Shure Brothers Incorporated
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Models WL93 and SM93 User Guide

MODEL WL93 AND SM93 SUBMINIATURE CONDENSER MICROPHONES



GENERAL

Shure Model WL93 and SM93 Microphones are omnidirectional, subminiature, lavalier electret condenser microphones designed for use in TV broadcasting, theater, and sound reinforcement applications where a visually unobtrusive microphone is desirable. The Model WL93 is for wireless use; the SM93 for wired applications. Both feature the 93 microphone element.

Despite its small size, the 93 microphone element provides full, clear sound comparable to that of much larger microphones. Its frequency response is tailored to body-worn applications, with low-end rolloff and presence rise.

The microphone cable has a miniature 4-pin connector (Switchcraft TA4F type) that connects directly either to a Shure wireless body-pack transmitter or to the preamplifier assembly supplied with the SM93.

Optimum pickup is achieved when the microphone is worn on the user's chest. However, high quality sound can also be obtained when the microphone is worn in the hair, sewn into clothing, or attached to an acoustic instrument such as a guitar.

Both models are supplied with a sew-on mounting bracket, a mounting block with attached tie bar, and an acoustic windscreen to minimize wind noise in outdoor applications. The SM93 is also supplied with a dual mounting block with attached tie bar.

The SM93 consists of the 93 microphone and a preamplifier assembly with male four–pin "Tini Q–G" (TA4M) and three-pin professional (XLR-type) audio connectors.

The SM93 is powered by phantom power supplied by broadcast, sound reinforcement or recording equipment, or an external phantom supply. The SM93 operates over an extremely wide voltage range of 11 to 52 Vdc, covering both DIN and IEC phantom power standards. A dual-channel power supply (Shure Model PS1A) is available for providing phantom power to the SM93.

FEATURES

- Subminiature lavalier design; ideal size for theater, television broadcasting, video, film, and sound reinforcement
- Small, inconspicuous mounting hardware
- Full, clear sound comparable to larger microphones
- Smooth extended frequency response with presence rise specially tailored for chest-worn microphone operation
- Controlled low-frequency rolloff reduces low-frequency clothing and room noise
- Low distortion, wide dynamic range
- Uniform omnidirectional polar pattern
- Preamplifier assembly (SM93) can be pocketed, strapped to the body, or clipped to belt or waistband
- Wide-range phantom powering (SM93) accepts all commonly used voltages

VARIATIONS

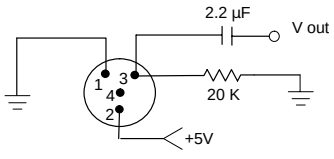
Version	Cable	Color
WL93	1.2 m (4 ft.)	Black matte microphone and cable with black accessories
SM93		
WL93–6	1.8 m (6 ft.)	
WL93T	1.2m (4 ft.)	Tan matte microphone and cable with tan accessories
WL93–6T	1.8 m (6 ft.)	

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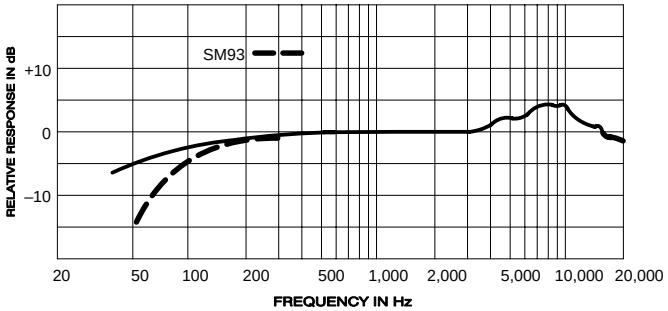
SPECIFICATIONS	**WL93 MICROPHONE** (with standard test circuit shown in Figure 1)	**SM93 MICROPHONE** (with preamplifier; refer to Figures 6 and 7)
Type	Condenser (electret bias)	Condenser (electret bias)
Frequency Response (Figure 2)	50 to 20,000 Hz	80 to 20,000 Hz, 12 dB/octave rolloff below 100 Hz
Polar Pattern	Omnidirectional, uniform with frequency	Omnidirectional, uniform with frequency
Output Impedance	3000 Ω	Rated at 150 Ω (90 Ω actual) Recommended minimum load impedance: . . . . 800 Ω (May be used with loads as low as 150 Ω with reduced clipping level)
Output Level (1 Pascal = 94 dB SPL)	Open Circuit Voltage: –38 dBV/Pa (13 mV)	Open Circuit Voltage: –43 dBV/Pa (7.0 mV)
Output Clipping Level (at 1,000 Hz)	0.25 V at 120 dB	–18 dBV (0.13 V) minimum
Total Harmonic Distortion	Less than 1% at 120 dB	Less than 1% at 120 dB
Maximum SPL	120 dB	120 dB
Dynamic Range (maximum SPL to A-weighted noise level)	102 dB	98 dB
Output Noise (equivalent SPL)	18 dB typical, A-weighted	22 dB typical, A-weighted 26 dB, weighted per DIN 45 405
Hum Pickup (electromagnetic)	N/A	–4 dB equivalent SPL in a 1 mOe field (60 Hz)
Signal-to-Noise Ratio	76 dB at 94 dB SPL (IEC 651)	72 dB at 94 dB SPL (IEC 651)
Phasing	Positive pressure on microphone diaphragm produces positive voltage on pins 3 and 4 with respect to pin 1 (ground)*	Positive pressure on microphone diaphragm produces positive voltage on pin 2 relative to pin 3 of preamplifier output cable connector
Recommended Operating Voltage	2 to 10 V; 5 V nominal (pin 2 to pins 3 and 4)	11 to 52 Vdc phantom. Protected against reverse voltage application
Current Drain	40 μA typical	0.33 mA
Environmental Conditions	Operating Temperatures: –18° to 57° C (0° to 135° F) Storage Temperatures: –29° to 74° C (–20° to 165° F)	Operating Temperatures: –18° to 57° C (0° to 135° F) Storage Temperatures: –29° to 74° C (–20° to 165° F)
Cable	Black 1.27 m (4.17 ft), attached, two-conductor, shielded, terminated by Switchcraft TA4F type connector (WL93T: Tan 1.27 m [4.17 ft])	Black 1.27 m (4.17 ft), attached, two-conductor, shielded, terminated by Switchcraft TA4F type connector
Case	Microphone: Black ABS thermoplastic case with stainless-steel-mesh grille	Microphone: Black ABS thermoplastic case with stainless-steel-mesh grille Preamplifier: Steel case with non–reflective black finish, black–chrome belt clip
Net Weight	Microphone: 16 g (0.57 oz)	Microphone: 16 g (0.57 oz) Preamplifier: 118 g (4.17 oz)

*Produces positive voltage at pin 2 of Shure L4/EC4 wireless receiver three–pin connector.



TEST CIRCUIT

FIGURE 1



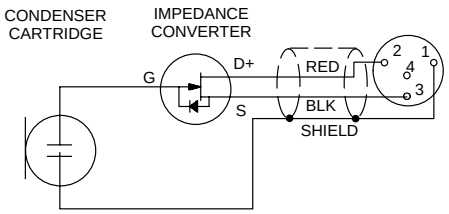
TYPICAL FREQUENCY RESPONSE

FIGURE 1

POWERING THE 93 MICROPHONE

The 93 impedance conversion circuitry is designed to be powered, as shown in Figure 3, from a regulated +5 Vdc source provided at microphone connector pin 2 from a Shure wireless body-pack transmitter or from the preamplifier supplied with the SM93. If the WL93 is to be used with any other wireless transmitter, either the microphone cable or the transmitter input must be rewired for proper operation and powering within the constraints of the *Recommended Operating Voltage* and *Current Drain* specifications.

NOTE: The WL93 microphone alone is not designed to be operated directly into the input of a mixer.



MICROPHONE WIRING DIAGRAM

FIGURE 3

POWERING THE SM93 AMPLIFIER

The SM93 with its supplied preamplifier can be powered by virtually any microphone phantom supply providing 11 to 52 Vdc phantom voltage. The Shure Model PS1A Power Supply provides power to one or two SM93 microphones. Phantom powering uses the balanced audio cable pair to carry the supply current to the microphone; the cable shield is the ground return.

Use only high-quality cables. Intermittent shorts between broken shield wires and balanced conductors will cause objectionable noise transients in the system. A reliable ground path is essential for the same reason.

LOADING THE SM93 PREAMPLIFIER

A minimum load impedance of 800 Ω or greater should be used for maximum signal handling and minimum distortion. The load can be as low as 150 Ω, but a reduction in output clipping level will result. It should be noted that the power supply itself may add loading (3300 Ω in the Shure PS1A) to the microphone.

MOUNTING THE SM93 PREAMPLIFIER

Most SM93 applications require that the preamplifier be worn on the body. The spring-loaded belt clip will hold the amplifier to a belt, skirt or trouser waistband or inside pocket.

WINDSCREENS

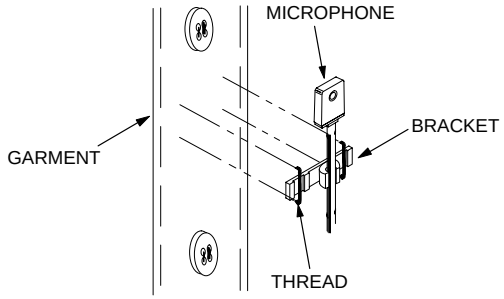
Since lavalier microphones are typically used indoors, they normally do not require windscreens. However, an acoustic foam windscreen(WL93, SM93: black; WL93T: tan) is supplied to help reduce undesirable wind noise associated with outdoor miking.

MOUNTING THE MICROPHONE

The tie clips and mounting bracket provided with the WL93 and SM93 are very small and designed to minimize visual detection. They allow the user to wear the microphone in a variety of ways, including the following:

1 **Tie Clip.** The microphone tie clip features a spring-loaded clasp that attaches easily to a necktie, lapel, blouse, or shirt. To mount the 93 to the tie clip, snap the microphone into the clip's mounting bracket and attach the clip to an article of clothing). The SM93 is also supplied with a dual tie clip for simultaneous mounting of two microphones.

2 **Sew-On Bracket.** The flat sew-on mounting bracket provided with the 93 can be sewn directly to a garment (Figure 4). The use of dark thread (for WL93 or SM93) or light thread (WL93T) is recommended when sewing the bracket to clothing.



SEW–ON MOUNTING

FIGURE 4

NOTE*:* Other mounting methods can be devised from materials such as tape, hook-and-loop fasteners, or safety pins available at most fabric or hardware stores.

3 **WL93T.** The tan color of the WL93T housing, cable and accessories, plus its longer-length cable enhance its use in theater productions where the 93 may be tape-mounted on the skin or under the hair.

FURNISHED ACCESSORIES

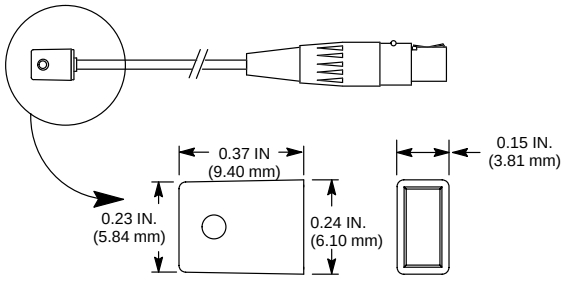
Preamplifier (SM93)	90A4360
Black Windscreen (WL93, SM93)	RK355WS*
Black Tie Clip Assembly (WL93, SM93)	RK354SB*
Dual Black Tie Clip Assembly (SM93)	RK307DB
Tan Windscreen (WL93T)	RK304T**
Tan Tie Clip Assembly (WL93T)	RK304T**
Black Sew-on Mounting Bracket (WL93, SM93)	65B1733
Tan Sew-on Mounting Bracket (WL93T)	65B1733A
Zippered Carrying Bag	26A13

* Replacements furnished in multiples of 4.

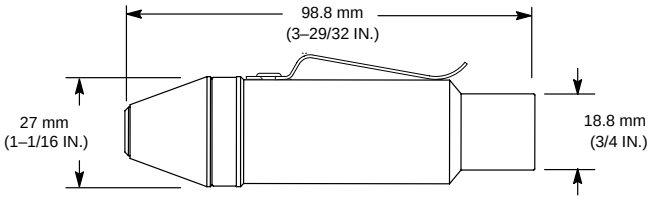
** RK304 incluses 2 tie clips and 2 windscreens.

OPTIONAL ACCESSORIES

In-Line On/Off Switch	WA360



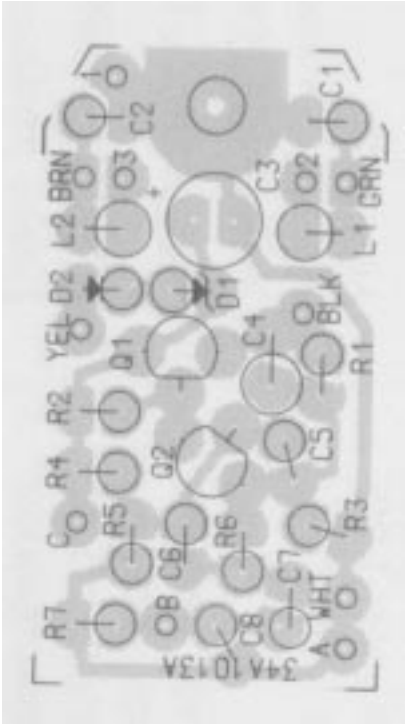
SM93/WL93 MICROPHONE



SM93 PREAMPLIFIER

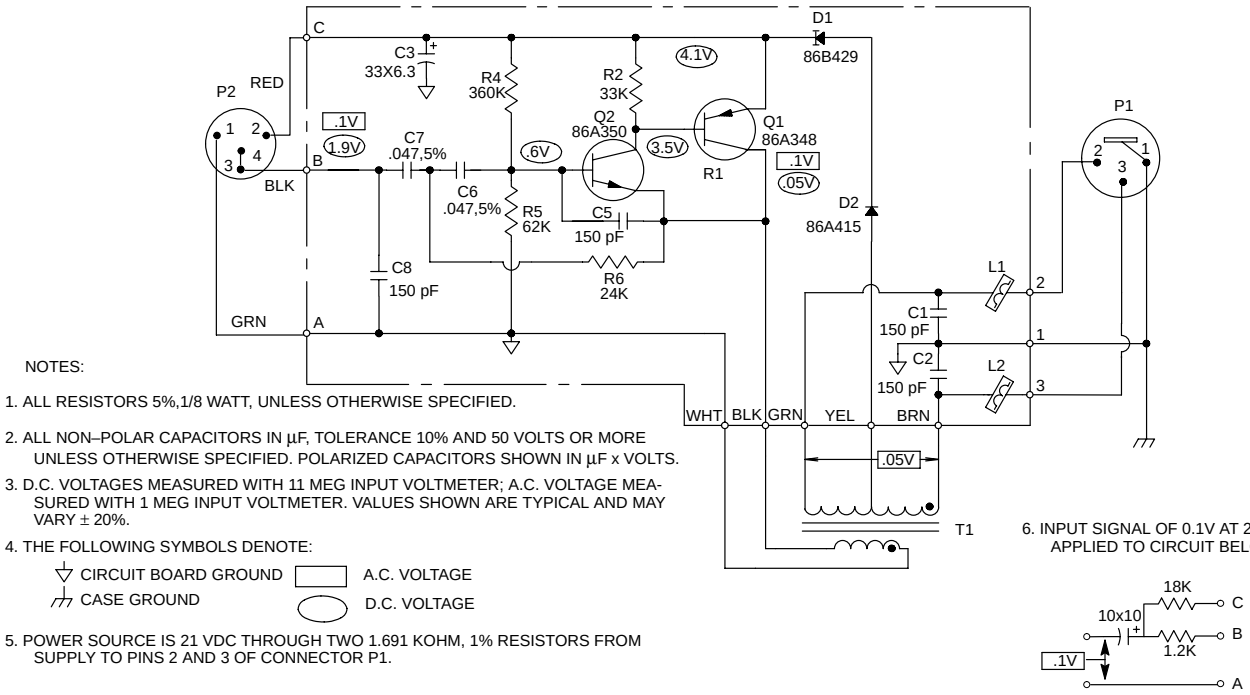
OVERALL DIMENSIONS

FIGURE 5



SM93 PREAMPLIFIER
PRINTED CIRCUIT BOARD

FIGURE 6



NOTES:

1. ALL RESISTORS 5%,1/8 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL NON–POLAR CAPACITORS IN µF, TOLERANCE 10% AND 50 VOLTS OR MORE UNLESS OTHERWISE SPECIFIED. POLARIZED CAPACITORS SHOWN IN µF x VOLTS.
3. D.C. VOLTAGES MEASURED WITH 11 MEG INPUT VOLTMETER; A.C. VOLTAGE MEASURED WITH 1 MEG INPUT VOLTMETER. VALUES SHOWN ARE TYPICAL AND MAY VARY ± 20%.
4. THE FOLLOWING SYMBOLS DENOTE:
   - CIRCUIT BOARD GROUND
   - CASE GROUND
   - A.C. VOLTAGE
   - D.C. VOLTAGE
5. POWER SOURCE IS 21 VDC THROUGH TWO 1.691 KOHM, 1% RESISTORS FROM SUPPLY TO PINS 2 AND 3 OF CONNECTOR P1.
6. INPUT SIGNAL OF 0.1V AT 2 KHZ APPLIED TO CIRCUIT BELOW:

SM93 PREAMPLIFIER CIRCUIT DIAGRAM

FIGURE 7

SHURE

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