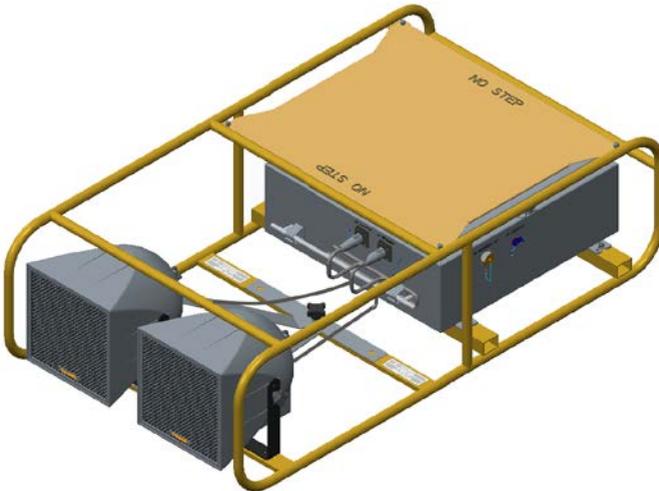
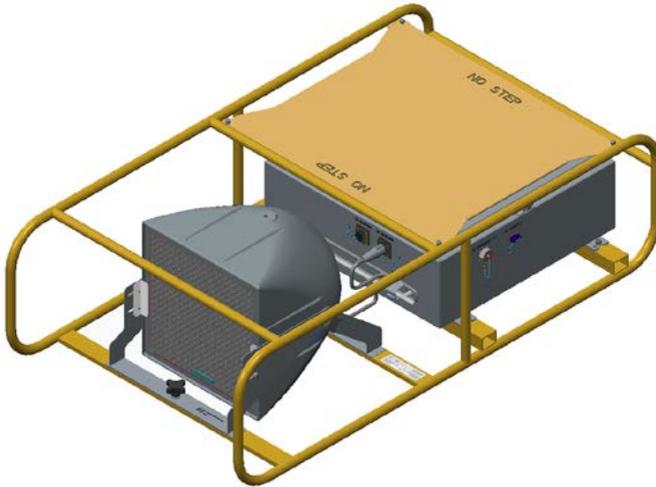


PEO  
**STRI**

MISSION FIRST ★ PEOPLE ALWAYS

**ARMY STRONG.**



# Sound Effects Simulator (SES)

## Quick Reference Pocket Guide

LT2-APM-TD-2013-000014

19 July 2013



# Table of Contents

<b>SAFETY SUMMARY</b> .....	1
<b>GENERAL INFORMATION - SES</b> .....	2
<b>EQUIPMENT DESCRIPTION</b> .....	3
SES Single Speaker.....	3
SES Dual Speaker.....	3
R.5 Loudspeaker.....	4
R.25 Loudspeaker.....	4
SES Electronics Enclosure.....	5
SES Frame.....	7
SES Solar Cover.....	7
Sound and Motion Controller .....	8
Power Inverter .....	9
AC/DC Power Supply .....	10
Power Amplifier .....	10
DC Power Supply.....	11
Breakout Board .....	11
<b>OPERATION PRINCIPLES</b> .....	12
<b>OPERATING INSTRUCTIONS</b> .....	13
Controls and Indicators.....	13
Operation – Sound Effects Simulator (SES).....	15
Install the SES .....	15
Start Up the SES .....	15
Operate the SES .....	16
Shut Down the SES .....	17
<b>OPERATION IN UNUSUAL CONDITIONS</b> .....	18
<b>TROUBLESHOOTING</b> .....	19
Malfunctions .....	19

# Table of Contents (Continued)

<b>MAINTENANCE INSTRUCTIONS</b> .....	22
Preventive Maintenance Checks and Services.....	22
Remove and Replace R.5 Loudspeaker .....	23
Remove and and Replace R.25 Loudspeaker .....	25
Remove and Replace Solar Cover .....	27
Remove and Replace Electronic Enclosure Components.....	28
Remove and Replace Sound and Motion Controller.....	29
Remove and Replace Power Inverter.....	30
Remove and Replace AC/DC Power Supply .....	31
Remove and Replace Power Amplifier.....	32
Remove and Replace DC Power Supply .....	33
Remove and Replace Breakout Board.....	34
Remove and Replace LED Indicator Light.....	35
<b>APPENDIX - SOUND RECORDING</b>	
Safety Summary .....	37
<b>GENERAL INFORMATION</b> .....	38
<b>EQUIPMENT DESCRIPTION</b> .....	38
PCM Sound Recorder .....	38
Operation – PCM Sound Recorder .....	39
<b>TROUBLESHOOTING</b> .....	43
Malfunctions .....	43
<b>MAINTENANCE INSTRUCTIONS</b> .....	44
Preventive Maintenance Checks and Services.....	44

# SAFETY SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that you must understand and apply during operations and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the SES quick reference pocket guide.

Below you will find definitions of the following alerts that appear throughout this quick reference pocket guide:

 **WARNING** — Identifies a clear danger to the person operating the equipment.

 **CAUTION** — Identifies risk of damage to the equipment.

**NOTE** – Serves to highlight essential procedures, conditions, and statements, or convey important instructional data to the user.

Hearing protection is required when within 56 feet from the operation of the speaker area.

## **WARNING**

Turn off main power and remove power cable before disconnecting any equipment or performing maintenance.

Remove all jewelry before performing maintenance tasks. Accidental short circuiting by tools or jewelry causes electrical shock or burns.

## **WARNING**

Some objects covered in this quick reference pocket guide are heavy and need two men to lift them.

## **CAUTION**

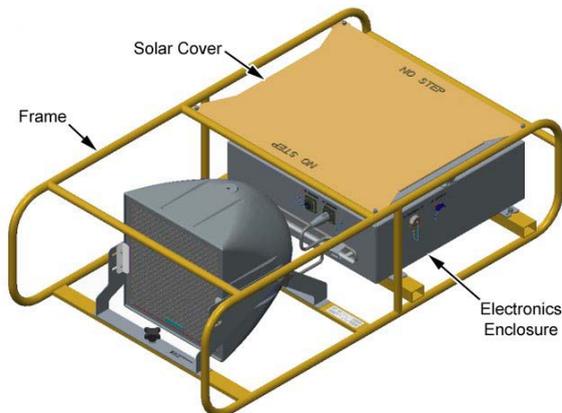
The SES Electronics Enclosure contains parts which are sensitive to damage by electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing or installing. Failure to do so may damage the part or assembly.

# GENERAL INFORMATION - SES

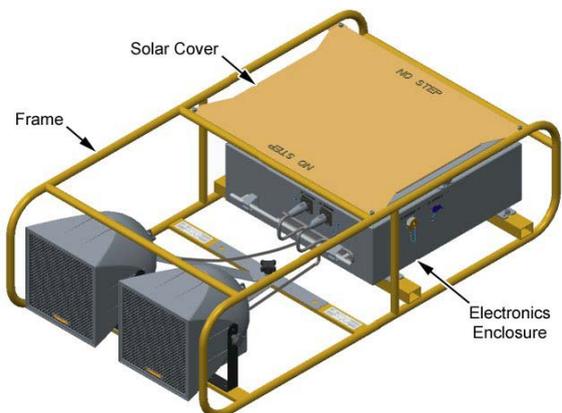
This pocket guide covers the operation, installation and maintenance of the Sound Effect Simulator (SES). The SES replicates battlefield audio effects and provides realistic and representative sounds such as human speech, gun fire, mortar fire and explosions to the soldier and/or unit. Normally located in a target emplacement, the SES is controlled from the Central Range Control System. Operating with AC or DC power, the SES responds to commands from target control software in accordance with the applicable FASIT component ICD.

Both the SES Single Speaker and the SES Dual Speaker are capable of withstanding inclement weather conditions that include partial submersion in water (while powered off) for four hours without failure due to moisture intrusion.

The Sound Effect Simulators are capable of operation at temperatures between 0 and 50 degrees Celsius, exposure to direct solar effects, rain and windy conditions.



**SES Single Speaker**

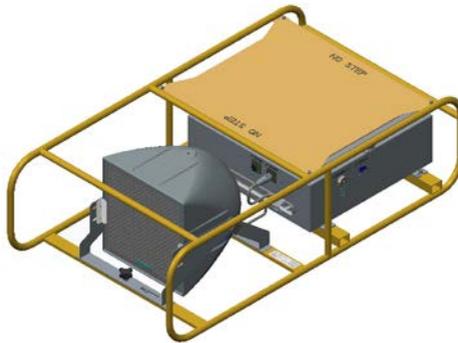


**SES Dual Speaker**

# EQUIPMENT DESCRIPTION

## SES Single Speaker

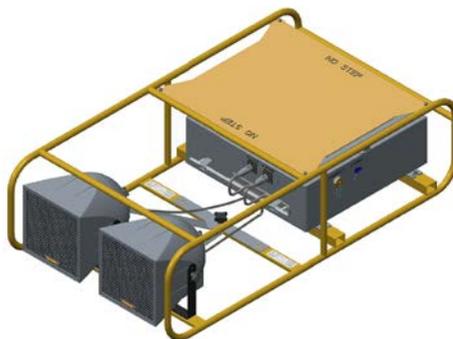
The SES Single Speaker is designed with one R.5 Loudspeaker that provides full-range high quality sound and voice audio in applications that require extreme weather resistance and long-term exposure. Total weight of the SES Single Speaker is 116.3 lbs.



Front View

## SES Dual Speaker

The SES Dual Speaker is designed with two R.25 Loudspeakers that provide short and medium range high quality sound and voice audio in applications that require extreme weather resistance and long-term exposure. Total weight of the SES Dual Speaker is 117.8 lbs.



Front View

## R.5 Loudspeaker



The R.5 Loudspeaker features:

- 3-way, horn loaded, coaxial loudspeaker type
- Weather-resistant, rotomolded UV enclosure
- Corrosion-resistant dual-layer powder coated steel grille and custom mounting yoke bracket
- Exposed hardware and fasteners are corrosion-resistant stainless steel
- Angling knobs on the mounting yoke control the speaker angle up or down.
- Dimensions- 16" x 16" x 16.10"
- Weight- 42.3 lbs

## R.25 Loudspeaker



The R.25 Loudspeaker features:

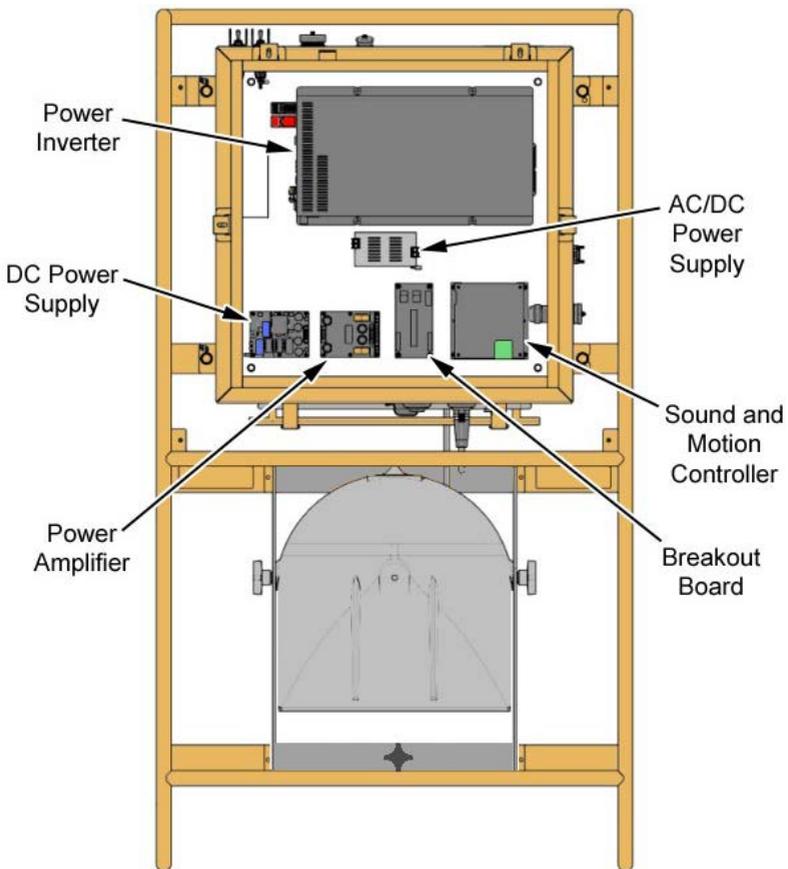
- 2-way, horn loaded, coaxial loudspeaker type
- Weather-resistant, rotomolded UV enclosure
- Corrosion-resistant dual-layer powder coated steel grille and yoke bracket
- Exposed hardware and fasteners are corrosion-resistant stainless steel
- Angling knobs on the mounting yoke control the speaker angles up or down.
- Dimensions- 11.3" x 11.3" x 13.3"
- Weight- 20 lbs

# SES Electronics Enclosure

## INTERIOR COMPONENTS

The SES Electronics Enclosure (shown below with solar cover and enclosure door removed) provides protection of interior components in any environment where the equipment may be exposed to rainy conditions or in specific applications where corrosion may be a problem. The door is secure with easily operated aluminum clamps.

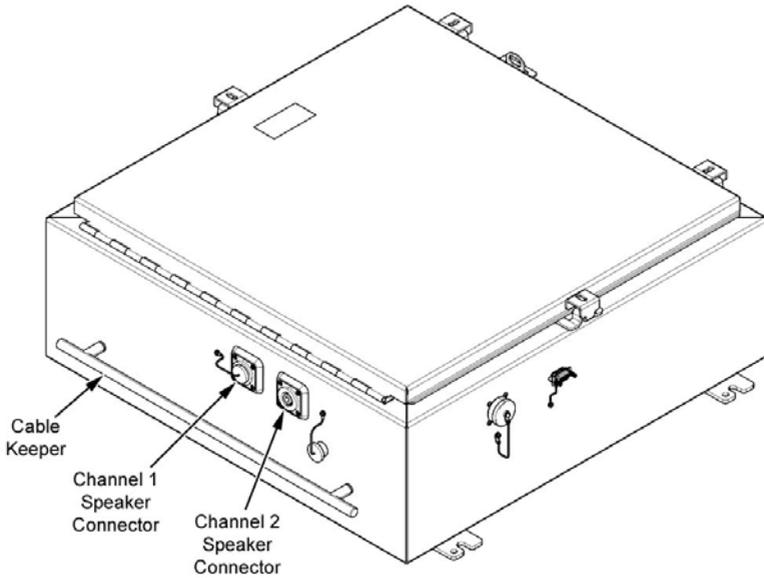
Interior components shown below include an SES Sound and Motion Controller, a Breakout Board, a Power Inverter, an AC/DC Power Supply, a DC Power Supply and a Power Amplifier.



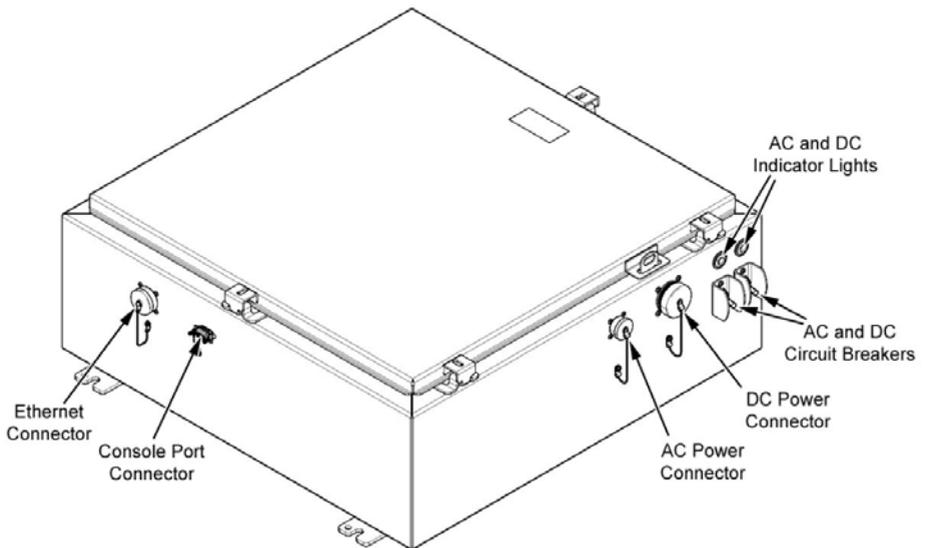
**SES Electronics Enclosure Interior Components**

# SES Electronics Enclosure (Continued)

## EXTERIOR COMPONENTS

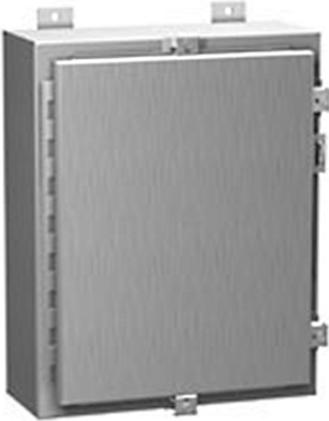


Front View



Rear View

## SES Electronics Enclosure



The SES Electronics Enclosure features:

- Contains the SES Sound and Motion Controller, Breakout Board, Power Inverter, AC/DC Power Supply, DC Power Supply and the Power Amplifier
- Formed from Type 5052 H-32 aluminum
- Provides protection where equipment may be hosed down or otherwise be very wet, or in specific applications where corrosion may be a problem
- Door is secure with aluminum clamps
- A removable 12 gauge inner panel is included
- Dimensions- 24" x 24" x 8"
- Shipping weight- 26 lbs

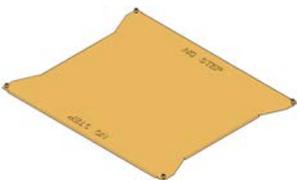
## SES Frame



The SES Frame features:

- Modular design allows for interchangeable SES Speaker configurations
- Formed from aluminum
- Dimensions- 32" x 58" x 16"
- Weight- 16 lbs

## SES Solar Cover



The SES Solar Cover features:

- Formed from aluminum.
- Dimensions- 24.75" x 29.5"
- Weight- 3.4 lbs

# Sound and Motion Controller



The Sound and Motion Controller features:

- Digitally records and plays back synchronous digital audio and control information
- 2.1 stereo or two independent professional quality audio channels
- Multi-channel polyphony feature allows numerous audio sounds to play on the same channel
- DSP functions including seven-band equalization
- Eight optically-isolated input triggers
- 16 digital outputs
- Provisions for audio line and microphone inputs with on-board analog to digital converters
- On-board 25 Watt per channel power amplifier
- Real-time clock
- Compact Flash and RS-232 interfaces
- Field upgradable operating system
- Supports FASIT ICD defined messages and behaviors
- Supports automatic TCP/IP addressing
- Sends and receives TCP/IP client messages
- Dimensions- 5.12" x 5.12" x 1.5"
- Weight- 1 lb 2 oz

# Power Inverter



The Power Inverter features:

- True sine wave output (THD < 3%)
- AC Voltage- 100 / 110 / 120VAC
- DC Voltage- 12VDC
- Continuous power: 1500W
- Built-in transfer switch and AC circuit breaker
- Power ON-OFF remote control
- Load control cooling fan
- Advanced microprocessor
- Output frequency 50/60 Hz switch selectable
- Low power saving mode to conserve energy
- LED Indicators- Input voltage level, output load level and fault status
- Input over voltage and input low voltage protection
- Low battery alarm
- Over temperature protection
- Over load protection
- Short circuit protection
- Reverse polarity protection
- Dimensions- 15.9" x 9.9" x 4.53"
- Weight- 15.4 lbs

## AC/DC Power Supply



The AC/DC Power Supply features:

- Single output
- 85~265 VAC universal input range
- Output voltage 24VDC
- Cooling by free air convection
- Short circuit protection; over power and over voltage protection
- Operating temperature: -40°C-+70°C (with derating)
- Max output wattage 60W
- Dimensions- 4.13" x 2.28" x 1.5"
- Weight- 9.17 oz

## Power Amplifier



The Power Amplifier features:

- Small single subwoofer
- Small power active mixers
- Thermal, overcurrent, high frequency and non-audio signal protection
- Auxiliary output voltage
- Bypass line outputs for external active/passive filters
- Mute command
- Max operating temperature: 40°C
- Dimensions- 4" x 3" x 1.8"
- Weight- .56 lb

## DC Power Supply



The DC Power Supply features:

- High efficient, low consumption DC power supply
- Specifically designed for D-Cell504 amplifiers
- Thermal protection
- Deep discharge lead-acid protection
- Remote power on/off switch
- Operating voltage limits from 9.5 to 68VDC
- Efficiency 93% (typical)
- Max operating temperature: 40°C
- Dimensions- 4" x 3" x 1.8"
- Weight- .66 lb

## Breakout Board



The Breakout Board features:

- Dimensions- 5" x 2.5"
- Weight- 2.3 oz

# OPERATION PRINCIPLES

The FASIT Sound Effects Simulator (SES) is a portable audio device that is used on live training ranges worldwide to provide realistic battlefield sounds in training exercises conducted day and night. The SES may be used by the range control system to play ambient audio or to supplement various firing or detonation events with audio. This device is typically located in target emplacements, shielded from direct fire with the speaker aimed toward the training audience. Only two basic connections are required: power and data. The power connection accepts either AC or DC power, allowing for a wide range of options typically found in live training ranges. The data connection consists of a network connection allowing the SES to communicate with a FASIT-standard control system.

The SES provides decentralized playback with centralized control provided through a standardized command set as part of the FASIT specification. FASIT Audio Device-compliant range control software used to control targets and other range devices will be used to control this peripheral as well, providing a non-proprietary solution for audio battlefield effects.

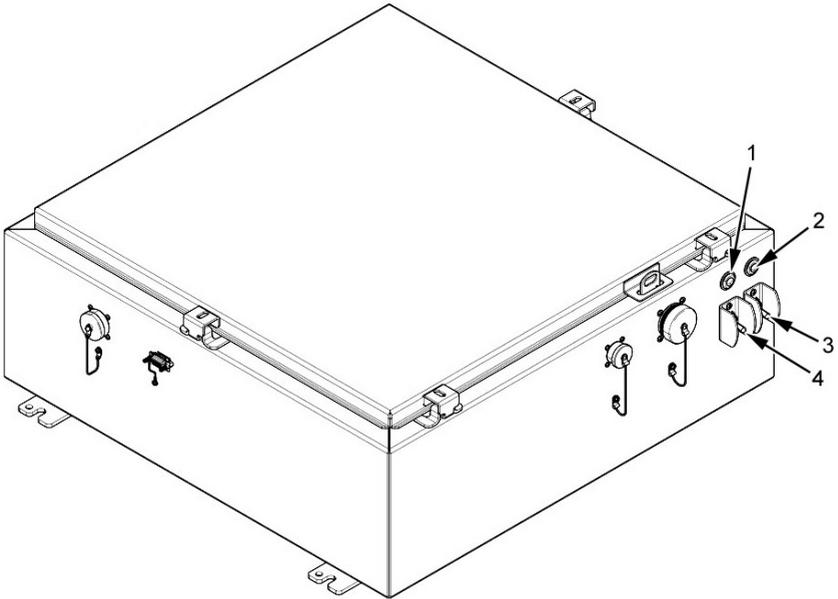
The SES is designed to operate in a considerable arena of environmental conditions, including high and low temperatures, rain, wind and other inclement conditions typically encountered on live training ranges. The device consists of a chassis enclosing an electronics enclosure and speaker system. All external connections and cabling between components and outside the device are environmentally protected.

The device makes use of non-proprietary audio files and allows loading of new sounds, or replacement of existing audio files as a basic convenience.

# OPERATING INSTRUCTIONS

## Controls and Indicators

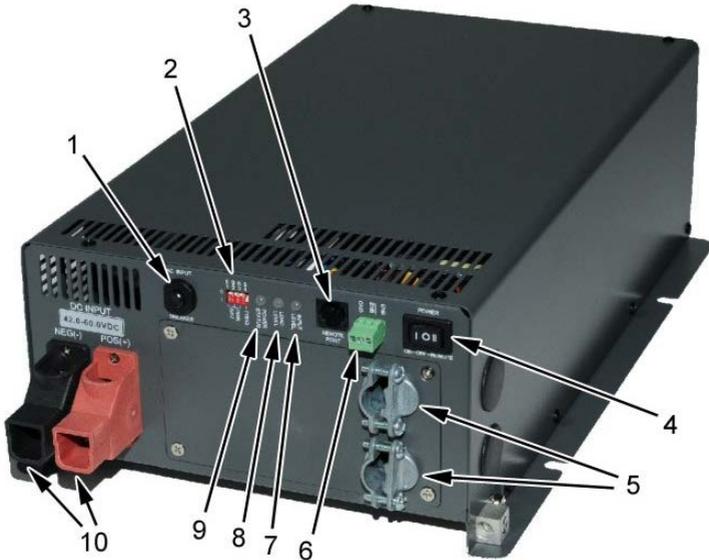
### ELECTRONICS ENCLOSURE



KEY	CONTROL/INDICATOR	FUNCTION
1	AC LED Indicator	Indicator light is green when AC power is on.
2	DC LED Indicator	Indicator light is green when DC power is on.
3	DC Circuit Breaker	Push the circuit breaker up to turn on DC power or down to turn off DC power.
4	AC Circuit Breaker	Push the circuit breaker up to turn on AC power or down to turn off AC power.

# Controls and Indicators (Continued)

## POWER INVERTER



KEY	CONTROL/INDICATOR	FUNCTION
1	AC Input Circuit Breaker	Protects the unit from overload.
2	Dip Switches	Power saving mode- S1, S2, S3; AC frequency- S4.
3	Remote Port	<i>Not applicable.</i>
4	Power Switch	Main ON-OFF-REMOTE power switch.
5	AC Output/Input	AC hardwire connections.
6	Green Terminal	Remote control terminal.
7	Input Level LED	LEDs are solid/blinking red, orange, or green colors.
8	Load Level LED	LEDs are solid/blinking red, orange, or green colors.
9	Power Status LED	LEDs are solid/blinking red, orange, or green colors.
10	DC Input Terminals	Connect DC input terminals to power source.

# OPERATION – SOUND EFFECTS SIMULATOR

## NOTE

Installation, start up, operation and shut down of the SES Single Speaker and the SES Dual Speaker are identical.

If utilizing AC power, connect the AC power cable to the SES AC power receptacle. If utilizing DC power, connect the DC power cable to the SES DC power receptacle.

Ensure the AC or DC power source is properly grounded before power is applied to the SES.

## INSTALL THE SES

### WARNING

The SES Single Speaker weighs 116.3 pounds and the SES Dual Speaker weighs 117.8 pounds. To avoid personal injury use two men to lift the SES.

1. The SES is designed for easy handling, moving and positioning within the target emplacement. Establish a location in the target emplacement for the SES and set in place.
2. Confirm the AC and DC circuit breakers are in the **OFF** position (pushed down).

## NOTE

If both AC and DC power are available, both can be attached to the SES simultaneously.

3. Connect the AC or DC cable to the appropriate SES power receptacle.
4. Connect the AC or DC cable to the target emplacement power supply receptacle.
5. Attach one end of the Ethernet cable to the SES Ethernet receptacle and the other end to the range network Ethernet receptacle in the target emplacement.
6. Adjust the rotation and tilt of the speaker(s) to the desired angles for the exercise.

## START UP THE SES

1. If AC power is supplied, flip the AC circuit breaker up to the **ON** position.
2. If DC power is supplied, flip the DC circuit breaker up to the **ON** position.
3. If both AC and DC power are available, flip both the AC and the DC circuit breakers up to the **ON** position. The SES will default to AC power.
4. When powered on, the SES is in communication with the range network and will be controlled by the Central Range Control.

# OPERATION – SES (CONTINUED)

## OPERATE THE SES

### NOTE

Central Range Control is responsible for SES modes of operation which are Maintenance Mode, Test Mode and Live Fire Mode. For the purposes of operation of the SES in a training exercise, Central Range Control will set the SES to Live Fire Mode.

1. Once power to the SES is turned on, Central Range Control will assume control of the SES audio operational functions and adjust the mode of operation from the default Maintenance Mode to Live Fire Mode.
2. A message will be sent from Central Range Control to the SES to perform a variety of audio commands.
3. During a live fire training exercise audio command messages play audio track, stop audio track, audio off, audio on and loop audio will be the most frequently sent messages. Once a command message is sent from Central Range Control to the SES, the SES will respond with a message to Central Range Control acknowledging that the message sent was received by the SES and indicate whether it will perform or cannot perform the requested command.
4. Recorded SES audio tracks can be played in all three SES modes with differing decibel limitations. In Live Fire mode, the SES will not exceed 124 decibels within 1 meter of steady-state sounds, and shall not exceed 140 decibels at 1 meter of impulse sound.

### NOTE

Additional recorded battlefield audio sound tracks can be added to the SES. However, this is accomplished in the Maintenance Mode. Refer to the Appendix – Sound Recording for information regarding the recording and transfer of new sound tracks to the SES.

5. Central Range Control will constantly monitor the SES status. Information concerning possible malfunctions with the SES are reflected by specific bit settings in the OEM fault field visible to Central Range Control.

## OPERATION – SES (CONTINUED)

### SHUT DOWN THE SES

1. If AC power is supplied, flip the AC circuit breaker down to the **OFF** position. Confirm the LED indicator light above the circuit breaker goes off.
2. If DC power is supplied, flip the DC circuit breaker down to the **OFF** position. Confirm the LED indicator light above the circuit breaker goes off.
3. If both AC and DC power is supplied, flip the DC circuit breaker down to the **OFF** position. Confirm the LED indicator light above the circuit breaker goes off. Flip the AC circuit breaker down to the **OFF** position. Confirm the LED indicator light above the circuit breaker goes off. The SES is now powered off.

#### NOTE

It will not damage the SES if the AC circuit breaker is turned off first. It would just unnecessarily cycle the power inverter.

# OPERATION IN UNUSUAL CONDITIONS

## WEATHER RESISTANCE



If the instructions below are not observed, the weather-resistant integrity of the loudspeaker can be compromised. This can result in damage to or failure of the hardware or internal components.

The SES Single and Dual Speakers are designed to withstand continuous outdoor exposure for many years of operation.

All five mounting holes must be sealed off with the stainless steel bolts, washers, and rubber washers supplied. If, for any reason, these bolts must be removed, seal off the hole with silicone caulking or some other suitable weather-tight sealant. The rubber washers supplied with the mounting bolts must always seat against the enclosure.

The gland nut securing the loudspeaker cable to the enclosure is sealed at the factory. Do not attempt to remove this nut or the weather-tight seal will be broken. If it is desired to replace the gland nut with a connector, the connector must be a weather-proof design. It must be suitably sealed to the enclosure with silicone caulk or some other suitable weather-tight sealant.

The grill assembly is designed to prevent normal and wind-driven rain from directly entering the mouth of the loudspeaker. To service the SES Single or Dual Speaker, see pages 23 thru 25.

# TROUBLESHOOTING

## Malfunctions

### NOTE

Prior to taking steps to correct a malfunction, the SES must be placed into Maintenance Mode. Maintenance Mode prevents the SES from being played at full power. There are two options for placing the SES in Maintenance Mode.

**Option 1-** The Range Control Center will send a command over the range network to the SES changing Live Fire Mode to Maintenance Mode.

**Option 2-** Locally at the SES target emplacement, the maintainer will disconnect the range network Ethernet cable from the SES electronics enclosure. This will automatically place the SES in Maintenance Mode.

### NO SOUND FROM THE LOUDSPEAKER

POSSIBLE CAUSE	CORRECTIVE ACTION
AC circuit breaker is <b>OFF</b> .	Push the AC circuit breaker up to turn <b>ON</b> .
DC circuit breaker is <b>OFF</b> .	Push the DC circuit breaker up to turn <b>ON</b> .
Internal inverter is tripped.	Check the inverter circuit breaker and reset the circuit breaker by pushing the circuit breaker button in..
Power supply problem.	If the power indicator LED is off and the circuit breaker is <b>ON</b> , push the circuit breaker to the <b>OFF</b> position and then to the <b>ON</b> position. If the light remains off, check the power cable connections and local power. If the supplied power is good and being delivered to the SES but the light remains off, call for manufacturer maintenance.
The input sound level control is turned down.	Ensure the volume controls from the Range Control Center are properly adjusted.
The Ethernet connection is not working.	This may be a range network issue. Call for range maintenance.

# Malfunctions (Continued)

POSSIBLE CAUSE	CORRECTIVE ACTION
Battery needs recharging. (In situations where the SES is using DC power supplied by a battery)	Turn <b>OFF</b> DC power. Disconnect the battery cable from the electronics enclosure receptacle. Recharge the battery immediately after discharge. Not recharging the battery will cause the battery to sulfate which will affect performance and longevity.
Battery needs replacing. (When the SES is using DC power supplied by a battery)	Replace the battery.
Cables are damaged or not correctly connected.	Ensure that all cables are connected correctly at both ends. Check for excessive wear and damage to the cable sheathing. The loudspeakers may not operate if the sheathing has surface breaks, kinks, burns or other physical damage.
Loudspeaker mounting holes are not properly sealed.	All five mounting holes must be sealed off with stainless steel bolts, washers and rubber washers and are tightly seated against the speaker enclosure. If the weather-resistant integrity of the loudspeaker is compromised and fails to operate, replace the loudspeaker.

## SOUND INTERFERENCE

POSSIBLE CAUSE	CORRECTIVE ACTION
Cables are damaged or not correctly connected.	Ensure that all cables are connected correctly at both ends. Check for excessive wear and damage to the cable sheathing. Disconnect and reconnect as necessary. Command the SES to play several different tracks and perform a sound check at different volumes. If distortion remains, call for manufacturer maintenance.
SES location.	Move the SES slightly to find the best reception position to remove sound interference.
Radio frequency disturbance.	Check to determine if there are any obvious radio frequency interference sources near the SES.

## Malfunctions (Continued)

POSSIBLE CAUSE	CORRECTIVE ACTION
Battery needs recharging. (In situations where the SES is using DC power supplied by a battery)	Turn <b>OFF</b> DC power. Disconnect the battery cable from the electronics enclosure receptacle. Recharge the battery immediately after discharge.

# MAINTENANCE INSTRUCTIONS

## NOTE

To troubleshoot malfunctions to the lowest repairable level, refer to the SES Product Definition Data (PDD).

## Preventive Maintenance Checks and Services

SEQUENCE NO.	ITEM TO BE INSPECTED/PROCEDURE
1	R.5 LOUDSPEAKER- Check that the speaker is not in 1.5” or deeper water. This inspection will reduce the possibility of rain or other precipitation compromising the performance of the speaker.
2	R.25 LOUDSPEAKER- Check that the speakers are not in 1.5” or deeper water. This inspection will reduce the possibility of rain or other precipitation compromising the performance of the speaker.
3	SOLAR COVER- Check for dents or damage. Ensure four captive screws are tightened.
4	ELECTRONICS ENCLOSURE- Inspect the LED indicator lights for cracks or damage.
5	SES CABLES- Check for excessive wear and damage to the cable sheathing. The equipment may not operate if the sheathing has surface breaks, kinks, burns or other physical damage.
6	SES CONNECTORS- Inspect cable connectors for excessive wear and damage. The equipment may not operate if connector pins are bent, missing, broken or show signs of corrosion.
7	Check the seal on the electronics enclosure and ensure the cover screws are tight.

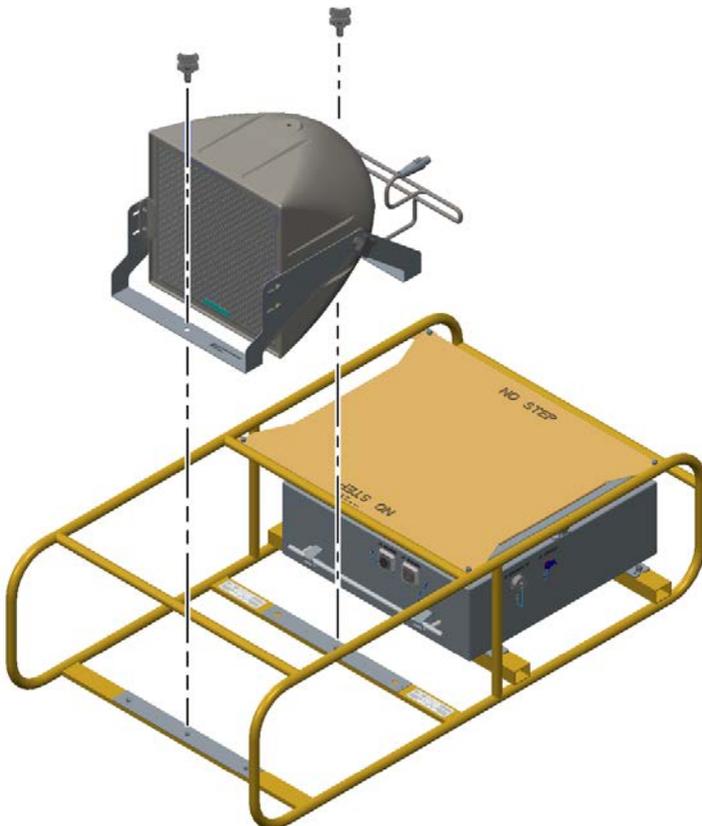
# Remove and Replace R.5 Loudspeaker



Turn off the main power and remove the power cable before disconnecting any equipment or performing maintenance. Severe injury and/or loss of life may occur if the R.5 Loudspeaker is improperly installed.

## REMOVE THE R.5 LOUDSPEAKER

1. Disconnect the R.5 Loudspeaker input cable connector P1 from the Electronics Enclosure receptacle J3.
2. Loosen the knobs securing the Loudspeaker mounting yoke to the SES frame by turning them in a counterclockwise direction. Remove the knobs and set them aside.
3. Lift the R.5 Loudspeaker from the SES frame.



## Remove and Replace R.5 Loudspeaker (Continued)

### REPLACE THE R.5 LOUDSPEAKER

1. Carefully position the new R.5 Loudspeaker with mounting yoke in the correct orientation in the SES frame aligning the center holes of the yoke to the frame.
2. Insert the knobs into the mounting yoke. Hand tighten by turning the knobs in a clockwise direction until the Loudspeaker is securely fastened to the SES frame.
3. When tightening the mounting hardware in the mounting yoke, do not use excessive force. Tighten the attaching hardware securing the Loudspeaker in the correct alignment position within the mounting yoke.
4. Connect the R.5 Loudspeaker input cable connector P1 to the Electronics Enclosure receptacle J3.
5. Reconnect the SES power cable.

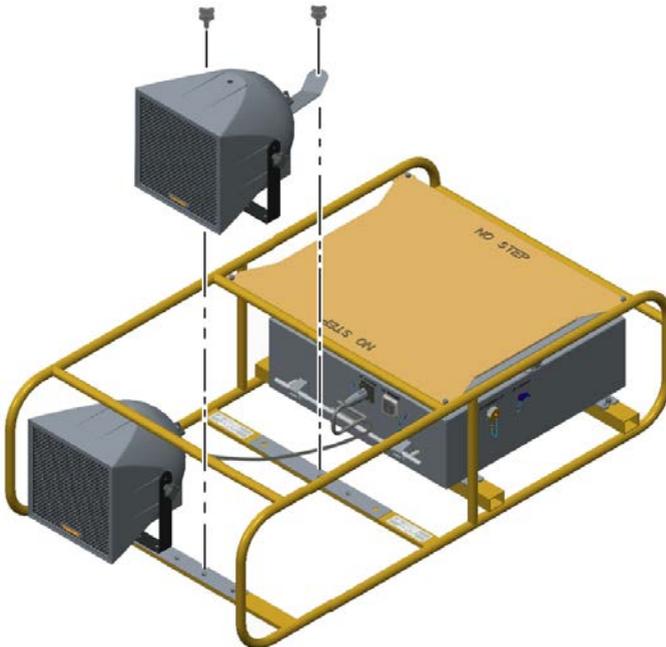
# Remove and Replace R.25 Loudspeaker



Turn off the main power and remove the power cable before disconnecting any equipment or performing maintenance. Severe injury and/or loss of life may occur if the R.5 Loudspeaker is improperly installed.

## REMOVE THE R.25 LOUDSPEAKER

1. Disconnect the R.25 Loudspeaker input cable connector P1 from the Electronics Enclosure receptacle J3 or J4.
2. Loosen the knobs securing the Loudspeaker mounting yoke to the SES frame by turning them in a counterclockwise direction. Remove the knobs and set them aside.
3. Lift the R.25 Loudspeaker from the SES frame.



## Remove and Replace R.25 Loudspeaker (Continued)

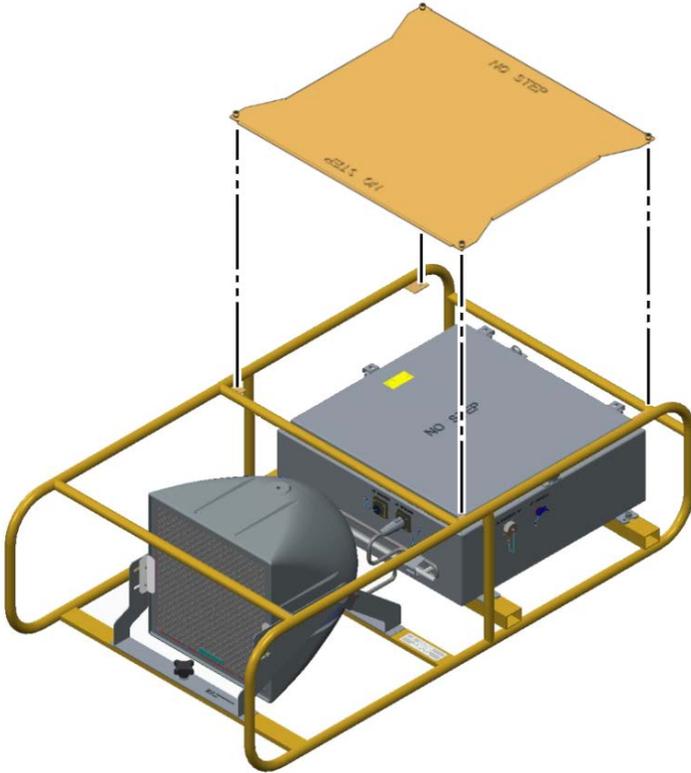
### REPLACE THE R.25 LOUDSPEAKER

1. Carefully position the new R.25 Loudspeaker with mounting yoke in the correct orientation in the SES frame aligning the center holes of the yoke to the frame.
2. Insert the knobs into the mounting yoke. Hand tighten by turning the knobs in a clockwise direction until the Loudspeaker is securely fastened to the SES frame.
3. When tightening the mounting hardware in the mounting yoke, do not use excessive force. Tighten the attaching hardware securing the Loudspeaker in the correct alignment position within the mounting yoke.
4. Connect the R.25 Loudspeaker input cable connector P1 to the Electronics Enclosure receptacle J3 or J4.
5. Reconnect the SES power cable.

# Remove and Replace Solar Cover

## REMOVE THE SOLAR COVER

1. Loosen four captive screws securing the Solar Cover to the SES frame.
2. Remove the Solar Cover.

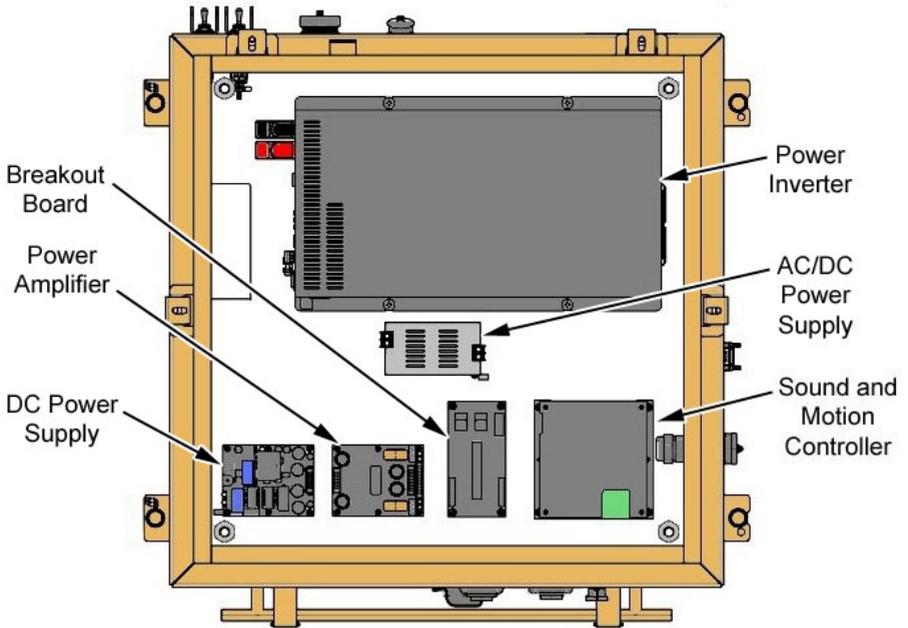


## REPLACE THE SOLAR COVER

1. Position the new Solar Cover in place on the SES frame.
2. Tighten four captive screws securing the Solar Cover to the SES frame.

# Remove and Replace Electronic Enclosure Components

The graphic below illustrates the location of electronics enclosure components for the following SES remove and replace maintenance procedures.



**Observe the following WARNINGS and CAUTIONS for the SES remove and replace maintenance procedures:**

## **⚠ WARNING**

Turn off the main power and remove the power cable before disconnecting any equipment or performing maintenance.

## **⚠ CAUTION**

The SES Electronics Enclosure contains parts which are sensitive to damage by electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing or installing. Failure to do so may damage the part or assembly.

# Remove and Replace Sound and Motion Controller

## **REMOVE THE SOUND AND MOTION CONTROLLER**

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Disconnect five cable connectors attached to the Sound and Motion Controller.
4. Loosen and remove four screws, flat washers and lock washers securing the Sound and Motion Controller to the electronics enclosure inner panel. Set the hardware aside.
5. Remove the Sound and Motion Controller.

## **REPLACE THE SOUND AND MOTION CONTROLLER**

1. Position the new Sound and Motion Controller in place on the inner panel of the electronics enclosure.
2. Install four screws, flat washers and lock washers into the Sound and Motion Controller and tighten to secure it to the inner panel.
3. Reconnect five cable connectors to the Sound and Motion Controller.
4. Shut the electronics enclosure door and secure the four door clamps.
5. Install the padlock into the door hasp and close to secure the door.
6. Reconnect the SES power cable.

# Remove and Replace Power Inverter

## REMOVE THE POWER INVERTER

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Disconnect fourteen cables attached to the Power Inverter.
4. Loosen and remove four screws, flat washers and lock washers securing the Power Inverter to the electronics enclosure inner panel. Set the hardware aside.
5. Remove the Power Inverter.

## REPLACE THE POWER INVERTER

1. Position the new Power Inverter in place on the inner panel of the electronics enclosure.
2. Install four screws, flat washers and lock washers into the Power Inverter and tighten to secure it to the inner panel.
3. Reconnect fourteen cables to the Power Inverter.
4. Shut the electronics enclosure door and secure the four door clamps.
5. Install the padlock into the door hasp and close to secure the door.
6. Reconnect the SES power cable.

# Remove and Replace AC/DC Power Supply

## REMOVE THE AC/DC POWER SUPPLY

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Disconnect all cable connectors attaching components inside the electronics enclosure to the enclosure housing.
4. Loosen and remove four lock nuts and flat washers attaching the inner panel to the electronics enclosure. Set the hardware aside.
5. Carefully grasp the edges of the inner panel and remove it from the enclosure.
6. Disconnect five cables attached to the AC/DC Power Supply.
7. Lift and turn the inner panel over to access the hardware securing the AC/DC power Supply to the panel.
8. Loosen and remove four screws, flat washers and lock washers securing the AC/DC Power Supply to the inner panel. Set the hardware aside.
9. Remove the AC/DC Power Supply.
10. Carefully place the inner panel on a flat surface.

## REPLACE THE AC/DC POWER SUPPLY

1. Position the new AC/DC Power Supply in place on the inner panel of the electronics enclosure.
2. Holding the AC/DC Power Supply in place, lift one edge of the inner panel and install four screws, flat washers and lock washers into the AC/DC Power Supply from the back side of the inner panel and tighten securing it to the inner panel.
3. Carefully lift the inner panel and place it in position in the electronics enclosure.
4. Reconnect five cables to the AC/DC Power Supply.
5. Install four lock nuts and flat washers into inner panel and tighten to secure it to the electronics enclosure.
6. Reconnect all cable connectors attaching components inside the electronics enclosure to the enclosure housing.
7. Shut the electronics enclosure door and secure the four door clamps.
8. Install the padlock into the door hasp and close to secure the door.
9. Reconnect the SES power cable.

# Remove and Replace Power Amplifier

## REMOVE THE POWER AMPLIFIER

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Disconnect six cables attached to the Power Amplifier.
4. Loosen and remove six screws, flat washers and lock washers securing the Power Amplifier to the inner panel. Set the hardware aside.
5. Remove the Power Amplifier.

## REPLACE THE POWER AMPLIFIER

1. Position the new Power Amplifier in place on the inner panel of the electronics enclosure.
2. Install six screws, flat washers and lock washers into the Power Amplifier and tighten to secure it to the inner panel.
3. Reconnect six cables to the Power Amplifier.
4. Shut the electronics enclosure door and secure the four door clamps.
5. Install the padlock into the door hasp and close to secure the door.
6. Reconnect the SES power cable.

# Remove and Replace DC Power Supply

## REMOVE THE DC POWER SUPPLY

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Disconnect four cables attached to the DC Power Supply.
4. Loosen and remove six screws, flat washers and lock washers securing the DC Power Supply to the inner panel. Set the hardware aside.
5. Remove the DC Power Supply.

## REPLACE THE DC POWER SUPPLY

1. Position the new DC Power Supply in place on the inner panel of the electronics enclosure.
2. Install six screws, flat washers and lock washers into the DC Power Supply and tighten to secure it to the inner panel.
3. Reconnect four cables to the DC Power Supply.
4. Shut the electronics enclosure door and secure the four door clamps.
5. Install the padlock into the door hasp and close to secure the door.
6. Reconnect the SES power cable.

# Remove and Replace Breakout Board

## REMOVE THE BREAKOUT BOARD

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Disconnect four cable connectors attached to the Breakout Board.
4. Loosen and remove four screws, flat washers and lock washers securing the Breakout Board to the electronics enclosure inner panel standoffs. Set the hardware aside.
5. Remove the Breakout Board.

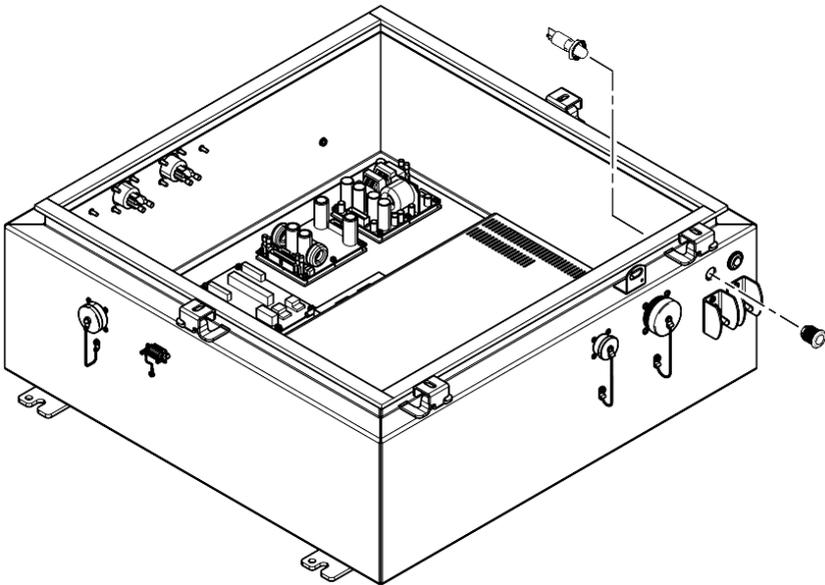
## REPLACE THE BREAKOUT BOARD

1. Position the new Breakout Board in place on the inner panel of the electronics enclosure.
2. Install four screws, flat washers and lock washers into the Breakout Board and tighten to secure it to the inner panel standoffs.
3. Reconnect four cable connectors to the Breakout Board.
4. Shut the electronics enclosure door and secure the four door clamps.
5. Install the padlock into the door hasp and close to secure the door.
6. Reconnect the SES power cable.

# Remove and Replace LED Indicator Light

## REMOVE AN LED INDICATOR LIGHT

1. Unlock and remove the padlock securing the door of the electronics enclosure.
2. Release four clamps securing the electronics enclosure door (shown on page 28 with SES Frame, solar cover and enclosure door removed) and open the door.
3. Unplug two wire connectors attached to the back of the LED indicator light.
4. From the inside of the electronics enclosure, turn the LED Indicator light nut counterclockwise to loosen.
5. While holding the LED bezel from the outside of the enclosure with one hand, pull out the LED Indicator lens components from the interior of the enclosure with the other hand.
6. Remove the LED Indicator Light.



## REPLACE AN LED INDICATOR LIGHT

1. Push the new LED bezel thru the exterior mounting hole of the electronics enclosure.
2. From the interior of the electronics enclosure, install the LED Indicator lens components. Tighten the nut securing the LED bezel to the electronics housing.
3. Reconnect two wire connectors attached to the back of the LED indicator light.
4. Shut the electronics enclosure door and secure the four door clamps.
5. Install the padlock into the door hasp and close to secure the door.
6. Reconnect the SES power cable.



# APPENDIX - SOUND RECORDING

## SAFETY SUMMARY

### WARNING

The PCM Sound Recorder uses rechargeable batteries. Misuse of batteries could cause a leak or rupture and result in personal injury.

Do not touch leaking fluid from a rechargeable battery. Battery fluid in an eye could result in loss of vision. Battery fluid on the body or clothing could cause injuries or burns on the skin.

### WARNING

The lithium batteries used in Sound Recording equipment may emit flame and/or smoke and get extremely hot if damaged or punctured.

Do not dispose of any batteries by fire or incineration. They can explode causing personal injury. Disposal should be in accordance with local authority regulation.

### CAUTION

Do not use the PCM Sound Recorder in rainy conditions. If the recorder has been exposed to rain or moisture, it may not operate normally and need to be serviced by qualified service personnel.

# GENERAL INFORMATION

The PCM Sound Recorder is a portable handheld device with four built-in microphones utilized for recording new battlefield audio sounds that can then be transferred to the SES. The PCM Recorder can also be mounted on a tripod and remotely operated from a safe distance to record sounds during a live fire training exercise.

## EQUIPMENT DESCRIPTION

### PCM SOUND RECORDER



The PCM Sound Recorder features:

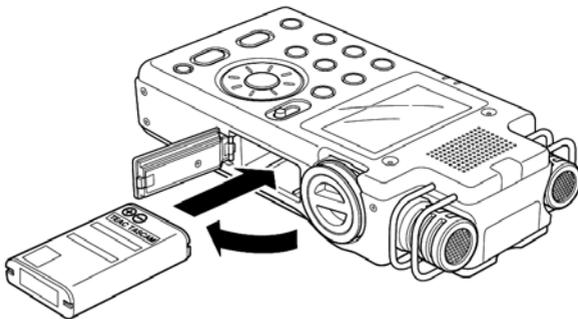
- Four built in microphones; two cardioids and two omnidirectional for sound recording
- Two XLR connectors accept microphone level signals with +48V phantom power for pro-grade condenser microphones or balanced line-level signals
- S/PDIF digital input
- Up to 96kHz/24-bit WAV recording
- Wired/wireless remote control
- Rugged aluminum case
- Records to SD or SD-HC card
- Cable with mini USB 2.0 jack
- Large thumbwheel individual gain control
- Built in speaker
- Tripod mount
- Li-Ion battery
- Dimensions- 3.15" x 6.02" x 1.38"
- Weight- 10.23 oz (not including batteries)

# OPERATION - PCM SOUND RECORDER

## RECORD AUDIO

The PCM Sound Recorder is a device used to record battlefield sounds in live fire training environments to add audio to the SES. It contains an SD card and will, by default, produce 44.1kHz, 15-bit WAV files. To prepare the unit for recording, do the following:

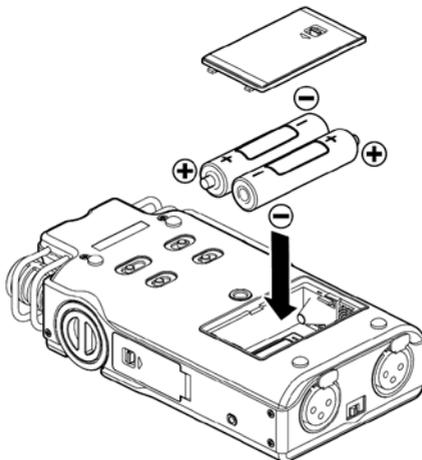
1. Insert the TASCAM BP-L2 lithium ion battery into the battery compartment on the side of the recorder. Orient the battery so that it fits in the battery compartment as shown in the graphic below.



### NOTE

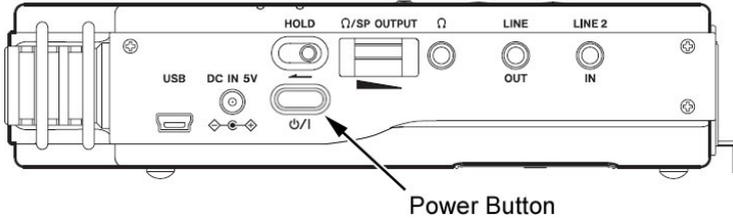
Charge the battery before using the unit by connecting it to a computer by USB.

2. Open the battery compartment cover on the back of the unit, install two AA batteries into the unit and close the battery compartment cover.

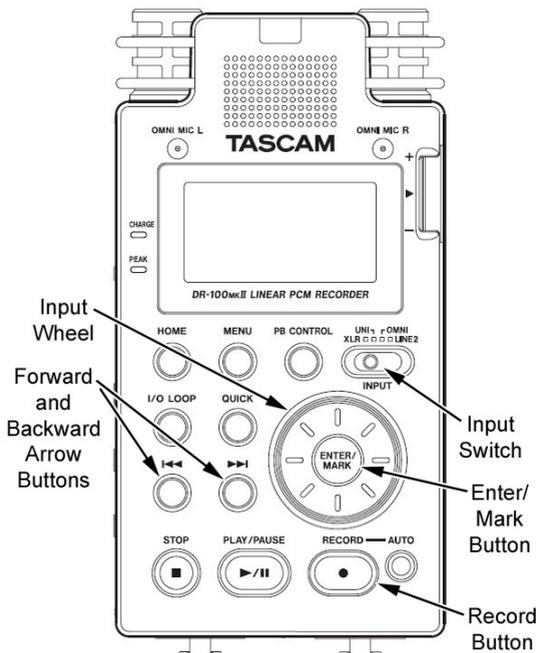


# OPERATION – SOUND RECORDER (CONTINUED)

- Turn on the recorder by pressing the **Power** button on the left side panel of the unit until power is turned on.

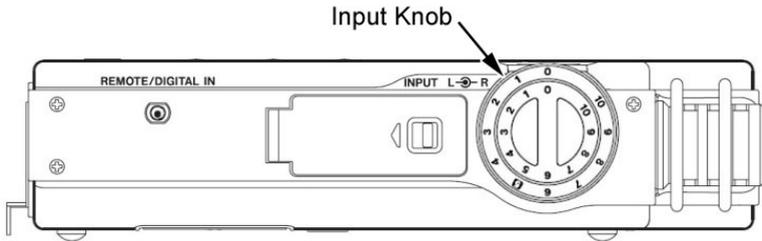


- Set the **INPUT** switch to **UNI**.
- Press the **MENU** button to display the menu screen. Use the input wheel to access the **INPUT SETTINGS** menu, and press the **ENTER/MARK** button to open the **INPUT SETTINGS** screen.
- Turn the **Input Wheel** and use the **ENTER/MARK** button and **Forward/Backward** arrow buttons to set the following: **Stereo Type**, **80Hz** low cut, and **AUTO** level control.
- Exit the menu by pressing the **HOME** button.
- Press the **RECORD** button to switch to recording standby. The indicator will flash.

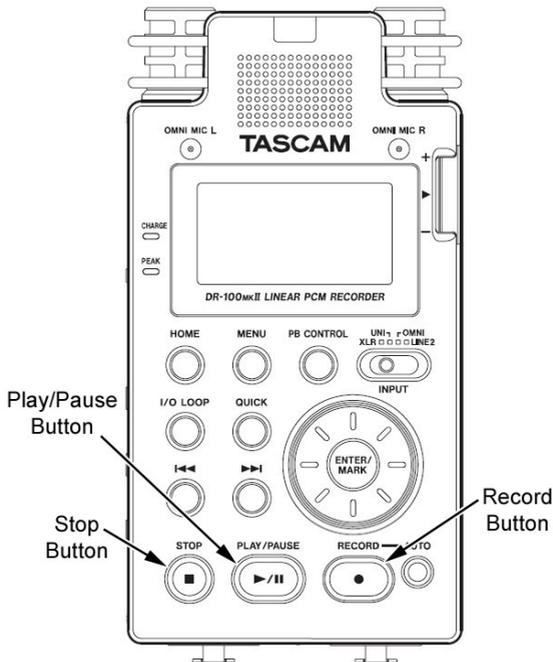


# OPERATION – SOUND RECORDER (CONTINUED)

9. Use the **INPUT** knob on the right side panel to adjust the analog input level.



10. Press the **RECORD** button to switch to start recording. The indicator will light during recording.
11. To pause recording, press the **RECORD** or **PLAY/PAUSE** button. Press the **RECORD** or **PLAY/PAUSE** button again to restart recording the same file.
12. Press the **STOP** button to finish recording.



# OPERATION – SOUND RECORDER (CONTINUED)

## **TRANSFER AUDIO FROM PCM RECORDER TO LAPTOP COMPUTER**

1. Once the file(s) is recorded, it can be transferred to a host computer by plugging the recorder to a computer via the included USB cable and powering on the recorder (or via the recorder's micro SD card and a USB card reader/writer). The recorder or micro SD card will appear as a drive on the computer and you can drag and drop the files from the recorder (or card) to the computer.
2. Names of the audio files should be in accordance with the FASIT ICD. You can rename the files on the computer as you would any other file.

## **TRANSFER AUDIO FROM LAPTOP COMPUTER TO SES**

1. To transfer files to the SES, first make sure the SES is in Maintenance Mode. Remove the SES network Ethernet cable. Then connect the computer to the SES via serial cable. The computer IP address must be in the range of the IP address of the SES. For example, if the SES IP address is 169.168.1.10, the computer should have an address of 169.168.1.XXX (not the same last number as the SES, e.g., 169.168.1.40).
2. Connect to the SES using an FTP server program (or something like Internet Explorer) using the SES IP address. The SES should appear as a drive on the computer with files visible in icon or list form. You can transfer, copy, replace, and delete files by dragging and dropping.
3. When finished, disconnect the FTP server and computer Ethernet cable. Reconnect the SES range network Ethernet cable. When ready, command the SES from the Range Control Center to the desired mode.

# TROUBLESHOOTING

## Malfunctions

### POWER WILL NOT TURN ON

POSSIBLE CAUSE	CORRECTIVE ACTION
Batteries are dead.	Install new AA batteries.
Batteries are not installed in the correct orientation.	Remove the AA batteries and reinstall them in the correct +/- orientation.
Is there a TASCAM BP-L2 lithium-ion battery installed?	If not, install the battery. It will extend the operating life of the unit.

### RECORDING DOES NOT WORK

POSSIBLE CAUSE	CORRECTIVE ACTION
The operation mode is not correct.	Change the operation mode to <b>STD</b> (default). Do this by turning off the device (holding down the <b>Power</b> button until it turns off) and then hold the <b>ENTER/MARK</b> and <b>Power</b> buttons to turn the device on in <b>Mode Select</b> state. Choose <b>STD</b> using the <b>Input Wheel</b> and the <b>ENTER/MARK</b> button.
The input settings are not correct.	Ensure the input settings are as follows: <ul style="list-style-type: none"><li>• TYPE: <b>STEREO</b></li><li>• LOW CUT: <b>80Hz</b></li><li>• LEVEL CTRL: <b>AUTO</b></li></ul>
There is no SD card installed in the recorder.	Install an SD card.
The SD card is full.	Copy the audio files to your computer. Delete unnecessary files to regain space on the SD card.
The SD card contains the maximum number of folders and files.	The total number of folders and files exceeds 999. Erase unnecessary files or move them to your computer.

## Malfunctions (Continued)

### THE UNIT DOES NOT FUNCTION

POSSIBLE CAUSE	CORRECTIVE ACTION
The <b>HOLD</b> switch is <b>ON</b> (in the direction of the arrow).	Push the <b>HOLD</b> switch to the other end of the slot. All controls are inoperative when <b>HOLD</b> is <b>ON</b> .

### REMOTE CONTROLLER WILL NOT OPERATE THE RECORDER

POSSIBLE CAUSE	CORRECTIVE ACTION
Batteries are not in the remote controller or are dead.	Confirm that there is a battery in the remote controller with power remaining.

## MAINTENANCE INSTRUCTIONS

### Preventive Maintenance Checks and Services

SEQUENCE NO.	ITEM TO BE INSPECTED/PROCEDURE
1	PCM RECORDER- Check for a humming sound. A hum may occur if a powered amplifier or other device with a large transformer is used near this unit. If this should happen, increase the distance between the recorder and the device.
2	PCM RECORDER- Check for dirt, moisture or mildew. To clean the recorder, wipe gently with a soft dry cloth. Do not use any benzene, paint thinner, ethyl alcohol or other chemical agents to clean the unit.

