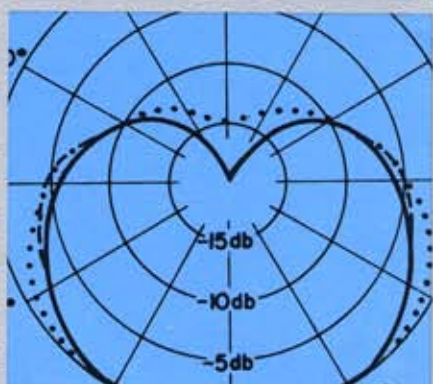
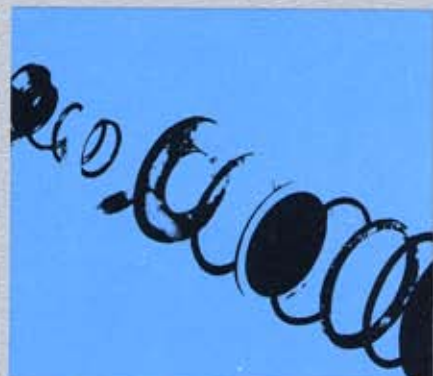
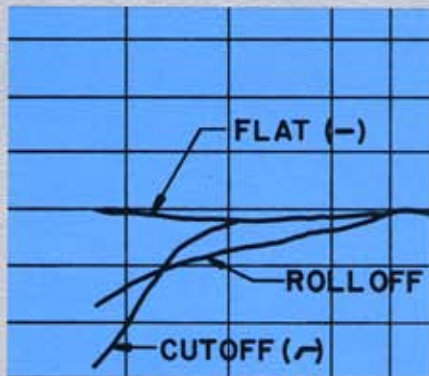


a new standard  
of reliability  
& applicability

# SM 81




 **SHURE**  
Cardioid Condenser  
Professional Microphone



- professional recording
- broadcast
- motion picture recording
- critical sound reinforcement

## The Shure Model SM81 Unidirectional Condenser Microphone

Although condenser microphones have earned a reputation for high quality, it has often been at the expense of mechanical and environmental ruggedness. This is why their use has been primarily limited to studio applications. Now, however—thanks to Shure's new SM81 Condenser Microphone—this is no longer the case.



The SM81 is a high-performance condenser microphone that is not only a superb instrument in the studio, but highly reliable for location recording as well! This new microphone is the product of years of operational testing during which Shure engineers sought—and found—new solutions to the common problems, which until now have restricted the use of condenser microphones. To achieve a microphone suitable for use in virtually any professional application, testing was conducted in an exceptionally wide range of studio and field situations involving extremes in temperature, humidity, and physical punishment.

### Ruggedness

Shure engineers improved and refined the design every step of the way, meeting the requirements uncovered during strenuous environmental and application tests. As a result, the SM81 is capable of withstanding extreme physical abuse, while at the same time maintaining the high quality performance expected of a studio condenser microphone. For example, the SM81 is built to withstand a minimum of six random drops from 1.8m (6 feet) onto a hardwood floor without any significant alteration of the electroacoustical performance or damage to the microphone case. All components have been especially selected to insure long-term stability over a wide temperature range of  $-29^{\circ}\text{C}$  to  $57^{\circ}\text{C}$  ( $-20^{\circ}\text{F}$  to  $135^{\circ}\text{F}$ ) with relative humidity from 0 to 95% and up to  $74^{\circ}\text{C}$  ( $165^{\circ}\text{F}$ ) with up to 50% relative humidity!

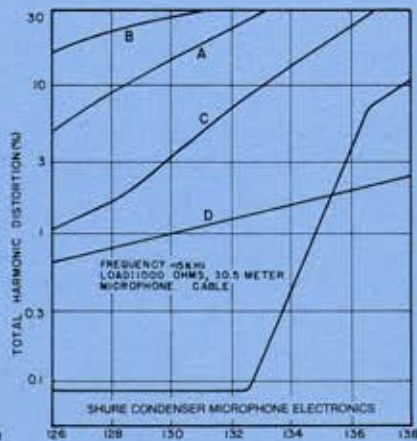
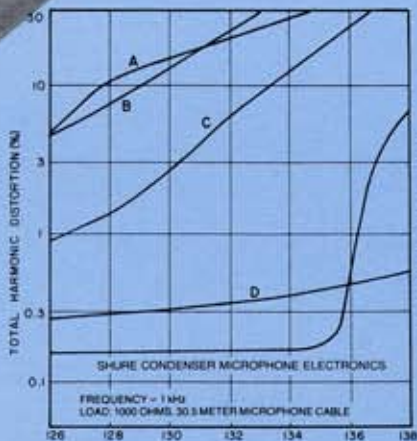
### Reach, Separation, Versatility

Similarly, the electroacoustical performance characteristics of the Shure SM81 are the result of exhaustive application testing. The SM81 is a singular microphone! A new breed! It is designed to provide superior performance in a wide variety of acoustic environments. The high signal-to-noise ratio and directional pattern offers outstanding reach (the ability to pick up distant sound while reducing unwanted noise); unparalleled separation (the ability to reject unwanted acoustical disturbances); unmatched durability; ultra-flat frequency response; and a versatility far beyond most other professional microphones in any category. The SM81 excels at reproducing both low and high level sound sources with accuracy, precision, and with every subtlety rendered intact. It'll never let you down!

# SM81

Whatever the challenge—the SM81 can deliver the high-quality professional performance expected of a Shure top-of-the-line Condenser Microphone.





EQUIVALENT SOUND PRESSURE LEVEL (dB SPL)

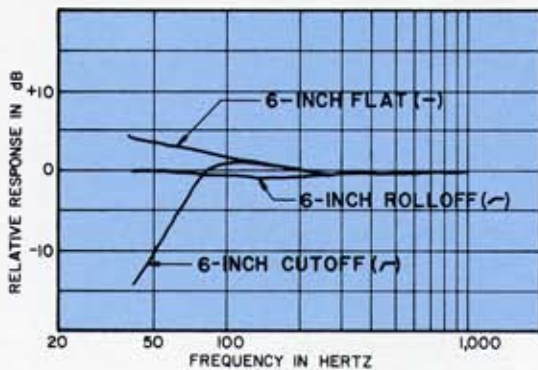
TOTAL HARMONIC DISTORTION vs. SOUND PRESSURE LEVEL  
(FOR SEVERAL PROFESSIONAL CONDENSER MICROPHONES)

## SM81's Total Harmonic Distortion... Exceptionally low up to Clipping Point

Measured at 1 kHz and 15 kHz. The SM81 exhibits remarkably low total harmonic distortion below its clipping point... significantly below that of other professional condenser microphones (curves A, B, C, and D).

## Built-in...Low Frequency Response Switch

The SM81 features a three-position low-frequency response switch right on the handle. The switch is recessed to avoid accidental movement, but can be conveniently adjusted without tools or disassembly. Depending on where you set it, you have the option of a flat response, a low-frequency rolloff of 6 dB per octave below 100 Hz, or a low-frequency cutoff of 18 dB per octave below 80 Hz. As noted in the chart below the low-frequency response switch can be used to compensate for proximity effect at a 6 inch working distance.



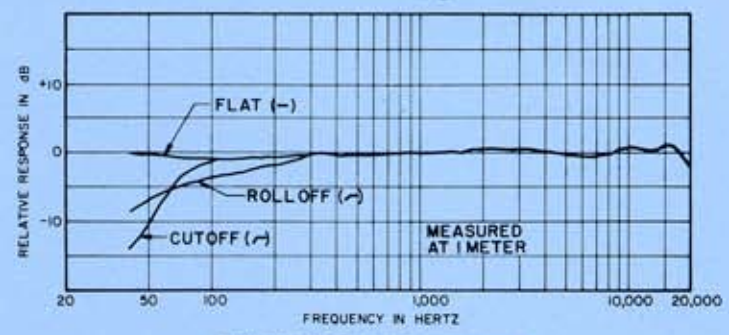
Proximity Effect & Compensation

## Built-in Attenuator

The SM81 has a switchable 10 dB attenuator built into the head of the microphone to prevent high sound pressure levels from overloading the microphone's internal electronics. In the "10" position, the output of the microphone is reduced by 10 dB, increasing the maximum sound pressure level at clipping by 10 dB.



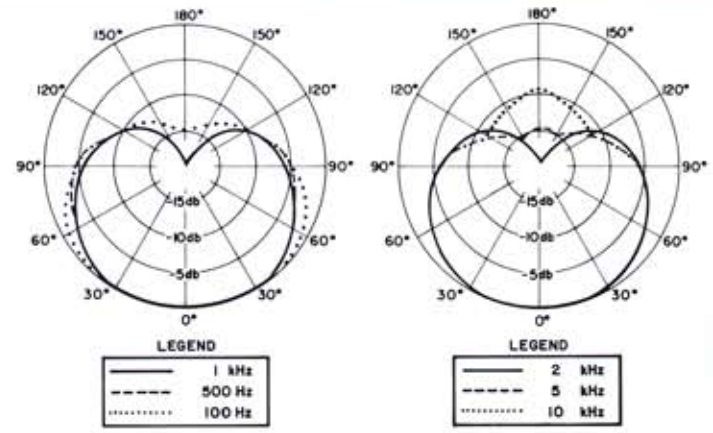
Type: Cardioid condenser (electret bias).  
**Frequency Response:** 20 to 20,000 Hz (See Figure 1).  
**Polar Pattern:** Cardioid (unidirectional) response—uniform with frequency, symmetrical about axis (See Figure 2).  
**Output Impedance:** Rated at 150 ohms (85 ohms actual).  
 Recommended minimum load impedance: 800 ohms. (Can be used with loads as low as 150 ohms with reduced clipping level.)  
**Output Level (at 1,000 Hz):**  
 Open Circuit Voltage ..... -64 dB (0.63 mV)  
 (0 dB = 1 volt per microbar)  
 Power Level ..... -39.3 dB  
 (0 dB = 1 milliwatt per 10 microbars)  
**Clipping Level (at 1,000 Hz):**  
 800-ohm Load ..... -4 dBV (0.63V)  
 150-ohm Load ..... -15 dBV (0.18V)  
**Total Harmonic Distortion:** Less than 0.5% (130 dB SPL at 250 Hz into 800-ohm load).  
**Maximum SPL (at 1,000 Hz):**  
 with 800-ohm load:  
 135 dB (attenuator at 0);  
 145 dB (attenuator at 10)  
 with 150-ohm load:  
 127 dB (attenuator at 0);  
 137 dB (attenuator at 10)



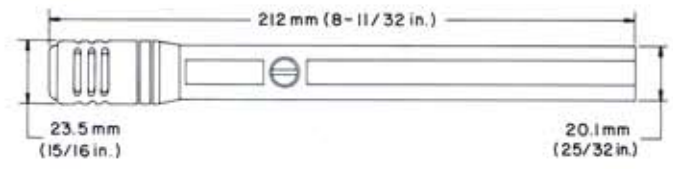
TYPICAL FREQUENCY RESPONSE  
 FIGURE 1

Hum Pickup Typical: -4 dB equivalent SPL in a 1 millioersted field.  
 Output Noise (equivalent sound pressure levels; measured with true rms voltmeter):  
 16 dB typical A-weighted  
 19 dB typical weighted per DIN 45 405

**Signal-to-Noise Ratio:** 78 dB (IEC 179)\* at 94 dB SPL.  
**Overvoltage and Reverse Polarity Protection:**  
 Max. External Voltage Applied to Pins 2 and 3 with Respect to Pin 1 ..... +50 Vdc  
 Reverse Polarity Protection ..... 200 mA max. (diode-clamped)  
**Phasing:** Positive pressure on diaphragm produces positive voltage on pin 2 relative to pin 3.  
**Cartridge Capacitance:** 54 pF.  
**LF Response Switch:** Flat, -6 dB/octave below 100 Hz, -18 dB/octave below 80 Hz.  
**Attenuator Switch:** 0 or 10 dB.  
**Power:**  
 Supply Voltage 12 to 48 Vdc, positive pins 2 and 3  
 Current Drain ..... 1.25mA (12V) to 1.75 mA (48V)  
**Environmental Conditions:**  
 Relative Humidity 0 to 50% ..... -29° to 74° C  
 (-20° to 165° F)  
 Relative Humidity 0 to 95% ..... -29° to 57° C  
 (-20° to 135° F)  
**Connector:** Professional three-pin male audio.\*\*  
**Case:** Steel construction with metallic vinyl paint finish.  
**Dimensions:** See Figure 3.  
**Weight:**  
 Net ..... 230 grams (8 oz.)  
 Packaged ..... 1.5 kilograms (3 lbs., 6 oz.)  
**Cable:** 7.6m (25 ft.), two-conductor, shielded, TRIPLE-FLEX® with professional three-pin male and female audio connectors.\*\*  
 \* S/N ratio is difference between microphone output at 94 dB SPL and microphone self-noise A-weighted.  
 \*\* Designed to mate with Cannon XL series, Switchcraft A3 (Q.G.) series, or equivalent connectors.



TYPICAL POLAR PATTERNS  
 FIGURE 2



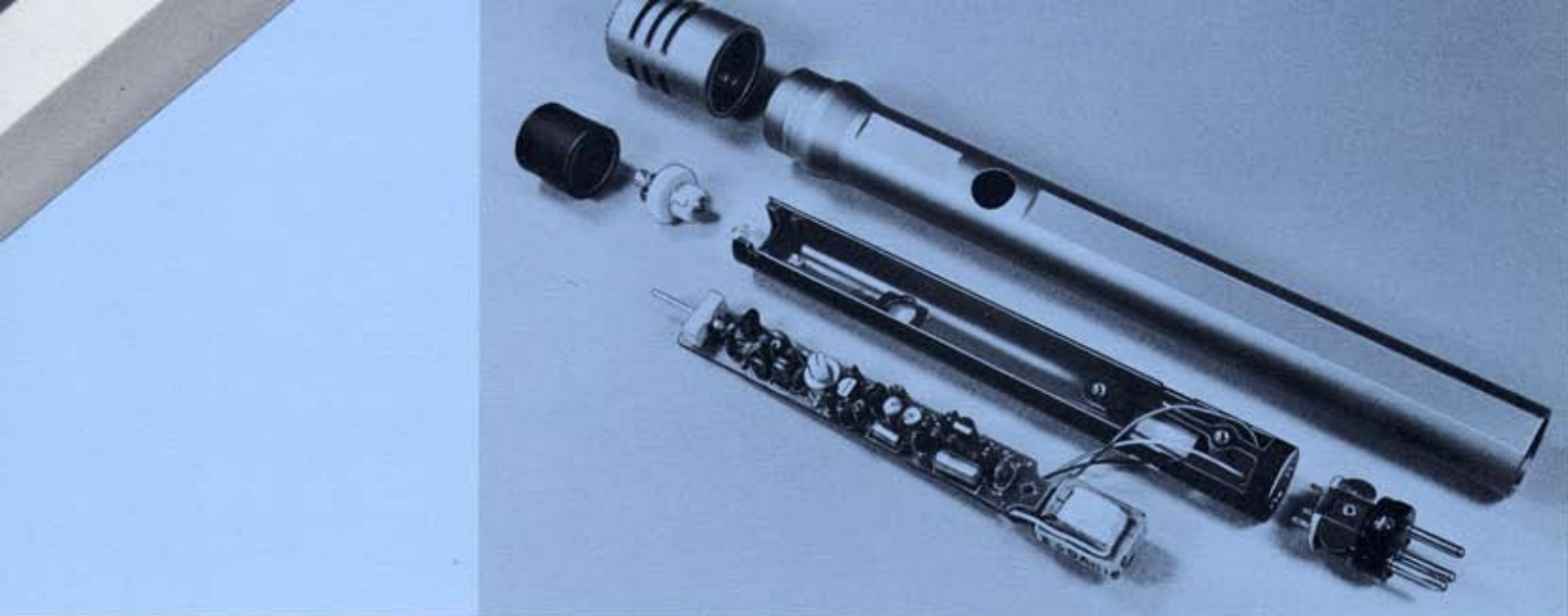
OVERALL DIMENSIONS  
 FIGURE 3



Specifications







## SM81 Puts it ALL together

- **EXTREMELY WIDE-RANGE FLAT FREQUENCY RESPONSE** for exceptionally accurate recording, broadcast, and critical sound reinforcement applications.
- **WIDE DYNAMIC RANGE**—low noise and high output clipping level characteristics.
- **QUIET**—low handling noise, low internal electrical noise.
- **PRECISE CARDIOID** polar pattern, uniform with frequency and symmetrical about axis, to provide maximum rejection and minimum coloration of off-axis sounds.
- **SUPERIOR LOW DISTORTION** characteristics (right up to the overload point) over the entire audio spectrum for a wide range of load impedances.
- **VERY LOW RF SUSCEPTIBILITY.**
- **SELECTABLE LOW-FREQUENCY RESPONSE: FLAT;** 6 dB/octave rolloff at 100 Hz compensates for proximity effect; 18 dB/octave cutoff at 80 Hz reduces effects of low-frequency disturbances with minimal effect on wide-range program material.
- **10 dB ATTENUATOR** for operation at high sound pressure levels, up to 145 dB SPL—accessible without disassembly, lockable in either position.
- **FIELD-USABLE** over a wide range of temperature and humidity conditions.
- **DEPENDABLE DESIGN**—Temperature and humidity stabilized diaphragm configuration, unique backplate structure designed to maximize signal-to-noise ratio and insure long-term charge stability.
- **RUGGED CONSTRUCTION** for outstanding reliability.
- **WIDE-RANGE SIMPLEX POWERING** includes DIN 45 596 voltages of 12 and 48 Vdc. In addition, it will operate over a wide range of power supply impedances.

**NOTE:** The SM81 can be used with the PS1 or PS1E2 power supplies listed on the back page of this folder, or the SM81 can be simplex-powered from virtually any mixer, audio console, or tape recorder. Any well-filtered voltage available in the mixer from 12 to 48 Vdc can be used.

## The inside story...Quality, Innovation, Precision

For optimum performance and dependability, highest quality materials and manufacturing techniques are utilized to produce the SM81. The revolutionary transducer is fabricated with unique, proprietary equipment to extremely close tolerances. For example, to insure dependable operation at high temperature and humidity, the special, low-mass, high-strength diaphragm material is coated with gold on both sides and stabilized prior to assembly by a special thermal cycling process.

The backplate of the SM81 also represents a significant engineering achievement. To produce the high signal-to-noise ratio of this microphone, this portion of the condenser transducer has been fabricated using selective gold deposition techniques as well as a unique lamination process to establish an extremely stable charge layer. These processes maximize the output of the transducer and at the same time keep the capacitance as high as possible for low noise.

Model SM81

# Features





Furnished Accessories with SM81	
Windscreen .....	49A41
Swivel Adapter .....	A57D
Attenuator Lock .....	34A830

#### OPTIONAL ACCESSORIES

Simplex Power Supplies .....	PS1, PS1E2
------------------------------	------------

**Heavy-Duty Windscreen** ..... A81WS  
This is a unique windscreen, specially designed for the SM81. Special dual density construction overcomes even high wind noise without significantly affecting frequency response. Two distinctly different layers of material are used, each with complementary acoustical properties. Hear the remarkable difference between this and ordinary windscreens!

**Tripod Microphone Stand (4.3m-14 ft.)** ..... S15  
Rugged and stable...yet portable and lightweight. Tripod legs provide an excellent base, even when the stand is fully extended to 14 feet. (Stand may be used at any height between 14 feet and 3-1/2 feet.) Five telescoping sections. Convenient vinyl bag and cable strain relief included.

**Stereo Microphone Adapter** ..... A27M  
Permits the mounting of two microphones on one stand (such as the S15). Either microphone can be independently swiveled in a full circle, facilitating numerous microphone angles for stereo applications.

**Isolation Mount** ..... A53M  
A breakthrough in noise isolation. Reduces mechanical and vibration noises by more than 20 dB. For desk, floor stand and fishpole use. 3/8"-27 Female thread with 180° swivel action.

**Boom Mount Assembly** ..... A53B  
A complete assembly that provides excellent support, control and noise isolation. Small size minimizes shadows, makes it ideal for either large or small booms. Mounts easily on booms, and permits quick microphone removal. Includes Model A53M Isolation Mount and Model A53C Isolation Cable. (Model A81WS Windscreen should be used when very fast boom movements or outdoor applications are expected.)

**Boom Extension Pipe** ..... A53E  
Rugged 508 mm (20 in.) boom extension pipe with A53C Isolation Cable preinstalled. Provides the same noise isolation as the A53C Cable, while it lowers the microphone 508 mm (20 in.) below boom to reduce shadows and lighting problems.

**Isolation Cable** ..... A53C  
Isolates and minimizes vibration and mechanical noises induced or transmitted by cable when using A53M Isolation Mount.

**Low-Profile Microphone Stand** ..... S53P  
A breakthrough in microphone placement technique. Minimizes the "hollow sound" caused by floor reflections usually associated with distant microphone pick-up techniques. Holds the microphone just a fraction of an inch above the floor for better sound quality in "footlight" type placement for recording or sound reinforcement of choral, orchestral or ensemble musical events and dramatic presentations. Effectively isolates mechanical noises.



# Accessories

The Shure Models PS1 and PS1E2 are ac power supplies that provide simplex (phantom) power for one or two Shure SM81, SM82, or other condenser microphones. They contain a power switch, power-on indicator, and two three-pin Male and Female professional audio connectors.

The PS1 and PS1E2 are identical except that the PS1 is designed to operate from 90 to 132 Vac, 50/60 Hz, and the PS1E2 operates from 90 to 125 Vac or 180 to 250 Vac, 50/60 Hz (switch-selectable). In addition to the voltage selector switch and ac fuse, the PS1E2 is supplied with a detachable ac line cord (without power plug).

The PS1 (only) is listed by Underwriters' Laboratories, Inc. and is listed by Canadian Standards Association as certified.

#### Model Features:

- Simplex power for one or two SM81, SM82, or similar condenser microphones.
- Low noise, hum and RF susceptibility.
- Short-circuit-proof operation.
- Handles both microphone and line level signals.
- Operates over wide ac voltage range.
- Three-pin professional audio connectors.
- Lightweight.
- Rugged construction.
- Listed by Underwriters' Laboratories, Inc. and Canadian Standards Association (PS1 only).

#### Power Supply Specifications

**Type:** All silicon transistor power supply.  
**Open Circuit Supply Voltage:** 21.5 ± 1.5 Vdc, regulated.  
**Supply Voltage Polarity:** Positive (+) on Female microphone connectors pins 2 and 3; negative (-) on pin 1 and case.  
**Typical Supply Operating Conditions (each channel):** 20V at 1.5 mA (with Shure Model SM81); 15V at 8 mA (with Shure Model SM82).

**Power Supply Resistors:** 1.69k ± 1% (two per channel).  
**Frequency Response:** +0/-0.2 dB, 20 to 20,000 Hz (with SM81 microphone and 1k load).

**Maximum Operating Level:** Greater than +24 dBm.  
**Short Circuit Supply Current:** 25 mA each channel (pins 2 and 3 to pin 1).

**Hum and Noise (20 Hz to 20 kHz, unweighted):**

Common Mode .....	-90 dBV max.
Differential Mode .....	-115 dBV max.

**Noise (300 Hz to 20 kHz, unweighted):**

Common Mode .....	-100 dBV max.
Differential Mode .....	-115 dBV max.

**Crosstalk:** -115 dB or less.

**Phasing:** Corresponding pins of all connectors are in phase.

**Operating Voltage:** PS1—90 to 132 Vac, 50/60 Hz ac only; PS1E2—90 to 125 or 180 to 250 Vac, 50/60 Hz ac only; Power consumption—3 watts max.

**Temperature Range:**

Operating .....	-7° to 57° C (20° to 135° F)
Storage .....	-29° to 71° C (-20° to 160° F)

**Connectors:** Three-pin professional audio, male (OUTPUT) and female (MICROPHONE).

**Dimensions:** 60.3 mm H x 152 mm W x 175 mm D (2 3/8 in. x 6 in. x 6 7/8 in.).

**Weight:** 1.25 kg (2 lbs., 12 oz.).

**Construction:** Aluminum chassis with steel cover, finished in gray enamel.

**Certifications:** Listed by Underwriters' Laboratories, Inc.; listed by Canadian Standards Association as certified (PS1 only).



# Power Supplies



Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60204  
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