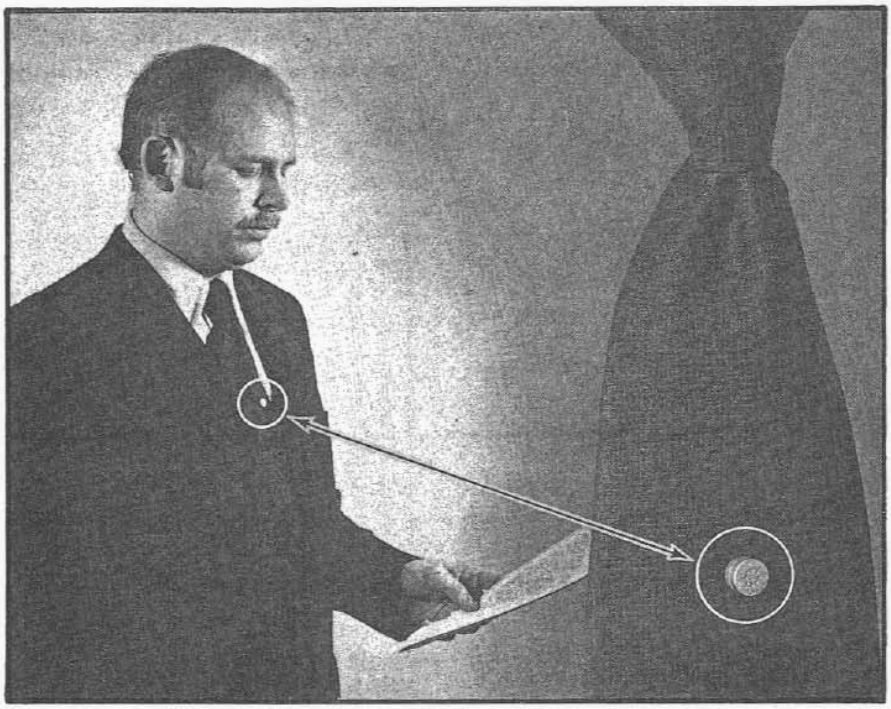


Electro-Voice®
a gulton company

# CO85
## Miniature Electret Condenser Omnidirectional Microphone

### SPECIFICATIONS:

| | |
|---|---|
| Element: | Electret condenser |
| Frequency Response: | 70 Hz – 16 kHz |
| Impedance: | 150 ohm Nominal (balanced) |
| Polar Pattern: | Omnidirectional |
| Output Level: | –56 dB (0 dB = 1 mW/10 dynes/cm$^2$) |
| EIA Sensitivity Rating: | –152 dB |
| Case Material: | Steel and High impact plastic |
| Dimensions: | Microphone dia. 10.3mm (13/32") |
| | Battery case dia. 19mm (3/4") |
| | (See dimension drawing for all other dimensions) |
| Weight: | Tie tac 2.8g (.1oz) |
| | Electronics 7.1g (.25 oz) |
| | Battery Housing 93.6g (3.3 oz) |
| Finish: | Fawn beige micomatt |
| Operating Voltage: | 1.1 to 1.8 Vdc |
| Battery Required: | See Figure 5 |
| Battery Life: | Greater than 1000 hours |
| Current Required: | 150 microamps |
| Accessories Furnished: | 385 Windscreen |
| | Belt Clip |
| | Funny piece of bent wire |
| | Tie Clip Adapter |
| Optional Accessories: | Model 512 Connector Adapter Kit |

### DESCRIPTION AND APPLICATIONS

The CO85* is an omnidirectional electret condenser microphone. Designed to be aesthetically pleasing, the CO85 is ideal for on-camera use. The unique design of the CO85 allows the microphone capsule to be attached to the performer's clothes in the manner of an ordinary tie tac. The backing or retention device for the microphone capsule is an electronics package that makes electrical as well as mechanical contact with the CO85. This approach allows the user to disguise the microphone as perhaps a tie tac, lapel pin, shirt button, broach, etc. Choice of placement and "disguise" is limited only by the user's imagination.

With the adaptation of an additional connector, the CO85 is capable of being powered from certain wireless transmitters or tape recorders, thus eliminating the battery connector housing (see operating instructions).

* U.S. Patent No. 3,864,531

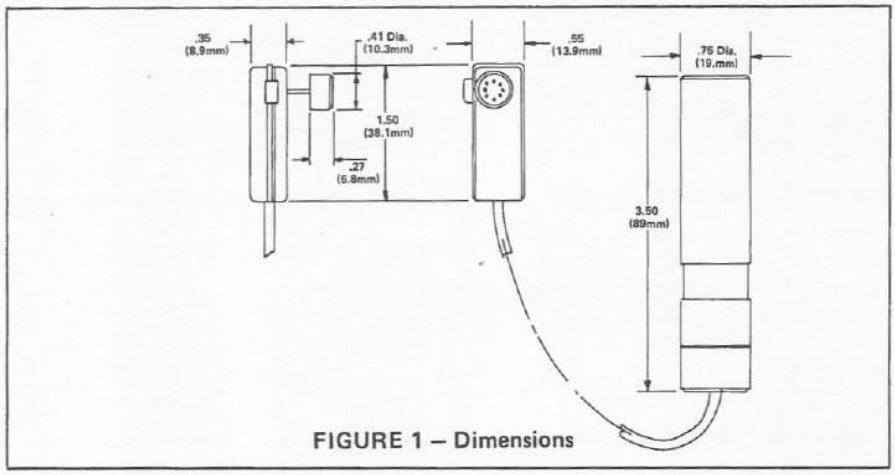


FIGURE 1 – Dimensions

## TECHNICAL INFORMATION

The tie tac portion of the CO85 contains the electret condenser generating element. The penetrating probe of the microphone is a coaxial stainless steel pin which is used to fasten the microphone to the electronics package. It also provides electrical contact in a manner very similar to that of a phone plug.

The electronics package can be broken down into three major sections. The top end contains the probe capturing device and maintains electrical contact. The middle section houses the impedance converter electronics, and the bottom section contains a special concave conical cable strain relief.

In order to prevent failure commonly associated with cables of small diameter, the need for a superior cable and strain relief design was recognized. Our experience has shown that a cable diameter of one eighth of an inch is as small as prudence will permit. The cable employed on the CO85 is an adaptation from a military product which contains a nylon shock-cord for added strength. Typically, the weakest point of the cable is at its point of termination. The innovative use of a concave conical strain relief allows the mechanical integrity of the cable to be maintained.

## OPERATING INSTRUCTIONS:

To prepare the CO85 for use, install the 1.4 volt battery (positive–plus–side down) in the battery connector housing (Fig. 2). The threaded cable connector should be inserted through the hole in the belt clip bracket and threaded into the battery/connector housing. The belt clip is supplied to provide a strain relief at the junction of the CO85 and the microphone cable. It is recommended that the belt clip be used unless concealment is of prime concern.

The stainless steel probe of the microphone capsule should be inserted through the tie (lapel, blouse, etc.). This may require firm pressure, depending on the material, but don't worry about bending the probe. As with a normal tie tac, a twisting or rotary motion aids easy insertion. **While pressing the probe release button** (button on side of electronics package), insert the probe into the electronics package. Release the button and check that the probe has been properly retained by the electronics package. See figure 3.

The battery/connector housing is designed to mate with a Switchcraft A3F (or equivalent) connector using two conductor shielded cable for connection to the mixer input. The CO85 may be used with any balanced or unbalanced low impedance input.

For those applications where the tie tac approach is not practical, an accessory clip adapter is supplied. Insert the electronics package into the adapter clip as shown in Figure 4 and then connect the microphone capsule. For added convenience the cable for the electronics package can be routed between the electronics package and the clip as shown in Figure 4, thus allowing the unit to be clipped to a pocket or providing a more stable cable–dress when used on the tie.

When the CO85 is used outdoors, it is suggested that the supplemental windscreen be used. Simply press the windscreen over the microphone until it "snaps in" and is properly seated.

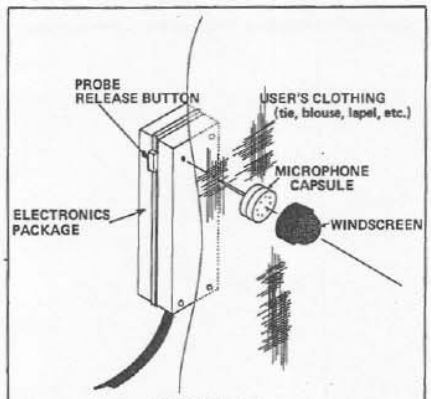


FIGURE 3

A small patch of cloth may be placed over the microphone capsule for the purpose of concealment. Ideally, a piece of cloth from the hem or seam of the garment being worn should be used. If the cloth is tightly woven, it is recommended that it be worked with the fingertips to loosen the

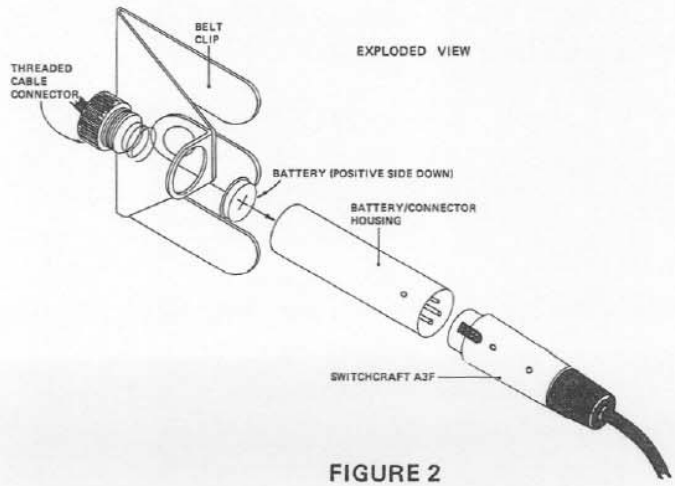


FIGURE 2

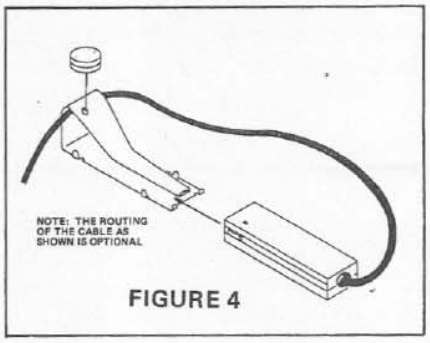



FIGURE 4

weave. This is to prevent severe high frequency losses to the microphone element. After the cloth is prepared, place it over the face and down the side of the mike capsule, then wrap a small gauge solid wire around and into the groove of the microphone capsule to retain the cloth. Excess cloth should then be trimmed and the capsule used as previously described.

A funny shaped piece of wire is supplied to facilitate in dressing the cable from the electronics to the battery/connector housing. To use this accessory, place the cable into the "U" shaped portion of wire and insert the ears of the wire into a button hole. This keeps the cable in line with the tie.

## 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. 6.

## POWERING THE CO85 FROM A TAPE RECORDER OR WIRELESS TRANSMITTER:

With specific modifications the CO85 can be powered from certain tape recorders and wireless transmitters, thereby reducing the overall bulk of the microphone package. Information concerning these modifications, specifically for Vega and Swintek wireless microphones and Nagra SN recorders, is available on request. For the Vega and Swintek wireless microphones request Technical Bulletin No. 17. For the Nagra SN recorder request Technical Bulletin No. 18. Write to: Electro-Voice, Inc., Department MR85, 600 Cecil St., Buchanan, Michigan, 49107.

## BATTERY

Because the current drain on the battery is so small (approximately 150 microamps), the battery may be left on continuously with a useful life expectancy of over one thousand hours.

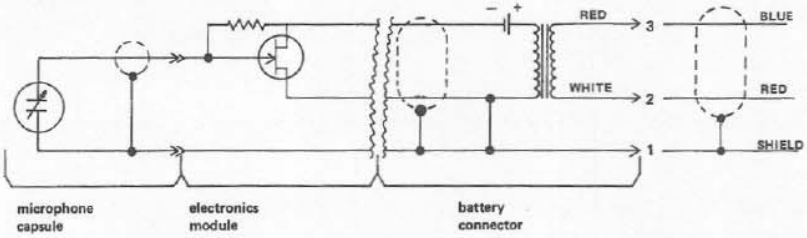
| BATTERY REPLACEMENT GUIDE | |
|---|---|
| RAY-O-VAC | T625 |
| MALLORY | RM-625 |
| BURGESS | Hg-625 |
| EVEREADY | E625 |
| BRIGHT STAR | BPX-625 |

FIGURE 5 – Battery Housing

NOTE: A microphone with extremely low output level indicates that the battery needs replacing.

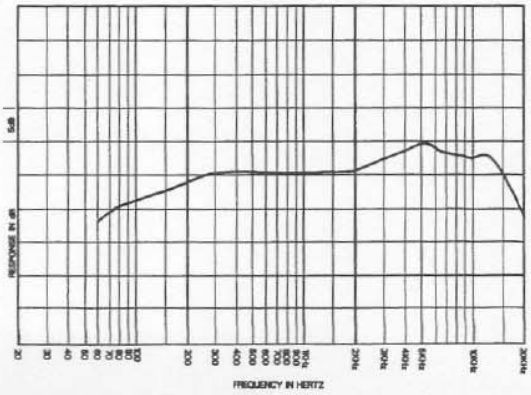
## ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The microphone shall be the Electro-Voice Model CO85. The microphone shall be an omnidirectional electret condenser. The microphone shall be used in the manner of an ordinary tie-tac.




NOTE: Positive Voltage on pin 2 with positive pressure on diaphragm

FIGURE 6 – Schematic




FREQUENCY RESPONSE CURVE

The microphone shall have a frequency response from 70 Hz to 16 kHz. The unit shall have a 150 ohm nominal impedance balanced output, with an output level of −56 dB (0 dB = 1 mw/10 dynes/cm$^2$). The microphone capsule and battery/connector housing shall be made of steel and the electronics package shall be made of high impact plastic. The CO85 will be supplied with a belt clip, windscreen, clip adapter and a button hole clip.

The battery/connector housing shall contain a Switchcraft A3M connector. A 15 foot (4.6m) 2 conductor shielded, brown, rubber-jacketed broadcast-type cable shall be provided.

## WARRANTY (Limited) FOR ELECTRET PROFESSIONAL MICROPHONES

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 for the life of the microphone 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.

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.

Specifications subject to change without notice.

Part Number 535829 — 524

a Gulton COMPANY ELECTRO-VOICE, Inc., 600 CECIL ST., BUCHANAN, MICH. 49107

MANUFACTURING PLANTS AT ■ BUCHANAN, MICH. ■ NEWPORT, TENN. ■ SEVIERVILLE, TENN. ■ GANANOQUE, ONT. ■ LITHO IN U.S.A.