



Polydirectional Microphone

TYPE 77-DX

CATALOG

B.1009

FEATURES

- High quality reproduction with greater sensitivity over entire audio frequency range
- Styled for either radio or TV applications
- Choice of directional pattern to control ratio of direct-to-reverberant sound pickup
- Three-position voice-music switch allows selection of best operating characteristic
- Efficient shock mounting

DESCRIPTION

The RCA Type 77-DX Polydirectional Microphone is primarily intended for broadcast use either in the radio or television studio. Two models are available. The MI-4045-F finished in satin chrome and a low-gloss umber gray enamel is intended for AM or FM stations, while the MI-11006-C microphone is intended for television use and is therefore completely finished in a low-gloss umber-gray enamel which eliminates glaring reflections. Both instruments are high-fidelity microphones of the ribbon type which may easily be adjusted to obtain a variety of directional patterns.

As a uni-directional microphone the 77-DX has a wide pick-up angle on front which may be used to advantage as a general programs and announce studio microphone and for television boom operation. It is recommended for use on programs where it is desirable to cover a large area with a single microphone, on programs where studio acoustics are more live than optimum, and programs where it is desirable to eliminate audience noise originating behind the microphone. The 77-DX can also serve as a bi-directional instrument on programs where the players are grouped around the microphone or are seated on opposite sides of a table. In the non-directional position, the microphone is excellent for announce work or for out-door locations.



MI-11006-C

MI-4045-F

The RCA Type 77-DX Polydirectional Microphone operates as a uni-directional, bi-directional or non-directional instrument by positioning of a shutter to secure various areas of opening. The moving element is a thin corrugated metallic ribbon clamped at the ends and suspended in the air gap of a magnetic circuit consisting of an Alnico V permanent magnet and pole pieces. One side of the ribbon is open and the other is connected by means of a tube to a folded acoustically damped pipe contained in the center section of the microphone.

The tube connecting the back of the ribbon to the labyrinth is slotted directly behind the ribbon and fitted with the shutter which controls the directional properties of the microphone. When the opening is completely closed, the microphone operates as a non-directional pressure microphone; at the wide-open position the instrument becomes 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.

The shutter opening is operated by turning a slotted shaft which is brought out flush with the rear of the windscreen.

The shutter position is indicated on a plate mounted on the screen and marked "U", "N" and "B". Three additional markings "L-1", "L-2", and "L-3" are used as reference points for other directional patterns which may be obtained. The bottom portion of the microphone contains an impedance matching transformer and switch for selecting response characteristics for voice or music. The switch shaft is slotted and accessible through a hole in the bottom of the lower shell. The transformer is exceptionally well shielded against stray magnetic fields.

The 77-DX will mount on any stand having a 1/2-inch pipe thread. Other stands will require a suitable adaptor. The microphone is cushion-mounted, and a fork mounting is provided so that the instrument may be fitted to the desired position. The microphone is connected for an output impedance of 250 ohms at the factory, but it may be adjusted for an output impedance of 30 or 150 ohms.

SPECIFICATIONS

Directional Characteristics.....	Adjustable, 6 positions (see curves)
Frequency Response.....	50-15,000 cps
Output Impedance.....	250 ohms, may be changed to 30 or 150 ohms
Load Impedance.....	Unloaded input transformer
EIA System	G _M
Effective Output Level (all output connections):	
Bi-directional.....	-50 dbm* G _M = -144 db
Uni-directional.....	-53 dbm* G _M = -147 db
Non-directional.....	-56 dbm* G _M = -150 db
Hum Pick-up Level.....	-128 dbm**
Dimensions (overall).....	11 1/2" long, 3 3/4" wide, 2 1/2" deep
Weight (including 1 1/2 lb. cable).....	4 1/2 lbs.
Cable (MI-43-D, 3 conductor, shielded).....	30 ft., no plug
Mounting.....	1/2" pipe thread

Ordering Information

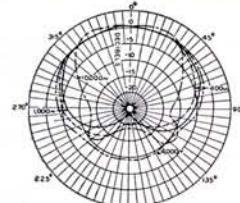
Type 77-DX Polydirectional Microphone in protective cloth bag:	
Satin Chrome Finish.....	MI-4045-F
Low Luster Gray Finish.....	MI-11006-C

* Sound Pressure = 10 dynes/cm².
 ** Referred to a hum field of 1 x 10⁻³ gauss.

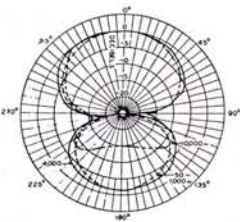
Typical Directional Patterns and Frequency Response Curves of 77-DX Polydirectional Microphone



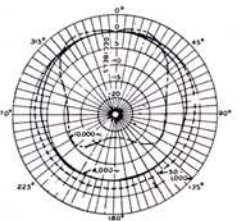
Rear view of 77-DX Microphone



UNI-DIRECTIONAL POSITION

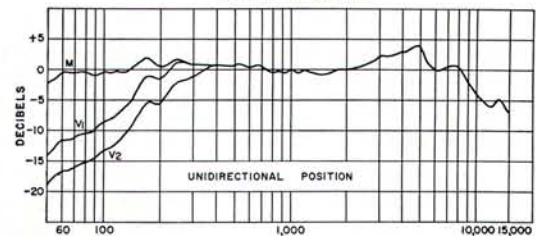


BI-DIRECTIONAL POSITION

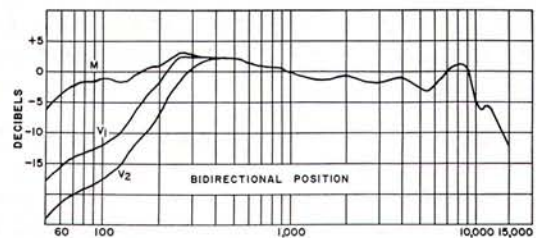


NON-DIRECTIONAL POSITION

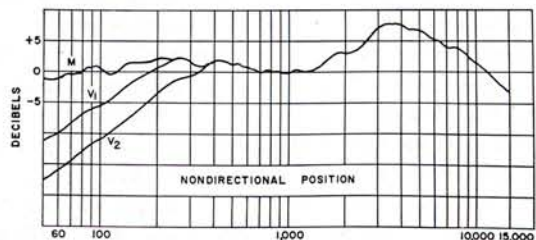
OPEN CIRCUIT RESPONSE OF A TYPICAL TYPE 77DX MICROPHONE



UNI-DIRECTIONAL POSITION



BIDIRECTIONAL POSITION



NON-DIRECTIONAL POSITION



RADIO CORPORATION OF AMERICA
 Broadcast & Television Equipment
 Camden, N. J.

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INSTRUCTIONS

Type 77-DX Polydirectional Microphone

MI-4045-F AND MI-11006-C

TECHNICAL DATA

Output Impedance

250 ohms may be changed to 30 or 150 ohms

Load Impedance

Unloaded input transformer

Effective Output Level

(all output connections)

Bi-directional (B) -50 dbm* Gm = -144 db

Uni-directional (U) -53 dbm* Gm = -147 db

Non-directional (N) -56 dbm* Gm = -150 db

L-1, L-2, L-3, between -50 and -53 dbm

(Gm = RTMA rating)

Hum Pick-up Level**

-128 dbm

Dimensions and Weight

Length: 11½ inches

Width: 3¾ inches

Depth: 2½ inches

Weight: Total - 4½ pounds

Less cable - 3 pounds

Cable

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

Finish

TV Gray and Satin Chrome (MI-4045-F)

TV Gray (MI-11006-C)

Stand Fitting

½ inch pipe thread



Figure 1—Type 77-DX Microphone
MI-4045-F

* Sound Pressure = 10 dynes/cm².

** Referred to a hum field of 1×10^{-3} gauss.

DESCRIPTION

The RCA Type 77-DX Polydirectional Microphones MI-4045-F and MI-11006-C are high-fidelity microphones of the ribbon type which may easily be adjusted to obtain a variety of directional patterns. Since the MI-4045-F microphone is primarily intended for broadcast use, it is finished in satin chrome and a low-gloss umber-gray enamel. The MI-11006-C microphone is intended for television use and is there-

fore completely finished in a low-gloss umber-gray enamel which eliminates glaring reflections usually seen on highly polished microphones.

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 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 microphones are intended primarily for indoor use and if used outdoors may require some additional protection against the 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 1/2-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 fitted 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

The Type 77-DX Microphone is phased so that the red cable lead is electrically positive when the sound pressure on the front of the microphone is in the positive half of the cycle.

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 microphone plug. 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.

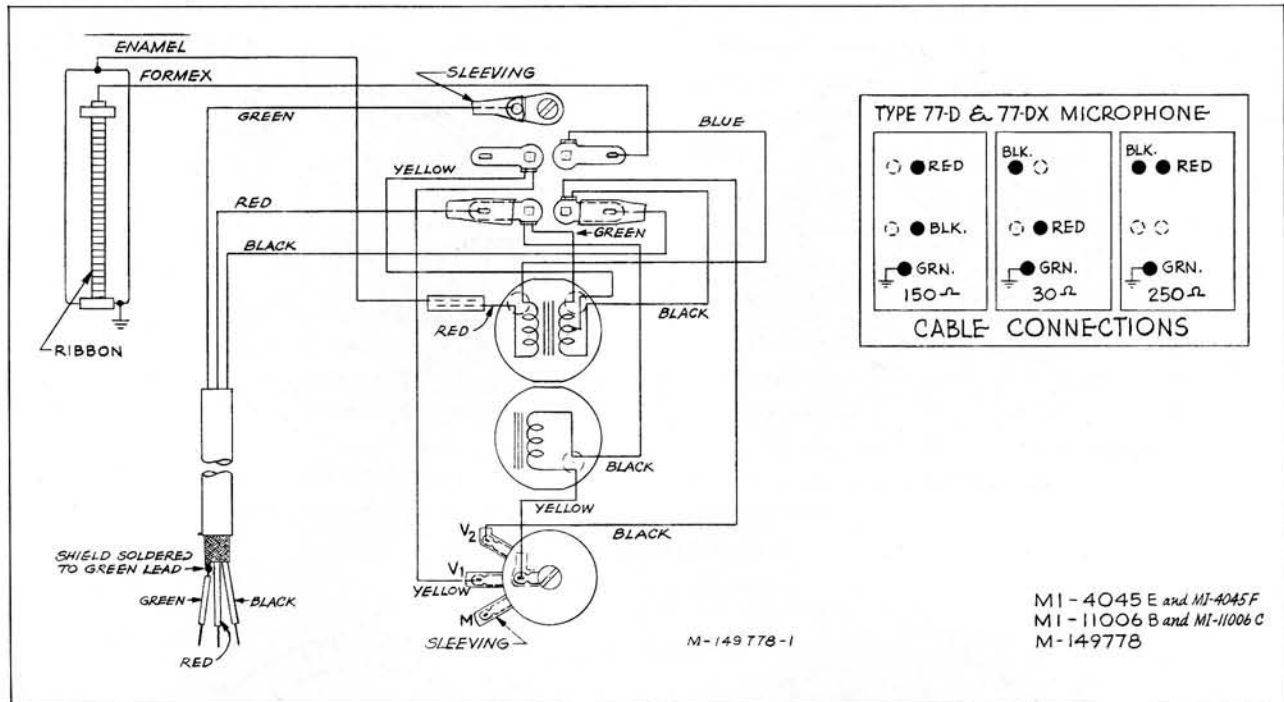


Figure 2—Schematic and Connection Diagram

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.

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

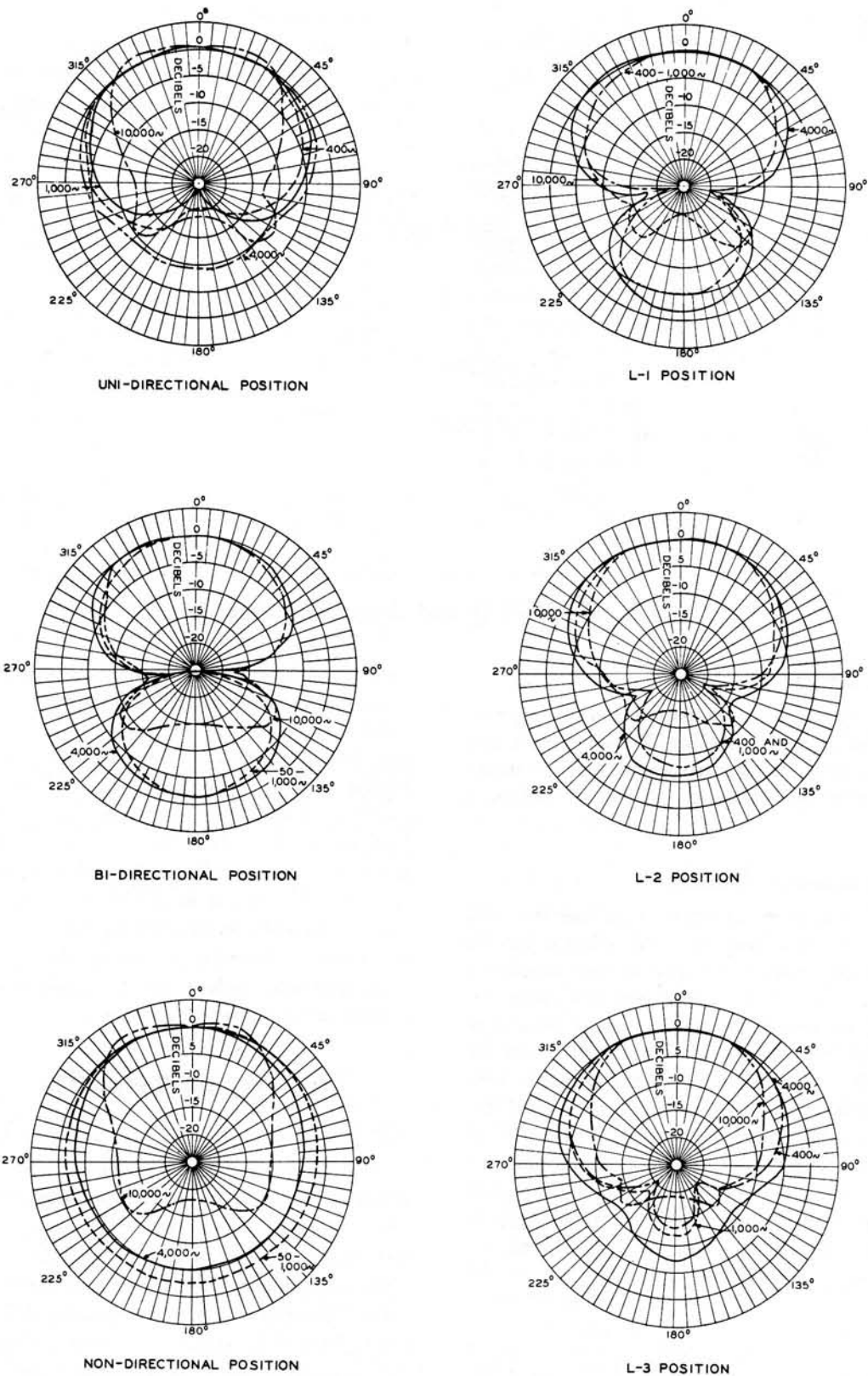
Hum

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 V_1 or V_2 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, the entire microphone should be returned to the manufacturer. Obtain a *Returned Apparatus and Repair Order* form from your *RCA Field Office Distributor* or write to *RCA Service Company*, Returned Apparatus Control, Camden, New Jersey, or *RCA Microphone Repair Dept.*, 2701 West Willow Street, Burbank, California. Attach the form, properly filled out, to the equipment and send the equipment and the repair order to the manufacturer.



T-163143

Figure 3—Directional Patterns

CAUTION: To prevent permanent damage to the ribbon do not test continuity of the microphone with a circuit checker without connecting a resistor of at least 50,000 ohms in series with the checker. When testing the microphone lines, observe the same precautions or make certain that the microphones are disconnected.

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 screens provide 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.

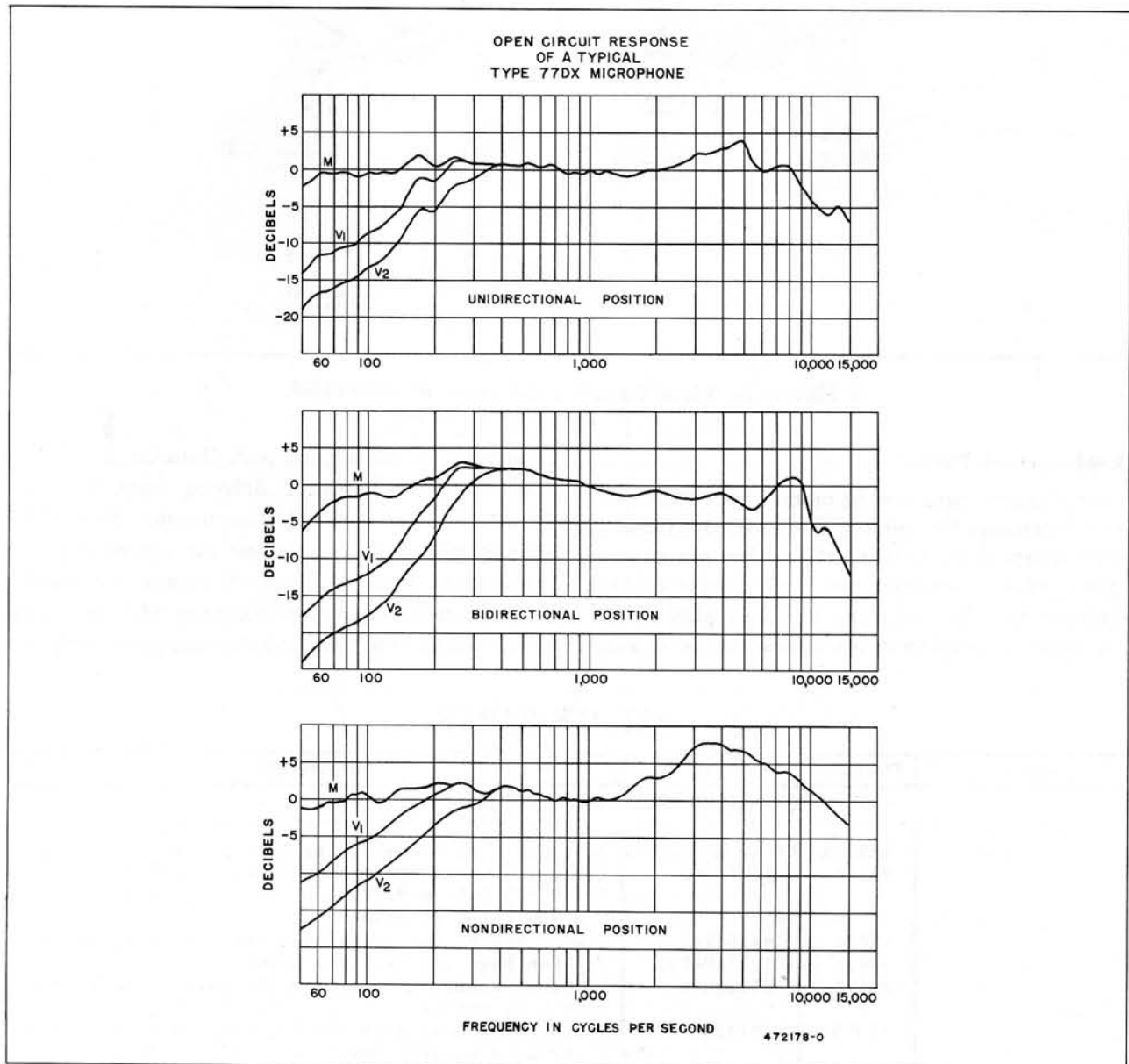


Figure 4—Frequency Response Curves

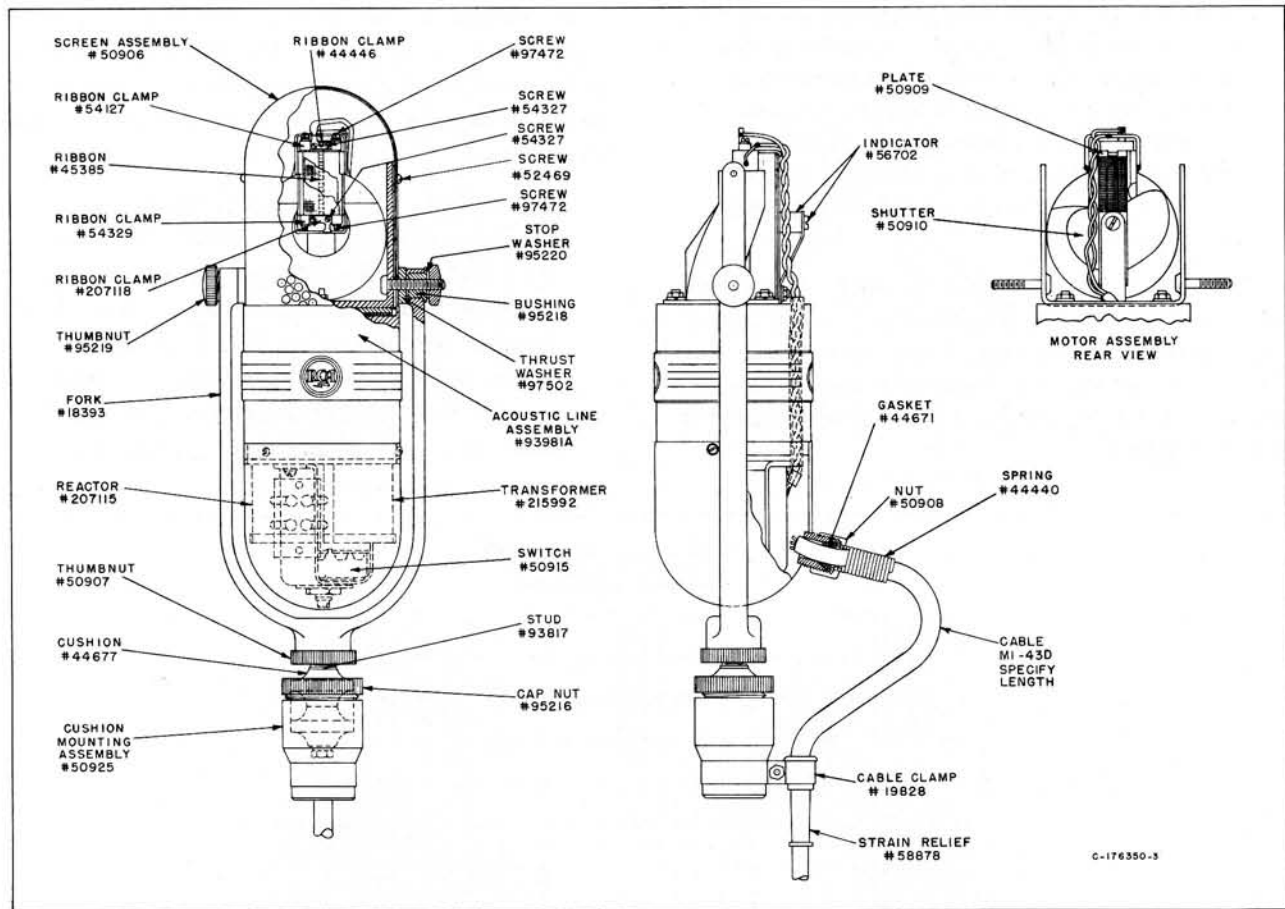


Figure 5—Parts Location Diagram of MI-4045-F

Replacement Parts

Replacement parts may be ordered from RCA Parts and Accessories Department, P.O. Box 654, Camden, New Jersey. When ordering replacement parts, please give symbol, description and stock number of each item ordered. The part which will be supplied against an order for a replacement item may not be an exact

duplicate of the original part. However, it will be a satisfactory replacement differing only in minor mechanical or electrical characteristics. Such differences will in no way impair the operation of the equipment. Parts with no stock numbers are standard components. They are not stocked by RCA and should be obtained from your local electrical parts distributor.

LIST OF PARTS

Symbol No.	Stock No.	Drawing No.	Description
POLYDIRECTIONAL MICROPHONE, MI-4045-F			
	93981A	Pt. of 176489-501	Acoustic Line Assembly: transformer & switch assy.
	95218	858220-5	Bushing: brass, microphone fork, swivel 0.296" lg. x 0.373 O.D. x 0.261 I.D. with 9/16 dia. x 0.030 thick shoulder
	19828	845581-4	Clamp: cable, incl. bushings, hex nut, and screw
	50925	188180-501	Cushion Mounting Assembly: complete
	44677	858223-1	Cushion: rubber 1" dia. x 9/16" thick with 1/4" dia. hole in center
	18393	417436-2	Fork: microphone fork casting only, with 1/8" pipe threaded hole in base and 1, 3/8" hole in ends of prongs
	44671	841845-3	Gasket: cable, rubber 7/16" O.D. x 9/32 I.D. x 7/32 thick

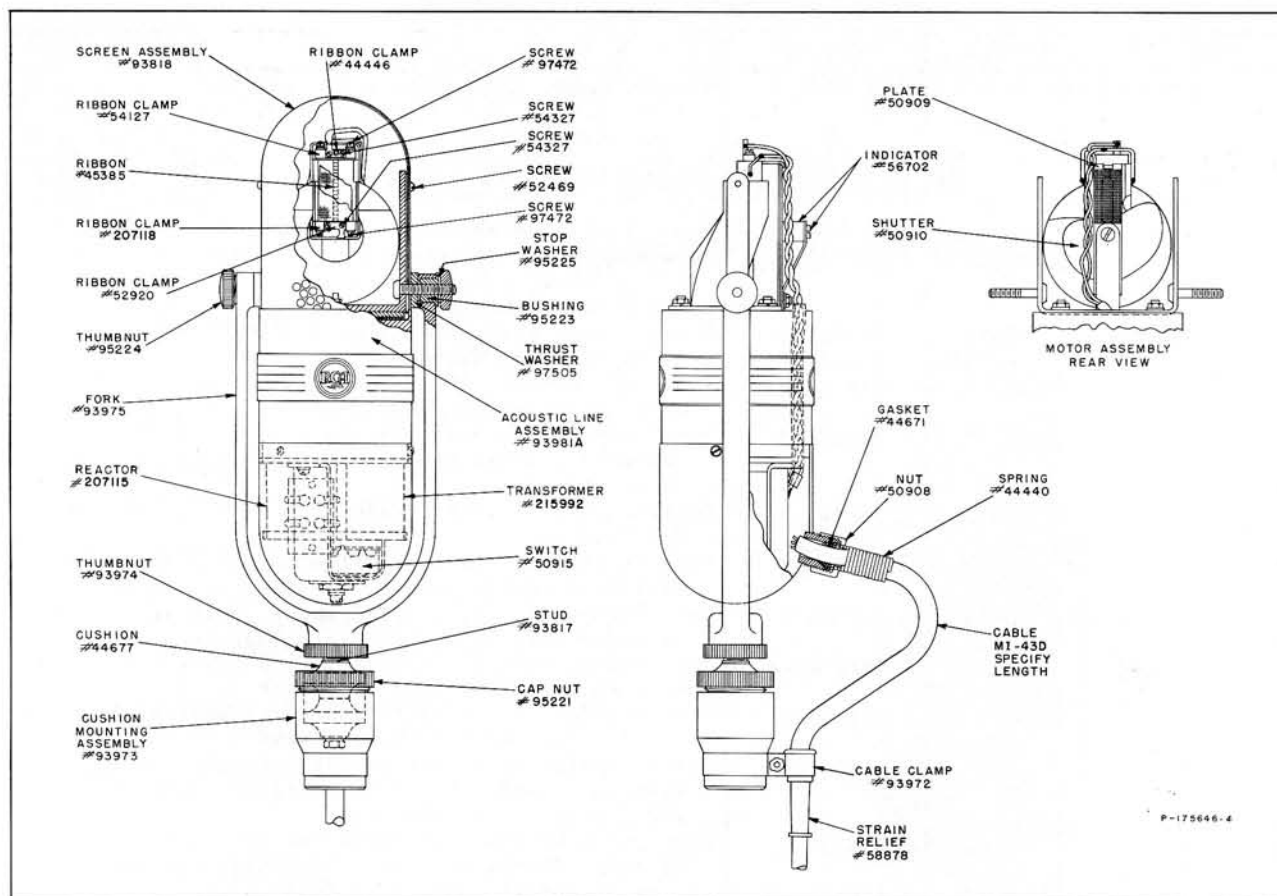


Figure 6—Parts Location Diagram of MI-11006-C

LIST OF PARTS (Continued)

Symbol No.	Stock No.	Drawing No.	Description
	50907	845554-3	Nut: thumb, 1" dia. x 3/16" thick with 1/8" pipe threaded hole in center fork base locking
	95216	858218-3	Nut: cushion retaining knurled cap nut, with #1-1/8-32 inside thread
	50908	841841-5	Nut: knurled, cable guard spring retaining, 5/8 O.D. x 7/16 lg. with 9/16-18 thread
	95219	8877780-3	Nut: thumb, knurled fork swivel 3/4" O.D. x 7/32 thk. with 1/4-28 tapped hole in center
	205158	46635-1	Plate: designation for polydirectional char., diamond shaped with 1/4" dia. hole in center & 2 mtg. holes .104" dia.
	207115	484397-2	Reactor: iron core, impedance at 50 cps, 0.5 v, 91 ohms +7% -5% D.C. res. 28 ohms, round can
	50906	148488-501	Screen assembly: comprising front and rear screen and band
	52469	57452-403	Screw: washer hd. #2-56 x 3/16" lg. for screen and cover
	44440	841846-13	Spring: cable guard
	58878	8842615-1	Strain relief: black neoprene 2-5/16" lg. with 0.308 dia. hole
	93817	858217-1	Stud: cushion mtg. 2-3/32" lg. with 1/8 pipe thread one end, 1/2"-20 x 3/8 lg. thread other end
	50915	143502-2	Switch: rotary, single circuit, 3 pos. screwdriver slotted shaft, music-voice
	215992	484397-1	Transformer: microphone, tapped for 30,150,250 ohms, output impedance turns ratio 1:23.5 ±2% round can
	97502	8879888-1	Washer: aluminum alloy, fork swivel thrust, 9/16" O.D. x 0.260 I.D. x 0.190 thick

LIST OF PARTS (Continued)

Symbol No.	Stock No.	Drawing No.	Description
	95220	8877781-1	Washer: stop, microphone fork swivel stop washer, 9/16" O.D. x .0598 thick, with 1/4" x 11/64" elongated hole in center
POLYDIRECTIONAL MICROPHONE, MI-11006-C			
	93981A 95223	Pt. of 176489-502 858220-6	Acoustic Line Assembly: transformer & switch assy. Bushing: brass, microphone fork swivel, 0.296 lg. x 0.373 O.D. x 0.261 I.D. with 9/16" dia. x 0.030 thick shoulder
	93972	845581-5	Clamp: cable clamp including bushing and hardware
	93973	188180-502	Cushion Mounting Assembly: complete
	44677	858223-1	Cushion: rubber, 1" dia. x 9/16" thick with 1/4" dia. hole in center
	93975	417436-3	Fork: microphone fork casting only, with 1/8" pipe threaded hole in base and 1, 3/8" hole in ends of prongs
	44671	841845-3	Gasket: cable, rubber, 7/16" O.D. x 9/32 I.D. x 7/32" thick
	95221	858218-4	Nut: cushion retaining knurled cap nut, with #1-1/8-32 inside thread
	93974	845554-4	Nut: thumb, 1" dia. x 3/16" thick, with 1/8" pipe threaded hole in center. fork base locking
	95224	8877780-4	Nut: thumb, knurled fork swivel, 3/8" O.D. x 7/32" thk. with #1/4-28 tapped hole in center
	50908	841841-5	Nut: knurled, cable guard spring retaining, 5/8 O.D. x 7/16" lg. with 9/16-18 thread
	205159	46635-2	Plate: designation, for polydirectional char., diamond shaped with 1/4" dia. hole in center, and 2 mtg. holes .104" dia.
	207115	484397-2	Reactor: iron core, impedance at 50 cps 0.5 v, 91 ohms +7% -5% D.C. res. 28 ohms round can
	93818	148488-503	Screen Assembly: comprising front & rear screen and band
	52469	57452-253	Screw: for screen & cover 2-56 x 3/16" lg.
	44440	841846-13	Spring: cable guard
	58878	8842615-1	Strain relief: neoprene black, 2-5/16" lg. with 0.308 dia. hole
	93817	858217-3	Stud: cushion mtg. 2-3/32" lg. with 1/8" pipe thread one end, 1/4-20 x 3/8" lg. thread other end
	50915	143502-2	Switch: rotary, single circuit, 3 pos. screwdriver slotted shaft, music-voice
	215992	484397-1	Transformer: microphone, tapped for 30,150,250 ohms output impedance turns ratio 1:23.5 ±2% round can
	97505	8879888-2	Washer: aluminum alloy, fork swivel thrust, 9/16" O.D. x 0.260 I.D., 0.190 thick
	95225	8877781-2	Washer: stop, microphone fork swivel stop washer, 9/16" O.D. x .0598 thick with 1/4" x 11/64" elongated hole in center
MOTOR ASSEMBLY (MI-4045-F AND MI-11006-C)			
	54127	8854649-1	Clamp: ribbon, top large
	207118	8819395-1	Clamp: ribbon, bottom large
	44446	845282-2	Clamp: ribbon, top small
	52920	845282-3	Clamp: ribbon, bottom small
	56702	147298-1	Indicator: shutter position, indicator and adjuster
	50909	188317-1	Plate: shutter pressure, .012 thick phos. bronze, 2-1/16" lg. x 7/16" wide
	45385	858297-1	Ribbon: microphone, corrugated aluminum foil, 2" lg. x .054 wide
	97472	8835319-60	Screw: fil. hd. #1-72 x 5/16 lg. large ribbon clamp
	54327	8835320-54	Screw: fil. hd. #0-80 x 1/8 lg. small ribbon clamp
	50910	188309-1	Shutter: acoustic tube, .005 thick phos. bronze, cam shaped

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