

RCA Microphones

Microphones General Information

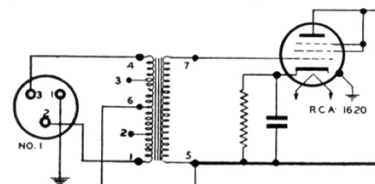
The excellence of RCA microphones is the result of continued effort on the part of Research, Development and Production personnel to produce a superior product. Out of this work have come the several types of broadcast microphones listed in the catalog. There is considerable overlap in the applications of the various types, but each does possess certain attributes which make it particularly well suited to some specific applications. These have been noted for each microphone in the catalog in order to assist in the selection of the microphone best suited for the intended application.

High Quality Broadcast and Television Microphones

Broadcast-type microphones such as the Types 44-BX, 77-D and 88-A all have certain common performance criteria which make them especially suited to this application. They have smooth response-frequency characteristics over the audio range, low distortion, high input levels, well-shielded output transformers to prevent hum pickup, and where necessary, are shock mounted to reduce the pickup of low frequency building rumble. Performance features which are unique to each particular type are listed and the applications discussed in the catalog.

Public Address Microphones for Broadcast Use

Public Address Microphones such as the MI-6206 and the KN-1A have been designed as economy microphones. In general, frequency range and sensitivity have been sacrificed to some extent in order to gain ruggedness and lower cost. The response limitations should be borne in mind when these microphones are used in Broadcast applications.



No. 1 Input Channel of OP-7 Portable Preamplifier showing unloaded transformer input

Unloaded Transformer Input

RCA Broadcast Microphones are designed to work into a microphone preamplifier whose input transformer is unloaded. Under this condition of operation the full generated voltage of the microphone appears at the grid of the first tube resulting in a gain in signal-to-noise ratio of between 3 and 6 db as compared with a matched resistance load. The exact value will depend on whether the major source of noise is in the microphone amplifier or in the output resistance of the microphone.

Microphone Resistance Loading

Microphones which are relatively inefficient or in which there is a great deal of damping associated with the moving system will in general have their frequency response characteristics little changed by electrical loading. The 88-A and 77-D (in the pressure position) are examples of this.

Highly efficient microphones, particularly those in which the moving system is mass controlled usually show impedance variations for a constant generated voltage. Such microphones will have their response characteristics adversely affected by resistance loading because the mechanical constants of the moving system will be disturbed by the reflected resistance load. The Type 44-BX, and 77-D (in the bi-directional and uni-directional positions) are examples of this. Resistance loading on these will generally result in a loss in low frequency response.

150 Ohms vs. 250 Ohms

Where microphones are connected to unloaded input transformers, impedance matching is not a consideration and the effects of connecting microphones with an output impedance of 150 ohms to a microphone amplifier designed to operate from a 250 ohm source and vice versa will usually be of small consequence. The effect on the level is shown in the tabulation below.

Mic. Output Impedance	Level Change db	
250	0	+2.2
150	-2.2	0
Amp. Input Designation	250	150

In addition there will be some change in the overall response-frequency characteristic of the system below 100 cycles and above 5000 cycles, the magnitude depending on the connection and the design of both the microphone and the amplifier input transformer. Variations in response with the usual broadcast quality microphone amplifiers will in most cases not exceed ± 2 db.

When microphones are connected to a resistance load the following changes in level will result when the output is referred to a matched condition.

Mic. Output Impedance	Level Change db	
250	0	-2.5
150	+2.0	0
Load Impedance	250	150

Microphones Shipped Less Plug

RCA microphones are supplied less the plug for connection to the wall outlet or amplifier system. This is done to allow the user to select any desired plug. As a convenience two types of Cannon plugs are cataloged and either may be ordered as an accessory if wanted.

Microphone Mounting

RCA has standardized on the rugged $\frac{1}{2}$ " pipe thread for microphone mounting. This size thread makes it easy to add microphone stand extensions, booms, etc., for they may be easily made up locally from standard $\frac{1}{2}$ " pipe and fittings. Most of the stands listed may also be used with microphones having a $\frac{5}{8}$ "-27 thread by removing an adapter which is supplied as a part of the stand. Various adapters are also supplied for microphones should the use of the $\frac{1}{2}$ " pipe thread prove inconvenient.

Effective Output Level

When a microphone is connected to an unloaded input transformer its power output cannot be expressed in dbm because no appreciable power is delivered by the microphone. The logical approach to the problem is to arrive at some figure which when combined with the conventionally measured ampli-

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fier gain will give the correct value of output level. This figure is listed in the catalog for each microphone and is called the Effective Output Level and differs from a proposed RMA standard rating only in the value of sound pressure. The Effective Output Level is based on a sound pressure of 10 dynes per square centimeter and the RMA rating on .0002 dynes per square centimeter.

The RMA standard defines the system rating (G_M) of a microphone as the ratio in decibels relative to 0.001 watt per 0.0002 dynes per square centimeter of the maximum electric power available from the microphone to the square of the undisturbed sound field pressure in a plane progressive wave at the microphone position. Expressed mathematically.

$$G_M = (20 \log_{10} \frac{E}{P} - 10 \log_{10} R_{MR}) - 50 \text{ db.}$$

where E = the open circuit voltage of the microphone

P = the undisturbed sound field pressure

R_{MR} = the microphone rating impedance

Electrical reference level = .001 watt

Sound pressure = .0002 dynes/sq. cm.

While this may look complex, the application is simple. In order to find the equivalent of the figure given as Effective Output Level, it is only necessary to add to the value of G_M the sound pressure level in db relative to 0.0002 dynes per square centimeter. As an example the value of G_M for the Type 44-BX Velocity Microphone is -149 db, and the usual sound pressure of 10 dynes per square centimeter corresponds to a level of +94 db. The value of G_M for a sound pressure level of 94 db is therefore -55 dbm, which is identical with the Effective Output Level. When the RMA rating is used, the output level of the microphone can be obtained by simply adding to the value of G_M the sound pressure level of the program material as measured in any of the readily available sound level meters.

Hum Pickup Level

An arbitrary standard 60 cycle a-c field of 10^{-3} gauss has been established as a reference. It is fairly representative of fields measured at typical microphone locations in broadcast studios. The hum level is referred to .001 watt and is calculated in the same fashion as the Effective Output Level, using as the output voltage the voltage produced by the standard field.

Type No.	Use***	Directional Characteristic	Effective Output Level dbm*	Output Impedance Ohms	Frequency Response cps	Hum Pick-up Level db**	Finish	Fitting
44-BX	Broadcast & TV Program & Announce	Bi-directional	-55	30/150 250	50-15,000	-112	Satin Chrome and Umber Gray	1/2" Pipe Thread
77-D	Broadcast & Tv Studio & Remote Program Announce Booms	Poly-directional	-57	30/150 250	50-15,000	-125	Satin Chrome and Umber Gray	1/2" Pipe Thread
88-A	Broadcast & TV Studio & Remote Program Announce	Non-directional	-55	30/150 250	60-10,000	-109	Satin Chrome and Umber Gray	1/2" Pipe Thread
KB-2C	Broadcast & TV Studio & Remote Program Announce	Bi-directional	-55	30/150 250	60-10,000	-108	Satin Chrome and Umber Gray	5/8"-27 Thread
MI-6206-G	Broadcast & Television (a) Talkback	Non-directional	-56	250	80-8,000	-109	Umber Gray	5/8"-27 Thread
KN-1A	Broadcast & Television (a) Talkback	Non-directional	-57	250	100-8,000	-109	Satin Chrome and Umber Gray	5/8"-27 Thread

* Reference level 0.001 watt, sound pressure 10 dynes per square centimeter. This corresponds to a rating by the proposed RMA system at a sound pressure level of 94 db.

** Level referred to a hum field of 10^{-3} gauss.

*** For details refer to description of each particular type.