



OPERATION MANUAL

SA601F & SA601FX  
INFRARED TRANSMITTER



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## INTRODUCTION

The Infrared Listening System 600 is a wireless assistive listening device which can be used as either an aid for the hard of hearing, sight description, or simultaneous translation. As an assistive listening device, the Infrared Listening System 600 meets the Americans with Disabilities Act standards to aid the hearing impaired. Also, infrared technology meets international standards for wireless interpretation equipment. The System 600 consists of three major components: the transmitter, the emitter, and the receiver.

The transmitter modulates an audio signal that is converted into infrared light by the emitters. This light carries the modulated audio on its back, fills the room, and is converted back into audio by the receiver. The infrared light is amplitude modulated with a 95 kHz or 250 kHz frequency-modulated sub-carrier. Both 95 kHz and 250 kHz are industry standard frequency carriers, therefore other manufacturer's receivers can be used with our system and our receivers used with other home or large area systems. For the purposes of this manual, the only difference between F series transmitters and FX series transmitters is frequency (F series=95 kHz; FX series=250 kHz).

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

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

## SA601F & SA601FX Transmitter

Feature	Advantage
Advanced pre-amp and limit/compressor circuit	Signal to noise ratio 60 dBC weighted Gain control on back of unit gives user more flexibility in setting an optimal audio level from a variety of audio sources Limits output before distortion Fast response time
Phantom Power	Can be used in conjunction with condenser microphone without the need of an external mixer
Infrared test diodes on front panel	Ability to monitor the output using a receiver without being in the seating area
Neutrik NCJ series audio input connector	Accepts both 3-pole XLR (microphone level signal) or ¼" phone connectors (line level signal)
BNC modulated audio output	Can drive Sound Associates and other manufactured emitters

## UNPACKING UNIT

As soon as the shipment is received, inspect the unit and all components for damage incurred by shipping. Also, check to see if all components are enclosed.

Equipment enclosed:

- 1 SA601F or SA601FX Infrared transmitter/base station
- 1 AC power cord
- 1 Instruction manual

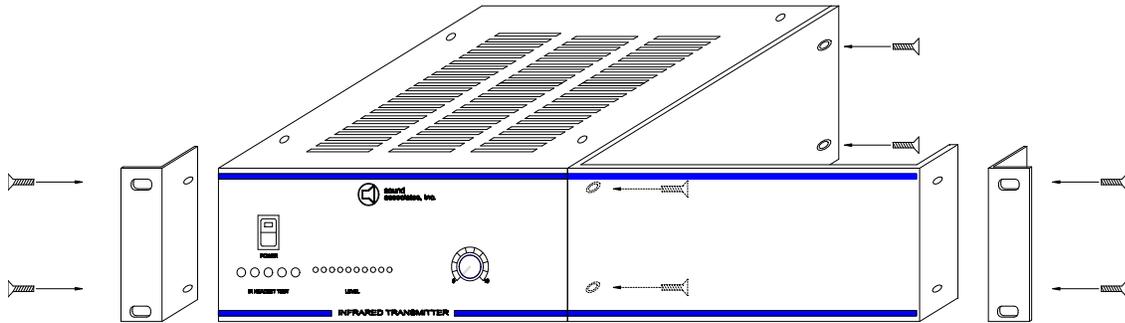
If the unit is damaged due to shipping, please keep all packing material and contact the shipping company as soon as possible. Only the consignee may institute a claim against a carrier if damage has occurred in shipping, however, Sound Associates will assist the client in any such event.

## RACK MOUNTING

### Rack Mounting One Transmitter:

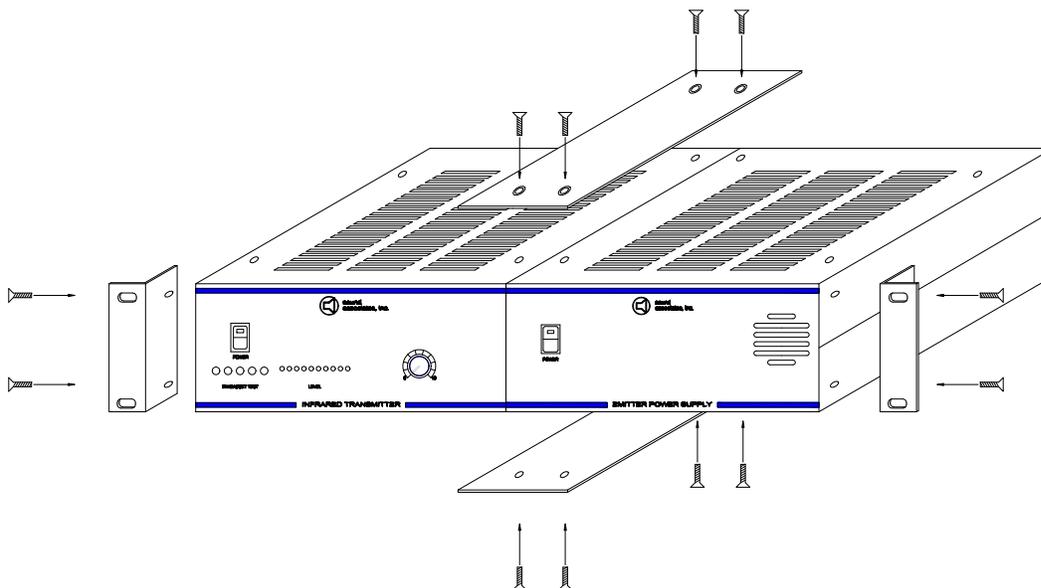
To mount a single transmitter in a standard 19" rack, use a RK1 single rack mount kit. Fix the blank half space bracket to the side of the transmitter with the four enclosed flat head 8/32 screws (see figure). Attach the rack ears to the transmitter and to the blank panel with the four enclosed flat head 8/32 screws. All screw lengths should not exceed 1/2 inch. The unit will mount in a 2-space rack.

*(See diagram on following page)*

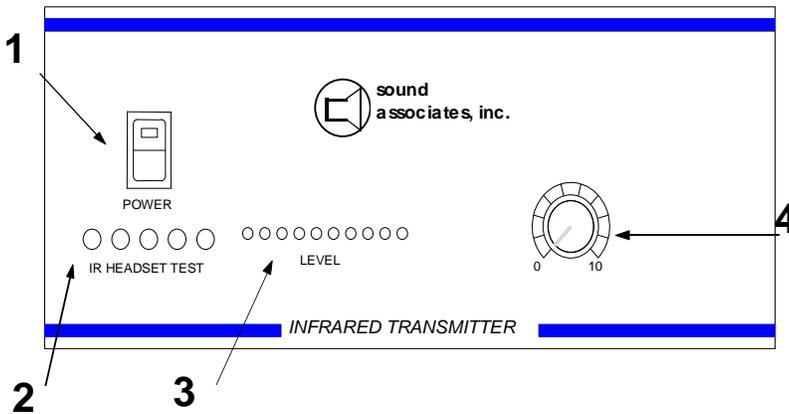


### Rack Mounting Two Transmitters or Transmitter and Emitter Power Supply Side by Side:

To mount two infrared transmitters or a transmitter and emitter power supply side by side in a standard 19" rack, use a RK2 double rack mount kit. Place the transmitters or transmitter and power supply side by side on a flat surface. Fix the top support plate to the units with four flat head 8/32 screws (see figure below). Once the support plate is tightened, flip the units and attach the bottom support plate with four flat head 8/32 screws, then attach the rack ears to the units with four 8/32 screws enclosed. All screw lengths should not exceed 1/2 inch. The unit will mount in a 2 space rack. When racked with an emitter power supply, be sure to separate by one rack space for ventilation.



## FRONT PANEL CONTROLS



### 1 - Power Switch:

Applies line power. Rocker switch with LED to indicate on/off modes.

### 2 - Infrared Test Diodes:

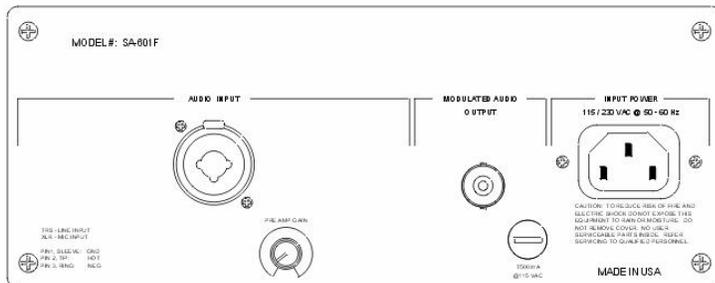
Infrared diodes that emit modulated infrared signal. Gives operator/installer the ability to monitor infrared output using a receiver without being in seating area.

### 3 - Level indicator:

10-segment level indicator. Indicates premodulated audio level. Each LED represents approximately a 3 db gain/loss.

4 - Volume Control: Adjusts audio level prior to modulation stage.

## REAR PANEL CONTROLS



1 - **Balanced audio input:** Inputs audio source via XLR connector (pin 2 hot) for a microphone level signal or 1/4" phone connector for a line level signal

2 - **Pre-amp gain control:** Controls the audio signal gain of the input channel's pre-amp. Used to optimize the input signal level for the best signal-to-noise performance.

3 - **Modulated Audio Output:** Supplies modulated audio to emitter panels or emitter power supply via RG58u coax cable terminated with BNC connector.

4 - **AC Fuse:** AC Fuse prevents excessive current flow. Timed 500 mA 5 x 20 mm European fuse at 115 VAC or timed 250 mA at 230 VAC

5 - **AC Power:** Connects to power source via AC line cord

## POWER CONNECTION

The transmitter is shipped with the input voltage set to 115 volts 50-60 Hz unless otherwise specified. The transmitter is furnished with a detachable AC power cord rated for 10 A at 120 volts that plugs into a 15 A plug. The input voltage may be changed internally from 115 volts AC to 230 volts AC. To change the voltage, first disconnect power and remove the top chassis cover. The input voltage switch is located in the back left-hand corner near the transformer. Simply slide the switch from 115-volt position to the 230-volt position. In the 115-volt position, the Mains fuse should be a T500 mA fuse. In the 230-volt position, the Mains fuse should be a T250 mA fuse. Voltages over 135 volts in the 115 volt position or over 255 volts in 230 volt position are potentially damaging to the transmitter's power supply circuit.

## AUDIO/CHASSIS GROUND LINK

In some installations, it might be necessary to separate the electronic 0 v from the chassis and Mains power ground to help avoid ground loops around unbalanced connections. Should this become necessary, it is easily accomplished by removing the header link (marked "chassis link"), located internally next to the power transformer.

## INPUT CONNECTION

The SA601 Series infrared transmitters have one audio input.

The Neutrik Combo connector accepts a balanced XLR line connector or a ¼" phone plug. The XLR connector is wired with **pin 1** as **ground**, **pin 2** as **positive (+)**, and **pin 3** as **negative (-)**. The ¼" phone plug is wired with the **sleeve** as **ground**, the **ring** as **negative (-)**, and the **tip** as **positive (+)**. Use the pre-amp gain control to best match the audio level of the source.

The XLR connection is a balanced 300-ohm microphone level input. The ¼" phone connection has a 30 dB pad, making it more suitable for line level signals. However, the pre-amp gain control on the back panel allows for ample reduction of line level signals even in the XLR connection. Please use the connection that best matches the source signal and adjust the gain control to better the signal-to-noise ratio.

The XLR input is supplied with +48 V phantom power for use with condenser-type microphones. The phantom power can be disabled internally by lifting the shunt on link-#3 located in the pre-amp section of the circuit.

The input is balanced electronically with differential amplifiers. Due to the electronic balancing, the input may be used with a balanced or unbalanced source.

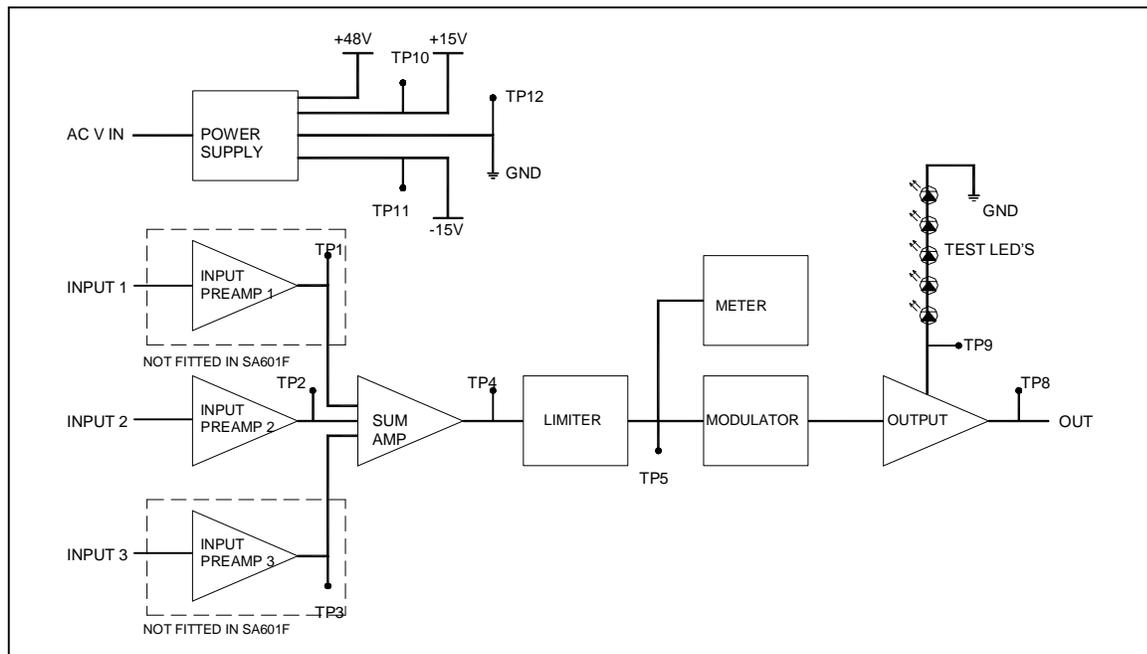
A balanced line is defined as two conductor shielded cable with each of the two center conductors carrying the signal but of opposite polarity and equal but opposite potential difference from ground. An unbalanced line is a single conductor shielded cable with the center conductor carrying the signal and the shield at ground potential.

## OUTPUT CONNECTION

The SA601 or SA601FX has one modulated output which connects to an emitter panel or to an emitter power supply via RG58u coaxial cable (RG59u for short cable runs) terminated with a BNC connector. The SA601 Series transmitters were designed to work in conjunction with SA611, SA612, and SA613 emitter panels. This transmitter may also be used to drive other manufactured emitters. The signal voltage is 8 V P-P, therefore, it is high enough to drive most emitters manufactured at considerable distances. Please check the manufacturer's instruction manual to be sure that the emitter will function properly at this signal voltage.

## THEORY OF OPERATION

The SA601F or SA601FX transmitter is a frequency modulator that produces an audio signal to 95 kHz or 250 kHz. This process allows the unit to work in conjunction with emitter panels and receivers that demodulated the signal back to audio. The transmitter consists of four major circuit stages: pre-amp, limiter, modulator, and output stage. Refer to the block diagram for signal flow.



The pre-amp circuit is designed around an SSM analog low noise pre-amp integrated circuit. The circuit consists of a 30 dB pad for the line level signal on the 1/4" phone connector and an external potentiometer for pre-amp gain control. The pad is active only in the TRS 1/4" phone connection. The pre-amp gain control is located on the back panel near the audio input connection (see back panel controls). The sensitivity of the input may be increased or decreased by this control if the input signal is too low or too "hot".

The limiter is designed around the THAT 4301 VCA integrated circuit which limits the audio signal prior to the modulation stage. The limiter restricts the peak modulation swing to <50 kHz as well as prevents distortion in the modulation stage. The limiter may be taken out of the circuit if so desired by lowering the limiter sensitivity trim pot at PR7 fully counterclockwise.

However, if the limit circuit is removed, we suggest that an external limiter/compressor be utilized.

The modulation circuit frequency modulates the audio signal to 95 kHz (SA601F) or 250 kHz (SA601FX). The output consists of a push pull driver circuit that has the ability to drive long cable runs without signal loss.

## LEVEL CONTROL

The SA601 Series has one master volume control and one pre-amp gain control. The pre-amp gain control adjusts the audio level prior to the pre-amp circuit and is used to optimize the input signal level for the best signal-to-noise performance. The pre-amp gain control should be set with care. If it is set too low, the signal-to-noise performance will suffer. If it is set too high, unpleasant signal clipping and distortion may occur. The main volume control located on the front panel adjusts the audio level after the pre-amp stage and prior to the modulation stage.

The audio level can be monitored visually by the 10 segment LED bar graph on the front of the unit or audibly with an infrared headset via the five test diodes on the front of the unit. Each segment of the bar graph represents an approximately 3 dB gain or loss. The limiter will become active once the level reaches the first red LED on the bar graph. Ideally the input level should be set to a nominal level, predominately in the yellow section of the bar graph with peaks occasionally reaching the red.

*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  <i>Make sure...</i> ...power supply is powered (the red LED on the emitter panel should light when transmitter is OFF) ...transmitter is powered (the red LED should flicker out and the green LED on the emitter panel should light) ...cable is not interrupted or crossed ...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"  <i>Make sure...</i> ...the audio input is plugged into the transmitter and functioning properly ...the volume on the transmitter is turned up ...the volume on the headset is turned up ...the headset battery is charged and secured firmly in place

Symptom	Cause/Remedy
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  <i>Make sure...</i> ...all emitters are connected and being powered ...emitters are in direct sight and not blocked ...emitter fault indicator light is not on ...intense light is not shining on the photo cell on the receiver ...energy efficient fluorescent lights are not in use

## TECHNICAL SPECIFICATION

Modulation	Transmitting Frequency	95 kHz (SA601F) or 250 kHz (SA601 FX)
	Modulation	$\pm 35$ kHz nominal, $\pm 50$ kHz peak
	Pre-emphasis	50 s
Input	Connector	Microphone – Female XLR; Line – ¼" phone
	Number of Inputs	1
	Wiring	Pin 1 – sleeve (ground); Pin 2 – tip (pos); Pin 3 – ring (neg)
	Phantom Power	$\pm 24$ V
	Sensitivity at 1 kHz	50 mV to 2 V adjustable
	Input impedance	Balanced > 50 k ohms/ >2 k ohms
	AF frequency response (-3 dB)	20 Hz to 20 kHz
	Maximum input level	20 dBm (7.75 V)
Output	Connector	BNC
	Number of outputs	1
	RF Voltage output	approximately 750 mV rms
	Impedance	approximately 50 ohms
Power	Power	120/240 ACV internally switchable
	Power consumption with (4) SA611 emitters	> 25 W
	Fuse	T500 mA (5 x 20 mm) @ 120V; T250 mA @ 240 V internal
Mechanical	Mechanical dimensions	8.5" w x 3.5" h x 9" d
	Weight	5 lbs.
	Finish/material	Black anodized aluminum

## SERVICE OR REPAIRS

Contact Sound Associates' Customer Service Department at 88-772-SOUND (7686) 10:00-5:30 Monday through Friday for any service or repairs.

## **ACCESSORIES**

- RK1 - single rack mount unit
- RK2 - double rack mount kit
- BNC003 – RG59u BNC to BNC cable (3ft.)

## **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

