HALO

INFANT PROTECTION SYSTEM

Installation and Operations Manual

March 2000

Revision 2.0

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1. Limited Warranty

1. **Warranty:** Subject to the limiting conditions set forth below, EXI Wireless Systems Inc. ("EXI") hereby warrants that: (a) each product, other than transponders (the "Transponders"), accompanying this warranty (the "Product"), will be free of defects in materials and workmanship for a period (the "Product Warranty Period") of two years after the date of the original sale by EXI of the Product; and (b) each Transponder accompanying this warranty will be free of defects and workmanship for a period (the "Transponder Warranty Period") of, in the case of a WTX-INF/WS Transponder, four years, and in the case of all other Transponders, three years, after the date of the original sale by EXI of the Transponder.

2. **Notification:** If the original or any subsequent purchaser (collectively, the "Purchaser") of the Product or Transponder, as the case may be, discovers a defect in materials or workmanship of a Product within the Product Warranty Period, or a Transponder within the applicable Transponder Warranty Period, the Purchaser must, within 30 days after the date of such discovery, notify EXI of such defect, and at EXI's request, return the defective Product or Transponder, as case the may be, to EXI.

3. **Repair or Replacement:** Subject to §4, upon acceptance by EXI of responsibility for the defect, EXI will, in its sole discretion, (a) in the case of a Product, either replace the Product, or provide the Purchaser with replacement parts for, or repair, the same; and (b) in the case of a Transponder, replace the Transponder at a discounted price equal to the product of: (i) the nearest whole number of months remaining in the applicable Transponder Warranty Period; and (ii) the amount of the then monthly credit available from EXI for the applicable Transponder. EXI's warranty in respect of any replacement Product, part thereof, or Transponder, as the case may be, will be for the unexpired portion of the original warranty period applicable to the relevant Product or Transponder.

4. **Exclusion:** The warranty referred to in §1 is the sole warranty made by EXI with respect to its Products and Transponders. EXI makes no other warranty or representation, express or implied, and hereby disclaims any implied warranty of merchantability or fitness for a particular purpose, statutory or otherwise, concerning its Products and Transponders. In addition, the warranty will not apply if EXI has not received a fully completed warranty registration card in respect of the Product or Transponder, as the case may be, within 30 days after the date of the original purchase from EXI of the same, or the Product or Transponder, as the case may be, or any part thereof: (a) is damaged by misuse, accident, negligence, lightning, power surge, brown-out, or leaking, damaged or inoperative batteries, or failure to maintain the Product or Transponder as specified or required by EXI; (b) is damaged by modifications, alterations or attachments thereto which are not authorized by EXI; (c) is installed, operated or repaired contrary to the instructions of EXI; (d) is opened, modified or disassembled in any way without EXI's consent; or (d) is used in combination with items, articles or materials not authorized by EXI.

5. **Limitation:** EXI will only be liable to the Purchaser for direct damages suffered by the Purchaser up to a maximum amount equal to the total amount of the purchase price actually paid by the Purchaser to EXI for the Product or Transponder, as the case may be. Specifically, EXI will not be liable for: (a) any special, indirect or consequential damage, including lost profits, lost revenues, failure to realize expected savings, or other commercial or economic losses of any kind, even if EXI has been advised of the possibility of such damage; (b) any loss or damage to any property or for any personal injury or economic loss or damage caused by the connection of the Product or Transponder, as applicable, to other devices or systems; (c) any damage or injury arising from or as a result of, misuse, abuse or incorrect installation, integration or operation of the Product or Transponder, as applicable, by persons not authorized by EXI; or (d) any defect in any batteries added to or used in conjunction with the Product or Transponder.

6. **Product Limitation:** The Purchaser (a) acknowledges that (i) the Products and the Transponders are not, nor can they be, guaranteed to prevent wandering patients, infant abductions, theft or any other event for which they were purchased, (ii) the Products and Transponders are only intended to provide additional safeguards to assist in the prevention of events such as those described in §(i), and (b) understands fully the foregoing limitations concerning the Products and Transponders, including EXI's limitation on liability described in §5, and agrees to warn, and obtain acknowledgements from, all users thereof of the same.

7. **No Additional Warranties:** The terms and conditions herein contain all the warranties and representations concerning EXI's Products and Transponders and supersede all previous negotiations, understandings, communications, representations, warranties and agreements, whether verbal or written, concerning the Products and Transponders.

8. **Deemed Acceptance:** The installation or use of the Product or Transponder by or at the direction of the Purchaser will be deemed as an acceptance by the Purchaser of the terms hereof.

9. **Governing Law:** The warranty herein will be governed by the domestic laws of the Province of British Columbia, Canada and the Purchaser hereby attorns to the exclusive jurisdiction of the laws of British Columbia. The provisions of the United Nations Convention on Contracts for the International Sale of Goods is hereby excluded.

2. Record of Changes

October 1999	Combined HALO Installation & Operating Manual and Elevator Manual.
March 2000	Added Cabling types and Threshold / RX Sensitivity Switch Adjust.

3. FCC Regulations

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.

This equipment has been tested and found to comply with the limits for 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 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

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

EXI Wireless Systems	Model No.: Patient Tag
CANADA: 287710217261A	FCC ID: HE7 PTG

***** This device complies with Part 15 of the FCC Rules. Operation is subject to the following two rules: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Made in Canada

EXI Wireless Systems	Model No.: Halo Infant/ECO tag
CANADA: TBD	FCC ID: HE7 ETG

***** This device complies with Part 15 of the FCC Rules. Operation is subject to the following two rules: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Made in Canada

EXI Wireless Systems	Model No.: Halo Asset tag
CANADA: TBD	FCC ID: HE7 ATG

***** This device complies with Part 15 of the FCC Rules. Operation is subject to the following two rules: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Made in Canada

4. INTRODUCTION

This manual serves as a guide for Installers of the HALO system. The major components of the system are described, as well as the system's intended functionality, so as to gain familiarity with its operation prior to installation. In order to successfully install and commission the system, it is absolutely critical to understand the capabilities of the system and its components prior to installation.

4.1. About Halo Infant Protection System

Halo is a premium infant protection system. Halo works in conjunction with the EXI P-tag patient transponder that is capable of sensing if it has been removed from the infant. Halo is an electronic system, which, in conjunction with staff diligence, creates a secure perimeter to deter infant abductions.

The function of the HALO system is to monitor areas within a building for the presence of HALO Tags. A Tag is sensed when it either enters an RF Field that is set up using the EXI HALO Controller (referred to as a Tag in Field or TIF), or when the Tag initiates an alarm signal (referred to as Tag Initiated Communications, or TIC).

HALO is designed to assist staff in providing a higher degree of safety for patients. **It is not intended as the sole means of protection in preventing a wanderer or infant from leaving the premises.** Regular checks to verify that your HALO system is operational is highly recommended.

SYSTEM MAINTENANCE SHOULD INCLUDE THE FOLLOWING STEPS:

All Tags should be checked for physical damage after each cleaning, disinfecting or sterilization procedure.

Each Tag should be tested for correct operation before being attached to an infant. The HALO software prompts for testing of Tags prior to their deployment. Please refer to the appropriate section in this manual for the instructions.

The warranty on Tags is 3 years, and the batteries within the Tags are expected to last in excess of the warranty period depending on the usage pattern. Do not leave Tags in the detection field for long periods of time, and store them in the foil bags supplied. Failure to do so will result in false alarms, and will reduce battery life.

Set up a regular system check schedule to verify that the Controllers, Receivers and Tags are operational. Controllers should have the "Ready" light illuminated to show that they are powered. Check the operation of the Controller daily by starting a bypass or triggering an alarm using a Tag to ensure that it is fully operational and protecting the egress point where it is located.

Check each Receiver on a regular basis to ensure that it can receive signals from Tags in the "Off Body" condition. Failure to regularly check for this operation may lead to failure to detect a Tag that is removed from an infant, and therefore compromising protection for the infant.

Whenever you see an infant who is a patient, look for the Tag on this infant to verify that it is still securely attached. This may require special knowledge as to the placement of the Tag.

Conduct frequent back-ups of Activity Logs for future reference.

4.2. System Components

This section describes the various system components required to complete the installation of the HALO system.

4.2.1. Door Control Package (Networked) – SR2C01N

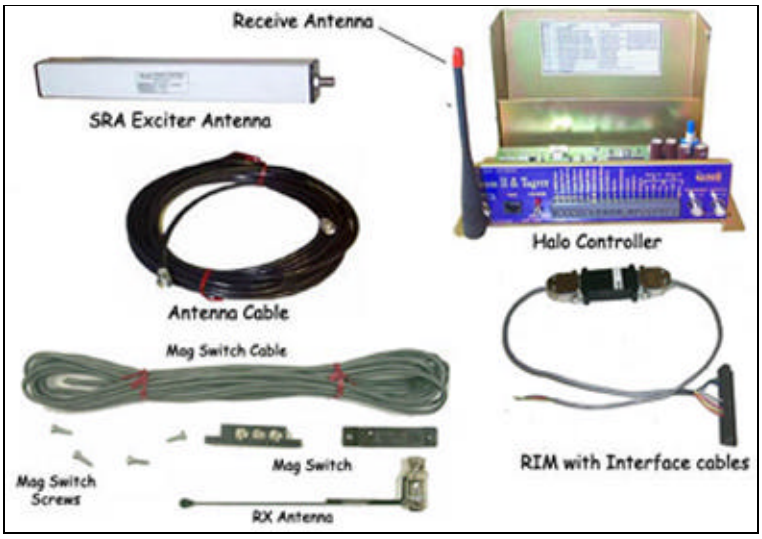


Figure 1 - Halo Controller Package

4.2.2. Elevator Package (Networked) – SR2L01N

Figure 2 - HALO Elevator Controller Package

4.2.3. HALO Receiver Package (Networked) - SR2R01N

Figure 3 - HALO Receiver Package

4.2.4. Power Supply

Individual power supply adapters Model # AR2PS01-024 may be used for each of the Door Control Packages and the Receivers. Alternatively, a Central Power Supply Model # AGECP01-624 has 6 independent inputs, each of which can power one Controller or two Receivers. The CPS may be purchased with a battery back-up option, which is highly recommended.

Figure 4 – Power Supply choices

4.2.5. HALO Console

Figure 5 - HALO Computer Package

5. Installation

5.1. Overview to Installing the HALO System

EXI HALO is designed to provide extended periods of reliable service. Once installed correctly, the system does not require tuning or adjustments, and it should provide exemplary service unless the position of its components is subsequently disturbed, the physical environment is altered as in a renovation, or a very strong noise source is introduced into the environment.

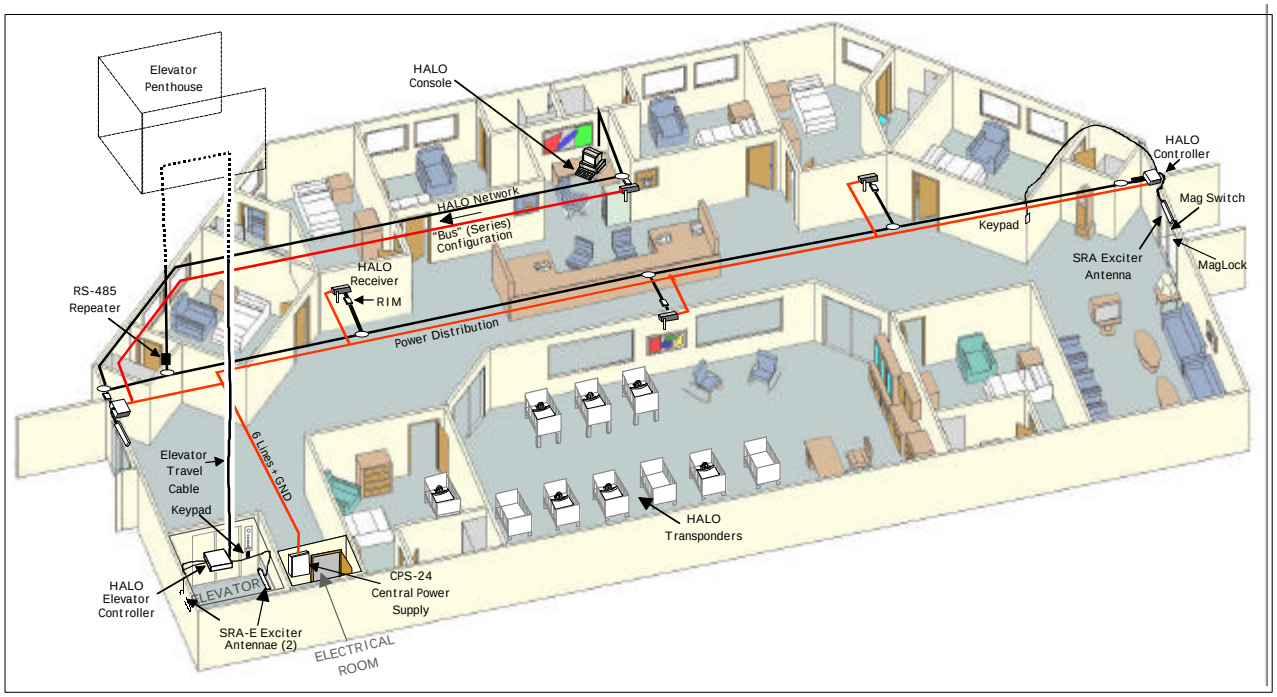


Figure 6 – Typical HALO System Installation

5.2. SYSTEM WIRING

The HALO network is based on the RS-485 electrical interface standard, which is 2-wire multi-node bus. The EXI HALO elements are designed such that many more than the RS-485 limit of 32 Drivers and 32 Receivers can be co-exist on the same network. The baud rate used in the HALO system is 57,600 bps, and therefore in order to avoid data corruption it is important to ensure that a clean signal is always present. Using the right type of cable, network topology, and not exceeding total cable length are critical factors in ensuring that the system will operate reliably.

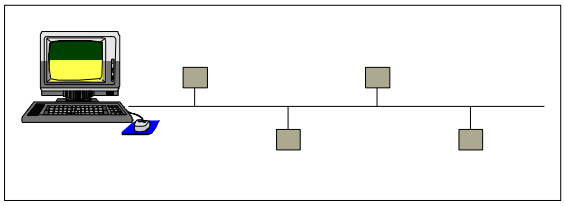


Figure 7 - "Bus" Topology

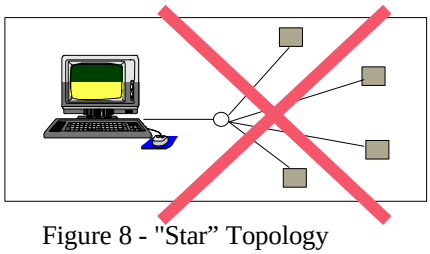


Figure 8 - "Star" Topology

Cable capacitance is a large factor in determining the quality of the signal on the network, and EXI recommends that cables with capacitance of greater than **15 pf** per foot should be avoided. The network should be constructed using a "multi-drop bus" type topology, avoiding any "star" type configuration. The system is designed to operate with up to 4,000 ft of cable with the recommended topology and cable. The total cable length varies depending upon the cable capacitance and nominal impedance, topology, and number of devices on the network. If the estimated total cable length is greater than 4,000 ft, a RS-485 Repeater will be required to ensure that the system works reliably, or works at all. It is also recommended that a Repeater be used to isolate HALO Elevator Controllers from the main system to minimize noise pick-up and loading of the system. Cables used in Elevator shafts should be stranded and not solid, and should be resilient enough to withstand the continuous flexing that it will experience for many years in the elevator shaft.

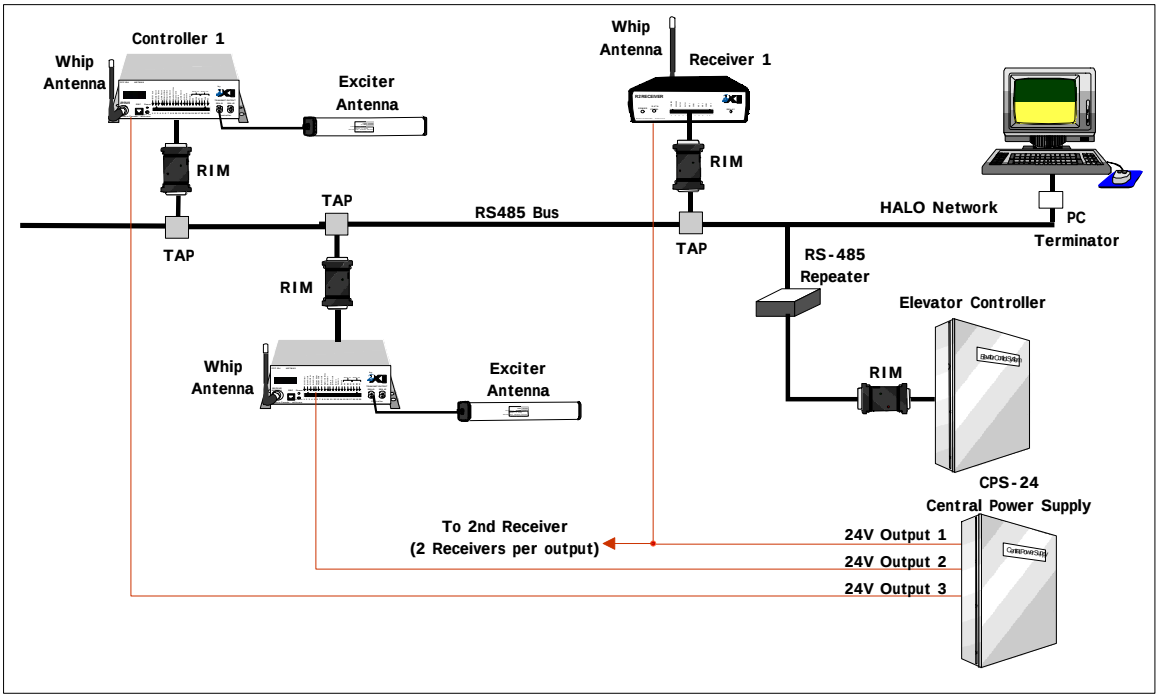


Figure 9 - Typical HALO Configuration

5.2.1. Cabling Type

Power Cable	2-conductor, 18-gauge, shielded or unshielded.
RS485 Network Cable	2-pair, unshielded twisted pair, 24-gauge, maximum capacitance 15pF per feet.
Ethernet Network Cable	10 Base –T cabling CAT 5 – 4-pair, unshielded twisted pair.
Elevator Travel Cable	3-conductor, shielded, stranded, low capacitance travel cable.

5.3. SYSTEM CONNECTION

The figure below shows the details of connecting the various system components together for the HALO system.

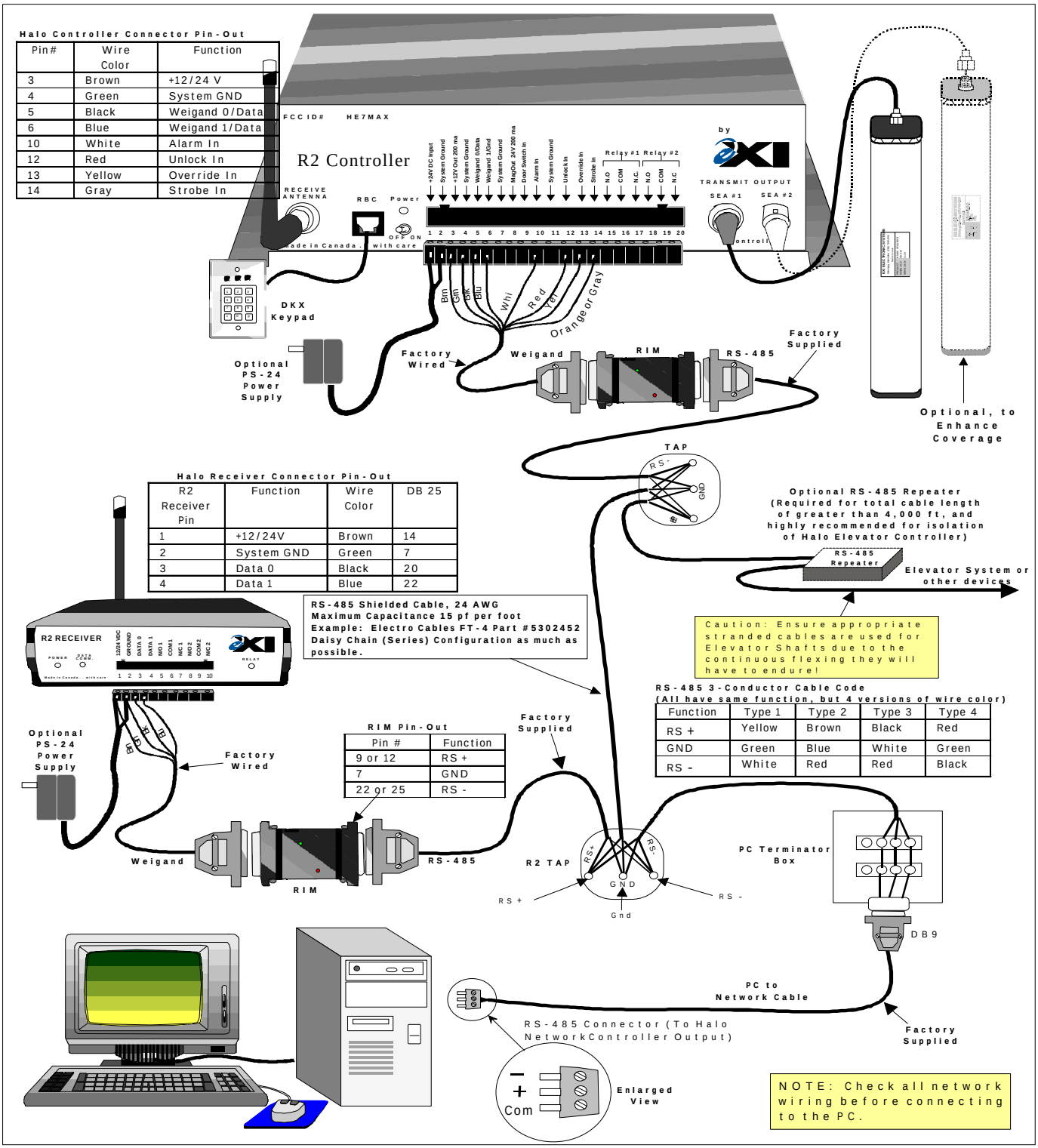


Figure 10 - Detailed System Diagram

5.4. DOOR CONTROL

The controller chassis may be horizontally or vertically mounted, on a wall, ceiling or shelf and should be mounted so that the front face panel is easily accessible. Since it is preferable to leave the RX antenna attached directly to the controller, the exact location of the controller will affect the reception of the tags and should only be finalized after setting up the field. The RX antenna should be positioned on a vertical plane for maximum performance.

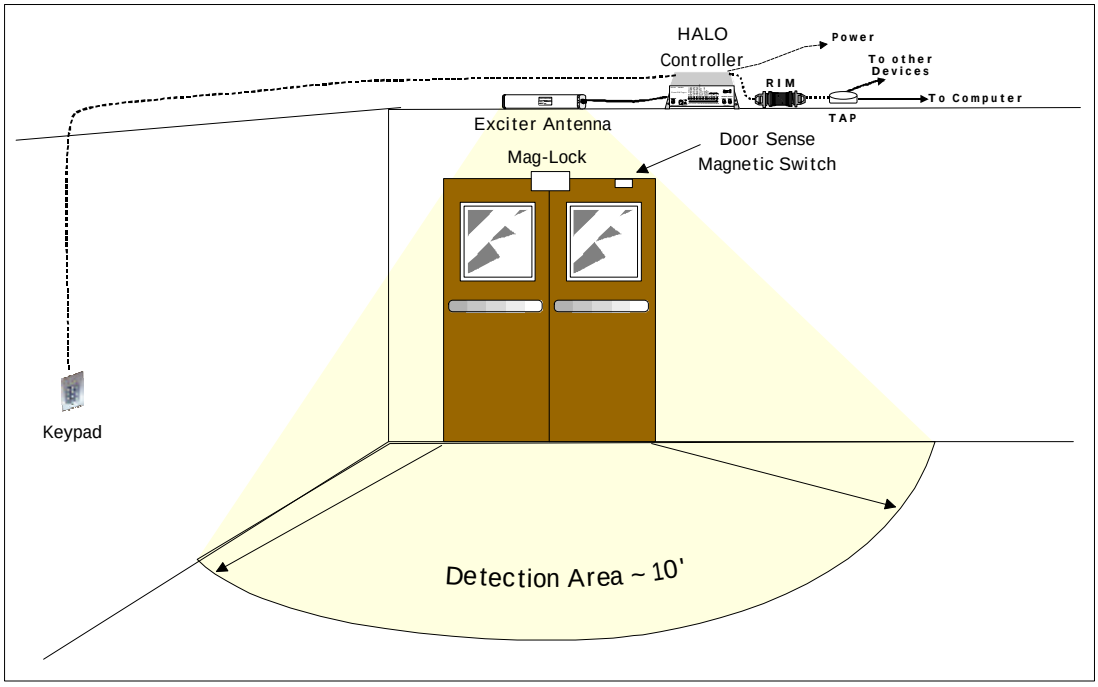


Figure 11 – Door Coverage

- Mount the Keypad about 10’ away from door so that it can be used before entering the detection field.
- Maglock release should be hooked up to an unused auxiliary normally open contact from Fire Alarm Panel.

5.5. LOCATION FOR SRA EXCITER ANTENNAS

One of the most important aspect of the entire installation is the correct positioning of the SRA Exciter Antenna. The Antenna may be installed:

- above the doorway, laid flat on the dropped ceiling tile.
- dropped inside a wall cavity 4’ above the floor.
- on the side wall along the hallway 4’ above the floor.

Each field needs to be fully tested to ensure adequate coverage of the protected area.

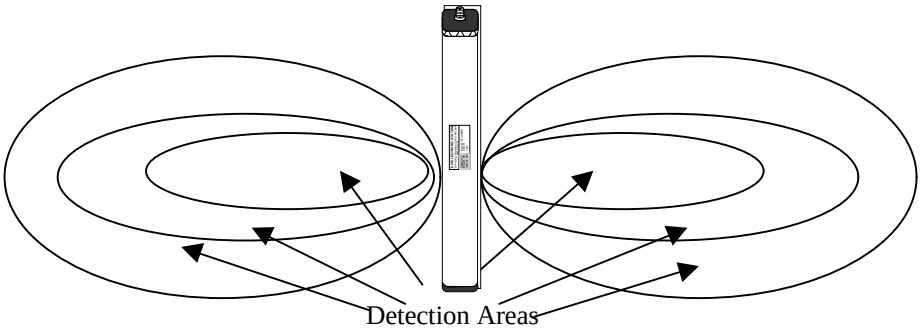


Figure 12 - SRA Antenna Exciter Field

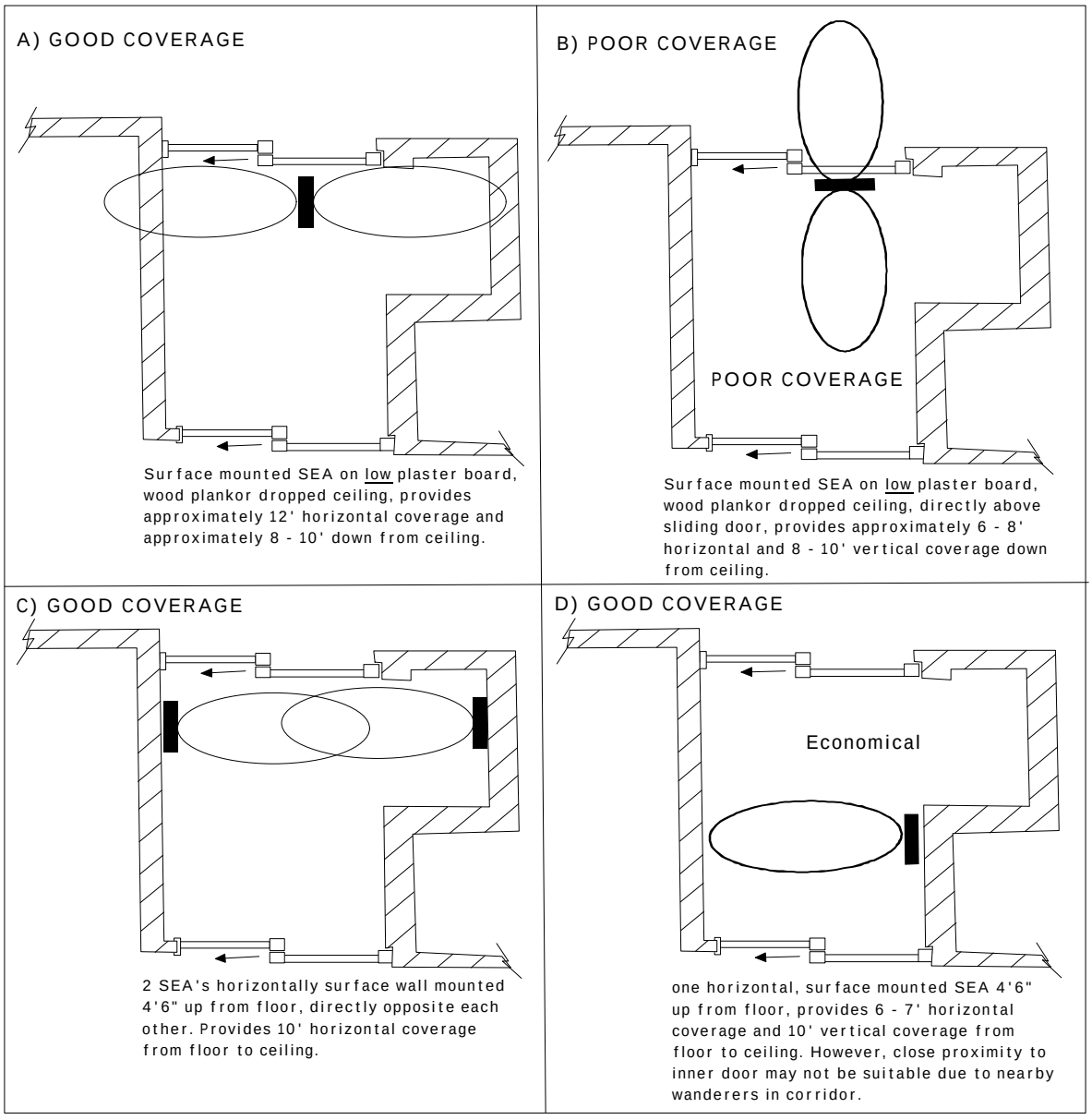


Figure 13 - SRA Antenna Installation and Coverage

Take note of the following:

- Ensure that no tag can reach the protected area without passing through a field.
- The field should not extend into other rooms or areas that are regularly occupied by tags. These tags could keep a controller in a pre-alarm state preventing the door from opening if magnetic door locks are being used.
- The tag should be detected at least 4 feet from the door in order to give the magnetic door lock time to energize.
- Proximity to other fields could also be a factor. If a Tag is able to receive communication from 2 different controllers in the case of field overlap, it will try to respond to both controllers. Each controller will see Tag communication when it doesn't expect it and report it as noise, thereby inhibiting any alarms..
- The antenna should be located be at least 18" away from metal objects, cables, air ducts etc. in order to be able to create a uniform field with minimal loss of RF power.

Ceiling height, door approach width and metal in the vicinity, need to be considered when planning the location for the exciter antennae. The field should extend to the floor and cover the entire exit way. A dropped ceiling consisting of a grid and non-foil backed ceiling tile are the easiest construction materials to work with. Check above the lay-in tile to see how much space you have and the proximity of metal objects such as pipes, cables and air plenums. The SRA may also be dropped inside a wall cavity. Sometimes it's simpler to mount the SRA on the side of a wall above the door or along the hallway about 5 feet from the floor.

Extensive metal close to the Exciter can distort the field in unpredictable ways. Metallic objects will absorb and/or reflect radiated energy, which affects the field. This phenomenon can increase or decrease the field strength in areas causing hot spots or holes in your field. It can even change the shape of the field with tag detection sometimes occurring as much as 35 ft away. At times this effect can be used to advantage but the desired result can only be determined experimentally.

Although it is not possible to completely predict the performance of the field for every situation, some information about the field will help to shorten the process of determining the best location for the SRA. In the absence of any site irregularities, the field is symmetrical, perpendicular to the antenna length. A cross-section through the length of the antenna is roughly oval as shown below.

Note: The coax cable used is RG59U with a solid copper center conductor and shield. SEA exciters draw current therefore do not use ordinary RG59U cables to extend the length supplied as they used copper clad steel.

Although the field strength is adjustable, the maximum distance for good coverage is approximately 10 feet. Sometimes 2 exciters are necessary to get adequate coverage.

If it's not possible to create a proper field with the exciter inside, an SRA-E exciter antennae could be placed on an outside wall to limit the penetration of the field into the building.

Watch out for foil backed ceiling tile!

5.6. LOCATING THE RECEIVER ANTENNA

The "RX" Antenna should be mounted in a vertical plane. The "RX" Antenna is provided with a removable right angle fitting that facilitates the desired mounting position. The area to be protected has to be blanketed by controllers and receivers so that all critical areas have coverage. Elevator Interfaces cannot be included in the area calculations since the elevator is not always on the floor. Walls, equipment and excess metal could affect the pickup range. Although greater distances are possible, a maximum of 40'between devices is recommended.

It is essential that the RX antennas have no metal barriers blocking the signals from the Tags although some metal objects may enhance communication by reflecting the signal further than it would normally transmit. Wire glass sometimes found around nurseries can cut down the range. The only way to be sure of adequate coverage is by testing the results. After all devices are installed and operational, ensure that the entire area has coverage. Experience will shorten this process as the installer learns what site conditions cause problems.

5.7. FINALIZE CONTROLLER INSTALLATION

Fasten SRA exciter antenna. If installing the SRA above a ceiling tile, use a marker pen to draw an outline of the SRA in its desired position on the upper side of the tile. Once you are certain of the SRA location, use some adhesive or caulk to cement the SRA to the tile, preventing it from falling on the floor should the tile be lifted for any reason.

> RIMs have unique serial numbers that are associated with the Controller or Receiver location that they serve. **Ensure that the correct RIM is used at the location being entered on the floor plan in the computer!**

If the SRA is to be dropped inside a wall cavity, do not let it hang on the coax cable nor hang so low that it touches the bottom steel plate. Loop the coax cable and wrap a tie-wrap, or band of electrical tape around it as shown below. Ensure the SRA will hang at the correct height by marking the cable prior to dropping the SRA inside the wall. Secure the cable when the SRA is hanging in the correct position.

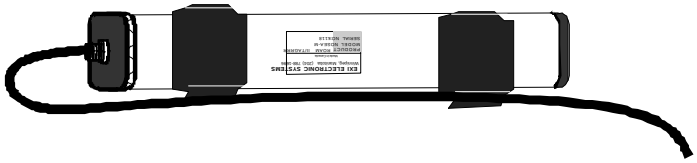


Figure 14 - Securing the Exciter Antenna Cable

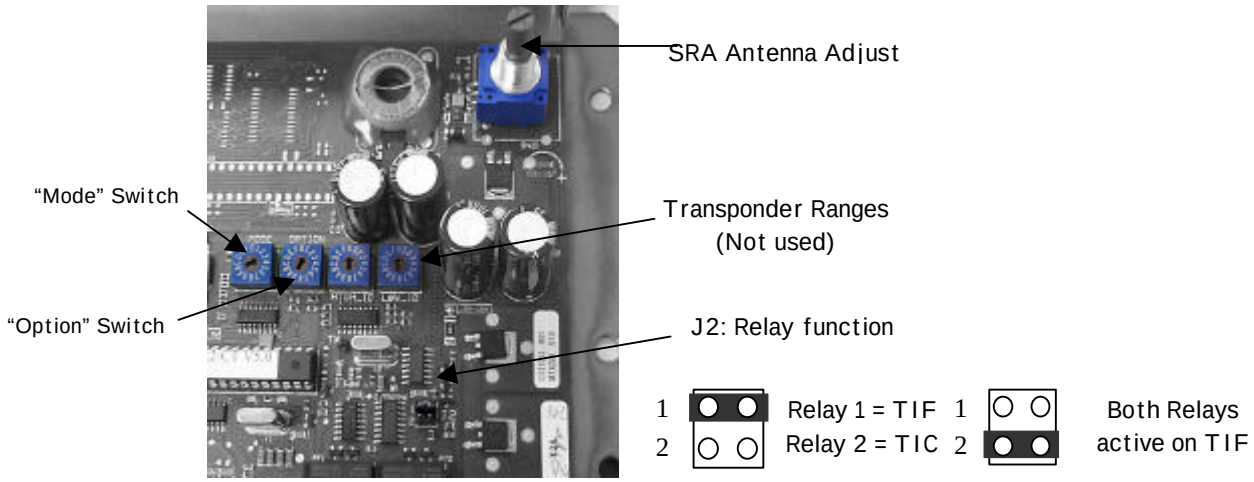
Mount the Controller permanently and position the RX antenna. Place the RIM close to the Controller and connect the three wires on the RS-485 side of the RIM to the RS-485 network. This may be done by using crimp type connectors, or by means of an EXI TAP box.

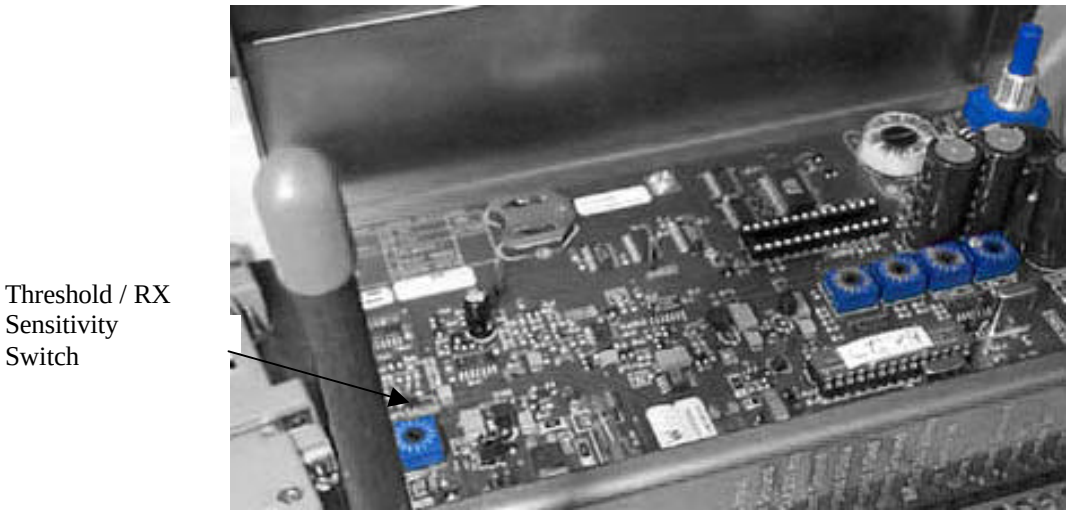
The Keypad is designed for flush wall mounting in a standard single-gang electrical box. Should surface mounting be necessary, an optional SMB box may be used. Should a louder local alarm be desired, either use a Wire-mold box extension and break out the knock out holes before mounting the panel, or install an external siren or other audible device.

Install door switch. Hook up Maglock and any peripheral devices. Make sure the Maglock will release in case of a Fire Alarm. Power up and test the field again.

Figure 15 - Maglock Installation

5.7.1.1. CONTROLLER CONFIGURATION SWITCHES





Figures 16 and 17 – Controller Switch Identification

5.7.1.2. MODE SWITCH SETTING

Mode Switch	*Controller Function*	*Response*
0	Test Mode	
3	Patient Monitoring with Keypad	Alarm ends on its own – fixed maximum bypass time
4	Patient Monitoring with Keypad	Continuous alarm - fixed maximum bypass time

5.7.1.3. OPTION SWITCH SETTING

Option Switch	Function	Patient Monitoring	Authorized Entry
0	Don't act on any Tags	No Tags are stopped	No Tags authorized
1	Act on all Tags	All Tags will be stopped	All Tags authorized

5.7.1.4. THRESHOLD / RX SENSITIVITY SWITCH

The Threshold switch may be adjusted to increase or reduce the sensitivity of the Receiver and therefore the range of detection of the Tag.

It is also used to remove some of the background noise as well as reduce interference from tags if the controller is having trouble detecting tags. The result in the adjustment raises the RF field strength threshold received from the tags in order to trigger the CPM into alarm (ie. from 25uV to 50uV) and reduces the detection field range.

'0' = MAX sensitivity & **'F'** = MIN sensitivity. The default setting is "2".

5.7.1.5. TEST CONTROLLER AND SET UP FIELDS

After reading **LOCATION FOR SRA EXCITER ANTENNAS**, choose a suitable location for the SRA. Setting up a field is a matter of experience gained by trial and error. The primary considerations here are the field shape and strength. The field has to fill the area in front of the door all the way to the floor so that no tag can reach the door without being detected.

To set up a field, start by placing the tag at the range you want for the field at the height a tag is usually going to be found. The tag needs to be detected far enough from the door to allow the magnetic door lock time to energize. The tag should be placed on a non-metallic surface for testing. You might want to do a preliminary field setup by holding the SRA at the approximate location you want to install it but be aware that your body could be affecting the field. The SRA should be temporarily placed and the field adjusted for range using this stationary tag. Since the Tag will be read easier in some orientations with respect to the SRA, it is also necessary to test with the Tag in a variety of positions.

With the SRA and tag in position use the SRA RANGE ADJUST control on the top right corner of the controller circuit board to set up your field strength. Turn the control shaft clockwise for maximum field range and counter clockwise for minimum field range.

Holding the tag, slowly pass through all the areas that you need the field to cover. **DON'T FORGET DOWN BY THE FLOOR**. The device should continue to beep at a steady rate. An uneven rate indicates that the controller is not able to read the tag successfully every time.
The final step is to ensure that the field does not extend into other rooms or areas that are regularly occupied by tags. These tags could inadvertently keep a controller in an alarm state.

5.8. INSTALLING RECEIVERS

Receivers are meant for use where only a "TIC" signal needs to be detected. The "Relay" light on the front of the receiver comes on to indicate relay activation when a "TIC" is detected. Receivers are not capable of creating a field of energy using Exciters, as Controllers can, and therefore do not have to be connected to the Exciter Antennae. Install the RX Antenna onto the Receiver and swivel it so that it is in the vertical plane. Place the Receiver in the approximate location for final use, connect the power supply and power-up.

Set the threshold such that the Receiver can detect a Tag from about a 25' radius within the protected perimeter. This detection area is highly dependent on the layout of the floor which in turn influences the placement of the Receivers on that floor. Generally, ensure that the whole floor has adequate coverage, and eliminate any "null" areas from which a Tag removal cannot be detected.

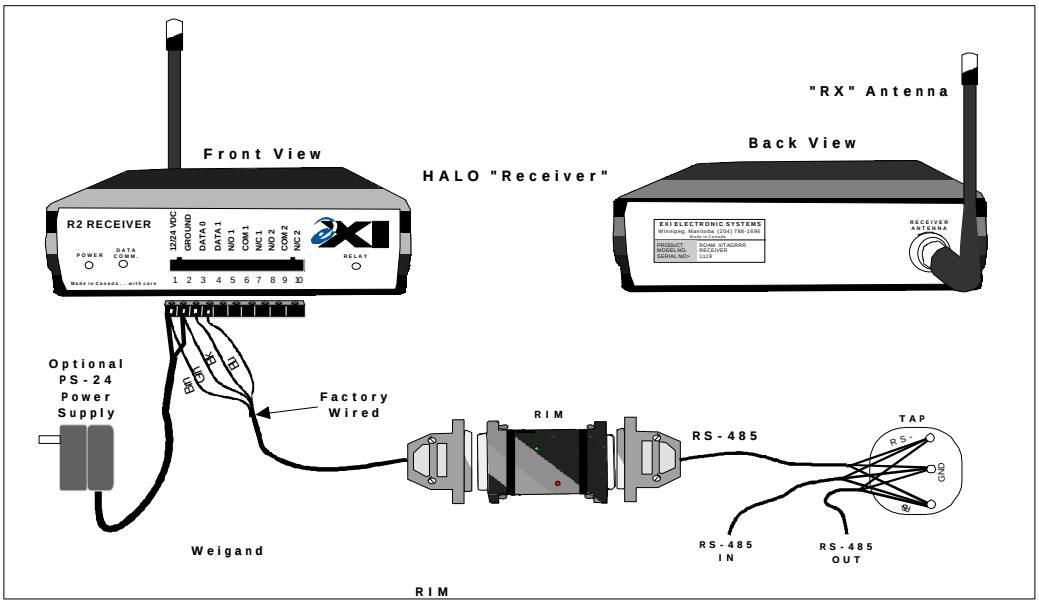
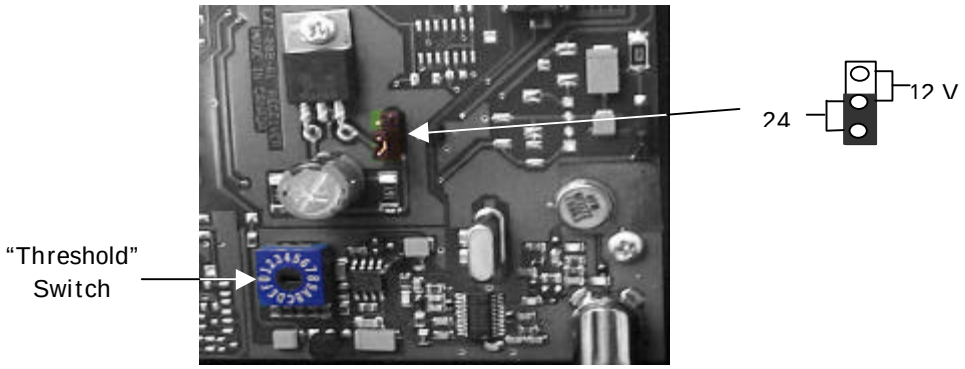


Figure 18 – HALO Receiver



5.8.1. Threshold Switch

The Threshold switch may be adjusted to increase or reduce the sensitivity of the Receiver and therefore the range of detection of the Tag.

It is also used to remove some of the background noise as well as reduce interference from tags if the controller is having trouble detecting tags. The result in the adjustment raises the RF field strength threshold received from the tags in order to trigger the CPM into alarm (ie. from 25uV to 50uV) and reduces the detection field range.

'0' = MAX sensitivity & **'F'** = MIN sensitivity. The default setting is "2".

5.9. RS-485 Interface Module (RIM)

Each HALO Controller, Receiver and Elevator Controller needs a RIM to interface to the RS-485 network that terminates at the HALO Computer. The RIMs have a unique serial number that is associated to the locations on the floor plans of the building, so that the computer can correctly show the location of an event occurring on the system. Therefore, ensure that the correct RIM is installed at the corresponding locaton.

5.9.1. RIM LED Status

The 2 LED's can be used to indicate a number of conditions to the installer. One LED is used to display device status while the other LED is used to indicate network status.

During normal operation both LEDs should be "Steady On".

LED behavior	RED LED	GREEN LED
OFF	RIM not working, no power source	No network detected
FLASHING	Poor communication due to loose or reverse wiring on Weigand lines.	Communication failure – no network address.
ON STEADY	Normal Operation. Power and Weigand is good.	Communication is good. Network activity has been detected.

After both LEDs are "Steady On" test the RIM for communication by flashing a tag creating a TIC or TIF alarm and the alarm created should be reported to the computer.

5.10. INSTALLING ELEVATOR CONTROLLERS

Only one elevator system should be installed per elevator car. When installing an elevator system it is best to coordinate with the local Elevator Company to ensure that the elevator controls are not affected by the HALO installation.

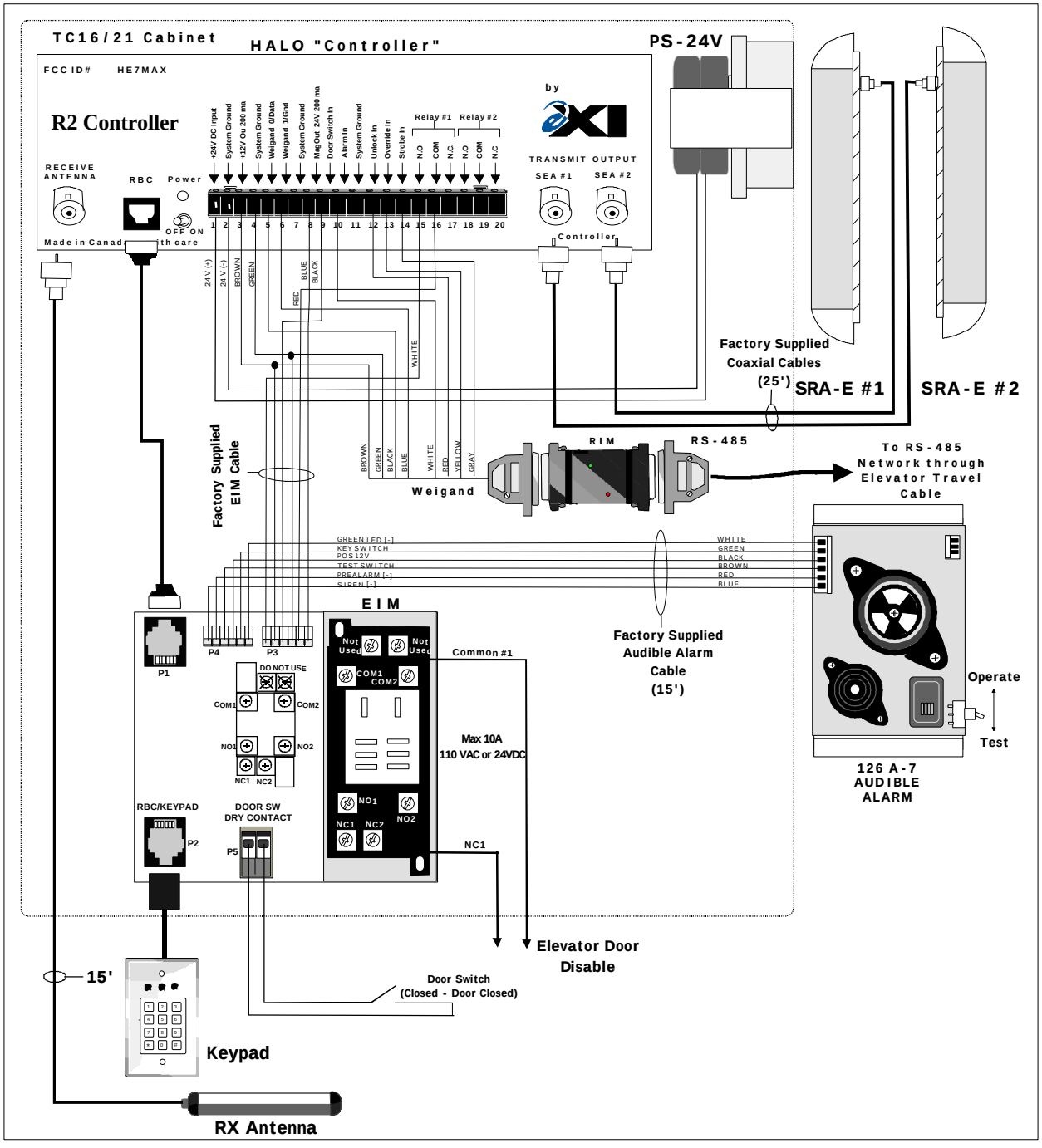


Figure 19 - Elevator Cabinet Detailed Wiring Diagram

5.10.1. CONTROLLER CABINET INSTALLATION

Mount the HALO Elevator Controller Cabinet inside the elevator car. A suitable location for mounting the cabinet would be bolted securely with locking hardware above the ceiling tile of the elevator car, or on top of the elevator car roof. The cabinet may be mounted in any orientation, depending on what the space allows. Ensure that the cabinet can be opened easily to allow you to make the various connections necessary, and to be able to make adjustments to the controls within the Elevator Controller inside the Cabinet.

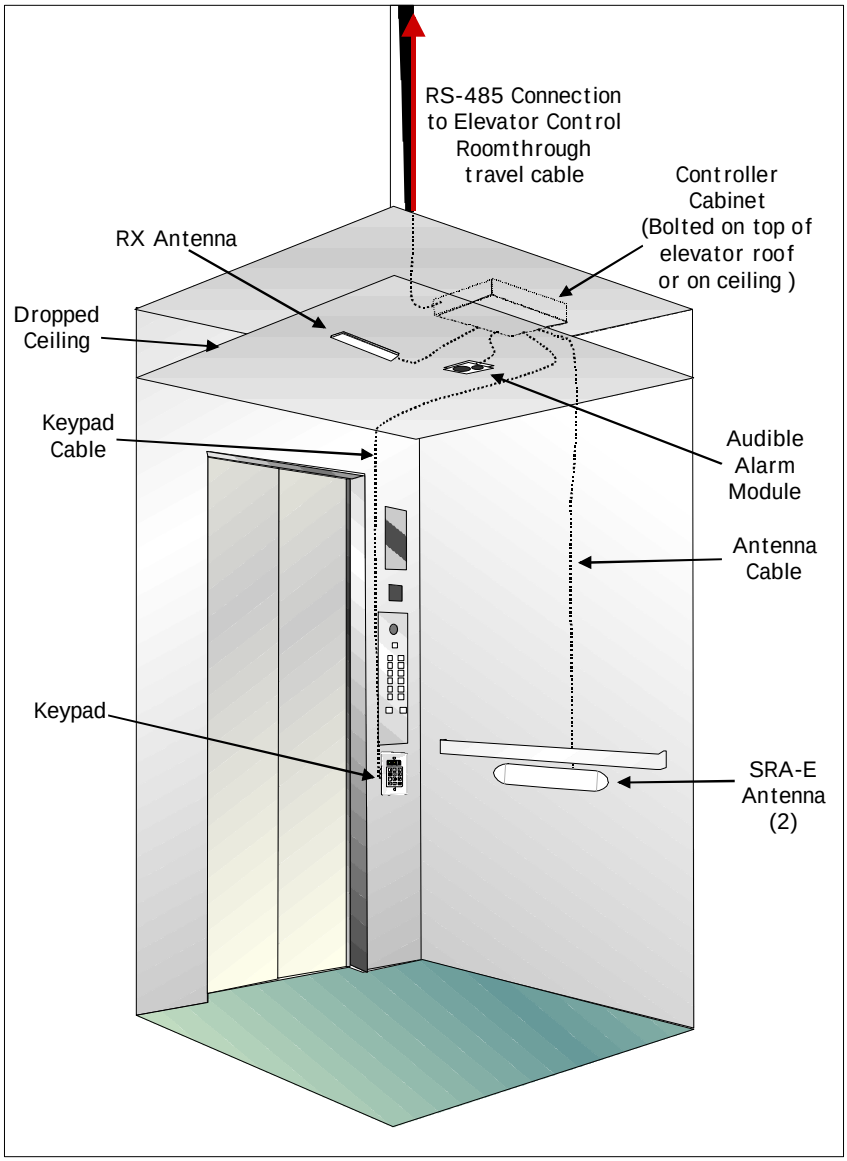


Figure 20 - HALO Elevator Controller Installation

Should any extra holes be required to mount the cabinet, ensure that no steel cuttings fall into the cabinet, as this may cause the system to malfunction. A 120 VAC duplex plug is required in the proximity of the cabinet so as to be able to supply power to the cabinet.

The RIM is built into the Cabinet. With the assistance of the Elevator Company, the three wires from the RS 485 side of the RIM should be pulled to the Elevator Control Room, or Penthouse, from which they

should be routed back to the HALO RS-485 Network. It is highly recommended that you employ an RS-485 Repeater, available from EXI, in the Elevator Control Room to separate the Elevator connections from the main HALO network. The Repeater isolates the noise that may be picked up during elevator operation, boosts the RS485 signal, and reduces the total capacitance on the network to ensure reliable operation.

5.10.2. LOCATION FOR SRA-E EXCITER ANTENNAS

One of the most important aspects of the entire installation is the correct positioning of the SRA-E Antennae. The two antennae are to be mounted under each side rail in the center position of the elevator sidewall, opposite each other. This is the recommended location and you may improvise depending on the design of the elevator car.

- Place the SRA-E template, or an antenna, on the center of the elevator wall, at least 1" below the handrail. Use the screw holes on the template to mark the location of the mounting screws and hole for coax cable entry, and drill holes as required.
- Remove the cover from the SRA-E, thread screw anchors (not provided) into the elevator wall to the correct depth, insert the screws into the SRA-E nylon foot, then thread the screws into the anchor receptors so the SRA-E mounts securely to the elevator wall.
- Repeat this procedure for the opposite side.
- Once the Antennae are mounted, run the Antenna Coaxial cables down from the Controller Cabinet on each side of the car. Draw the cables through the ½" holes on the nylon foot on each side and connect the mating coax fitting on each of the SRA-E antenna. Then replace the cover on each antenna.

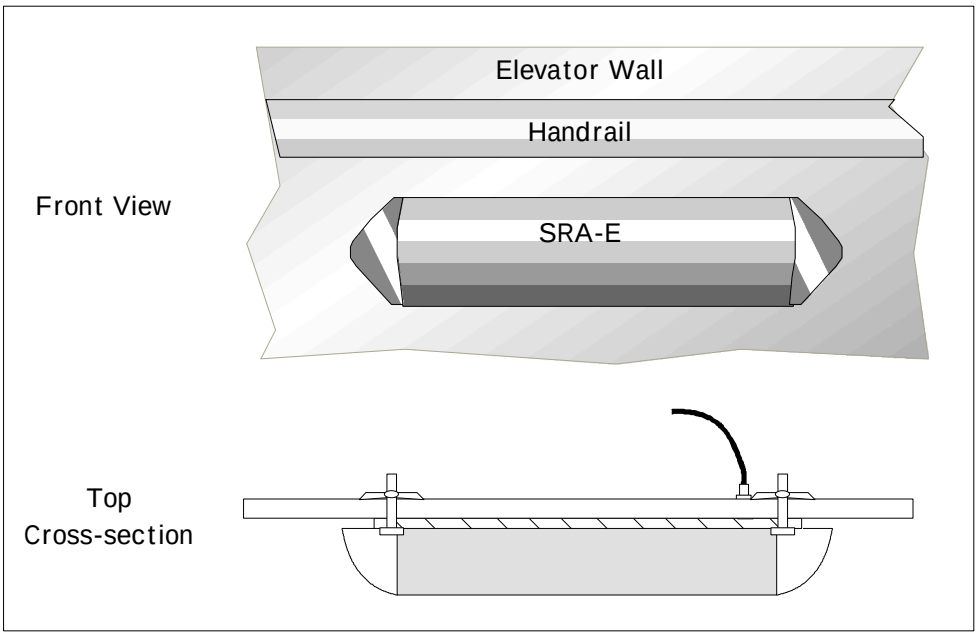


Figure 21 - SRA-E Installation

5.10.3. Elevator Receive (RX) Antenna

Locate a suitable position for the RX Antenna. Should the elevator have a dropped ceiling which is accessible, this area may be used for the antenna provided that the insulation between the antenna and the cab is not treated with a foil backing. Should such a foil backing be present, you may strip the foil from the fiberglass and discard it. Do not locate the RX Antenna above a metal or metalized plastic egg-crate ceiling, as this would render it ineffective.

It is recommended that the RX Antenna be mounted in the horizontal plane, parallel to the elevator floor, to reduce noise pick-up.

- Place the RX Antenna on the surface to which it will be placed and mark the point through which the coax cable will exit.
- Drill a suitable hole at the location marked and place a grommet into this hole to protect the coax cable from getting frayed.
- Clean the surface where the antenna is to be mounted with alcohol or similar cleanser. Remove the protective strip from the double-sided tape at the back of the RX Antenna and mount the antenna to this surface.
- Thread the coax cable through the grommet and connect it to the Controller within the HALO Elevator Cabinet.

5.10.4. Audible Alarm Module

The Audible Alarm module can be mounted on the elevator “COP” panel. If the elevator car has an egg-crate style ceiling, a dropped ceiling or a lighting valance, the Audible Alarm module may be mounted in this location as well. An open area should be chosen so as to allow the alarm sounds to be clearly heard.

The switch on the module is to select between “Exciter Field Test Mode” and “Normal Operation”. With “Exciter Field Test Mode” selected, the beeper on the module will sound momentarily each time a valid response is received from a Transponder. This helps to determine the outside limits of the detection field, and whether any null areas exist within this field.

- Identify the location where the Audible Alarm Module will be located, ensuring that easy access can be gained for the 6-conductor cable that connects it to the Elevator Cabinet.
- Secure the Audible Alarm Module with the metal self-tapping screws provided, to the elevator car ceiling or the wall above a suspended ceiling, or the “COP” panel.
- Connect one end of the Audible Alarm Cable to the module and the other end to the connector marked “P4” on the Elevator Interface Module (EIM) within the cabinet.

5.10.5. Keypad

It is recommended that the Keypad be mounted on the elevator “COP” panel at a height that allows easy access for the nursing staff who must enter a 3-7 digit code to enable the Bypass mode. If there is no spare space available on the “COP” panel, the Keypad may be mounted in a suitable location on the elevator wall.

- Cut a hole in the “COP” panel to accommodate the rear of the Keypad assembly that will be inserted.
- Drill holes for the screws, using the Keypad as a template to locate the correct positions for these holes.
- Thread the Keypad Cable supplied through the “COP” panel and up to the cabinet.
- Plug one end of the cable to the Keypad and the other end to the EIM within the cabinet.

- Secure the Keypad to the “COP” panel.

Figure 22 - Elevator Keypad Installation

5.10.6. “Door not Closed” Contact

In order for the system to operate correctly, the contacts supplied with the elevator controls that indicate when the elevator door is open or closed, have to be monitored by the HALO Elevator Controller. These contacts have to be normally open when the doors are open, and closed when the doors are closed. If such a pair of contacts is not available, a suitable set of contacts will need to be installed, as without these the HALO Elevator Controller will not shut off when the elevator doors are closed.

- Run a pair of wires from the Form-C contacts on the EIM within the cabinet to the elevator door open control contacts within the elevator control panel.
- If necessary, run a pair of wires from the elevator control “Fire Condition” contacts to the “System Override In” and “Common” inputs of the Elevator Controller within the cabinet.

5.10.7. Door Control and Fire Alarm Supervision

The elevator doors are held open in alarm conditions so that the elevator cannot move. The EIM within the cabinet has Form-C Normally Open (N/O) and Normally Closed (N/C) contacts that can be used to control the door.

In the event of a fire alarm, a “system override” input is available on the Elevator Controller within the cabinet. When this input is shorted to ground, the system, and the door control function, will be inhibited so as to render the elevator operational. Only a few elevators require this function to be implemented as most elevator systems have their own “Fire Condition” operating mode that seizes control of the elevator during a fire condition. If in doubt, check with the elevator company.

- Run a pair of wires from the Form-C contacts on the EIM within the cabinet to the elevator door control contacts within the elevator control panel.
- If necessary, run a pair of wires from the elevator control “Fire Condition” contacts to the “Override In” and “Common” inputs of the Elevator Controller within the cabinet.

5.10.8. System Adjustment and Testing

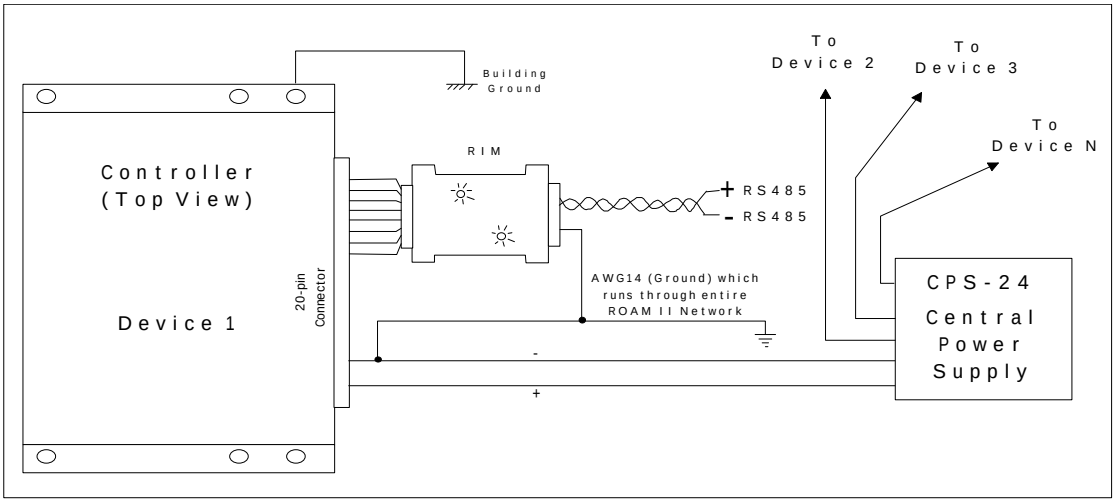
Upon completion of the installation, follow this procedure for testing the system operation:

- Power on the system, and set the Test Switch on the Audible Alarm Module to “Test”.
- Expose a Transponder within the elevator cab. The pre-alarm beeper will beep as the system senses the Transponder within its field. The closer the beep intervals, the greater the sensitivity of the Transponder to the exciter field. Try various orientations and positions of the Transponder within the cab (don’t forget the floor!), to ensure adequate coverage.
- In the event that the field appears to be too strong, indicated by the fact that a Transponder is sensed well outside the elevator cab, adjust the “Range Adjust” setting within the HALO Controller located inside the Cabinet to optimize the exciter field (see Threshold setting instructions for HALO Controller in Section 5.7.1.5)
- Set the Tests Switch on the Audible Alarm back to Normal Operation.
- Enter the elevator with a Transponder, which should immediately trigger a pre-alarm beeper tone lasting for 11 seconds. The Alarm light on the Keypad will flash momentarily during this time.
- Leave the elevator cab within the 11 seconds, or place the Transponder within its metal foil bag (making sure it is tightly sealed). The system should reset itself and release the doors for normal operation at the end of the 11-second pre-alarm period.
- To test the Bypass function, expose the Transponder within the cab. The pre-alarm beeper will trigger. Enter “1938” on the Keypad, which should now allow normal operation of the elevator.
- Test the “full alarm” mode by exposing a Transponder within the cab for greater than 11 seconds. After the pre-alarm beeper is heard for the 11-second duration, a loud alarm will begin. If the Transponder is removed from the cab during the full alarm period, the system should reset itself within 6 seconds.

5.11. SYSTEM GROUNDING CONSIDERATIONS

The difference between successful installations that are free of noise versus those that are plagued with unreliable operation is often poor grounding of the system elements. Ensure that no ground loops exist in the system, and that all the system components are adequately grounded.

The figure below shows ground requirements for Controllers in the system. The chassis of the Controller is connected to the building ground. The Receiver is also and the power supply and RS-485 grounds are connected together for both the Controller and Receiver so that the signal at the RS-485 interface is referenced correctly.

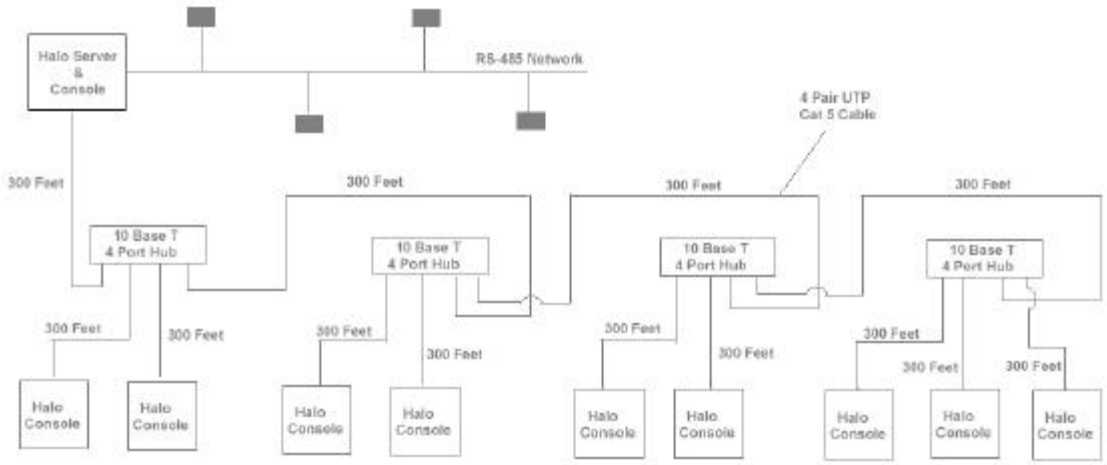


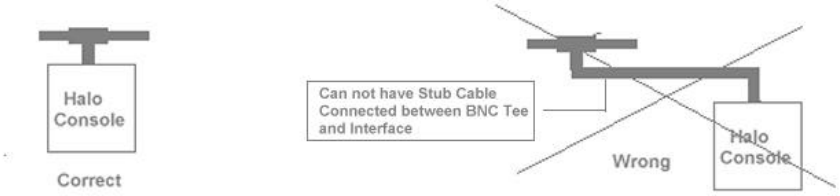
6. PC Networked Installation

(Must have a dedicated Ethernet)

10BASE-T CABLING:

- Maximum allowable distance per segment is 100 meters.
- Supports 10Mb/s transmission rate.
- Uses a Star Topology.
- Unshielded Twisted Pair Category 5 cable recommended.
- Two Computers (10 Base T NICs) may be directly attached to each other without a repeating hub, provided the distance between the two computers is less than 100 meters. In this case a special "Crossover Cable" is required that attaches transmit pair of one station to the receive pair of the other station, and vice versa. When using a hub the cross over function is performed inside the repeating hub.
  NOTE: It is recommended to use a hub to connect two Computers.
- **ADVANTAGES:** a) Star Wiring topology supports easier maintenance & troubleshooting. Provides a modular approach to network construction.
  b) Inexpensive cabling & easy to install.
  c) Ethernet packets are routed more effectively & efficiently than the traditional Bus design.
- **DISADVANTAGES**: 10Base2 supports longer segment lengths.
- **5-4-3 RULE:** With 10Base-T wired networks, a maximum of 5 wiring segments is allowed between any connected computers within the LAN and only 3 of the segments can be populated with consoles or server.
- Therefore the maximum distance between two computers is 500 meters.
- 10Base-T cable is susceptible to EMI. Try to keep cables away from Elevator motors, florescent lighting fixtures, uninterruptible power supplies, & other sources of EMI. Coiling up cables can also cause interference.

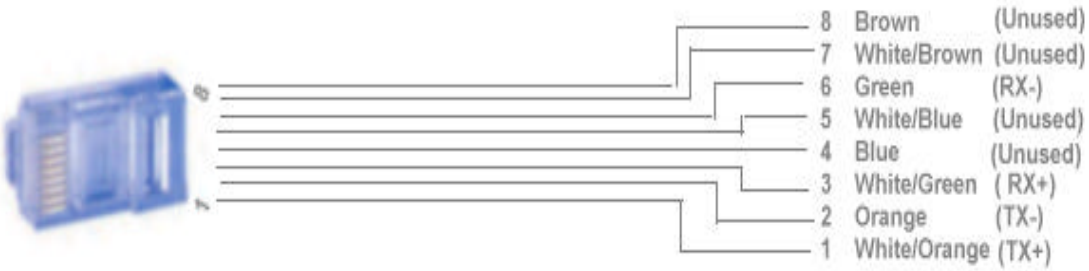




RJ-45 Connector

The 10Base-T media system uses two pairs of wires, which are terminated in an eight-position (RJ-45 style) connector. This means four pins of the eight-position connector are used. The following table shows the RJ-45 connector pin assignments.

PIN NUMBER	SIGNAL
1	TxD+ (Transmit Data)
2	TxD- (Transmit Data)
3	RxD+ (Receive Data)
4	Unused
5	Unused
6	RxD- (Receive Data)
7	Unused
8	Unused



7. Theory of Operation

The EXI HALO system uses Radio Frequency waves for communications between the HALO system components and the Tags. The HALO Controller continuously emits a 307 kHz RF frequency via the Exciter Antenna, setting up a field in its local area. When a Tag enters this field, a Radio Receiver within the Tag senses the 307 kHz RF field and transmits its identification information to the HALO Controller using a low level Radio Signal at frequency of 434 MHz.

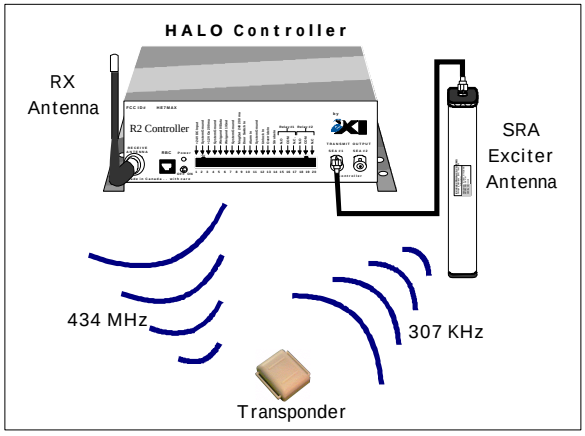


Figure 23 - Controller Operation

7.1. Tag Communications

All Halo tags will transmit their serial number whenever they first enter a field created by a HALO controller. We refer to this type of communication as a TIF (tag in field) for the purpose of brevity. The HALO controller is able to communicate directly with one Tag even if there are multiple Tags in the field since the communication is bi-directional. The Tag will not retransmit its serial number again until it is reset by the controller or out of the field for at least 6-18 seconds.

If a Tag is able to receive communication from 2 different controllers in the case of field overlap, it will try to respond to both controllers thereby inhibiting any alarms. Each controller will see Tag communication when it doesn't expect it and report it as noise. While in the field, the Tag continues to communicate with the controller but in a limited way in order to conserve battery power. Because of this limited communication, the controller has no way of knowing when each Tag leaves the field. It can only tell that there is still at least 1 Tag in the field. It takes 6-18 seconds of all the Tags being out of the field before the controller will recognize that the field is empty.

Some types of tags will also transmit their serial number when certain events occur to the tag. We refer to this transmission as a TIC (tag initiated communication). All HALO Controllers and Receivers can pick up these transmissions. **P-Tags** transmit a TIC whenever the Tag is first removed from the body and again after variable intervals, the longest being 4 minutes. The Tag has to be put back on the body for 10 seconds to reset it before it will repeat its pattern.

7.2. HALO System Communications

HALO Controllers and Receivers connected to the network report any events to the HALO PC Console, in addition to responding to such events locally. A HALO Controller, if configured as such, will independently control its associated door in the presence of a Tag at its door, in addition to reporting such an event to the HALO PC Console. This ensures that local control and security is maintained regardless of the state of the HALO network or PC Console. All devices that are connected to the RS485 communications bus are fully supervised such that any device failure is reported at the console immediately

7.3. HALO CONTROLLER

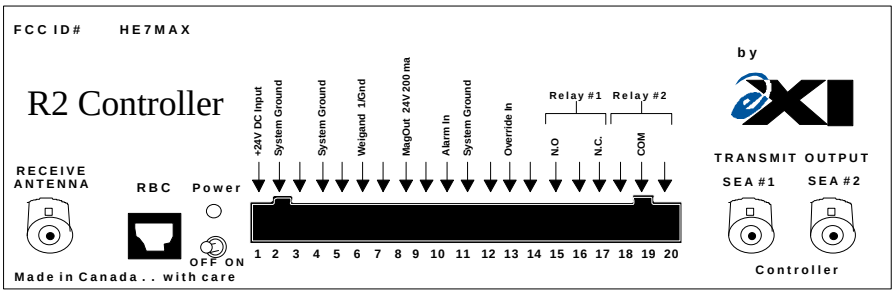


Figure 24 – Halo Controller Front Panel

The HALO controller handles all communication with the Tags, provides audible and visual indicators of what state its in and prevents egress when necessary. This device is fully capable of operating in stand-alone mode although it does provide for communication to several different types of central reporting systems. The front panel provides easy access to a number of different output formats as well as allowing inputs to alter some of its automatic functions as necessary. Local alarm and bypass annunciation is available through the DKX Keypad.

The Tag serial numbers as well as status information is output in **Weigand** format on 2 of the output pins. This is a standard format used by many Card Access Systems. The **MagOut** line will engage a **Magnetic Door Lock** when Tag's are detected in the field. Due to NFPA 101 regulations being adopted in many locations, it may be mandatory to provide an automatic door release with 15 seconds after a door has been locked up. The controller provides 2 Form-C dry contacts rated at 1 Amp @ 30VDC. They will provide normally open or normally closed contacts and will change state to indicate the 2 different alarm conditions – **T**ag **I**n **F**ield (**TIF**) and **T**ag **I**nitiated **C**ommunication (**TIC**). These **Relays** can be used to turn on remote signaling devices such as:

- Nurse Call system annunciators (should have latching function)
- EXI model "SSM" 2-zone audible alarm with selectable tone sequences
- EXI model "ANN-6L" Audible-Visual 6-zone, LED type non-supervised Annunciator

See Appendices for details.

The HALO controller uses the **Door Switch input** to disable alarm reporting, when the door is closed. This is known as the **Nurse Saver Feature**. Although Tags are still detected and reported to a central system, no alarms are annunciated until the door opens. At that time, all the Tags are re-read by the controller so that only the Tags that are still in the field will cause an alarm. The door switch is also useful during bypass as the controller will detect the door opening and then terminate the bypass as soon as the door closes. In the event that a Tag is detected at the door with the door being closed, and the Tag remains at the door for a period exceeding 70 seconds, an Alarm condition is created. This is known as the **Loiter Feature**, preventing a patient from waiting at the door for an opportunity to exit when the door is bypassed, or otherwise opened.

A remote system or switches can use three input lines to alter the normal operation of the controller. **Unlock In** provides a temporary release of the door, for a system override such as that from a fire alarm control.. **Alarm in** will cause an immediate lockup of the door with the local and remote alarm annunciators on. **Override In** will disable the controller so that no tags are read and nothing will be reported to the Host computer. Shorting the appropriate line to system ground will activate the function.

Controller Input	Switch State	Result
Unlock In	Closed	
	Open	
	Closed	Force Door Lock
	Open	Normal Operation
Override In		Controller Disabled
		Normal Operation

7.4. KEYPAD

The Keypad provides the user with four separate functions.

Local audible and visual alarm,
Allows bypass function,
Reset the alarm when the controller is in continuous alarm mode, or reset the bypass sequence
Controller status indication via the keypad LEDs.

member needs to be able to initiate a bypass function from either side of the door, there will have to be two Keypads installed. A "Y" Cable adapter is available to easily connect the two keypads to the door controller.

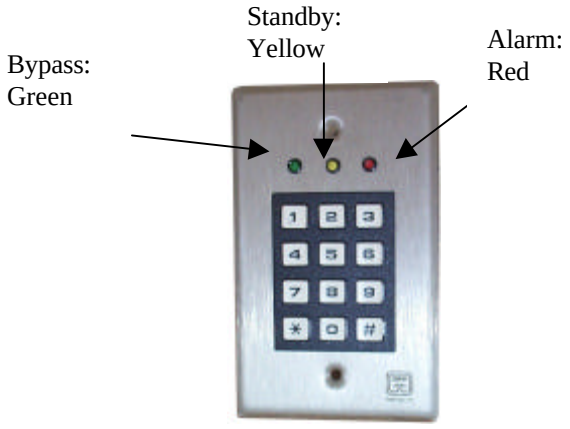


Figure 25 – Keypad Indicator Functions

JUMPER J1 settings on Halo Controller	**Position 2 for DKX Keypad operation.**
	Position 1 for RBC Keypad operation.

INDICATORS	STANDBY MODE	ALARM MODE	BYPASS MODE (1938)	RESET MODE (1939)	READER MODE
YELLOW	ON	ON	ON	ON	ON
RED	OFF	ON (FLASHING)	ON (FLASHING)	X=don't care	OFF
GREEN	OFF	OFF	ON (FLASHING)	X=don't care	ON

BYPASS is used to move Tags through a controlled area without triggering an alarm. The *GREEN* light will alternately flash with the *RED* light when the unit is in Bypass.

During Bypass mode:

- you have 8 seconds to bring the transponder into the field after entering the Bypass code on the Keypad, or the system will re-arm
- once the Tag is in the field, bypass will end 8 seconds after all Tags leave the field or the door closes, or the maximum Bypass time is exceeded. Bypass can also be terminated by a Reset from a Keypad.
- once you enter the field you have 90 seconds to pass through the detection zone
- if you passed through within 90 seconds the system will rearm within 8 seconds or the system will go into alarm after 90 seconds.
- Any Tags still in the detection area 10 seconds after the door closes will be reread so they can trigger an alarm if necessary.

RESET request will turn off the TIC-alarm relay or terminate the Tag Alarm if the Continuous Alarm mode was selected and there are no more Tags in the field. It takes the controller 6 seconds to recognize that the Tag has actually left the field.

STANDBY: The *YELLOW* light indicates the system power supply is ON.

ALARM: The *RED* light flashing indicates that the controller is in Alarm. A beeper also provides an audible alarm indication when this light is on. If the door is open, the **Alarm light** and beeper will beep with a **long ON time** and the **Alarm Relay** will turn ON. This alarm will also be reported at the HALO PC Console.

Pre-Alarm (Nurse Saver Feature)

If the door is closed and there is a door switch installed, the **Alarm light** and **beeper** on the keypad associated with that door will turn on and off with a **short ON time**, when a Tag enters the field. This is a known as a **pre-alarm** condition as a bad Tag is in the detection area but the door hasn't opened. Such an event is indicated at the HALO PC Console by a change in the appropriate floor button, and the device icon, from their normal color to yellow.

Loiter Alarm

If the Tag remains in this field for 70 seconds, a "Loiter" alarm is reported at the HALO PC Console and the associated floor button, and device icon, turn red.

READER MODE: A constant *GREEN* light indicates that the associated Controller is in "Reader Mode". That is, the HALO system software has disabled that particular Controller for normal Tag communications, and has enabled the Controller to detect the presence of Tags not in the Database inventory, for the purpose of adding such Tags into the Database inventory.

The Keypads allow a unique programmable code for both reset and bypass. The Keypads come preset with default codes of "**1938" for Bypass** and "**1939" for Reset**. Refer to **Keypad programming sheet** for instructions on how to change these codes.

7.5. HALO RECEIVER

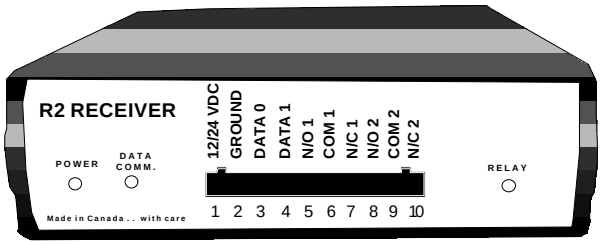


Figure 26 - HALO Receiver Front Panel

The HALO Receiver is used for detecting "off body" or Tag Initiated Communication (TIC) conditions, within a building. The Receiver does not have the capability of generating an Exciter Field, as does the HALO Controller.

7.6. ELEVATOR CONTROLLER

Although an Elevator Interface looks like a controller placed inside a box with added sirens and switch inputs, with the elevator firmware installed in the controller chassis, the Interface behaves much differently. This unit requires a door switch be installed in order to operate properly. With the **Elevator Door disable**, the unit will prevent the elevator door from closing during Pre-Alarm and Full-Alarm. The Elevator Interface can be bypassed with a **Keypad,** if a Tag is present in the Elevator. Bypass is used to take Tagged patients onto the elevator. There is no local annunciation of a TIC alarm however the serial number is sent to the HOST computer for remote annunciation.

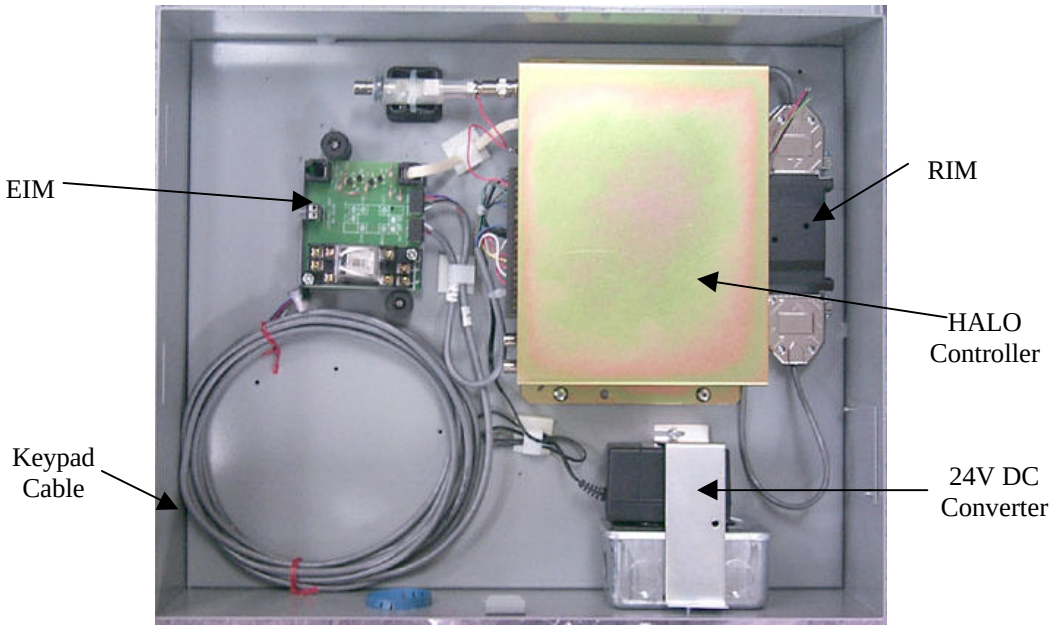


Figure 27 - Inside the HALO Elevator Cabinet

7.6.1. Pre-Alarm

The Elevator Interface enters a Pre-Alarm state as soon as it detects a Tag in its field. The **flashing Alarm light** on the Keypad and the **Pre-alarm beeper** indicate this state locally. This alarm will end when the user requests a bypass or 6 seconds after all Tags leave the field. After 11 seconds of Pre-Alarm, the Tags

are reread. If there are any non-bypassed Tags detected, Full-Alarm will start and the HOST computer will report a Tag Alarm.

7.6.2. Full-Alarm

Full-Alarm is indicated locally by a steady **Alarm light** on the Keypad and the **Full-Alarm siren**. This alarm will continue until all the Tags leave the detection field or the user requests a Bypass.

7.6.3. Elevator Bypass

Bypass is initiated locally with the Keypad. The Bypass will only apply to the Tags that are currently in the field. Any new Tags detected after the Bypass request will cause the Pre-Alarm to start again. If there are no Tags in the field at the time of bypass, there will be nothing to Bypass. If any Tags are bypassed, the **Bypass light** on the Keypad will be on and will remain on until all the bypassed Tags have left the elevator.

8. HALO Console (Single Station)

For Networked version see Halo Networked Dealers Manual: 984-000003-000

The HALO Console is a Pentium based Host Computer with a Color Monitor, a Keyboard, mouse, and Speakers for audible feedback. A ZIP drive is built into the computer to allow for periodic backup of data. The ZIP disk is removable, allowing for off-site archiving of the backed-up database. The computer also has a built-in RS-485 Interface card to which the HALO system components are connected.

The Color Monitor comes in two flavors and may be a CRT based 17" monitor or a 15" LCD Flat Panel. An Uninterruptable Power Supply (UPS) is highly recommended to ensure that the computer is not affected in the event of AC brown-outs, or in the case of loss of AC power.

The Host Computer runs the HALO Application Software that provides the following major user functions:

- Management of the database that stores the identities of all the system components and Tags that are deployed within the system
- Management and storage of logs of all the events that occur during use
- Annunciation of any of the alarm conditions that may exist, showing location of such an alarm condition in a graphical format overlaid over the floor plan of the building in which the system is installed

For stand-alone HALO systems that only require localized alarm and control, the Host Computer may not be required. The computer comes pre-loaded with the Microsoft Windows 98™ Operating System, and the EXI HALO Console. The EXI HALO Console application is the primary interface for the user, annunciating Alarm information at the same time as logging all activity on the network. The Halo system has three separate security access levels, namely "USER", "SUPERVISOR" and "DEALER".

As an installer, you will be interested primarily in the Dealer mode for installation purposes, and the other modes for training purposes. When the computer is first powered up, the "User" screen is automatically launched, and the default floor plan will be seen. Pressing **"ALT" "D"** simultaneously accesses dealer mode, while the Supervisor mode requires **"ALT" "L".** To exit the HALO Console, press **"ALT" "Q"** twice while in Dealer mode and type in **"Dealer"** for the user and password fields.

Level	Password	Functions	Access Management
User	Yes	Admit Patients Discharge Patients Accept/Silence alarms Toggle between floor plans (No Password required)	Access controlled by Supervisor or Dealer level users
Supervisor	Yes	All user functions Manage user list Assign usernames and passwords View and annotate activity logs Add/Delete/Edit tags from fleet Initiate System Data Backups Print logs Exit the Halo system	The first Supervisor is setup by the installing dealer. This Supervisor may add more assigned supervisory access.
Dealer	Yes	All user/Supervisor functions System Diagnostics System modifications Importing floor plans	Controlled by Dealer and EXI

Figure 28 - Buttons for Dealer and Supervisor modes

Both Dealer and Supervisor modes require a User Name and Password for access. Upon entering the correct information in the panel as shown below, the HALO Console enters the appropriate mode.

Figure 29 - Dealer Mode User/Password Prompt

The User mode only has access to the **Floor Plan** screen, while the Supervisor mode has access to system **Activity**, **Tag** management and **Users** management screens. The Dealer mode has an additional **Dealer Only** screen that is used to add floor plans and network devices, in addition to being able to set system parameters and carry out simple diagnostics.

USER *SUPERVISOR* *DEALER*

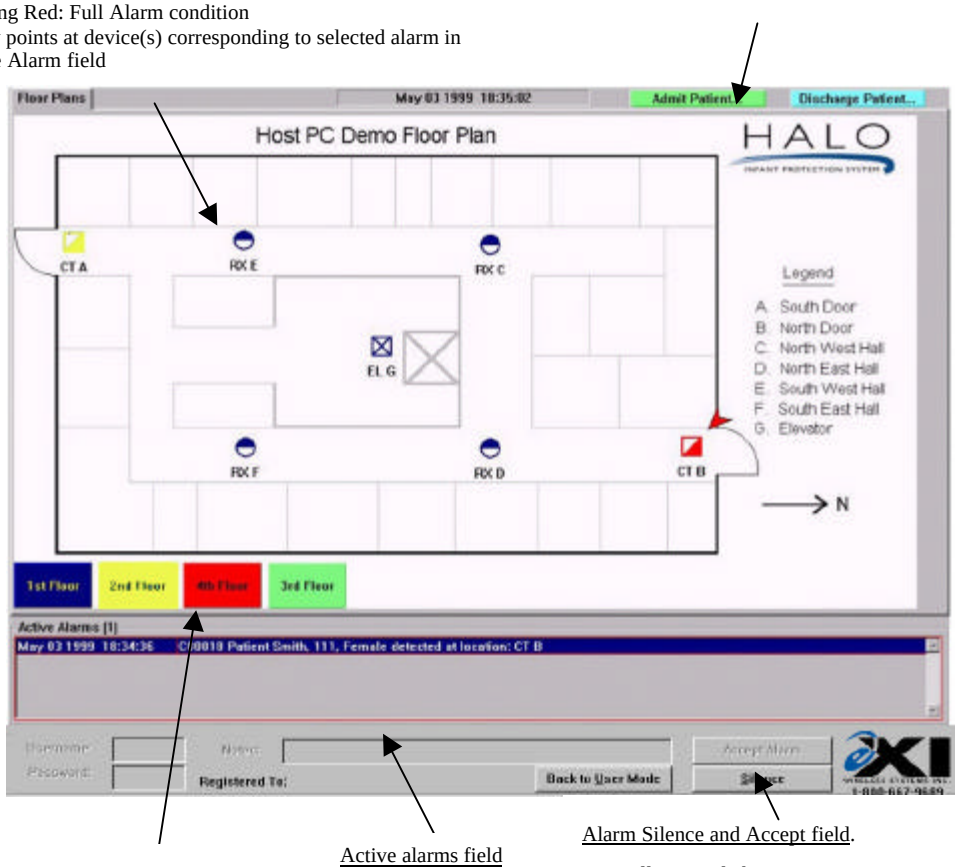
Figure 30 – Available Screens Depending on Access Level

8.1. Computer Display Conventions

The computer displays various types of information, which is color coded to differentiate between the Dealer, Supervisor and User modes. In addition, the "Icons" that display the locations of the various system components such as the Controllers and the Receivers, and the on-screen "buttons" may also change color to indicate their status.

Floor Plan area.
Controllers shown as half-filled square icons
Receivers shown as half-filled circular icons
Elevators shown as square icon with "X'
Blue: Normal, Yellow: Pre-Alarm condition,
Flashing Red: Full Alarm condition
Arrow points at device(s) corresponding to selected alarm in Active Alarm field

Patient **Admit** and **Discharge** buttons



Floor Plan Buttons
Green: Normal
Blue: Indicates that the cursor is positioned over button
Yellow: Indicated Pre-alarm condition on floor
Red: Alarm condition on this floor

Active alarms field
Red: Normal alarm color
Blue: Selected alarm

Alarm Silence and Accept field.

Normally grayed characters.

"**Silence**" button is active upon selecting an alarm from the Active Alarm field.

"**Accept Alarm**" button is active after valid Username and Password are entered.

Figure 31 - HALO Console User Screen

8.2. Connecting to the Host Computer

Unpack the Host Computer and the Monitor and place them in approximately their permanent location. If a UPS has been supplied, place the UPS next to the Computer. Ensure that there is a suitable power outlet in the vicinity of the location, and connect the UPS to this output. Attach the Monitor Cable, Keyboard, Mouse and the Power Cable to the Computer, and connect the Power Cable plug to the output of the UPS.

Connect the 3-pin RS-485 connector on the Network Cable to the RS-485 Interface Card socket at the back of the Computer, and connect the DB-9 connector at the other end of the cable to the PC Terminator Box. The use of a Terminator Box is not necessary, but is highly recommended so as to enable relocation of the Computer without having to also relocate the RS-485 line that runs to the networked devices. In the event that the PC Terminator Box is not used, the 3-pin RS-485 connector can be spliced directly to the RS-432 network line, and the DB-9 connector may be discarded.

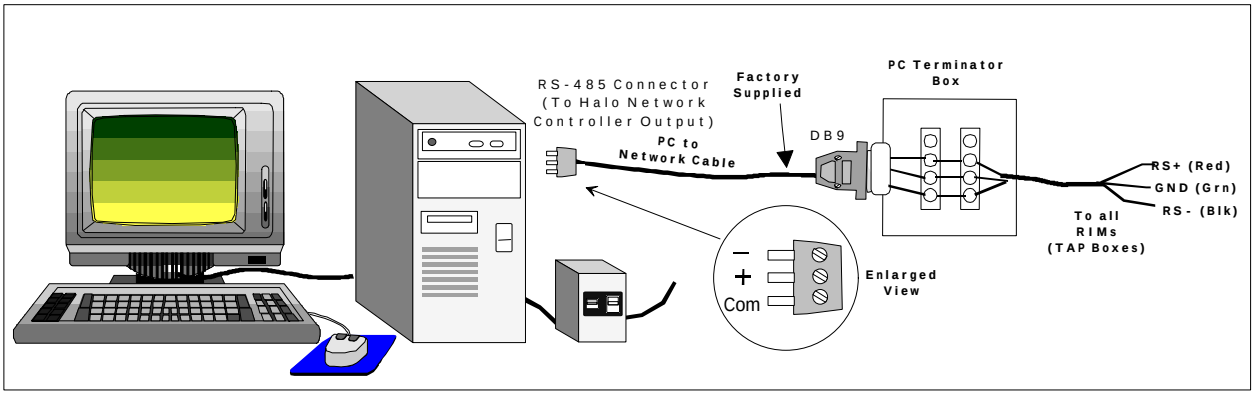
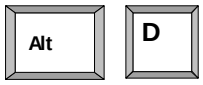


Figure 32 - Host Computer Connections

Turn the UPS power switch to ‘ON”, and then power up the computer. After some self-tests, the Microsoft Windows 98 splash-screen will be seen followed by the HALO Console default User screen.

8.2.1. Navigating the Dealer Screens

Press 

on the computer keyboard simultaneously.

Type in the “User name” and “Password” at the prompt (both fields are the word “Dealer”).

The default Dealer level screen will appear as shown below, showing all the floor plans present in the system.

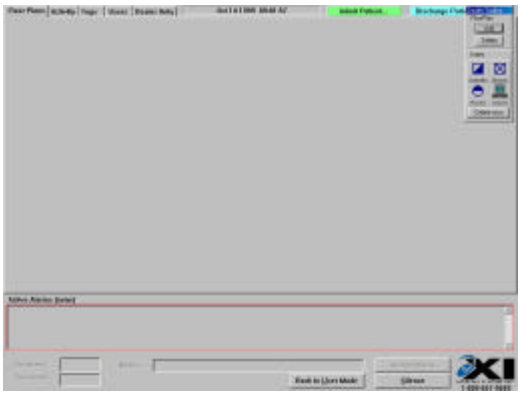


Figure 33 - Dealer Floor Plan Screen

Clicking on the “Activity” tab accesses the Activity screen, which lists all events that have been logged in the system. The maximum number of events stored is 14,000 activities, after which any additional events will displace the very first event logged on a First-in-First-out basis.

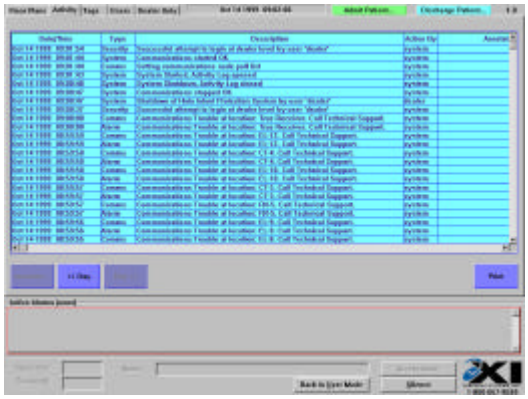


Figure 34 - Dealer "Activity" Screen

The “Tags” screen contains the details of all Transponders that have been assigned to the system. This screen allows the addition or deletion of Tags, and entry of patient information for Tags that are assigned to a patient.

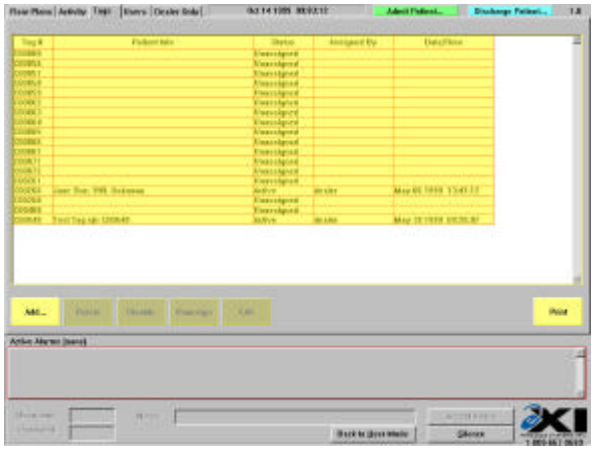


Figure 35 - Dealer "Tags" screen

The next tab selection is the “Users” screen. This allows for new Supervisors and Users to be entered.

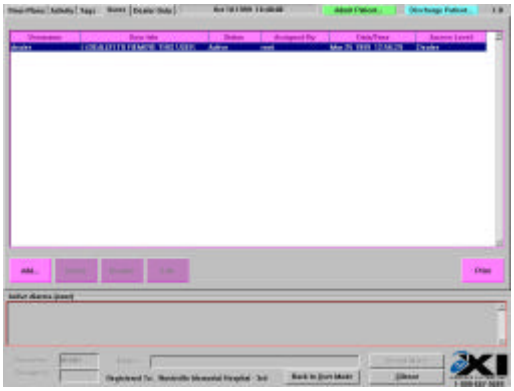


Figure 36 - Dealer "User" Screen

The “Dealer Only” screen contains a list of all devices present on the HALO network, and allows the addition and deletion of devices as well as the setting up of the communications parameters of the network. The communications port default value of “COM2”, and the baud rate of “57600” bits per second should never need to change, and are there only for future considerations.

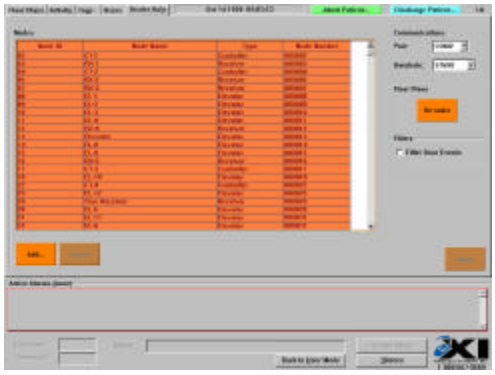


Figure 37 - "Dealer Only" screen

8.2.2. Adding a Floor Plan

The top right of the Dealer **Floor Plan** screen has a Dealer Toolbar panel that allows floor plans to be added or removed, and also enables icons for available system devices to be placed on the floor plan.

Figure 38 - Dealer Toolbar

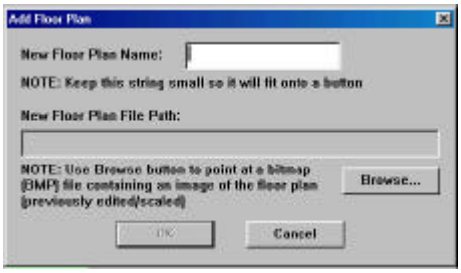


Figure 39 - Floor Plan Entry

In order to add a floor plan, one has to be created in the BMP (Bitmap) format. The maximum allowable size for a floor plan is 1010 pixels in the horizontal plane, and 660 pixels in the vertical plane. This image should be stored along with other floor plan images in the directory named **"C:\Program Files\eXI\Halo\floor plans\"** which is the default directory for floor plans set up at the factory.

Once a bitmap has been stored in the above location, click on the "Add" button in the Dealer Toolbar. A panel appears as shown below. Type in the name of the floor, and then click on the "Browse" button to locate the floor plan in the default directory described above. The floor plan will be placed under a new button that has the name of the floor as you had entered.

8.2.3. Adding System Devices

New System Devices such as Controllers, Receivers and Elevator Controllers can be added to the system if necessary. Remember that all devices in the original installation plan are already added into the application at the factory, and therefore there should be very little need to add more in the field. This may only become necessary because of substituting a RIM device, or adding more nodes.

In order to add devices, click on the "Dealer Only" tab and click on "Add". Fill in the appropriate information in the "Add Node to System" panel and click on "OK". Note that the "Node Number" is the serial number of the RIM associated with the device added.

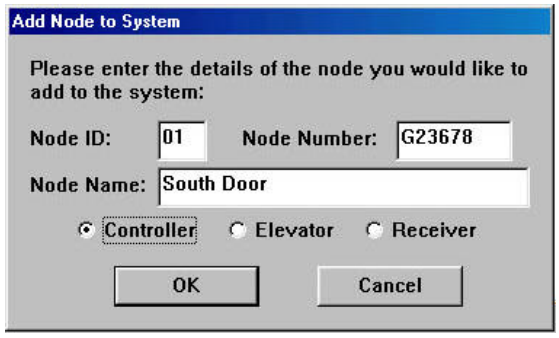


Figure 40 - Adding a Node to the System

If you try and leave the "Dealer Only" screen after changes are made, a warning pane appears.

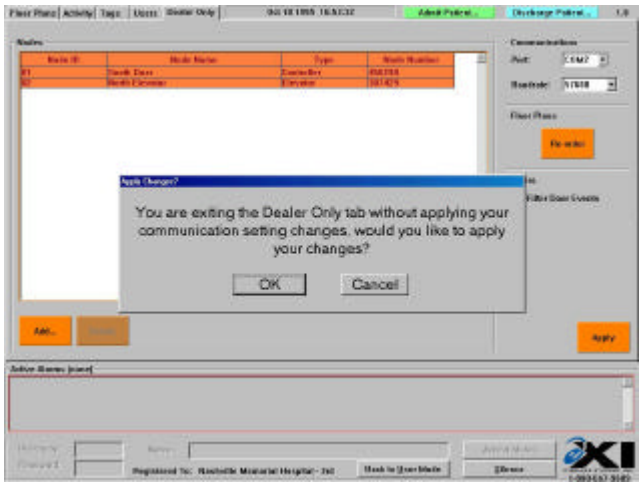


Figure 41 - Exit warning from "Dealer Only" Screen

Click on “OK” if you want to accept the changes and then click on the “Floor Plans” tab.

The node that was just entered will need to be placed on the appropriate floor and at the physical location of the device that the icon represents. Select the appropriate icon from the Dealer Toolbar and drag it to the correct location on the floor plan. An “Add Icon” panel will show you the list of nodes available for placement. Highlight the appropriate node and click “OK” to complete the placement.

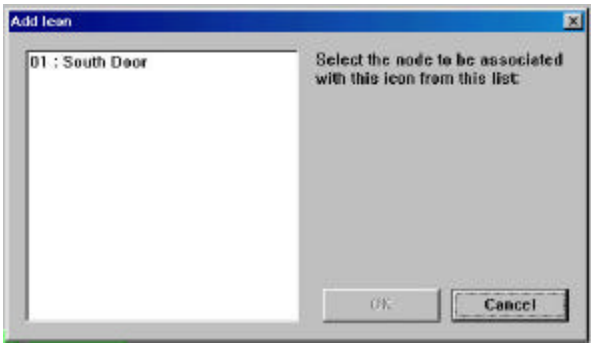


Figure 42 - Adding Icons for Nodes

8.2.4. Adding Tags and Users

Refer to the “HALO Users Guide” for detailed instructions on how new Tags and Users may be added to the system.

9. DKX KEYPAD PROGRAMMING

The Keypad is pre-programmed for the following:

- BYPASS FUNCTION: 1938
- RESET FUNCTION: 1939

To re-Program Keypad:

1) BEGIN programming mode enter: * 382436#
   - 3 beeps indicate a valid program code was entered.
2) DELETE all codes enter: *12#

- The code to be deleted must be entered twice. Any outputs assigned to this code do not need to be entered: Example to delete the code 1938 enter *12 1938#1938#

3) SET code length enter: *19_#
   - You may set the code length for 3, 4, 5 or 6 digits. The number entered after *19 dictates the number of digits in your code.

     Example *194# was used to set program for 4 digits.
4) ASSIGN user codes enter: *11_ _ _ _ _ _ # _ #
   - The number of codes digits entered depends on the code length selected in the option *19
   - The program codes with these selectable outputs.
     a) Main Relay Bypass function
     b) Aux Relay Reset function

     Example 1: *11 1938## was used to set the Main Relay Bypass function so that it operates when 1938 is entered on the keypad.

     Example 2: *11 1939 was used to set the Aux Relay Reset function so that it operates when 1939 is entered on the keypad.
5) Set the MAIN RELAY BYPASS function time enter: *21_ _#
   - Programs the Main Relay Bypass function

     Example: *2101# was used to set the main relay bypass function.
6) Set the AUX RELAY RESET function time enter: *22_ _#
   - Programs the Aux Relay Reset function

     Example: *2201# was used to set the aux relay reset function.
7) EXIT program mode enter: *99#
   - EXIT program mode and allows the keypad to return to “on line”

10. Appendix A - Weigand Output Specification

Fields	# of bits	
Even Parity bit	(first)1	Parity bit + next 16 bits = 0
Control code	4	used to distinguish message types
Door bit	1	1 = Door open, 0 = Door closed
Maglock bit	1	1 = Maglock On, 0 = Maglock off
Info - 1	8	Info bytes are dependant on message type (see below for descriptions)
Info- 2	8	either bit patterns bit 7 -> bit 0
Info - 3	8	or 6 digits (1 digit = 4 bits)
Odd Parity bit	(last)1	Parity bit + previous 16 bits = 1
Total	32	

The control code that accompanies Tag serial #'s not only identifies that this message contains a Tag serial # but it also describes the state of the controller at the time.

Message Types	Control Code Decimal (Binary)	Info - 1	Info - 2	Info - 3
Tag Serial # -ABCDEF		Tag digits - AB	Tag digits - CD	Tag digits - EF
- normal	0 (0000)	"	"	"
- Bypassed	4 (0100)	"	"	"
- TIF alarm	1 (0001)	"	"	"
- Loiter	3 (0011)	"	"	"
- Host alarm	2 (0010)	"	"	"
- Unlock Req	5 (0101)	"	"	"
- TIC	7 (0111)	"	"	"
- Test Mode	10 (1010)	"	"	"

PIN # Entry
0 = no key, A = zero key
	8 (1000)	eg. 4 Key presses
		0 (0000) 0 (0000)
			"0123"
			A(1010) 1(0001)
				
				2(0010)
				3(0011)

Event (elevator only)	9 (1001)	Door Opened = 00	00	01
Switch Selections	11 (1011)	Version #	Mode/Option	ID Range High/Low
Status - sent after any significant changes	12 (1100)	Noise Counter	Input states	Device Status

Status message information definition:

Noise Counter - indicates the number of times the device has detected something on its receiver but couldn't make sense of it. This counter decrements over time if noise goes away. The status message gets sent for a Noise Alarm ON (when this counter rolls over to 100(64Hex)) and then again when the Noise Alarm Clears (gets back to zero).

Input states - nothing "on" will equal 73Hex

bit 7 - not used

bit 6 - Strobe 0 = ignore other host inputs

bit 5 - Override 0 - override request

bit 4 - Unlock 0 = lock release request

bit 3 - bypass key 1 = pressed

bit 2 - Reset key 1 = pressed

bit 1 - Alarm 0 = Host alarm request

bit 0 - Door switch 1 = open, 0 = closed

Device Status - Normal (nothing happening) = 00

bit 7 - not used

bit 6 - RF field occupied by tag(s)

bit 5 - In Override

bit 4 - In Unlock

bit 3 - In Bypass

bit 2 - Host alarm

bit 1 - TIC Alarm

bit 0 - TIF alarm

11. APPENDIX B - ACCESSORIES

11.1. SELECT SOUND MODULE (SSM)

The SSM is an audible annunciator that creates two distinct alarms – a general alarm and an urgent alarm. The two active tones are programmed from a selection of 8 tones in each group using DIP switches inside the unit. The SSM has the following additional features:

a) Bakelite plastic cover with ivory finish – flush mounts to standard 1-gang electrical outlet or Wire mold box for surface mounting.

b) Day/Night loudness control input (12V active high input for reduced night volume by 50% when active)

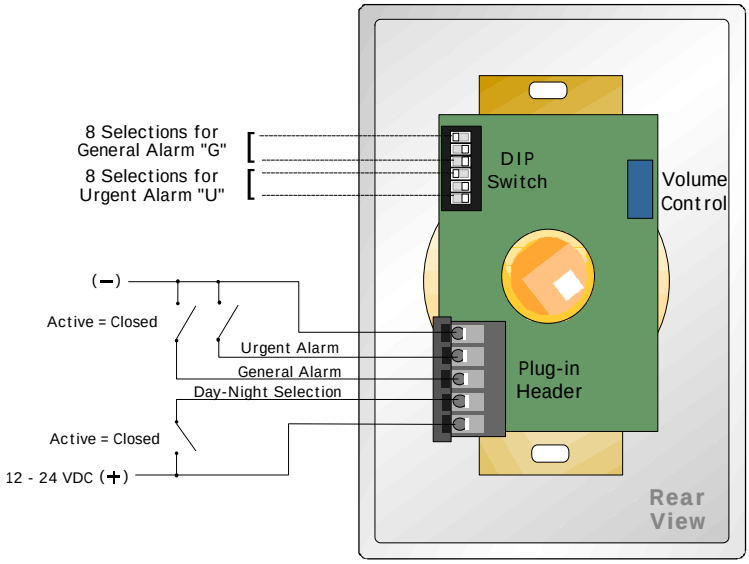
c) 16 possible sounds, 8 pleasant tones for general alarms and 8 brisk tones for urgent alarms

d) General and Urgent alarms will alternate if both are activated

e) Field adjustable loudness setting using a volume control (screwdriver required)

f) Reverse polarity protection

g) Operates from 12 to 24 VDC at 0.1A maximum, and is reverse polarity protected.

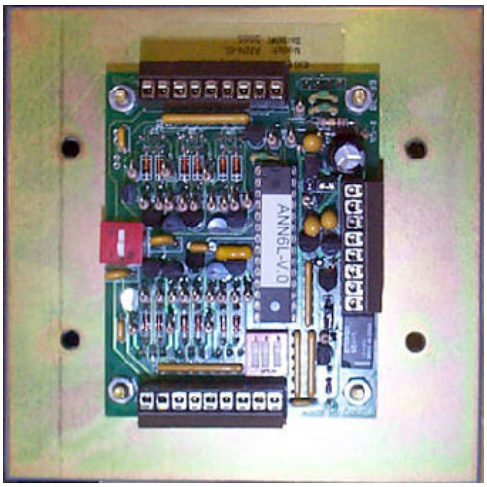


11.2. ANN-6L SIX ZONE ANNUNCIATOR

For situations that warrant using the HALO Controller in a stand-alone configuration, without the Computer Console, the ANN-6L may be used as the annunciator panel. The ANN6L is a six-zone central alarm panel, usually mounted at the nursing station, reception or a guard station to monitor the status of up to 6 alarm zones. Each additional ANN-6L will allow six more zones to be monitored. The reset switches can be ganged so that only one reset switch needs to be pressed to reset all the panels.

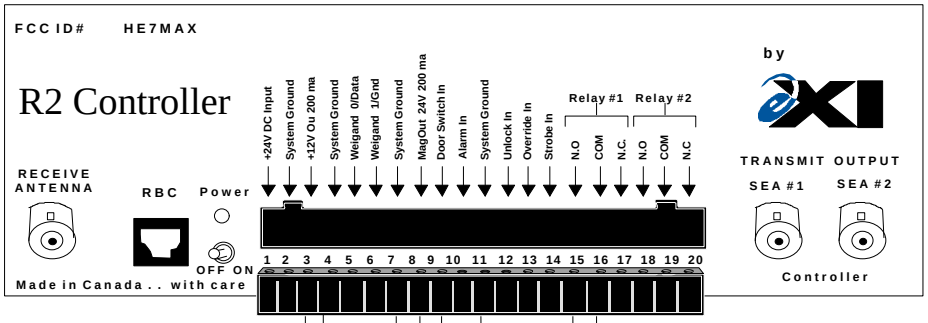
Alarms can also be monitored at separate locations with additional ANN-6L panels. These secondary panels provide either common or local alarm status. Reset can be performed on any ANN-6L when used for common alarm indication.

- Six Bi color LEDs indicate alarm priority.(red = latching : yellow = non-latching)
- Two distinctive piezo alarms indicate alarm priority. These may be disabled during install.
- Latching and non latching alarms.
- Alarm inputs accepted via N/O or N/C dry contacts or a voltage transition (switch selected function)
- Reset function can be ganged with other annunciator resets for remote operation
- Silence button deactivates audible alarm, new alarms activate audible alarm
- Onboard Form C relay for auxiliary output.
- Mounts in a standard 2 gang electrical box. (supplied)
- External speaker output provided



12. APPENDIX C - APPLICATION NOTES

12.1. HALO CONTROLLER HOOK UP WITH ANN-6L

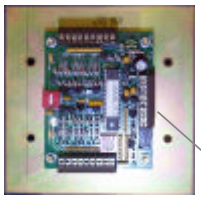


Magnetic Contacts located at door and door frame are closed when door is closed. (Supplied with HALO Controller Pak)

Magnetic Door Lock, 24 VDC 160 mA Max

ANN-6L (Front view)

ANN-6L (Rear view)



24 VDC outboard relay, 20 mA max

Commons

1A 1B 2A 2B 3A 3B

Alarm Inputs 1 to 6 (active when grounded)
A=Latching, Flashing Red light and audible alarm
B=Non-Latching, Flashing Yellow light, no audible alarm

P1

Internal Beeper
ON OFF
J2

12/24 VDC

Power Ground

Reset

Beeper

Ground

N.O

N.C.

Common

P3

Output low when Reset button pressed

Low Input forces ANN-6L to Reset

82Ω, 2W

External Speaker (150 mA Max)

Relay Form C SPDT 1A Max @ 24 VDC

C1 = Commons Grounded Return Inputs high

SW2

C2 = Commons Positive Return Inputs low

24V

Voltage Select

J1

12V

SW1

1 2 3

OPEN

P2

Common 4A 4B 5A 5B 6A 6B

Functional Description

Because the door switch function is utilized (Pin 9 of Controller), the door will be locked by the Controller if it is sensed to be closed when a transponder enters the field. Data is sent to the HALO Computer, but Relays #1 and #2 are not activated (Pins 15 to 20). The outboard relay is energized and input 1B of ANN-6L is grounded so that the ANN-6L displays a flashing yellow light (1B is a non-latched input).

However, if the door is sensed to be open when a Transponder enters the field, the alarm will be instant and alarm data will be sent to the Computer, and both Relays #1 and #2 will be activated for the duration set within the Controller. Input 1A of the ANN-6L is grounded through Relay #1 of the Controller, resulting in a flashing red light and audible alarm (if enabled). As input 1A is a latching input, the ANN-6L requires to be Reset for the alarm condition to be silenced.

SW1 Settings

Sel #1: Open - Alarm Input High active
Closed - Alarm Input Low active

Sel #2: Open - Audible alarm on latched input (A) only
Closed - Audible alarm on both latched and non-latched

Sel #3: Open - Relay activated on latched input (A) only
Closed - Relay activated according to Sel #2 setting

12.2. ANN-6L Switch Configurations