



### MODEL SM94 UNIDIRECTIONAL CONDENSER MICROPHONE

The Model SM94 is a unidirectional electret condenser microphone tailored to the instrument miking needs of professional musicians and sound engineers in both live performance and sound recording. Its smooth, flat frequency response is free of either a “presence peak” or a low-frequency rolloff, making it a perfect choice for all types of musical instruments. The SM94 is equally at home in sound reinforcement systems or in sound studios and motion picture/TV scoring stages. When used with the optional windscreen, the SM94 can be used by vocalists and speech-makers who desire a wide, flat response with minimum coloration.

The SM94 can be powered by any phantom power source, or by an internal 1.5-volt AA battery. The battery, which serves as a backup power source in the event of phantom power failure, can provide up to 5,000 hours of continuous operation.

The SM94 is supplied with a swivel adapter for use on a microphone stand, boom or gooseneck, and a zippered vinyl storage bag. Model SM94-LC is supplied without a cable.

Accessories include a foam windscreen (A3WS), two-channel phantom power supply (PS1A), and 7.6 m (25 ft.) microphone cable (C25J).

#### Features

- *Wide, flat response for optimum musical instrument sound reproduction*
- *Full spectrum sound—no presence peak or low-end rolloff*
- *Cardioid polar pattern that is uniform with frequency and symmetrical about axis for maximum rejection of unwanted sound and minimum of-axis coloration*
- *Very low susceptibility to RF and electromagnetic hum*
- *Low distortion output and wide dynamic range for variety of load impedances*
- *Shock-mounted cartridge for reduced handling noise*

- *Accepts 12 to 48 Vdc phantom power*
- *Rugged all-metal construction*
- *Usable over wide range of environmental conditions*
- *Built-in battery power backup*
- *Optional foam windscreen*

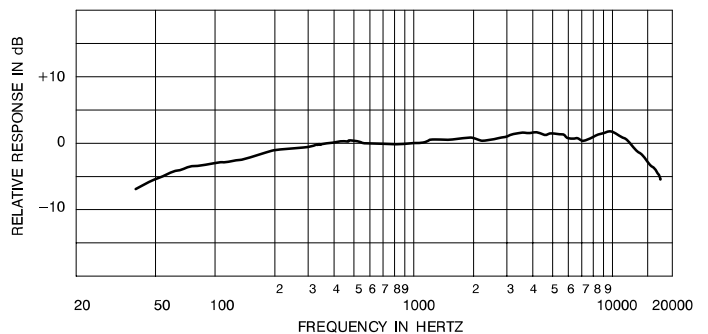
#### SPECIFICATIONS

##### Type

Cardioid condenser (electret bias)

##### Frequency Response

40 to 16,000 Hz (see Figure 1)

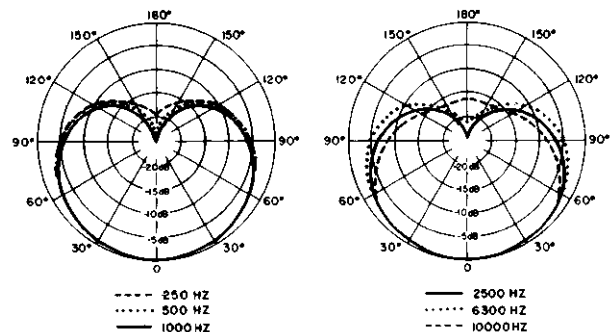


TYPICAL FREQUENCY RESPONSE

FIGURE 1

##### Polar Pattern

Cardioid (unidirectional)—uniform with frequency, symmetrical about axis (see Figure 2)



TYPICAL POLAR PATTERNS

FIGURE 2

### Output Impedance

Rated at 150  $\Omega$ ; 200  $\Omega$  actual

### Recommended Minimum Load Impedance

800  $\Omega$

### Sensitivity (at 1,000 Hz)

Open Circuit Voltage: -49 dBV/Pa (3.5 mV) (phantom)  
-50 dBV/Pa (3.2 mV) (battery) (1 Pa = 94dB SPL)

### Output Clipping Level (1 kHz, 3% THD)

800- $\Omega$  Load . . -14 dBV (0.63 V) (phantom), 1% THD;  
-23 dBV (0.71 V) (battery), 3% THD

### Total Harmonic Distortion

< 0.25% (130 dB SPL at 250 Hz into 800  $\Omega$  load)

### Maximum SPL

800  $\Omega$  Load: 141 dB (phantom), 123 dB (battery)

### Hum Pickup

-3 dB equivalent SPL in a 1 millioersted field (60 Hz)

### Output Noise (equivalent sound pressure levels; measured with true rms voltmeter)

22 dB typical, A-weighted

25 dB typical, weighted per DIN 45 505

### Dynamic Range

119 dB (phantom); 101 dB (battery) (maximum SPL, 2000- $\Omega$  load, to A-weighted noise level)

### Signal-to-Noise Ratio

72 dB (IEC 651)\* at 94 dB SPL

### Overvoltage Protection

Maximum External Voltage Applied to Pins 2 and 3 with respect to Pin 1: +52Vdc

Reverse polarity protected to 75 Vdc

### Polarity

Positive pressure on diaphragm produces positive voltage on pin 2 relative to pin 3

### Capacitance

24 pF

### Power

Phantom Operation

Supply Voltage: 11 to 52 Vdc, (+) pins 2 and 3

Current Drain: 1.0 TO 1.2 mA max. at 52 Vdc

### Battery Operation

Type: 1.5 V alkaline, AA size (NEDA 15A)

Life: Up to 5,000 hours with fresh battery

### Environmental Conditions

Temperature:

Storage . . . . . -29° to 74° C  
(-20° to 165° F)

Operating . . . . . -6.7° to 49° C  
(20° to 120° F)

Humidity:

Storage . . . . . 0-95% relative humidity at room temperature (72° to 80° F, 22° to 27° C)

### Connector

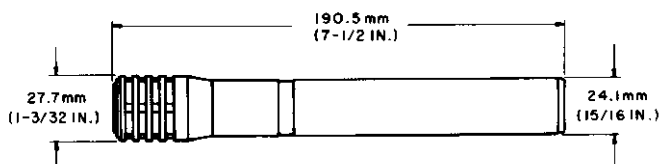
XLR professional audio 3-Pin

### Case

Steel and brass construction with gray finish and stainless steel mesh grille

### Dimensions

See Figure 3



OVERALL DIMENSIONS  
FIGURE 3

### Weight

Net . . . . . 250 grams (8.8 oz) less battery  
Packaged . . . . SM94-LC: 949.7 grams (2 lb 1 1/2 oz)

### Certification

Eligible to bear CE Marking. Conforms to European EMC Directive 89/336/EEC. Meets applicable tests and performance criteria in European Standard EN55103 (1996) parts 1 and 2, for residential (E1) and light industrial (E2) environments.

\*S/N ratio is difference between microphone output at 94 dB SPL and microphone self-noise A-weighted.

### OPERATION

The SM94 is designed for phantom powering by a Shure PS1A Power Supply, or by any microphone power supply providing 12 to 48 Vdc phantom voltage, or by any microphone mixer (such as the Shure SCM262 and SCM268) with a phantom supply. In addition, the SM94 can be powered by a single 1.5-volt AA alkaline battery. The battery also serves as a backup in case of phantom power failure. A new alkaline battery will provide up to 5,000 hours of continuous microphone operation. Note that the microphone is powered at all times during battery operation but there is no battery drain during phantom-powered operation.

### BATTERY OPERATION

Disconnect the microphone cable, and unscrew the SM94 handle, turning counterclockwise (from top) until the handle is free of the microphone body. Slide the handle away from the grille, exposing the battery compartment. Insert a new battery (or replace the old battery), observing the polarity marking in the compartment.

Slide the handle toward the grille, and tighten the handle by turning it clockwise (from top).

### WIND NOISE

Use the optional foam windscreen (A3WS) when using the SM94 outdoors on a windy day, indoors near strong air currents such as air-moving equipment, or as a vocal microphone.

### CIRCUIT DESCRIPTION

A block diagram of the SM94 is shown in Figure 4. The capacitor cartridge is followed by an impedance converter stage. This stage has an active load to obtain good load-driving capability with the low battery voltage of 1.5 volts.

The audio signal is transformer-coupled for a balanced output to the microphone connector. An active power sup-

ply circuit regulates the phantom voltage, and the 1.5-volt battery provides instantaneous backup in case the phantom power supply fails. The regulator/reverse voltage protector provides built-in protection against miswired cables and equipment.

**TROUBLESHOOTING**

Due to the circuit complexity of the SM94, only basic servicing is recommended. The following steps should be taken if problems arise:

1. Check the power supply output voltage. For the Shure PS1A, this should be 21.5, ±1.5 Vdc, open circuit.
2. Check the voltage on connector pins 2 and 3 (at back of connector, with cable connector removed from shell, but connected to microphone). The voltage at pins 2 and 3 with reference to pin 1 should be between 10 and 48 Vdc.
3. If the microphone does not work on phantom power, battery operation may still be possible. Similarly, if battery operation is impaired, the SM94 may still operate on phantom power. In either case, you should send the microphone to an Authorized Shure Service Center at your earliest opportunity.

**ARCHITECTS' SPECIFICATIONS**

The microphone shall be a condenser microphone with a frequency response of 40 to 16,000 Hz. It shall have a cardioid directional characteristic, with cancellation at the sides of 6 dB and a minimum cancellation at the rear of 15 dB at 1 kHz. The microphone shall have a rated output impedance of 150 Ω for connection to microphone inputs of 150 Ω or higher. The open circuit voltage shall be -49 dBV/Pa (3.5 mV) dB equals 1 volt per Pascal).

The overall dimensions shall be 190.5 mm (7-1/2 in.) in length by 27.7 mm (1-3/32 in.) in diameter. The handle diameter shall be 24.1 mm (15/16 in.) The weight shall be 250 grams (8.8 oz).

The microphone shall be capable of being powered by a phantom power supply with an output of 11 to 52 Vdc, or by a mixer, audio console or tape recorder capable of supplying 11 to 52 Vdc, or by an internal 1.5-volt battery.

The microphone shall be a Shure Model SM94.

**FURNISHED ACCESSORIES**

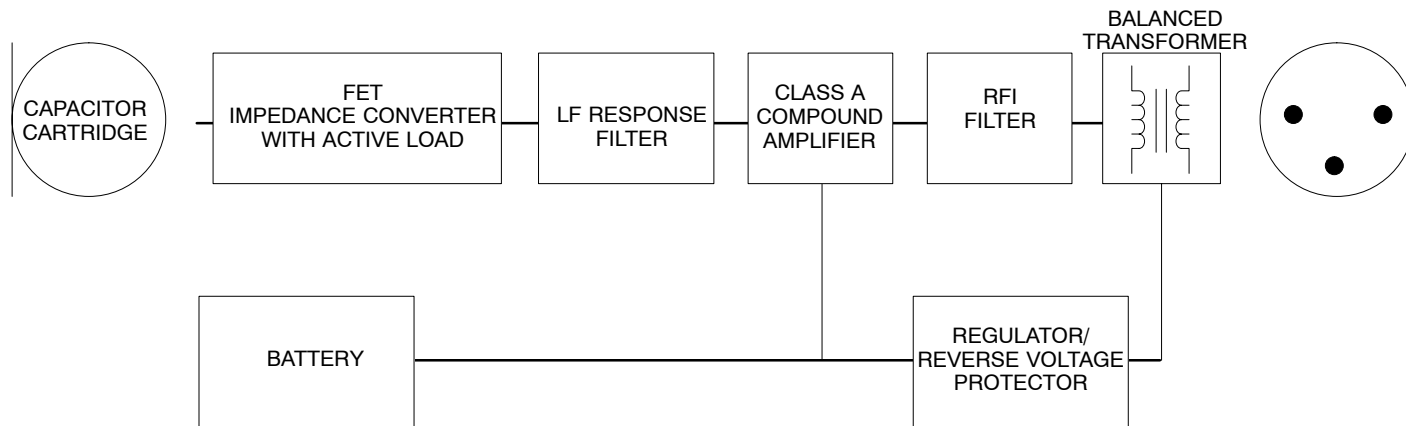
Swivel Adapter	.....	A25D
Carrying/Storage Bag	.....	26A13

**OPTIONAL ACCESSORIES**

Phantom Power Supply	.....	PS1A
Switch-Selectable Attenuator	.....	A15AS
Isolation Mount	.....	A53M
Windscreen	.....	A3WS
7.6 m (25 ft.) Cable	.....	C25J

**REPLACEMENT PARTS**

Screen and Grille	.....	RK255G
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**BLOCK DIAGRAM  
FIGURE 4**