CERVIS

PG-2H10JS and PG-9H10JS

Pistol Grip Handheld Remote

User Manual

U068.6.0

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 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.

The following only applies to PG-2H10JS handheld remotes.

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.

Manual Conventions

Figure Captions are centered beneath the referenced figure.

Table Captions are left justified just above the tables.

✓ ***Note:*** ***Notes pertaining to the use of the device, function, switch, system, etc. are used to alert the user to information that is useful, instructive, or informative.***

Caution! 	**Caution Statements indicate action instructions or user information that demands attention. Failure to recognize the statements of a Caution may be detrimental or may cause harm to the operator, system equipment, or personnel that may be in the area. It is critical for the user/operator to pay attention to a Caution.**

CERVIS

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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.***
- ✓ ***Equipment changes or modifications not expressly approved by the manufacturer will void the warranty.***
- ✓ ***Equipment owner/operators must abide by all applicable Federal, State, and Local laws concerning 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 disconnect power from the base unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.***
- ✓ ***Disconnect power from the base unit either by detaching the 12-pin cable(s) from the base unit connectors 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 cause 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.***
- ✓ ***Keep high-energy RF devices away from handheld remotes. For instance, activating high-power communication radios in close proximity to handheld remotes can cause interference and "false" circuit activation.***
- ✓ ***Do not key two-way radios while using the handheld remote.***

1.0 SmaRT PG-2H10JS and PG-9H10JS Handheld Remote

✓ ***Note**: A SmaRT handheld remote's operating frequency will be in either the 2.4GHz or 900MHz range. The first number in the system or device name indicates the operating frequency. For instance, a SmaRT pistol grip (PG) handheld remote will either be PG-2H10JS or PG-9H10JS, where "2" indicates 2.4GHz and "9" indicates 900MHz operating frequency. As such, references to the handheld (HH) remote, base unit (BU), or system in this manual use "x" rather than "2" or "9" in the name to indicate the operating frequency.*

The SmaRT PG-xH10JS is designed for traditional and non-traditional mobile applications. Capable of activating and deactivating the input/outputs of SmaRT base units, the ergonomic layout of the PG handheld remote offers comfortable remote operation of the SmaRT system.

Using direct sequence spread spectrum (DSSS) wireless technology at system-dependent 2.4GHz or 900MHz frequency range to communicate, the SmaRT PG-xH10JS handheld remote provides a robust link with a base unit in congested radio environments. The PG handheld remote allows seamless association to a SmaRT base unit without the need to open either unit's casing. The rugged, weatherproof handheld enclosure allows the unit to operate worry free in harsh weather conditions.

Figure 1. SmaRT PG-xH10JS Handheld Remote Control Unit

1.1 Handheld Features

- **Direct Sequence Spread Spectrum (DSSS) technology at 2.4GHz or 900MHz**
- **Direct-line-of-sight operation**
- **Dual- or single-axis joystick control**
- **Weatherproof design**
- **Custom control programming available**
- **Optional umbilical controlled area network (CAN) Bus operation**
- **Critical low voltage auto-shutdown**
- **Rugged high-impact polymer/polycarbonate/aluminum enclosure**
- **Five toggle multiple-function controls**
- **Oversized Machine Stop button**
- **Controls a full line of SmaRT base units**
- **Low voltage warning LED indication**
- **Variable inactivity time-out**
- **Four status and diagnostic LED indicators**
- **Spring return trigger for digital or proportional control**
- **Magnets integrated into the handle for convenient attachment to ferrous metal surfaces (helps avoid misplacing the PG handheld remote)**
- **Operates at 1.6 – 3.2VDC (four AA alkaline batteries) with nominal battery life of ≈100 hours**

1.2 Standard Switch and Joystick Identification

The standard PG-xH10JS has five toggle switches, one joystick, a machine stop button, and a spring-return trigger. Units configured for CAN Bus communications also have an umbilical port at the base of the handheld remote handle, as shown in Figure 1.

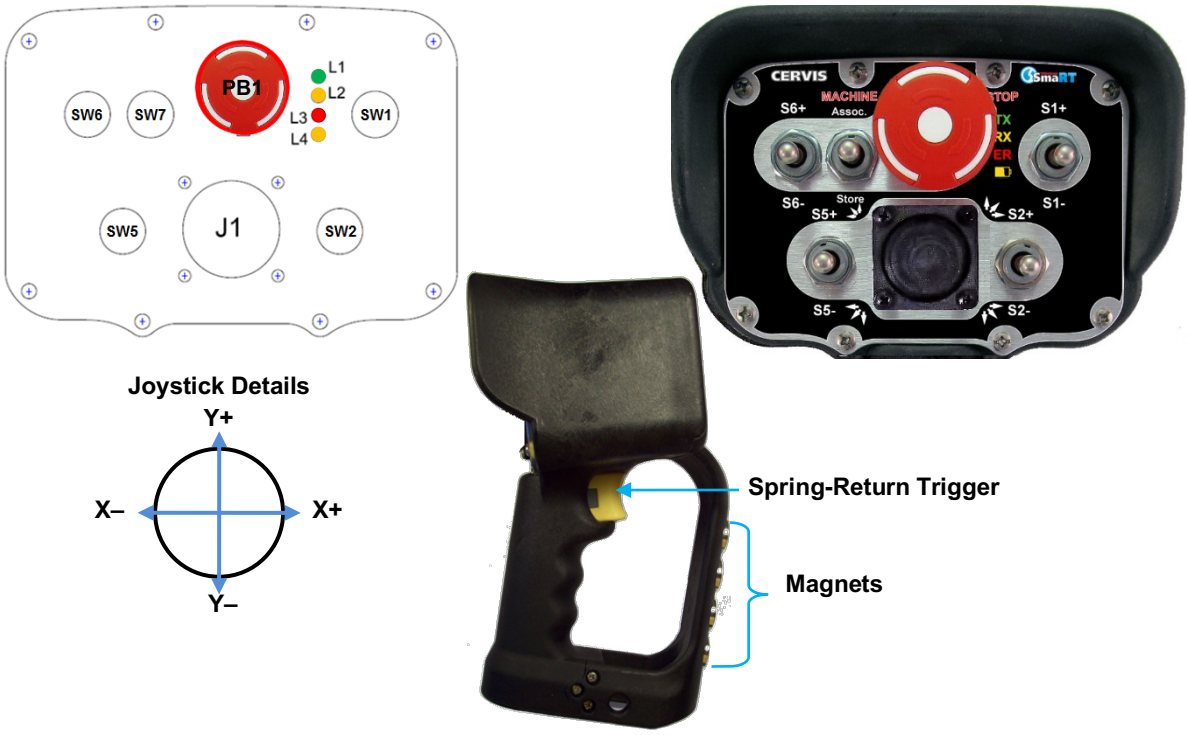

Figure 2. Top Plate Switch and Joystick Layout

1.3 Optional Umbilical CAN Bus Connector

Optionally, you may connect the PG-xH10JS to the base unit using an umbilical cable as a backup. The keyed CAN Bus connector is located at the base of the PG handheld remote handle. When not in use, an aluminum cap attached by a chain to the handle protects the connector and prevents it from being misplaced when removed for use, as illustrated in Figure 3 below. Cervis, Inc. offers a selection of umbilical wiring harnesses fit for use with the PG-xH10JS handheld remote. For details, please contact your Cervis, Inc. representative.

PG-2H10JS Optional Keyed Umbilical Connector
(base of the handheld remote handle)

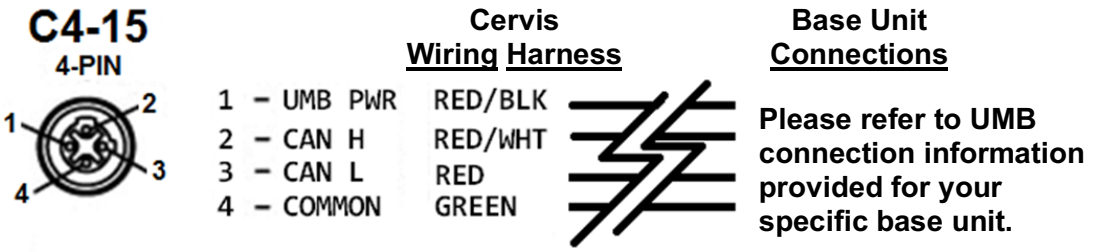

Figure 3. Umbilical Connector and CAN Bus Wiring

1.4 Standard Remote Switches

Table 1. Standard Remote Switches

Control*	Function	Description	Default
SW1 UP **SW1 DOWN**	Output Control	Three-position momentary or latch	Center (no command)
SW2 UP **SW2 DOWN**	Output Control	Three-position momentary or latch	Center (no command)
SW5 UP **SW5 DOWN**	Output Control	Three-position momentary or latch	Center (no command)
SW6 UP **SW6 DOWN**	Output Control	Three-position momentary or latch	Center (no command)
SW7 UP **SW7 DOWN**	Associate Store	Three-position momentary or latch	Center (no command)
PB1 Down (push)	Machine Stop (handheld disabled)	Two-position maintained Spring-loaded mushroom style	Down (unit off)
PB1 Up (twist-to-release)	Machine Stop (handheld enabled)		
JS1 +Y **JS1 -Y**	Proportional Output Control Proportional Output Control	Dual axis open gated joystick	Center (no command)
JS1 +X **JS1 -X**	Proportional Output Control Proportional Output Control	Dual axis open gated joystick	Center (no command)
Trigger	Joystick Enable Switch Enable Proportion Control	Spring-loaded return to full extension	Extended (no command)

*SW = Switch, PB = Pushbutton, JS = Joystick

1.5 Remote LEDs

The standard PG-xH10JS handheld remote has four LEDs that relay operating status and for troubleshooting when needed.

Table 2. Handheld Remote LEDs

LED	Identifier	Color	Function
1 (top)	**TX**	Green	Rapid blinking during transmit/Solid when a switch is active
2	**RX**	Amber	Rapid blinking during receive/Solid when an output is active
3	**ER (error)**	Red	Solid when ERROR condition occurs
4	 **(battery)**	Amber	Blinking when voltage is low or if batteries need to be replaced

Although the LEDs are shown in Table 2—and are in color on the faceplate label in the previous illustrations— the faceplate and label protects the colored LEDs. The label areas covering the

colored LEDs are transparent, allowing the LEDs to be observed when lit and used for status and system troubleshooting.

2.0 PG-xH10JS Pistol Grip Battery Installation

✔ ***Note**: PG-xH12JS Pistol Grip remotes are shipped from Cervis, Inc. with a set of four fresh type "AA" alkaline batteries separate from the pistol grip. Install these batteries before using the handheld remote.*

Four size "AA" alkaline batteries power this SmaRT PG handheld unit. The battery —located on the back of the pistol grip, as shown in Figure 4—is sealed with a cover attached to the unit by four Phillips screws, sufficiently tightened to compress an O-ring to seal out moisture. You can access the battery compartment by loosening the screws—which remain attached to the cover—and removing the cover. 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 PG handheld:

1. Loosen the four Phillips battery compartment cover screws on the rear of the remote and lift the cover from the handheld.
2. Install (or replace with) four fresh size "AA" batteries. Observe proper polarity by positioning the batteries as shown in Figure 4.
3. Replace the compartment cover and tighten the four Phillips screws. Do not over-tighten these screws, *but make sure they are tight enough to properly seal the gasket.*

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

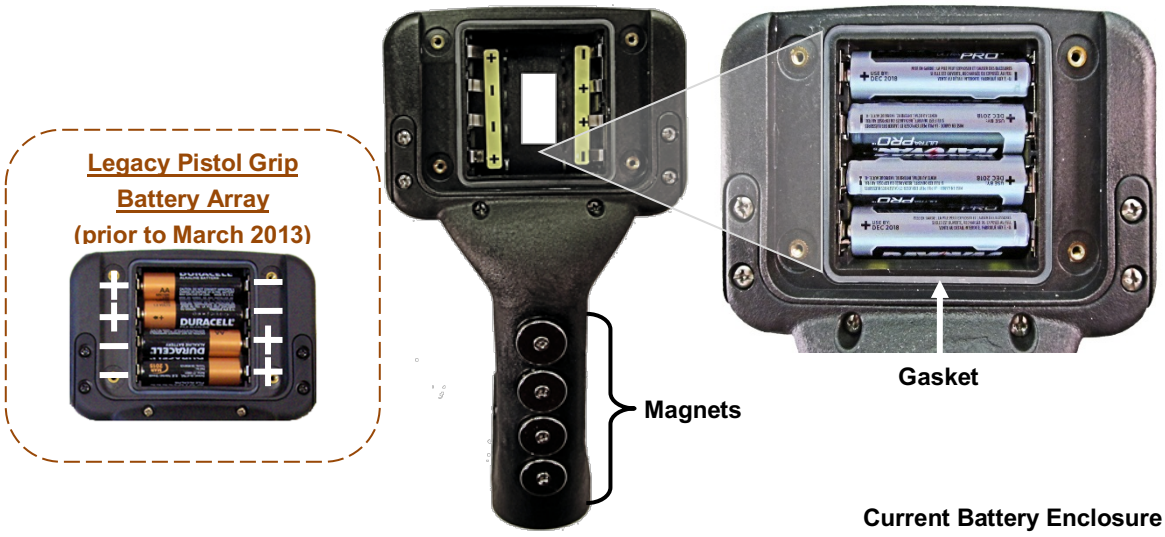

Figure 4. Pistol Grip Battery Installation

✔ ***Note:** Make sure the cover screws tight enough to compress the sealing gasket. Do not over-tighten the screws!*

2.1 PG-xH10JS Pistol Grip Associate Mode

✓ ***Note:*** *All remote control system remotes and base units are associated—that is, communication links between them are established—before they are shipped from Cervis, Inc. It is not normally necessary to associate your system when it arrives. But, there are circumstances when it may become necessary to establish the communications link between the remote and base unit while in the field. Associate Mode allows this.*

Use Associate Mode to establish the communication link between the PG handheld remote and the base unit. A clear line of site must be between the handheld and the base unit, and both units must initially be powered down (OFF) to begin the procedure. The pistol grip remote is turned OFF by pushing in the oversized mushroom STOP button. The base unit is safely powered down by removing the power source from the unit.

Caution! ***To prevent inadvertent movement of the machine, be sure to remove power from the base unit before attempting to enter Associate mode.***

Associate PG-xH10JS Remote to a Base Unit (See Figure 5)

1. Stand near to the base unit with the handheld remote **OFF** and **power removed** from the base unit (disconnect P1 and P2, or turn the source power OFF).
2. Release the **STOP** button on the handheld by twisting clockwise until it pops **UP**.
3. Push and hold **SW7 UP** and then immediately push and hold **SW1 UP**. All LEDs light solid.
4. Observe the LEDs. When **TX blinks** and all other LEDs turn off, power up the base unit. All LEDs flash once.
5. Release the **SW1 UP** and **SW7 UP**.

A successful Association is indicated when LEDs TX and RX are rapidly blinking while the remaining LEDs remain unlit.

Figure 5. Switch Actuation for Associate Mode

✓ ***Note:*** ***The Associate example above is an excerpt from Cervis SpecSheet S157. Be aware that particular systems may demand a different Associate switch instruction set. Refer to your ESM, ESD, or EASS document that came with your system.***

3.0 PG-xH10JS Pistol Grip Operation

The PG-xH10JS pistol grip remote control is ready to operation when the batteries are installed and the unit is associated to the base unit. The system is associated if the TX and RX LEDs of the pistol grip remote and base unit are rapidly blinking while the remote and the base unit are powered.

3.1 To Start and Stop the Unit

1. Twist the Machine Stop button clockwise . The spring loaded button snaps into the UP position thus enabling the handheld remote for use.
2. Activate SW1 toggle switch (see Note below). Initial activation of the chosen switch *will not* engage operation of its mated base unit output. Activation of any output controlling switch thereafter – once the handheld is active – *will control* the switch-matched function.

Note: ***In many systems the toggle switch used to active the pistol grip remote is SW1, but the activation switch may be application dependent—in which case you will have to refer to the ESM, ESD, or EASS document sent with the system.***

3. Push the large red Machine Stop button down to stop operation of the base unit outputs and disable the handheld remote.

3.2 Toggle Switch Operation

Toggle switches SW1, SW2, SW5, SW6, and SW7 are three position toggles with the center position as neutral (inactive). Up (+) and Down (–) positions command output control.

3.3 Joystick and Trigger Operation

Typical joystick operation is proportional control for the X axis and Y axis activation. The joystick can also be programmed to act as digital output signals to the system base unit.

Typical trigger operation is that of proportional control along with the use of a joystick. The pistol grip trigger configuration depends upon its designated use for the particular system in which the handheld remote is used. It can be programmed to act as:

- an Enable, where it must be engaged to allow a function or functions to be performed by the joystick or toggle switch function controls.
- a PWM, where the position of the trigger is gauged to provide a particular position-signal command for the base unit to react to for accurate machine control.
- a standard Digital control (On, Off).

3.4 PG-xH10JS Proportional Joystick Adjustment

Adjust Mode is dependent on the particular base unit of the system in which the PG-xH10JS is used. Refer to the Engineered System Manual (ESM) or Engineered Application Specific Supplement (EASS) that is sent with the system for the particular steps used to adjust PWM (pulse-width-modulated) controls for the system.

4.0 SmaRT PG-xH10JS Remote Control Specifications

Table 3. PG-2H10JS and PG-9H10JS Pistol-Grip Specifications

Item	Description	
Power	**V_{in}**	+1.6V to +3.2VDC
	Batteries	Four (4) AA alkaline
	Battery Life	≈ 100 hours (nominal)
	Low V Shutdown	1.6VDC
	Auto-shutdown	variable, ten (10) minute default
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 @ 100mW (PG-2H10JS) 906-924MHz @ 10mW (PG-9H10JS)
	License	None required
	Modulation	DSSS
	Antenna	Internal
Enclosure	**Dimensions**	mm: 230.6x133.9x146.9 inch: 9.1 x 5.3 x 5.8
	Total Weight	≈3lbs (≈1.36kg)
	Durability	High Impact Polymer case
	Faceplate	Aluminum or Polycarbonate
Indicators (4 LEDs)	**TX (Green)**	Blinking – transmitting, no switch active Solid – transmitting, switch active
	RX (Amber)	Blinking – receiving
	ERR (Red)	Solid – Indicates error with handheld remote Flashing – Switch conflict Switch held by user when turned on
	BATT (Amber)	Flashing – Low battery indication
Control Switches	**Toggles (5)**	3-position, center-detent push-to-operate switches, momentary or latch
	Trigger (1)	Proportional controller, joystick enable, or digital
	Joystick (1)	Single or dual-axis
	M-Stop (1)	Oversized 2-position maintained button
JS-xH10JS-UMB Umbilical Connector	**Turck**	4-pin, keyed with chain-attached aluminum cap

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 FCC for operating distance from human tissue.

Appendix B: Agency Identification Label Locations

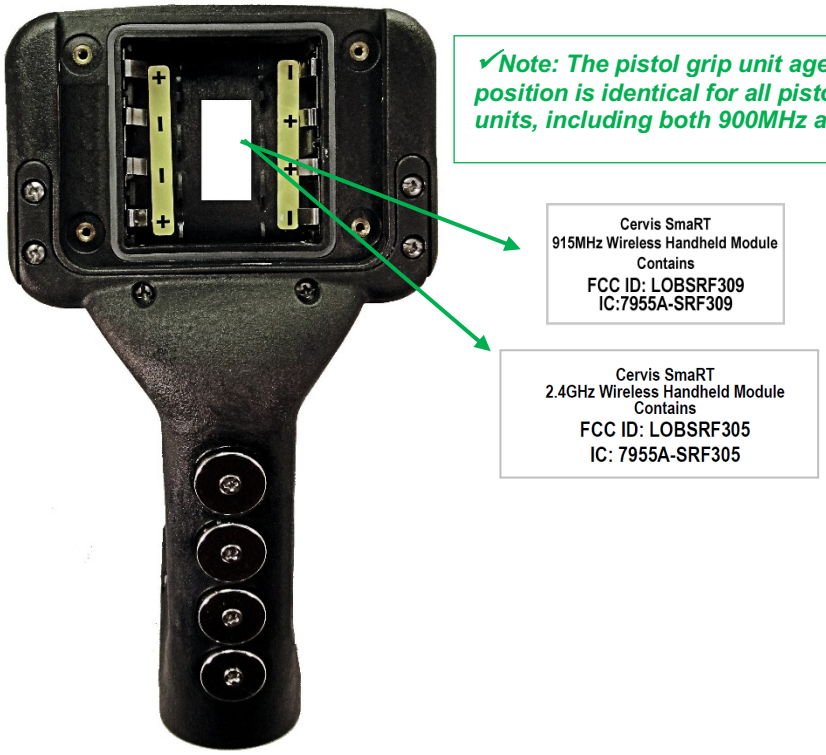

Figure 6. Agency Identification Label Locations

Appendix C: PG-xH10JS Family of SmaRT Handheld Remotes

All PG-xH10JS handheld remotes use four AA alkaline batteries for power, have four handle-embedded magnets, a dedicated Stop button, five 3-position toggle switches, a dual axes joystick, and proportional trigger control. The following table defines various other features applicable to the models listed.

Table 4. PG-xH10JS Family of Pistol Grip Handheld Remotes

Model Name	Freq.	RF Power	Umbilical Connector	CAN Capable
PG-9H10JS	900MHz	10mW	No	No
PG-9H10JS-UMB	900MHz	10mW	Yes	Yes
PG-2H10JS	2.4GHz	100mW	No	No
PG-2H10JS-UMB	2.4GHz	100mW	Yes	Yes

Appendix D: Declaration of Conformity

Declaration of Conformity

EU DECLARATION OF CONFORMITY

Manufacturer: Structured Mining Systems, Inc.
(d.b.a. Cervis, Inc.)
170 Thorn Hill Road
Warrendale, PA 15086 USA
Telephone No. (724) 741-9000

Date: February 14, 2018

This declaration of conformity is issued under the sole responsibility of the manufacturer. The undersigned hereby declares, on behalf of Structured Mining Systems, Inc. (d.b.a. Cervis, Inc.) of Warrendale, Pennsylvania, that the below referenced list of Industrial (ISM) radio equipment products, to which this declaration relates, is in conformity with the provision of the following European Union harmonization legislation:

Council Directive 1999/5/EC (R&TTE)
Council Directive 2006/95/EC (Low Voltage)
Council Directive 2004/108/EC (Electromagnetic Compatibility)
Council Recommendation 1999/519/EC (Human Exposure to Electromagnetic Fields)

Relevant Harmonized Standards or Other Technical Specifications:

ETSI EN 300 328 v1.7.1:2006	ETSI EN 301 489-17 v2.2.1:2012
IEC 60950-1 Ed 2.2; 2013-05-28	BS EN 62311:2008
ETSI EN 301 489-1 v1.9.2:2011	BS EN 62209-2:2010

The technical documentation is maintained at the corporate headquarters of Structured Mining Systems, Inc. (d.b.a. Cervis, Inc.), 170 Thorn Hill Road, Warrendale, PA.

Products: (see other sections/areas of the product user manual for product images, accessories, components, and software, which allow the radio equipment to operate as intended)

MODEL NUMBER	PART NUMBER	BATCH OR SERIAL NUMBER RANGE		
PG-2H10JS	07128570	_____	to	_____
PG-2H10JS-UMB	07128571	_____	to	_____
PG-2H12JS	07129570	_____	to	_____
PG-2H12JS-UMB	07129571	_____	to	_____
PG-2H14	07125570	_____	to	_____
PG-2H14-UMB	07125571	_____	to	_____
PG-2H14-DIS	07125572	_____	to	_____
PG-2H14-DIS-UMB	07125573	_____	to	_____

Anthony M. Di Tommaso

Anthony M. Di Tommaso
Director of Product Development, Quality, & Finance

February 14, 2018
Date