Link Booster™

User Manual

U090.B.0

FCC Statements

15.19 – Two Part Warning

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference and

(2) This device must accept any interference received, including interference that may cause undesired operation.

15.21 – Unauthorized Modification

NOTICE: The manufacturer is not responsible for any unauthorized modifications to this equipment made by the user. Such modifications could void the user's authority to operate the equipment.

15.105(b) – 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.

Industry Canada Statement

This device complies with Canadian RSS-210.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc-ca/rpb.

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.

Industry Canada Statement

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.

IC Unlicensed Devices EIRP Statements for Removable Antennas

Part 1: 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.

Part 2: This radio transmitter (LOBSRF-305) has been approved by Industry Canada to operate with the antenna type 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 (LOBSRF-305) 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.

RoHS Compliance Statement

Cervis, Inc. complies with the requirements of ***Restriction of Hazardous Substances (RoHS/WEEE) Specification*** based on in-house practice and declaration of compliance from our vendors. For additional information concerning RoHS compliance, please contact Cervis, Inc. at:

CERVIS, Inc.

170 Thorn Hill Road • Warrendale, PA 15086

Phone: 724.741.9000 • Fax: 724.741.9001

This product may contain material that may be hazardous to human health and the environment. In compliance with EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE):

- ✓ Do not dispose of the product as unsorted municipal waste.
- ✓ This product should be recycled in accordance with local regulations. Contact local authorities for detailed information.
- ✓ This product may be returnable to the distributor for recycling. Contact your distributor for details.

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Cervis Inc. Safety Precautions

- ✓ ***Read and follow all instructions.***
- ✓ ***Failure to abide by Safety Precautions may result in equipment failure, loss of authority to operate the equipment, and personal injury.***
- ✓ ***Use and maintain proper wiring. Follow equipment manufacturer instructions. Improper, loose, and frayed wiring can cause system failure, equipment damage, and intermittent operation.***
- ✓ ***Changes or modifications made to equipment not expressly approved by the manufacturer will void the warranty.***
- ✓ ***Owner/operators of the equipment must abide by all applicable Federal, State, and Local laws concerning installation and operation of the equipment. Failure to comply could result in penalties and could void user authority to operate the equipment.***
- ✓ ***Make sure that the machinery and surrounding area is clear before operating. Do not activate the remote control system until certain that it is safe to do so.***
- ✓ ***Turn off the handheld remote and remove power from the base unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.***
- ✓ ***Power can be removed from the Base Unit by detaching the 12-pin cables from the base unit connectors P1 and P2, or by removing the source power from the circuit.***
- ✓ ***Use a damp cloth to keep units clean. Remove mud, concrete, dirt, etc. after use to prevent obstructing or clogging the buttons, levers, wiring, and switches.***
- ✓ ***Do not allow liquid to enter the handheld or base unit enclosures. Do not use high pressure equipment to clean the handheld remote or base unit.***
- ✓ ***Disconnect the radio base unit before welding on the machine. Failure to disconnect the base unit may result in destruction of or damage to the base unit.***
- ✓ ***Operate and store units only within the specified operation and storage temperatures defined in the specifications of this document.***
- ✓ ***Do not key 2-way radios while using the handheld remote.***

1.0 SmaRT Link Booster (SLB) Introduction

The SmaRT Link Booster (SLB) is a 900MHz @ 10mW or 2.4GHz @ 100mW line-of-sight communications booster designed to extend the communication range between a 900MHz SmaRT remote control unit and a 900MHz SmaRT base unit or a 2.4GHz SmaRT remote control unit and a 2.4GHz SmaRT base unit. The SmaRT Link Booster is particularly useful when the handheld remote and the base unit are not in line-of-sight of each other, in which case the SLB is positioned so that it is in line-of-sight of each unit — at the corner of a structure, for instance — where the structure would typically block the communications between the handheld and the base unit.

Figure 1. SmaRT Communications Link Booster

The Link Booster comes with four (4) magnets installed inside the back of the case that can be used to attach the unit to any ferrous surface. The link booster is powered by two (2) C cell alkaline Batteries or the rechargeable Lithium Ion battery offered by Cervis, Inc. The SLB allows the user to select the type of battery preferred. The removable swivel antenna can be oriented as vertical, at a 45° angle, or at 90° allowing optimal signal strength.

1.1 SmaRT Link Booster Features

- Powered by two C-size alkaline batteries or the Cervis, Inc. rechargeable Lithium Ion battery
- Significantly extends the communications link between the handheld remote and the target base unit
- Able to communicate line-of-sight around obstacles with proper line-of-sight to devices positioning
- Magnetic back allows the unit to be easily attached and removed from flat ferrous surfaces
- Optional steel back-plate adapter fits a standard camera style tripod/support device
- LED indicators for handheld and base unit TX (transmit) and RX (receive) allow determination of message transmit and receive activity
- Active channel menu page
- Handheld and base unit RF signal strength menu pages
- Handheld and base unit serial number menu page
- Operates at 2Vmin. to 4.5Vmax
- 900MHz @ 10mW broadcast
- Health LED
- Eight character LED display
- 2.4GHz @ 100mW broadcast
- Battery life (%) menu page

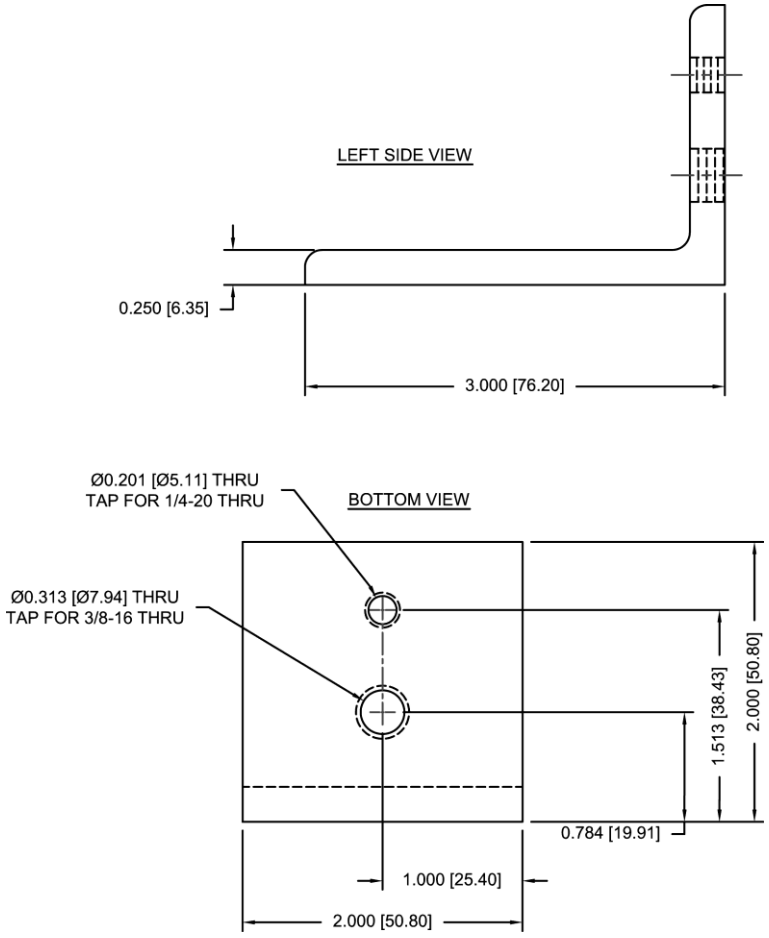

Figure 2. SmaRT Link Booster Tripod Bracket

2.0 Installing C Cell Alkaline Batteries or Li-ion Pack

The SLB is typically powered by two (2) C cell alkaline batteries or by the Li-ion Battery Pack.

1. Remove the battery cradle cover.
2. Insert two C cell alkaline batteries or the Li-ion Battery Pack into the cradle, negative end first.
3. Install the battery cradle cover by pushing against the positive end of the exposed battery with the cover while turning the cover clockwise until it is fully seated.

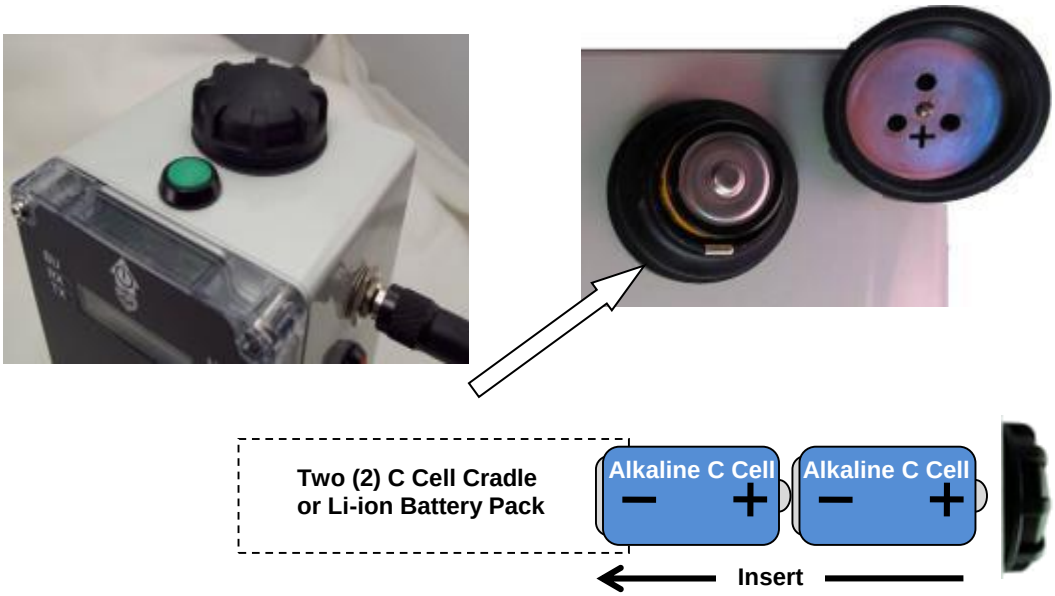

Figure 3. Installing the SLB Batteries

✓**Note:** *Cervis Lithium Ion battery pack is a single unit that is inserted into the battery cradle in the same way as the C cell alkaline batteries are installed.*

Caution!	***Observe proper polarity when placing batteries into the cradle. Improper battery placement can result in excessive heat, battery explosion, injury to the operator, and damage to the unit.***

3.0 Choosing the Battery

Due to the voltage differences in standard cell alkaline batteries and the Cervis Lithium Ion battery, an initial battery selection must be made. This selection must be made whenever changing to a different style battery — alkaline to Lithium Ion, Lithium Ion to alkaline. Use the following steps to choose which battery is in use.

1. Power down the SLB by holding Power button for three (3) seconds. The display will be unlit.
2. Simultaneously press and hold **Button UP** and **Button DN**, then press and release the power button. The Display will read **BAT MENU.**
3. Simultaneously release Buttons 1 and 2. The Display will read ⬆ **=A** ⬇**=LI.**
4. **Select** ⬆ to choose the C cell alkaline batteries. (Selecting ⬇ will choose the Cervis lithium ion battery pack.

The SLB will immediately change to the SmaRT LB and remain in service until shut down.

Step 2

Step 4

Successful Battery Type Selection

Figure 4. Choosing a C Cell Battery

4.0 SLB Indicators

Figure 5. SLB LED Indicators

4.1 Battery Strength

The battery strength can be found in the MENU while under normal operation as a % of 100, where 100% indicates full charge.

1. Enter the Menu system by holding the UP and DOWN buttons for approximately three (3) seconds, until MENU displays.
2. Cycle through the menu pages using UP or DN buttons until the battery status page displays as illustrated in Figure 6.
3. Exit the menu system by simultaneously pressing the UP and DN button when satisfied.

Figure 6. Battery Status

✓**Note:** *Observe all stat, federal, and local disposal laws when disposing of used batteries.*

4.2 Handheld and Base Unit Signal Strength Indications

Handheld and base unit RSSI values (signal strength) can be seen by using the MENU while under normal operation. To view the values:

1. Hold the UP and DOWN buttons for approximately three (3) seconds, until MENU displays.
2. Use the UP and DOWN buttons to cycle to the pages until **HH SS** ## or **BU SS** ## can be shown in Figure 7. Larger numbers indicate more signal strength.
3. Exit the menu system by simultaneously pressing the UP and DOWN buttons when satisfied.

Figure 7. Signal Strength Indication

4.3 Handheld and Base Unit Serial Number Indications

The handheld remote and the base unit serial numbers can be displayed using the SLB Menu system. To view the serial number while in normal operation:

1. Hold the UP and DOWN buttons for approximately three (3) seconds, until MENU displays.
2. Use the UP or DOWN button to cycle to the pages that display a six digit hexadecimal number as shown in Figure 8.
3. Displayed number with leading 00#### is the base unit serial number.
4. Displayed number with leading 80#### is the handheld remote serial number.
5. Press both UP and DN to exit MENU.

Figure 8. SLB Serial Number

5.0 Using the SLB

5.1 SLB Power On

The Link Booster is turned on by pressing the power button located on top of the unit, next to the battery tube cover. In order to conserve power the unit will shut off the display when not in scan mode or menu. A blinking health indicator will prove the unit is in fact powered on. If the unit is paired with a HH and BU system the TX and RX lights will blink.

Figure 9. SLB Power On

5.2 SLB Power Off

The Link Booster is turned off by pressing and holding the power button for three (3) seconds. **PDOWN** will display, go out, display again. When the user releases the power button, the unit powers down.

Figure 10. SLB Power Off

5.3 Establish SLB communications Using Scan

The SLB must initially be told to Scan an associated handheld and base unit before it will communicate with them. The SmaRT Link Booster establishes the communication links once it scans and finds the system.

- If a handheld/base unit system is already associated (see your system manuals for details), then the Scan feature can immediately be used to establish communications with the system.
- If the handheld remote and the base unit that are going to be used as a system are not associated, then that pair of devices meant for a system must use the Associate procedure that is detailed in the handheld remote manual or system manual before the SLB Scan can be used.

Scan to Establish Communications

The SmaRT Link Booster must initially scan for the system before it can be used. The following assumes that the handheld remote and base unit that comprise the system are associated. Use the following instructions to Scan for the system:

1. Turn on (power up) the handheld, base unit, and SLB with all devices in line of sight of and near to the SLB.
2. Press and hold the SLB **UP Button** for three (3) seconds.
3. When the SLB display reads **SCAN**, release the A Button and wait while the unit scans each channel. It will scan until if finds a valid message.
4. When the unit finds a valid message it will display the Base Unit ID. (The Base Unit ID is on the front label of the base unit.)
    a. If the ID is the one you want, press **Button UP** to use this unit pair. The SLB will exit Scan mode.
    b. If the displayed ID isn't the unit you desire, press **Button DN**. The SLB will continue to scan. (It is possible with multiple SmaRT Systems running that a scan will list more than one unit.)
5. When the Link Booster is finished scanning each channel it will display **DONE**. Press **Button DN** to exit the SCAN mode from here.

If the SLB found an acceptable, base unit ID, the SLB Handheld TX and RX and the Base Unit TX LEDs will be flashing indicating communications.

If the SLB did not find an acceptable base unit ID, the SLB Handheld and Base Unit LEDs will remain unlit — unless a previously established, existing pair is on.

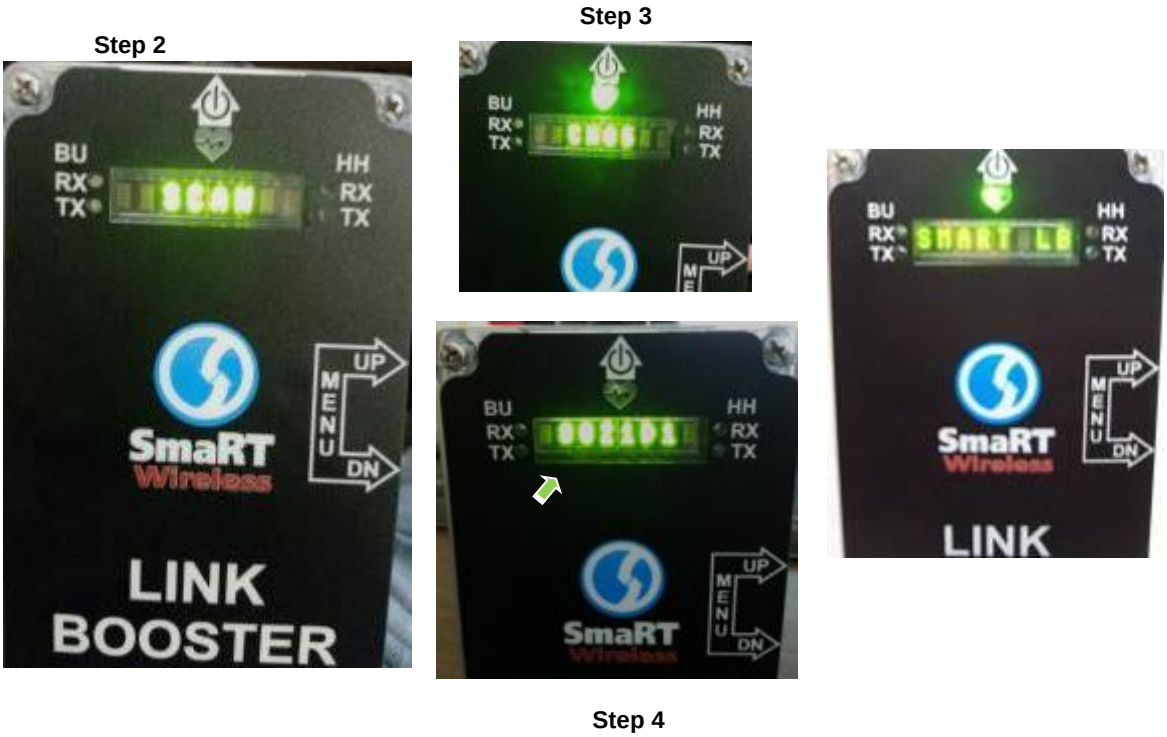

Figure 11. Using Scan to Establish the Link

6.0 SmaRT Link Booster Specifications

Table 1. SmaRT Link Booster Specifications

Item	Description	
Power	**V_{in}**	+2V to +4.5VDC
	Batteries	Two (2) Alkaline C Cells (2V – 3.3V) One (1) Cervis Lithium Ion rechargeable (3.3V – 4.5V)
Environment	**Operating Temp**	-40°C to 70°C (-40°F to 158°F)
	Storage Temp	-40°C to 70°C (-40°F to 158°F)
	Humidity	0 to 100%
Radio	**RF**	906-924MHz@10mW 2.400 – 2.480 @ 100mW
	License	None required
	Modulation	DSSS
	Antenna	External
Enclosure **(Designed to IP67 Standards)**	**Dimensions**	inch: 6 x 3 x 3 ¼ , Antenna: 8 $^{5}/_{16}$
	Weight	SLB with antenna 1.6 lbs. Tripod mounting plate 0.70 lbs.
	Durability	High Impact Polymer case
	Magnets	Four (4)
Indicators	**LEDs**	Sixteen (5) green total: Two (2) Handheld TX, RX Two (2) Base Unit TX, RX One (1) Health Indication
Control Switches	**Buttons**	Three (3) pushbuttons
Display	**LED**	Eight (8) characters

Visit our Web site at: www.cervisinc.com