INSTRUCTIONS FOR

Polydirectional Microphone

TYPE 77-D

(MI-4045-B)

TECHNICAL DATA

Output Impedance
30, 150, and 250 ohms

Load Impedance
Open circuit

Effective Output Level at 1,000 Cycles*
(all output connections)
Bi-directional (B) -54 dbm
Uni-directional (U) -57 dbm
Non-directional (N) -60 dbm
L-1, L-2, L-3, between -54 and -57 dbm

Output Level for Speech at 2 Feet
(all output connections)
Bi-directional (B) -61 vu
Uni-directional (U) -64 vu
Non-directional (N) -67 vu
L-1, L-2, L-3, between -61 and -64 vu

Hum Pick-up Level†
-125 dbm

Dimensions and Weight
Length—11½ inches
Width—3¾ inches
Depth—2½ inches
Weight: Total—4½ pounds
Less cable—3 pounds

Cable
MI-43, 3 conductor, shielded,
30 feet long, no plug

Mounting
½-inch pipe thread

* Sound Pressure = 10 dynes/cm.^{2}
† Referred to a hum field of 1 x 10^{-3} gauss.

DESCRIPTION

The RCA-Type 77-D Polydirectional Microphone is a high-fidelity microphone of the ribbon type. It is possible, as indicated by the name, to obtain easily a variety of directional patterns.

Instead of being open on both sides as in the conventional velocity microphone, the ribbon element in this microphone is coupled to an acoustic labyrinth which forms the body portion of the microphone. The tube connecting the back of the ribbon to the labyrinth is slotted directly behind the ribbon and fitted with an adjustable shutter to secure various areas of opening. When the opening is completely closed, the microphone operates as a non-directional pressure microphone; at the wide-open position the microphone becomes

Figure 1—Type 77-D Microphone

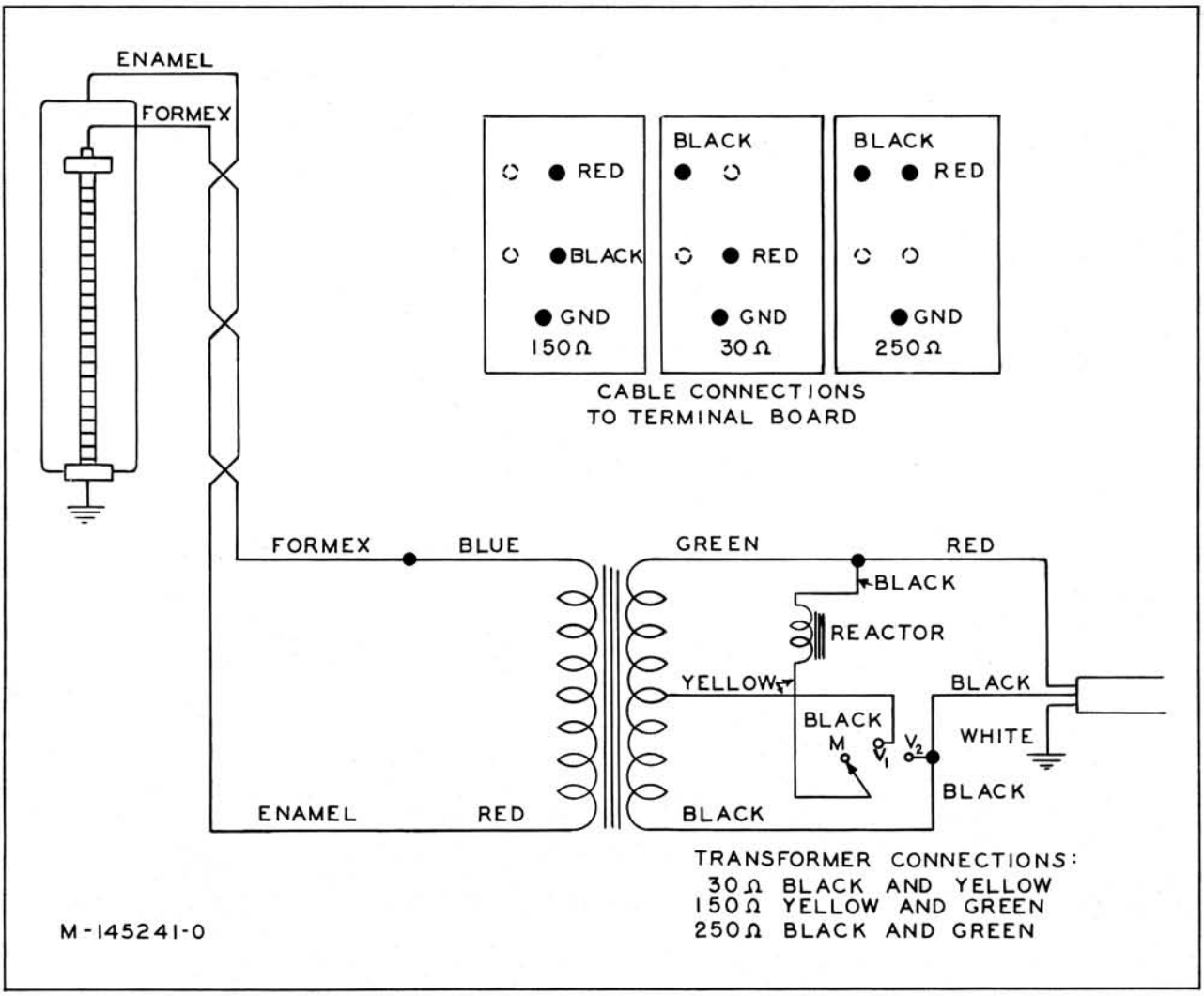


Figure 2—Schematic and Connection Diagram

bi-directional. With the proper size opening the pattern becomes a cardioid by virtue of the phase shift which occurs. Openings smaller or larger than this critical size produce directional patterns with various sized rear lobes.

Different amounts of low-frequency attenuation are obtained by a reactor shunting the output.

APPLICATION

The microphone is intended for use in broadcast studios, high-fidelity sound systems and similar applications. It is intended primarily for indoor use and if used outdoors may require some additional protection against wind.

The choice of directional patterns makes possible a considerable degree of control of the ratio of direct sound to reverberant sound as well as the possible reduction of unwanted sound such as audience noise in a studio. The wide angle of pick-up provided by the cardioid pattern is useful in covering large groups with a single microphone. For "close-talking" applications the non-directional characteristic is of considerable value since the low-frequency response is not accentuated as in the case of a velocity microphone. Numerous other applications of the various directional patterns as well as the different response curves will no doubt suggest themselves to the user.

OPERATION

Mounting

The microphone will mount on any stand having a ½-inch pipe thread. Other stands will require a suitable adaptor. The microphone is cushion-

mounted, and a fork mounting is provided so that the microphone may be tilted to the desired position.

Connections

As shipped the microphone is connected for an output impedance of 250 ohms. To connect the microphone for an output impedance of 30 or 150 ohms, first lower the bottom cover by removing the four machine screws around the rim of the cover. Pull the cover down until the transformer terminal board connections are accessible. For the proper cable connections, refer to figure 2.

Directional Characteristics

The adjustable shutter over the slot in the tube leading to the acoustic labyrinth may be rotated by means of a screwdriver adjustment extending through the rear screen flush with a designation plate.

The plate is marked U, N and B, as symbols for the uni-directional, non-directional and bi-directional patterns. Three additional markings L-1, L-2 and L-3 are used as reference points for other directional patterns which may be obtained. Refer to figure 3 for the patterns associated with each of the six symbols. "Stops" are provided on the continuously-variable pattern selector at the six marked positions, although the shutter may be set at any intermediate position.

Frequency Response

At the bottom of the lower shell is a screwdriver-operated selector marked M (music), V_1 and V_2 (voice). The voice positions connect a reactor across the entire secondary or part of the secondary of the output transformer, depending on the switch position (see diagram, figure 2). Refer to figure 4 for the frequency-response characteristics of each setting. As can be seen from the curves, the reactor attenuates the low-frequency response. This is especially desirable when the microphone is less than three feet from the source of sound and the low-frequency response would otherwise be exaggerated.

Phasing

When the outputs of two or more microphones are connected into a mixing circuit, it is necessary that the outputs of all such microphones have the same phase relation. Otherwise, the output of one microphone will oppose the output of another, resulting in a reduction in output, and introducing varying degrees of distortion.

To check the phasing of two or more microphones, connect one microphone to the associated amplifier input and set the volume control to obtain the desired output, while talking into the microphone. Then, connect the second microphone in parallel with the first and, without changing the volume control setting, hold both microphones close together and talk into them. If the volume decreases from the previous level, reverse the connections of one of the microphone cables at the amplifier input terminals. Check each additional microphone for phasing in this manner, and, if necessary, reverse the cable connections to correct the phasing to agree with that of the microphone already connected.

When the sound source is directed toward the back of the microphone, there will be a large phase shift when changing the pattern selector from bi-directional to non-directional or the reverse. The safest way to avoid undesirable directional effects resulting from the above is to set microphones operating close to one another on the same directional response position, or at least avoid having some on the non-directional pattern and the others on the bi-directional pattern.

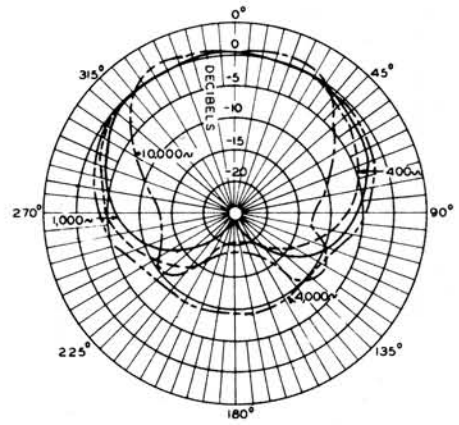
Directional Setting

The proper position of the pattern selector depends upon the particular installation. The same holds true for the placement of the microphone. Consult figure 3 for the directional patterns of the six reference positions.

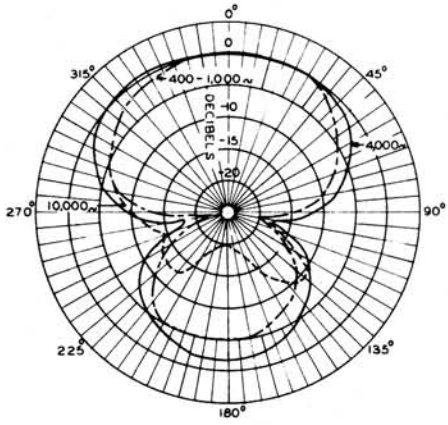
A locking plate is furnished with the microphone for the uni-directional position. To install, first set the pattern selector at U. Remove the two machine screws holding the designation plate on the microphone. Use these screws to install the locking plate in place of the designation plate.

Frequency Response Settings

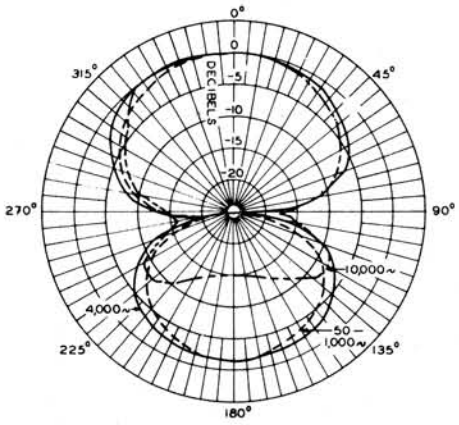
For sound sources greater than three feet from the microphone the frequency response selector can be used in the M position for any of the directional response patterns. If the non-directional characteristic is used, no low-frequency attenuation should be required even for very small distances. If the bi-directional or uni-directional patterns are used, low-frequency attenuation will be required when the sound source is less than 3 feet from the microphone, unless special effects are desired. It is suggested that the V_1 position be used for distances down to 1 foot and the V_2 position for still shorter distances. Refer to



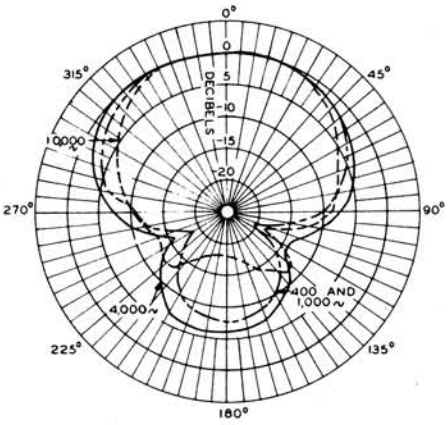
UNI-DIRECTIONAL POSITION



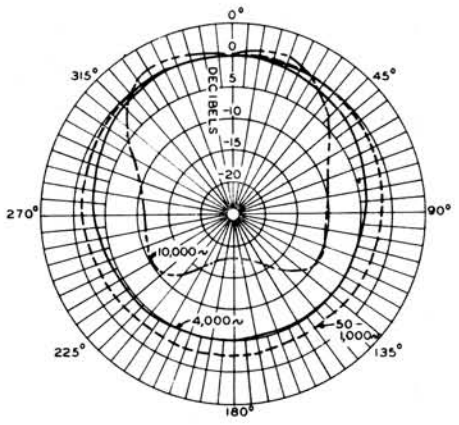
L-1 POSITION



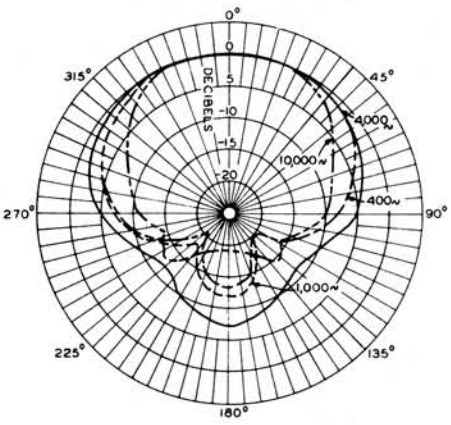
BI-DIRECTIONAL POSITION



L-2 POSITION



NON-DIRECTIONAL POSITION



L-3 POSITION

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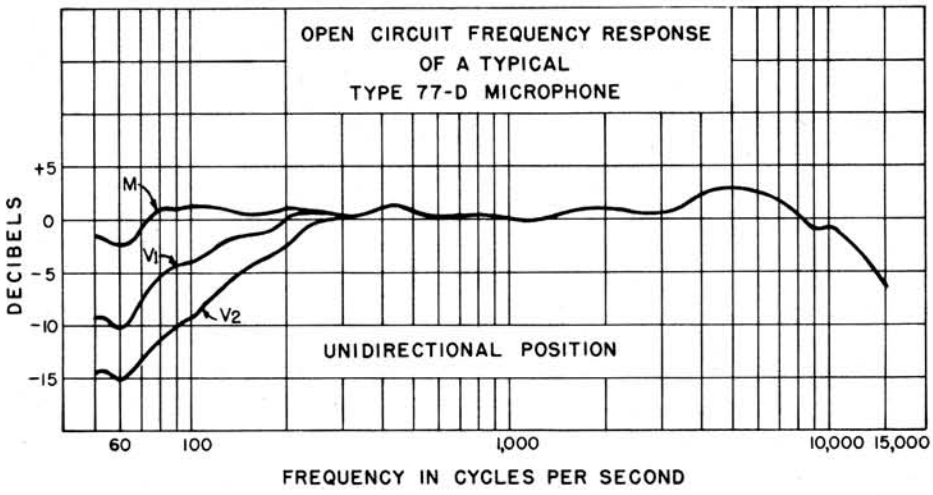
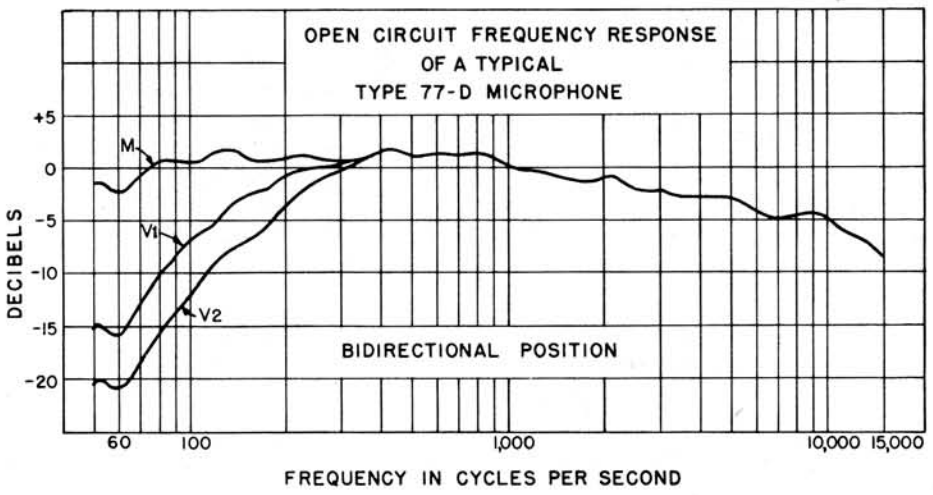
Figure 3—Directional Patterns





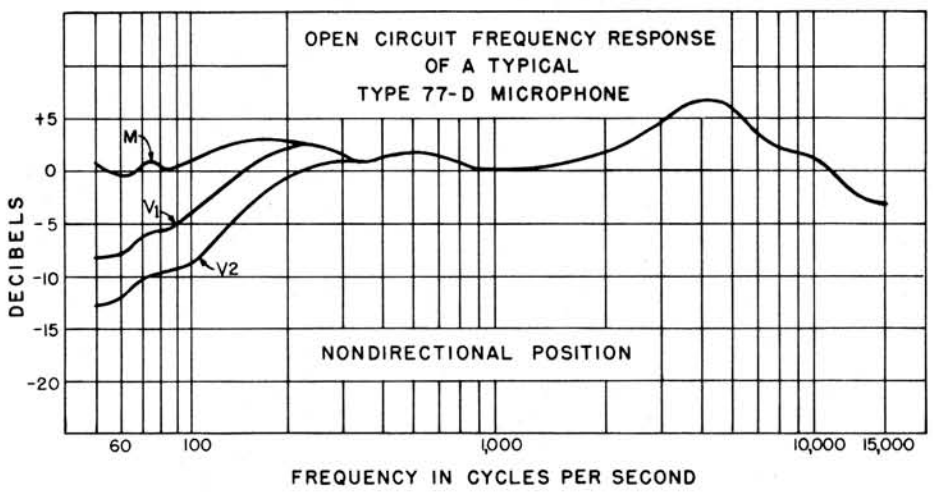


Figure 4—Frequency Response Curves

figure 4 for frequency-response curves of the M, V_1, and V_2 settings.

Hum

Hum may originate in any part of the audio system. In the microphone circuit, it may result from ground loops or unbalance caused by improper cable connections to the preamplifier terminal board or microphone plug. Hum may also be induced into the microphone transformer or ribbon by magnetic fields emanating from power transformers or electrical machinery. In the Type 77-D Microphone, the design of the ribbon circuit and the transformer, and the thorough shielding of the transformer have reduced hum pickup from these sources to a minimum. In the event that exceptionally strong fields are encountered, the induced hum may be minimized by turning or tilting the microphone, or changing its location. Turning the frequency response selector to the V1 or V2 positions will also reduce the hum together with the overall low-frequency response.

MAINTENANCE

It is recommended that no attempt be made to make repairs other than replacement of screens, transformers, mounting parts and cables. For microphone mechanism repairs, return the unit to the factory. Secure a "*Repair Order*" and "*Returned Apparatus Tag*" from your RCA dealer or write *Radio Corporation of America, RCA Victor Division, Camden, New Jersey*. Attach the tag, properly filled out, to the damaged equipment and send the equipment and the repair order to the manufacturer.

CAUTION: To prevent permanent damage to the ribbon, do not use a battery-powered continuity meter to check connections on the transformer.

To remove the top screen assembly for replacement, first remove the side thumbscrews and mounting hardware at the top of the microphone fork. Then, unscrew the two machine screws on the side bands near the top, and lift the screen assembly off the microphone.

To remove a transformer, reactor or cable for replacement purposes, first lower the bottom cover as described under "*Connections*." Before removing the cable, be sure to loosen the cord guard and cable clamp.

CAUTION: Keep the microphone away from iron filings or magnetic dust. Although the silk screen provides excellent protection, minute iron particles commonly found on work benches and in maintenance shops may be drawn through the screen by the powerful magnet. If allowed to accumulate, these particles may mar the quality of reproduction.

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.

LIST OF PARTS

Description	*Stock No.*
Acoustic line assembly	54043
Band, microphone	53417
Cable, microphone (specify length desired)	43984
Clamp, cable	19828
Cushion mounting assembly	50925
Cushion, rubber mounting	44677
Fork, mounting	18393
Gasket, cord	44671
Guard, cord	50908
Nut, thumb; for mounting fork	50902
Nut, thumb; for cushion mounting	50907
Plate, name; for directional characteristics	52466
Plate, name; for unidirectional setting	52467
Plate, pressure	50909
Screen assembly, front and back screens	50906
Screw, round head; for nameplate 2-56 x 1/8 long	52468
Screw, washer head; for screen or cover 2-56 x 3/16 long	52469
Spacer, fork	50905
Spring, cable guard	44440
Switch, voice-music	50915
Transformer and Terminal board assembly	54439
Washer, spring	50903
Washer, retaining	50904
MOTOR ASSEMBLY	
Clamp, ribbon, top small	44446
Clamp, ribbon, bottom small	52920
Clamp, ribbon, top large	54127
Clamp, ribbon, bottom large	54329
Indicator, shutter position	56702
Magnet and tube assembly	54328
Ribbon, microphone	45385
Screw, ribbon clamp, fil. head, 0-80 x 1/8 long	54327
Screw, ribbon clamp, fil. head, 1-72 x 1/4 long	48436
Shutter, tube	50910