

# **BROADCAST AUDIO EQUIPMENT**

## **Type 44-BX Velocity Microphone**



**RADIO CORPORATION OF AMERICA**  
ENGINEERING PRODUCTS DIVISION CAMDEN, N. J.



# Velocity Microphone, Type 44-BX

## Features

- Excellent reproduction of the entire audio frequency range.
- No loss in quality with off axis pickup.
- Artists may be placed on both sides of the microphone.
- Pickup of reflected sound reduced.
- Quality smooth as a result of the absence of pressure doubling, cavity and diaphragm resonance.
- Response may be adjusted to provide best possible frequency characteristics for either vocal or musical pickup.
- Unaffected by temperature humidity or air pressure.
- Shock mounted.
- Attractive appearance.

## Uses

The 44-BX is intended primarily for AM, FM and TV studio use where a microphone of the highest quality of reproduction is desired. It has the following general uses.

### A. BROADCAST STUDIO—

- (1) *General Program and Announce.*
- (2) *Plays* where the players may be grouped around the microphone.
- (3) *Conference Pickup* where the participants are seated on opposite sides of a table.
- (4) *Programs* where studio acoustics are more live than optimum.
- (5) *Programs* where the microphones may be suspended overhead and angled to reduce audience noise.
- (6) *Programs* where the direction pattern permits orientation to eliminate undesirable reflections from walls.

### B. BROADCAST REMOTE—

- (1) *General Program and Announce.*
- (2) *Plays* and other stage presentations where the microphone may be suspended overhead and angled to reduce audience noise.
- (3) *Programs* where the directional properties reduce the effect of an overly reverberant location.

The 44-BX microphone is not recommended for outdoor use because of the relative sensitivity of the microphone to wind.

## Description

The Type 44-BX Velocity Microphone is a Bi-directional microphone in which the moving element is a thin, rather narrow, corrugated metallic ribbon supported at the ends and placed between the pole pieces of a magnetic circuit. Because of its lightweight, the motion of the ribbon corresponds very closely to the velocity of the air particles and the voltage generated in it is, therefore, a reproduction of the sound waves which traverse it. An impedance matching transformer and compensating reactor are located in the base of the microphone and the upper perforated portion provides a windscreen of distinctive shape.

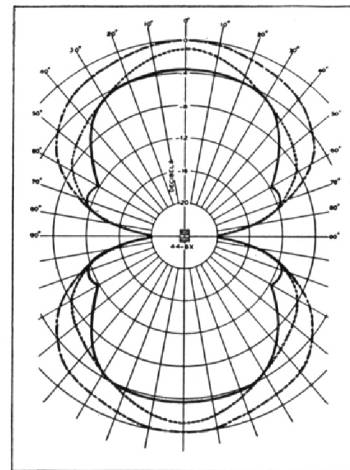
The 44-BX is attractively finished in satin chrome and a neutral umber gray to harmonize with modern studio interiors. The yoke mounting permits a wide range of tilting angles and the shock mounting reduces undesirable pickup from floor vibrations.

## Specifications

Directional Characteristics	Bi-directional
Output Impedances	30/150/250 ohms
Effective Output Level	-55 dbm*
Hum Pickup Level	-112 dbm**
Frequency Response	50-15,000 cycles
Finish	Umber gray and satin chrome
Mounting	1/2" pipe thread
Dimensions, overall	
Height (including cushion mounting)	12"
Width	4 3/4"
Depth	3 3/8"
Weight (unpacked, including mountings)	8 1/2 lbs.
Cable (MI-43A) 3 conductor shielded	(30 feet (no plug))
Stock Identification	MI-4027-G

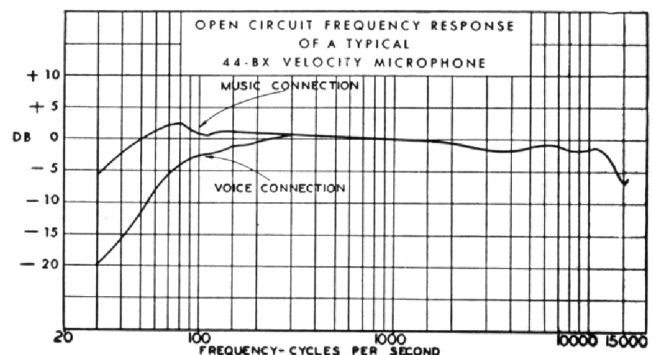
\* Referred to 0.001 watt and a sound pressure of 10 dynes/cm<sup>2</sup> (94 db level).

\*\* Referred to 0.001 watt and a 60 cycle hum field of 0.001 gauss.



Directional characteristic of a typical 44-BX Velocity Microphone

— 10,000 cps  
 - - - 6,000 cps  
 - · - · 1,000 cps





# INSTRUCTIONS FOR

## Velocity Microphone

### TYPE 44-BX

(MI-4027-B, -D)

#### TECHNICAL DATA

##### Output

\*-55 db at 1,000 cycles effective level.  $1.8 \times 10^{-3}$  volts open circuit across 250-ohm tap. (With an input sound pressure of 10 dynes per square centimeter.)

\*(0 db = 0.001 watt.)

##### Output Impedance

50 or 250 ohms.

(Connected for 250-ohms when shipped.)

##### Directional Characteristics

Bi-directional, Figure 8 pattern.

(See curve Figure 4.)

##### Frequency Response

30 to 15,000 cycles.

(See curve Figure 3.)

##### Dimensions and Weight

†Length 12 inches

Width  $4\frac{3}{4}$  inches

Depth  $3\frac{3}{8}$  inches

†Weight  $8\frac{1}{2}$  pounds

†Includes the mounting.

##### Mounting

$\frac{1}{2}$ -inch straight pipe thread.

##### Finish

MI-4027-B, Black and chromium.

MI-4027-D, Dark umber gray and chromium.

of the ribbon is due to the small instantaneous pressure differences existing between the two faces of the ribbon due to sound waves. Measurements have shown that a microphone of this type provides a sound responsive device with an exceptionally uniform frequency response throughout the audio range used in radio broadcasting.

The sensitivity and frequency response of the Type 44-BX Microphone are practically unaffected by changes in temperature, humidity, and barometric pressure because of its type of construction. The ribbon and magnet assembly is



Figure 1—Type 44-BX Microphone

#### DESCRIPTION

The Type 44-BX Microphone is a ribbon type microphone which operates on the pressure gradient principle, and is especially designed to provide a microphone capable of reproducing sound with the fidelity required for modern radio broadcasting. The moving element is a very thin corrugated aluminum ribbon, suspended between the poles of a permanent magnet. The ends of the ribbon are connected to the primary of a transformer which raises the impedance of the ribbon to either a 50- or 250-ohms. The ribbon is open to sound waves both front and back. Movement

protected against mechanical injury by a perforated housing. A cover plate on the bottom of the microphone provides access to the terminal board of the output transformer. The microphone is provided with a cushion mounting which is tapped to fit a  $\frac{1}{2}$ -inch straight pipe thread. A hanger is provided, packed separately, if it is desired to suspend the microphone instead of mounting it on a stand.

### Response Characteristic

Frequency response curves, taken with a plane progressive sound wave, are shown in Figure 3. The response of the microphone can be altered to provide the characteristic most suitable for either music or voice by changing a jumper connection on the output terminal board. A small circular hole is provided in the cover plate of the transformer case through which may be seen the letter M (music) or V (voice) indicating whether the microphone is connected for music or voice.

***IMPORTANT:** The response selector feature is incorporated for the sole purpose of supplying a microphone with the best possible characteristics for either voice or music pickup. It is not intended that alterations in response will be made between numbers on a program. It is recommended that the microphone be connected for one of these types of service, and then the use restricted to that type of service.*

### Directional Characteristic

One of the most important characteristics of the velocity microphone is its directional property. For equal distances from the microphone, the relative response to sound originating at various angles in a horizontal plane perpendicular to the ribbon is shown in Figure 4. Sound waves approaching the microphone from either direction along an axis perpendicular to the plane of the ribbon have the maximum effect. Sound waves from a direction in the same plane as the ribbon have little effect upon it.

A directional characteristic of this type results in a considerable reduction in the pickup of background noise and reflected sounds because such sounds from side directions will have little effect. When used for public address or sound re-enforcing purposes the directional characteristic is of considerable value in reducing feed-back effects between the microphone and loudspeaker. The allowable operating distance of the velocity micro-

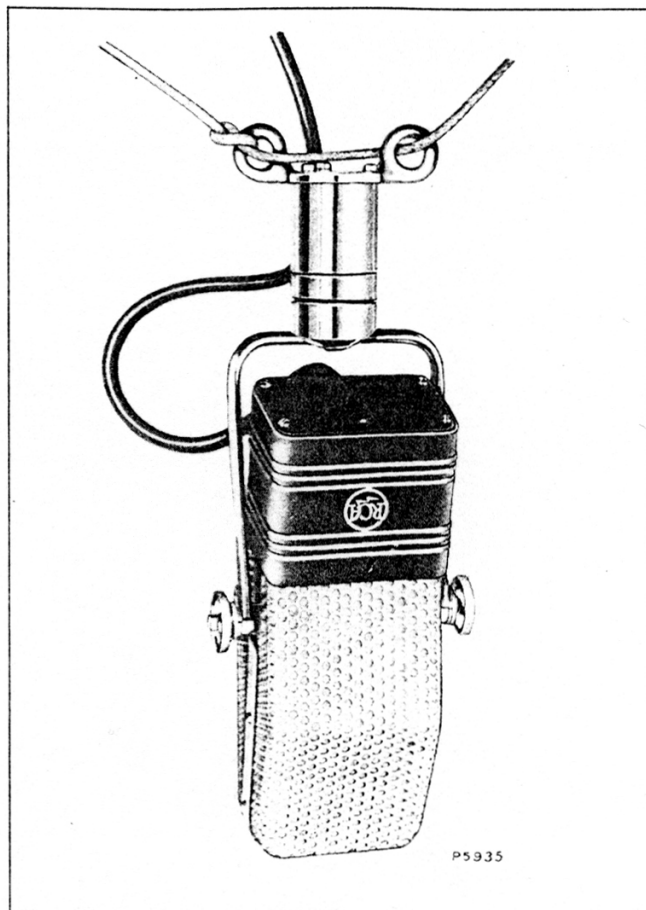


Figure 2—Microphone on Suspension Hanger

phone is approximately 1.7 times that of a non-directional microphone of the same sensitivity.

## INSTALLATION

### Assembly

Packed with the Type 44-BX Microphone are three machine screws, three lockwashers, and a hanger. If suspension mounting is desired, either the threaded flange or the complete cushion mounting must be removed. In the former case the hanger is attached to the bottom of the cushion mounting and in the latter case it is attached to the microphone fork.

***IMPORTANT:** When suspension mounting is used the weight of the microphone should be carried by the hanger, with no strain on the cable. (See Figure 2.)*

### Connections

With the cover plate of the transformer housing removed, the output terminal board will be exposed. On one side of the terminal board there



are four terminals (see Figure 5). The two outside ones are the output terminals, with one marked  $\pm$  to indicate the phasing. The unit as shipped from the factory is connected for 250-ohm operation by having both the jumpers across the center terminals (marked 250). For 50-ohm operation the two jumpers should be removed from across the center terminals and connected so that there is a jumper across each pair of terminals marked 50.

On the other side of the terminal board there are two terminals across which there should be a jumper marked V. This indicates the unit is connected for voice operation. For music operation this V jumper should be removed from one terminal and with the other terminal as a pivot, turned 180-degrees and then tightened. The letter M on the terminal board is now exposed thus indicating the unit is connected for music operation.

### Phasing

When the outputs of two or more microphones

are fed into a common mixing circuit, it is necessary that their respective outputs be in phase. If the microphones are not in phase, the output of one will oppose the output of the other. This not only results in a reduction in the output but also introduces distortion to a varying degree.

**CAUTION:** A velocity microphone may be reversed in phase by rotating the microphone through an arc of 180-degrees.

### Operation

The velocity microphone is especially well adapted to studio use where its directional characteristic, and excellent response may be utilized to the best advantage. Since broadcasting studios are usually constructed so that there is an optimum of sound reflection within the room, the problems introduced because of echoes and reverberation is not a serious one. More attention may therefore be directed to the placement of the microphone so as to accentuate certain sounds and reduce others by means of the directional charac-

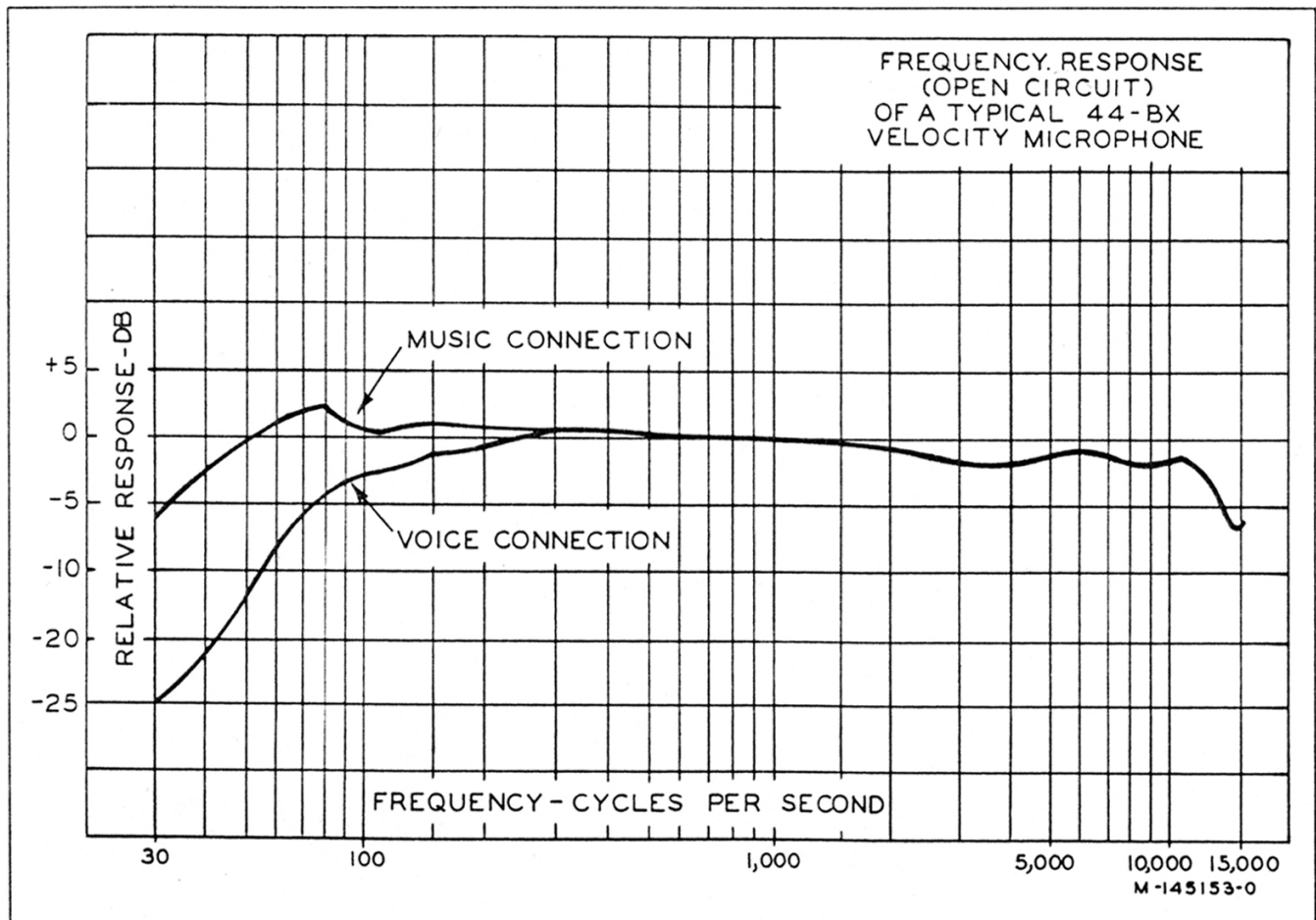


Figure 3—Frequency Response

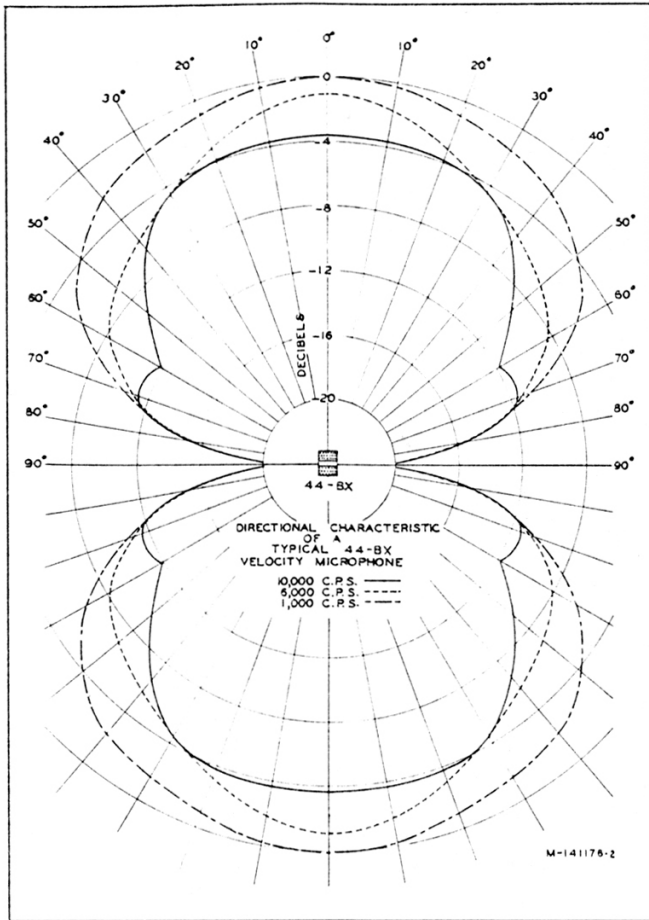


Figure 4—Directional Characteristics

teristics of the velocity microphone. Interesting effects can be obtained by different arrangements of instruments and performers about the microphone.

In order to secure the best results it is essential that performers and instruments be grouped properly, and that all sources of sound be placed relative to the microphone so that each person or instrument will register with the proper relative intensity. The correct grouping and placement will be determined best by experience, since the requirements of individual set-ups vary widely. The following general rules may be helpful in developing the necessary technique for any particular situation.

1. Even when the voice connection is used, never place artists, speakers, or singers within less than one foot of the microphone, except for special effects. When the music connection is used, the best results are secured if the performer is three to four feet from the microphone. The low frequency response is increased if the source of sound

is less than three feet from the microphone, and it is desirable to maintain this distance unless special effects are wanted. Voices tend to become boomy and unnaturally deep-throated if the performer is too close to the microphone. Beyond three feet the response is as shown by the curves (see Figure 3).

2. Place the microphone so that the source of the sounds, that it is desired to reproduce, will be either to the front or back of the microphone. Also, position the microphone so that the source of unwanted sounds is toward the sides of the microphone, where such sounds will be attenuated.
3. Place instruments having a low frequency range at greater angles with the perpendicular to the microphone ribbon, while instruments having higher frequency ranges may be placed in line with this perpendicular or removed from it only by small angles. The mid-frequency instruments are, of course, spaced in between those having the higher and lower ranges. Referring to the chart (Figure 4) which shows the directional characteristics of the microphone will assist in placement of the various instruments and performers to the best advantage.

Determine the exact placement by means of the following factors:

- A. Wishes of Orchestra or Band Leader.
- B. Number of performers and number and type of instruments.
- C. Size and construction of the studio.
- D. Peak volume swings as indicated by a volume level indicator.
- E. Results as determined by actual monitoring with a pair of RCA high fidelity headphones, or by a suitable loudspeaker connected to the monitoring output of the amplifying system.

Experimental placement of the performers and instruments is usually necessary in order to obtain the best results.

4. Protect the microphone from strong winds or loud explosive type sounds. Such sounds may stretch the microphone ribbon abnormally and necessitate replacement of the ribbon.
5. Always place the microphone so that sound from the subject is received directly and not reflected sound from tables, walls, etc.



## SERVICE

Under normal operating conditions, no difficulty should be experienced with the velocity microphone. However, should any trouble occur, it is recommended that the customer make no attempt to repair the microphone except for the replacement of the cable, mounting parts, and transformer.

**CAUTION:** Do not attempt to check the continuity of the secondary of the microphone transformer with an ohmmeter without first disconnecting one side of the primary from the ribbon, otherwise the ribbon may be seriously damaged.

If it is definitely determined that trouble exists in the microphone and not elsewhere in the circuit, then before returning the unit for repair, obtain a *Returned Apparatus* tag and *Repair Order* from an

authorized RCA dealer or the manufacturer. Attach this tag, properly filled out, to the damaged unit and enclose the repair order.

Ribbons are carried in stock to take care of special cases, but the performance may not be within the original manufacturing limits if repairs are made in the field.

## REPLACEMENT PARTS

The following parts list is included to provide identification when ordering replacement parts. Order from RCA Replacement Parts Department, Camden, New Jersey, giving the *stock number* and *description* of the parts wanted. Replacement parts supplied may be slightly different in form or size from the original parts but will be completely interchangeable with them.

Description	MI-4027-B Stock No.	MI-4027-D Stock No.
Cable, 30 foot; with strain relief	18390	18390
Cushion mounting assembly; less flange	17433	.....
Flange	43151	51370
Fork	44659	51365
Guard; both sections	17434	51363
Mounting, rubber-cushion; for cushion assembly	44662	44662
Nut, thumb; for swivel	17435	51367
Nut, thumb; for cushion mounting	17439	.....
Ribbon	20935	20935
Spacer; used under Nut No. 17439	17438	.....
Transformer; RT-435	16828	16828
Washer, locking; used under Stop Washer	17437	51369
Washer, stop; used under Swivel Thumb Nut	17436	51368

## ACCESSORIES

Description	Stock No.
Boom Stand, Type 90-C; Satin aluminum and black finish	MI-4094-A
Desk Stand, Type 91-A; Black enamel finish	MI-4058-B
Desk Stand; Type 91-A; Dark umber gray finish	MI-4058-C
Program Stand, Type 90-A; Satin chrome finish	MI-4090-A
Cable, extension; two conductor shielded (specify length in feet)	MI-62

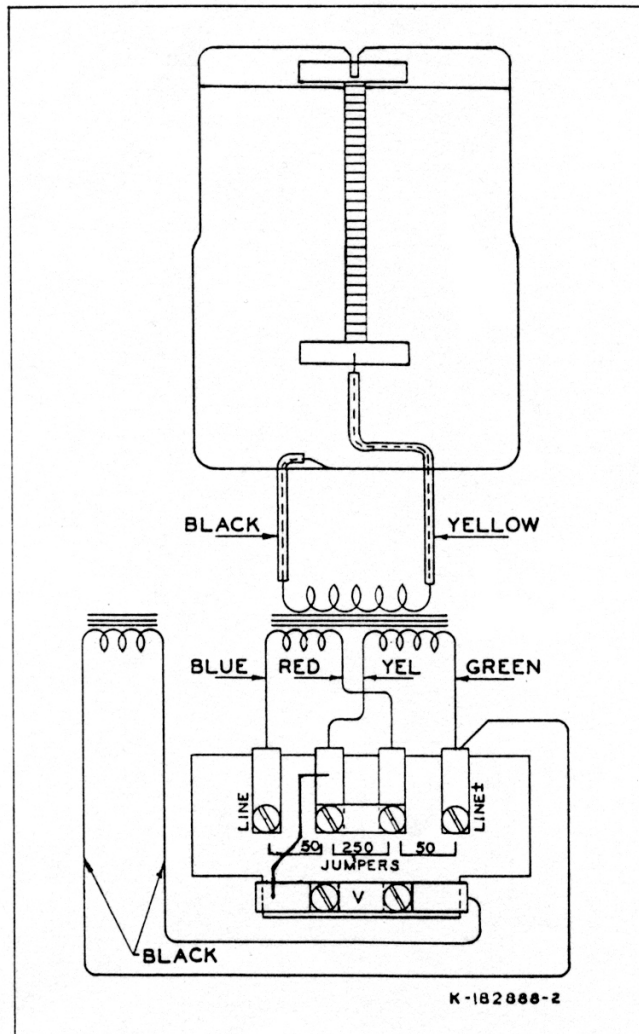


Figure 5—Connection Diagram





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