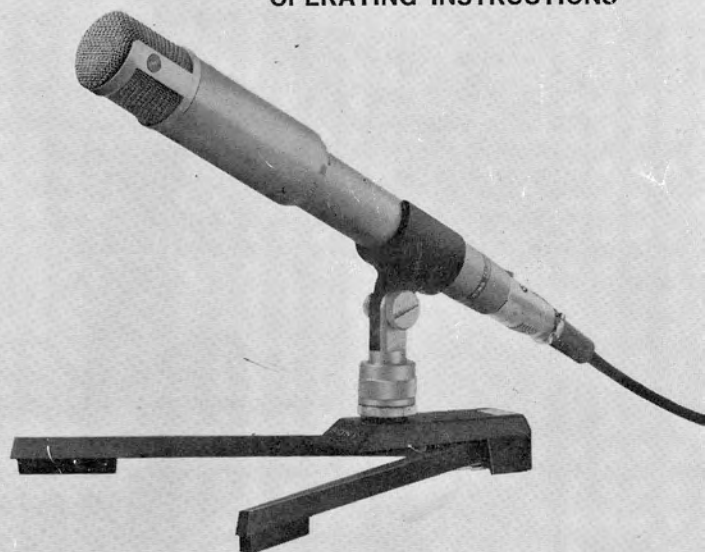


SONY[®]

C-55FET CONDENSER MICROPHONE
TURNING CAPSULE SYSTEM
TECHNICAL MANUAL
OPERATING INSTRUCTIONS



SONY **SUPERSCOPE**

8150 VINELAND AVENUE SUN VALLEY, CALIFORNIA · 91352

1. Description

The SONY C-55 FET unidirectional condenser microphone is the highest quality microphone having superior performance, operating conveniences and utmost reliability.

SONY CORPORATION has before marketed the FET condenser microphone model "C-37 FET" which superseded the most severe requirements of radio/TV stations, studios and recordists, and has sold a number of units in a short period of time. The SONY C-55 FET unidirectional condenser microphone is the result of design and production experience of the C-37 FET and intended to be used together with the C-37 FET. These two types of microphone, the C-37 FET and C-55 FET, make possible that all the professional use microphones are of FET condenser type for the utmost high fidelity sound pick-up, operating conveniences and reliability.

2. Features

- * Self-contained dry cell batteries of 800 hour continuous operation.
- * Turning-capsule by a finger provides the widest application from hand-held microphone to boom-mount use.
- * Smooth frequency response characteristics over the audio range, sharp directional characteristics, low noise and wide dynamic range are realized through the use of precision-engineered capsule and specially selected low noise FET from SONY semiconductor division.
- * Because of sturdy construction against mechanical vibration and wind noise, and shielding against external magnetic field and TV wave buzz, the C-55 can perform satisfactorily in the most adverse operating atmosphere.
- * The C-55 finished in a low-gloss satin nickel plating, is pleasing on color TV screen.
- * Newly developed flash-light battery checker indicates the battery consumption visually at any instance.
- * Varied accessories affords use of the microphone in wide application.

3. Major components and assemblies

The C-55 is shipped from factory in a sturdy plastic case together with stand holder and microphone cable.

3.1 Microphone body

The microphone body is made of brass

which is precision machined and finished in satin nickel plating. The color and modern styling is designed with color television and stage in mind.

The microphone is well balanced and may be mounted either on a stand, boom or on a perambulator.

3.2 Microphone capsule

The capsule has 18mm outside diameter with unidirectional characteristics. The capsule is held by a special suspension system, allowing to rotate by 90 degree without affecting its operational characteristics.



Figure-1 C-55 FET condenser microphone in the carrying case

3.3 FET circuit (see figure-3)

SONY CORPORATION semi-conductor division has developed the junction type silicon field effect transistors FET specifically for use in condenser microphone.

The FET forms a source-follower circuit. Input impedance of the gate circuit is as high as about 2PF, 400M ohms which transmits the capsule electromotive force without distortion. (The internal capacitance of the capsule is about 30 PF).

The circuit K.F. is less than 1% with input signal of 1 volt, 1K Hz which is 134 dB SL when converted to the capsule acoustical input level. The inherent noise of the circuit is about 24 dB SL. Dynamic range is then 110 dB which is wide enough for the program having large peak value.

The circuit components are securely mounted on a epoxy printed circuit board which is humid.-resist. treated and sealed for moisture proof. This assures stable operation of even in the most humid operating conditions.

3.4 Polarizing circuit (see figure-4)

DC polarizing circuit for the capsule is produced by stepping up 9 volts from dry cell battery to 85 volts by means of a small size dc-dc converter. The very low frequency pulse of about 20 Hz is rectified and ripple component is eliminated by a large time-constant filter circuit. It is also fed to a voltage regulator circuit using a neon tube.

The converter circuit is housed in an high-mu metal shielding case and isolated from the FET circuit.

(Note: the capsule polarizing voltage cannot be measured by means of an ordinary VOM or VTVM).

3.5 Power supply

The C-55 operates on three power supplies;

- 1 Self-contained dry cell battery
- 2 medium size external battery
- 3 ac commercial power

A small size dry cell battery for transistor radio use is suited. The SONY 006P, EVERREADY 216, mercury battery E146 or their equivalent are recommended.

Being installed in the microphone battery compartment, the battery is spring loaded in order that the battery has good electrical contact in all operating conditions. The battery compartment uses rust-proof components such as the gold-plated contact terminals and the stainless steel spring. Even in case of leakage of battery content or corrosion of the battery itself, the circuit components and the casing will not be easily damaged.

Medium size mercury battery can also be employed for continuous 3000 hours operation with the use of SONY battery adaptor model DC-109 (available at additional cost). The EVERREADY No. E234 or its equivalent 2pcs is recommended.

The C-55 FET can also be powered by the commercial ac power 120V, 220V, 60Hz with the use of SONY ac adaptor model AC-109.

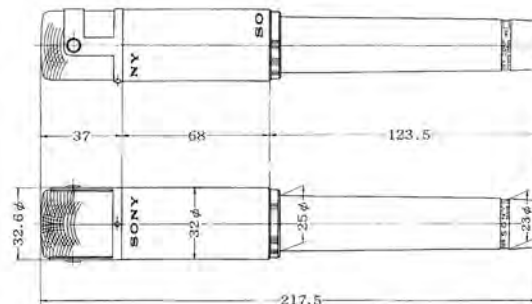


Figure-2 C-55 FET condenser microphone physical dimensions

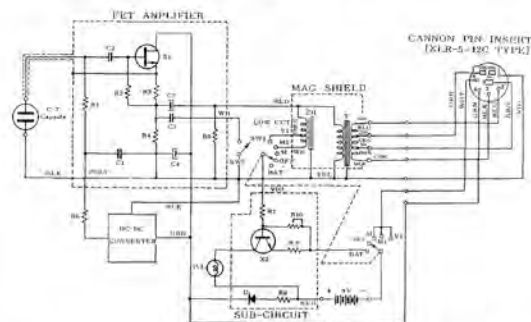


Figure-3 C-55 FET condenser microphone, schematic diagram FET circuit

TABLE 1. Parts List

Ref. NO.	Parts Description
R1, R2, R6	Resistor, metal-film, 220ohms
R3	" carbon, fixed, 680ohms, 1/4W
R4	" " " 4.7Kohms "
R5	" " " 18Kohms "
R6	" " " "
R7	" " " 2.2Kohms 1/2W
R8, R9	" " " 33ohms "
R10	" " semi-fixed, 4.7Kohms
C1	Capacitor, film, 0.01μF 100WV
C2	" " 0.001μF 100WV
C3	" " 0.022μF 35WV
C4	" electrolytic, 50μF 10WV
C5	" tantalum, 1.5μF 10WV
CH	Choke, low-cut, housed in electro-magnetic shield case
T	Transformer, output, housed in electro-magnetic shield case
X1	Field Effect Transistor, TX-133A
X2	Transistor, 2SC-402-4
D	Diode, 1T22J
SW1	Switch, rotary, 2 circuits, 5 terminals
SW2	" " 1 circuits, 2 terminals
PLUG	CANNON Plug, XLR-5-14
PL	Pilot Lamp, 4.5V, 15mA

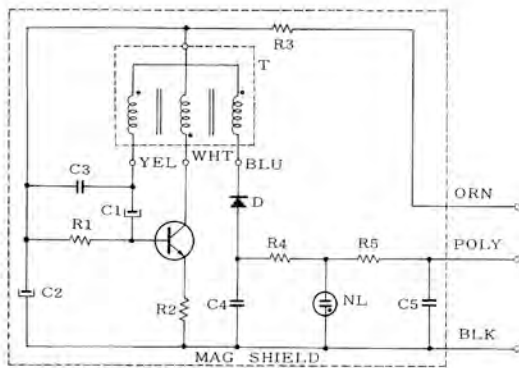


Figure-4 C-55 FET condenser microphone, schematic diagram dc-dc converter

3.6 Battery checker

A flash-lamp type battery checker is provided in order to indicate the voltage drop of the battery before initiating the operation of the microphone. The flash-lamp circuit devised in order not consume too much current for this purpose. Selecting "BAT" position of the five position switch (a ring located in the center of microphone), will light a lamp in only a moment.

TABLE-2 Converter Circuit Parts List

Ref. NO.	Parts Description
R1	Resistor, solid, 150Kohms, $\frac{1}{4}$ W
R2	" " 10ohms "
R3	" " 4.7Kohms "
R4, R5	" " 200Mohms "
C1	Capacitor, electrolytic, 5 μ F, 10WV
C2	" " 30 μ F, "
C3	" film 0.0047 μ F, 200WV
C4	" " 0.01 μ F, 100WV
X	Transistor, 2 SC-401-3
D	Diode, silicon 1S-205
T	Transformer, oscillator Coil housed in Mag. shield case
NL	Neon tube stabilizer

3.7 Function control switch

A switch is located in the center of the microphone in order to turn on/off the power and to select a desired frequency response characteristics. (See figure-5)

POSITION

FUNCTION

BAT Battery output voltage is

checked by means of a flash-lamp type checker

OFF

The microphone is off

M

Flat frequency response

M1

Slight low frequency attenuation

V1

Low frequency attenuation



Figure-5 C-55 FET condenser microphone, turning operation, main switch

3.8 Microphone cable

The microphone cable is specially developed for the SONY condenser microphones. It has an extremely long service life due to its flexibility in all temperature conditions and to the fact that it does not curly-stiffened after it is wound on a roll. The cable is constructed of cadmium-bronze alloy wire and synthetic resin fabric.

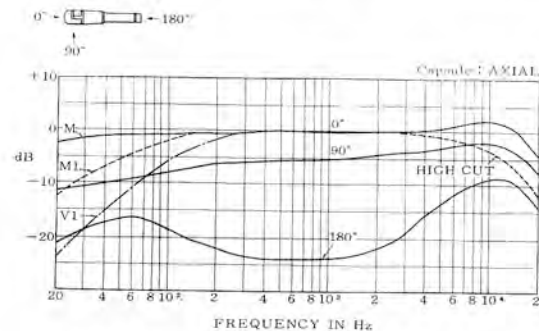


Figure-6 C-55 FET condenser microphone, frequency response characteristics (sound; along with axis 0°)

3.9 Wind screen and shock mounting.

The capsule is housed in a metallic grill which has a wind shielding sponge lining,

effectively eliminating the effect of wind noise and breathing. The capsule is held in a suspension to absorb most of the harmful vibration transmitted through the microphone cable, and through building floor, etc.

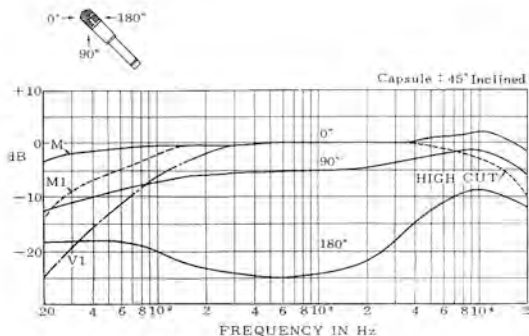


Figure-7 C-55 FET condenser microphone, frequency response characteristics (sound; 45° to axis)

5. Specifications

Frequency range;

Frequency response characteristics of the microphone for the sound from 30 Hz to 1600 Hz coming from the front, from the diagonal direction and from the side are given in figure-6 (front to the axis), figure-6 (front to the axis), figure-7 (45° to the axis) and figure-8 (90° to the axis). (Switch position is M).

Low-cut/high-cut characteristics;

The low-cut/high-cut attenuation characteristics for the sound coming from the front are given in figures-6, -7 and -8.

Low frequency attenuation; below 300 Hz, 2 steps

High frequency attenuation; above 5000 Hz, 1 step

Output level;

50 ohms; -77 dB
250 ohms; -70 dB
600 ohms; -67 dB

(0 dB = 1 volt/ μ bar, 1000Hz)

Directional characteristics;

Polar response characteristics on a vertical plane is given in figures-9, -10, and -11.

Electrical impedance;

50, 250, 600 ohms (selected by resoldering terminal). Connected for 250 ohms when shipped.

Power supply;

Standard operating power voltage; 10.0 volts-7.0 volts

Minimum operating power voltage; approximately 2.5 volts

Battery drain current; Approximately 800 μ A

Battery life (EVERREADY 216); Continuously 800 hours

Noise;

Signal-to-noise ratio; Better than 50 dB (1,000 Hz, 1 μ bar)

Inherent noise; Less than 24 dB SL (0dB = 2×10^{-4} μ bar)

Wind noise (*); -43 dB \pm 5 dB SL

External magnetic field induction noise (**); Less than -20dB/m Gauss.

Maximum input sound pressure level(**); About 134 dB SL, 1% harmonic distortion, 1000Hz

Dynamic range; About 110 dB

Phasing; Positive pressure on the capsule causes positive voltage on blue (600 \sim 50 ohms) cable lead against black cable lead. Blue lead (pin No.2) is selected when shipped.

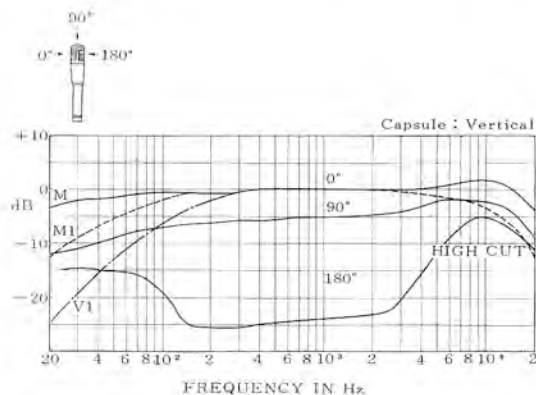


Figure-8 C-55 FET condenser microphone, frequency response characteristics (sound; 90° to the axis)

Note: (*) Wind noise is the value measured by applying wind of 2 meter / second from all directions to the microphone. The mean value is taken and converted to the equivalent input sound pressure level. (0 dB = 2×10^{-4} μ bar)

(**) The external magnetic field induction noise is measured with the microphone placed in the alternating magnetic field of 50 Hz, 1m gauss.

The maximum noise value is taken and then converted to the equivalent input sound pressure level. (0dB = 2×10^{-4} μ bar)

(**) The maximum input pressure level is the input level which produces 1% waveform distortion in 1K Hz output signal. The input level is converted to the equivalent input sound pressure level. (0dB = 2×10^{-4} μ bar)

6. ARCHITECT'S AND ENGINEERING SPECIFICATIONS

The microphone shall be SONY model C-55 FET condenser microphone or equivalent. A condenser type microphone shall have cardioid directional characteristics with the flat frequency response ranging from 30 to 16000 Hz, having integral tone control network of two step low cut positions for frequencies below 300 Hz and one step high cut position for frequencies above 5000 Hz. This selection shall be made with single switch. The condenser capsule shall have the turning capsule mechanism, allowing to set the capsule at any desired angle between horizontal and vertical plane. The change in frequency response and directivity characteristics shall be so small as negligible, accompanied by turning the capsule. The rear sound cancellation shall be more than 15 dB from the front sound in the range of 300 to 3000 Hz. The microphone shall be equipped with the three output impedances, 50, 250 and 600 ohms. Either of them shall be selected by resoldering transformer taps. The self-generating noise with 600 ohm output impedance shall be less than 24 dB SL. (Reference level: 0 dB = 2×10^{-4} μ bar, audibility threshold level). Hum pick-up level shall be less than -20 dB SL in the alternating magnetic field of 10^{-3} gauss. The output level shall be -67 dB at 600 ohms, -70 dB at 50 ohms. (Reference level: 0 dB = 1V/ μ bar, 1000 Hz). The microphone shall be powered by either battery or ac commercial power. The battery shall be 9 volts EVE-READY No. 216 or equivalent for more than 800 hours continuously with single unit. Ac power shall be available with the use of ac adaptor on 117V or 220V ac, 60 Hz. The microphone body shall be made of machined brass with non-reflecting satin nickel finish. Overall dimensions of the microphone shall be less than 1-9/32 inch diameter and 8-9/16 inch long. The microphone cable shall be of four conductor shielded broadcast type of cadmium bronze wire of 20 feet. The microphone shall be equipped with CANNON XLR-5-11C and -12C at both ends. Net weight shall be less than 0.7 lbs less cable.

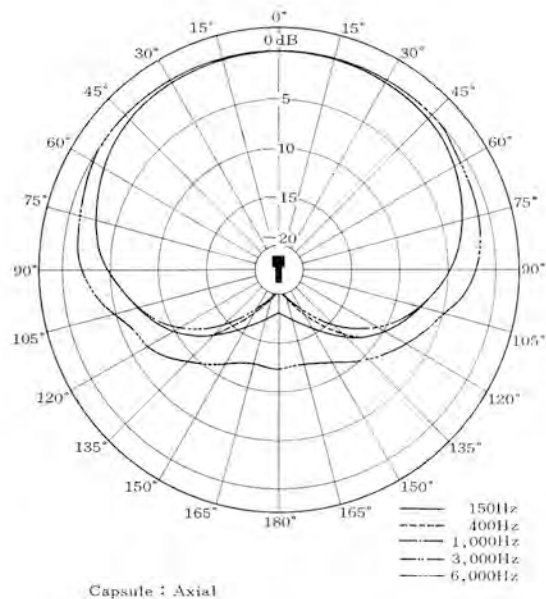


Figure-9 C-55 FET condenser microphone, frequency response characteristics (sound; along with axis)

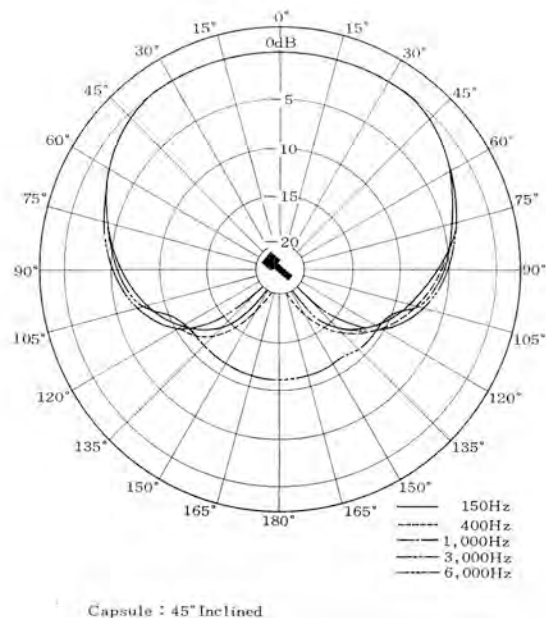
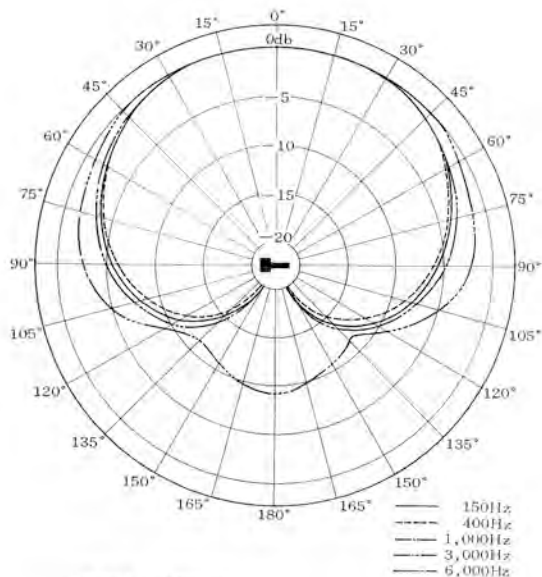


Figure-10 C-55 FET condenser microphone, directivity characteristics (sound; 45° to axis)



Capsule : Vertical

Figure-11 C-55 FET condenser microphone, directivity characteristics (sound; 90° to axis)

7. Operating Instructions

The C-55 FET is factory shipped ready for use. Operating procedures for this microphone require no new knowledge or particular knack. However it is recommended to be familiar with all controls and operation before using the microphone.

7.1 Microphone cable handling

The microphone cable is wound and housed in the cover of the microphone carrying case. It is held in position by a partition plate and nylon latches. The nylon latches are pulled by finger to open the plate and are pushed home to close it.

7.2 Power on/off (figure-5)

Locate a ring switch which is in the center of the lower part of the battery cover. The ring switch has five positions. The microphone is off when either "BAT" or "OFF" position is selected. See 7.4 Battery for "BAT" position.

A frequency response characteristics is selected by "M", "M1", or "V1" position. See 7.5 Selecting a frequency response characteristics.

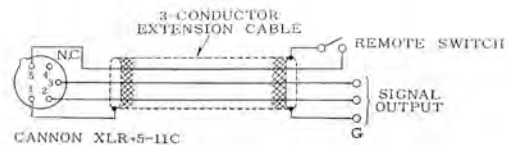
REMOTE SWITCH;

The microphone can be powered on and off remotely at a distance by connecting an extra switch across pin No.5 and ground. See figure 12-1.

CONNECTOR SWITCH;

The CANNON connector can also be used as a switch by connecting pin No. 1 and pin No. 5 of the plug (XLR-5-11C) with a jumper wire. Power is then on with the plug inserted and off with the plug disconnected. See figure 12-2

1. REMOTE ON-OFF SWITCHING



2. CONNECTOR SWITCHING

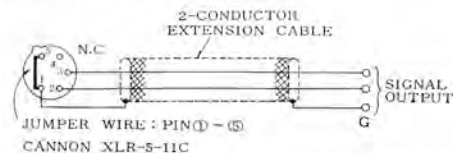


Figure-12 C-55 FET condenser microphone, connection of remote switch and connector switch

7.3 Insertion and removal of a battery.

A single battery is used to supply all power of the microphone. The battery is EVEREADY 216 or equivalent. This is the common 9 volts universally used transistor radio battery, available anywhere. Set the ring switch to "OFF" position.

Pull the battery cover downward and locate the battery compartment. Insert a fresh battery in the battery compartment making sure of correct polarity for the battery. Close the battery cover by sliding it upward along with the guide until it is firmly locked.

Remove battery as soon as it weakens, otherwise the snap terminals may corrode. Should the snap terminals start corroding, replace the whole battery compartment.



Figure-13 C-55 FET condenser microphone, battery insertion

7.4 Battery Checker

A fresh 216 type EVEREADY battery can power the microphone for about 800 hours continuously.

The battery life can be checked by means of the battery checker.

When the ring switch is turned counter clockwise from "OFF" position and selected "BAT" position, a red-colored checker lamp located in the lower part of the capsule grille to indicate the output voltage of the battery.



Figure-14 C-55 FET condenser microphone, turning capsule operation

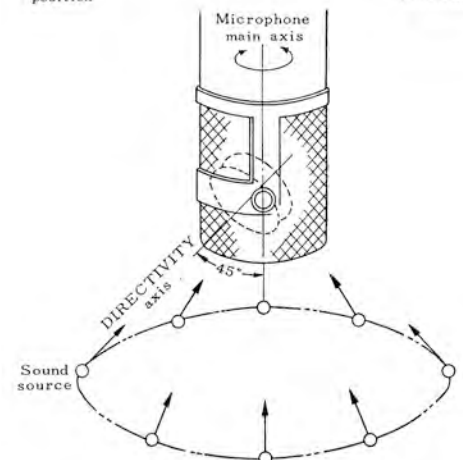
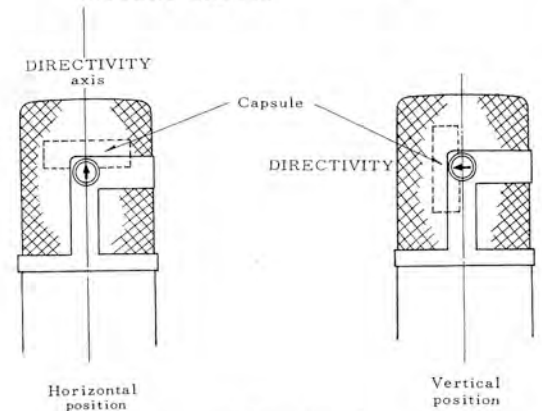
Lamp lights bright; Assures normal operation. Not necessary to replace the battery.

Lamp lights dull; The battery is able to power the microphone at least 20 ~ 30 hours more. However sensitivity starts declining and distortion slight increasing. Recommended to replace the battery.

Lamp does not light; The microphone stops operation. Replace battery.

CAUTION

WAIT MORE THAN 30 SECONDS BEFORE ATTEMPTING THE ANOTHER BATTERY CHECK.



When microphone is rotated with 45° to the sound source

Figure-15 C-55 FET condenser microphone, using turning capsule

7.5 Selecting a proper angle of the capsule.

The C-55 FET has the turning capsule system, making possible to select an optimum angle of the capsule from horizontal to vertical position. The capsule is turned by pressing two buttons at the top with fingers as illustrated in figure-14. The capsule is locked as the fingers are released. The arrow mark on the button shows the direction of the capsule. Direct the arrow mark toward the sound source. The arrow mark is set to 45 degree position as in the figure-15 when the microphone is mounted on the boom-stand. The microphone can be rotated around the axis of the unit which gives an optimum pick-up for the sound coming from many directions. It also has a good appearance on the TV screen.

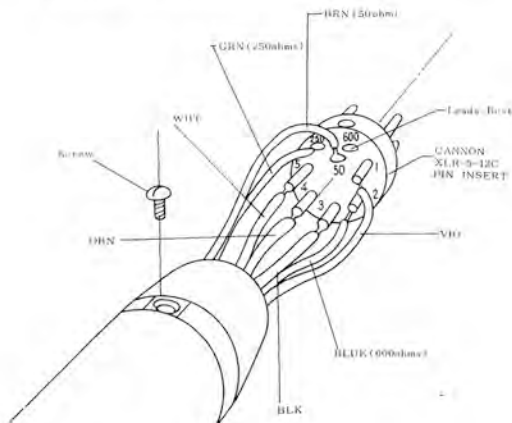


Figure-16 C-55 FET condenser microphone, wire connection to CANNON plug, showing 600 ohm connection

7.6 Selecting another frequency response characteristics "M" position of the ring switch provides the most flat frequency response characteristics.

Low cut; "M1" position can be selected by turning the ring switch clockwise.

"V1" position can be selected by turning the ring switch further clockwise. This position provides the heaviest attenuation in low frequency region.

High cut; High frequency attenuation can be obtained by opening the battery cover and locate the H-CUT switch below the battery compartment. The switch in " — " position provides no high frequency attenuation. " ~ " position provides the rolling-off in the frequency range higher than 5000 Hz. See figures-3, -4, and -5.

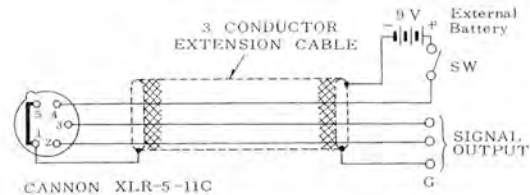


Figure-17 C-55 FET condenser microphone, extension cable wiring of external battery

7.7 Selecting another output impedance

Either 50, 250 or 600 ohm output impedance can be selected. 250 ohm is selected when shipped from factory.

Locate the INSERT setscrew of the CANNON plug type XLR-5-14. Remove it and pull the INSERT out of the plug. Lead wires and terminals will be then visible. See figure-18. Solder a lead wire of the desired impedance (blue-600 ohms, green-250 ohms, brown-50 ohms) to the No.2 pin. Unwanted lead wires should be soldered to a lead rest. Check the performance. Place the INSERT into home and secure it by the setscrew.

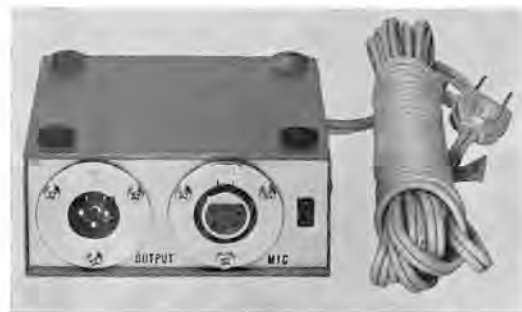


Figure-18 C-55 FET condenser microphone, type AC-109 ac adaptor

7.8 Connecting an external power

The C-55 FET can be powered by an external power, which should be connected across pin No.4 and ground as illustrated in figure-17. The microphone can also be powered by ac power with the use of SONY ac adaptor model AC-109 on 117V or 220V ac in exactly same manner as the conventional vacuum tube type condenser microphone.

7.9 Use of adaptor for ordinary 3 pins cable connector

The CANNON XLR-5-12C (5 pin) is used at the grip end. However, XLR-3-11C (3 pins) can also be used with the use of adaptor model PC-13. Only internal battery can be used when XLR-3-11C is used.

SONY

WARRANTY

Your SONY microphone is a quality product and fully guaranteed against defective materials and workmanship for a period of one year from date of purchase.

This guarantee is valid only if repairs are effected by SONY or SUPERSCOPE and the attached Warranty Registration Card has been returned to SUPERSCOPE within 10 days of the purchase date. If it is necessary to send this microphone to SUPERSCOPE Inc., all shipments must be prepaid. If the repairs are within the terms of his Warranty, the microphone will be returned prepaid, provided it is addressed within the continental limits of the United States.

This Warranty is void if the Serial Number has been altered or removed, or if an attempt has been made to disassemble capsule, FET circuit, or DC connector.

This Warranty shall not apply if the instrument has not been connected or operated in accordance with the instructions furnished by SONY and SUPERSCOPE.

This Warrant shall also be voided if the instrument has been altered or repaired in any way that SUPERSCOPE believes has affected the stability reliability of the instrument. This Warranty is in lieu of all others expressed or implied.

The SONY Corporation and/or SUPERSCOPE Inc., reserves the right to make changes in design and improvements upon its products without any obligation to install these changes upon any of its products theretofore manufactured.

WARRANTY

SUPERSCOPE