

GENERAL

The SM91A Microphone is designed specifically for surface-mounted applications. It is a professional-quality permanently-biased condenser microphone with a half-cardioid pickup pattern (cardioid in the hemisphere above the mounting surface.)

The SM91A takes advantage of the well-known principle that, at a barrier or boundary, sound pressure doubles compared to its value if the boundary is removed. When placed sufficiently near the boundary surface, a microphone has effectively 6 dB higher sensitivity and approximately 3 dB greater rejection of random background noise.

Because of its half-cardioid polar pattern, the SM91A surface-mounted microphone discriminates against sounds originating from the rear, suiting the SM91A for conditions where an omnidirectional pattern makes other surface-mounted microphones impractical. The intrinsic unidirectionality of the SM91A can be a great benefit when it is desirable to isolate a particular vocalist, instrument, or group from the rest of an ensemble being recorded. Because of a cardioid pickup pattern, no physically isolating barriers are required, and directionality is maintained to low frequencies.

The SM91A can be used for individual instrument pickup, e.g., mounted inside the lid of a grand piano or on the floor next to a bass drum. Experimental placement and critical listening will help to determine the best location for any particular purpose or effect desired.

The meticulously optimized design of the SM91A includes a unique cartridge, developed at Shure. The result is high sensitivity, exceptionally accurate sound reproduction over the entire audio frequency range, and freedom from off-axis coloration comparable to the finest unidirectional microphones.

The furnished ILP-1 preamplifier is a high-clipping level low-noise unit, phantom powered by 11 to 52 Vdc. It has selectable gain of 0 or +10 dB, and switchable low-frequency response, flat or low cut (rolled off at 12 dB/octave). The low cut is particularly useful to minimize pickup of ambient low-frequency noise from sources like heating or air-conditioner fans, for instance.

The SM91A consists of a small, rugged, surface-mounted microphone finished in professional durable matte-black enamel, a 7.6 m (25 ft) small diameter two-conductor shielded interconnecting cable with two 3-socket miniature Switchcraft connectors; and the ILP-1 preamplifier assembly with standard 3-pin professional audio connector output.

Features:

- Wide flat frequency response for faithful sound reproduction across the audio spectrum
- High sensitivity, low self-noise
- Very low distortion and high output clipping level
- Half-cardioid polar pattern minimizes pickup from rear of microphone, permits aiming microphone, e.g., toward performers and away from audience, or toward singers and away from instruments
- Low susceptibility to RFI, electrostatic and electromagnetic hum
- Extremely rugged construction of both microphone and preamplifier for outstanding reliability
- Switch-selectable 12 dB/octave low-frequency cut-off permits tailoring response to suit conditions
- Switch selectable preamp gain of 0 or +10 dB
- Accepts phantom power of 11 to 52 Vdc, permits use of wide variety of amplifiers or phantom supplies
- Standard 3-pin male XLR-type output connector on preamp can be directly connected to any 3-pin female XLR-type phantom-powered input
- Low profile and matte black finish for unobtrusive appearance on-camera or onstage; on floor, table, ceiling, wall, or lectern
- Usable over very wide range of temperature and humidity

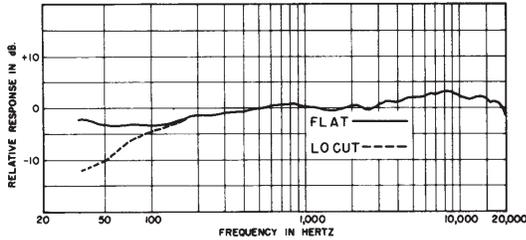
SPECIFICATIONS

Type

Cardioid condenser (electret bias) for surface mounting

Frequency Response

20 to 20,000 Hz (see Figure 1)

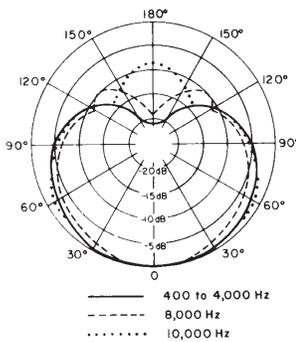


TYPICAL FREQUENCY RESPONSE
(measured at 30° incidence to infinite surface)

FIGURE 1

Polar Pattern

Half-cardioid (cardioid in hemisphere above mounting surface), uniform with frequency, symmetrical about axis (see Figure 2)



TYPICAL POLAR PATTERN

FIGURE 2

Output Impedance

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 (at 1,000 Hz, measured with sound source at 30° incidence to flat surface)

Open Circuit Voltage -71.5 dB (0.27 mV)
0 dB = 1 V/μbar

Preamplifier Output Clipping Level (at 1,000 Hz, less than 0.1% THD)

	GAIN	
	0	+10
800 Ω load	0 dBV (1.0 V)	-7.0 dBV (0.45 V)
150 Ω load	-13.0 dBV (0.22 V)	-21.0 dBV (0.09 V)

Maximum SPL (at 1,000 Hz, less than 1% THD)

800 Ω load	
ILP-1 gain set at 0 dB	146.5 dB
ILP-1 gain set at +10 dB	136.5 dB
150 Ω load	
ILP-1 gain set at 0 dB	129.5 dB
ILP-1 gain set at +10 dB	118.5 dB

Electromagnetic Hum Pickup (maximum)

-0.5 dB equivalent SPL in 1 mOe field (60 Hz)

Preamplifier Controls

Selectable Low-Frequency Response: Flat/Low Cut
(12 dB/octave rolloff below 80 Hz)

Selectable Gain: 0/+10 dB

Output Noise

25.5 dB SPL, A-weighted
32 dB SPL, C-weighted
28.5 dB SPL per DIN 45 405

Signal-to-Noise Ratio

68.5 dB re 94 dB SPL

Dynamic Range

121 dB (800 Ω load, gain set at 0 dB)

Phasing

Positive pressure on diaphragm produces positive voltage on pin 2 relative to pin 3 of preamp output connector

Power

11 to 52 Vdc phantom (simplex) voltage (operational down to 9 Vdc with reduced clipping level); current drain 2.2 mA at 52 Vdc, 1.8 mA at 11 Vdc

Case

Microphone: Matte black enamel die-cast base and perforated steel grille with replaceable or cleanable fine mesh screen and foam pad wind/dirt barrier
Preamplifier: Matte black enamel finished steel

Cable

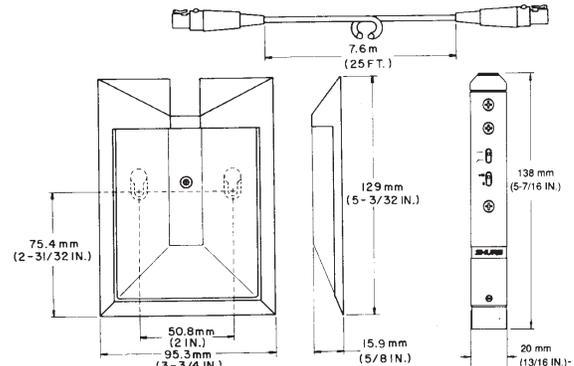
7.6 m (25 ft) two-conductor shielded, small diameter, with Switchcraft Tini (Q.G.) 3-pin (female) connector on each end

Environmental Conditions

Operating Temperature: -18 to 57° C (0 to 135° F)
Storage Temperature: -29 to 74° C (-20 to 168° F)
Relative Humidity: 0 to 95%

Dimensions

See Figure 3



OVERALL DIMENSIONS

FIGURE 3

Net Weight

Microphone: 280 g (9.9 oz) less cable
ILP-1 Preamplifier: 170 g (6 oz)

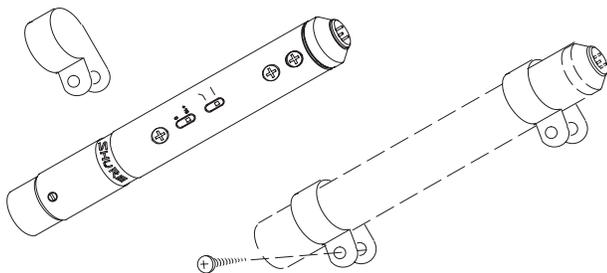
LOCATION

To maintain the flattest possible low-frequency response and the best rejection of random background noise, choose a flat surface as large as possible on which to locate the SM91A. The surface can be a floor, wall, ceiling or table.

Too small a mounting surface causes a low-frequency rolloff beginning at the frequency whose wavelength is comparable to the size of the surface. The rolloff continues at a rate of about 3 dB per octave until it reaches a plateau approximately 6 dB lower than the mid- and high-frequency response. In a similar fashion, too small a mounting surface decreases the rejection of low-frequency background noise.

MOUNTING

The SM91A can be permanently mounted to a lectern, tabletop, floor, ceiling, or wall using two No. 6 screws located 50.1 mm (2 in.) apart. The location of two keyhole slots in the base of the microphone is marked on the nameplate. Cut through the marked slots before sliding the base onto the screws.



MOUNTING CLAMPS, PREAMPLIFIER
FIGURE 4

The supplied mounting clamps are intended to hold the preamplifier in place in permanent installations (see Figure 3). Use either one or two clamps depending on location and application. To avoid ground loops and hum, avoid grounding the microphone preamplifier housing to metal building structures. The ILP-1 preamplifier can also be plugged directly into a flush mounted connector if desired.

INTERCONNECTING CABLE

One 7.6 m (25 ft) cable is supplied for connecting the SM91A Microphone to the ILP-1 Preamplifier. To retain access to the controls located in the preamplifier, it is sometimes desirable for the units to be located a greater distance apart. Up to 15 m (50 ft) of additional cable can be used between the SM91A Microphone and ILP-1 Preamplifier with no loss in response or output.

CLEANING

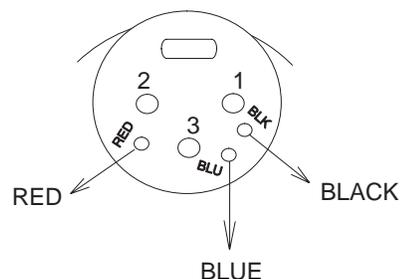
When the microphone is located in a dusty environment, periodic cleaning may be desirable. This can be easily accomplished by removing the Phillips-head screw on the grille, and lifting off the grille, the fine mesh screen, and the foam pad. Clean the fine stainless steel mesh screen by washing it in soapy water. Dry it thoroughly, and replace the foam pad, screen, and grille. Fasten firmly with the Phillips screw.

DISASSEMBLING AND REASSEMBLING THE ILP-1

1. At the XLR-3 end of the preamplifier, turn the slotted head setscrew fully inward (counterclockwise), and use a long-nose pliers to withdraw the connector from the case.
2. Unsolder the three lead wires from the XLR-3 board.
3. Remove all four Phillips-head screws from the ILP-1 case (three on the switch side, one on the back).
4. Grasp the end cap and withdraw the cap assembly, pc board assembly, and connecting wires and jacks from the case.

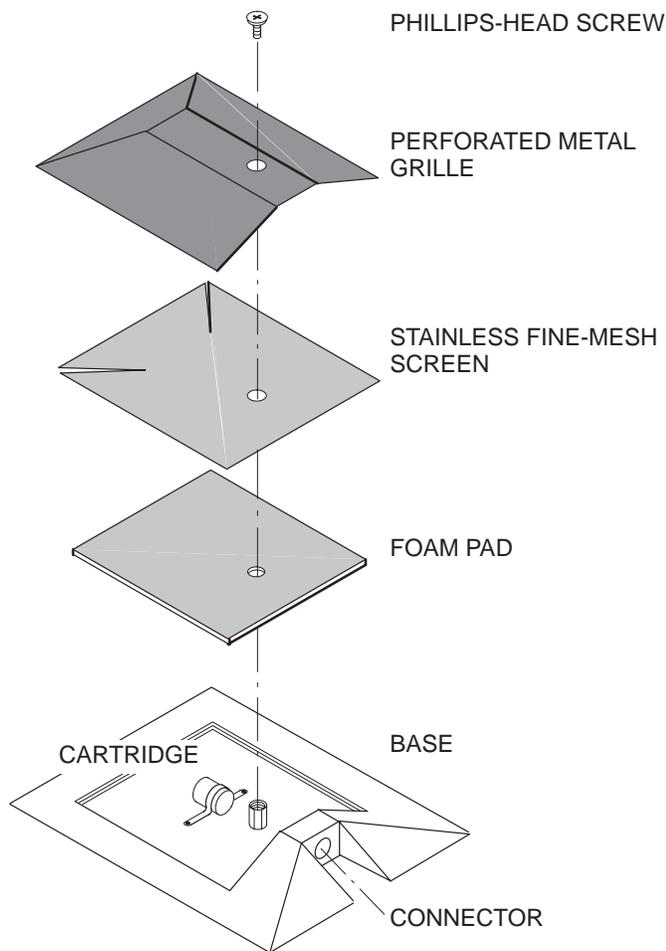
REASSEMBLY

1. Make sure the pc board is seated in the slot of the endcap and that no wires are pinched.
2. With the XLR-3 connecting wires foremost, feed the endcap-board assembly into the case. Again, take care not to pinch the wires connecting the board to the endcap.
3. Rotate the assembly until the four holes for Phillips screws line up with the holes in the case.
4. Replace the four Phillips screws.
5. Resolder the three lead wires to the back of the XLR-3 board as shown below.



WIRING TO XLR-3 PC BOARD TERMINALS
FIGURE 5

6. Replace the XLR-3 board-connector assembly in the case lining up the key in the connector with the slot in the case. Take care not to engage the butterfly-shaped ground contact in the key slot as it will prevent seating the connector properly.
7. Insert the connector fully in the case until the slotted setscrew can be seen in the case hole; tighten the set-screw firmly by turning it clockwise.



MICROPHONE PARTS
FIGURE 6

To paint the base:

1. Remove the flat-head Phillips screw in the top center of the perforated metal grille. Lift off the grille, screen, and foam pad.
2. Wrap the grille in thin plastic film, use a pointed instrument to perforate an opening for the screw, and replace the wrapped grille on the microphone.
3. Replace and tighten the screw.
4. Carefully paint the microphone base and screw head with the desired color. To avoid getting any paint on the connector, either mask it thoroughly or connect a mating plug to it.
5. Allow the paint to dry thoroughly.

To paint the metal grille:

1. Once again, remove the flat-head Phillips screw in the top center of the plastic-wrapped perforated metal grille. Lift off the grille.
2. Remove the plastic wrap and paint the outside of the grille. Take care to use a thin layer only; do not fill the perforated holes with paint.
3. Allow the paint to dry thoroughly.
4. Use fine sandpaper to remove any paint that may have adhered to the outer edges of the grille and the edging around the screw-hole.

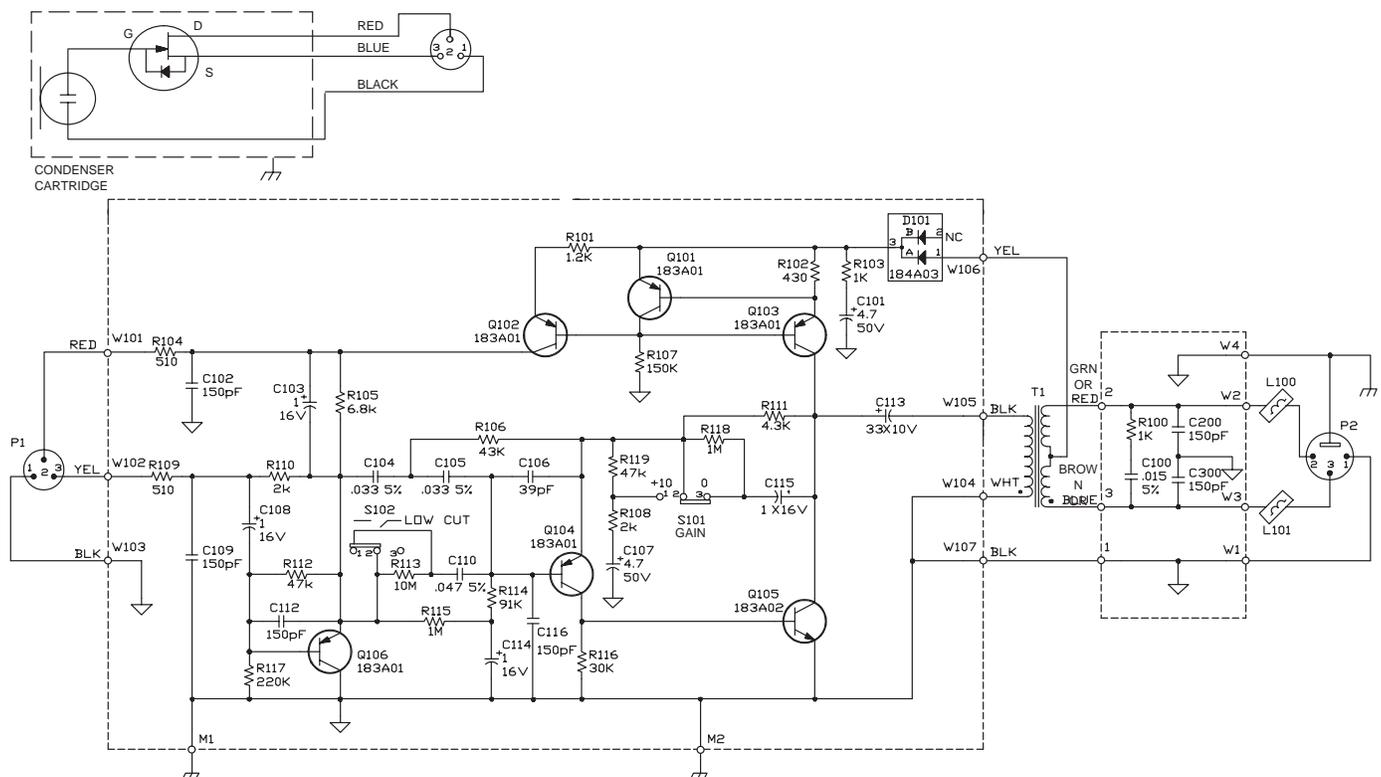
IMPORTANT

For proper shielding it is extremely important to maintain electrical continuity between the grille and the metal base.

5. Before replacing the grille, check that the fine-mesh screen is clean. Otherwise, wash it in soapy water. Rinse and dry it thoroughly.
6. Replace the foam pad, mesh screen, and perforated grille; and fasten securely with the Phillips screw.

REPLACEMENT PARTS

Reference Designation	Part Number	Description	Commercial Alternate
Preamplifier			
A1	90B4220	ILP-1 Preamplifier Assembly	None
A2	90HZ2600	Pc Board Assembly	None
P1	95A8077	Plug Assembly, Male, Mini	Switchcraft, TB3M Tini
P2	90HV2600	XLR-3M Connector and Pc Board Assembly	None
MP1	66A264	Preamp Switch Cover	None
MP2	80A476	Mounting Clamp	All States 3/4-HNB
Microphone			
A3	98A144	Microphone Assembly	None
A4	R129	Cartridge and Impedance Converter	None
MP3	53A1879B	Grille	None
MP4	37A147	Inner Screen	None
W1	C107	Cable Assembly, 7.6 m (25 ft), Two Conductor, Shielded, Small Diameter	None



- NOTES:
- 1 UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE 1/8 WATT, 5%.
 - 2 UNLESS OTHERWISE SPECIFIED, ALL CAPACITORS IN μF , 10%, 50 V OR GREATER. ELECTROLYTIC CAPACITORS SHOWN IN μF X VOLTS, 20%.
 - 3 THE FOLLOWING SYMBOLS DENOTE:
↓ PC BOARD GROUND
 ⏏ CHASSIS GROUND

**CIRCUIT DIAGRAM
FIGURE 7**