

**Electro-Voice**<sup>®</sup>  
 a gulton company

# Model CS15 Cardioid Electret Condenser Microphone



## SPECIFICATIONS

Element:	Electret Condenser
Frequency Response:	40 Hz-18 kHz
Polar Pattern:	Cardioid
Impedance:	150 Ohm Nominal (balanced)
Distortion:	At 141 dB - (SPL) -1% THD @ 1 kHz open circuit. At 130 dB - (SPL) -15% THD @ 1 kHz open circuit At 130 dB - (SPL) -1% THD @ 1 kHz into matched impedance
Dynamic Range:	119 dB (141 dB input - open circuit)
Output Level:	-45 dB ref (0 dB = 1 mw/10 dynes cm <sup>2</sup> )
EIA Sensitivity Rating:	-137 dB
Self Noise:	1.4 uV "A" Weighted
S/N Ratio:	72 dB "A" Weighted
Equiv. Noise Level:	Less than 22 dB re .0002 dyne/cm <sup>2</sup> "A" Weighted
Case Material:	Steel
Dimensions:	6-15/16" (176mm) long, 1-1/16" (27mm) Dia. 3/4" (19mm) Shank Diameter
Weight:	8 oz (227 grams)
Finish:	Fawn beige micomatt
Cable:	15' (4.6m) two conductor, shielded, brown rubber-jacketed cable with Switchcraft A3F connector.
Operating Voltage:	8 to 48 DC (Standard 48V remote power accepted.)
Current Required:	3 to 12 ma. (depending upon supply voltage)
Accessories Furnished:	315 Blast Filter 312A Stand Clamp
Optional Accessories:	PS8 Battery Supply 307 Shock Mount 340 Security Clamp 315A Windscreen

## DESCRIPTION & APPLICATIONS

The Electro-Voice Model CS15 is a professional remotely powerable electret condenser cardioid microphone designed especially for recording, broadcast and sound reinforcement applications where the smooth, wide range response of a studio microphone is desired. The machined steel case and rugged internal design enable the CS15 to withstand abuse.

The CS15, being a true cardioid microphone, offers greatest rejection at 180° off-axis, directly to the rear of the microphone. Like all other condenser cardioid microphones, the CS15 is a single "D" cardioid. Due to the proximity effect in all single "D" cardioids, the low frequency response of the CS15 is dependent upon the distance from the sound source to the microphone as illustrated in Fig. 2.

Maximum bass response is produced in close-up use with the microphone one quarter inch from the sound source (Fig. 2A). Minimum bass response is experienced at distances greater than 24" (610mm) (Fig. 2C). By working closer to the microphone than might otherwise be natural, the human voice will sound more robust, although intelligibility may be adversely affected.

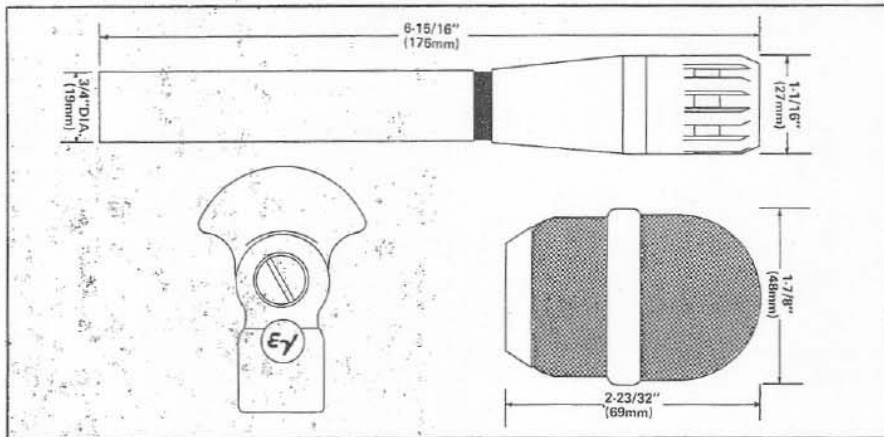


FIGURE 1 - Dimensions

### OPERATING INSTRUCTIONS

The CS15 Condenser Microphone requires a remote power supply in order to operate. Power may be obtained from a microphone input equipped with remote powering (48 vdc) or from an accessory power supply placed in the line between the microphone and mixer input.

The PS8 Remote Battery Power Supply is designed to power the CS15 and should be placed in the microphone line between the microphone and the mixer. Care should be exercised to make certain that the PS8 is installed with its female connector facing the microphone. Because the PS8 employs a transformer with a center tapped secondary, attenuator pads, filters and other similar devices may be inserted between the PS8 and the preamplifier input (NOT between PS8 and CS15).

A removable blast filter (Model 315) is supplied with the CS15. This filter is designed to reduce P-popping and blasting commonly encountered in close-miking applications.

### SPECIAL NOTE--MAINTENANCE INSTRUCTIONS

This electret condenser microphone should not be left in the open sun or other hot environments where temperatures may approach or exceed 130 degrees Fahrenheit for any period of time. Following this suggestion will prolong the life of the generating element, and insure reliable, trouble-free performance over the years.

### CS15 AND DISTORTION

Many times, microphones are unjustly accused of causing distortion. More often than not, the mixer preamp is the problem. Mixer or console preamps are designed to operate with a nominal input level of several millivolts. When this nominal input level is exceeded, the preamp quickly goes into clipping, thus causing distortion. Both dynamic and condenser microphones are capable of delivering over one volt to the mixer input at less than .15 percent total harmonic distortion. Preamps, over the years, traditionally have been designed with dynamic microphones in mind. With condenser microphones having output levels 10 to 20 dB greater than dynamics, caution should be exercised so as not to overload the mike preamp.

### ELECTRET PRINCIPLE

The generating element of a condenser microphone is a capacitor, with one of its plates being the microphone's moving diaphragm; the other plate being the stationary backplate. When a charge is applied to the diaphragm, and changes in air pressure move the diaphragm, an output voltage is generated. All condenser microphones require a charge or difference of potential between diaphragm and backplate. The early condenser microphones achieve this by employing an external D.C. power source of approximately 200 volts. This system at best was awkward to use.

Today, condenser microphones operate from voltages of 48 volts and less. There are two methods of utilizing these lower voltages. One

method increases the input voltage by employing some sophisticated electronic circuitry. Another method is to apply the 48 volts directly to the diaphragm, thus making the dynamic range and sensitivity of the microphones totally dependent upon the stability of the 48 volt supply. Still other methods have been devised.

In recent years, materials and techniques have been developed which allow placing a permanent charge on the condenser microphone capacitor element (diaphragm). This ability to permanently charge a material is known as the Electret Phenomenon. With a permanent charge on the diaphragm, the only voltage now needed is to power the impedance converter. Because the output of any condenser microphone element is extremely high impedance, a means to convert the small fluctuations in capacitance into a usable output voltage is needed. The impedance converter provides this function and generally consists of a field effect transistor and its associated circuitry as shown in Fig. 3.

### REMOTE POWERING OF CONDENSER MIKES

Before the advent of the low voltage condenser microphone, powering of the capacitor element (diaphragm) had to be from a separate external D.C. power source. This necessitated the use of five conductor cables between microphone and power supply and severely limited the distance between same. With the low voltage requirements of today's condenser mikes, a method exists that allows the supply voltage to be sent down the same cable that carries the audio information from the microphone to the mixer input. This method not only allows the use of standard 2-conductor shielded cable, but allows use of a central power supply to all mike inputs in a console or mixer via a remote power bus (Fig. 4).

As illustrated in Fig. 5, the positive side of the supply is split between the two audio leads via two 1% resistors (normal value 6.8k 1/2 watt). The negative side of the supply is connected to the shield. To use the voltage at the microphone, a center tapped transformer is employed, and the voltage appears across the center tap of

the transformer and the cable shield. Because the current flowing in each audio lead is of the same polarity and magnitude, no degradation to the audio signal is encountered. This same principle allows the use of both condenser and dynamic microphones interchangeably in the same input without fear of damaging the voice coil or other parts of a dynamic microphone.

**NOTE:** Remote powering will **NOT** work with unbalanced mike inputs (no input transformer) or where the input transformer has a center tapped primary with the center tap tied to the ground (earth). No signal conditioners (pads, filters, etc.) should be placed in the microphone line between the microphone and its remote power source.

### POWERING THE CS15

The CS15 is designed to operate from its accessory battery supply Model PS8 or the 48 volt remote powering generally employed in recording studios. Requiring a minimum of 8 volts at 3 milliamps for proper operation, the CS15 is capable of handling 48 volts with the correct consumption then increased to 12 milliamps. The increase in current is due to the activation of a Zener diode inside the microphone designed to protect its electronics from over-voltage.

In a remote powering system that utilizes a 48 volt supply and two 6,800 ohm (1% 1/2 watt) resistors (See Fig. 5), the CS15 will draw approximately 12 milliamps. The current consumed by the microphone may be reduced by inserting an additional 6,800\* ohm (5% 1/2 watt) resistor in series with the two 6,800 ohm resistors (See Fig. 6). This added resistance creates a voltage drop ( $E=IR$ ), thus lowering the voltage to the CS15. Because microphones that need a full 48 volts (+6V,-8V) to operate draw approximately .5 milliamps, the voltage drop across the 6,800 ohm resistor is small enough that the microphone is left with sufficient voltage for proper operation. The amount of work required by the Zener is lessened due to the lower voltage reducing the total current consumption of the CS15.

\*NOTE: In any case, resistor value **NOT** to exceed 7.5k ohm.

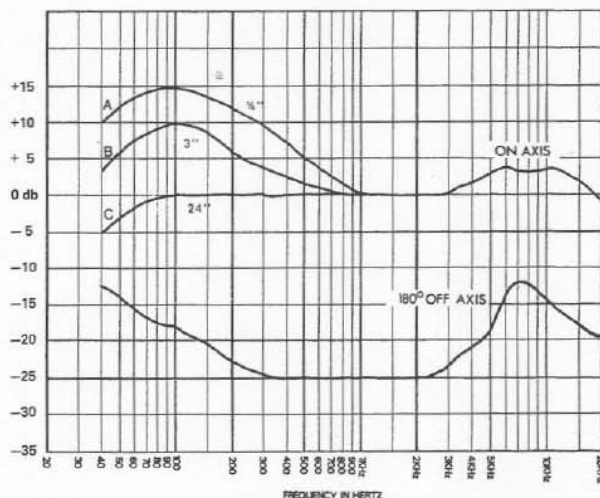


FIGURE 2 - Frequency Response

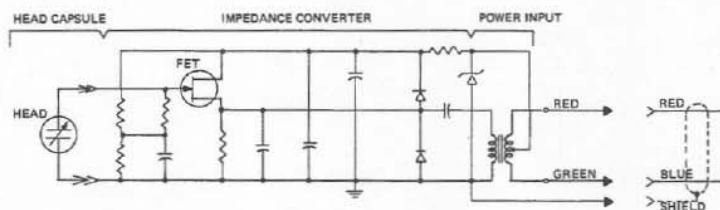


FIGURE 3 - Wiring Diagram

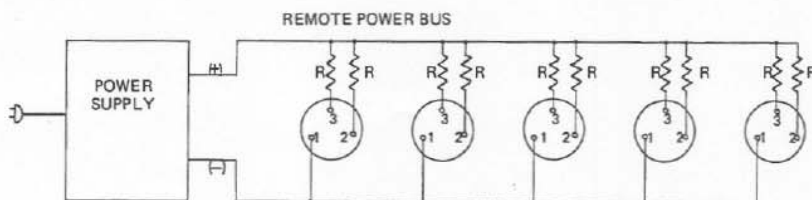


FIGURE 4 - Remote Power Bus

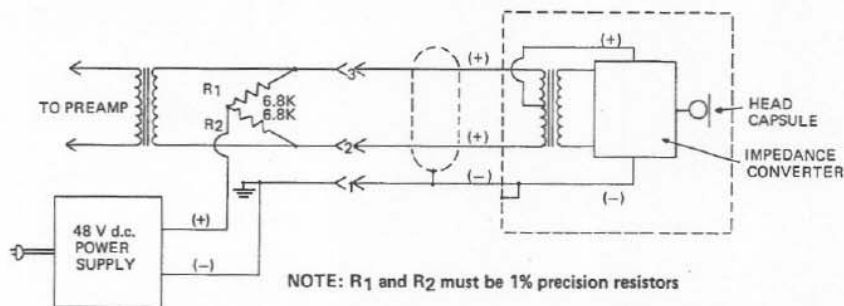
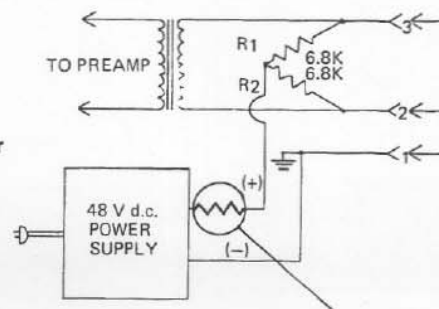


FIGURE 5 - Remote Powering and the CS15

FIGURE 6 - Remote Power Modification (optional)



Resistor value 6.8K NOT to exceed 7.5K

## ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The microphone shall be a condenser cardioid type. The microphone shall have a wide range uniform frequency response from 40 to 18000 Hz.

Response at the front of the microphone at 600 Hz shall be nominally 25 dB greater than the response at the rear.

The microphone shall have an output of -45 dB (0 dB = 1 mw/10 dynes/cm<sup>2</sup>). The microphone shall have an electret diaphragm. A 15 foot (4.6m), 2 conductor shielded, brown rubber-jacketed cable with a switchcraft A3F connector installed in the microphone end shall be provided. Low impedance connections shall be balanced line configuration.

The microphone shall accept a 141 dB SPL input while providing no greater than 1% THD output (open circuit termination). Dynamic range shall be 119 dB or greater. Equivalent noise shall be less than 22 dB.

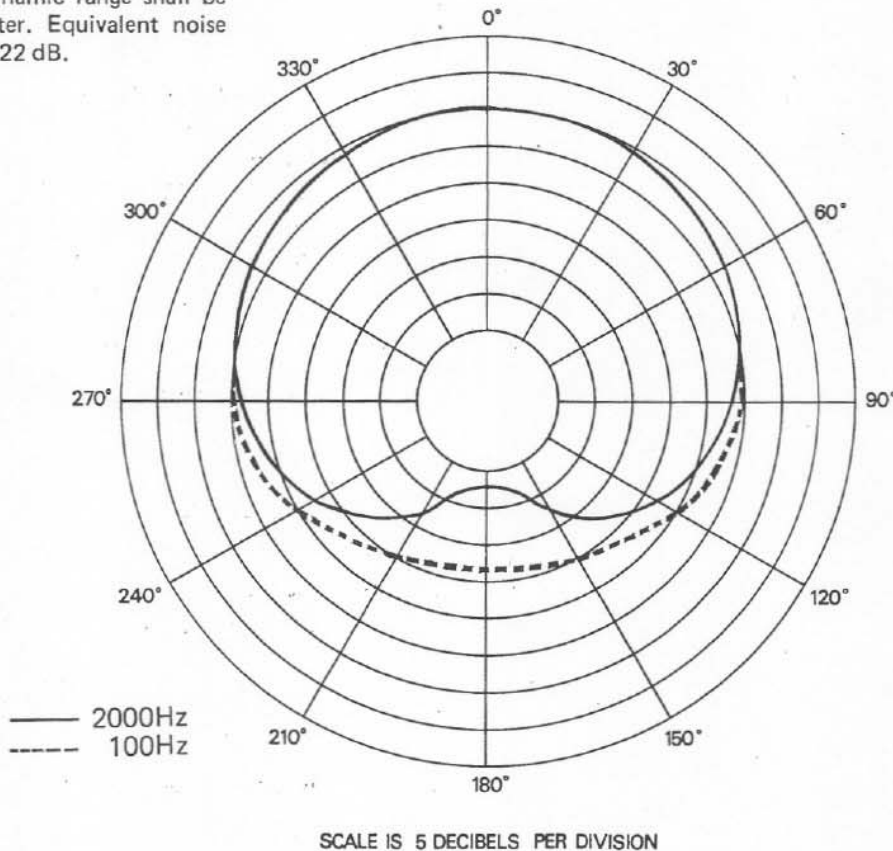
The case shall be machined steel. Dimensions shall be 6 15/16" (176mm) long, 1 1/16" (27mm) diameter (3/4" shank diameter -19mm) and weight shall be 8 ounces (227g). A removable blast filter, model 315, shall be provided along with a model 312A clamp. Finish shall be fawn beige micomatt.

The Electro-Voice Model CS15 condenser microphone is specified.

For correct shipping address, instructions on return of Electro-Voice products for repair, and locations of authorized service agencies, please write: Service Department, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (Phone 616/695-6831).

Electro-Voice also maintains complete facilities for non-warranty service of E-V products.

**WARRANTY (Limited)** — Electro-Voice Professional Electret Condenser Microphones are guaranteed unconditionally against malfunction from any cause for a period of two years from date of original purchase. Also, Electro-Voice Professional Electret Condenser Microphones are guaranteed without time limit against malfunction due to defects in the acoustic system, and for three years against defects in the active electronics. If such malfunction occurs, microphone will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not cover finish, appearance items, cables, cable connectors, or switches and lifetime warranty does not cover malfunction due to abuse or operation at other than specified conditions. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee.



POLAR RESPONSE