



## Console Box Remotes

### CB-xH Manual

U093.3.0

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### 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 <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/safety-code-6-health-canada-radiofrequency-exposure-guidelines-environmental-workplace-health-health-canada.html>.

*Le présent appareil est conforme à la norme CNR-210 d'Industrie Canada.*

*Le programme d'installation de cet équipement radio doit s'assurer que l'antenne est située ou fait telle qu'elle n'émet pas de champ RF dépassant les limites de Santé Canada pour la population générale ; consulter le Code de sécurité 6, disponible auprès de Santé Canada site Web <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/safety-code-6-health-canada-radiofrequency-exposure-guidelines-environmental-workplace-health-health-canada.html>.*

### 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 (EIRP) 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 or LOBSRF-309) 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 ou LOBSRF-309) 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.**

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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 cause 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.**
  - ✓ **Equipment owner/operators must abide by all applicable Federal, State, and Local laws concerning proper equipment installation and operation. 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.**
  - ✓ **Remove power from the base unit either by detaching the 12-pin cables from the enclosure or by removing the source power from the base unit circuit.**
  - ✓ **Use a damp cloth to keep units clean. Remove mud, concrete, dirt, etc. after use to prevent obstructing or clogging the buttons, levers, joysticks, 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 cause destruction of or damage to the base unit.**
  - ✓ **Operate and store units only within the specified operation and storage temperatures defined in this document's specifications.**
  - ✓ **Keep high-energy radio frequency (RF) devices away from handheld remotes. Activating high-power communication radios, for instance, in close proximity to handheld remotes can cause interference and "false" circuit activation.**
  - ✓ **Do not key two-way radios while using the console box remote.**
- ✓ **Note:** A SmaRT handheld remote's operating frequency is in either the 2.4 GHz or 900 MHz range. The first number in the system or device name indicates the operating frequency. For instance, a SmaRT CB-xH (console box) handheld remote in this document may either be CB-2H12LV or CB-9H12JS (or some variation of levers [LV] and joysticks [JS]), where "2" indicates 2.4 GHz and "9" indicates 900 MHz operating frequency. As such, references to the handheld remote, base unit, or system in this manual may use "x" rather than "2" or "9" in the name to indicate the operating frequency.

# 1.0 Smart Console Box CB-xH Remote Introduction

The Smart Console Box (CB) wireless family of remote controllers communicate with and control Smart Base Unit (BU) receivers using either 900 MHz (906–924 MHz) or 2.4 GHz (2405–2480 MHz) frequency ranges. Using line-of-sight Channel-Hopping Direct Sequence Spread Spectrum (CH DSSS) technology, either broadcast frequency offers a generous control distance in congested radio environments. The rugged enclosure and water-resistant components ensure reliable operation in harsh weather environments—operating in temperatures as low as  $-20^{\circ}\text{C}$  to a maximum of  $55^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $131^{\circ}\text{F}$ )—allowing the unit to operate worry free in harsh weather conditions.

The Smart Console Box is designed for traditional and non-traditional mobile applications. Capable of activating and deactivating the input and outputs of Smart base units (either standard or enlarged sizes), the CB remote's ergonomic layout offers comfortable Smart system operation. The Smart CB-xH also offers a variety of joystick and switch options—several of which are illustrated in Figure 1—that are factory configured to order. The controllers provide a robust link with Smart base units in congested radio environments, allowing seamless association without the need to open the enclosures to establish a link.



Seven Single Axis Levers (+Y, -Y)  
 Nine 3-position Toggles (six shown)  
 Oversized Stop Button  
 Eight Diagnostic LEDs



Single Axis Joystick (+Y, -Y)  
 Eight-Character LED Display  
 Nine 3-position Toggles (six shown)  
 Two Pushbuttons and a Potentiometer  
 Oversized Stop Button  
 Eight Diagnostic LEDs



Dual-Axis Joystick (+Y, -Y, -X, +X)  
 Two Single-Axis Levers (+Y, -Y)  
 Nine 3-position Toggles (six shown)  
 Oversized Stop Button  
 Seven Diagnostic LEDs



Three Single- or Dual-Axis Joysticks  
 Four 3-position Toggles (one shown)  
 Oversized Stop Button  
 Eight Diagnostic LEDs  
 User-Writable Areas for Switch Function Descriptions

Figure 1. Smart CB-xH Wireless Remote Examples

## 1.1 SmaRT CB-xH Custom Options

### Controls, Switches, and Connections

SmaRT CBs offer a variety of controls and switch types that provide an extensive number of configuration and control options, including:

- Up to three dual- or single-axis joysticks
- Up to seven single-axis levers
- Up to 11 two- or three-position momentary or maintained toggle switches on the top deck, and up to three toggle switches on either side for a possible total of 17 toggle switches
- A variety of pushbuttons, potentiometers, and rotary switches (design-dependent)
- Choice of stop switch (twist-up or pull-up)
- Umbilical cable option available for backup or network control area network (CAN) control

### Branding/Labeling Option

Cervis, Inc. offers in-house design of attractive custom labels for engineered system CBs, designed in partnership with the customers. Custom labels—made of durable Lexan™ polycarbonate—can include client logos, specific function text, and specific foreground and background colors.

## 2.0 CB-xH Console Box Remote



Figure 2. CB-xH07LV Console Box

### 2.1 CB-xH Diagnostic/Status LEDs

SmaRT CBs have up to eight diagnostic/status LEDs, the first four of which are standard.

Table 1. CB-xH Remote LEDs

LED	Name	Color	Function
L1	Transmit (TX)	Green	Flashes when message is sent
L2	Receive (RX)	Amber	Flashes when message is received
L3	Error (ERR)	Red	Lights when error occurs
L4	Battery (BATT)	Amber	Low battery warning when on ( $\geq 2.1$ V)
L5–L8	Custom	Amber	Custom (optional)

Table 2. CB-xH Remote Operational LED Diagnostic Information

Condition	LED Information
Console Box Is Transmitting	TX rapid blinking
Switch Active On Console Box	TX solid
Low Battery	BATT slow blinking
M-Stop/Stop Down At Startup	LEDs Flash Odd then Even
Stuck Switch Or Switch Fault At Power-Up	LEDs Flash: 1, 2, 5, 6 then 3, 4, 7, 8



## 2.2 CB-xH Battery Installation and Replacement

The SmaRT console box remote operates between 1.9 to 3.2 VDC powered by two 1.5 V type “C” cell batteries (included when shipped). Nominal battery life expectation is approximately 70 to 100 operating hours<sup>1</sup> before it becomes necessary to replace the batteries.



**Figure 3. SmaRT Console Box Battery Installation**

### Battery Replacement Process

1. Remove the battery cover by unscrewing it in the counter-clockwise direction.
2. Remove the discharged batteries and properly dispose of them according to local regulations.
3. Place two “C” cell batteries in the terminal cavity. Observe proper polarity, with the negative side inserted first and each positive battery terminal facing toward the cap. The + polarity marking is cut in the interior of the cap as illustrated in Figure 3.

Replace the battery cover by threading it clockwise onto the cavity. You will feel tension as you tighten the cap. Hand-tighten the cap to compress the compartment O-ring seal embedded in the cap. Make sure you do not overtighten the cap, or you will damage the battery compartment.

✓ **Note:** Change batteries soon after the first low-battery warning to ensure continued reliable operation. Cervis, Inc. recommends having fresh spare batteries on hand at all times that the system is in use. The console box remote senses when the voltage is at the low power threshold—approximately 2.1 V—at which time, the Amber battery (BATT) LED periodically flashes to warn you that you must change the batteries soon. The warning flashes while the unit is in use either until the batteries are replaced or until the voltage drops below 1.9 V; after which, the unit automatically powers down (auto-shutdown). The unit will not power-up and operate until the depleted batteries are replaced. Cervis, Inc. recommends replacing them with two fresh batteries.

<sup>1</sup> At room temperature. Not only does usage affect battery life, but so does operating or storing the battery in too-high or too-low ambient temperatures. For instance, the longer batteries are exposed to extreme cold or heat, the more likely battery life will be negatively affected. Factors such as a battery’s age and initial quality also may come into play.

## 2.3 Neck/Shoulder Harness

The 1¾" wide neck/shoulder harness lets you conveniently and comfortably strap the CB-xH around your neck or shoulder for easy access and operation. Adjustable to lengths up to 60 inches (~1.5 m), the harness conforms to most body lengths; and its rugged, heavy-duty construction and quick-release fasteners keep a single CB-xH securely against your body. Plus, its polypropylene webbing resists wear, and its bright orange color gives it high visibility against even the lightest colored garments.

### 2.3.1 Adjusting the Harness

Before you attach the harness to your CB-xH, adjust the blue strap to the most comfortable operating length for your individual body type.



The harness' left strap features a 6 inch (152 mm) long quick release hook-and-loop Nylon rip cord.



Connect the two parts of the rip cord together, and press down to secure the connection.



## 2.3.2 Attaching the Harness to the CB-xH

Both ends of the high-visibility orange straps feature a pair of heavy-duty metal button snaps at the ends.



To attach the harness to your CB-xH, locate either the two T-shaped harness clips on the front of your CB—one is on the left side; the other is on the right—or the orange bar across the top of it.



Thread the high visibility orange straps through the harness mounts or bar—snap side up—past the first two (female) snaps.



Fold the strap over onto itself, and fasten the female snaps to their male counterparts.



✓ **Note:** You'll know the snaps are secured when you hear a clicking sound.





When you have the harness securely together, hang it around your neck—or drape it over your shoulder—and begin operating your CB-xH.



## 2.4 Turn CB-xH Remote On

Turn on the console box remote as follows:

1. Stop Button:
  - a. Twist-up Stop button: Release the Stop button by twisting clockwise until it pops up (spring-loaded).
  - b. Pull-up Stop button: Pull the Stop button up.
2. Flip the ON/OFF switch (S12) UP and hold it until the LEDs activate.

## 2.5 Turn CB-xH Remote Off

Shut down the console box remote using any of the following methods:

- Push the Stop switch down for immediate stop.
- Flip the ON/OFF switch (S12) DOWN and hold it until the LEDs extinguish.

- Do not activate any switch and wait for the console box Switch Inactivity Timeout to expire (standard time is four minutes).

## 2.6 Associate Console Box with System Base Unit

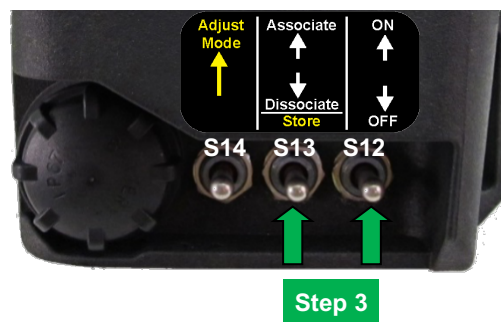
The CB-xH remote must be associated (that is, establish a communications link) with the SmaRT system base unit receiver before the system can be used. Systems are associated at Cervis, Inc. before leaving the factory; but there may be times when it is necessary to Associate while in the field. The following steps describe the Associate process.

✓ **Note:** Before beginning the association process, the CB remote must be OFF and the base unit must have power disconnected.

### Associate with the Base Unit

1. Stand near the base unit with the CB remote OFF and power removed from the base unit (that is, either detach cables from the base unit, or disconnect the power source).
2. Release the Stop switch (twist-up or pull-up) on the remote.
3. Hold the Associate switch (S13) UP. While holding the Associate switch UP, activate the CB remote by holding the ON/OFF switch (S12) UP. Continue to hold both switches.
4. All LEDs illuminate for ~1 second.
5. When the TX LED blinks at once per second, apply power to the base unit.
6. Release the Associate and ON/OFF switches (S13 and S12) when they go out.

The CB and BU TX and RX LEDs are active, indicating that the communication link is established.



*Figure 4. Associate Console Box with Base Unit*

## 2.7 Dissociate Console Box from System Base Unit

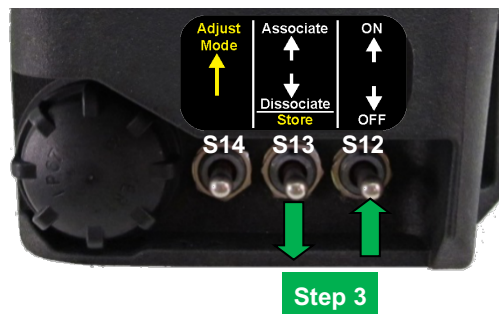
During instances of severe interference—or perhaps when troubleshooting—it may become necessary to break the established communications link between the console box and the system base unit. This is done via the following steps.

✓ **Note:** *The console box remote must be OFF, and the base unit must have power disconnected before beginning dissociation.*

### Dissociate from the Base Unit

1. Stand near the base unit with the console box remote OFF and power removed from the base unit (that is, either detach cables from the base unit, or disconnect the power source).
2. Release the Stop switch on the remote.
3. Hold the Dissociate switch (S13) DOWN. While holding the Dissociate switch DOWN, activate the console remote by holding the ON/OFF switch (S12) UP. Continue to hold both switches.
4. When the TX LED blinks once per second, apply power to base unit.
5. All LEDs illuminate for ~1 second. Release the Associate and ON/OFF switches (S13 and S12) when they go out.

Only the console box TX LED is active and none of the base unit LEDs are active, indicating that the communication link is broken.



*Figure 5. Dissociate Console Box from Base Unit*

## 2.8 Proportional Output Lever and Joystick Adjustments

### What You Need to Know for Output Minimum (Min) and Maximum (Max) Adjustments

#### Caution



If the base unit is wired to the machine, machine movement will occur during these procedures.

Keep in mind at all times that you are going to control a moving piece of machinery. You must strictly adhere to the safety instructions described in this manual's Cervix, Inc. Safety Precautions.

- Before performing dynamic Min and Max adjustments, make sure the area around the controlled machine is safe to operate.
- Power the base unit for dynamic adjustment.
- Make sure the base unit LEDs are close enough to be easily read.
- Observe the base unit LEDs while performing Min and Max adjustments.
- Adjust Mode timeout defaults to a ten-second window of opportunity, where the unit returns to normal operating mode if none of the switches are operated within the ten-second window. The timer resets to ten seconds each time a lever or joystick is operated while in Adjust Mode.
- Adjust each Pulse Width Modulation (PWM) lever or joystick using the following steps. Each lever or joystick direction can be independently adjusted.

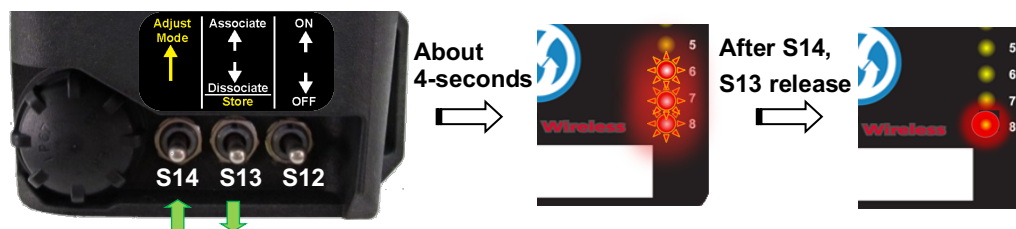


Figure 6. Enter Lever or Joystick Adjust Mode (Standard Base Unit)

### 2.8.1 Enter Adjust Mode for Standard Base Unit PWM Outputs

1. Release the Stop switch (twist-up or pull-up) and flip the ON/OFF switch (S12) UP.
2. Enter Adjust Mode by holding the Adjust Mode switch (S14) UP (first) and the Associate switch (S13) DOWN while watching the standard base unit LEDs. Adjust Mode is indicated when the bottom three LEDs 6, 7, and 8, begin flashing (Figure 6).
3. Release switches the Adjust Mode and Associate switches (S14 and S13). LEDs 6, 7, and 8 go out; then LED 8 lights solid (Figure 6). This indicates that you are in Adjust Mode.

✓ **Note:** To abandon Adjust Mode at any time, hold switches the Adjust Mode and Association switches (S14 and S13) DOWN.

#### Caution!

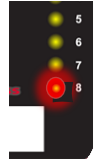


Be aware of lever or joystick activation during this process. Base unit outputs may be active or activated during the adjustment process.



## 2.8.2 Minimum Adjustment

LED 8 on the standard base unit lights solid (see right), indicating lever or joystick select mode (minimum).



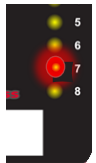
1. To select the minimum activation of the lever or joystick to be adjusted, move the desired switch beyond 50% deflection and release it back to neutral. LED 8 on the standard base unit flashes, indicating Adjust Mode (min).
  - To retain the current minimum value, flip the Adjust switch (S14) UP.
  - To set the minimum to 0%, flip the Associate switch (S13) DOWN to store that value.
  - To adjust the current value, slowly move the switch again until machine movement is initiated. Continue to hold in position, and flip the Associate switch (S13) DOWN to store the value, then release the lever or joystick to neutral.

✓ **Note:** To cancel adjustment of the lever or joystick and return to Select Mode (minimum), allow the lever or joystick to return to neutral – LED 8 on the base unit will light solid.

2. LED 8 goes out and LED 7 lights solid after storing, indicating Select Mode (maximum). Continue to Section 2.8.3 to set maximum lever or joystick activation.

## 2.8.3 Maximum Adjustment

LED 7 on the standard base unit lights solid (see right), indicating Select Mode (maximum).



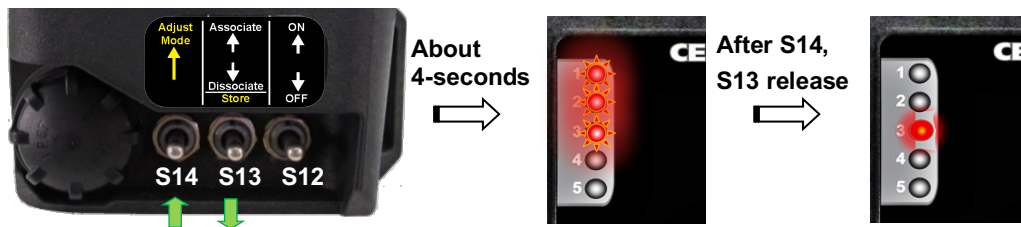
1. To select the maximum activation of the lever or joystick to be adjusted, move the desired lever or joystick beyond 50% deflection, and release it back to neutral. LED 7 on the standard base unit flashes, indicating Adjust Mode (max).
  - To retain the current minimum value, flip the Adjust switch (S14) UP.
  - To set the maximum value at one increment above the minimum value, flip the Associate switch (S13) DOWN to store that value.
  - Or, to adjust, slowly move the lever or joystick again until machine movement is to the desired point. Continue to hold in position and flip the Associate switch (S13) DOWN to store the value, then release the lever or joystick to neutral.

✓ **Note:** To cancel adjustment of the lever or joystick and return to Select Mode (maximum), allow the lever or joystick to return to neutral – LED 7 on the base unit will light solid.

2. LED 7 goes out and LED 8 lights solid after storing, indicating a return to Select Mode (minimum). Return to Section 2.8.2 to set minimum lever activation.

✓ **Note:** Flipping the Associate switch (S13) DOWN and the Adjust switch (S14) UP toggles between MIN and MAX while in Adjust Mode.

## 2.8.4 Enter Adjust Mode for Enlarged Base Unit (EBU) PWM Outputs



**Figure 7. Enter Lever or Joystick Adjust Mode (EBU)**

1. Release the Stop switch (twist-up or pull-up), and flip the ON/OFF switch (S12) UP.
2. Enter Adjust Mode by holding the Adjust switch (S14) UP (first) and the Associate switch (S13) DOWN while watching the EBU LEDs. Adjust Mode is indicated when the top three LEDs 1, 2, and 3, begin flashing (Figure 7).
3. Release the Adjust switch (S14) and the Associate switch (S13). LEDs 1, 2, and 3 go out, and then LED 3 lights solid (Figure 7). This indicates that you are in Adjust Mode.

✓ **Note:** To abandon Adjustment Mode at any time, hold the Adjust and Associate switches (S14 and S13) DOWN.

### Caution!



Be aware of lever or joystick activation during this process. Base unit outputs may be active or activated during the adjustment process.

## 2.8.5 Minimum Adjustment

LED 3 on the EBU lights solid (see left), indicating lever or joystick select mode (minimum).



1. To select the minimum activation of the lever or joystick to be adjusted, move the desired lever or joystick beyond 50% deflection and release back to neutral. LED 3 on the EBU flashes, indicating Adjust Mode (Min).
  - To retain the current minimum value, flip the Adjust switch (S14) UP.
  - To set the minimum to 0%, flip the Associate switch (S13) DOWN to store that value.
  - To adjust the current value, slowly move the lever or joystick again until machine movement is initiated. Continue to hold in position and flip the Associate switch (S13) DOWN to store the value, then release the lever or joystick to neutral.

✓ **Note:** To cancel adjustment of the lever or joystick and return to Select Mode (min), allow the lever or joystick to return to neutral – LED 3 on the EBU will light solid.

2. LED 3 will go out and LED 2 will light solid after storing, indicating Select Mode (Max). Continue to Section 2.8.6 to set maximum lever or joystick activation.

## 2.8.6 Maximum Adjustment

LED 2 on the EBU will light solid (see left), indicating Select Mode (maximum).



1. To select the maximum activation of the lever or joystick to be adjusted, move the desired switch beyond 50% deflection and release back to neutral. LED 2 on the EBU flashes, indicating Adjust Mode (max).
  - To retain the current minimum value, flip the Adjust switch (S14) UP.

- To set the maximum value at one increment above the minimum value, flip the Associate switch (S13) DOWN to store that value.
- To adjust the current value, slowly move the lever or joystick again until machine movement is to the desired maximum point. Continue to hold in position and flip the Associate switch (S13) DOWN to store the value, then release the lever or joystick to neutral.

✓ **Note:** *To cancel adjustment of the lever or joystick and return to Select Mode (Max), allow the lever or joystick to return to neutral – LED 2 on the base unit will light solid.*

2. LED 3 will go out and LED 2 will light solid after storing, indicating a return to Select Mode (Min). Return to Section 2.8.5 to set minimum lever activation.

✓ **Note:** *Activating the Associate (S13) DOWN and the Adjust switch (S14) UP will toggle between MIN and MAX while in Adjust Mode.*

## 2.8.7 Exit Adjust Mode

Exit Adjustment Mode by either:

- Releasing switch and waiting approximately ten seconds for the handheld (when in Select Mode only) to timeout
- Pressing the console box Stop switch
- Pressing the console box ON/OFF switch (S12) DOWN for three seconds, which powers down the console box.

### 3.0 Umbilical Connection (Option)

The umbilical connector is located on the right side of the console box. The connector is capped to protect it when it is not being used. The standard connector is a four-pin connector that allows for hardline CAN communications. When the CAN option is active, the console box radio is disabled, and all commands are issued to the base unit through the umbilical cable. Cervis, Inc. offers an array of umbilical kits that simplify connecting a SmaRT console box. Figure 8 illustrates an example of a C4-20 Umbilical Kit that may be used in a SmaRT console box system.

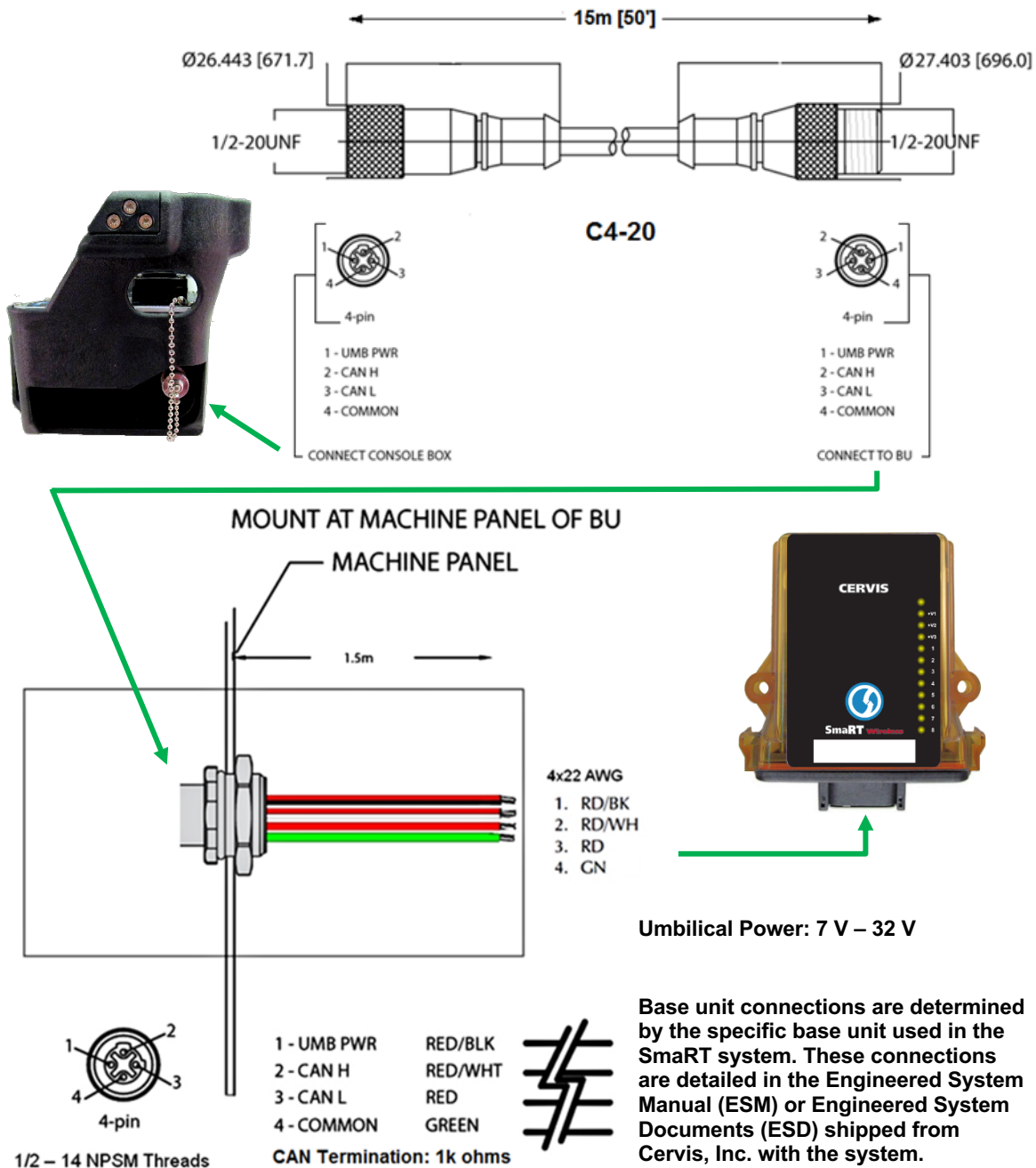


Figure 8. Umbilical Connection Option and C4-20 Umbilical Kit Example

## 4.0 CB-xH Remote Console Box Specifications

*Table 3. CB-xH Remote Console Box Specifications*

SmaRT CB-xH Console Box Specifications		
<b>Power</b>	<b>+1.9 to +3.2 VDC</b>	Two "C" Cell Batteries
<b>Radio</b>	<b>Frequency</b>	906–924 MHz; 2405–2480 MHz
	<b>License</b>	License-Free
	<b>Modulation</b>	Channel-Hopping DSSS
	<b>Antenna</b>	Internal
	<b>Inactivity Timeout</b>	Standard four minutes (adjustable)
<b>Environment</b>	<b>Operating Temp</b>	–20° C to 55° C (–4° F to 131° F)
	<b>Storage Temp</b>	–20° C to 85° C (–40° F to 185° F)
	<b>Humidity</b>	0 to 95%
<b>Indicators (8)</b>	<b>TX (green)</b>	Flashing on transmit
	<b>RX (amber)</b>	Flashing on receive
	<b>ERR (red)</b>	Solid – Error
	<b>BATT (amber)</b>	Slow Blinks – below 2.1 V warning, approaching discharge, replace batteries
	<b>L5 (amber)</b>	Custom (LED color optional)
	<b>L6 (amber)</b>	Custom (LED color optional)
	<b>L7 (amber)</b>	Custom (LED color optional)
	<b>L8 (amber)</b>	Custom (LED color optional)
<b>Enclosure</b>	<b>Dimensions</b>	263.5 mm x 141.5 mm x 139 mm (10.4" x 5.6" x 5.5")
	<b>Durability</b>	High-impact glass-filled polymer case Aluminum faceplate
	<b>Weight</b>	1.8 kg (3.95 lbs.)
<b>Function Controls</b>	<b>Joysticks</b>	Dual- or single-axis
	<b>Levers</b>	Single axis (Y+, Y–)
	<b>Toggles</b>	Two- or three-position maintained or momentary
	<b>Pushbuttons</b>	Custom option
	<b>Stop</b>	Twist-up or Pull-up
<b>Umbilical Option</b>	<b>4-Pin</b>	CAN J1939 standard; 1 k $\Omega$ internal termination (termination options available)

## Appendix A: Exposure to Radio Frequency Energy

SmaRT handheld remote units contain radio transceivers. When active, a handheld remote sends out radio frequency (RF) energy through its internal antenna. The SmaRT handheld remote complies with limits set by the United States Federal Communications Commission (FCC) for operating distance from human tissue.

## Appendix B: RF Exposure Considerations

The radio module may be used in a variety of host applications that fall into two general categories:

1. Mobile applications: Those where any operating locations are **not** on a human body. In mobile applications, the host application is typically fixed to mobile equipment, with either an internal or an external antenna.
2. Portable applications: Those where the transmitting equipment **is** located on the hand, arm, or other part of the human body. In portable applications, the equipment is typically held in the hand of an operator or affixed to the torso on either a belt or harness.

Equipment containing the radio module was evaluated for RF exposure hazards by two approaches:

1. Maximum Permissible Exposure (MPE) for mobile applications.
2. Specific Absorption Rate (SAR) for portable applications.

Required separation distances are measured from the actual location of the radiated part of the antenna. An antenna may be inside the host application, affixed to the enclosure of the host application, or at the end of an optional extension coaxial cable.

### **Mobile Applications**

Equipment **must** be located at least 20 cm away from areas likely to be occupied by an unaware person.

### **Handheld Applications**

All operators of handheld equipment with any type of antenna require proper equipment operation training, and such training must include RF exposure safety instructions. Once training is completed, they are considered “aware persons.”

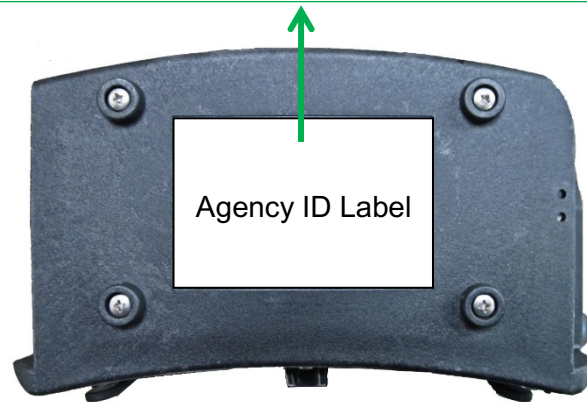
If the portable operating pose is on the hand or arm, a 5-mm separation is required between the radiating part of the antenna and nearby human tissue.

### **Required Training**

All installers and operators of host applications that include an SRF305 or SRF309 radio transceiver module **must** be trained to use proper RF safety precautions.

## Appendix C: Agency Identification Label Location

✓ **Note:** The Agency ID label for all console boxes can be found in the position shown.



*Figure 9. Agency Identification Label Locations*

## Appendix D: CB-xH Product Family Listing

**Table 4. CB-xH Common Features**

<b>Power:</b>	<b>Two Type “C” Cell Batteries</b>
<b>Dedicated Stop Switch:</b>	<b>Oversized, Spring-Loaded Two-Position (Twist-Up) or static Two-position (Pull-Up)</b>
<b>Activation:</b>	<b>Twist-Up: Twist the Stop Button up, then flip switch S12 up Pull-Up: Pull the Stop Button up, then flip switch S12 up</b>
<b>Discrete Inputs Type:</b>	<b>Momentary or Maintained Two- or Three-Position Toggle</b>
<b>Attachment:</b>	<b>Molded Belt Attachments Or Harness Brackets/Bar</b>
<b>Diagnostic Indicators:</b>	<b>Green, Amber, and Red LEDs</b>

**Table 5. CB-xH Model Specific Features**

<b>Model Name</b>	<b>Freq.</b>	<b>RF Power</b>	<b>Proportional Inputs Prop. Input Type</b>	<b>Umbilical</b>
<b>CB-9H07LV</b>	900 MHz	10 mW	7 Single-Axis Levers	No
<b>CB-9H07LV-UMB</b>	900 MHz	10 mW	7 Single-Axis Levers	Yes
<b>CB-2H07LV</b>	2.4 GHz	100 mW	7 Single-Axis Levers	No
<b>CB-2H07LV-UMB</b>	2.4 GHz	100 mW	7 Single-Axis Levers	Yes
<b>CB-9H03JS</b>	900 MHz	10 mW	3 Dual-Axis Joysticks	No
<b>CB-9H03JS-UMB</b>	900 MHz	10 mW	3 Dual-Axis Joysticks	Yes
<b>CB-9H03JS-DIS</b>	900 MHz	10 mW	3 Dual-Axis Joysticks	No
<b>CB-9H03JS-DIS-UMB</b>	900 MHz	10 mW	3 Dual-Axis Joysticks	Yes
<b>CB-2H03JS</b>	2.4 GHz	100 mW	3 Dual-Axis Joysticks	No
<b>CB-2H03JS-UMB</b>	2.4 GHz	100 mW	3 Dual-Axis Joysticks	Yes
<b>CB-2H03JS-DIS</b>	2.4 GHz	100 mW	3 Dual-Axis Joysticks	No
<b>CB-9H03JS-DIS-UMB</b>	2.4 GHz	100 mW	3 Dual-Axis Joysticks	Yes

**Custom Configurations by Request**



