Security Escort

SE3000 Series

en Hardware Installation Manual

Table of contents

1 About this manual

1.1 Agencies

Consult the documentation accompanying each component for specific listings.

1.2 General information

The purpose of this manual is to identify the components of the Security Escort system, provide installation instructions for those components as well as the system as a whole provide testing procedures for the system and its components, and provide a troubleshooting guide. The sections of this manual are as follows:

- *System overview, page 7*: This section provides a reference for estimating and ordering components for a Security Escort installation. Attention is given to relevant specifications of individual components to assist an installer in providing accurate bid estimation.
- *Equipment estimation, page 11*: This section serves as a guide to estimating the equipment needed in the system, the location accuracy to expect, and how to mount the SE receivers to achieve that accuracy.
- *Installation instructions, page 21*: This section provides an overview and quick reference for the overall installation of a Security Escort system. Consult the Installation Instructions that accompany each individual Security Escort component for specific installation and set-up instructions for that component.
- *System power-up and debug, page 30*: This section includes information on making the system “live” after all components are installed and wired.
- *Testing and troubleshooting, page 33*: This section provides procedures for ensuring that the system is “live” and functional. Also, a troubleshooting guide is provided in the event that some components do not respond to the system.
- *Appendix: SE coordinator information sheet, page 36*: The Appendix provides additional information and forms that may be useful before and during installation.

If you encounter any problems or questions that are not covered in this manual, contact Bosch Security Systems Technical Support at the phone number listed on the back page of this manual.

1.3 Safety symbols and their meanings

Throughout this document, the following symbols are used to alert the reader to safety issues when installing or operating the system:

Notice!
This symbol alerts the reader to possible equipment damage if procedures are not followed correctly. For example, “Do not connect the positive wire to the negative terminal.”

Caution!
This symbol informs the reader of possible bodily injury if procedures are not followed exactly. The text accompanying this symbol tells the reader what he should or should not do. For example, “Ensure that you are properly grounded before opening the unit.”

1.4 Conflicts with other documents

In addition to this manual, the installer is directed to review installation instructions that accompany individual components, and release notes. In the event of a discrepancy between the information provided in this document, and the information provided in a document accompanying a specific component (or release notes), the information contained in the installation instructions or release notes shall prevail.

1.5 Trademarks

Microsoft ® and Windows ® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

2 System overview

2.1 System component description

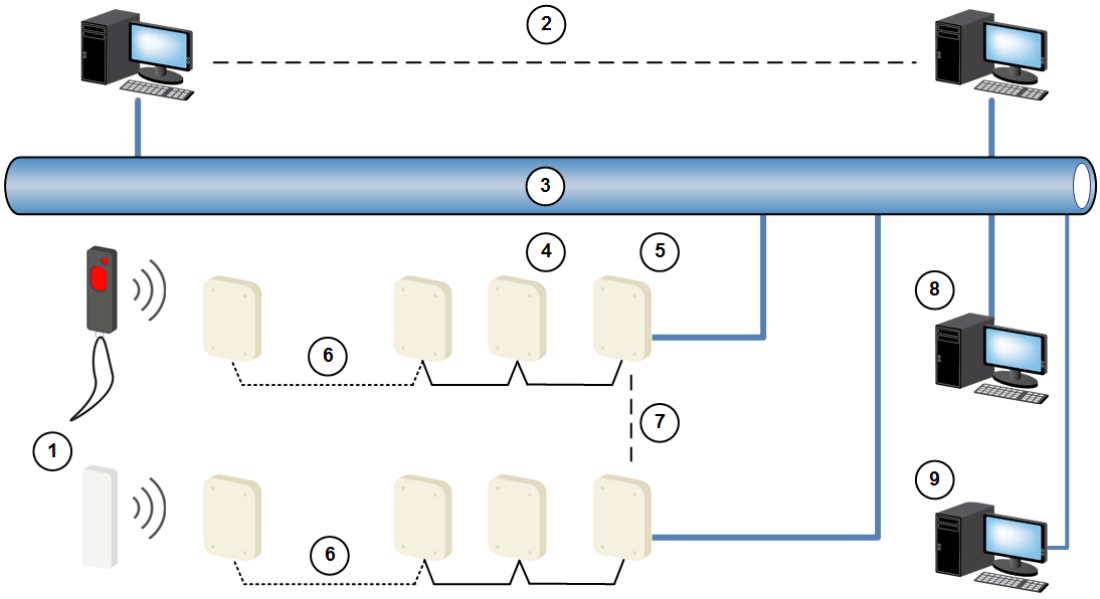


Figure 2.1: System Block Diagram

1	SE transmitters	6	Up to 15 SE receivers
2	Up to 8 workstations	7	Up to 1024 SE coordinators
3	LAN	8	Slave workstation
4	SE receivers	9	Master workstation
5	SE coordinator		

The Security Escort System consists of four basic components: SE transmitters, SE receivers, SE coordinators, and the Central Console.
The **SE transmitter** is a miniature, hand-held radio transmitter used to transmit either a distress or a test signal. The **SE receivers** are located throughout the protected area and detect the radio transmissions from SE transmitters. **SE coordinators** are devices that control groups of SE receivers, connected to them by wire. Each SE coordinator relays alarm and test signals from its SE receivers to the Central Console.
In addition, the SE coordinator tests for device and wiring faults, and transmits problem conditions to the Central Console. The **Central Console** consists of a computer (plus an optional backup and up to 8 optional workstations) which receives alarm and trouble signals from the SE coordinators, analyzes the signals, activates strobes and sirens, and produces a display for the Security dispatcher. Each of these system elements is described more fully in the sections that follow.

2.2 Compatible parts

The following table indicates the new parts available for inclusion in a Security Escort system.

Part Name	Description
Electronics, Components	

SE-COR-433	Electronics for coordinator
SE-RCV-433	Electronics for indoor or outdoor receiver
SE-TRM-433T01	Personnel transmitter
SEC-3402-433	Point tracking transmitter
SEC-RFPB60M-433	Pendant transmitter
Software	
SE2005	System software for up to 500 users
SE2010	System software for up to 1,000 users
SE2050	System software for up to 5,000 users

Contact Bosch Security Systems Customer Service or refer to website for the latest transmitter models.

The following table indicates the existing parts that are compatible with the new parts of the Security Escort system.

Part Name	Description
Enclosures and Housings	
AE3	Large enclosure, 51.5 cm x 37.5 cm (20.25 in x 14.75 in)
AE1	Small enclosure, 36.8 cm x 31.8 cm (14.5 in x 12.5 in)
AE_100	Indoor receiver enclosure
AE_101	Outdoor receiver enclosure

Contact Bosch Security Systems Customer Service or refer to website for up-to-date model numbers.

2.3 System components and specifications

2.3.1 Central Console

Description

The Central Console consists of one or two computers (and up to 8 additional workstations) running the Security Escort software within the Microsoft Windows environment. One computer serves as the master controller for the entire Security Escort system and the second slave computer serves as a back-up. The slave computer can be used for administrative functions such as adding subscribers or performing routine system tests without interfering with the operation of the main computer. The workstations can perform all normal Security Escort functions with the exception of communicating with the SE coordinators.

Software overview

The Central Console contains all of the operating software and all of the databases required by the Security Escort system. The installation and maintenance portion of the Security Escort software is designed to facilitate set-up and modification of the system and to provide rapid diagnosis of system problems, usually with only one person being required. The system software also continually monitors the status of each SE coordinator to ensure it is functioning correctly.

Versions

There are several versions of the software available. The number of users the system will support defines each version. The following table lists the available models and number of supported users:

Model	User Base
SE2005	500
SE2010	1,000
SE2050	5,000

Notice!

For systems supporting more than 5,000 users, contact Bosch Security Systems Sales.

Minimum system requirements

As a minimum, each computer in the Central Console should be equipped with the following features and components:

- **Processor:** Intel i5 and above
- **Operating system:** Microsoft Windows 7® 32/64-bit, Windows 8/8.1® 32/64-bit, Windows 10® 32/64-bit, Windows Server 2008, Windows Server 2012, Windows Server 2016 R2
- **Virtual operating system:** VMware® Workstation 12 Player or newer
- **RAM:** Minimum 2 GB, due to .NET requirement
- **Hard disk space:** 1 GB of hard disk space should be available to allow collection of historical data
- **Backup:** External backup drive for backup and history storage
- **Video:** Color depth of 32 bit should be used
- **Modem:** Optional V.32bis (14.4), V.34 (33.8), or V.90 (56.6) modem for remote access and pager dial-out. If modem is external an additional serial port is required.
- **Printer:** Network printers

2.3.2 SE coordinator

Description

The SE coordinator is a device controller for up to 15 SE receivers. Its primary function is to monitor the SE receivers and report conditions and events to the Central Console via Ethernet communication. It also provides power output to certain devices.

Compatible Enclosures	AE_100 indoor enclosure AE_101 outdoor enclosure
Temperature Range	-30°C to +65°C (-22°F to +149°F)
Primary Power Source	Power over Ethernet (PoE)
Secondary Power Source	24 VDC in
Input	2 analog inputs (4 state supervised monitoring)
Output	2 relay outputs (relay dry contact, 1A @ 30 VDC)
Antenna Type	Internal

Sensitivity Adjustments	-100 dB minimum
Communication Interface	Ethernet 10/100 BaseT (Central Console) RS-485 (SE receivers)
Frequency	433.42 MHz

Notice!
The SE coordinator, SE receiver and SE transmitters are only compatible with other equipment using the same radio frequency band.

2.3.3 SE receiver

Description
The SE receivers are located throughout the protected area, including building interiors. Each SE receiver contains a radio receiver to detect the transmissions from SE transmitters, and a microcomputer to decode and interpret the received test and alarm messages. In addition, the microcomputer monitors tampering and other problems, and reports such conditions to the SE coordinator.
Each SE receiver contains an internal self-contained sounder. These sounders are optionally activated if the SE receiver has detected an alarm transmission.
Indoor SE receivers are typically mounted on inside walls and are housed in small beige, rectangular units. Indoor SE receivers have one red and one green light. The green light is used to indicate a successful test of an SE transmitter; the red light is only illuminated during certain system tests and during alarms.
Outdoor SE receivers are contained in small weatherproof enclosures typically mounted on the sides of buildings and on light posts. Outdoor SE receivers do not have the visible red and green LEDs. Outdoors, the strobe lights connected to the SE receivers flash to acknowledge a successful test.

Compatible Enclosures	AE_100 indoor enclosure AE_101 outdoor enclosure
Temperature Range	-30°C to +65°C (-22°F to +149°F)
Power	24 VDC in
Input	2 analog inputs (4 state supervised monitoring)
Output	2 relay outputs (relay dry contact, 1A @ 30 VDC)
Antenna Type	Internal
Sensitivity Adjustments	-100 dB minimum
Communication Interface	RS-485 (SE coordinator/SE receivers)
Frequency	433.42 MHz

2.3.4 SE transmitter

The SE transmitters contain a unique code which is associated with the user at the time the transmitter is assigned. When the transmitter generates an alarm, this code is sent to the Central Console. The Central Console displays the transmitter location graphically on a map along with the user's picture, and his/her name, and any other necessary information.

3 Equipment estimation

A Security Escort system installation consists of three major steps:

1. the initial equipment estimate,
2. the pre-installation coverage verification, and
3. the post installation after survey.

The SE receivers work effectively in a wide variety of installations and can be placed with confidence provided these installation requirements are met. Therefore, It is acceptable to estimate the initial required equipment. To ensure proper coverage after proposal acceptance, potential SE receiver locations can be verified using a standard SE receiver in test mode or the portable test SE receiver before installation begins.

3.1 Location accuracy

The Security Escort system provides quick response to a duress call. Its intent is to dispatch a responding individual to an area without additional delay to their response to that duress call. The Security Escort system uses radio frequency (RF) for alarm transmissions. This is significant because it prevents normal construction from blocking the signal and helps to eliminate dead spots where the alarm could not be heard. The fact that RF energy passes through normal construction prevents Security Escort from locating an alarm with 100% certainty to a specific side of a wall. Alarms originating at or near building walls will typically be indicated within 7.5 m (25 ft) of the actual location. However, there may be times when the computed location may appear to be on the other side of the wall.
The Security Escort system was designed to provide a computed alarm location typically within 7.5 m (25 ft) of the actual location when indoors, and a computed alarm location typically within 15 m (50 ft) of the actual location outdoors. Any deviation from the following installation guidelines will degrade the computed location accuracy. Therefore, to achieve accuracy, the following installation guidelines must be adhered to.

3.2 Initial equipment estimate

3.2.1 Number of indoor SE receivers

To estimate the number of indoor SE receivers, read the Indoor SE receiver installation (Summary) first. Assume the SE receivers are placed on a grid with a maximum spacing of 25 m (80 ft) between SE receivers for standard construction. In multi-floor applications, the SE receivers on each floor must be placed directly above the SE receivers on the floor below (this is required for proper floor-to-floor location).
For example, to determine the number of SE receivers required to protect a building of standard construction of 60 m x 30 m (200 ft x 100 ft) and four floors:

1. To determine the number of SE receivers in each direction, divide each dimension of the building by 25 m (80 ft), drop the remainder, and add 1. For example:
   - 60 m/25 m = 2.4, becomes 2, add 1 = 3
     (200 ft/80 ft = 2.5, becomes 2, add 1 = 3)
   - 30 m/25 m =1.2, becomes 1, add 1 = 2
     (100 ft/80 ft =1.25, becomes 1, add 1 = 2)
2. To determine the number of SE receivers required per floor, multiply the number of SE receivers in one direction by the number of SE receivers in the other direction.
   Number of receivers per side x number of sides
   - 3 x 2 -= 6
   6 SE receivers per floor.

3. To determine the total number of SE receivers, multiply the number of SE receivers per floor by the number of floors.
   Number of receivers per floor x number of floors
   - 6 x 4 = 24
   24 SE receivers for the building

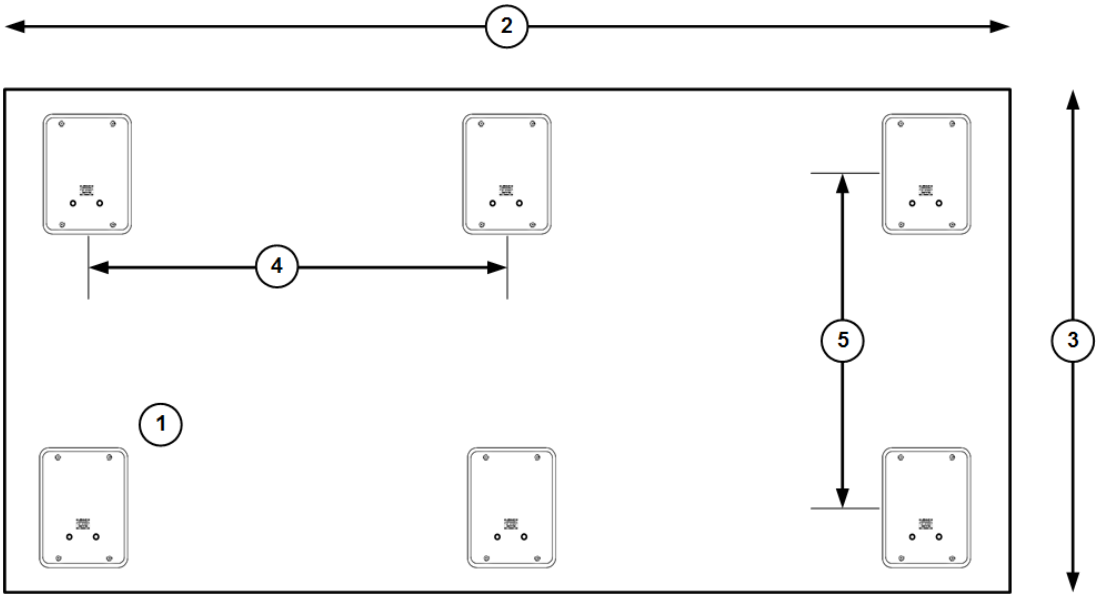


Figure 3.1: Determining the Number of Indoor SE receivers Required

1	SE receivers (6 units)	4	25 m (80 ft)
2	60 m (200 ft)	5	25 m (80 ft)
3	30 m (100 ft)		

For the best location accuracy, consistent SE receiver spacing is important. Do not place SE receivers significantly closer in one section of a building than another section.

3.2.2 Number of outdoor SE receivers

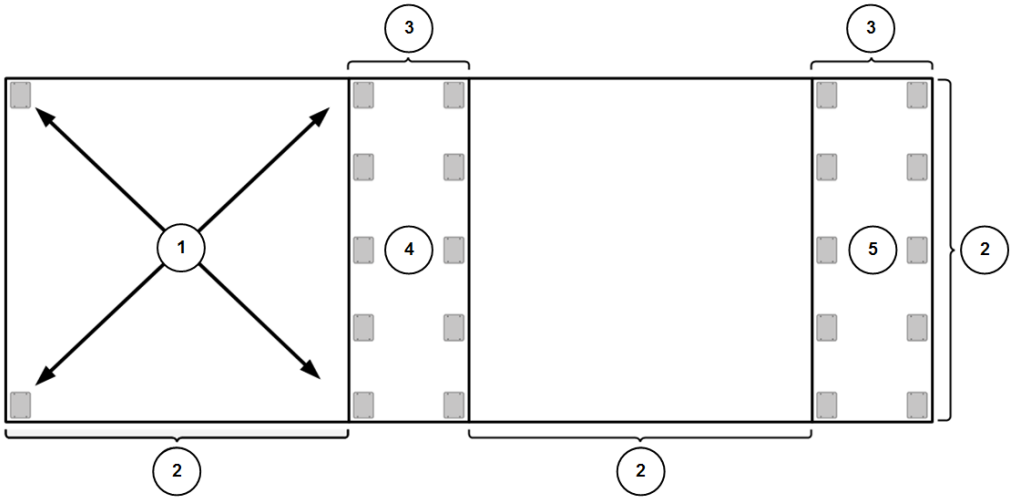


Figure 3.2: Number of outdoor SE receivers

1	SE receivers	2	90 m (300 ft)
3	30 m (100 ft)	4	Building 1
5	Building 2		

To estimate the number of SE receivers, read the Outdoor SE receiver installation first.
Assume a maximum SE receiver spacing of 90 m (300 ft) between SE receivers, in both directions, for SE receivers that are not within 30 m (100 ft) of a building with inside coverage. SE receivers within 30 m (100 ft) of a building should be spaced the same as SE receivers in the building (spacing the outside SE receivers at a somewhat larger spacing is acceptable in most cases).
An outside area directly between two buildings with inside protection will need no additional SE receivers if the buildings are 90 m (300 ft) or less apart. If the buildings are more than 90 m (300 ft) apart the outside SE receivers should be evenly spaced between the buildings.

Notice!
Make sure the standard 90 m (300 ft) spacing is not exceeded. For spacing outside adjacent to a covered building, start the 90 m (300 ft) spacing at the building wall.

3.2.3 Allowance for special coverage requirements

The number of SE receivers estimated above should be raised by 5% to allow for special coverage considerations and RF problem areas.

3.2.4 Number of SE coordinators and SE receivers

Assume that one SE coordinator will be installed per building for indoor installations. If wiring can be run from other buildings or from outdoor SE receivers, they may be connected to that SE coordinator. All outside wiring must be under ground, or in metal conduit.
Each SE coordinator can handle 15 SE receivers only. However, it is a good idea to leave some addresses available on each connection to allow for future expansion.

Bus wire
The recommended wiring for RS-485 communication is 24-AWG Cat5e or better, using 4-conductors, with unshielded twisted pair for indoor installations, and shielded twisted pair for outdoor.

3.3 Pre-installation coverage verification

The pre-installation coverage verification is performed before construction begins. It is done to determine the location of each SE receiver. Each SE receiver location should be checked using a standard SE receiver in the test mode.

3.3.1 Verify each potential SE receiver location

Using an SE receiver with ”receiver spacing” mode
”Receiver spacing” mode is enabled by setting switch number 1 of dip switch CFG2 on the SE receiver (see the Security Escort Coordinator & Receiver Installation Manual).
This mode is exactly the same as the “test” mode, except that the sounder is triggered for transmissions with an adequate receive margin. This indicates the maximum acceptable spacing of SE receivers. Use the following procedure to test the spacing of SE receivers:

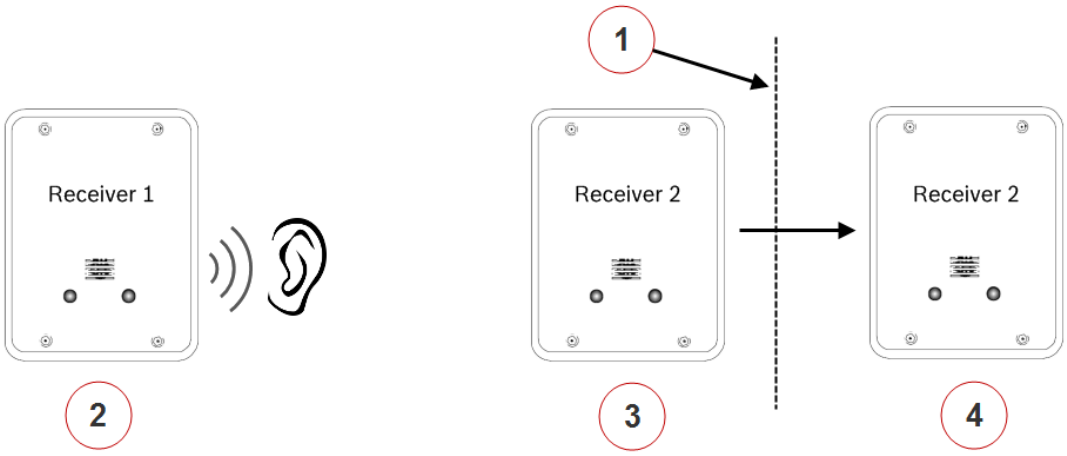


Figure 3.3: SE receiver Spacing

1	SE receiver 1 stops sounding the test beeps when SE receiver 2 is moved past this point	3	SE receiver 2 at maximum range
2	SE receiver 1	4	SE receiver 2 beyond maximum range

1. Mount the first SE receiver (SE receiver 1). Set switch number 1 of dip switch CFG2 to the ON position. Power the SE receiver from a 12 VDC source.
2. Take the second SE receiver (SE receiver 2) and an SE transmitter a distance away from the first SE receiver (SE receiver 1).
3. Activate the SE transmitter.
4. If SE receiver 1 sounds the test beep, SE receiver 2 is within range. Repeat this test until SE receiver 1 no longer sounds the test beeps. Move back to the last location where SE receiver 1 received the test beeps. This location marks the maximum spacing between the SE receivers. The distance between the SE receivers should not exceed 25 m (80 ft) indoors and 90 m (300 ft) outdoors. Mount SE receiver 2 at this location or closer to SE receiver 1.

Using an SE coordinator, SE receivers and laptop computer to determine SE receiver location.

Notice!
System software and area map must be installed on laptop computer to use this method.

Before the SE receivers are mounted, an SE coordinator with long RS-485 wires connected to the SE receivers can be used to see actual alarm location. Place the SE receivers in the proposed locations wired back to the SE coordinator. Program the SE receivers with their locations in the **Transponder Database**.
Using the maintenance SE transmitter and the maintenance alarm database, activate alarm transmissions within the area surrounded by the temporarily placed SE receivers. Verify that the location accuracy is acceptable at all points of concern. If not acceptable, move the SE receivers, update the SE receiver location in the **Transponder Database** and retest.
Do not test outside of the last SE receiver in any direction, as this will give incorrect locations. Repeat this test in all areas of different construction and concerns at the site.

3.3.2 Indoor SE receiver installation (Summary)

- Indoor SE receivers must be mounted in a evenly spaced grid no more than 25 m (80 ft) apart.
- Indoor SE receivers must be mounted 1.5 m to 1.8 m (5 ft to 6 ft) above the floor. This is true even if this is a single story building. Do not mount SE receivers above the ceiling or in roof rafters.
- In multistory buildings, the SE receivers must be mounted directly above the SE receivers on the floor below. The same number of SE receivers must be used on each floor level. If you meet all of the indoor installation guidelines, you can expect the computed location to indicate the correct floor about 95% of the time.
- SE receivers must not be mounted within 30 cm (1 ft) of any metal object, including wire mesh, metal foil, metal pipe and HVAC ducting in walls.
- Take care that large metal objects do not shield an SE receiver from a protected area. For example metal staircases, metal food serving lines, metal walls, lead lined walls, metal roofs, wire mesh in walls, walk-in freezers and refrigerators.

For the best indoor and outdoor location or an indoor only system

- Mount the indoor SE receivers on the recommended 25 m (80 ft) grid, with the last row of indoor SE receivers on the outside wall of the building. Do this even if the building is less than 25 m (80 ft) wide or long.
- There should be an SE receiver at each outside corner of a building.

Handling two protected buildings sharing a common wall with floor levels that do not match

- Ask the customer which building has areas of greater concern and favor the recommended mounting heights in that building.
- The recommended 25 m (80 ft) maximum indoor spacing grid should be maintained throughout both buildings as if the wall in question was not there. Mounting heights only for those SE receivers at or near (within 6 m [20 ft]) the wall in question should be affected. Mounting heights for all other SE receivers in the buildings must follow the indoor recommendation. Mark the recommended mounting height for SE receivers on the higher floor level and also mark the recommended mounting height for SE receivers on the lower floor level. Mount the SE receiver at its normal grid location midway between these two heights, but not above the ceiling level of the lower floor.

3.3.3 Outdoor SE receiver installation (Summary)

- Outdoor SE receivers must be mounted in a evenly spaced grid no more than 90 m (300 ft) apart.
- Outdoor SE receivers must be mounted 3 m (10 ft) above the ground.
- SE receivers must not be mounted within 30 cm (1 ft) of any metal object, including fences, metal walls and walls with wire mesh. If an SE receiver is mounted on a metal fence, that fence should be grounded (not floating or insulated from ground) and the SE receiver should be spaced 30 cm (1 ft) from the fence and 3 m (10 ft) above the ground.
- Take care that large metal objects do not shield an SE receiver from a protected area. For example; metal fences, metal staircases, metal buildings, power transformers and metal roofs.
- SE receiver locations should be below building overhangs and eaves as these can shield the areas below them.

– SE receivers should have a clear line of sight of the protected area. Therefore, take care where the ground is hilly or uneven, that there are no areas and low spots where several receivers can't hear the signal.

Transition areas between indoor and outdoor areas

– An outside area directly between two buildings with complete indoor protection will need no additional SE receivers between the buildings, if they are 90 m (300 ft) or less apart.
– When protecting an outside area directly between two buildings with complete indoor protection, and they are more than 90 m (300 ft) apart, place a row of outside SE receivers evenly spaced between the buildings. Make sure the SE receiver row does not exceed the standard 90 m (300 ft) spacing from the buildings. The spacing between SE receivers in that row should be about the same as the spacing for the SE receivers in the buildings.
– However, if a building is adjacent to an outdoor area, that building will have a greater density of SE receivers and, therefore, has a tendency to pull the computed location towards it. To counteract the building tendency to pull the location, consider the following special cases:
  – If the outdoor area adjacent to the building is wide open and the customer is not concerned about reduced location accuracy in this area, then nothing special needs to be done. Follow the normal indoor and outdoor recommendations.
  – The building is near the boundary of the protected area, with or without a fence at the boundary. The SE receivers at the boundary of the protected area near the building should be spaced about the same as those in the building, approximating the same grid as used in the building.
  – The building is adjacent to a large protected outdoor area that extends for more than 90 m (300 ft) from the building. The SE receivers in the large protected outdoor area should be placed on the normal 90 m (300 ft) grid except for the first row of SE receivers adjacent to the building. This first row of outdoor SE receivers in the transition area should "split the difference" between the indoor and outdoor spacing at about 60 m (200 ft).

Boundary areas at the outer edge of the protected area

The system cannot locate an alarm past the last SE receiver at the boundary of the protected area. Therefore, the last row of SE receivers must be at or past the end of the protected area.

3.4 Post installation after survey

3.4.1 Testing the location accuracy of an installation

Notice!

Before doing any of the following testing, it is important to verify that every SE receiver in the system is functioning correctly using the procedure described in the Security Escort Hardware Installation Manual and Software Installation Manual. Additionally, every SE receiver must be programmed in the **Transponder Database** with its actual physical location and floor level. **It is also important that SE receivers which are physically stacked directly above one another on floors of a building are also located at the same X and Y coordinates in the database**.

There are three methods that can be used to verify the location accuracy of an installed system, using a standard subscriber or maintenance SE transmitter. Repeat the chosen process throughout all protected areas. Ask the customer for the areas where they have special concerns and devote extra attention to those areas, since the customer is likely to be more critical in those areas.
Remember the intent of the Security Escort system is to dispatch a responding individual to an area that will not add additional delay to their response to that duress call. Therefore, the computed location should be considered to be in error only when it would add unacceptable additional time to the alarm response.
While testing, it is helpful to see which SE receivers are involved in the alarm response and the relative reception level they reported. To display the SE receivers, select menu **Utilities > Security Preferences**. Make sure the **No receiver icons** checkbox is not checked and click the **[Save]** button. Select menu **Setup > System Preferences.** If **Show test levels** and **Show maintenance levels** checkboxes are checked, the relative reception level is shown in the SE receiver icons; otherwise, the floor number will be shown.
When testing with any of the following methods, the SE transmitter must be used exactly as it would be used in normal operation. An SE transmitter designed to be belt mounted or used in a holster must be in its normal mounting attitude and be worn on the belt of the individual originating the test transmissions. Handheld SE transmitters must be held in the hand about waist high, never held above the head.

Using a standard subscriber SE transmitter

1. This method requires two people with radio contact between them. One person operates the computer running the Security Escort software, and the other takes the subscriber SE transmitter to the area to be tested.
2. Press the alarm on the SE transmitter and remain at the spot where you transmitted.
3. The computer operator acknowledges the alarm and accurately describes the computed location over the radio. The individual with the SE transmitter should confirm the reported location or describe over the radio the actual location. Either individual must record all discrepancies, including the actual and computed locations.
   We recommend using a map or floor plan and drawing an arrow from the actual alarm location to the reported location. It is also helpful if all successful alarm locations are marked with a **P** (passed), then the alarm can be reset from the computer screen.
4. For areas where there are alarm location problems, try facing in different directions in the same spot. Also generate additional alarms from different spots to fully understand the extent of the problem. You should generate alarms in areas adjacent to the area with the problem to see if they are also affected.

Using a maintenance SE transmitter with only one person

1. The Security Escort software retains the last 50 maintenance alarm locations. Make sure you are the only one using a maintenance SE transmitter on site, buddy check is off, and that you limit yourself to a maximum of 50 maintenance alarms per sequence.
2. Synchronize the time on your watch to the computer. Carry a detailed map or floor plan of the area to be tested that you can write on.
3. Take the maintenance SE transmitter to the area to be tested. Press the alarm on the SE transmitter and accurately mark the spot on the map where you transmitted with a “1” (for the first transmission). Also record the time of the first transmission only.

4. Continue to the next location, transmit and mark that spot on the map with a “2.” Repeat the process throughout the area to be tested, being sure not to exceed 50 alarm transmissions and making sure that at least 10-sec. elapse between transmissions.
5. When finished, return to the computer and select menu **File > Maintenance Alarm Database**. Scroll through the alarm list to find the alarm that matches the time of your first transmission. This is the maintenance alarm that you marked as “1” on your map.
6. Confirm that the actual location from the map matches the reported location.
7. If the actual location differs from the reported location, draw an arrow on the map from the actual location to the reported location. Press the up arrow once to go to the next alarm. Compare the locations, drawing an arrow to the reported location if they differ. Repeat this procedure for all points on your map, making sure that the points on the map stop when you run out of entries in the scrolling list on the computer screen. Otherwise, the points on the map and the screen are out of sync and the errors on your map are incorrect and misleading.
8. For areas where there were alarm location problems, you may want to repeat the above process facing in different directions from the same spot. This generates additional alarms from different spots in the problem areas to fully understand the extent of the problem.
9. You should also generate alarms in areas adjacent to the area with the problem to see if they are also affected.

Using a maintenance SE transmitter with two people

1. The two people must have radio contact between them. One person operates the computer running the Security Escort software and the other takes the maintenance SE transmitter to the area to be tested.
2. At the computer, select menu **File > Maintenance Alarm Database**. Make sure the top item in the scrolling list is selected.
3. Press the alarm on the SE transmitter and remain at the spot where you transmitted. At the computer, observe the alarm and accurately describe the computed location over the radio. The individual with the SE transmitter should confirm the reported location or describe the actual location over the radio. Either individual must record all discrepancies, including the actual and computed locations. We recommend using a map or floor plan and drawing an arrow from the actual alarm location to the reported location. It is also helpful if all successful alarm locations are marked with a **P** (passed).
4. For areas where there are alarm location problems, try facing in different directions from the same spot.
5. Generate additional alarms from different spots to fully understand the extent of the problem.
6. You should generate alarms in areas adjacent to the area with the problem to see if they are also affected.

Reviewing potential problem areas

Review the potential problem areas on the maps with the customer to see which areas cause them concerns, and which areas they consider acceptable. If the customer considers an area acceptable, it is typically not worth spending additional time trying to improve the location accuracy in those areas.

3.4.2 Improving the location accuracy of an installation

Once we have identified those areas that must be improved, what are the options to improve the computed location accuracy?

Notice!
All changes using the following steps could potentially change the computed locations for all alarms at or around the changed area. Therefore, after any change is made, the entire vicinity around the changed area must be verified.

- Typically the first thought is to add more SE receivers in the problem area. Generally this is a bad approach. If the system was properly designed using the recommended grid layout, adding extra SE receivers in any area of the grid will distort the response in adjacent areas and floors. While it may seem to fix the problem area, typically it will create more problems in adjacent areas. The exception is when an area is shielded by something such as wire mesh in the walls that prevent the RF transmitted signal from passing through. Therefore, additional SE receivers may have to be added in the shielded area to ensure that all alarm transmissions will be heard.
- Verify that the location of the SE receivers in the **Transponder Database** is accurate to their physical location, and the SE receivers are indicated to be at the correct floor level. It is also important that SE receivers that were physically stacked directly above one another on floors of a building are also located at the same X and Y coordinates in the database.
- Try changing the **Transponder Database** location of SE receivers (not the actual physical location) one at a time while testing the alarm location response, using one of the testing methods above. For example, if alarms are getting pulled outside a building in one area, move the closest SE receiver (in the **Transponder Database**) to that area a little further into the building and retest. If the area can be corrected using this method, verify the surrounding areas to make sure they were not adversely affected. It is generally better if the correction is done in small steps while verifying the adjacent areas, rather than trying to correct the entire error in one step.
- The Security Escort software allows individual SE receiver sensitivity to be set in the **Transponder Database**. SE receivers can be adjusted from 50% to 149% of their normal sensitivity. No physical SE receiver changes or upgrades are required. Try changing the **Transponder Database** sensitivity of SE receivers one at a time while testing the alarm location response, using one of the testing methods above. For example if alarms are being pulled towards a particular SE receiver, lower its sensitivity in 10% increments and retest. If the area can be corrected using this method, verify the surrounding areas to make sure they have not been adversely affected. **It is generally better if the correction is done in small steps while verifying the adjacent areas, rather than trying to correct the entire error in one step**.
- There are five different location algorithms that can be selected on an individual receiver basis in the **Transponder Database**. “Classic” (original Security Escort algorithm), “Linear”, “Low“ pull, “Medium” pull and “Strong” pull. By default, when an SE receiver is set for outside or tunnel, it will use the “Linear” algorithm and all other SE receivers will use the “Low” pull algorithm. The SE receiver that hears the alarm transmission the strongest will determine the algorithm used for this alarm. Changing the **Transponder Database** algorithm setting for an SE receiver only affects the location when the alarm is close to this SE receiver and it hears the alarm the strongest. Change the **Transponder Database** algorithm setting for an SE receiver and test in its area, using one of the testing

methods above. The stronger the pull the more the alarm will be pulled towards the SE receiver, with “Linear” having no extra pull. Verify the surrounding areas to make sure they have not been adversely affected.

– The five different location algorithms can individually limit how close other SE receivers must be to the level of the SE receiver hearing the alarm the best, before they will be included in the alarm. “Classic” (original Security Escort algorithm), “Linear”, “Low” pull, “Medium” pull and “Strong” pull each have a separate setting. By adjusting this setting you can control if distant SE receivers with low receive levels will be considered in the alarm calculation.
– You can add “Virtual” receivers in the **Transponder Database**. A “Virtual” receiver is added at one of the 15 points allowed per SE coordinator. However, there is no physical hardware used. The “Virtual” receiver is intended to compensate in cases where there is an SE receiver imbalance. For example if a building with a dense population of SE receivers is adjacent to a fence with few SE receivers and an alarm occurs between them; the alarm location may pull towards the building. The “Virtual” receiver references to other physical SE receivers that must be on the same SE coordinator. Only if both of the referenced SE receivers receive an alarm transmission, then the “Virtual” receiver will be added to the alarm as if was a physical SE receiver that heard the alarm at the average receive level of the two reference receivers.
  The “Virtual” receiver’s location and sensitivity may be adjusted the same as a physical SE receiver. After a “Virtual” receiver is added, verify the surrounding areas to make sure they have not been adversely affected. **In no event should a “Virtual” receiver be utilized as a cost savings measure to avoid the installation of an actual SE receiver**.

4 Installation instructions

4.1 Overview of installation process after survey

This section includes information about the installation and setup of the individual components and system wiring. It is recommended that the installation instructions that accompany each specific component be consulted prior to beginning any phase of the installation.

A typical installation proceeds in the following order:

1. The site survey is completed, indicating the proposed location of each component.
2. Wiring runs to all of the proposed component locations and the Central Console.
3. Empty enclosures are installed as specified in the site survey.
4. The components are secured inside the enclosures and connected to the previously run wiring. The individual components are set up and their addresses recorded.

Notice!
Use the SE Coordinator Information Sheet, located in the Appendix of this document, to keep track of SE receiver addresses and location for programming the **Transponder Database**.

5. The recorded addresses are entered into the Central Console and the system is brought on-line.
6. The system is tested and tuned up as needed.

4.2 Run system wiring

4.2.1 General guidelines

After the site survey (and special pre-installation verifications) has been completed, the wiring can be run between the proposed locations of the system components and the Central Console. See specific installation instructions accompanying each component for wiring details.

The following table indicates the specifications for the wiring:

From	To	Signal Type	Gauge	Max. Length	Remark
SE coordinator / SE receiver	SE receiver	RS-485	#24	1000 m per bus	Twisted pair Cat5e cable recommended. Shielded cable may be required for outdoor use.
	Power Supply	Power	#18	Please refer to the sections below for detailed specification.	
			#24		
	Input 1 or 2	I/O	#18	15 m	Solid, not twisted, not shielded
	Output 1 or 2	I/O	#18	15 m	Solid, not twisted, not shielded
SE coordinator	Host PC	Ethernet / PoE	Cat5e UTP	100 m	Shielded cable may be required for outdoor use

Tab. 4.1: Specifications for Wiring

4.2.2 Indoor wiring diagram with APS-PSU-60 using 18 AWG

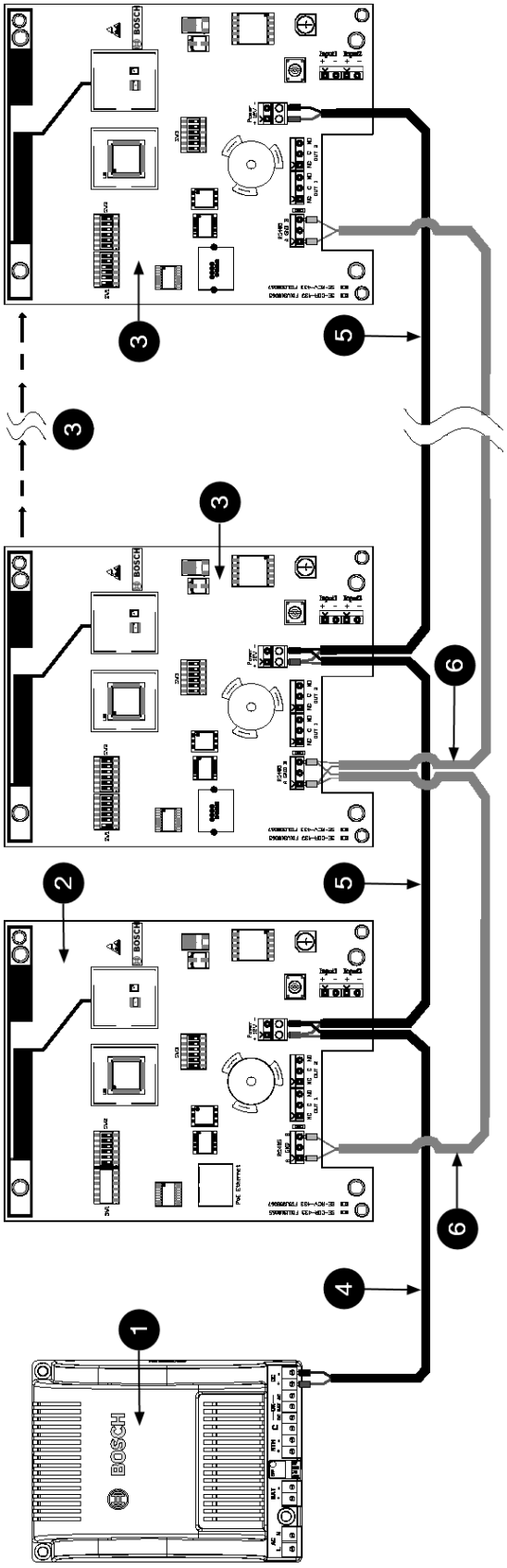


Figure 4.1: Wiring diagram example for indoor configuration using 18 AWG cable for input power

Item	Specification	Description	Quantity	Remarks
1	APS-PSU-60	Power supply	1	Output voltage set to 24V mode
2	SE-COR-433	SE coordinator board	1	
3	SE-RCV-433	SE receiver board	Up to 15	Maximum number of SE receivers that can be connected to the SE coordinator
4	18 AWG, 2 wires not twisted multi strands	15 m power cable from power supply to SE coordinator	1	Wire color: - red for (+) input - black for (-) input
5	18 AWG, 2 wires not twisted multi strands	24 m power cable from SE coordinator / SE receiver to SE receivers	Up to 15	Wire color: - red for (+) input - black for (-) input
6	4x2x24 AWG, Cat5e twisted multi strands	24 m twister pair RS-485 cable from SE coordinator / SE receiver to SE receivers	Up to 15	Wire color: - orange/white for RS-485 (A) - white/orange for RS-485 (B)

Notice!
Wire colors of Cat5e cable mentioned above may differ in other countries, depending on color coding standard.

Notice!
Please refer to the PSU-60 - AMC Power Supply Unit Quick Installation Guide for the configuration of APS-PSU-60.

4.2.3 Indoor wiring diagram with APS-PSU-60 using 24 AWG cable

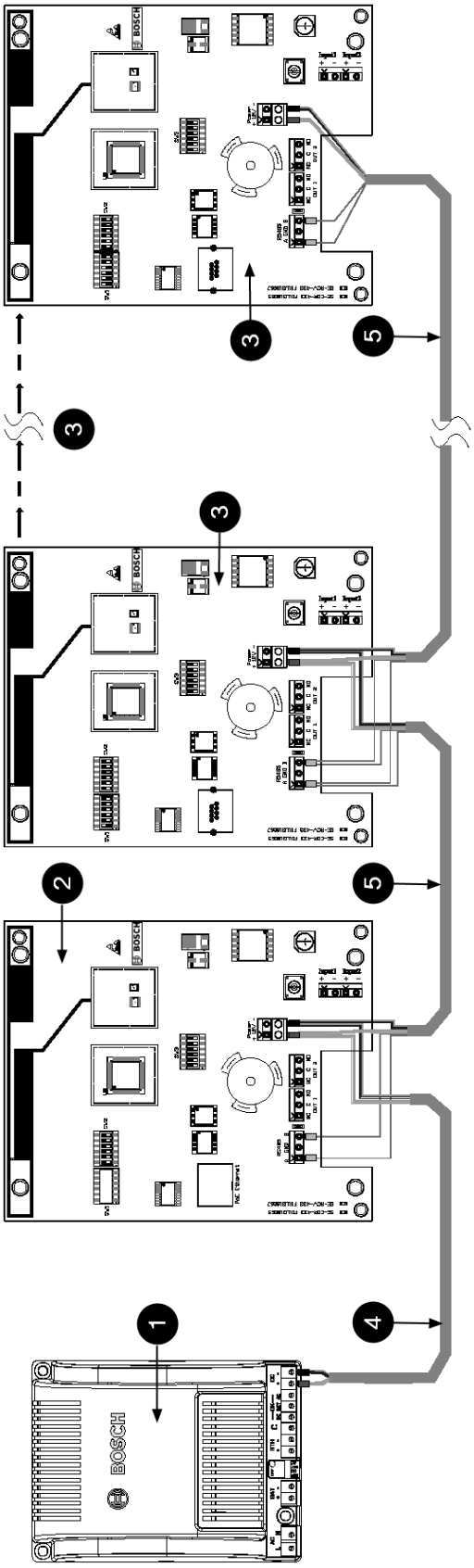


Figure 4.2: Wiring diagram example for indoor configuration using 24 AWG cable for input power

Item	Specification	Description	Quantity	Remarks
1	APS-PSU-60	Power supply	1	Output voltage set to 24V mode
2	SE-COR-433	SE coordinator board	1	
3	SE-RCV-433	SE receiver board	Up to 15	Maximum number of SE receivers that can be connected to the SE coordinator
4	4x2x24 AWG, Cat5e twisted multi strands	15 m power cable from power supply to SE coordinator (**use 3 pairs**)	1	Wire color: - brown/white and white/brown and green/white for (+) input - blue/white and white/blue and white/green for (-) input
5	4x2x24 AWG, Cat5e twisted multi strands	24 m power cable from SE coordinator / SE receiver to SE receivers (**use 3 pairs**) - 1 twisted pair for RS-485 communication	Up to 15	Wire color: - brown/white and white/brown and green/white for (+) input - blue/white and white/blue and white/green for (-) input - orange/white for RS-485 (A) - white/orange for RS-485 (B)

Notice!
Wire colors of Cat5e cable mentioned above may differ in other countries, depending on color coding standard.

Notice!
Please refer to the PSU-60 - AMC Power Supply Unit Quick Installation Guide for the configuration of APS-PSU-60.

4.2.4 SE coordinator/SE receiver wiring notes

Connect the SE receivers to the SE coordinator as a connected series of point-to-point (multi-drop) nodes. The recommended cable wiring can be found in the Wiring Guidelines table.
The SE coordinator and SE receivers communicate with each other using the RS-485 interface. The communication connector is identified by their 3 terminal points, namely A, GND and B.
The recommended data transmission speed is 19200 bps @ 1km (default) and 115 kbps @ 500m. Please refer to the table below for the full range of data transmission speeds:

Data transmission speed (bps)	Range (m)
19200	1000
38400	900
57600	800
115200	500

Tab. 4.2: Range of data transmission speeds

The recommended wiring for RS-485 communication is 24-AWG Cat5e using 4-conductors, with unshielded twisted pair for indoor installations, and shielded twisted pair for outdoor installations.

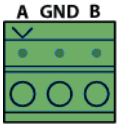


Figure 4.3: RS-485 Connector

4.3 Mounting the enclosures

4.3.1 AE_100 indoor enclosure

The AE_100 Indoor Enclosure houses the SE coordinator/SE receiver. It is suitable only for indoor installation. Use the security hex driver to secure the face of the enclosure to the body.

Notice!
Refer to the *Pre-installation coverage verification, page 13* for specifications and methods for achieving optimum SE receiver placement.

When mounting the enclosure to a pre-wired electrical box, make sure that the electrical box has a 15 cm (6 in.) overhead clearance. The enclosure should be mounted as shown in the figure below.

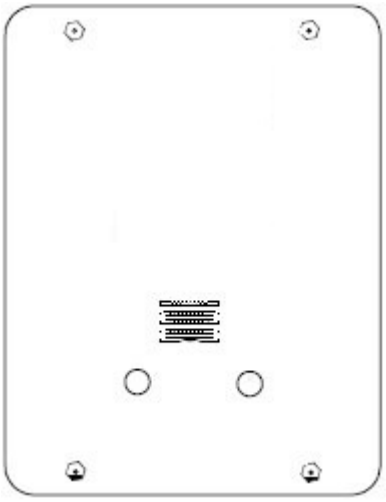


Figure 4.4: AE100 Enclosure (Front)

Recommended mounting

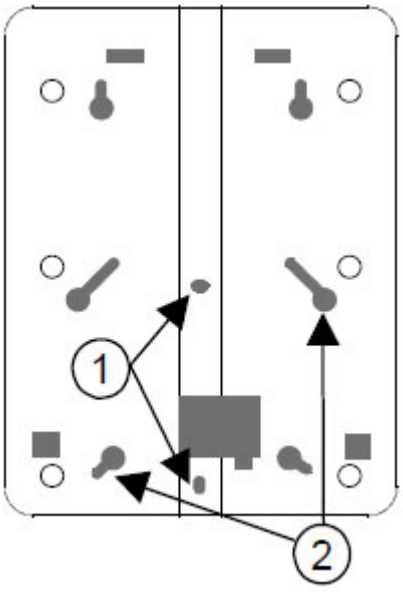


Figure 4.5: AE100 Enclosure (Back)

1	Use with single-gang electrical box.	2	Use with 9 cm (3.5 in.) square electrical box.

4.3.2 AE_101 outdoor enclosure

This AE_101 enclosure houses the SE receiver. It is suitable for outdoor installation.

Notice!
Do not use this enclosure if you intend to allow user feedback through the sounder and LEDs of the receiver.

4.4 Mounting and setting up components

4.4.1 SE coordinator installation

Normally, the enclosures are mounted first with the laying of cables and wires. Then, the electronics are mounted, wired, and tested.

– Mount the enclosure to the mounting surface.
– Mount the circuit board to the enclosure.

Notice!
The address of the SE coordinator cannot be configured and is fixed as 0.

4.4.2 SE receiver installation

Mount the electronic assembly to the enclosure. Leave at least 10 cm (4 in.) of wire hanging out of the unit. Do not leave extra wire inside the enclosure as this could impact the receiving antennas.
Every SE receiver on each communication bus of the SE coordinator must have its own address. Set the address on the SE receiver using the dip switches. See the Security Escort Coordinator & Receiver Installation Manual.

Notice!
Use only address numbers 1 through 15. Do NOT use address number 0 (reserved for SE coordinator).

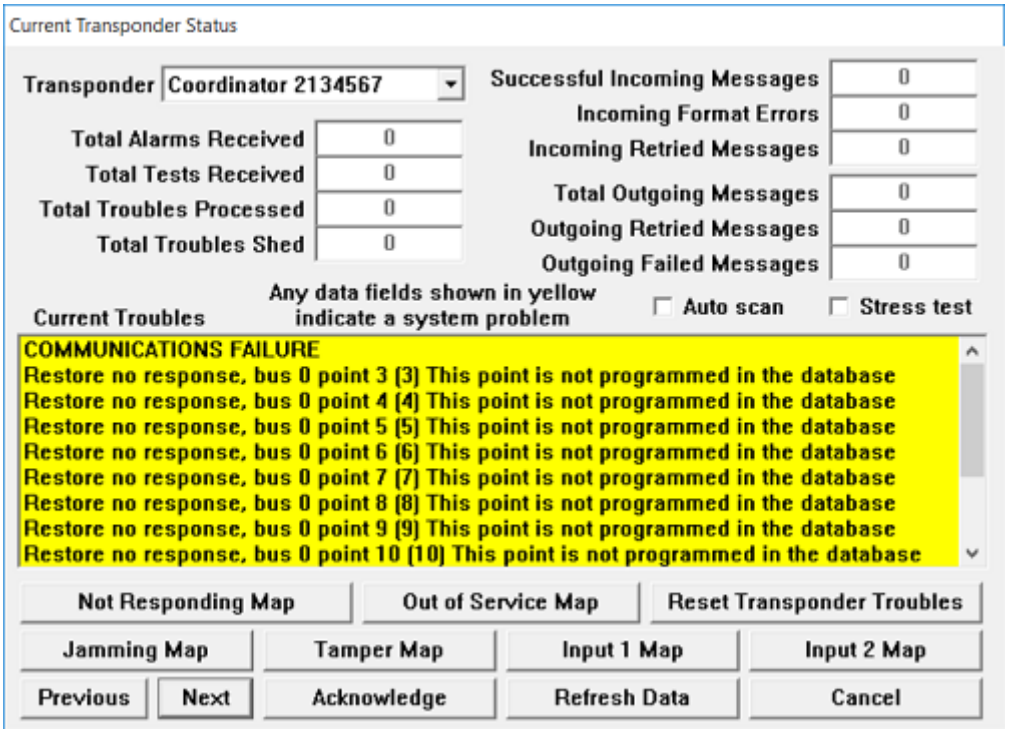
5 System power-up and debug

5.1 Initial system configuration

This is performed to check the hardware device and its wiring installation.

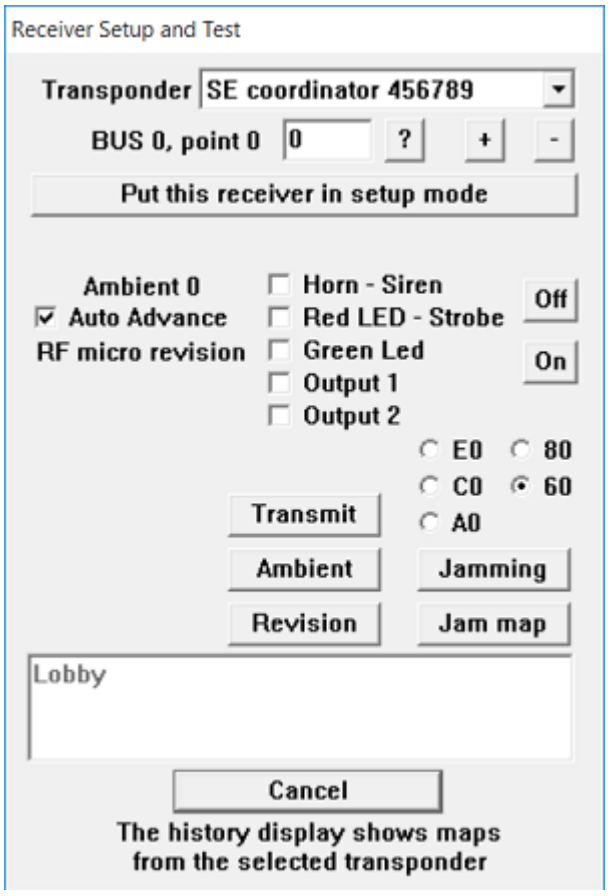
5.2 Powering up the system for the first time

1. Ensure SE coordinator and receiver are powered up.
2. In the Security Escort Central Console software, select the menu **Setup > Transponder current status**. The following window appears:



3. Select the desired SE coordinator from the **Transponder** drop-down list box.
4. Click the **[Reset Transponder Troubles]** button. If the selected SE coordinator is communicating with the Central Console, the number “g1” will appear in the **Total Outgoing Messages** and **Successful Incoming Messages** fields. The SE coordinator is now communicating with the Central Console software. If the number “1” only appears in the **Total Outgoing Messages** field, there might be a problem between the Central Console and the SE coordinator (refer to the section Troubleshooting SE coordinators, points and SE receivers of this manual and locate the problem).
5. Check the **Stress test** checkbox. This tests the communications reliability by causing the Central Console software to send a continuous stream of messages to the selected SE coordinator. The values in the **Successful Incoming Messages** and **Total Outgoing Messages** fields should start counting up rapidly, with few, if any errors. It is normal to have slightly fewer **Total Outgoing Messages** than **Successful Incoming Messages**. If the errors are greater than 1% of the number of messages, then refer to the section Troubleshooting SE coordinators, points and SE receivers of this manual and locate the problem.
6. After the stress test runs, any current troubles are displayed. Correct any troubles at this time. Run the “Auto scan” process to sync with the actual status of the SE coordinators after resetting the troubles, or programming the SE coordinators in the Database.

7. To verify the RF reception, LED and sounder operation, and location of each SE receiver, select the menu **Setup > Receiver configuration**. The following dialog window appears:



8. Select the desired SE coordinator from the **Transponder** drop-down list box.
   - Click the **[?]** button next to the **point number** field. A grid of bus and point numbers appears showing the programmed SE receivers.
   - Click the lowest point number button. If the first SE receiver is MUX point zero (0), click the **[0]** button. If the first SE receiver is point one (1), click the **[1]** button. The point number is automatically entered.
   - Click the **[Put this receiver in setup mode]** button. The red and green LED light up for the selected SE receiver on the selected SE coordinator.
   - Take the maintenance SE transmitter and go to the selected SE receiver. The red and green LED should be lit when you arrive at the first SE receiver location.
   - Transmit an alarm from the maintenance SE transmitter. The SE receiver should activate by flashing the red LED and activate the sounder (if the sounder jumper is in place on the SE receiver). This confirms that the RF portion of the SE receiver is working and you are at the right location. The software then turns off the LEDs on the tested SE receiver. The SE receiver with the next higher point number is automatically selected and its red and green LED lights up.
   - Proceed to that SE receiver and perform the same operation with an alarm on the maintenance SE transmitter until the operation of all SE receivers is confirmed and all SE receivers are working and in their proper location on that SE coordinator. If the LED fails to light up, the LED jumpers may be missing on that SE receiver, the SE receiver may be set to the wrong address, or you may be at the wrong location. If the

LED are lit but the SE receiver fails to respond to the maintenance alarm, there may be a problem with the SE receiver board or another SE receiver is receiving a stronger signal.

9. Repeat the sequence above starting with step 1 for all other SE coordinators and SE receivers in the system.

6 Testing and troubleshooting

6.1 Built-in troubleshooting aids

Notice!
For wiring troubleshooting, refer to the section Troubleshooting reference of this manual where applicable.

Notice!
For SE coordinator and SE receiver troubleshooting, refer to the Security Escort Coordinator and Receiver Installation Manual where applicable.

6.2 Troubleshooting reference

Symptoms	Probable Cause	Possible Solutions
SE coordinator not responding.	No power to SE coordinator.	If powered by Power over Ethernet (PoE), check that the Cat5e cable or the power sourcing equipment (for example, the network switch supplying the PoE) is not faulty.
		If powered by DC input, check power for 10.8V DC to 13.2V DC. If lower than 10 V or no voltage present, check wiring on power side of SE receiver, repair or replace cable.
	Defective SE coordinator.	If power is present and SE coordinator is not responding, replace SE coordinator.
SE coordinator intermittently not responding.	Moisture on circuit board.	Seal housing where moisture is entering enclosure. Replace SE coordinator until the old one dries out.
	Bad splice to SE coordinator.	Check all splices to make sure cables are tight and not loose causing high resistant open.

Symptoms	Probable Cause	Possible Solutions
	Defective SE coordinator.	If power is present and SE coordinator is intermittently not responding, replace SE coordinator.
SE coordinator LEDs not working.	Defective SE coordinator.	Replace the SE coordinator.
SE coordinator LEDs all lighted up.	Incorrect address.	Check that addresses of SE coordinator and the SE receivers are correct. If addresses are correct, replace SE coordinator.

Tab. 6.3: SE coordinator issues

Symptoms	Probable Cause	Possible Solutions
Single SE receiver not responding in a connected bus network.	Incorrect address.	Check the address of SE receiver configured on the dip switch.
	No power to SE receiver.	Check power for 10.8 V DC to 13.2 V DC. If lower than 10 V or no voltage present, check wiring on power side of SE receiver, repair or replace cable.
	Defective SE receiver.	If power is present and address switch is configured correctly, replace SE receiver.
Single SE receiver intermittently not responding.	SE receiver is located past the 1000 m (3300 ft) maximum cable run.	Re-position the SE receiver within the recommended spacing.
	Moisture on circuit board.	Seal housing where moisture is entering enclosure. Replace SE receiver until the old one dries out.
	Bad splice to SE receiver.	Check all splices to make sure cables are tight and not loose causing high resistant open.
	Defective SE receiver.	If power is present and address switch is configured correctly, replace SE receiver.

Symptoms	Probable Cause	Possible Solutions
SE receiver jamming.	Electrical equipment in area causing jamming on SE receiver.	Go to the software dialog **Setup** r**eceiver configuration**. Increase jamming threshold by one degree at a time until jamming stops and SE receiver returns to normal. If jamming persists after increasing level, relocate SE receiver or attempt to identify and minimize the jamming source.
SE receiver LEDs not working.	Defective SE receiver.	Replace the SE receiver.
SE receiver's sounder not operating.	Switch 6 on dip switch CFG1 in "OFF" position on SE receiver.	Remove the cover, check dip switch CFG1 and make sure switch 6 is set to "ON".
	"Run Silent" is turned on in the Central Console software.	At the Central Console, select menu **Setup** > **Transponder Parameter** dialog and un-check the **Run Silent** checkbox.
	Defective SE receiver.	If the sounder still does not operate after performing the steps above, replace the SE receiver.

Tab. 6.4: SE receiver issues

7 Appendix: SE coordinator information sheet

SE coordinator ID:		**SE coordinator Location:**	
Transformer for SE coordinator Location:			
Breaker Panel Location:		**Breaker Number:**	
Siren/Strobe Output To:			
SE receiver Locations:			
Point #1:			
Point #2:			
Point #3:			
Point #4:			
Point #5:			
Point #6:			
Point #7:			
Point #8:			
Point #9:			
Point #10:			
Point #11:			
Point #12:			
Point #13:			
Point #14:			
Point #15:			
Location of Splices:			

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