

SHURE®

MODEL SM98 UNIDIRECTIONAL CONDENSER MICROPHONE



GENERAL

The SM98 is a miniature electret condenser microphone with a unidirectional (cardioid) pickup pattern. A smooth wide frequency response from 40 to 20,000 Hz allows the microphone to be extremely well adapted to pick up all kinds of musical instruments. A detachable 4.6m (15 ft) cable with Switchcraft Tini Q.G. connectors and a battery or simplex (phantom) powered preamplifier are supplied with the microphone. A windscreen is provided for outdoor use, and a swivel adapter is supplied for conventional microphone stand or goose neck mounting.

The unidirectional pattern of the SM98 discriminates against sounds coming from the rear, permitting higher gain before feedback in sound reinforcement applications. Because of its uniform cardioid pattern extending out to 20,000 Hz, the microphone can be used for pickup of a particular instrument in an ensemble or orchestra, minimizing the need for isolation booths or barriers. A very high maximum sound pressure level allows use of the SM98 with all acoustic instruments including drum kits and other percussion as well as brass, reed, wind, string, and keyboard instruments. The SM98 can also be used with amplified guitars and keyboards.

The low-distortion, high-clipping-level preamplifier provides switch-selectable Flat or Low-Cut response to suit pickup characteristics needed for various instruments. The Low-Cut position is also useful when it is necessary to filter out low-frequency noise from such sources as wind noise or air conditioning equipment.

The SM98 is powered either by two readily available 9-volt alkaline batteries (300 hours continuous battery life) or by an 11-to-52 Vdc simplex (phantom) supply from sound reinforcement, recording or broadcast equipment. The preamp is designed so that the battery supply will automatically switch in should the simplex power fail. However, no battery drain will occur as long as the simplex voltage exceeds the battery voltage.

A series of optional accessories is available designed exclusively for use with the SM98. These include the following: A98MK Drum Kit, a gooseneck holder for mounting the microphone directly on most drums; A98-G18, an 18-inch gooseneck for mounting the microphone on a

podium, table, or desk; A98HA, a hanging adapter permitting the microphone to be suspended from above; and A98PF, a pop filter and locking collar kit, allowing the SM98 to be used for speech or vocal pickup.

Features:

- Smooth wide response for accurate sound reproduction across the entire audio spectrum
- Symmetrical cardioid pattern, uniform with frequency out to 20 kHz, maximizes gain before feedback, minimizes need for isolation when picking up single instruments out of a group
- Switch-selectable 12 dB/octave low-frequency cutoff permits tailoring response to suit particular instruments or room conditions
- Very high SPL capability
- Very low distortion and high output clipping level
- Battery or simplex (phantom) powering: uses standard 9-volt alkaline batteries; accepts wide range of simplex voltages, from 11 to 52 Vdc
- Low susceptibility to RFI, electrostatic and electromagnetic hum
- Rugged construction of microphone and preamplifier for outstanding reliability
- Detachable cable at both microphone and preamplifier
- Usable over very wide range of temperature and humidity
- Supplied with unique swivel adapter for mounting on conventional microphone stands or goosenecks
- Optional accessories to increase microphone's versatility include: A98MK, Drum Kit; A98-G18, Gooseneck Adapter; A98HA, Hanging Adapter; A98PF, Pop Filter

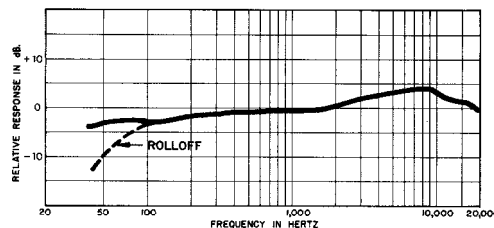
SPECIFICATIONS:

Type

Cardioid condenser (electret bias)

Frequency Response

40 to 20,000 Hz (see Figure 1)

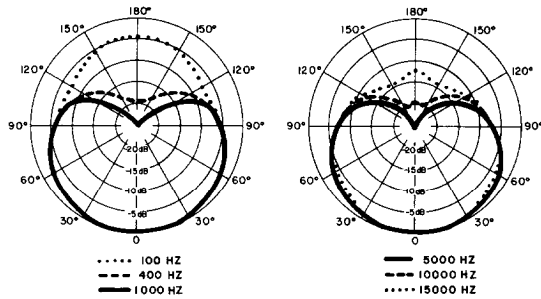


TYPICAL FREQUENCY RESPONSE
FIGURE 1

SHURE
MODEL SM98
UNIDIRECTIONAL CONDENSER MICROPHONE

Polar Pattern

Unidirectional (cardioid), uniform with frequency, symmetrical about axis (see Figure 2)



TYPICAL POLAR PATTERN
FIGURE 2

Output Impedance

Rated at 150 ohms (90 ohms actual)
Recommended minimum load impedance: 800 ohms
(May be used with loads as low as 150 ohms with reduced clipping level)

Output Level (at 1,000 Hz)

Open Circuit Voltage -80.0 dB (0.10 mV)
0 dB = 1V/ μ bar

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

800 ohm load 0 dBV (1.0V)
150 ohm load -13 dBV (0.22V)

Maximum SPL (at 1,000 Hz)

800 ohm load 155 dB
150 ohm load 145 dB

Hum Pickup

-5 dB equivalent SPL in 1 m0e field (60 Hz)

Output Noise

34 dB SPL, A-weighted
37 dB SPL, weighted per DIN 45 405

Signal-to-Noise Ratio

64 dB re 94 dB SPL

Dynamic Range

121 dB

Phasing

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

Power

Battery: Two 9-Vdc alkaline (NEMA 1604A), approximately 300 hours continuous with fresh alkaline batteries
Simplex (Phantom) Voltage: 11 to 52 Vdc, operational down to 9 Vdc; 1.8 mA current drain; permissible to use simplex power with batteries in place or removed

Switches and indicator

Two recessed slide switches and green LED indicator on top surface of preamplifier assembly

Battery On/Off Switch: Move to On to power from batteries or to use batteries as backup power in case of interruption to external power supply (no battery drain occurs as long as simplex voltage source is greater than battery voltage). Move to Off to prevent battery drain when unit is not in use

LED Indicator: Green LED flashes momentarily when switch is moved to On to indicate at least 8 hours of battery life remaining

Flat/Lo Cut Switch: In Lo Cut position, 12 dB/octave rolloff below 80 Hz (see Figure 1)

Cable

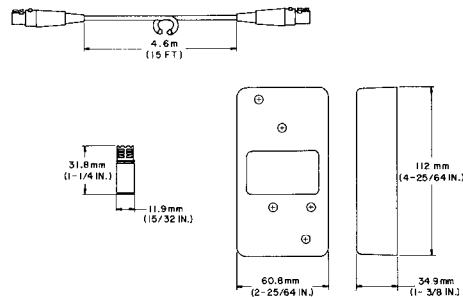
4.6m (15 ft) two-conductor shielded, small diameter, interconnecting cable with 3-socket miniature Switchcraft Tini Q.G. connector on each end to mate with microphone output connector and preamplifier input connector

Case

Microphone: Matte black enamel brass case and stainless steel inner grille
Preamp: Matte black enamel die-casting

Dimensions

See Figure 3



OVERALL DIMENSIONS
FIGURE 3

Environmental Conditions

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

Net Weight

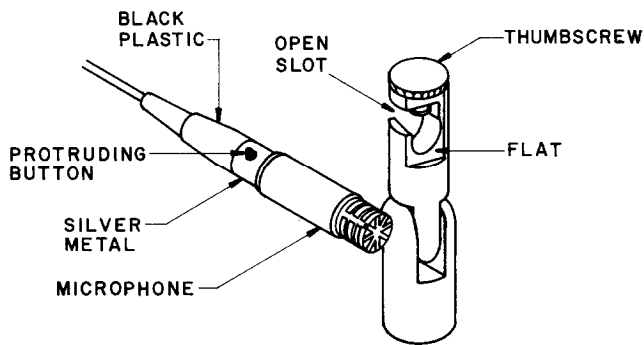
Microphone: 12 grams (0.4 oz) less cable
Preamp: 435 grams (15.4 oz) less batteries

Furnished Accessories

Windscreen, Swivel Adapter

USING THE SWIVEL ADAPTER

- To mount the SM98 in the supplied swivel adapter:
1. Mount the adapter on a microphone stand.
 2. Loosen the thumbscrew at the top of the adapter.
 3. Attach the microphone to the connector.
 4. Slip the cable through the slot in the adapter. Slide the connector back through the hole until the protruding black cable-lock button is in the open slot and the microphone stops flush with the flat on the adapter.



SWIVEL ADAPTER
FIGURE 4

5. Making sure the thumbscrew will clamp on the silver metal segment of the connector, NOT ON THE BLACK PLASTIC PART, tighten the thumbscrew. CAUTION: Tightening the thumbscrew on the plastic section of the connector could damage the connector body.
6. Tilt the adapter to aim the microphone as desired.
7. To remove the microphone without disturbing the swivel adapter and cable, reach into the open slot of the adapter and press the cable-lock button while disengaging the microphone.

BATTERY INSTALLATION

To install batteries, remove the two screws in the bottom corners of the preamplifier case. Lift off the case cover exposing the battery compartment. The use of 9-volt alkaline batteries (NEMA 1604A or equivalent) is highly recommended. Two batteries are required; always replace batteries in pairs.

To prevent possible damage due to leakage, remove the batteries if the unit will not be used for a long period of time.

INTERCONNECTING CABLE

One 4.6m (15 ft) cable is supplied for connecting the SM98 Microphone to its preamplifier. To retain access to the switches located on the preamplifier, it is sometimes desirable for the units to be located a greater distance apart. Up to 15m (50 ft) of additional cable can be used between the SM98 Microphone and preamp with no loss in response or output.

POWERING THE SM98

The SM98 can be powered by two internal 9-volt alkaline batteries or by an external simplex supply of 11 to 52 volts dc.

To use batteries, move the Battery On/Off switch to On. The green LED will indicate at least 8 hours of battery life remaining by flashing once when the switch is moved to On. **If the LED does not flash, the batteries should be replaced.** A battery-powered SM98 preamplifier output can be connected to any balanced-line low-impedance input.

To use simplex power, connect the preamplifier output to a balanced-line microphone input supplying 11 to 52 Vdc simplex (phantom) power. The batteries may be left in place while the unit is externally powered. There will be no battery drain as long as the simplex voltage exceeds the battery voltage with the battery switch On, or if the battery switch is turned off.

OPTIONAL ACCESSORIES

Drum Mounting Kit.....	A98MK
Gooseneck Adapter.....	A98-G18
Hanging Adapter.....	A98HA
Pop Filter and Locking Collar.....	A98PF

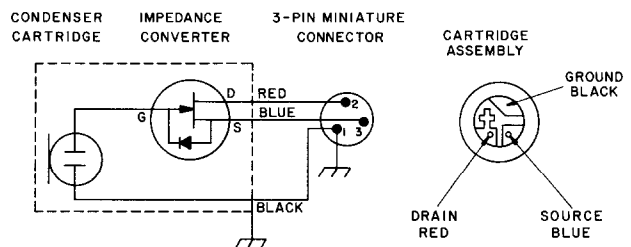
GUARANTEE

This Shure product is guaranteed in normal use to be free from electrical and mechanical defects for a period of one year from date of purchase. Please retain proof of purchase date. This guarantee includes all parts and labor. This guarantee is in lieu of any and all other guarantees or warranties, express or implied, and there shall be no recovery for any consequential or incidental damages.

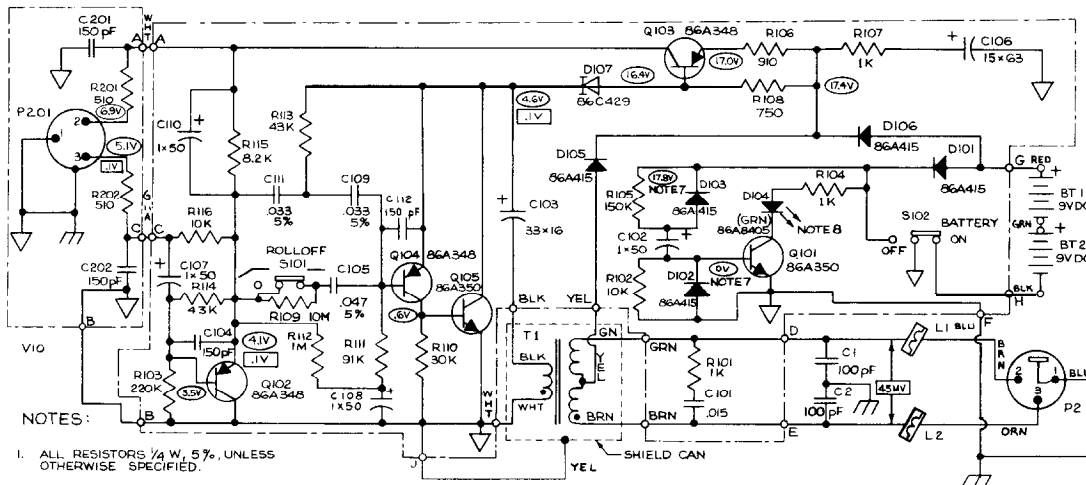
SHIPPING INSTRUCTIONS

Carefully repack the unit, have it insured, and return it prepaid to: Shure Brothers Incorporated
Attention: Service Department
222 Hartrey Avenue
Evanston, Illinois 60202-3696

If outside the United States, return the unit to your dealer or Authorized Shure Service Center for repair. The unit will be returned to you prepaid.



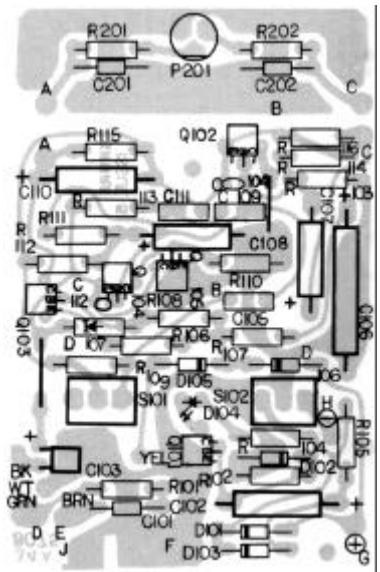
MICROPHONE CIRCUIT DIAGRAM
FIGURE 5



- NOTES:
1. ALL RESISTORS 1/4 W, 5%, UNLESS OTHERWISE SPECIFIED.
 2. ALL NON-POLAR CAPACITORS IN μ F, TOLERANCE 10% AND 50 VOLTS OR MORE UNLESS OTHERWISE SPECIFIED. POLARIZED CAPACITORS SHOWN IN μ F * VOLTS.
 3. FOLLOWING SYMBOLS DENOTE:
 CASE GROUND
 CIRCUIT BOARD GROUND
 D.C. VOLTAGE
 A.C. VOLTAGE
 4. INPUT SIGNAL OF 0.1 V AT 1 KHZ APPLIED TO PIN 3 OF P1 THROUGH 150 Ω .
 5. D.C. VOLTAGES MEASURED WITH 11 MEG. INPUT VOLTMETER; A.C. VOLTAGES MEASURED WITH 1 MEG. INPUT VOLTMETER. VALUES SHOWN ARE TYPICAL AND MAY VARY \pm 20%.

6. POWER SOURCE IS 18.0 VDC BETWEEN G AND H AS SHOWN, WITH BATTERY SWITCH IN "ON" POSITION OR 21 VDC THROUGH TWO 2000 OHM 1% RESISTORS FROM SUPPLY TO PIN NO. 2 AND PIN NO. 3 OF OUTPUT CONNECTOR (BATTERY SWITCH IN EITHER POSITION).
7. MEASUREMENT VALID ONLY IF 18.0 VDC IS CONNECTED BETWEEN G AND H AS SHOWN AND BATTERY SWITCH IS IN "ON" POSITION.
8. LED FLASHES ONCE WHEN BATTERY SWITCH IS MOVED FROM "OFF" TO "ON" POSITION. ASSUMES 18.0 VDC BETWEEN G AND H.

PREAMPLIFIER CIRCUIT DIAGRAM
FIGURE 6



PREAMPLIFIER PC BOARD
FIGURE 7

REPLACEMENT PARTS LIST

Reference Designation	Part Number	Description	Commercial Alternate
A1	90A8216	Printed Circuit Board Assembly	None
A2	R134	Microphone Cartridge-Housing	None
C102, 107, 108, 110	86S628R	Capacitor, Electrolytic, 1 μ F, 50 Wvdc	None
C103	86AE629	Capacitor, Electrolytic, 33 μ F, 16 Wvdc	Mallory VTL33S25
C106	86W628R	Capacitor, Electrolytic, 15 μ F, 63 Wvdc	None
D101, 102, 103, 105, 106	86A415R	Diode, Computer, 75V, 0.4A	TI, GE 1N4148
D104	86A8405	LED, Green	None
D107	86C429	Diode, Current Regulator, 1.3 mA	Motorola, Teledyne 1N5300
L1, L2	80A253	Ferrite Bead Ring	Stackpole 57-0180
MP2	RK245	Swivel Adapter	None
MP3	49A66	Windscreen	None
P1	95A8077	Connector, Receptacle, 3-pin Miniature	Switchcraft TB3M
P2	95A247	Connector, Receptacle, 3-pin	Switchcraft D3M
Q101, 105	86A350	Transistor, NPN	Motorola, National Semiconductor 2N5210
Q102, 103, 104	86A348	Transistor, PNP	Motorola, National Semiconductor 2N5087
S101, 102	55A8031	Slide Switch, SPDT	None
T1	51A286	Transformer	None
W1	C107	Cable and Connector Assembly	None

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