Form No. 3383-464 Rev A

Long-Range Exit-Side Lockout Kit

2024 or 4045 Directional Drill

Model No. 130-4454

Operator's Manual

Introduction

The exit-side lockout transmitter and receiver is designed to remotely stop and lockout the user controls of a directional drill.

Read this information carefully to learn how to operate and maintain your machine properly and to avoid injury and equipment damage. You are responsible for operating the machine properly and safely.

You may contact Toro directly at www.Toro.com for product and accessory information, help finding a dealer, or to register your product.

This manual identifies potential hazards and has safety messages identified by the safety alert symbol (Figure 1), which signals a hazard that may cause serious injury or death if you do not follow the recommended precautions.

Figure 1

1. Safety alert symbol

This manual uses 2 words to highlight information. **Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

This product complies with all relevant European directives. For details, see the separate product-specific Declaration of Conformity (DOC) sheet.

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/dealer for details.

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.

• Consult the dealer or an experienced radio/TV technician for help.

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.

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.

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Safety

Improperly using or maintaining this equipment can result in injury. To reduce the potential for injury, comply with these safety instructions. Toro tested this equipment for reasonably safe service; however, failure to comply with the following instructions may result in personal injury.

To ensure maximum safety, best performance, and to gain knowledge of the product, it is essential that you and any other operator read and understand the contents of this manual before using this product. Pay particular attention to the safety alert symbol (Figure 1), which means Caution, Warning, or Danger—"personal safety instruction." Read and understand the instruction because it has to do with safety. Failure to comply with the instruction may result in personal injury.

- Failure to abide by these precautions may result in equipment failure and personal injury.
- Use and maintain proper wiring. 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.
- 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 is removed from the Base Unit by detaching the 12-pin cable from the base unit connector P1, 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 a high pressure washer to clean the equipment.
- 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 this document.

Setup

Installing the Receiver

Remove the panel on the control tower next to the operator's seat (Figure 2).

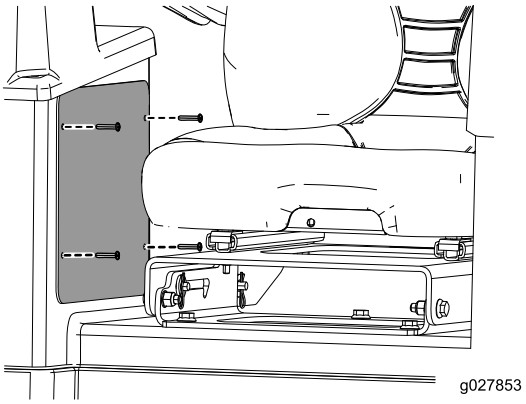

Figure 2

Remove the receiver that is currently installed and install the new receiver as shown in Figure 3.

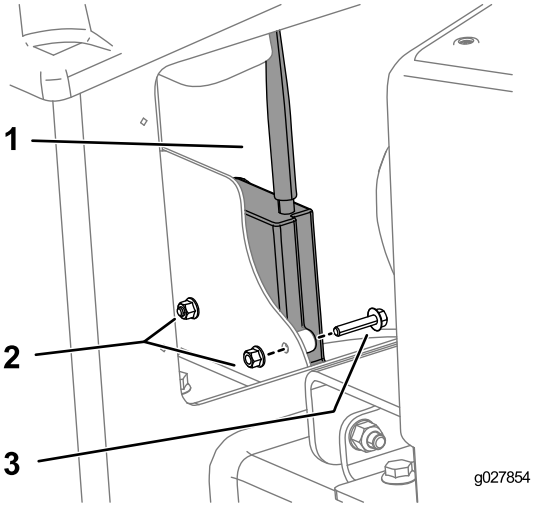

Figure 3

1. Receiver
2. Nuts
3. Bolts

Product Overview

Controls

Exit-Side-Lockout System

The exit-side-lockout system provides the individuals working around the machine with a means to disable the drill pipe from rotating and thrusting.

This system consists of a receiver mounted on the machine and a transmitter (Figure 4) that must be held by a designated individual working around the machine.

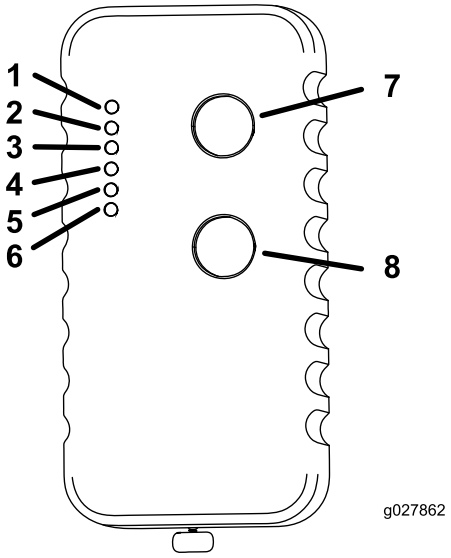

Figure 4

1. TX indicator light
2. RX indicator light
3. ER indicator light
4. BA indicator light
5. A1 indicator light
6. A2 indicator light
7. On button
8. Off button

Label	Function
TX	Transmit
RX	Receive
ER	Error
BA	Low Battery
A1	Auxiliary 1
A2	Auxiliary 2

The individual holding the transmitter can push the Lock Drill (Off) button to stop the drill rotation and thrust. This is primarily used to stop/lockout the drill operations in the following situations:

- When installing or removing a drill head or reamer
- Whenever someone needs to approach the drill pipe or head anywhere in front of the machine
- Placing a wiper on the drill pipe
- When the handheld transmitter operator identifies a problem requiring immediate shutdown of drilling

When it is safe to resume drilling, the individual holding the transmitter can press the Unlock Drill (On) button. This button sends a signal to the receiver that allows the machine operator to reset the system and restore the thrust and rotary functions.

Specifications

Handheld Unit

Batteries	3 AAA
Auto shutdown	After 2 hours of inactivity
Low battery warning	3.2 V and below
Low battery shutdown	At 3.2 V the BA indicator light will flash rapidly for 30 seconds prior to shutdown.
Operating temperature	-20 to 55 degrees C (-4 to 131 degrees F)
Storage temperature	-40 to 55 degrees C (-40 to 131 degrees F)
Radio frequency	2405 to 2480 MHz
Radio RF power	50 mW
Radio license	Not required
Modulation	DSSS
Antenna	Internal

Base Unit

Radio frequency	2405 to 2480 MHz
Radio RF power	100 mW
Radio license	Not required
Modulation	DSSS
Antenna	External
Operating temperature	-20 to 55 degrees C (-4 to 131 degrees F)
Storage temperature	-40 to 55 degrees C (-40 to 131 degrees F)

Operation

Handheld Indicator Lights

The following table lists the various states of the indicator lights on the handheld transmitter (Figure 4) and their meanings:

Indicator Light State	Meaning
The TX indicator light is dim and blinking rapidly.	The handled unit is transmitting to the receiver.
The TX indicator light is bright and blinking rapidly.	A button is active on the handheld unit.
The RX indicator light is bright and blinking rapidly.	The handheld unit is receiving transmission.
The ER indicator light is lit solid.	There is an error with the transmission.
The BA indicator light is blinking slowly.	The batteries are low. See Replacing the Transmitter Batteries (page 4)

Replacing the Transmitter Batteries

1. Loosen the four screws securing the battery cover (Figure 5).

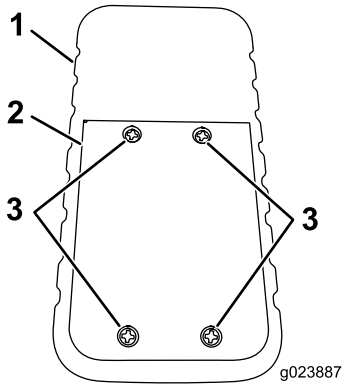

Figure 5

1. Handheld transmitter
2. Battery cover
3. Screws

2. Remove the cover (Figure 6).

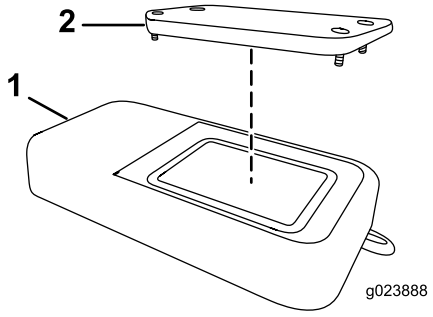

Figure 6

1. Handheld transmitter
2. Battery cover

3. Remove the existing batteries.
4. Install 3 new, AAA batteries in the orientation shown in Figure 7.

   Important: Ensure that you install the batteries in the correct polarity orientation or you could damage the transmitter.

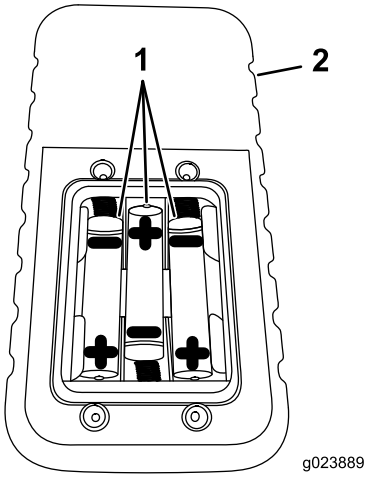

Figure 7

1. Handheld transmitter
2. AAA batteries

5. Replace the cover and secure it with the screw removed previously.

   Tighten the screws enough to ensure that the sealing gasket is compressed, but do not over tighten them.

Associating the Handheld Transmitter with the Base Unit

If the handheld transmitter ever stops communicating with the base unit, or if you replace it with a new transmitter, you need to associate the transmitter to the base unit as follows:

1. Ensure that the machine is turned off.
2. Ensure that the handheld transmitter is not active (i.e., no lights are on).
3. Stand near the rear control panel of the machine.
4. Simultaneously press and hold the On and Off buttons.

   All of the lights will illuminate.
5. Continue holding the buttons until the TX light begins flashing.
6. Continue holding the On and Off buttons and turn on the machine to power the base unit.

   The base unit and handheld establish a communication link while you hold the button. Once the process is complete, all of the lights will flash.
7. Release the buttons.

Disassociating all Handheld Transmitters from the Base Unit

Important: Completing this procedure will disassociate all transmitters from the base unit, which will need to be associated again before they will function.

1. Ensure that the machine is turned off.
2. Ensure that the handheld transmitter is not active (i.e., no lights are on).
3. Stand near the rear control panel of the machine.
4. Simultaneously press and hold the On and Off buttons.

   The Green light illuminates.
5. Continue holding the buttons until the Yellow light begins flashing, then release the buttons.

   The Red light begins flashing allowing you 2 seconds to press the next button.
6. Press and hold the Off button

   The Red light turns off and the Green and Yellow lights illuminate.

   Important: If you do not press this button within 2 seconds, you will have to start this procedure over again.
7. Continue holding the Off button and turn on the machine to power the base unit.

   The base unit and handheld establish a communication link while you hold the button. Once the process is complete, the Yellow light turns off, the Red light begins flashing, and the Green light illuminates. All lights remain as mentioned until you release the button.
8. Release the Off button.

   The Red light turns off and the Green light flashes for a few seconds.

Notes:

Notes:

Count on it.

CERVIS INC. ™

Wireless SmaRT ™

WSMB-7588
JEM TECHNICAL

Engineered System Manual 2-3

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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:

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15.105(b) – Note:
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—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

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.

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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.

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.

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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 cable from the base unit connector P1, 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 Heading 6.0 SmaRT System WSMB-7588 Specifications of this document.***

1.0 WSMB-7588 System List of Equipment

✓ ***Note:*** *It is possible to order the system with one part number. Specify WSMB-7588 in the purchase order to receive the parts listed in the table below. If an individual part needs to be ordered, use the part number listed in the table below.*

Table 1. WSMB-7588 System List of Equipment

Qty	Item	Part #	Description
1	OO-2H02-7588	OO-2H02	Handheld, 2-button, 2.4GHz
1	BU-2H06D-7588	BU-2H06D-EXT	Base unit, 6-FET, 2.4GHz, external antenna
1	BB3-07	BB3-07	Antenna, 2.4GHz, swivel
1	J5-02	J5-02	Antenna extension cable

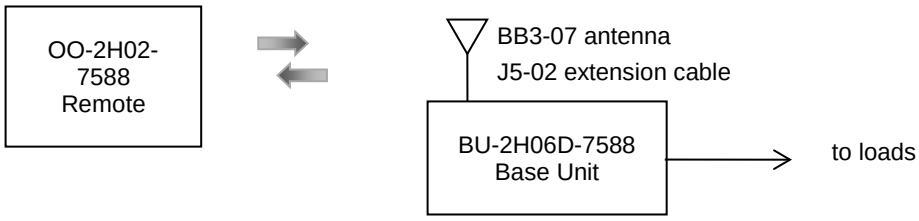


Figure 1. WSMB-7588 System Diagram

2.0 BU-2H06D-7588 Mounting

✓***Note:*** *The BU-2H06D-7588 must be mounted so that connector P1 is facing down to guard against water entering the wiring harness.*

✓***Note:*** *The BU-2H06D-7588 uses an RP-TNC connection for the antenna. If extending the antenna from the base unit, only a Cervis recommended extension cable kit should be used.*

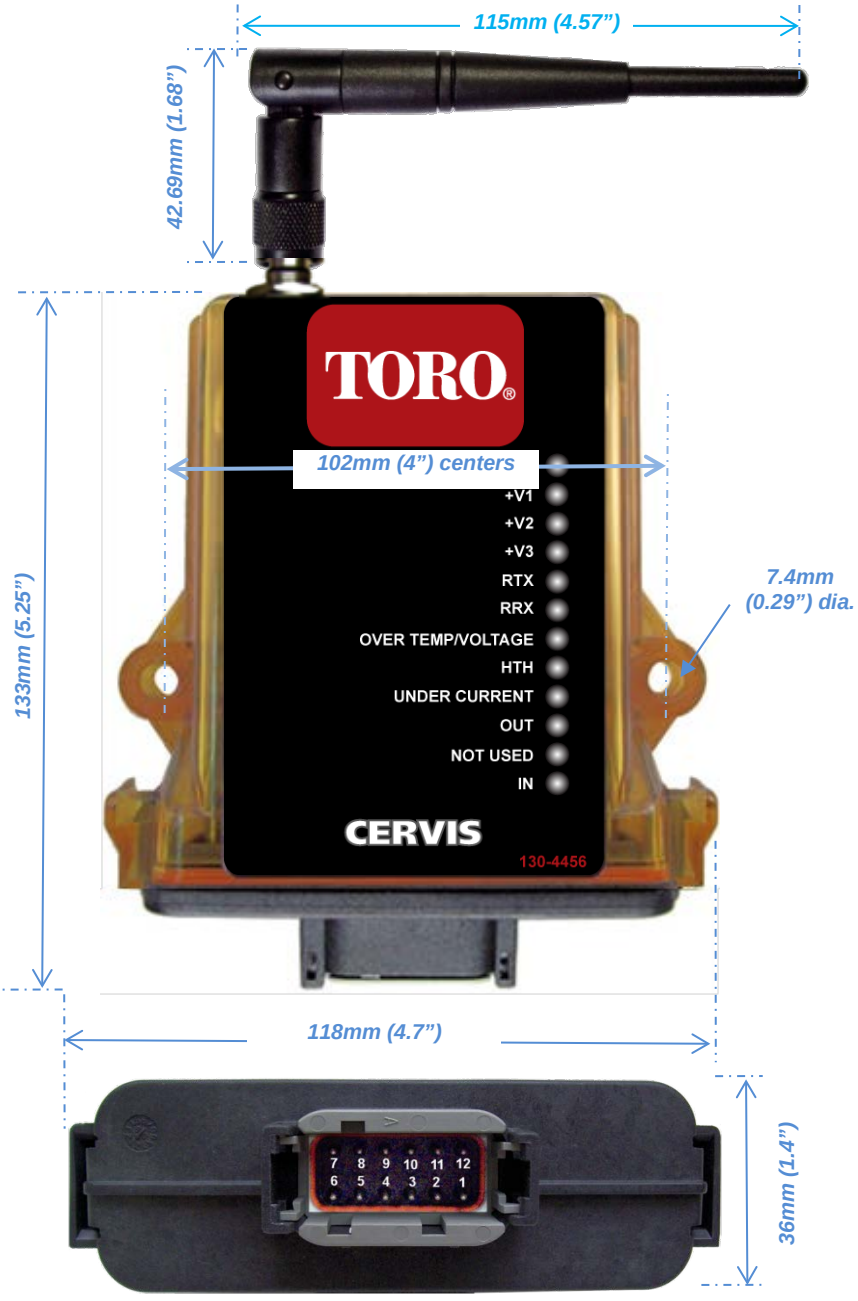
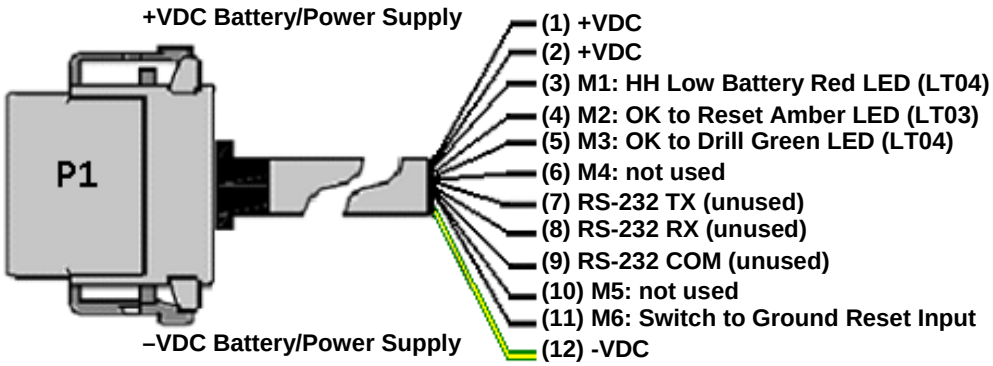


Figure 2. BU-2H06D-7588 Mounting Details

3.0 Cable Wiring Diagram



✓*Note: Unused wires should never be tied together. Cervis recommends cutting the wires close to the P1 connector or cutting the unused wires back and taping the end of each to minimize transient/radio interference.*

Figure 3. P1 Connector Wiring Diagram

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4.0 OO-2H02-7588 Handheld Remote Details

Figure 4. OO-2H02-7588 Handheld Remote

4.1 OO-2H02-7588 Remote Buttons and LEDs

Table 2. OO-2H02-7588 Handheld Remote LEDs

Button/LED	Label	Function
Button 1	ON	ON
Button 2	OFF	OFF
LED 1	TX	Transmit
LED 2	RX	Receive
LED 3	ER	Error
LED4	BA	Low Battery
LED5	A1	Auxiliary 1
LED6	A2	Auxiliary 2

Table 3. OO-2H02-7588 Handheld Remote LED Diagnostic Information

Condition	LED Information
Handheld is transmitting	LED1 rapid blinking dim
Button active on handheld	LED1 rapid blinking bright
Handheld is receiving	LED2 rapid blinking bright
Error	LED3 lit solid

Condition	LED Information
Low battery	LED3 slow blinking
A1 and A2	unused

4.2 OO-2H02-7588 Turn ON and Turn OFF

ON – Press Button 1

OFF – Press and hold Button 2 for 4-seconds.

4.3 OO-2H02-7588 Handheld Remote Battery Installation

Handheld units are powered by three size AAA 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 handheld:

1. Remove the four small Phillips screws from the Battery Compartment cover and lift the cover from the handheld.
2. If installing batteries in an empty battery compartment, install three fresh size AAA batteries. Be sure to position the batteries as shown in Figure 5 below.
3. If replacing expired batteries, remove the old batteries and install three fresh size AAA batteries. Be sure to position the batteries as shown in Figure 5 below.
4. Replace the compartment cover and tighten the four Phillips screws. These screws should not be over-tightened, but they should be tight enough to assure the gasket provides a proper seal.

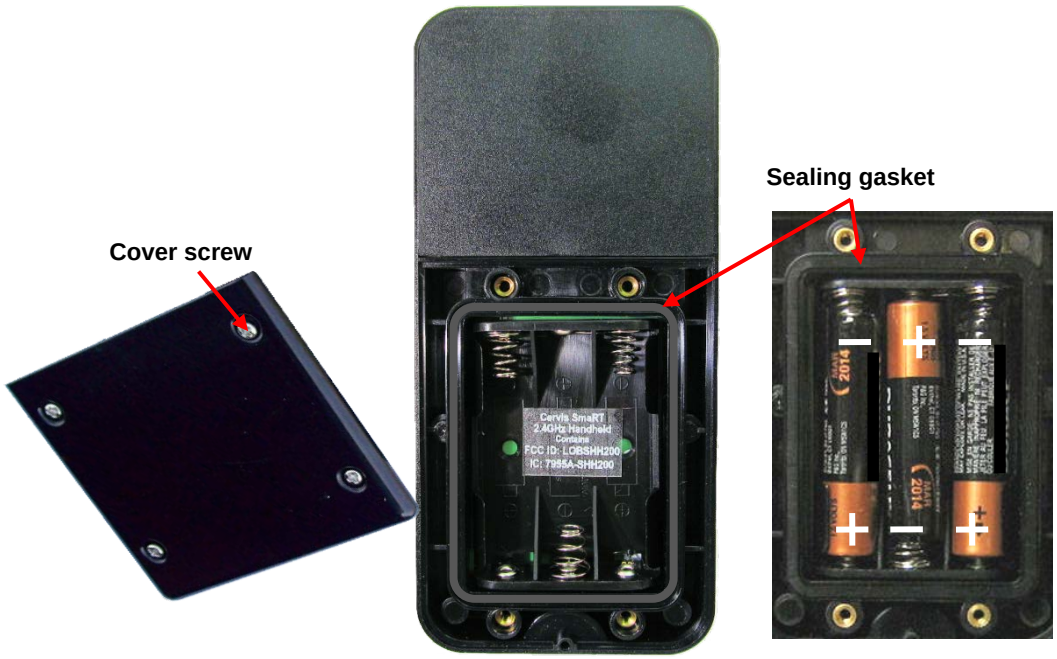

Figure 5. OO-2H02-7588 Handheld Remote Battery Installation

✓***Note:*** *Cover screws must be tightened enough to ensure the sealing gasket is compressed. Do not over-tighten the screws.*

CAUTION *Be sure to observe proper polarity when placing batteries in the handheld battery compartment.*

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4.4 Associate Handheld and Base Unit

The OO-2H02-7588 must establish communications with base unit BU-2H06D-7588 before the system can be used. The OO-2H02-7588 handheld remote is associated to the system base unit before leaving the factory. This is done using the Associate procedure. In situations where it is necessary to re-establish handheld-to-base unit communications, the following Associate procedure must be performed.

Associate Handheld Remote to Base Unit

1. Remove power from the base unit.
2. Stand near the base unit in unobstructed, clear line-of-sight with the handheld in hand.
3. Simultaneously press and hold buttons **B1** and **B2**. All LEDs activate.
4. Continue to hold both buttons until the TX LED begins flashing.
5. Apply power to the base unit while continuing to hold the buttons. All LEDs flash, then all activate.
6. Release both buttons.

The SmaRT System is ready for use with that particular handheld remote.

Figure 6. Associate Handheld Remote to Base Unit

4.5 Low Battery

At 3.5V the BAT LED begins flashing. Approximately 30 seconds later, the handheld shuts down.

5.0 BU-2H06D-7588 Base Unit Details

5.1 BU-2H06D-7588 Hardware Configuration

Table 4. BU-2H06D-7588 Base Unit Hardware Configuration Details

Required Fields	Interface Description
Control Power	12VDC
Number of I/O Channels	6
Output Composition	FET
Antenna Option	EXTERNAL
Frequency	2.4GHz

✓***Note:*** *Input channels are active when the input is switched-to-ground (same potential as P1:12). For the input to be considered active, the voltage at the input channel must be less than 1V relative to P1:12 for at least 100msec. For the input to be considered inactive, the voltage at the input channel must be greater than 3V for the same minimum amount of time. All input channels are equipped with internal pull-up resistors. Therefore, when an input is disconnected from an input channel, the input is considered inactive.*

5.2 BU-2H06D-7588 Safety Link

SAFETY LINK ENABLED – In the event that the handheld and base unit lose communication, the base unit will deactivate any active outputs. In the event that communication is re-established, no active commands can be present in the initial communication in order for a link to be established and for outputs to be affected by the handheld and by proxy in this application the other base units. Safety Link is based on a five (5) second window – in the event that no message is received from the handheld within five (5) seconds after receipt of the last valid message, any active outputs will be disabled.

5.3 BU-2H06D-7588 Channel Configuration Details

Table 5. BU-2H06D-7588 Base Unit Channel Configuration Details

Channel #	Type	Style	Custom Code Notes
M1 **Transmitter Low Bat** **(Red LED)**	Level Output	Momentary	Low Battery signal sent from HH (active for 30 seconds)
M2 **OK to Reset** **(Amber LED)**	Level Output	Latched ON	B1
		Latched OFF	B2 OR Loss of link
M3 **OK to Drill (Green LED)**	Level Output	Latched ON	M2 AND M6 ACTIVE
		Latched OFF	HH OFF OR Loss of link
M4 (Not used)	Level		
M5 (Not used)	Level		
M6 **Reset Input**	Level Input	Momentary	Switch to ground input from reset switch Active when<1, not active when >3

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6.0 SmaRT System WSMB-7588 Specifications

6.1 OO-2H02-7588 Handheld Remote Specifications

Table 6. OO-2H02-7588 Handheld Remote Specifications

Item	Description	
Power	**V_{in}**	+3.6V to +4.5V
	Batteries	Three (3) AAA
	Low Battery Warning	3.2V LED 3 flashes for 30 seconds prior to shutdown
	Inactivity Timeout	Infinite
Environment	**Operating Temp**	-20°C to 55°C
		(-4°F to 131°F)
	Storage Temp	-40°C to 55°C
		(-40°F to 131°F)
	Humidity	0 to 100%
Radio	**Frequency**	2405-2480MHz
	RF Power	50mW
	License	License free certification pending
	Modulation	DSSS
	Antenna	Internal
Enclosure	**Dimensions**	mm: 136.38 x 68.96 x 28.42
		Inches: 5.37 x 2.68 x 0.92
	Total Weight	200 gr./7.2 oz. (with lanyard)
	Durability	High Impact Polymer case
		Polycarbonate faceplate
		Impact absorbing bumper
Six Indicators	**TX Green**	Transmit
	RX Amber	Receive
	ER Red	Error
	BA Amber	Low battery
	A1	Auxiliary (unused)
	A2	Auxiliary (unused)
Buttons	**Pushbuttons**	Two (2)
	Button Life	5-million operations (typical)

6.2 BU-2H06D-7588 Base Unit Specifications

Table 7. BU-2H06D-7588 Base Unit Specifications

Item	Description	
Power	**Vin**	+7 to +28VDC
Radio	**Frequency**	2405-2480MHz
	RF Power	100mW
	License	License Free certification pending
	Modulation	DSSS
	Antenna	External
Environment	**Operating Temp**	-20°C to 55°C (-4°F to 131°F)
	Storage Temp	-40°C to 85°C (-40°F to 185°F)
	Humidity	0 to 100%
Indicators (12)	**Unmarked**	Input power polarity reversed when lit
	+V1 – +V3	OK when active solid
	RTX	Blinking when transmitting
	RRX	Active when receiving
	Over Temp/Voltage	Lit when temp or voltage exceeded
	HTH	OK when blinking
	Under Current	Lit when current too low
	Out	Output active when lit
	Not Used	Unused
	In	Input active when lit
Enclosure	**Dimensions**	mm: 133 x 118 x 36 inch: 5.24 x 4.65 x 1.42
	Durability	High Impact Polymer
	Weight	.24kg (0.5lbs)
Outputs/Inputs	**FETs**	Six, open drain 4A per channel,15A total @ 55ºC

6.3 BU-2H06D-7588 (BU-2H06D-EXT) Antenna List

Table 8. BU-2H06D-7588 (BU-2H06D-EXT) External Antenna Details

External Antenna	Manufacturer	Cervis BIN
OMNI242R	**RFM**	**BIN BB3-07**

✓***Note:*** *Only the antenna recommended by Cervis, Inc. is to be used with the SmaRT base unit.*

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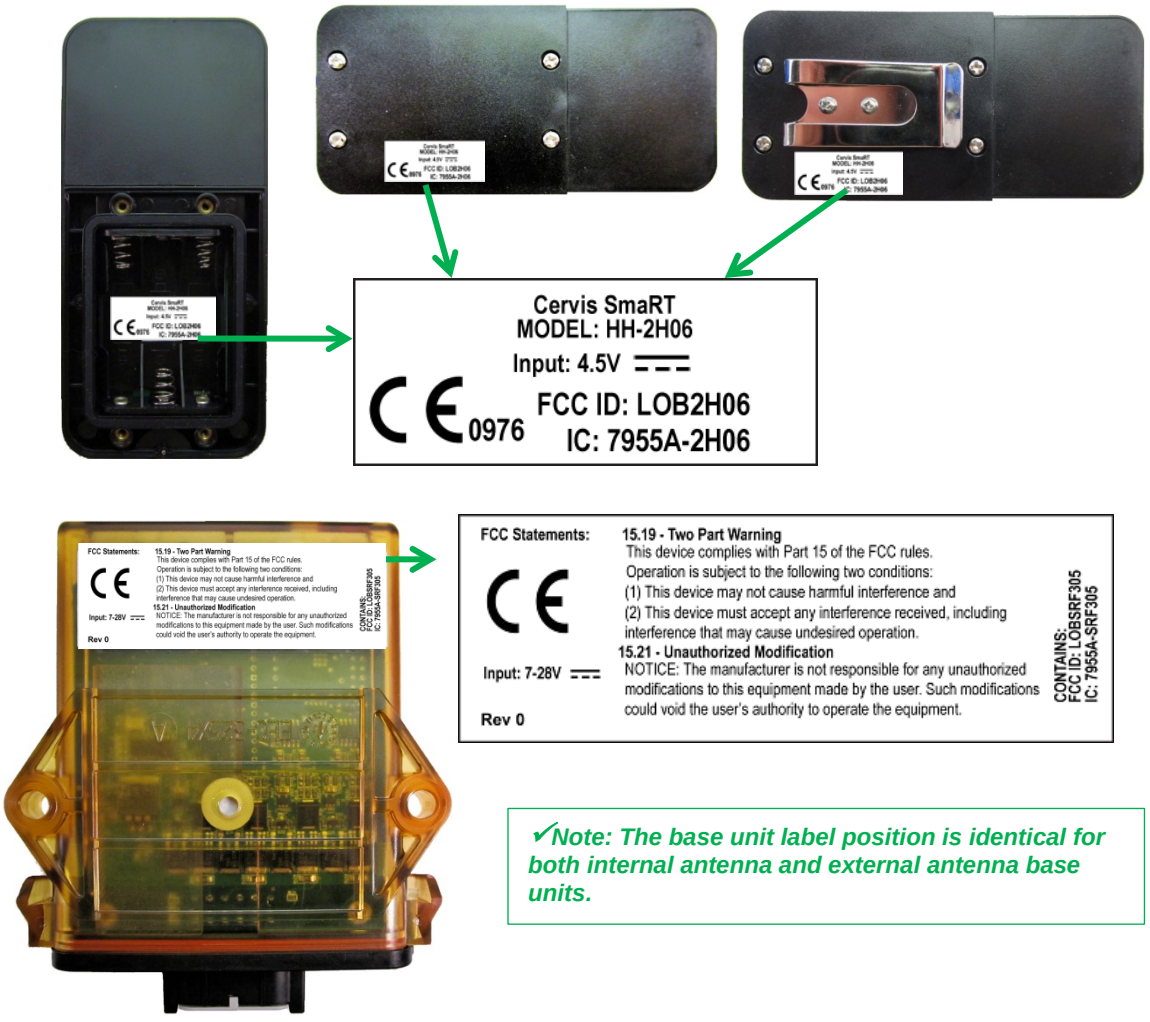
Appendix A: Exposure to Radio Frequency Energy

SmaRT handheld remote units contain radio transceivers. When active, handheld remotes send out radio frequency (RF) energy through its internal antenna.

For optimal performance and to ensure that human exposure to RF energy does not exceed the recommended guidelines, always follow these instruction and precautions: When using the handheld remote, hold the remote so that the top buttons are away from the body in the direction of the base unit. Keep the remote when in use at least 15mm (5/8 inch) away from the body, and only use carrying cases, belt clips, or holders that are approved by Cervis, Inc.

A SmaRT base unit when active sends out radio frequency (RF) through its external antenna. Base units using an external antenna should be mounted to ensure the antenna is at least 20cm away from the human body.

Appendix B: Agency Identification Label Locations



✓*Note: The base unit label position is identical for both internal antenna and external antenna base units.*

Figure 7. Agency Identification Label Locations

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