

# **BROADCAST AUDIO EQUIPMENT**

## **Type 77-DX Polydirectional Microphone**



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

## EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or if evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. This should be done within 15 days, if possible. If concealed damage is discovered immediately notify the carrier, confirmed in writing and insist upon an inspection and report.

In addition to the above, the shortages or damages should also be reported to RCA, but do not return any damaged equipment unless we have furnished complete return shipping instructions.

Transportation companies are required to adjust for damage resulting from their negligence and RCA will assist you, if necessary, in obtaining settlement. Accordingly, you should save all shipping papers, letters or invoices concerning the shipment until it is certain that the equipment was delivered in good condition or until any damage has been adjusted.

## REPLACEMENT PARTS

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.

The following tabulations list service parts and electron tube ordering instructions according to your geographical location.

### SERVICE PARTS

LOCATION	ORDER SERVICE PARTS FROM:
Continental United States, Alaska and Hawaii	Service Parts Order Service, Bldg. 60, 19th & Federal Sts., Camden 5, New Jersey or through your nearest RCA Regional Office. Emergency orders may be telephoned, telegraphed, or teletyped to RCA Emergency Service, Bldg. 60, Camden, N. J. (Telephone: WO 3-8000).
Dominion of Canada	RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec or through your local Sales Representative or his office.
Outside of Continental United States, Alaska, Hawaii and the Dominion of Canada	RCA International Division, Clark, N.J., U.S.A. or through your local Sales Representative.

### ELECTRON TUBES

LOCATION	ORDER ELECTRON TUBES FROM:
Continental United States, Alaska and Hawaii	Local Tube Distributor
Dominion of Canada	RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec or through your local Sales Representative or his office.
Outside of Continental United States, Alaska, Hawaii and the Dominion of Canada	Local Tube Distributor or from: Tube Department RCA International Division 30 Rockefeller Plaza New York 20, New York, U.S.A.

If for any reason, it is desired to return tubes, please return them to the place of purchase.

**PLEASE DO NOT RETURN TUBES DIRECTLY TO RCA WITHOUT AUTHORIZATION AND SHIPPING INSTRUCTIONS.**

It is important that complete information regarding each tube (including type, serial number, hours of service and reason for its return) be given.

When tubes are returned, they should be shipped to the address specified on the Return Authorization form. A copy of the Return Authorization and also a Service Report for each tube should be packed with the tubes.

### LIST OF RCA REGIONAL OFFICES

Atlanta 3, Georgia 522 Forsyth Bldg. Lamar 7703	Boston 16, Mass. Room 2301, John Hancock Bldg. 200 Berkeley St. Hubbard 2-1700	Chicago 54, Ill. 1186 Merchandise Mart Plaza Delaware 7-0700	Cleveland 15, Ohio 1600 Keith Bldg. Cherry 1-3450
Dallas 1, Texas 1907-11 McKinney Ave. Riverside 1371	Hollywood 28, Calif. RCA Bldg., 1560 N. Vine St. Hollywood 9-2154  Branch—San Francisco 2, Calif. 420 Taylor St. Ordway 3-3027	Kansas City 6, Missouri 340 Dierks Bldg. Harrison 6480	New York 20, New York 36 W. 49th St. Judson 6-3800

# **BROADCAST AUDIO EQUIPMENT**

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INSTRUCTIONS FOR

## **Polydirectional Microphone**

Type 77-DX

MI-4045-F and MI-11006-C

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

Printed in U.S.A.  
5105-576



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



Figure 2 - Type 77-DX Microphone  
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\*  $G_M = -144$  db

Uni-directional (U) -53 dbm\*  $G_M = -147$  db

Non-directional (N) -56 dbm\*  $G_M = -150$  db

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

( $G_M =$  RETMA rating)

### Hum Pick-up Level\*\*

-128 dbm

### Dimensions and Weight

Length - 11-1/2 inches

width - 3-3/4 inches

Depth - 2-1/2 inches

weight - Total - 4-1/2 pounds  
Less cable - 3 pounds

### Cable

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

### Finish

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

TV Gray (MI-11006-C)

### Stand Fitting

1/2 inch pipe thread

\*Sound Pressure = 10 dynes/cm<sup>2</sup>

\*\*Referred to a hum field of  $1 \times 10^{-3}$  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 therefore 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 3.

## 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 4 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 3). Refer to figure 5 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.

## 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 4 for the directional patterns of the six reference positions.

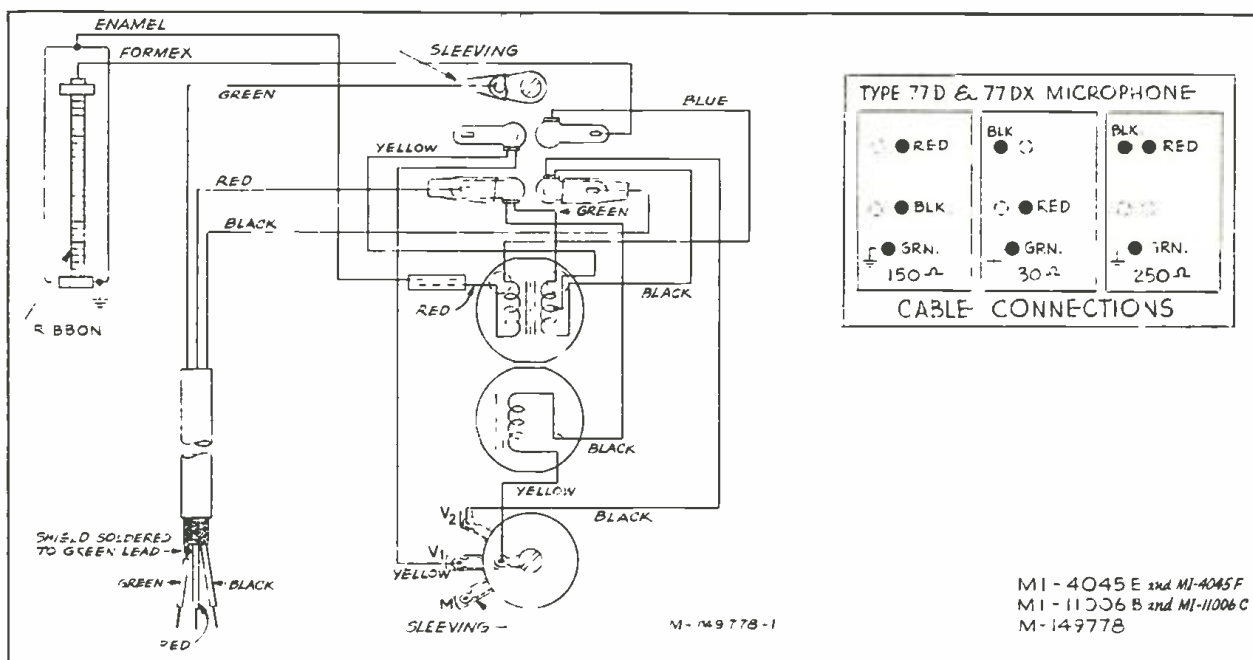


Figure 3 - Schematic and Connection Diagram

### 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<sub>1</sub> position be used for distances down to 1 foot and the V<sub>2</sub> position for still shorter distances. Refer to figure 5 for frequency-response curves of the M, V<sub>1</sub>, and V<sub>2</sub> settings.

### Hum

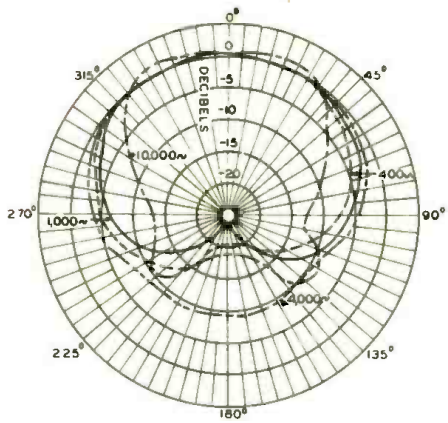
Hum may originate in any part of the audio system. In the microphone circuit, it may result from ground loops or unbalance caused by improper cable connections to the pre-amplifier terminal board or microphone plug. Hum may also be induced into the microphone transformer or ribbon by magnetic fields 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<sub>1</sub> or V<sub>2</sub> positions will also reduce the hum together with the overall low-frequency response.

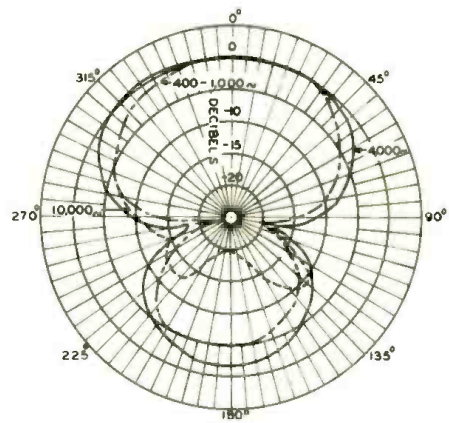
### MAINTENANCE

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 the *RCA Field Office* or write to *RCA Service Company, Returned Apparatus Control, Camden, N.J.* Attach the tag, properly filled out, to the damaged equipment and send the equipment and the repair order to the manufacturer.

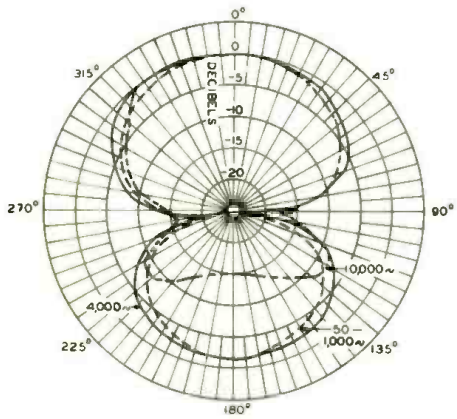
**CAUTION:** To prevent permanent damage to the ribbon do not test continuity of the microphone with a circuit checker without connecting a resistor of at least 50,000 ohms. in series.



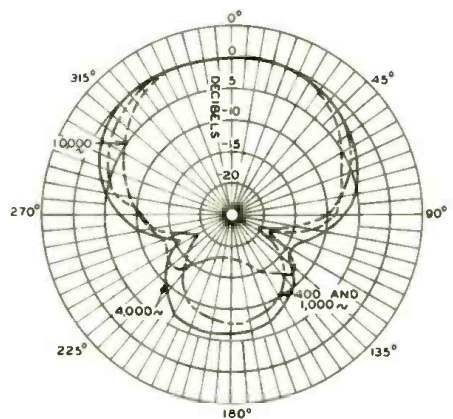
UNI-DIRECTIONAL POSITION



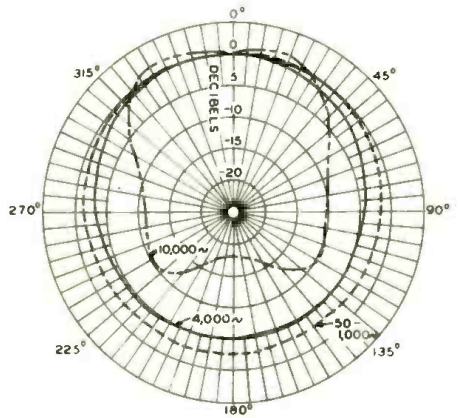
L-1 POSITION



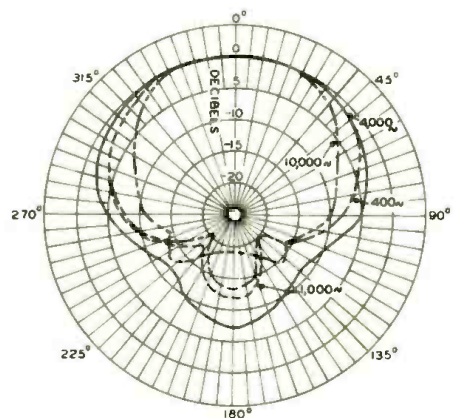
BI-DIRECTIONAL POSITION



L-2 POSITION



NON-DIRECTIONAL POSITION



L-3 POSITION

T-163143

Figure 4 - Directional Patterns



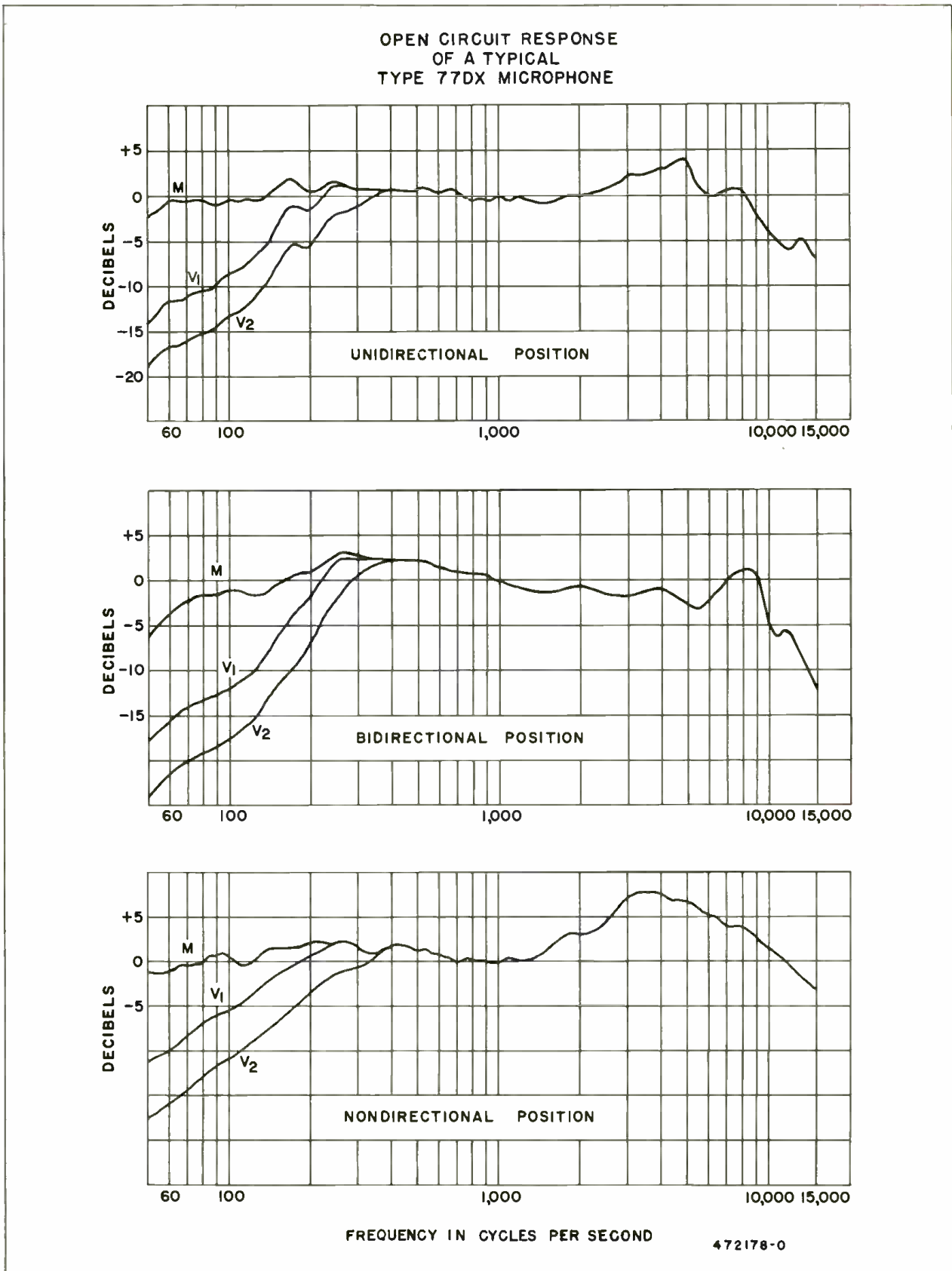


Figure 5 - Frequency Response Curves

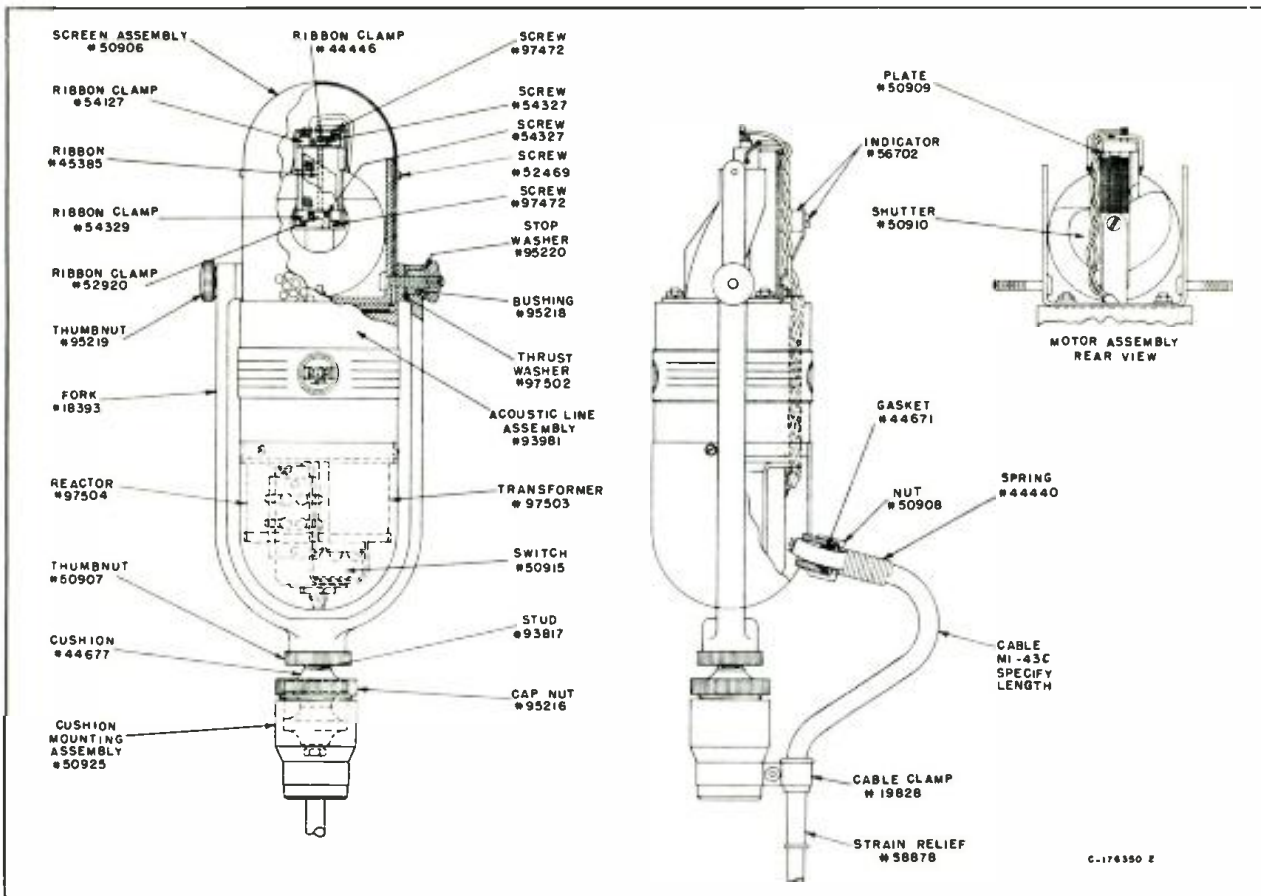


Figure 6 - Parts Location Diagram of MI-4045-F

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.

#### 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.
<b>MI-4045-F</b>	
Acoustic, line assy. less band, transformer & switch assy.	93981
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	95218
Clamp, cable, incl. bushings, hex nut, and screw	19828
Cushion mounting assy. complete	50925
Cushion, rubber 1" dia. x 9/16" thick with 1/4" dia. hole in center	44677
Fork, microphone fork casting only, with 1/8" pipe threaded hole in base and 1, 3/8" hole in ends of prongs	18393
Gasket, cable, rubber 7/16" O.D. x 9/32 I.D. x 7/32 thick	44671
Nut, thumb, 1" dia. x 3/16" thick with 1/8" pipe threaded hole in center fork base locking	50907

Description	Stock No.
Nut, cushion retaining knurled cap nut, with #1 1/8-32 inside thread	95216
Nut, knurled, cable guard spring retaining, 5/8 O.D. x 7/16 lg. with 9/16-18 thread	50908
Nut, thumb, knurled fork swivel 3/4" O.D. x 7/32 thick with 1/4-28 tapped hole in center	95219
Plate, designation for poly-directional char., diamond shape with 1/4" dia. hole in center & 2 mtg. holes .104" dia.	205158
Screen Assy. comprising front & rear screen & band	50906
Screw, washer hd. #2-56 x 3/16" lg. for screen & cover	52469
Spring, cable guard	44440
Stud, cushion mtg. 2-3/32" lg. with 1/8 pipe thread one end, 1/4"-20 x 3/8 lg. thread other end	93817

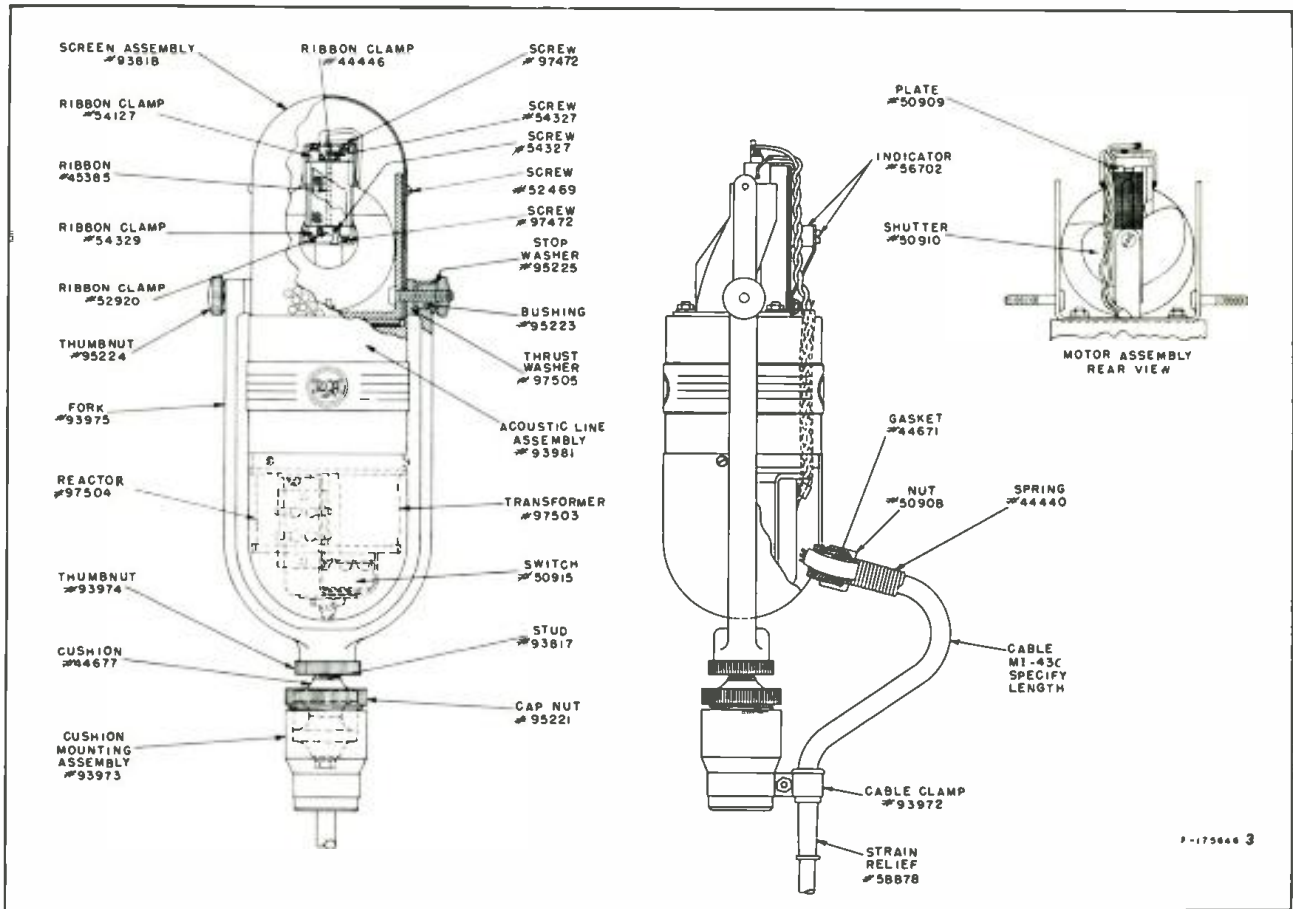


Figure 7 - Parts Location Diagram of MI-11006-C

## LIST OF PARTS (Continued)

Description	Stock No.
<b>MI-4045-F (Continued)</b>	
Strain relief, black neoprene 2-5/16" lg. with 0.308 dia. hole	58878
Switch, rotary, single circuit, 3 pos. screw driver slotted shaft, music-voice	50915
Reactor, iron core, impedance at 50 CPS, 0.5 v, 91 ohms, +7%, -5% D.C. res. 28 ohms, round can	97504
Transformer, microphone, tapped for 30, 150, 250 ohms, output impedances turns ratio 1:23.5 ±2% round can	97503
Washer, aluminum alloy, fork swivel thrust, 9/16" O.D. x 0.260 I.D. x 0.190 thick	97502
Washer, stop, microphone fork swivel stop washer, 9/16" O.D. x .0598 thick, with 1/4" x 11/64" elongated hole in center	95220
<b>MOTOR ASSEMBLY</b>	
Clamp, ribbon, top large	54127
Clamp, ribbon, bottom large	54329
Clamp, ribbon top small	44446
Clamp, ribbon bottom small	52920
Indicator, shutter position, indicator and adjuster	56702
Plate, shutter pressure, .012 thick phos. bronze 2-1/16" lg. x 7/16" wide	50909
Ribbon, microphone, corrugated aluminum foil, 2" lg. x .054 wide	45385
Screw, fil. hd. #1-72 x 5/16" lg. large ribbon clamps	97472
Screw, fil. hd. #0-80 x 1/8" lg. small ribbon clamps	54327
Shutter, acoustic tube, .005 thick phos. bronze, cam shaped	50910
<b>MI-11006-C</b>	
Acoustic line assy. less band transformer & switch	93981
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	95223
Clamp, cable clamp including bushing & hardware	93972
Cushion, mtg. assy. complete	93973
Cushion, rubber, 1" dia. x 9/16 thick with 1/4" dia. hole in center	44677
Fork, microphone fork casting only, with 1/8" pipe threaded hole in base and 1, 3/8" hole in ends of prongs	93975
Gasket, cable, rubber, 7/16" O.D. x 9/32 I.D. x 7/32" thick	44671
Nut, cushion retaining knurled cap nut, with #1-1/8-32 inside thread	95221

Description	Stock No.
Nut, thumb, 1" dia. x 3/16" thick, with 1/8" pipe threaded hole in center, fork base locking	93974
Nut, thumb, knurled fork swivel, 3/4" O.D. x 7/32" thick, with #1-4-28 tapped hole in center	95224
Nut, knurled, cable guard spring retaining, 5/8 O.D. x 7/16" lg. with 9/16-18 thread	50908
Plate, designation, for poly- directional char., diamond shape with 1/4" dia. hole in center, and 2 mtg. holes .104 dia.	205159
Reactor, iron core, impedance at 50 CPS 0.5 v 91 ohms, +7%, -5% D.C. res. 28 ohms round can	97504
Screen assy. comprising front & rear screen and band	93818
Screw, for screen & cover 2-56 x 3/16" lg.	52469
Spring, cable guard	44440
Stud, cushion mtg. 2-3/32" lg. with 1/8 pipe thread one end, 1/4-20 x 3/8 lg. thread other end	93817
Strain relief, neoprene black, 2-5/16" lg. with 0.308 dia. hole	58878
Switch, rotary, single circuit, 3 pos. screw driver slotted shaft, music-voice	50915
Washer, aluminum alloy, fork swivel thrust, 9/16" O.D. x 0.260 I.D., 0.190 thick	97505
Washer, stop, microphone fork swivel stop washer, 9/16" O.D. x .0598 thick with 1/4 x 11/64" elongated hole in center	95225
Transformer, microphone, tapped for 30, 150, 250 ohms output impedance turns ratio; 23:5 ±2%, round can	97503
<b>MOTOR ASSEMBLY</b>	
Clamp, ribbon, top large	54127
Clamp, ribbon, bottom large	54329
Clamp, ribbon, top small	44446
Clamp, ribbon, bottom small	52920
Indicator, shutter position, indicator and adjuster	56702
Plate, shutter pressure, .012 thick phos. bronze 2-1/16" lg. x 7/16" wide	50909
Ribbon, microphone, corrugated aluminum foil, 2" lg. x 0.054 wide	45385
Screw, fil. hd. #1-72 x 5/16 lg. for large ribbon clamps	97472
Screw, fil. hd. #0-80 x 1/8" lg. small ribbon clamps.	54327
Shutter, acoustic tube, .005 thick phos. bronze, cam shaped	50910



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