



## MCB-9XL Transmitters

U106.1.0

## MCB-9XL Transmitters

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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 [www.hc-sc.gc.ca/rpb](http://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.*

## Table of Contents

List of Figures .....	i
List of Tables .....	i
<b>Cervis Inc. Safety Precautions .....</b>	<b>ii</b>
1.0 Warrior MCB-9XL Transmitter (MCB-9XL).....	1
2.0 Warrior MCB-9XL Layout .....	2
2.1 Standard Joysticks, Toggle Switches, and Pushbuttons.....	2
2.2 LEDs.....	2
3.0 MCB-9XL Battery Installation.....	3
3.1 Low Battery and Auto Shutdown .....	3
4.0 Warrior MCB-9XL Operation .....	4
4.1 MCB-9XL System Startup .....	4
4.2 Associating an MCB-9XL with a Receiver .....	5
4.2.1 Associating an MCB-9XL Using the DIP Switch Unlock Option. ....	5
4.2.2 Associate an MCB-9XL to a Receiver.....	6
5.0 Warrior MCB-9XL Specifications.....	7
Appendix A: Exposure to Radio Frequency Energy .....	8
Appendix B: RF Exposure Considerations .....	8
Appendix C: Agency Label.....	8

## List of Figures

Figure 1. Warrior MCB-9XL Three and Four Joystick and Transmitters .....	1
Figure 2. MCB-9XL Battery Installation.....	3
Figure 3. MCB-9XL Turn ON/OFF.....	4
Figure 4. Method 2 Virtual Unlock Switch 7 – Push and Hold Down .....	5
Figure 5. Warrior MCB-9XL Agency Label.....	8

## List of Tables

Table 1. MCB-9XL Standard Switches .....	2
Table 2. MCB-9XL LEDs.....	2
Table 3. MCB-9XL Advanced LED Diagnostics.....	2
Table 4. Warrior MCB-9XL Receiver Specifications .....	7

**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 transmitter control system until certain that it is safe to do so.**
- ✓ **Turn off the handheld transmitter and remove power from the machine unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.**
- ✓ **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 machine unit enclosures. Do not use high pressure equipment to clean the handheld transmitter or machine unit.**
- ✓ **Disconnect the radio machine unit before welding on the machine. Failure to disconnect the machine unit may result in destruction of or damage to the machine unit.**
- ✓ **Operate and store units only within the specified operation and storage temperatures defined in the specifications of this document.**
- ✓ **Keep high-energy RF devices away from handheld transmitters. Activation of high-power communication radios, for instance, in close proximity to handheld transmitters can result in interference and “false” circuit activation.**
- ✓ **Do not key 2-way radios while using the handheld transmitter.**

## 1.0 Warrior MCB-9XL Transmitter (MCB-9XL)

The Warrior MCB-9XL transmitter is a compact handheld remote that interfaces with Warrior machine units. The MCB-9XL is available as a three joystick or a four joystick transmitter, both powered by four type AA batteries. Each version includes two toggle switches, a push-pull SPST Professional MSTOP, and a green multi-purpose pushbutton. Both MCB-9XL units have four diagnostic/status LEDs that indicate wireless link (RF) activity, Battery condition, trolley/hoist A selection, and trolley/hoist B selection. The rugged MCB-9XL enclosure is constructed of glass-filled nylon designed to meet an ingress protection of IP55 as defined by IEC 60529.

Using line-of-sight DSSS technology, transmission power offers a generous control distance in crowded radio environments. The rugged enclosure and water resistant components ensure reliable operation in harsh weather environments operating in temperatures as low as -4°F (-20°C) to a maximum of 158°F (70°C). Warrior MCBs transmit using an internal antenna, while status is conveyed to the user via four red LEDs.

MCB-9XL transmitter functions can be configured by manipulating the MU-9X15 DIP Switch (S01) Mode settings.



Figure 1. Warrior MCB-9XL Three and Four Joystick and Transmitters

### Warrior MU-9X15 Features

- Three or Four 2-Step Single Axis Joysticks
- Two Toggle Switches and an Activate Pushbutton
- 900MHz @ 100mW Operation
- Push/Pull Professional Machine Stop
- Four System Status/Diagnostics LEDs
- Operates Using Four AA Alkaline Batteries
- Mounting by Custom Shoulder Harness

## 2.0 Warrior MCB-9XL Layout

### 2.1 Standard Joysticks, Toggle Switches, and Pushbuttons

The standard MCB-9XL switches are listed in Table 1.





**Table 1. MCB-9XL Standard Switches**

Switch	Function	Type	Switch Type/Description
JS1 through JS4	Trolley/hoist Motion Control	Analog Joystick	Single Axis, two-step.
S01	A/B Select	Toggle	3 Position Maintained
S07	Aux/Select/Next	Toggle	3 Position Momentary
S09	Horn/Start/ON	Pushbutton	Green, SPST
MSTOP	Machine STOP	2-Position Maintained	Pull up to ENABLE; Push down to STOP





### 2.2 LEDs

The MCB-9XL LEDs are listed in Table 2.

**Table 2. MCB-9XL LEDs**

LED	Icon	Function	
L1		Transmit indication	Flashes when message is sent Solid with switch motion
L2		Low Battery indication	Slow Blinks when <2.2V
L3		A Selection	Lights when A trolley/hoist is selected
L4		B Selection	Lights when B trolley/hoist is selected

**Table 3. MCB-9XL Advanced LED Diagnostics**

LEDs	Indication	Diagnostic
 RF	RF Solid	Transmitting, looking for receiver.
	RF Blinking	Transmitting to and receiving from the mounted receiver.
 Bat	RF/A ↔ Bat/B	M-Stop Check: Cycle M-Stop, Blinks back-and-forth.
	RF/Bat ↔ A/B	Stuck switch: Check switches/proportional not neutral.
	RF→Bat→A→B→RF→Bat	Scrolling: Tilt Mode active.
	B→A→Bat→RF→Bat	Scrolling: Signifies Maintenance Mode
 Select	Bat	Blinking: Batteries low, replace with fresh batteries soon.
	RF/BAT/A/B	Shutting Off: Unit is shutting down: Inactivity timeout M-Stop engaged Keyswitch moved to OFF Unit wake-up without S12
 Select	Bat	Shutting Off: Batteries below operating level shutting unit down; replace batteries with fresh set.
	A/B	Shutting Off: Joystick/Lever command reached out-of-bounds. Condition unsafe, operation turning off.

### 3.0 MCB-9XL Battery Installation

MCB-9XL handheld units are powered by four AA alkaline batteries. When installing batteries, be sure to observe proper polarity as marked on the inside of the compartment to avoid damaging the unit. To replace or install batteries in the MCB:

1. Loosen the four Phillips battery compartment cover screws on the rear of the transmitter and lift the cover from the MCB.
2. Install (or replace with) four (4) fresh size AA batteries. Observe the proper polarity by positioning the batteries as shown in Figure 2.
3. Replace the compartment cover and tighten the four Phillips screws. These screws should not be over-tightened, **but they must be tight enough to ensure the gasket provides a proper seal.**

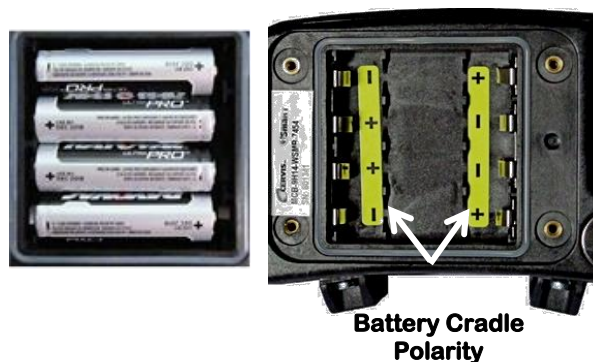


Figure 2. MCB-9XL Battery Installation



**Caution!**

Be sure to observe proper polarity when placing batteries in the MCB-9XL battery compartment.

### 3.1 Low Battery and Auto Shutdown

#### Low Battery Warning

The MCB-9XL Low Battery Warning is factory set to activate when the power voltage reaches 2.2V, at which time the Battery LED will begin to blink once per second until the voltage reaches the Auto-Shutdown voltage of 2.0V. Cervis recommends that once the Battery LED begins to flash the batteries be replaced as soon as possible. Replacement batteries must be four new size AA batteries and that all four batteries be made by the same manufacturer.

✓ **Note:** *If the transmitter is linked to a receiver, the horn blows four times per minute when under Low Battery condition.*



**Caution!**

Do not mix battery manufacturers when replacing the MCB-9XL batteries. Batteries must be fresh and all from the same manufacturer.

#### Auto-Shutdown

Auto-Shutdown will occur when the power voltage drops to 2.0V. The MCB-9XL will shut down when 2.0V is reached and will not activate until the used batteries are removed and a fresh set of four AA batteries are installed using the directions shown in Heading 3.0.



## 4.0 Warrior MCB-9XL Operation

### 4.1 MCB-9XL System Startup



*Figure 3. MCB-9XL Turn ON/OFF*

The following assumes that power is applied to the Warrior receiver.

1. Confirm that **STOP** is pressed.
2. Turn on the handheld by pressing and releasing the green **S9** pushbutton. Wireless/A and Battery/B LEDs should be cycling.
3. **Within 1 second**, pull up the **STOP**.
4. Wait until the LEDs cycle and then the RF begins to flash.
5. Press the Horn/Start pushbutton (S9). The horn sounds and the MLC relays energize the in the receiver.

The MCB-9XL is ready for crane operation.

#### Turn Off the Transmitter

The following are methods of turning off or disabling the MCB.

- Push the MSTOP down. This results in an immediate shutdown of the MCB-9XL and all machine unit outputs.
- Allow the unit inactivity timer to “time out”, in which case shutdown occurs after four minutes of transmitter controls inactivity.



## 4.2 Associating an MCB-9XL with a Receiver

Warrior system transmitters are associated to the receiver before the system is shipped and the association process is locked by S01 DIP Switch 8 in the receiver being 0 (OFF). The receiver will only communicate with the transmitter with which it is associated. When necessary, other Warrior transmitters can be associated to the receiver as additional spares or to replace damaged transmitters, but the receiver association ability must first be unlocked. Depending on the receiver, the second method described below may be the only method available.

### There Are Two Methods To Unlock Association

**Method 1** is by manually changing the position of DIP Switch 8 in the receiver. To unlock Association, S01 DIP Switch 8 must be changed from its default position (0 (OFF)) to (1 (ON)). Unlocking with the DIP switch will unlock association until DIP Switch 8 is changed back to the 0 (OFF) or LOCKED position.

**Method 2** is by virtually unlocking the receiver using the following steps, where there is no need to physically change S01 DIP Switch 8:

1. Make sure the MCB-9XL and MU are associated and communicating, but the MLC should **not** be pulled-in.
2. Press and hold S7 down (Figure 4).
3. Press the M-Stop.

✓ **Note:** *Once the Virtual Unlock is performed, the next transmitter to be associated has a five minute window-of-opportunity to associate.*

*Once the new or different transmitter is associated to that receiver, the receiver then locks.*



**Figure 4. Method 2 Virtual Unlock Switch 7– Push and Hold Down**

### 4.2.1 Associating an MCB-9XL Using the DIP Switch Unlock Option.

This process will unlock association of the receiver allowing the user to associate transmitters to the receiver until the DIP switch is set back to the locked position.

1. Set the receiver S01 DIP Switch 8 ON (UP).
2. If the receiver is **Off**, the Horn/Light relay will momentarily activate when it is powered. If the receiver is **On**, the Horn/Light relay will activate when switch 8 is moved.
3. Go to section 4.2.2.



**Caution!**

**It is not recommended to leave receivers in an unlocked state. Move DIP Switch 8 to the “0” (OFF) position once association is complete.**

## 4.2.2 Associate an MCB-9XL to a Receiver

This process is required when the handheld memory slot is either empty or the user wishes to associate to a different receiver.

✓ **Note:** *During this process, a receiver that is in use with another handheld cannot be associated.*

1. Confirm that **MSTOP** is pressed.
2. Turn on the handheld by pressing and releasing the green **S9 pushbutton** on the left side.
3. **Within 2 second**, cycle (OFF to ON) the **MSTOP**.
4. **Within 1 second**, while the **B Select LED** is active, press and hold **S7D** then press **S9** and release both actuators simultaneously.

*Handheld LEDs will begin cycling from bottom to top indicating the handheld is in Maintenance Mode. If the operator waits too long to perform the following step, the process will have to be started again.*





5. Simultaneously press and hold **S7 UP** and pushbutton **S9** for approximately 5-seconds (S7 must be activated first). Release S7 and S9 when **LED A** starts to blink.
6. LEDs **RF**, and **B Selection**, and the **RF** will become active indicating the handheld is attempting to locate all available Warrior receivers to which the transmitter can link.
7. Once the handheld has completed its search and one or more receivers have been found, the **RF** and **A Selection** LEDs become active.

If there are no receivers available, the handheld will stay in scan mode until the handheld times out or is turned off.

8. A detected receiver will start blinking its Association LED indicator and the Horn/Light relay is engaged to sound the horn to which it is connected. In order to select this receiver press **S7 UP**. The RF LED will start blinking rapidly indicating communication is established. The receiver ID is now stored in the handheld memory slot.
  9. If the found receiver unit is **NOT** the receiver desired, press **S7 DOWN** to scroll through detected receivers until the desired receiver is found indicated by blinking its Association LED and pulsing the Horn/Light relay that is engaged to sound the horn. Press toggle switch **S7 UP** to select the receiver. The RF LED will start blinking rapidly indicating communication is established. The selected receiver is stored in the handheld memory slot.
  10. Press the green pushbutton S9 to pull-in the MLC relay. The transmitter is now linked to the chosen receiver and the crane is ready for control.
- Each transmitter must be associated one-at-a-time. Once associated, the transmitter will only work with that receiver until the ID is cleared.
  - Transmitters work on a first-come-first-serve basis meaning only one TX can ever be paired to a chosen RX at a time.
  - If a spare transmitter is purchased, it will have to be associated by the operator using the described association process.
  - Transmitters for each newly purchased system are associated at Cervis before shipped.

## 5.0 Warrior MCB-9XL Specifications

Table 4. Warrior MCB-9XL Receiver Specifications

Item	Description	
<b>Power</b>	<b>Operating Voltage</b>	2.1VDC to 3.0VDC
	<b>Batteries</b>	Four (4) AA Alkaline
	<b>Low V Warning</b>	2.2VDC
	<b>Auto-Shutdown</b>	2.0VDC
	<b>Inactivity Shutdown</b>	4 Minutes (default)
<b>Environment</b>	<b>Operating Temp</b>	-40°F to 158°F (-40°C to 70°C)*
	<b>Storage Temp</b>	-40°F to 185°F (-40°C to 85°C)
	<b>Humidity</b>	0-95% non-condensing
<b>Radio</b>	<b>Frequency</b>	904-926MHz @ 100mW
	<b>License</b>	No license required
	<b>Modulation</b>	DSSS, channel hopping
	<b>Antenna</b>	Internal
<b>Enclosure</b>	<b>Dimensions</b>	Inches: 7.09" x 4.15" x 4.61" mm: 180.03 x 105.44 x 117.04
	<b>Material</b>	Glass filled nylon
	<b>Faceplate</b>	Acrylic
	<b>Weight</b>	≈2.5 lbs. (1.13kg)
	<b>Durability</b>	IP55
	<b>Hardware</b>	Stainless steel
<b>Control Switches</b>	<b>Joysticks</b>	Three or Four (Model dependent) 2-step single axis (digital)
	<b>Toggles</b>	3-position momentary or maintained
	<b>M-Stop</b>	Professional pull-up/push-down
	<b>Pushbutton</b>	Activation button (green)
<b>Indicators</b>	 <b>Wireless</b>	Indicates wireless communication and switch motion
	 <b>Battery</b>	Indicates low battery voltage
	 <b>A Selection</b>	Indicates trolley/hoist A selection
	 <b>B Selection</b>	Indicates trolley/hoist B selection

\*Tested at 70°C for four hours

## Appendix A: Exposure to Radio Frequency Energy

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

## Appendix B: RF Exposure Considerations

The radio module may be used in a variety of host application that fall into two general categories: mobile or portable. Mobile applications are any operating locations that are **not** on a human body. Portable applications are those where the transmitting equipment **is** located on the hand, arm, or other part of the human body. In mobile application the host application is typically fixed to mobile equipment, with either an internal or external antenna. In portable applications the equipment is typically held in the hand of an operator or affixed to either a belt or harness on the torso.

Equipment containing the radio module has been evaluated for FR exposure hazards by two approaches: Maximum Permissible Exposure (MPE) for “mobile” applications and SAR for portable applications. Mobile applications are any operating locations that are not on a human body.

The 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 in a location at least 20cm away from areas likely to be occupied by an unaware person.

### **Handheld Applications**

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

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

### **Required Training**

All installers and operators of host applications that include an SRF310 FT module must be trained to use proper RF safety precautions as presented in this section.

## Appendix C: Agency Label



*Figure 5. Warrior MCB-9XL Agency Label*

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