

SEARCHCAM® ENTRYLINK®
Hazmat Wireless Video System

INSTRUCTION MANUAL
Model SC-EL-300



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SEARCHCAM® ENTRYLINK® INSTRUCTION MANUAL

SAFETY PRECAUTIONS

Read and follow this manual. Operations in and around a hazardous material release are extremely dangerous. Only those individuals who are specifically trained to operate in a hazardous materials exclusion zone should attempt to use this product within the exclusion zone. There is no substitute for proper training and good judgment.

HAZARDOUS ATMOSPHERES

Federal law prohibits entry into a flammable atmosphere when the lower explosive level exceeds 10%. The Searchcam® EntryLink® is not designed to operate continuously in a flammable atmosphere. It is designed to allow safe exit from a flammable atmosphere if one is encountered during entry operations. Carry and use a direct reading combustible gas indicator where flammable vapors may be present. If flammable vapors are encountered, immediately exit the area and take the necessary steps to change the atmosphere before returning to the area.

Do not attempt to charge the EntryLink battery pack in a hazardous atmosphere, as an explosion may result.

Only the EntryLink handheld camera unit is approved for hazardous atmospheres. Do not place the receiver system in a hazardous atmosphere.

Do not modify the EntryLink. Modifications to the EntryLink may cause an explosion in a hazardous atmosphere.

ELECTROCUTION HAZARD

The EntryLink antenna stand will conduct electricity. Always check for overhead power lines before raising the antenna stand. Do not place the antenna within 20 feet of any power line or energized equipment.

LASER WARNING



FCC STATEMENT

The Searchcam EntryLink contains a video transmission system that requires a FCC license under Part 90 of the FCC rules. The transmitter operates in the frequency range between 2450 and 2483 MHz. Any modifications to the system may void the user's authority to operate this system under FCC rules. The FCC ID for the transmitter is: QL7SSIIVTX01.

BATTERY CAUTION

The Searchcam EntryLink is equipped with an internal Lithium Ion battery pack. This battery system is state of the art and is capable of providing long system operation at one half the weight of older battery technologies. Lithium Ion batteries perform well in very cold and very warm temperatures and they do not develop a memory. However, the system requires proper maintenance to achieve full operational life. To assure that the EntryLink continues to operate reliably, follow these simple guidelines.

1. Always recharge the EntryLink after each use. Do not store the system with a discharged battery. Since the EntryLink draws a small amount of current even when shut down, a fully discharged battery would continue to be drawn down and reach a point where it would be damaged.
2. Whenever possible, store the unit with the battery charger plugged into the unit and with power to the battery charger. The battery charger will maintain the Searchcam EntryLink battery at a full charge, thereby assuring the unit is ready for immediate use.
3. If it is not possible to store the EntryLink connected to the battery charger, then the EntryLink battery should be recharged every 30 days to avoid non-recoverable deep discharge.

SYSTEM DESCRIPTION

The Searchcam® EntryLink is a wireless video camera system designed for entry into hazardous areas. The EntryLink will provide incident commanders with real

time video images and audio information from the incident exclusion zone and is specifically designed to safely operate at hazardous material incidents.

The EntryLink system consists of four major components; the handheld camera, the receiver antenna, the control receiver console and the video monitor. These four components are required to properly operate the EntryLink system.

ENTRYLINK HANDHELD CAMERA

The handheld video camera is carried by the entry team into the exclusion zone and houses several subcomponents necessary for system operation. These include the color video camera, the microphone, the illumination system, the air temperature sensor, the digital compass, the laser pointer, the wireless transmitter, the antenna and the battery pack. The protective housing contains these subcomponents and seals and protects them from the harsh environment of the exclusion zone. The EntryLink handheld camera is the business end of the system.

RECEIVER ANTENNA MODULE

The receiver antenna module consists of two subcomponents; the wireless receiver and the directional high gain antenna. The combination of the pair functions to receive the signal transmitted by the EntryLink transmitter and converts it into signals used to recreate the video and audio. The module is designed to be used in an elevated position and should be placed outdoors, facing the entry team. The portable telescoping antenna stand is the primary method for elevating the antenna up to 17 feet above the ground. However, other mounting systems may be utilized, such as vehicle mounts and permanent towers. The receiver antenna module should be placed as high as possible above the ground.

RECEIVER CONTROL CONSOLE

The receiver control console provides power and signal processing for the receiver antenna module. The control console is also the point of operation for the receiver side of the system. Power, cable selection, and channel selection are all controlled or monitored from the console. Typically, the control console would be placed on or near the video monitor.

VIDEO MONITOR

The video monitor is the output of the EntryLink system. The video monitor accepts the video and audio signals from the control console and displays the information gathered by the Entry Team. Any standard video monitor can be used with the EntryLink. Also, a videocassette recorder (VCR) may be used with the monitor to capture and record the video and audio from the EntryLink.

SYSTEM SETUP

ANTENNA PLACEMENT

Before erecting the antenna stand, examine the area between the intended antenna location and the Exclusion Zone where the Entry Team would operate.

Choose an antenna site that is free from obstacles that may block signal transmission. Trees, buildings and large vehicles could affect the picture quality by interfering with the radio signal. Always try for a clear line of sight between the EntryLink handheld camera and the antenna receiver. Choose an antenna site that is level and on firm ground. If the antenna is raised on unlevel ground, it may fall over. Also, soft ground may cause one or more of the legs to sink, which could cause the stand to fall. Place the antenna stand far enough away from objects so that if the stand should fall over it would not strike any objects. Maintain a clear area of no less than 18 feet around the stand.

THE ANTENNA STAND

To set up the antenna stand, expand the three support legs completely. The support legs should cover an area of approximately five feet square. The three lower folding leg braces should be parallel to the ground with the sliding collar locked to the bottom of the telescoping mast. This will assure that the stand will have sufficient stability to reduce the chance of the stand tipping over once the antenna is installed and the stand is raised to the maximum height. Do not raise the stand until the antenna is installed and the stand is positioned for use.

ANTENNA RECEIVER MODULE

Place the antenna receiver module onto the top of the stand. Tighten the locking bolt to securely hold the antenna housing into the stand socket. Locate the 50' extension cable and connect this to the 16-pin connector at the base of the antenna receiver module. Once the cable is connected, verify the antenna stand position and turn the antenna housing's ridge to face the Exclusion Zone. The antenna has a reception field of 60 degrees and the antenna should be aimed to place the work area at the center of the antenna's reception field. After verifying that the antenna stand is level and on firm ground, raise the stand to the maximum height by extending the tube sections one at a time. Each section must be firmly locked using the hand lock to prevent the stand from collapsing. If the stand is raised during windy conditions, staking or weighting the legs with sandbags may be necessary to prevent the stand from tipping over.

Raise the stand to its full height if possible and place the antenna stand where it will have an unobstructed view of the entry work area. Place the antenna as high as possible and as close as possible for the best reception. Receiver antenna placement is the single most important variable in maintaining a quality picture. Always attempt to maintain clear line of sight between the Entry Team and the receiver antenna. In most cases the system will continue to function if the antenna height is lower or the antenna does not have a clear line of sight; however, picture break-up may occur more often and transmission range may be less. The antenna stand and receiver are designed to be mobile and can be moved to improve reception if necessary. The optional antenna extension cable reel increases the flexibility of the system by allowing the antenna to be placed up to 500 feet from the console.

CONTROL CONSOLE

Connect the antenna extension cable to the rear of the control console. Place the control console on or near the video monitor and connect the video and audio output cables from the EntryLink control console to the video and audio input connectors on the video monitor. Note that there are three available A/V outputs on the console. This allows connecting up to three video devices at one time. For example, a second video monitor and a video cassette recorder could all be used simultaneously. Plug the power supply for the control console into a 110 AC source and connect the power output to the control console. Also, verify that the video monitor is connected to the power supply and turned on and set to the appropriate input setting. The console requires a 12 VDC power source to operate and if desired could be powered directly from a vehicle or battery. Contact Search Systems, Inc. for assistance with alternate power supplies. Before operating, the channel and cable length should be selected. Information on these functions is addressed in the System Operation section of this manual.

ENTRYLINK HANDHELD CAMERA

The battery should be charged before using the EntryLink camera. Once the battery is charged, remove the battery charger connector and replace the charger port cover. Always make sure the charger port cover is installed prior to using the EntryLink camera in a hazardous environment.

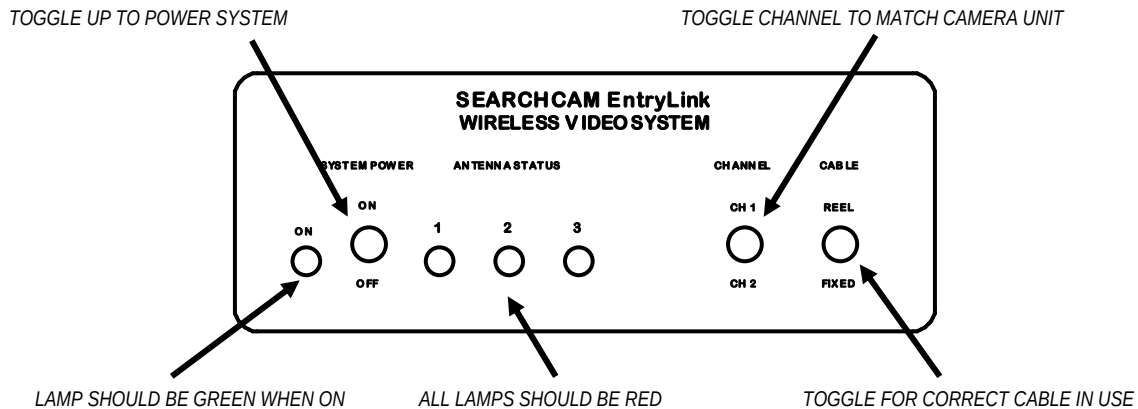
The EntryLink is now operational; however, several sub-functions can be adjusted using the Field Setup mode of the system. This mode will allow local calibration of the compass, channel selection and audio muting. Access to the Field Setup mode is described in the System Operation section of this manual.

SYSTEM OPERATION

The EntryLink camera unit and the receiver control console must be activated and functioning properly in order to operate the system as it is designed.

RECEIVER CONTROL CONSOLE

The following is a description of the control console switch settings and indicators.



RECEIVER CONTROL CONSOLE OPERATION

- SYSTEM POWER** The power switch is the main power switch for the receiver system. This switch controls the power supply for both the antenna receiver module and the control console. The green LED lamp indicates system power is operating.
- ANTENNA STATUS** The three red LED lamps on the control panel indicate normal operation and all three lamps should light. If the lamps flash, check the cable connection between the console and the antenna.
- CHANNEL SELECT** The system has two channels available. The same channel must be selected on both the display transmitter and the receiver console.
- CABLE SELECT** The cable select switch controls the cable compensation system in the control console. This automatically adjusts the system to operate with either the fixed 50-foot antenna cable or the optional 500-foot antenna cable reel. The switch enables the system to maintain the best picture quality regardless of which antenna cable is used.

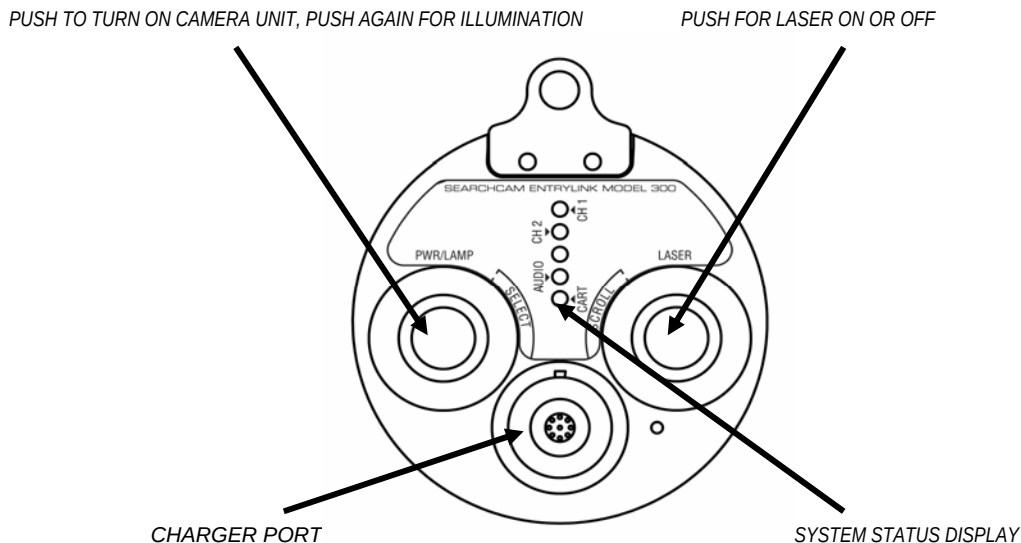
To operate the EntryLink receiver system, turn the **POWER** switch on the antenna control console to the **ON** position. The green LED lamp will now be illuminated. Set the **CABLE SELECT** switch to the proper setting. Set the **CHANNEL SELECT** switch to the same channel as the EntryLink Camera unit. The channel selection must always match between the transmitter and the receiver. The **ANTENNA STATUS** lights should illuminate to indicate that the antenna is operating correctly. If the antenna status lights flash in unison, there is a problem with the connection between the control console and the antenna. The control console is now ready for operation. Verify that the video monitor is powered on and is set to receive video and audio from the control console.

ENTRYLINK CAMERA

The EntryLink remote camera is controlled by two push button switches. The switches are located at the rear of the system.

To power up the system, press the button on the left, label **PWR/LAMP**. The appropriate channel lamp and the audio lamp should illuminate. The status lamps indicate channel selection, audio status and proper function of the remote cable cart option. To access and/or change these functions, please refer to the Field Setup instructions. To turn the laser pointer on and off, press the right button labeled **LASER**.

To turn the illumination on, push the left button labeled **PWR/LAMP**. The illumination array will come on at 100% output. Pressing the **PWR/LAMP** again will lower illumination output by 25% each time the button is push until the lamp shuts off. Press and hold the **PWR/LAMP** button for five seconds to turn the system off.



ENTRYLINK CAMERA UNIT OPERATION

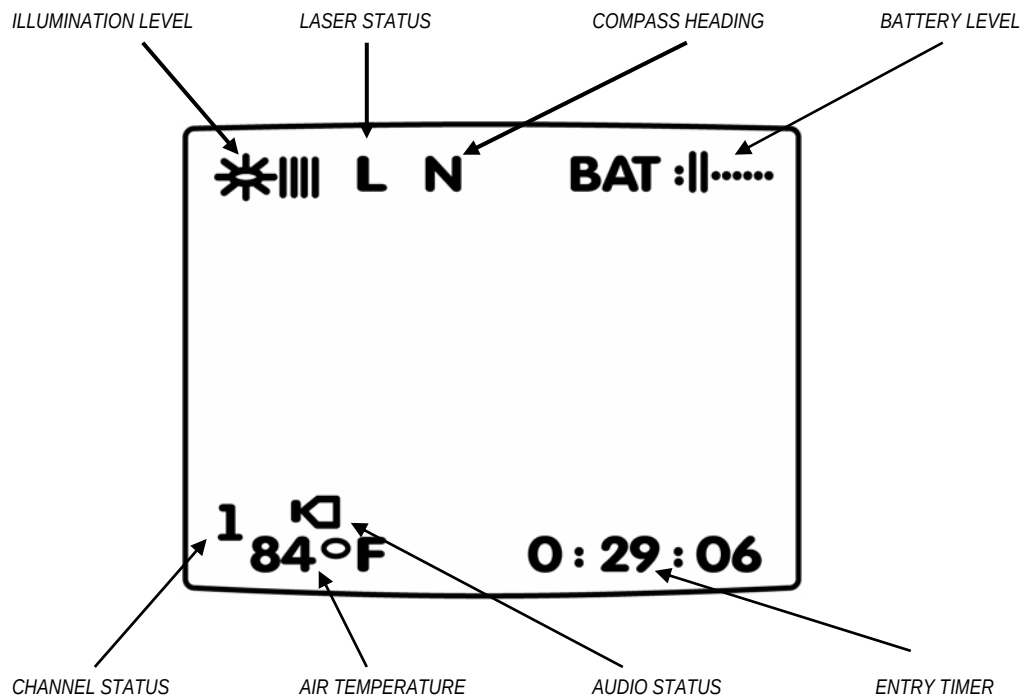
Operation of the camera, once it is activated, is simply a matter of pointing it at the desired target. Some picture break-up will occur as the camera is moved, particularly when walking. Always try to move the camera slowly when panning. This reduces break-up and gives the viewers on the other end time to react to the image. Also, keep the camera level and away from the body. This reduces the signal attenuation caused by the body and signal drop caused by antenna position. Also, the electronic compass module is sensitive to out of level conditions and will not read correctly when out of level by more than 15 degrees for more than a few seconds.

A lanyard strap is provided with the camera to allow slinging the camera when it is not needed or both hands are required. The bottom of the camera grip is

drilled and tapped to fit onto a standard camera tripod, which will allow the camera to be set up for long term monitoring.

ON SCREEN DISPLAY INFORMATION

The following system information is displayed on the video screen during system operation.



ONSCREEN GRAPHICS

ILLUMINATION LEVEL:	Illumination level is displayed by four bars. Each bar represents 25% of the output level. The icon will disappear when the illumination is off.
LASER STATUS:	When the laser is on, the "L" icon is displayed. When the laser is off, the icon will disappear.
COMPASS HEADING:	The direction the camera is pointing is displayed in the eight cardinal points. (N,NE,E,SE,S,SW,W,NW) The compass can be calibrated for local magnetic declination through the Field Setup mode. Some metal objects can affect the compass reading.
BATTERY LEVEL:	The battery level is displayed by eight bars. The battery level indicator will begin flashing when approximately 45 minutes of battery time is left. The unit will automatically shut down when all the bars disappear. Always recharge the battery immediately after use and do not store the unit with a discharged battery.
CHANNEL STATUS:	A "1" or a "2" will be displayed depending on which channel is selected on the hand-held camera unit. It is important to remember that this display is for the hand-held camera unit only. Channel selection for the control console is displayed and selected by the toggle switch position. Channel selection for the camera unit is changed through the Field Setup mode.

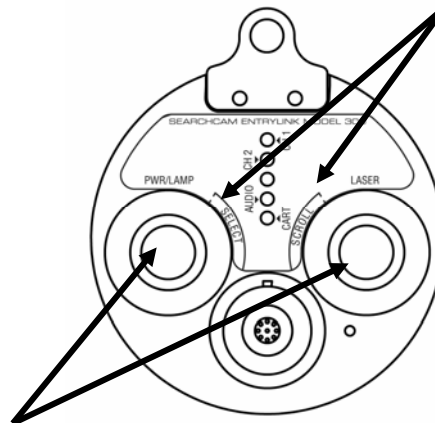
AIR TEMPERATURE:	Ambient air temperature, measured at the base of the hand-held camera unit's antenna housing, is displayed. This is not instantaneous measurement and should be used to show general trend in the air temperature only. The sensor can be affected by direct sunlight and will show higher readings when exposed to direct sunlight. The unit of measurement, Celsius or Fahrenheit, can be selected through the Field Setup mode.
AUDIO STATUS:	The audio system can be turned off (muted) through the Field Setup mode. When the audio system is off, an "X" will appear through the icon.
ENTRY TIMER:	The timer tracks the length of time the camera unit has been turned on in hours, minutes and seconds. The timer is reset when the unit is turned off.

FIELD SETUP MODE

The Field Setup mode enables selection of the transmission channel, audio mute function and compass calibration. The system is set at the factory to channel one with the audio on. The compass is calibrated at the factory. However, since the factory is located in California and the compass measures true magnetic North, the compass could be off by as much as 15 degrees from map north. The compass calibration allows the adjustment for magnetic declination.

To enter Field Setup mode, place the EntryLink handheld unit in a location where the screen of the video monitor can be viewed. If the compass will be calibrated, position the handheld unit at least 10 feet away from metal objects. Large metal objects, like a vehicle, will affect the magnetic reading of the compass. Turn the handheld unit, the receiver console and the video monitor on. Hold the EntryLink camera by the pistol grip and press the **LASER** and then the **PWR/LAMP** buttons together until the Field Setup screen is displayed on the video monitor.

BUTTONS ARE ALTERNATELY LABELED TO GUIDE IN FIELD SETUP



PRESS AND HOLD BUTTONS TOGETHER TO ENTER FIELD SETUP MODE

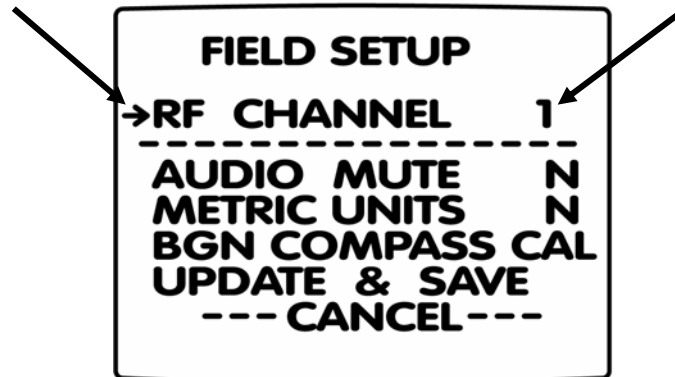
PUSH BUTTON SEQUENCE FOR FIELD SETUP MODE

Once the Field Setup screen is displayed, use the **LASER** button to scroll the arrow through the selection choices and the **PWR/LAMP** button to change the selection. The selection will change on the video screen, but the change will not

be made in the camera unit until the UPDATE&SAVE line is selected. To exit Field Setup mode, scroll to UPDATE & SAVE or --- CANCEL --- and press **PWR/LAMP**.

PRESS SCROLL BUTTON TO MOVE ARROW TO NEXT LINE

PRESS SELECT BUTTON TO CHANGE SELECTION



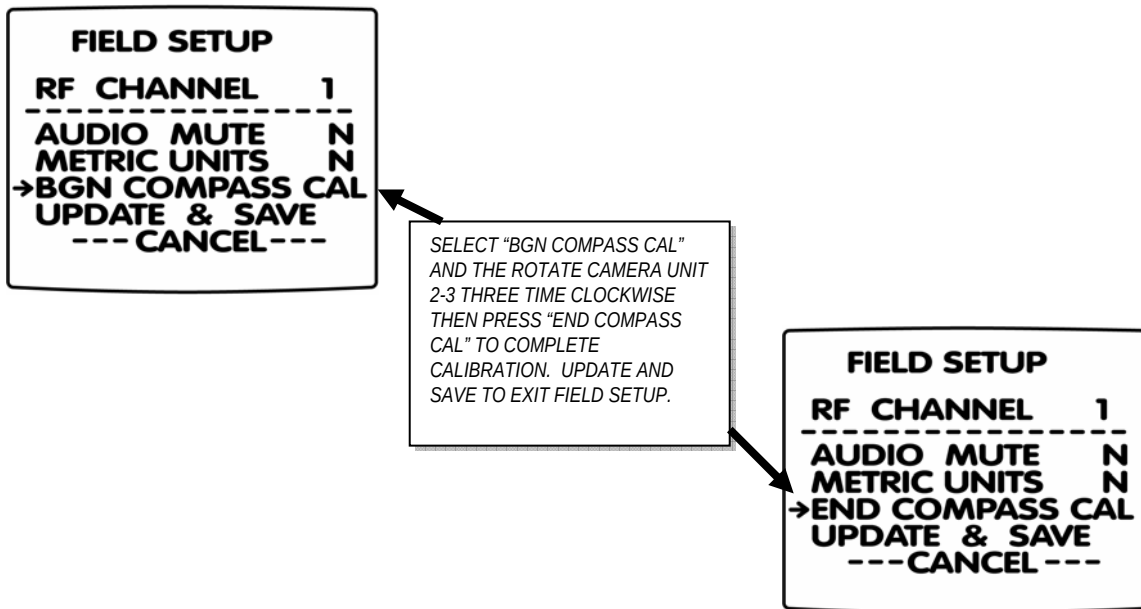
FIELD SETUP SCREEN

RF CHANNEL:	Select channel "1" or "2"
AUDIO MUTE:	Turns audio transmission on or off. An "N" indicates audio is not muted, "Y" indicates that the audio is muted or turned off.
METRIC UNITS:	Changes air temperature sensor display units to Celsius or Fahrenheit. The "N" indicates Fahrenheit and the "Y" indicates Celsius.
BGN COMPASS CAL:	Starts compass calibration function. (See the following section)
UPDATE & SAVE:	Applies changes and exits from Field Setup mode.
--- CANCEL --- :	Exits from Field Setup mode without changes.

COMPASS CALIBRATION

The compass calibration allows for updating the compass to local conditions. Generally this means adjusting for magnetic declination. However, if there are large iron ore deposits or large metal objects in the area and that effect compass operation, calibration may compensate for the deviations.

To calibrate the compass, enter the Field Setup mode and scroll to the line labeled "BGN COMPASS CAL" . Standing on level ground and away from metal objects, press the **PWR/LAMP** button to start the calibration. The line will change to "END COMPASS CAL" to indicate entering the calibration mode. Hold the EntryLink camera unit as level as possible and slowly rotate the camera 360 degrees clockwise. Make two or three complete revolutions and then press the **PWR/LAMP** button to end calibration. Scroll to the "UPDATE & SAVE" line and press the **PWR/LAMP** button to select, save, and exit the calibration. Test the system to make sure the compass points appear on the screen and the heading is correct. If any points are missing or show incorrect heading, repeat the calibration of the compass. Take care to keep the EntryLink camera level during the calibration revolutions and be mindful of any metal objects in the local area, as both will effect the calibration.



COMPASS CALIBRATION SEQUENCE

MAINTENANCE

DECONTAMINATION

Equipment decontamination is an essential part of hazardous materials response operation and the EntryLink is designed to withstand wet decon. Always make sure that the o-ring on the charger port sealing cap is intact and that the cap is

installed prior to wet decon. Wash the EntryLink with a mixture of Dawn® dish soap and warm water and then rinse with clear water. Do not use water warmer than 120 degrees F and do not immerse the EntryLink camera housing deeper than 12 inches. Do not pressure wash or steam clean the EntryLink camera. Cleaning solvents may be used on the metal portions of the housing to remove thick oily contaminants. Use only Isopropyl alcohol or 409® cleaner on the plastic housing of the antenna.

Towel dry the housing and then use low-pressure compressed air (30 psi) to remove moisture around the illumination LEDs and the microphone screen. Use a cotton swab dipped in glass cleaner to clean the camera and laser windows. Do not seal the EntryLink components in their storage cases until they are completely dry.

The microphone is designed to withstand exposure to water. However, it will not function when it is wet. Always thoroughly dry the microphone after it is exposed to moisture.

BATTERY RECHARGING

Warning: Never attempt to charge the EntryLink battery pack in a hazardous atmosphere, as an explosion may result.

To recharge the battery, remove the charger port sealing cap located on the back end of the hand-held unit and plug the charger into the 8-pin port. Always reinstall the cap before using the camera to protect the connector from debris.

Recharging the battery will take a maximum of 5 hours and is indicated by the Red LED on the charger changing to Green. The charger is designed to recharge the battery in three modes. The first is the fast charge mode. This is indicated by a Red LED and will last about 1 ½ hours. This is followed by the topping mode, which is indicated by the LED flashing between Red and Green. The final mode is the maintenance mode and this is indicated by a solid Green LED. The camera unit should be left on the charger with the charger connected to power when it is not in use. The battery charger is specifically designed to continuously monitor and maintain the EntryLink battery. This will maintain the battery at a full charge, assuring the system is ready for immediate use.

The EntryLink will self-discharge if it is not left connected to the battery charger. The battery will be damaged if it is fully discharged. If the system cannot be left on the charger all the time, the battery should be recharged at least every 30 days. Always recharge the battery as soon as possible after each use. Under no circumstances should the system be stored with a discharged battery. The EntryLink always draws a slight amount of current when shut off. If the system is stored with a discharged battery, there will not be sufficient battery capacity to prevent the battery from being fully discharged and the battery will be damaged. Damage can occur within a few days if the unit is stored with a discharged battery.

Battery life is approximately 4.5 hours with the illumination off and 3 hours with the illumination on maximum.

CUSTOMER SERVICE

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