw data with the improved performance once the system is giving commands.

Here’s how to set the unit for benchmark mode:

<p>Unplug power to the Scrolling Display(s) and/or the wireless modem.</p>	
<p>Unplug power to the Wireless Display on the on the control box.</p>	
<p>Turn off the blue LED “pick” lights: Using the settings screen on the Control Box, scroll down to the second page and select “Pick Light.” Turn the blue pick lights off.</p>	
<p>Disable all sound: Open the Control Box door and unplug the green power socket on the inside of the door.</p>	
<p>When you are ready to go live with the system, simply reverse the above steps.</p>	

7. Final Inspection and Testing


7.1 Sentinels™


7.1.1 Status

If you have successfully run the installation wizard for all of the Sentinels™, then the green LED is solid on each Sentinel™.



If you want to double check the connection, you can disconnect a battery from a charger and then watch the system status screen. You should see the charger ID. If you don't see the pool and charger ID you expected, then the system may be misconfigured.

Status							
Pool Name	Next Battery on Charger	Batteries Available	Charging	Connected Not Charging	No Battery Connected	Quarantine	Unknown
PALLET	---	0	0	3	1	0	0
REACH 	---	0	0	0	3	0	0


Time Since Last Upload
01:20:11
Serial Number
4503e6af
2013-08-14
09:33




The charger ID will move from column to column as the status changes.

Note: a 10-charger pool you should see all 10 charger IDs.

Available = Charged and ready to use.

The top of the queue is 102 and this charger ID will be the Next Battery on the Scrolling Display or on home screen.

PALLET Queue					
Available	Charging	Connected Not Charging	No Battery Connected	Quarantine	Unknown
102	103	104	101		
109	107				
110	106				
108	105				




1/1

7.1.2 Quarantine

The Quarantine column shows the quantity of chargers that have not started or have not completed the charge of a battery that has been connected to it for 24 hours. The system quarantines the battery by taking it out of the queue, and if the issue is not resolved within 72 hours, the battery is returned to the queue.

72 hours is the default factory setting.

PALLET Queue					
Available	Charging	Connected Not Charging	No Battery Connected	Quarantine	Unknown
102	103	104	101		
109	107				
110	106				
108	105				

1/1

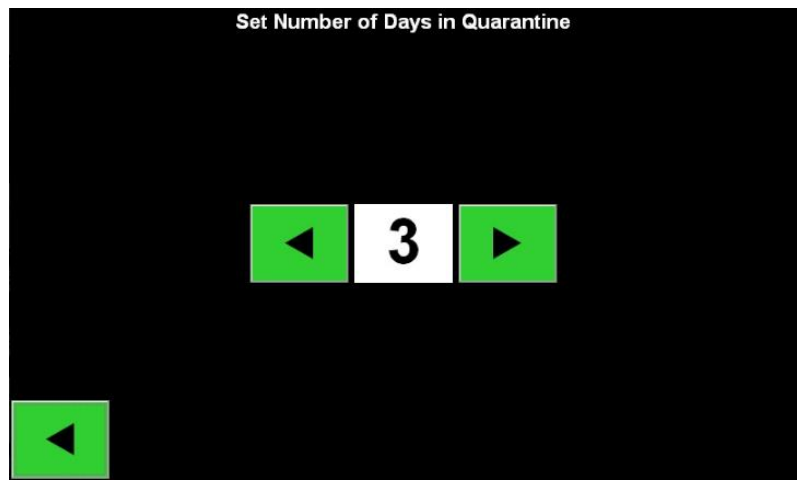
- If any charger ID's are listed in the column marked "Quarantine", check to see if the charger indicates a fault.
- Confirm that the amber LED is illuminated on the Sentinel™, and that a battery is connected.
- If the display and all indicator lights on the charger are blank, check to see if there is power to the charger.
- If the charger is functioning properly, check the voltage of the battery as some chargers will not recognize an over discharged battery.
- To remove the battery from Quarantine, disconnect and reconnect the battery.

To change the number of days that a battery is in Quarantine, press Quarantine under the Settings screen.

Settings			
Display Pools	1 through 9		Sentinel Outputs
Volume	Good Pick Volume = 3 Mispick Volume = 3	Long	Message Length
Communication Test		Pair 1 = 0 + 0 Pair 2 = 0 + 0 Pair 3 = 0 + 0 Pair 4 = 0 + 0	Link Pools
Quarantine			

2/2

Scroll to the desired number of days in Quarantine by pressing the arrows on the screen.



7.1.3 Sentinel List

Check the Unassigned Sentinel™ list on the touch screen.



This is a very useful screen. You'll be able to see the serial numbers of the unassigned Sentinels™.

When the system is fully configured all Sentinels™ will be assigned.

Press the green arrow at the end of a Sentinel row to see the Sentinel Edit screen.

Unassigned Sentinels - Sentinel List						
Pool #	Chg ID	Serial #	Ver.	Status	Reporting	
0		10003	12	Unknown	Yes	▶
0		10155	12	Unknown	Yes	▶
0		10086	12	Unknown	Yes	▶
0		10185	12	Unknown	Yes	▶
0		10191	12	Unknown	Yes	▶
0		10084	12	Unknown	Yes	▶
0		10087	12	Unknown	Yes	▶
						▶
						▶
						▶

At the bottom of the screen, there are three green navigation buttons: a left arrow, a grey up arrow, and a grey down arrow. A 'Refresh' button is located in the bottom right corner. A '1/1' indicator is in the bottom right corner.

To find an unassigned Sentinel or determine if a Sentinel has been assigned properly, press Blue On. This will turn the blue LED on the Sentinel on. Press Blue Off when finished.

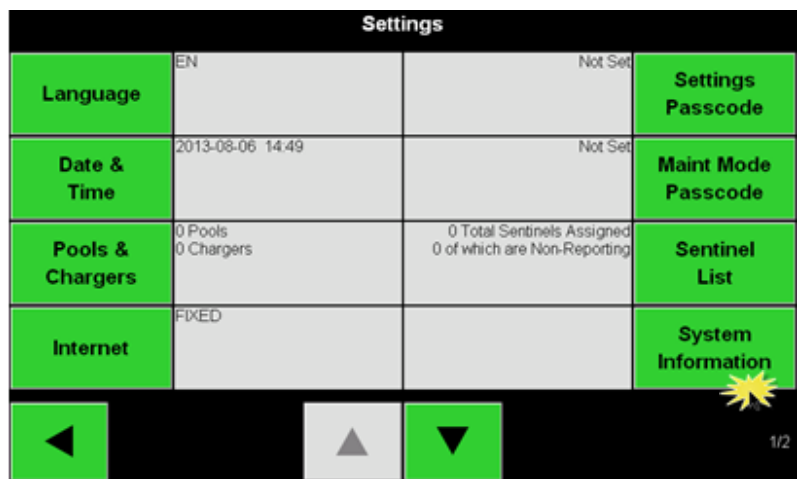
A Sentinel can be moved to a different Pool by scrolling through Pool ID.

The charger number can be changed by pressing Charger ID.

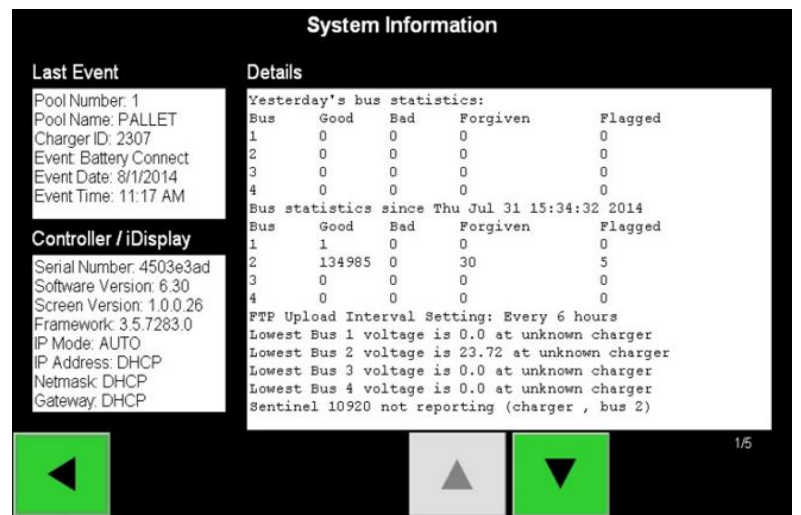


7.1.4 System Information

When the system is installed, you can look at the System Info screen to check that your lowest voltage on any bus is above the 19 Volt limit.



The limiting factor is 19 Volts min voltage on the last Sentinel™ on a bus.



7.2 Scrolling Display(s)

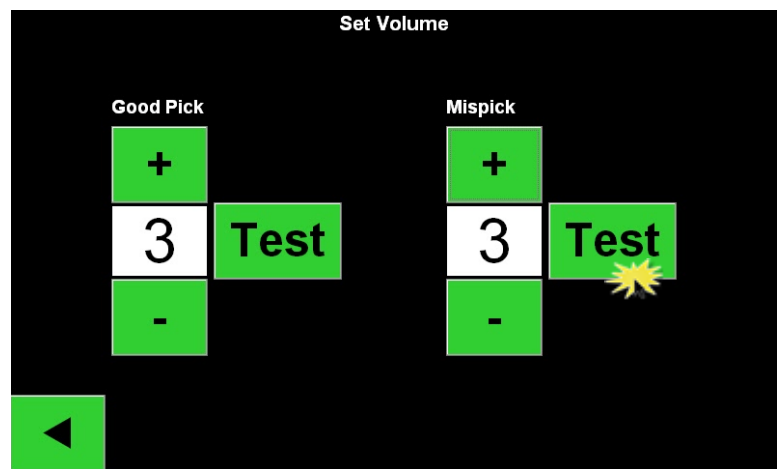
Each pool has a corresponding Scrolling Display. Make sure that each display shows only the pool and charger numbers for that pool. For example, if you are taking a battery from the Pallet Jack pool, the Scrolling Display should reflect this. If the Scrolling Display instead indicates that you should take a battery from the Reach Truck pool, then it is incorrectly programmed.



7.3 Shouter

To test the shouter, unplug any battery other than the battery indicated on the Scrolling Display. You should hear the shouter say, "Stop! You have selected the wrong battery..."

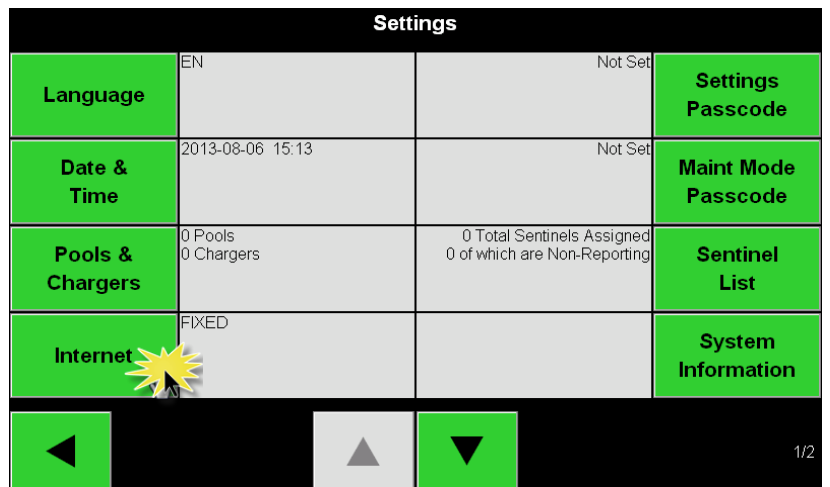
Alternatively, you can just use the set volume setting to test the shouter. Press the Test button.



7.4 Check Data Upload to Web

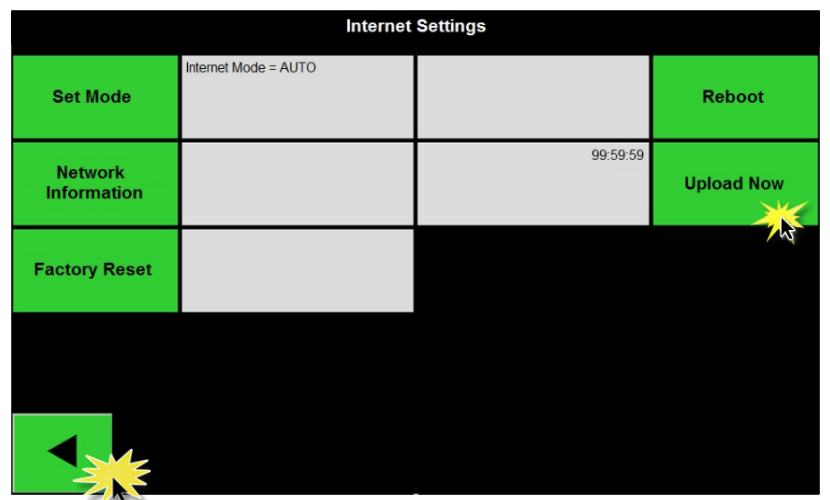
After you have connected the Control Box to a cellular modem or Ethernet port, reboot the Control Box. To do this, go to “Settings,” “Internet,” and “Reboot.” You are now ready to do a data upload test.

Click on the “Settings” screen (default factory password is 919191) and select the “Internet” button.



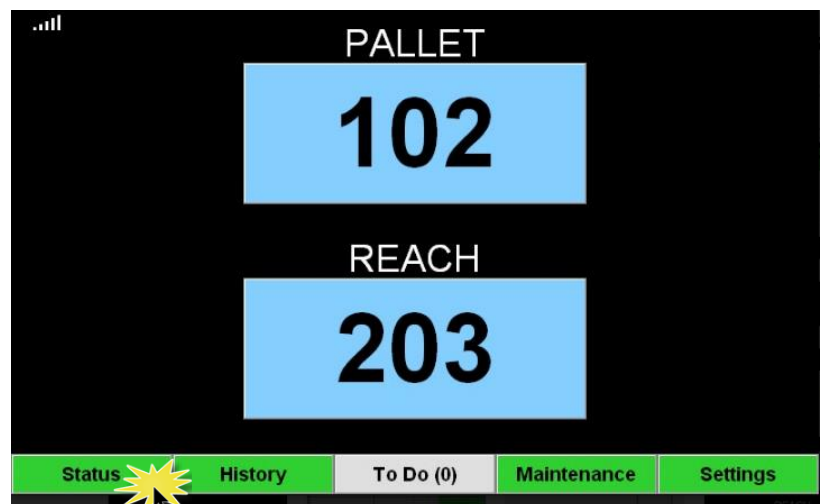
Select the “Upload Now” button.

Exit out of this screen using the back-arrow button.



This will take you back to the home screen. Then click the “Status” key. Screen automatically adjusts to named pools.

Also note, the upper left symbol displays the level of communication with Control Box.



Wait 5 minutes, then check the “Time Since Last Upload” on the bottom left corner of the status screen.

Status							
Pool Name	Next Battery on Charger	Batteries Available	Charging	Connected Not Charging	No Battery Connected	Quarantine	Unknown
PALLET	---	0	0	1	3	0	0

Time Since Last Upload 99:59:59

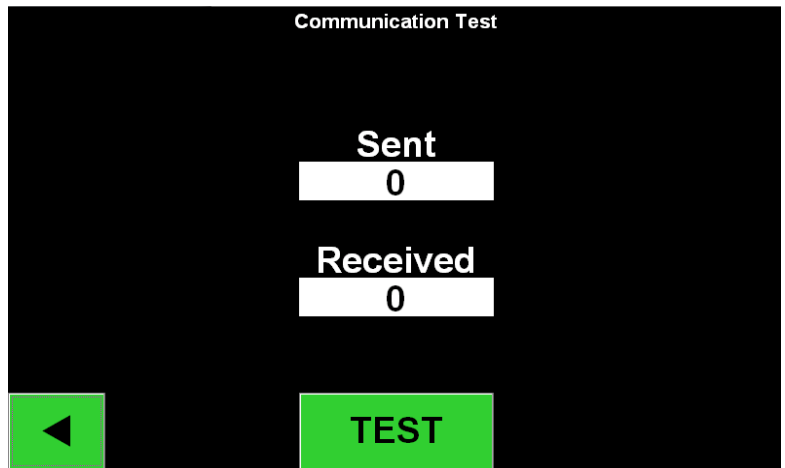
Serial Number 4503e6af 2013-08-07 11:23

7.5 Wireless Communications Test

The wireless display is operated via its touch-screen. Test the communications for the wireless display. Use the trouble shooting guide if you are not able to get acceptable % consistently to improve reception. Test the wireless display from each end of the battery room and the center.

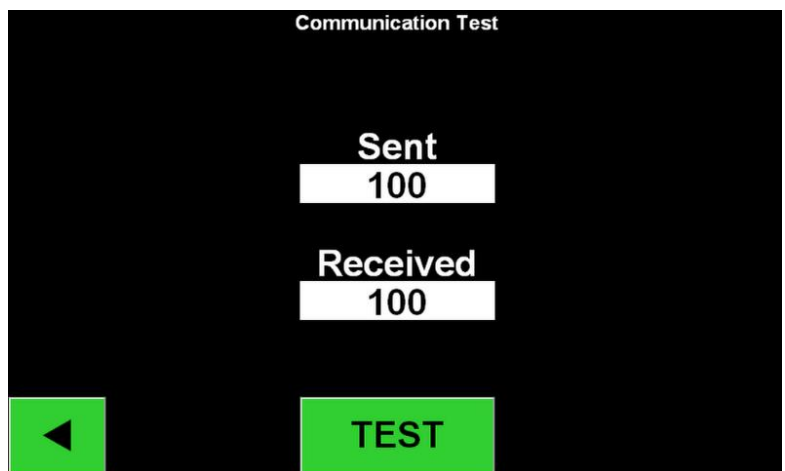
Run a **Communication Test**

To test the data flow between the Control Box and the Wireless Display.



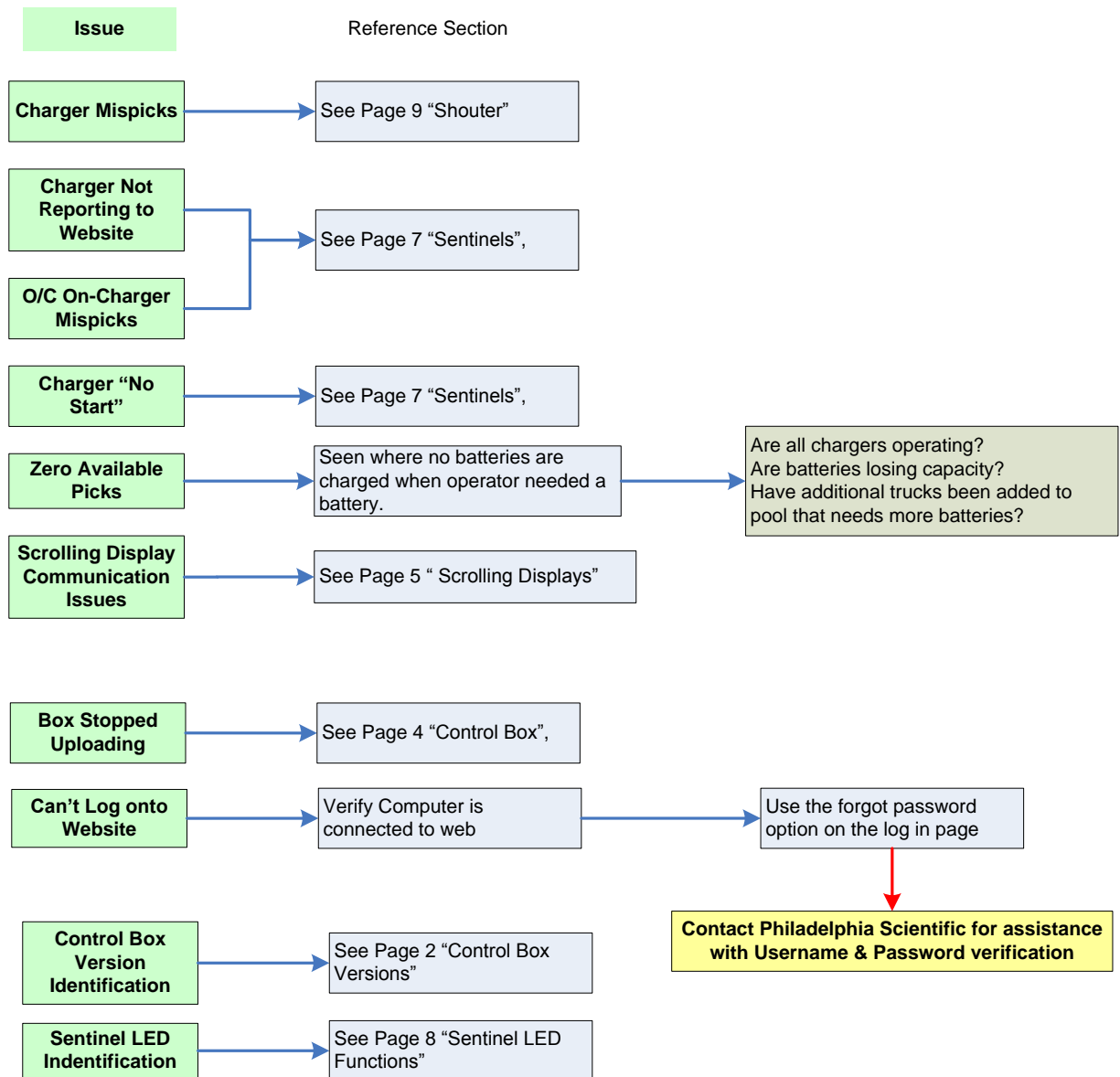
Sent and received should read 100%. Use this test to ensure good RF antenna placement to service the entire run of the battery changer.

A good “Received” % test range is +95%.



Task	Status
Make sure all Sentinels™ are displaying a solid green light.	<input type="checkbox"/>
Make sure all Sentinels™ are assigned and reporting via the “Sentinel List” under “Settings” on the home screen.	<input type="checkbox"/>
Test the Shouter(s) for “Correct” and “Incorrect” battery pick sounds from the menu. Test this by clicking “Settings” then “Volume.” Also select desired volume at this time.	<input type="checkbox"/>
Test the upload capabilities of the iBOS® System via the Internet.	<input type="checkbox"/>
If the passwords were disabled during installation, reset the Maintenance default password to “11111” and the Settings default password to “919191”. Or set passwords of your own choosing.	<input type="checkbox"/>
Make sure the date and time are set correctly.	<input type="checkbox"/>
Make sure all chargers are labeled by Pool (101, etc.)	<input type="checkbox"/>
Check Charger Settings to make sure “Cool Down” setting and “Delay Equalization Charge” are set to “Off.”	<input type="checkbox"/>

8. Troubleshooting



8.1 Version Determination

6 Series Control Box



5 Series Wireless Control Box



4 Series Control Box



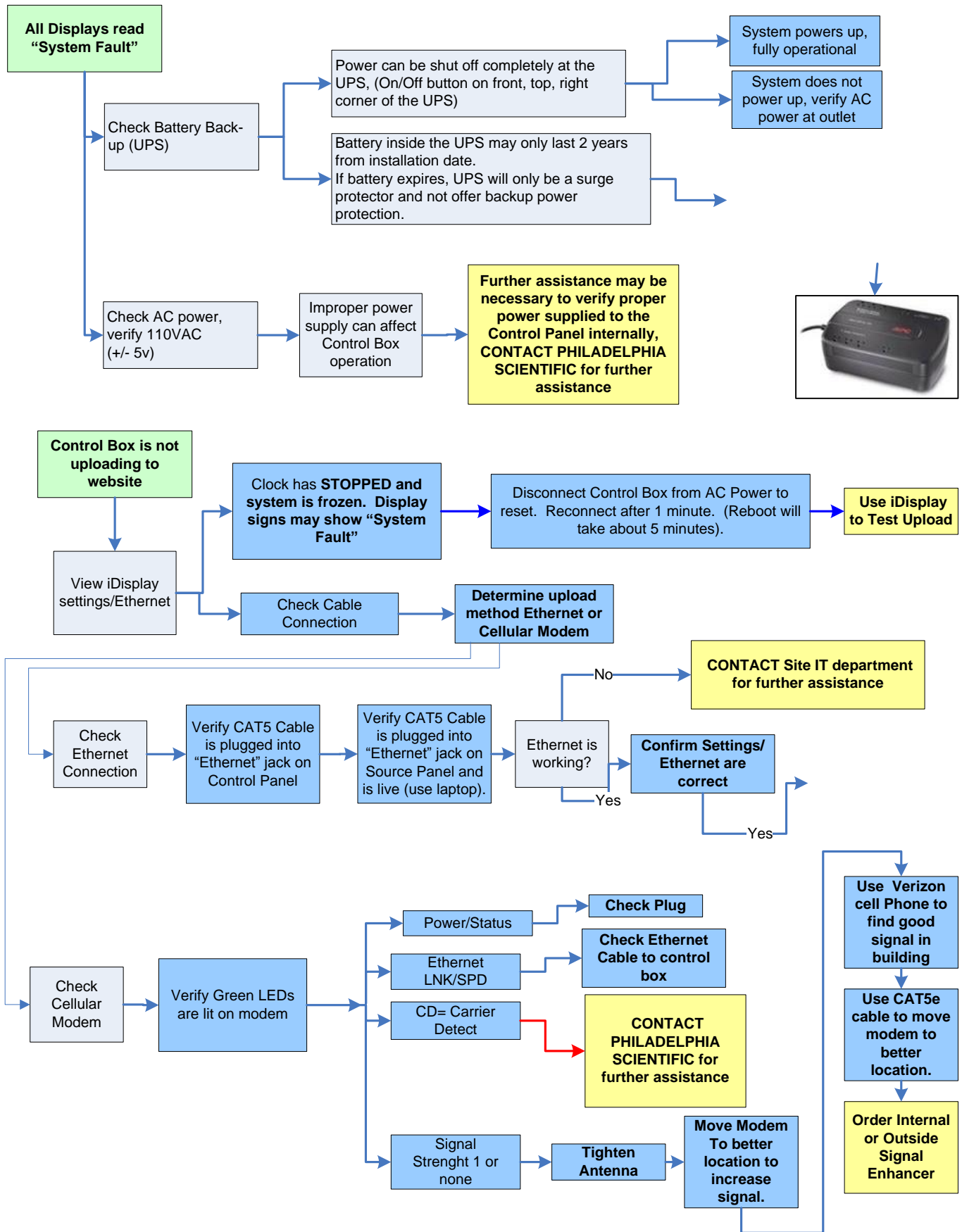
Real Time Monitor connects via the 5 Port Phone Jack in the top left-hand corner.

Legacy Control Box, 3 Series PLC Controlled

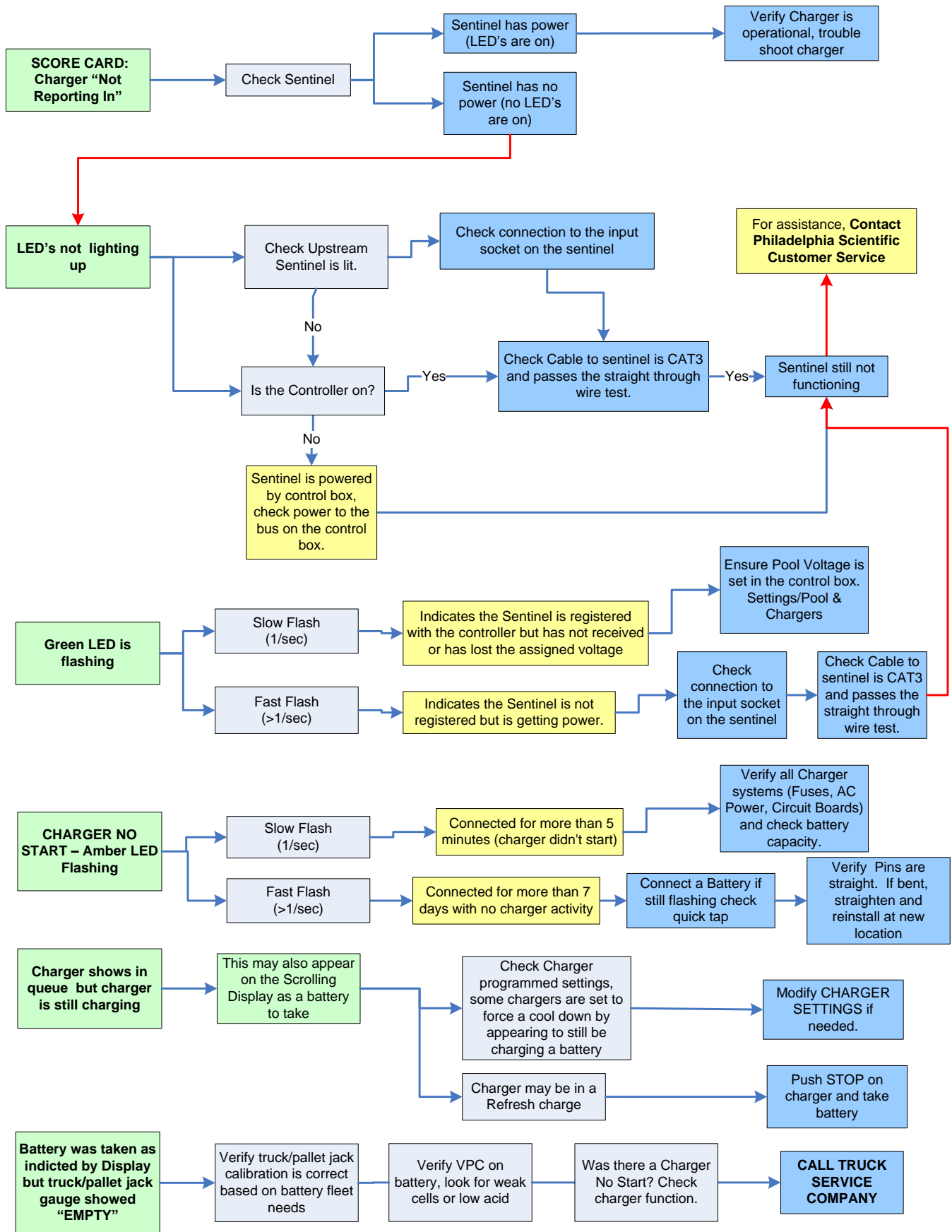


PLC based programming,
Refer to original installation guide for help or CONTACT PHILADELPHIA SCIENTIFIC CUSTOM SERVICE FOR ASSISTANCE.

8.2 Control Box

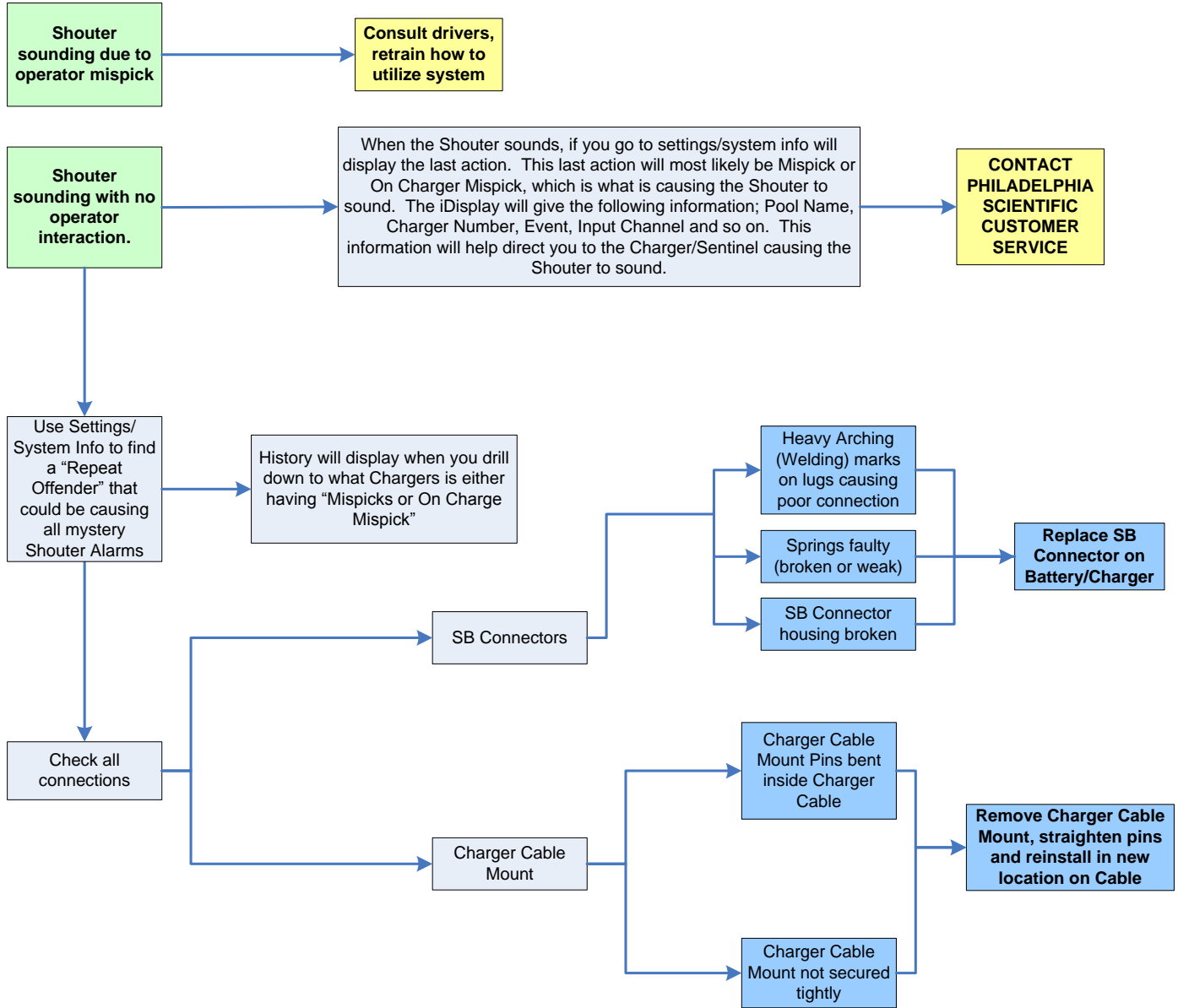


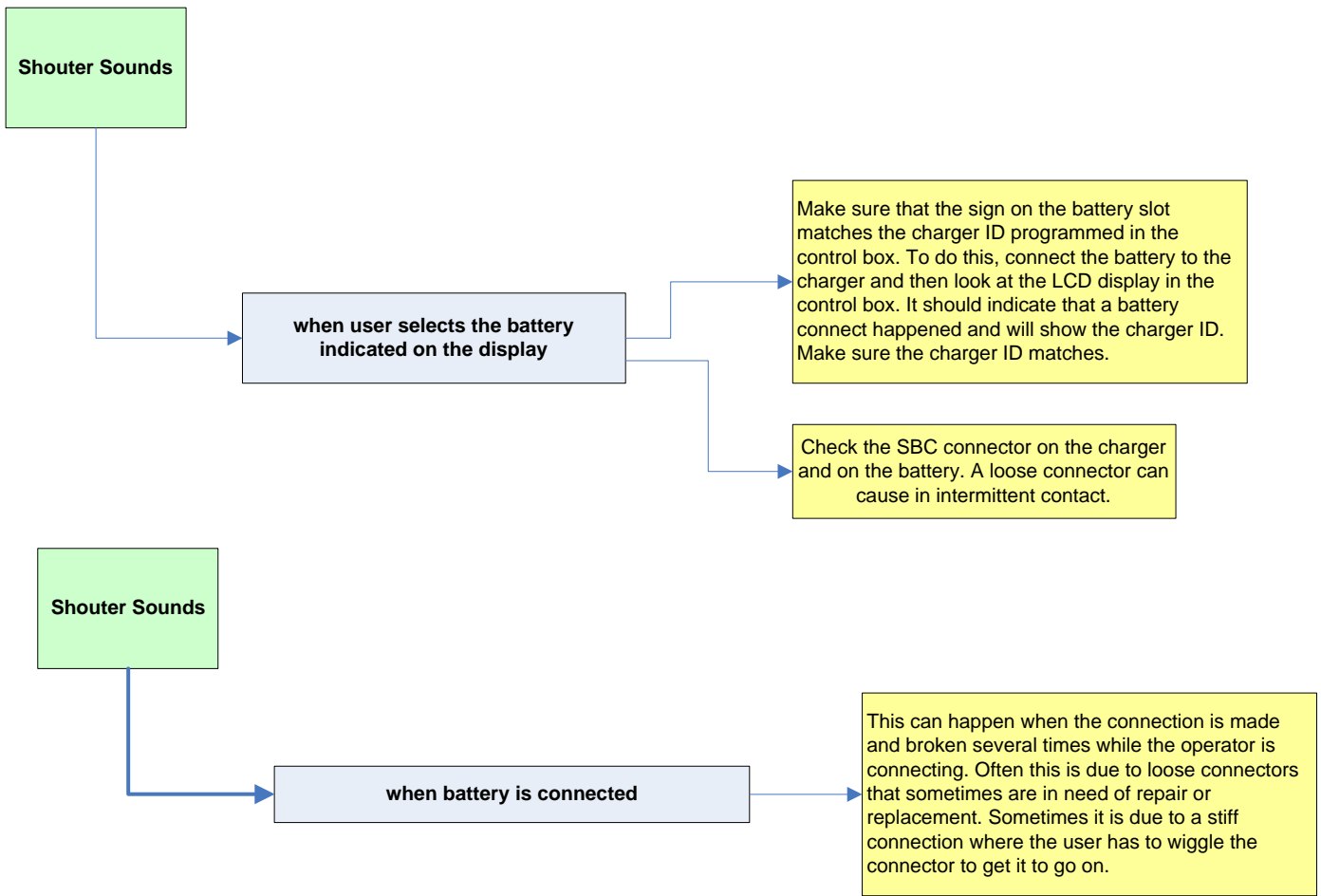
8.3 Sentinel™



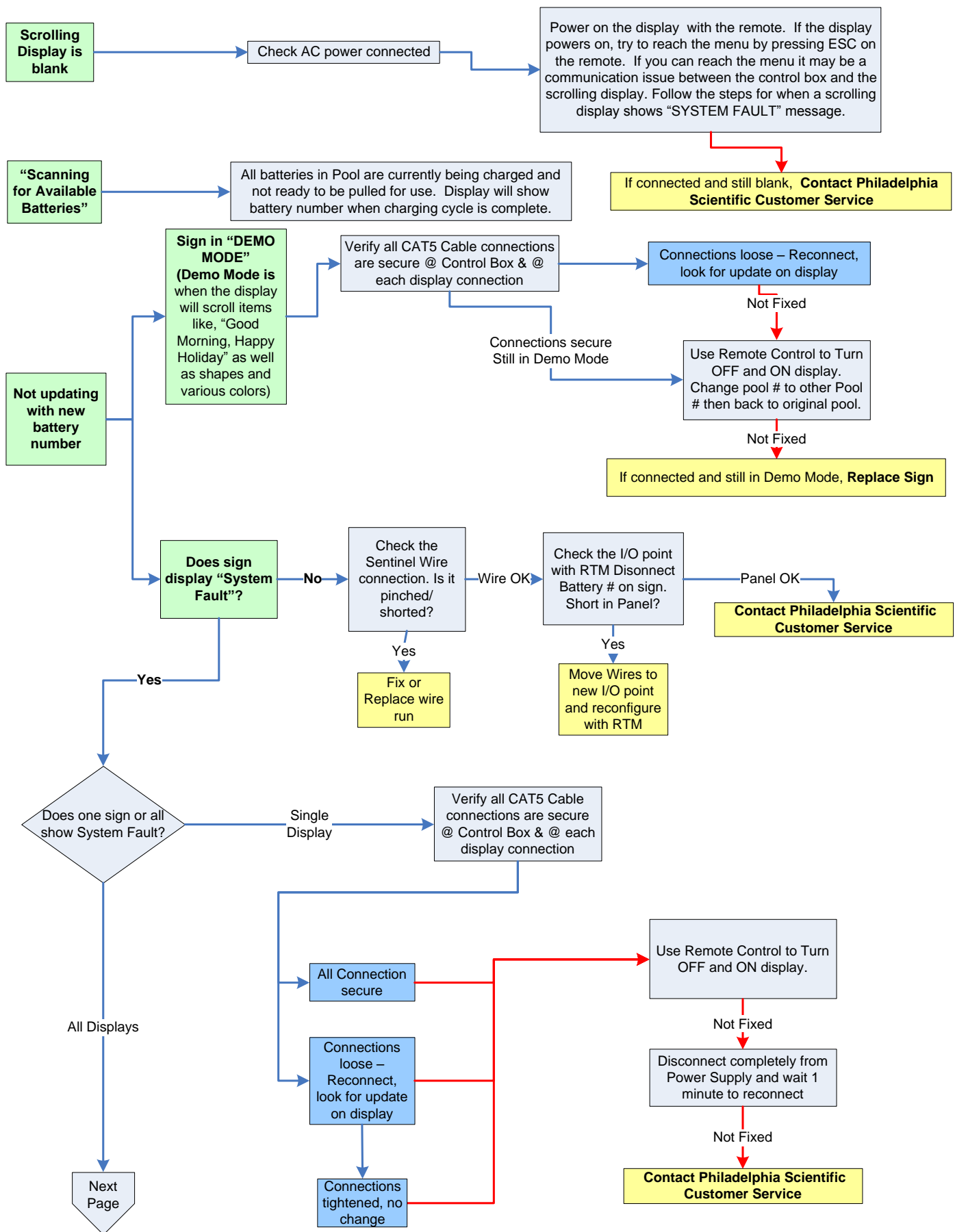
See Appendix A for further information on Sentinels™.

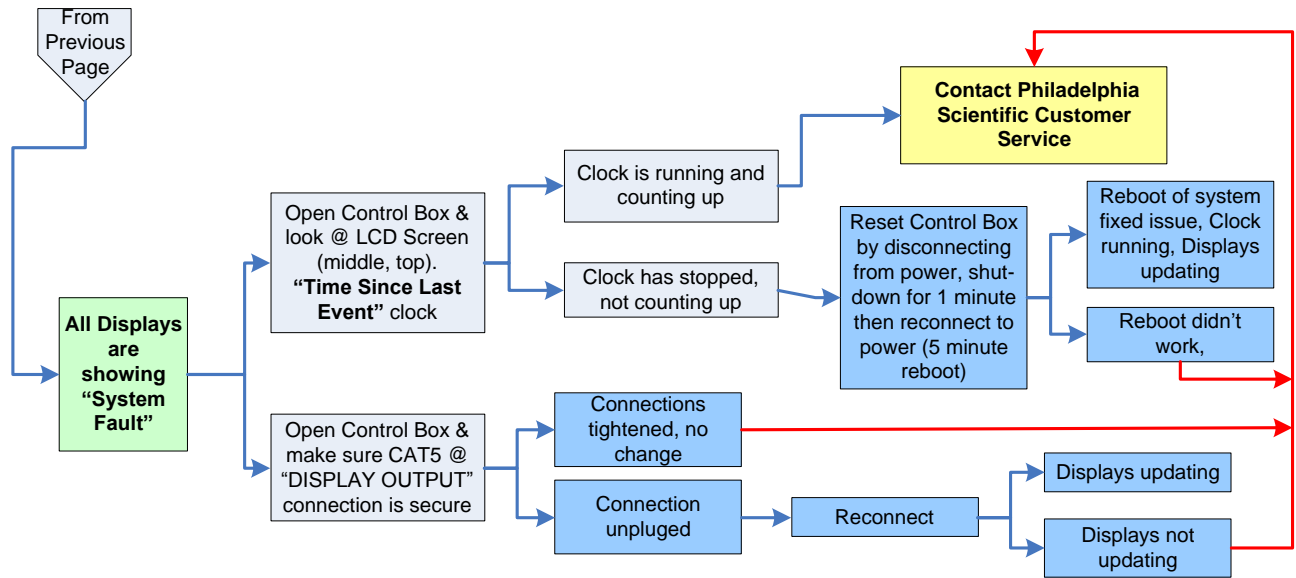
8.4 Shouter





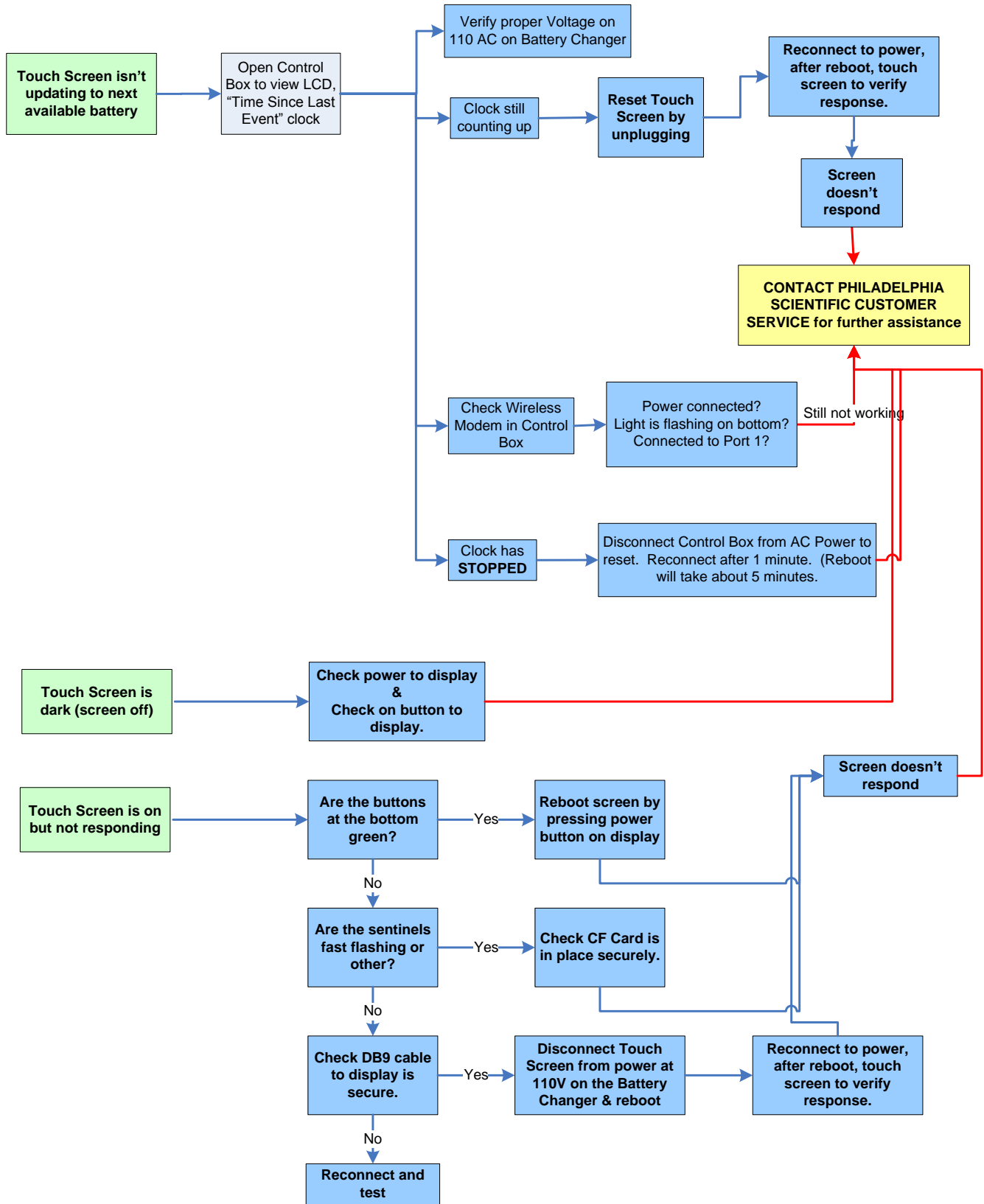
8.5 Scrolling Displays





See Appendix B for further information on Scrolling Displays.

8.6 Wireless Touch Screen

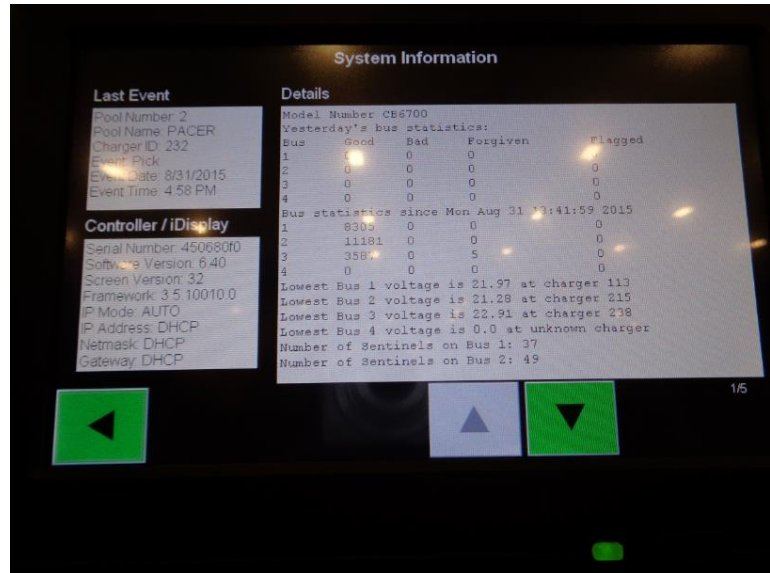


8.7 System Trouble Shooting Reference

8.7.1 System Information.

Shows

- versions of the software for both the display and the control box
- Lowest bus voltage
- Bus statistics
- Last Event
- Ethernet Upload Setting



8.7.2 Wireless Display RF Antenna Relocation

- If reception is not good to the mounted wireless display, an additional 20' (6.1 m) Antenna Extension Cable (BOS-203) can be purchased to move the antenna to an improved reception location.
- Once relocated, use the wireless communications test to verify location

New Location with direct line of site



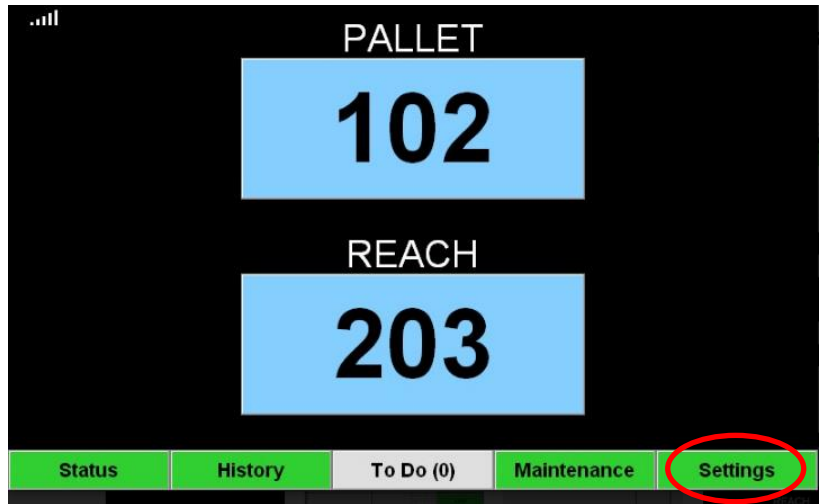
System Tip: Always leave batteries connected to a charger. The charger will automatically refresh the battery to keep it ready to go, as long as a refresh interval has been set and the charger is capable of refreshing.

8.7.3 Changing out a Sentinel™

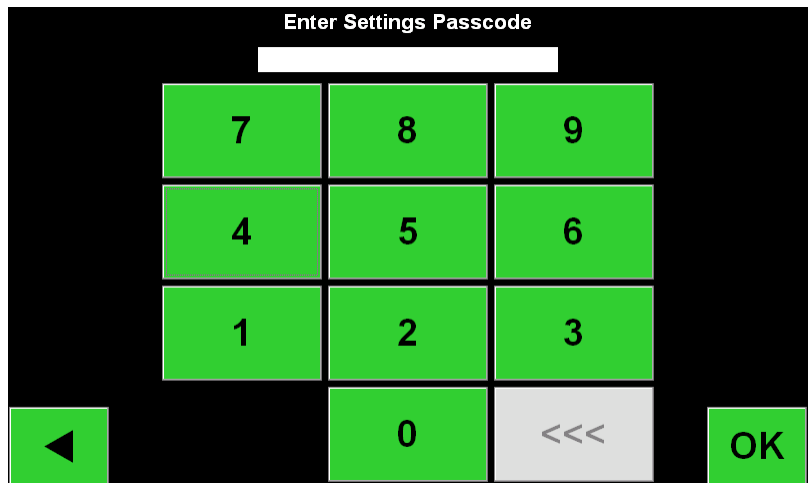
- Carefully cut the wire ties securing the Sentinel™. Remove the quick tap from the DC charging cables. Disconnect the data cables from the Sentinel™.
- Replace with another Sentinel™ according to the instructions listed in *Section 5.3 Installing the Sentinel™*.



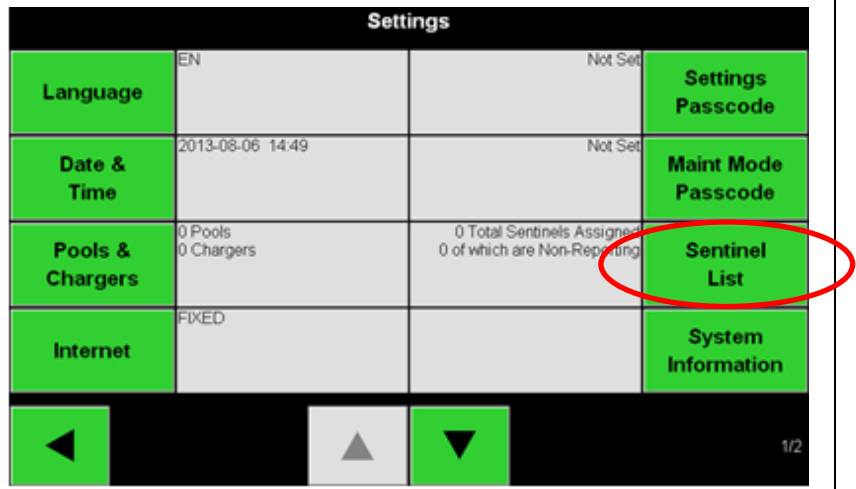
- Press Settings



- Enter the Settings passcode.
- The default passcode is 919191.



- Press Sentinel List

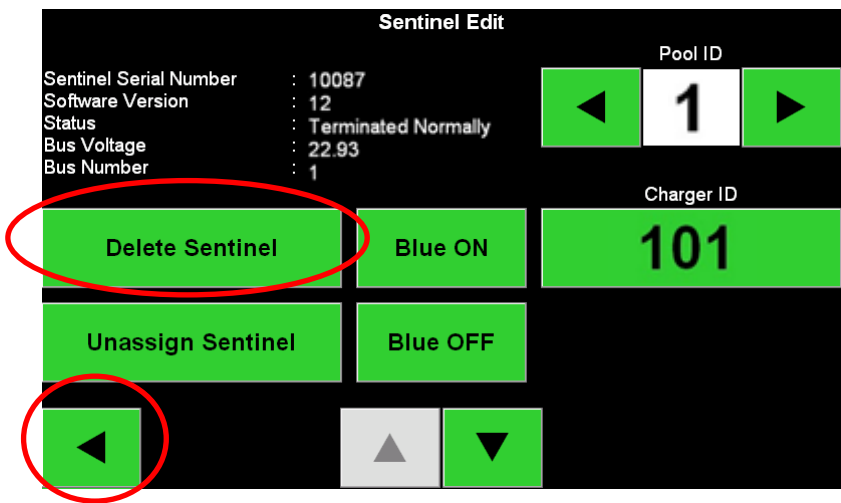


- Find the charger ID matching the Sentinel that was just removed.
- Press the green arrow at the end of the row containing the charger ID.

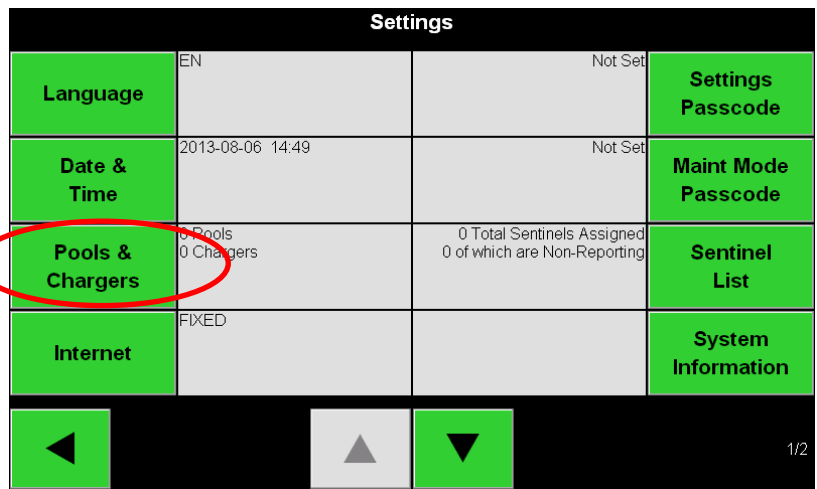
The screenshot shows a table titled 'All - Sentinel List'. The table has columns for Pool #, Chg ID, Serial #, Ver., Status, and Reporting. The first row is highlighted, and the 'Chg ID' '101' and the green arrow at the end of the row are circled in red. A 'Refresh' button is visible at the bottom right.

Pool #	Chg ID	Serial #	Ver.	Status	Reporting
1	101	10003	12	Terminated Normally	Yes
1	102	10155	12	Terminated Normally	Yes
1	103	10086	12	Terminated Normally	Yes
1	104	10185	12	Terminated Normally	Yes
1	105	10191	12	Terminated Normally	Yes
1	106	10084	12	Terminated Normally	Yes
1	107	10087	12	Terminated Normally	Yes

- Press Delete Sentinel
- Press the back arrow until you arrive on the Settings page.

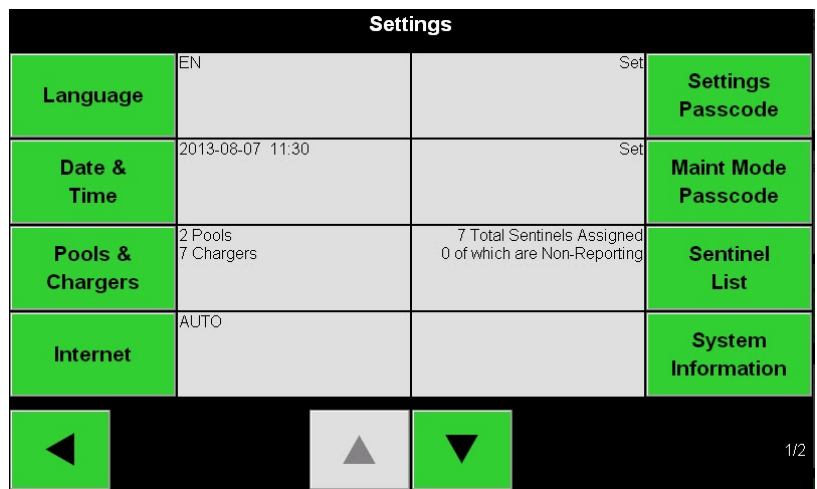


- Press Pools & Chargers and follow the directions in 6.3 Configuring Pools and Chargers to add a charger to the pool where the new Sentinel™ belongs.



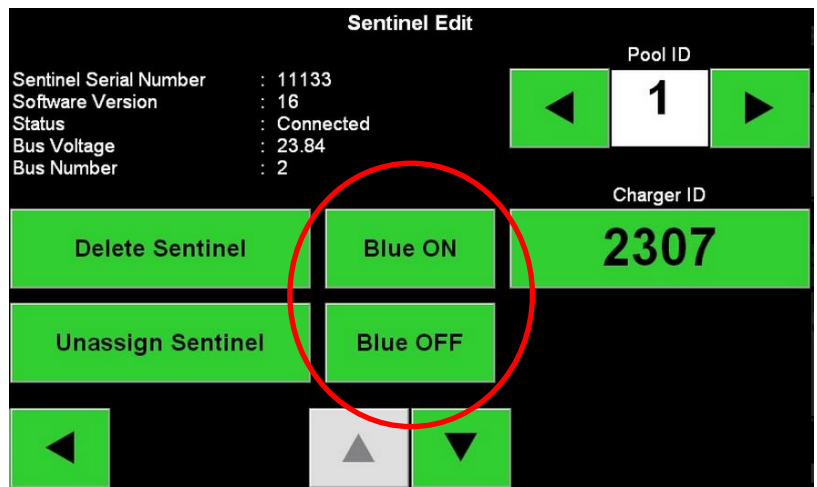
8.7.4 Reconfiguring a Sentinel™ that has been configured for the wrong charger

- Follow the instructions in Section 8.7.3 starting with “Press Settings” on the control box touch screen.



8.7.5 Troubleshooting with Blue Light

- As an aid in physically locating a Sentinel™, there is an option to turn on its blue light from the control box.
- To turn on the blue light on a Sentinel™, locate the corresponding charger ID or serial number on the Sentinel™ list.
- Press the green arrow at the end of the row.
- Press “Blue ON” to turn the blue light on.
- Press “Blue OFF” when you are finished.



Appendix A – Sentinel™ Information

The Sentinel's™ job is to detect when a charger is finished charging and a battery is ready to be selected. Normally the battery is connected, and the charger turns on. The Sentinel™ observes the voltage as it changes over time. When the charger turns off, the Sentinel™ can detect that and signal that the battery has just gone through a complete charge. Sometimes chargers have a cool down timer that will make the “charge complete” light come on several hours after the charger turns off. In these cases, the Sentinel™ will correctly terminate when the charger turns off and not when the “charge complete” light illuminates on the charger.

In addition to a normal charge cycle, the Sentinel™ can terminate in two other ways. Both happen in a situation where the charger does not turn on. This can either be because the battery is over-discharged, and the charger does not start, or if a fully charged battery is connected and the charger senses this and does not start.

Status LED's

The Sentinel™ has three LED's on it that can help diagnose what the Sentinel™ is doing.

Green LED

A solid green light indicates a good connection to the Controller.

All Sentinels™ should have a solid green light. Upon initial connection, the green light will flash fast, then slower, before settling at solid green. If the green light remains fast flashing, check the wire connection to the Sentinel™.

Amber LED

When the amber light is on, the battery is connected.

If the amber light does not turn on, check the quick tap to ensure that the pins have fully penetrated the cables.

If you disconnect a battery and the amber light does not turn off, check for leaking voltage from the charger.

Blue LED

A bright blue with momentary flashing light indicates the next battery to pick in that pool.

If you do not want to use the blue light as a pick light indicator, it can be turned off in the settings panel. Click “Settings,” then “Pick Light,” and turn it off.

Appendix B – Scrolling Display Information

Section 1 – Sign Types

There are multiple type signs that are compatible with the iBOS® system. To identify which type of sign you have: Type A or B see below.



Type A Scrolling Displays: Are labeled on the back for use with “Use with 9 VAC”. Type A signs also use a telephone cable (RJ11) for a data connection.



Type B Scrolling Displays: Are labeled on the side with “Use with 5 VDC”. Type B signs also use a Cat 5 cable for data connection.

The Scrolling Display is potentially the most confusing part of the iBOS® charger management system to trouble shoot. The Scrolling Display continuously displays information even when it loses its connection with the Control Box or if the Control Box stops working. This description of how it works and how it communicates with the controller may help in understanding how to trouble shoot the system if there are problems.

Each display is set to a particular “channel”. So just like a television, each display will only display the information that is broadcast on that channel. The sign ID is equivalent to the TV channel. The sign set to ID 1 will display Pool 1 information. The sign set to ID 2 will display Pool 2 information etc. In section 5 of this manual are instructions on how to set the sign ID on the Scrolling Display.

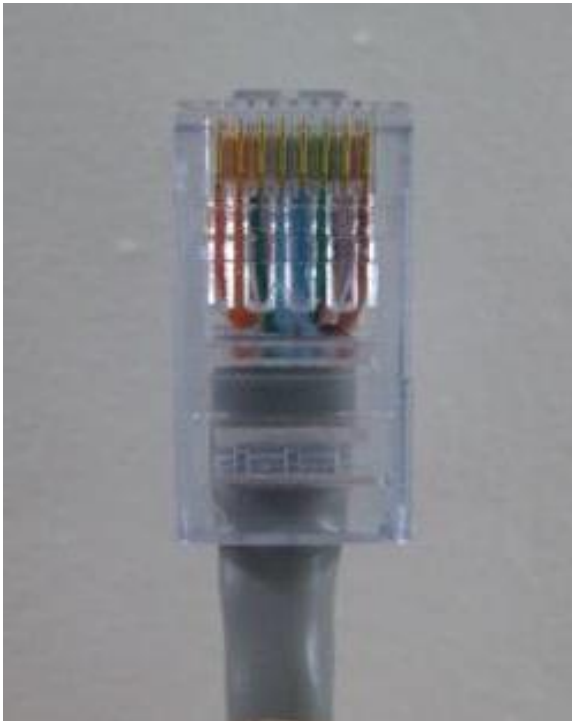
If there is a problem with the wiring to the Scrolling Display or if the Control Box stops working, then the Scrolling Display will not receive a sign update every 15 seconds. The Scrolling Display has a memory buffer in it and it will keep displaying the message in the buffer over and over until another message is received. The Scrolling Display can continue to show information even if the Control Box is disconnected. The way you will know that the Scrolling Display is not receiving updates is that you will see the message “***** SYSTEM FAULT *****” appear on the display following the normal message.

If the communication to the Control Box is lost (or the Control Box stops working) then you will start to see the words “SYSTEM FAULT” come up after the normal communication. The Control Box loads a long message that would take about 45 seconds to scroll across the display. But the message is interrupted before it finishes. The first 15 seconds are the real message, for example “Take next REACH TRUCK battery from charger 101”. The next 30 seconds of the message display “SYSTEM FAULT”. When things are working correctly, the Control Box sends a new message every 15 seconds. This will always interrupt the message just after the real message is displayed but before the “SYSTEM FAULT” portion. So under normal circumstances the only thing that is displayed is the normal message.

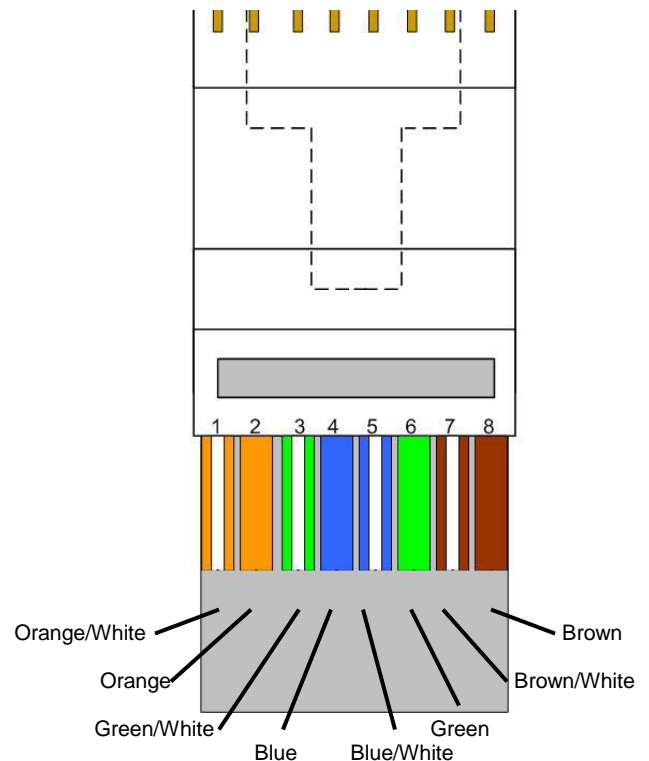
Section 2 – Type B Signs

Troubleshooting a scrolling iBOS® Type B display

1. Trace the cable from “faulty” Scrolling Display to display connection jack inside the iBOS® Control Box and verify connections.
2. Inspect the cable connecting the Control Box to Display that you are troubleshooting. Control Boxes are connected to Scrolling Displays with standard Ethernet cable. Verify that crossover cable has not been used. A crossover cable is a type of Ethernet cable used to connect computing devices together directly such as directly connecting two personal computers via their network adapters. When looking at the clear connector with the tab facing down and the cable coming to you, is the order of the colored wire the same on both ends? If the color order is inverted, this is a CROSSOVER cable and cannot be used with the Scrolling Display.



Depicted with the tap facing down and away from you

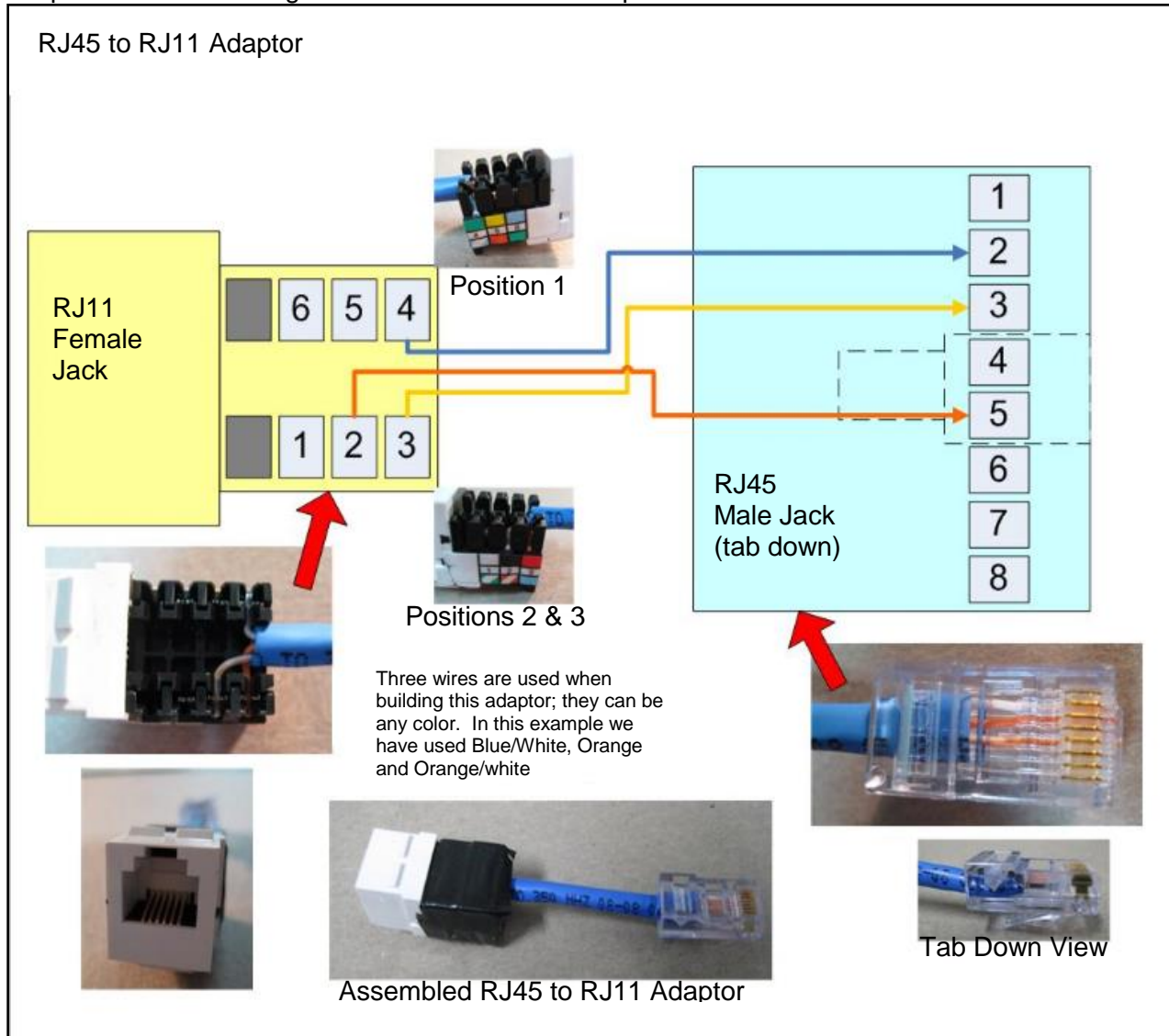


3. Verify that the display is assigned to the correct pool. The pool 1 display would need to be set as ID01. Turn off the power to all the displays except the one you are programming.
 - a. Point the remote control at the sign and press the ESC key. The words SERIAL ADDR will appear.
 - b. Press the ENT key. The sign's number will appear (example: ADDR=1).
 - c. At the top of the remote control, press the PREV or NEXT keys to lower or raise the number to correspond with the pool number associated to that sign.
 - d. When the sign's ADDR number matches the pool number, press the ENT key.
 - e. Press the ESC key. The words SERIAL ADDR will appear (if not, continue pressing the ESC key until SERIAL ADDR appears).
 - f. Press the left arrow key on the remote control. The word BAUDRATE will appear.
 - g. Press the ENT key. The sign's baud rate will appear (example: 9600).
 - h. If the resulting number is not 9600, press PREV or NEXT keys to lower or raise the baud rate to 9600.
 - i. Press the ENT key. The sign will exit its set-up mode automatically within 10 seconds.

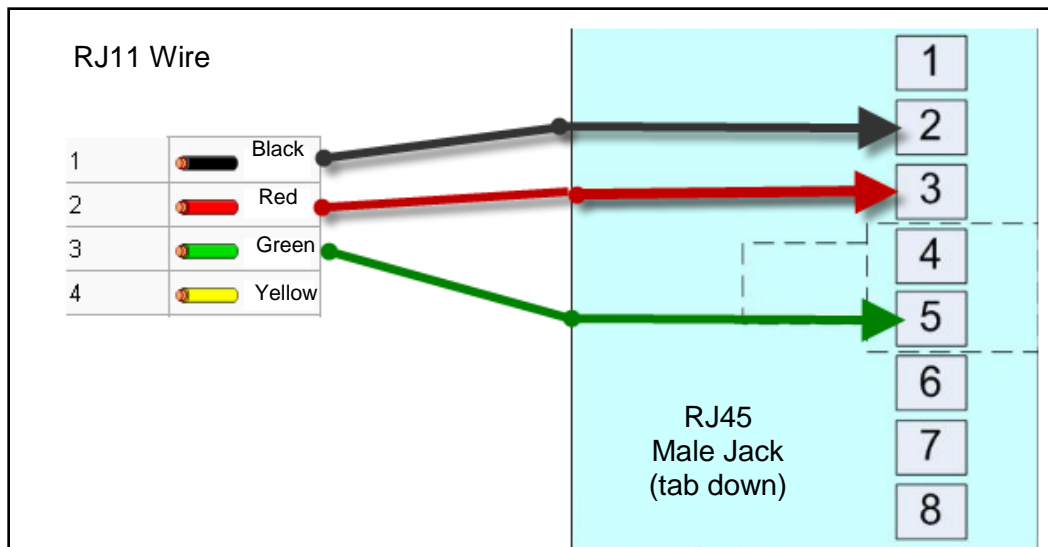
- Switch ID# from ID01 to ID02 to verify if you can receive any signal at all. Using the remote control that comes with the Scrolling Display, follow the steps from step 3. Go to another POOL display, switch ID# from ID02 (or whatever that display is assigned to), to ID01 to verify Control Box is sending message correctly for ID01.

Section 3 – Type A Signs

In order to connect a Type A sign to an iBOS® system Series 5 or higher you will need to construct an adaptor. The follow diagram illustrates how the adaptor is connected.



Conversely a 4-conductor phone wire can be connected directly by using a RJ45 jack, using the diagram. As with all electrical connections all wires must be properly crimped for good connections.



For Type A signs there is a special diagnostic channel which can help when checking sign communication. It is channel “0A” (the channel right after channel 9). If you set your sign to this channel you will see a single digit number scroll across the screen. The digit will change every second if there is communication to the sign. If you see any of the following on the screen, it means that there is no communication at present:

- Same number not changing.
- Blank.
- The “Take next battery ...” message.

Note: this feature is present in version 4.15 and higher.

Troubleshooting a Type A iBOS® display

1. Trace phone cord from “faulty” Scrolling Display to the 5 Port Phone Jack inside the iBOS® Control Box and move cord to another jack to verify if signal can be received by the Display from another connection.
2. Inspect the phone cord connecting the Control Box to Display that you are troubleshooting.
 - a. Is the phone cord no longer than 25’ (7.6 m)?
 - b. Is it a Cross-Over Cable? NON-CROSS-OVER CABLE = When looking at the clear phone connector with the tab facing down and the phone cord coming to you, is the order of the colored wire the same on both ends? BLACK, RED, GREEN, YELLOW. If one end is Black, Red, Green, Yellow and the other is Yellow, Green, Red, and Black this is a CROSS-OVER Cable and will not work with the Scrolling Display.
3. Verify that the display is assigned to the correct pool. The pool 1 display would need to be set as ID01. Turn off the power to all the displays except the one you are programming.
 - c. Press ESC (display shows Ed Rn Del Set)
 - d. Press S (for set).
 - e. Press Enter. Continue to press until you see the ID number displayed.
 - f. Press ▲ and ▼ to change ID number. Use 1 for pool 1.
 - g. Press Enter until you see Ed Rn Del Set
 - h. Press R
 - i. Press P
 - j. Press A

4. If steps 1-4 have not resolved the problem, clear out all the memory buffers in the Scrolling Display. To do this use the following steps using the display remote control:
 - k. Press ESC (display shows Ed Rn Del Set)
 - l. Press D screen will show Page Tmr Gfx
 - m. Press P, screen will show Page (A-Z, Del)?
 - n. To Delete Page A: Press A, then screen will show SURE Y/N?
 - o. Press Y, to confirm deletion & exit to main menu
 - p. Press ESC, to end the editing
 - q. Press R
 - r. Press P
 - s. Press A, you will initially see a rainbow color phrase "Good Morning" formed on the screen, within 13 seconds updated message should be received from Control Panel by the Scrolling Display and you will see message like, "Take next available forklift battery..."

5. Switch ID# from ID01 to ID02 to verify if can receive any signal at all. Using the remote control that comes with the Scrolling Display follow the steps from step Go to another POOL display, switch ID# from ID02 (or whatever that display assigned to), to ID01 to verify Control Box is sending message correctly for ID01.



a
is

Type A Sign - Remote

Appendix C – Internet Connection Requirements

This appendix is provided to present all the information that an IT department would need in order to connect an iBOS® system to the iBOSworld website. The iBOS® system is used in the battery room to provide rotation of battery usage to maximize the useful life of the battery and to give management information about the optimum number of batteries and chargers needed and also if all of the chargers are working properly.

Description of hardware: The iBOS® system is installed in the battery room of the distribution center. There is a sensor connected to each of the chargers and they are all wired to a central Control Box. The Control Box monitors the charger activity, displays messages on a Scrolling Display for the battery room operators, and collects data on the activities in the battery room. The Control Box has a Pentium® computer running Linux™ inside it. The Linux is an embedded Ubuntu GNU/Linux®. The Control Box is equipped with Ethernet for uploads to the web.

Description of data: The data collected is: which chargers are being picked from, the number of fully charged batteries available at any time, and the times when an operator picks a battery other than the one they should. The data is stored in a proprietary comma delimited format and transmitted via FTP to a server on the internet maintained by Philadelphia Scientific, LLC. The size of the data files is dependent on the size of the installation and the activity level. For example, a typical 20 charger site that pulls a battery from each charger every day would generate about 4k of data per day. In addition, the configuration file for the Control Box is uploaded to the server whenever it is changed. This helps us do remote technical support by being able to see how the box is configured and provides a backup of the configuration information in case hardware needs to be replaced.

Connecting to the Internet

Method 1 – Ethernet

Option A: DHCP Dynamic Host Configuration Protocol (DHCP) is an automatic configuration protocol used on IP networks. This setting allows for the easiest connection to the web. The Control Box will be assigned an IP address for the network on boot up. The installer will configure the Control Box to Ethernet auto mode.

Option B: To connect the Control Box to a corporate network, the Control Box is typically configured with a fixed IP address. The IT department needs to allocate an IP address and provide that information to the installer. Two-way data flow is necessary to enable software updates and establish confirmation for file uploads. The installer will then configure the Control Box to Ethernet mode and configure the IP address of the Control Box. The IT department then needs to configure the firewall to allow the information to get to the server. Our server's address is www.ibosworlddata.com. We only need SFTP on Port 22 enabled. If the IT department limits access to the Internet, our server's address may need to be set for DNS server access. We use the standard Google global Domain Name System (DNS) to resolve the URL for uploads. (IP: 8.8.8.8 and 8.8.4.4.) DNS addresses can be changed via the Internet button on the Settings screen. Also, all communication is initiated by the Control Box. We are not enabling an ability to remotely initiate a communication session from the outside. When we use the Ethernet method we generally set the upload frequency to once per hour.

Method 2 – Cellular Modem

Connect and turn on cellular modem then boot the Control Box. An IP address will be assigned through DHCP during the boot up process. NOTE: Our system comes configured for Verizon as its carrier. AT&T configuration is available by special order. Call Philadelphia Scientific® at 215-616-0390 and ask for Customer Service.

Appendix D – Display Protection

Philadelphia Scientific® strongly recommends the use of a surge suppressor device on each of the displays (both Scrolling Displays and Wireless Displays).

The device must be purchased by the owner of the equipment; this protects your investment in the iBOS®.

For the displays devices the surge suppressor must have the following minimum requirement:

- 400 volts clamping voltage
- 750 Joule rating
- 15 amp
- 60hz

The Tripp Lite™ Spike Cube™ has been found to meet these requirements. Model #: SPIKECUB



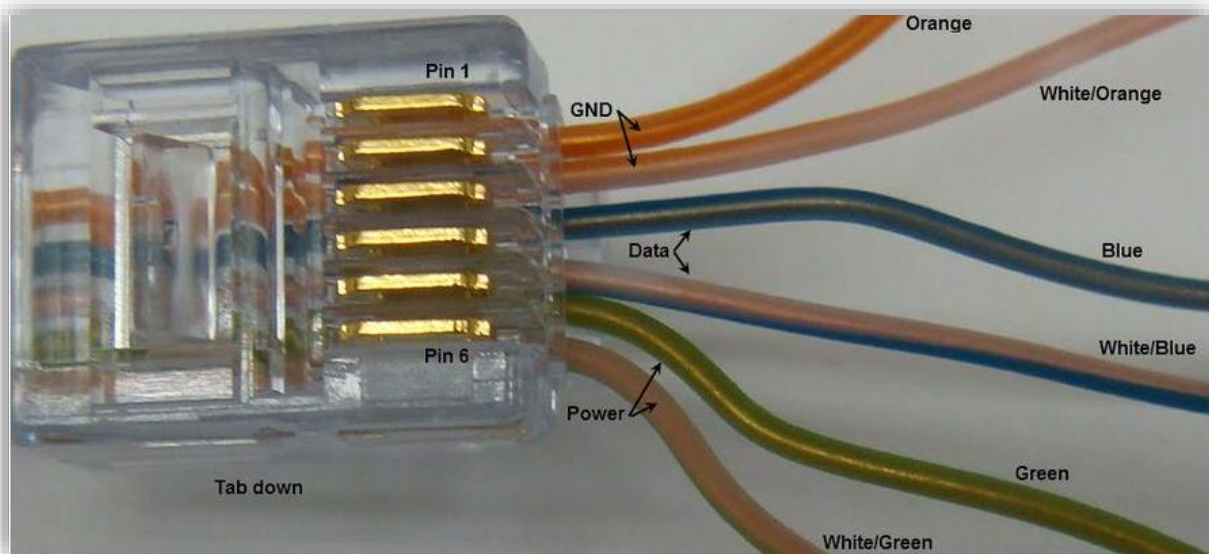
Furthermore, Philadelphia Scientific® also strongly recommends the use of a surge protector and uninterruptable power supply for the Control Box.

Appendix E – Custom Sentinel™ Data Cable

Step 1: Cat 3 bulk Sentinel™ Data Cable is measured out to the desired length and then cut and

Step 2: Terminate the cable with the following as in the RJ12 EZ Diagram.

- Pin 1 – Orange
- Pin 2 – Orange/White
- Pin 3 – Blue
- Pin 4 – Blue/White
- Pin 5 – Green
- Pin 6 – Green/White



RJ12 EZ Sentinel™ Data Cable Termination 1

Step 4: Check to ensure there are no crossed wires and all are seated evenly in the jack, then crimp firmly. The tool will remove the excess wires at the end.

Step 5: Test the continuity of the wire with the cable tester in the kit. Do the quality test twice.



Appendix F – Glossary

Data Cable – Is a six wire CAT3 construction which has both the power and data that supplies each Sentinel™. Using non-standard cable is not recommended and may void warranty.

Mispick – When an incorrect battery is selected. Information about mispicks is recorded and available for viewing through the website.

Port or Receptacle – Slot into which a specified jack is inserted

Quarantine – When a charger does not start or does not complete the charge of a battery that has been connected to it for 24 hours, the system removes the battery from the queue. If the issue has not been resolved within 72 hours, the battery is returned to the queue.

Running Dark – When the system is gathering information but there is no battery selection guidance provided. This allows personnel to collect raw data to compare it with performance after iBOS® system is implemented.

Scrolling Display- a 24" LED display that is an option to communicate next battery. There is one per pool.

Sentinel™ – Charger monitoring device that monitors the voltage from the DC cable and communicates to the Control Box via a wired bus.

Sentinel™ Bus – This is the chain of Sentinels™ that are connected to the Control Box. Standard Control Box has 4 buses to connect up to 200 Sentinels™. The limit is 50 Sentinels™/bus.

Spring-latch audio socket – Connects the optional External Shouter to the Control Box with spring-loaded connectors.

Touch Display – Touch screen (Wireless or Wired) display communicates with the Control Box and shows next battery to take. This interface removes the need for RTM software on a separate computer.

Unknown – The Unknown column shows the number of chargers with an unknown status according to the system.

Upload (data) – through the Ethernet connection event data and system settings will upload to the iBOSworld.com website on a periodic basis (usually a few times/day). This is not a user settable feature.

iBOSworld.com – Website portal for all system data. Login access is created by Philadelphia Scientific® and the site requires an active subscription for viewing data.

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