UNI-DIRECTIONAL MICROPHONE

TYPE 77-B

MI-4042

DESCRIPTION

The Uni-Directional Microphone consists of two different ribbon type microphones operating in a common airgap. One of the units is responsive to the pressure gradient of the sound wave, and is commonly called a velocity microphone. The other unit responds to the pressure in the sound wave. The outputs of the two microphones are connected in series and the resultant vector addition of the generated voltages produces a directional characteristic as shown in Figure 1 (c). Characteristics of the velocity section and of the pressure section are shown at "a" and "b" respectively. The construction of the velocity section follows the conventional arrangement. The pressure operated section is open on one side and terminated on the other in a folded tube packed with sound absorbing material. This arrangement produces a pressure operated microphone which is essentially resistance controlled over the range. This feature is necessary in this type of microphone since both the phase and magnitude of the output voltages of both sections must maintain a correct relation over the entire operating range.

The ribbon and magnet assembly is enclosed in the perforated housing at the top of the assembly. This screen serves the triple purpose of providing wind screening, protection against dust and mechanical injury. The folded tube associated with the pressure section is contained in the cylindrical body part of the microphone, and the impedance matching transformer is located in the hemispherical shell at the bottom of the microphone.

The cushion mounting is threaded to fit any of the microphone stands having a 1/2-inch pipe thread. Removal of the cushion mounting will allow the microphone to be used with stands having a 1/8-inch pipe thread.

SENSITIVITY - With an input sound pressure of 10 dynes per sq.cm., the output on the axis of maximum response will be 1070×10^{-6} volts open circuit across the 250 ohm terminals. Using this voltage value, the output levels will be as follows: -61 db with reference to 6 mw zero level and -64 db with reference to 12.5 mw zero level. If the microphone is operated into a 250 ohm load, these levels should be dropped by 6 db.

RESPONSE CHARACTERISTICS - The operating range of the microphone extends from 50 cycles to 10,000 cycles. When the microphone is located less than two feet from the source of sound, the low frequency response will be somewhat increased though to a much smaller extent than experienced with a velocity microphone. Beyond three feet, the variation becomes negligible. The frequency response is essentially unchanged by the direction of the incident sound over an angle of 150 degrees at the front of the microphone.

DIRECTIONAL CHARACTERISTICS - One of the most important characteristics of

the Type 77-A microphone is its uni-directional property. On the front, or operating side, of the microphone the response is very uniform, while at the rear of the microphone sounds are attenuated an average of 14-20 db, thus giving approximately a 10-to-1 ratio of desired to undesired pick-up. Sound waves originating in front and along an axis perpendicular to the plane of the ribbon will, naturally, have the maximum effect.

The actual measured response of the uni-directional microphone, as shown in Figure 2, approaches a cardioid very closely. For all frequencies up to 4,000 cycles the cancellation is very good. At higher frequencies a small "tail" occurs because of the slight phase displacement that begins to become noticeable in this range.

For the same allowable reverberation pick-up, the operating range of the uni-directional microphone is approximately 1.73 times greater than a non-directional microphone having the same sensitivity.

ASSEMBLY

MOUNTING - As previously mentioned, the microphone may be used with stands having either a 1/2-inch pipe thread or 1/8-inch pipe thread, by removing the cushion mounting.

CABLE CONNECTIONS - The microphone is shipped connected for 250 ohms output. Transformer connections for 50 ohm output are shown in Figure 3. The terminal board is made accessible by removing the hemispherical bottom shell.

TRANSFORMER CONNECTIONS - By removing the screws in the transformer primary lugs and rotating the assembly to the points indicated and reassembling the screws, the microphone may be converted to either a pressure or velocity microphone with an attendant loss of 3 db in sensitivity and no change in output impedance.

PHASING - When the output of two or more microphones are fed into a common mixing circuit, it is important that their respective output currents be in phase with relation to each other; otherwise, they will cancel each other, resulting in a reduction in output instead of a gain.

To check the phasing of two microphones or more, first turn their respective attenuators to zero. Place two microphones side by side and adjust the attenuator of one, while speaking into the microphone, to a normal output level as indicated by a volume indicator, if one is available; otherwise, note the volume level from the speakers, by ear. Next turn up the attenuator of the second microphone to approximately the same position as the first and note whether the output level increases or diminishes. If it increases, the two microphones are in phase; if it decreases, the two microphones are out of phase. If the microphones are out of phase, remove the screen cover of one microphone and reverse the cable connections at the terminals.

If more than two microphones are to be used in the same mixing circuit, the phasing test should be repeated with each microphone, using the first micro-

phone as a reference for each of the others. After each microphone is phased, its attenuator should be returned to zero so that it will not affect the testing of the next microphone. When more than two microphones are being phased, it is a pretty good idea to check the phasing of all of the microphones before changing the connections of any, then reverse the connections of the minority group to save unnecessary labor.

REPLACING RIBBONS - It is not recommended that the customer attempt repairs other than the replacement of screens, transformers and mounting parts. For new ribbons, etc., it is recommended that the unit be returned to the RCA Manufacturing Company for repair.

This may be done by writing to the RCA Manufacturing Company, Inc., for a "RETURNED APPARATUS" tag and "REPORT BLANK". Before doing this, however, make absolutely certain that the trouble is in the microphone and not elsewhere in the circuit.

38-16-9

PARTS LIST

Description	Type	Stock No.
Uni-Directional Microphone	77-B	MI-4042
Program Stand	AZ-4090	MI-4056
Program Stand (Chrome and Black)	90-A	
Light Program Stand (Chrome and Black)		MI-4068-A
Boom Stand	90-B	
Portable Microphone Stand	59-A	
Microphone Screens		18225
Output Transformer		18226
Cushion Assembly		18227
Fork		18228
Clamping Nut		
Cushion Washer		
Cushion Washer		18229
Clamping Washer		
Microphone Cable		MI-59
Microphone Plug	P3-CG-12	MI-4630
Female Cord Connector	P3-CG-11	MI-4620
Flush Type Wall Receptacle	P3-13	MI-4622
Surface Wall Receptacle	P3-17	MI-4621
Flush Wall Receptacle (in switch plate)	P3-35	MI-4625

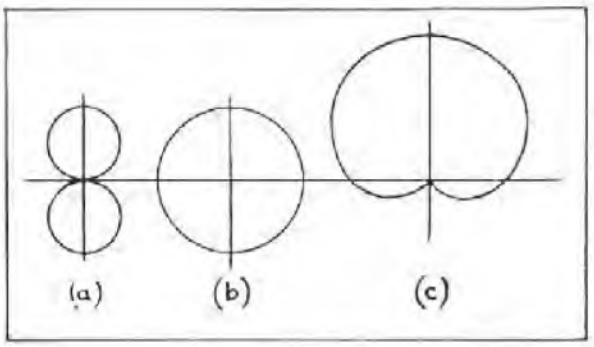


FIGURE 1 - DEVELOPMENT OF DIRECTIONAL PATTERN

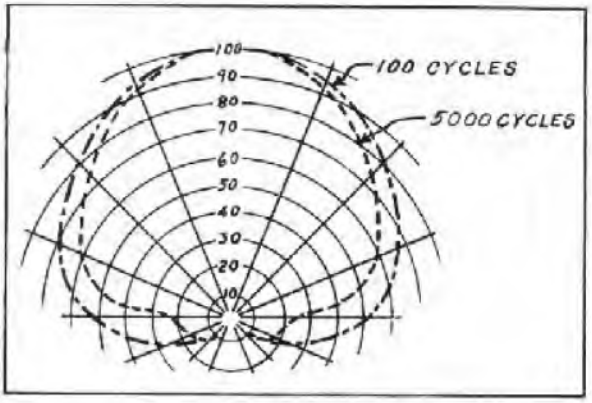


FIGURE 2 - CARDIOID PATTERN OF MICROPHONE RESPONSE

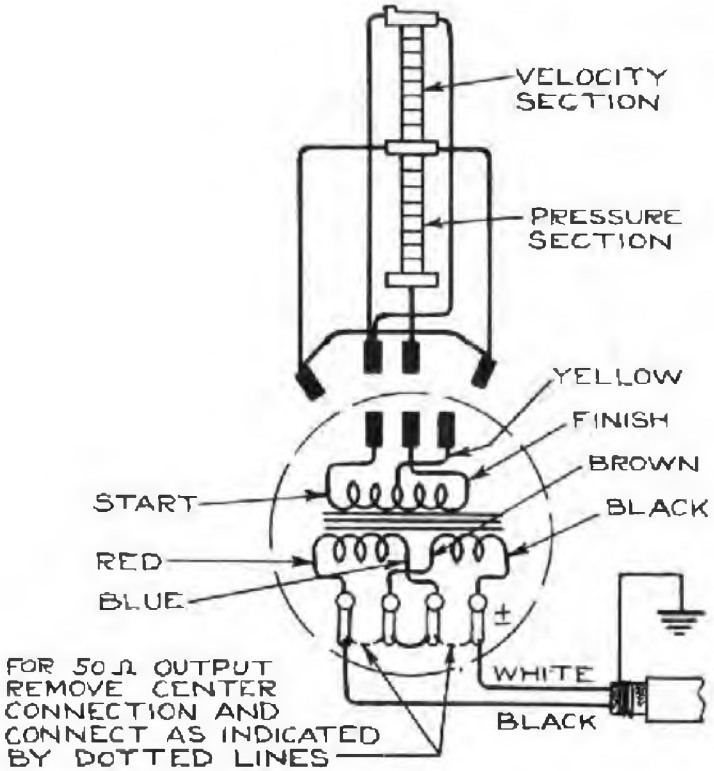


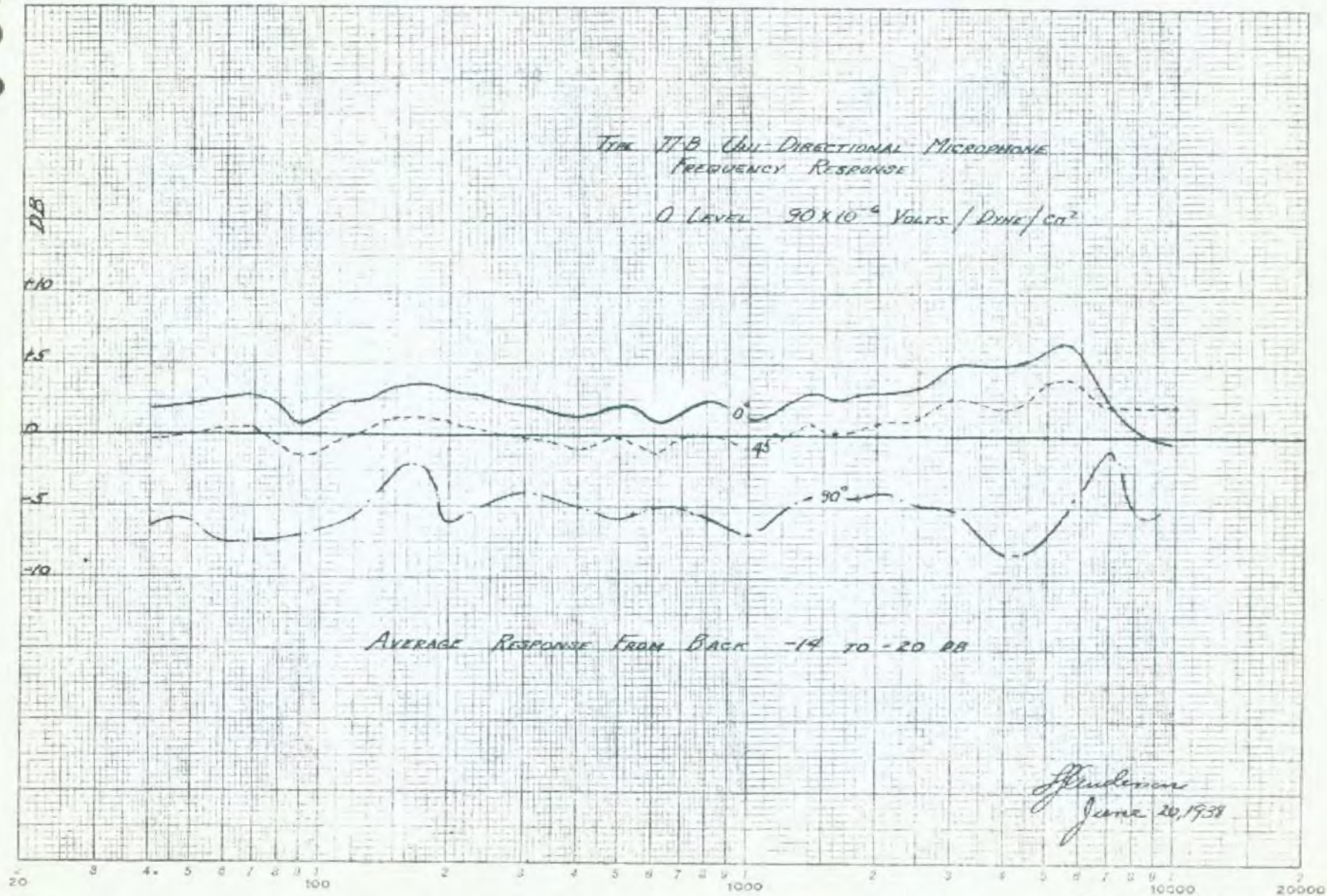
FIGURE 3 - MICROPHONE CIRCUIT
(Schematic K-844226)

Manufactured by
RCA MANUFACTURING COMPANY, INC.
Camden, N.J., U.S.A.

Printed in U.S.A.

IB-26509

S-839869



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