

# OPERATION MANUAL

## SA611, SA612, SA613

### EMITTER PANELS



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## INTRODUCTION

The Sound Associates SA611, SA612, and SA613 are high-powered infrared emitter panels. The emitter panel transforms a frequency modulated signal, generated by an infrared modulator or transmitter, into infrared light invisible to the naked eye. In contrast to a radio system, the transmission is contained within the room it is broadcast; therefore, adjacent rooms can utilize the same infrared frequency without interference.

The 600 Series emitter panels work in conjunction with the SA601F Transmitter, PS24 Power Supply, and SA650 Series Receivers. These emitters are powered by 24 to 30 volts DC from an emitter power supply and activated by the carrier signal from the transmitter. One power supply can power a total of 200 diodes. Therefore, each power supply will power a maximum of either four SA611's, two SA612's, one SA613 and one SA611, or any combination.

To ensure proper set up and use of the system, the following instructions should be read completely before attempting to install any equipment. If you require further assistance, please call our Customer Service Department Monday-Friday 10:00 am - 5:30 pm at (888) 772-SOUND (7686).

## INFRARED LISTENING SYSTEM 600 FEATURES

### Infrared Technology

| Feature   | Advantage  |
|---|--|
| Wireless Receivers  | No pre-registered seating<br>No "deaf section"<br>Easy distribution  |
| Wireless signal transmission by Infrared light as compared to RF transmission | Confidentiality; signal will not pass through walls or curtains<br>No interference from common radio signals<br>Superior audio quality |
| The audio signal is frequency modulated at 95 kHz or 250 kHz                  | Industry standard<br>Headsets are interchangeable with other home and large area systems   |

### SA611, SA612 & SA613 Emitter Panels

| Feature   | Advantage  |
|---|--|
| Powered by low voltage  | Eliminates the need for 120 VAC at each emitter location<br>Reduces installation time and cost |
| Infrared diodes are activated when modulated audio signal is present        | Lengthens diode life<br>Helps troubleshoot wiring problems                                     |
| Fault Circuit   | Indicates diode or voltage regulator failure   |
| New switching voltage regulator   | Increases efficiency by 20%  |
| Removable front plate   | Allows for painting of emitter panel to blend into its surroundings                            |
| Connected to power supply via a single 18-gauge, 2-conductor shielded cable | Supplies low voltage and audio signal via one cable<br>Saves on installation time and cost     |
| Full three-year warranty  | Insures years of trouble free use  |

## UNPACKING UNIT

As soon as the shipment is received, inspect the unit and all components for damage incurred by shipping. If the unit is damaged due to shipping, please keep all packing material and contact the shipping company as soon as possible. Only the consignee may institute a claim against a carrier if damage has occurred in shipping, however, Sound Associates will assist the client in any such event.

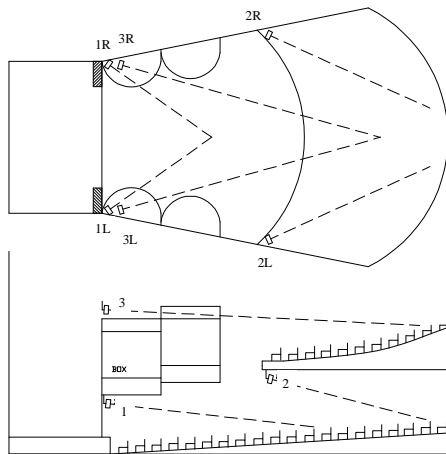
Equipment enclosed:

- 1 SA611, SA612 or SA613 Emitter Panel
- 1 Instruction manual
- 3 Emitter Cable Stake-ons

If the unit fails to operate up to specification please contact your nearest Sound Associates dealer or Sound Associates' Customer Service Department at (888) 772-SOUND (7686).

## INSTALLATION DESIGN/EMITTER POSITIONING

One of the most important parts of the installation is the emitter layout. The emitters produce the infrared light on which the audio signal is carried and must be in direct view of the seating area. The carrier behaves like visible light. A blocked emitter will cause a shadowing effect on the audience, allowing only the non-shadowed areas to receive the audio signal. The installation design must take into consideration the seating rake, any balconies or overhangs, columns, and any projections that may obstruct the infrared light.

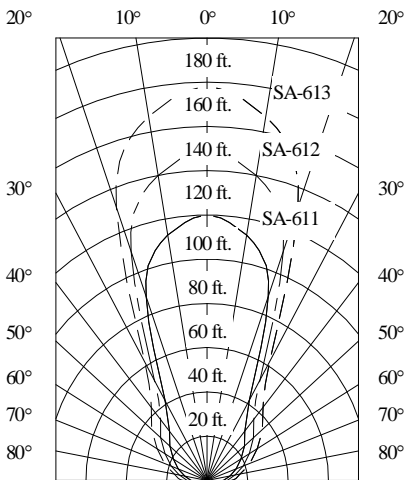


This figure shows the emitter layout for a large theater with one overhang and approximately 1000 seats. You will notice the emitter is positioned over the last seat it is to cover, and faces into the seating area causing a crisscross of the emitter radiating patterns. The crisscross configuration of the emitter panels usually covers the most area per emitter while overlapping infrared signals. This allows the same seat to be covered by two or more emitters so a temporary obstruction, such as a person or scenery (between the receiver and the emitter), will not alter the reception.

When designing an infrared listening system for any space the five points that must be considered are: 1) the room size, 2) the seating rake, 3) obstructions, 4) the wall color, and 5) extraneous light.

### Room Size

The sheer size of the room in which the infrared system will be installed is the largest consideration in the emitter design. This section determines which emitters to use and how many. The following figure is the radiating pattern of the SA611, SA612, and SA613 emitter panels. The SA611, SA612, and SA613 cover approximately 3,000 sq. ft., 6,000 sq. ft., and 9,000 sq. ft. respectively. However, the room's square footage does not necessarily correspond directly to the emitter coverage. Therefore, the coverage pattern should be laid over a plan of the space to be designed to make sure every seat is covered. Although the emitters cover a large area, it is always better to over design with a line of sight system.



### Seating Rake

The seating rake relates directly to vertical position of the emitter and emitter coverage. Due to the system design, the headset/receiver's receiving diode (positioned under the user's chin) must be in direct view of the emitter. Therefore, the emitter must be positioned high enough to clear the head of the person seated in front the last row you wish to cover with that emitter. As the rake increases, the receiver is more visible, allowing the emitter to cover more seats at a lower vertical height.

### Obstructions

Permanent obstructions such as columns or balconies and temporary obstructions such as people or scenery are common in most facilities that require an infrared system.

Although the infrared listening device has excellent audio quality and little interference, the carrier behaves the same as visible light, and can be blocked or shadowed. If a temporary obstruction passes between the receiver and the emitter (such as a person or scenery), static may be heard temporarily. This is possible, but unlikely in most situations since the signal is received in two ways. The first is a direct signal, which means the signal received by the headset is in a direct path of the transmission from the emitter. The second type of reception is an indirect signal, which means the signal reaches the receiver by way of reflection. This reflective property, along with individual design, should insure that no interference will occur with temporary or permanent obstructions.

### Wall and Ceiling Color

The infrared listening system uses infrared light as the carrier of the modulated audio signal. This light signal is invisible to the naked eye but has the same properties as visible light. Therefore, light-colored surfaces reflect the infrared signal; increase the indirect reception; and decrease the size or number of emitters, while dark surfaces absorb the infrared signal.

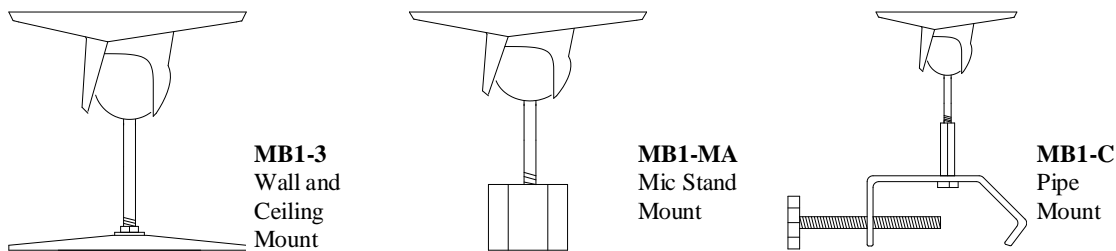
### Extraneous Light

A concentration of infrared light on the receiving diode of the receiver will cause interference with the carrier frequency and raise the noise floor in the receiver. The infrared system is inoperable with ambient illumination above 200fc for incandescent lights, 1000fc for daylight, and 1000fc for fluorescent lights.

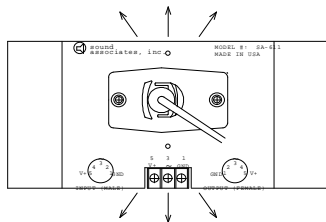
The Sound Associates Infrared Listening System 600 operates on the industry standard 95 or 250 kHz subcarrier. However, some electronic ballast fluorescent lights cause interference up to 100 kHz. The interference is attributed to the mercury found in energy-efficient fluorescent lights which causes broadband interference across the infrared spectrum. Therefore, 95 kHz cannot be used where energy-efficient fluorescent lights exist. When the use of energy-efficient lights is unavoidable, the secondary frequency of 250 kHz must be utilized. Sound Associates offers headsets and transmitters set at 250 kHz to avoid interference with energy-efficient fluorescent lights.

## MOUNTING EMITTER PANEL

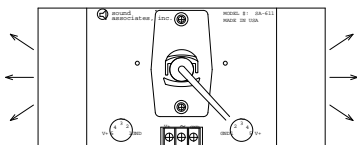
The 600 series emitters utilize 25 series Omnimounts to secure emitters to ceiling, walls, microphone stands, or piping. Sound Associates offers three types of mounts:



The mount can be separated into two sections by loosening the Allen bolt under the pivot ball. The socket end of the mount attaches to the emitter and the opposite end to the wall, microphone stand, or pipe. Each mount attaches to the emitter via two 1/2" 8/32 screws (Note: The mounting screw can not exceed 1/2" because the screw will damage the PC board).



The socket end of the mount can attach to the emitter horizontally to allow the emitter more mobility in the vertical direction...



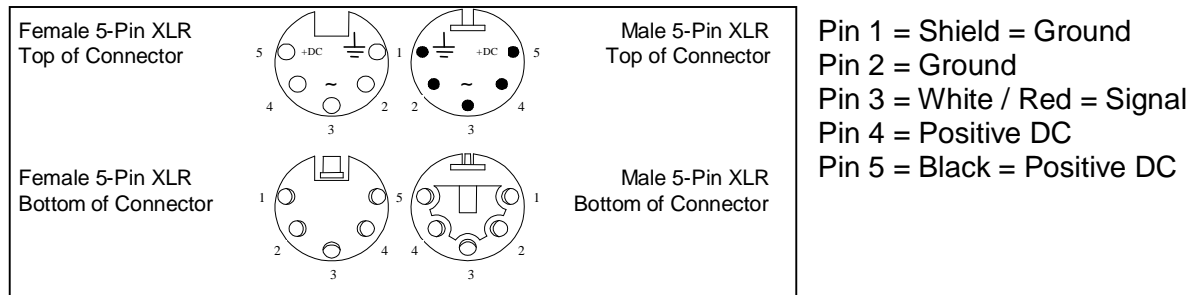
or the mount can attach to the emitter vertically, to allow the emitter more mobility in the horizontal direction.

After deciding on the location of the emitters, fix the mounting plate of the MB13 to a secure flat surface with two screws or bolts with a maximum diameter of 1/4 inch. To allow for proper ventilation, the emitter panel should be mounted 12 inches from all walls and ceilings. When using the mounting bracket with the clamp, be sure not to over-tighten the bolt and use safety wires where necessary.

## CABLING

The 600 series emitter panels are low voltage high output infrared light sources. The emitter is connected to the emitter power supply via one 2 conductor shielded cable. This single cable

supplies low voltage 17-30 VDC plus the modulated audio signal. The emitter cable pin configuration is as follows:



The 600 series emitters are connected to the PS24 via 5-Pin XLR connectors, wire with enclosed stake-on, or bare wire secured directly to the emitter. Each power supply can power up to four SA611's, two SA612's or one SA613 and one SA611 emitter panel. Emitters can be "daisy chained" or linked together and up to 50 power supplies can be added to increase coverage. Refer to the table below to determine the maximum cable length between the power supply and last emitter.

| Alpha Model #/Gauge | Max. Load | Maximum Distance from Power Supply to Last Emitter Panel (24 VDC supply) | Maximum Distance from Power Supply to Last Emitter Panel (30 VDC supply) |
|---------------------|-----------|--|--|
| 2421 18 AWG         | 2.4 amps  | 110 ft.  | 240 ft.  |
| 2432 16 AWG         | 2.4 amps  | 190 ft.  | 400 ft.  |
| 2442 14 AWG         | 2.4 amps  | 330 ft.  | 740 ft.  |
| 2444 12 AWG         | 2.4 amps  | 490 ft.  | 1000 ft.   |

NOTE: The formula to calculate the maximum distance is:

$$(1/DCR1) + (1/DCR2) (V_{drop} / Load) (1/4)$$

Where:

DCR1 = DC resistance of the 2 conductors.

DCR2 = DC resistance of the drain wire.

V<sub>drop</sub> = Maximum Voltage drop [supply voltage (24 or 30 VDC) - minimum operating voltage (19 VDC)], in this case is 5 V for the 24 VDC or 11 V for the 30 VDC at power source.

Load = Maximum load on the line, in this case the maximum load at 24 VDC is 2.4 Amps.

NOTE: The two unused pins are linked internally on the PCB of the emitter and power supply to the ground and positive DC respectively. Therefore, the 5-Pin XLR connector pin 2 is linked to pin 1 (ground) and pin 4 to pin 5 (positive DC).

NOTE: The wiring of the emitter is very important. Most problems with the Infrared System stem from incorrect wiring. Before powering the system check to make sure:

- 1) No shorts exist between conductors
- 2) The positive DC is not placed on the ground or signal terminals

## FAILURE / POWER INDICATORS

Each emitter is equipped with a DC power indicator, a signal indicator, and fault LED indicator. The power/signal indicators are located on the bottom of the emitter panel next to the 5-Pin XLR connectors. The red LED will light when >19 VDC is present at the emitter. The red light will flicker off and the green light will come on when voltage and signal are present.

The 600 series emitter panels also have a fault LED for every 50 diodes. The fault LED is located on the top right hand side of each set of 50 diodes and will illuminate red if a row of diodes fail. The fault LED will also indicate voltage irregularities in the voltage regulator. The emitter panel should be repaired as soon as a failure indicator illuminates.

*Note: If the modulation circuit is overloaded, the red power LED on the bottom of the emitter and the front panel emitter fault LED will flash with each peak. This will occur only after audio distortion is reached. Simply lower the audio input gain or main front panel gain control if this occurs on a regular basis.*

## TROUBLESHOOTING

| Symptom  | Cause/Remedy   |
|--|--|
| Only white noise or static is heard in the headset     | Headset is not receiving the infrared transmission<br><br><i>Make sure...</i><br>...power supply is powered (the red LED on the emitter panel should light when transmitter is OFF)<br>...transmitter is powered (the red LED should flicker out and the green LED on the emitter panel should light)<br>...cable is not interrupted or crossed<br>...the photo cell on the headset is in direct view of the emitter panel   |
| No static and no audio in the headset                  | The headset is not powered or the infrared light is being received with no audio signal "on its back"<br><br><i>Make sure...</i><br>...the audio input is plugged into the transmitter and functioning properly<br>...the volume on the transmitter is turned up<br>...the volume on the headset is turned up<br>...the headset battery is charged and secured firmly in place   |
| Signal is received but with some static in the headset | The infrared signal is too weak or high levels of infrared light are interfering with the transmission<br><br><i>Make sure...</i><br>...all emitters are connected and being powered<br>...emitters are in direct sight and not blocked<br>...emitter fault indicator light is not on<br>...intense light is not shining on the photo cell on the receiver<br>...energy efficient fluorescent lights are not in use (they cause interference with the 95 kHz subcarrier) |



| Symptom  | Cause/Remedy   |
|--|--|
| Red LED DC Power Indicator Light is on<br>(located on bottom of emitter) | DC power is present but no modulated audio signal is reaching the emitter<br><br><i>Make sure...</i><br>...transmitter is on<br>...connection cable between transmitter and power supply is complete<br>...signal wire between power supply and emitter is complete (pin 3)                          |
| Both Green (Signal) and Red (DC Power) Indicator Lights are on           | Voltage is too low or modulator signal is not functioning properly<br><br><i>Make sure...</i><br>...voltage is greater than 19 VDC at emitter<br>...modulation conductors are not interrupted<br>...95/250 kHz sinewave is present at emitter<br>...Audio signal is not over driving the transmitter |
| Red LED (Fault) Indicator Light is on<br>(located on front of emitter)   | Diode has failed<br><br>...Send in for service   |

## SERVICE OR REPAIRS

Contact Sound Associates' Customer Service Department at 888-772-SOUND (7686) 10:00-5:30 Monday through Friday for any service or repairs.

## TECHNICAL SPECIFICATION

|   | SA611                              | SA612                              | SA613                              |
|---|------------------------------------|------------------------------------|------------------------------------|
| Number of Diodes                                  | 50                                 | 100                                | 150                                |
| Average IR Power                                  | 1W                                 | 2W                                 | 3W                                 |
| Approximate Coverage                              | 3000 sq. ft.                       | 6000 sq. ft.                       | 9000 sq. ft.                       |
| IR light wavelength                               | 940 nm                             | 940 nm                             | 940 nm                             |
| Modulated AF input                                | 50 mV – 3 V/5 K ohms               | 50 mV – 3 V/5 K ohms               | 50 mV – 3 V/5 K ohms               |
| Carrier frequency range                           | 30 kHz – 280 kHz                   | 30 kHz – 280 kHz                   | 30 kHz – 280 kHz                   |
| Input connection                                  | Terminal strip or male 5-pin XLR   | Terminal strip or male 5-pin XLR   | Terminal strip or male 5-pin XLR   |
| Output connection                                 | Terminal strip or female 5-pin XLR | Terminal strip or female 5-pin XLR | Terminal strip or female 5-pin XLR |
| Switching threshold for automatic on/off function | 50 mV                              | 50 mV                              | 50 mV                              |
| Supply voltage (nominal)                          | 24 – 30 VDC                        | 24 – 30 VDC                        | 24 – 30 VDC                        |
| Minimum Supply voltage                            | 19 VDC                             | 19 VDC                             | 19 VDC                             |
| Maximum Supply voltage                            | 30 VDC                             | 30 VDC                             | 30 VDC                             |
| Power consumption                                 | 0.6 A                              | 1.2 A                              | 1.8 A                              |
| Dimensions  | 7.75" w x 3.75" h x 2.8" d         | 7.75" w x 7.5" h x 2.8" d          | 7.75" w x 11.25" h x 2.8" d        |
| Weight  | 1.6 lbs                            | 3.2 lbs.                           | 4.8 lbs                            |
| Finish  | Black or white powder coat         | Black or white powder coat         | Black or white powder coat         |
| Material  | Aluminum extrusion                 | Aluminum extrusion                 | Aluminum extrusion                 |

## ACCESSORIES

### Mounts:

- MB13 Wall or ceiling bracket
- MB1MA Microphone stand mount (bulk/ft.)
- MB1C Emitter mount with clamp

### Cable:

- SA6000 (16 GA emitter cable, bulk/ft.)
- SA6000P (16 GA emitter cable, plenum rated, bulk/ft.)
- SA6001 (5-pin XLR line connectors, pair)
- SA6025 (25 ft. cable with 5-pin XLR connectors)
- SA6050 (50 ft. cable with 5-pin XLR connectors)
- SA6100 (100 ft. cable with 5-pin XLR connectors)

\*custom cable sizes also available

## **SOUND ASSOCIATES**

### **FULL THREE YEAR WARRANTY**

We, Sound Associates, Inc., warrant to you the original owner or any subsequent owner of each new Sound Associates infrared transmitter, emitter power supply, or emitter panel, that the unit is free of defects in workmanship and materials for a period of three years from date of original purchase. If the infrared product fails due to defects in materials or workmanship, or does not meet specifications enclosed with the product, Sound Associates will repair or replace the unit, whichever Sound Associates chooses, free of charge. All repairs will be conducted by trained personnel at Sound Associates' facility in reasonable time. All expenses on remedying the defect, including return shipping will be borne by Sound Associates. All shipping fees, taxes, duties, and other customs fees incurred by products being shipped between foreign countries will be borne by the purchaser.

Sound Associates is not responsible for malfunctions due to misuse, accident, or neglect. This warranty does not cover damage to other products resulting from Sound Associates product failure. It does not cover defects or damage caused by unauthorized modifications or service. Sound Associates reserves the right to change the design of any product without notice and with no obligation to make corresponding changes in products previously manufactured.

# Typical System Schematic

