INSTRUCTIONS

for

INDUCTOR MICROPHONE

TYPE 50-A

(MI-4030-A)
(MI-4030-B)
(MI-4030-C)

RCA Victor Division
RCA Manufacturing Company, Inc.
Camden, N. J., U. S. A.

Instructions IB-23801-3

OPERATING INSTRUCTIONS
FOR
INDUCTOR MICROPHONE
TYPE 50-A
(MI-4030-A)
(MI-4030-B)
(MI-4030-C)

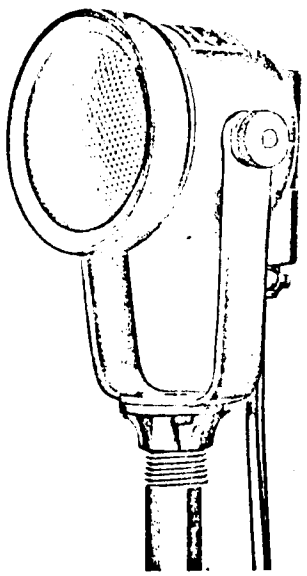

Figure 1—Type 50-A Inductor Microphone

1. Introduction.—The inductor microphone is the result of continued research and development toward the production of a low priced microphone) the outstanding characteristics of which are: (a) high quality, (b) high sensitivity, (c) freedom from shock excitation troubles, (d) minimum response to wind effects, (e) compactness and (f) ruggedness.

This microphone is a pressure operated microphone of the moving conductor type. A single 0.010-inch aluminum conductor is rigidly coupled to a diaphragm and located between the poles of a permanent magnet with its length perpendicular to the magnetic lines of force. The ends of the conductor are connected to a transformer which matches the impedance of a 250 or 50 ohm line. Sound waves reaching the diaphragm vibrate the conductor within the magnetic field set up by the magnet. The vibration of the conductor is in accordance with the sound vibrations and, occurring as it does within the magnetic field, sets up corresponding alternating electric potentials across the primary of the microphone transformer. These minute voltages are subsequently amplified to the power level required for broadcasting.

The microphone and the microphone transformer are inclosed within a sturdy and attractive metal case on the back of which is mounted recessed male connector for the attachment of the microphone cable. The microphone case is fitted with a perforated metal front cover which serves to protect the transmitter from mechanical injury and adverse wind effects. This assembly is pivoted in a fork, to which is attached a threaded flange mounting by means of which the microphone may be fastened to the top of a microphone stand. A suspension mounting (Type UP-4277) is also supplied with the microphone to permit the unit to suspended overhead when desired.

2. Sensitivity.—With an input sound pressure of 10 dynes per square centimeter perpendicular to the plane of the diaphragm, the inductor microphone will deliver 800 microvolts across a 250-ohm load, which is equivalent to an output level of —67 db. as compared with a zero level of 12.5 milliwatts, or —64 db. as compared with a zero level of 6 milliwatts.

On an open circuit basis of measurement, *i. e.*, with an input of 1 dyne per square centimeter (1 bar) perpendicular to the diaphragm, the output of the microphone across an open circuit is the equivalent of —81 db. with reference to a zero level of 12.5 milliwatts.

3. Quality of Response.—The frequency response of the microphone is uniform over its useful operating range from 60 to 10,000 cycles.

The variation of the frequency response characteristic with the direction of the incident sound is very similar to that of any other pressure operated microphone of comparable size, in that the response to the higher frequencies is attenuated as the angle between the direction of the incident sound and the plane of the diaphragm is decreased.

The effect of the directional characteristic upon the operating technique is further explained in the subsequent paragraphs.

4. Microphone Assembly.—Packed with the microphone are a program stand flange and a Type UP-4277 suspension hanger. The program stand flange is assembled to the base of the microphone fork by means of three machine screws and lockwashers. The suspension hanger is made up of

five parts: a hanger frame casting, a special screw, a fibre washer, a locking washer and a knurled thumb-nut.

(*a*) *Stand Mounting.*—If it is desired to mount the microphone unit on any standard RCA program stand, it is only necessary to screw the microphone program stand flange on the threaded upper end of the stand column. See Figures 1 and 2.

(*b*) *Suspension Mounting.*—If it is desired to suspend the microphone overhead, the program stand flange must be removed from the microphone fork, and the Type UP-4277 suspension hanger must be attached in its place, as follows:

Unscrew the three screws holding the program stand flange to the microphone fork, and remove the flange. Put the screws, lockwashers and flange safely away for future use.

Unscrew the knurled thumb-nut of the Type UP-4277 suspension hanger and disassemble this unit.

Insert the hanger screw through the hole in the microphone fork with the head of the screw toward the microphone.

Place the fibre washer, the hanger casting and then the locking washer over the screw, and screw the knurled thumb-nut in place as shown in Figure 3.

The microphone may now be suspended overhead, connected and turned in the swivel and fork to the desired direction.

(*c*) *Cable Connections.*—Figure 4 shows the location of the various numbered contacts of both plugs and receptacles, and, in conjunction with the schematic wiring diagram, Figure 6, will serve to indicate the proper connections of the various leads when testing, repairing, or replacing any electrical part.

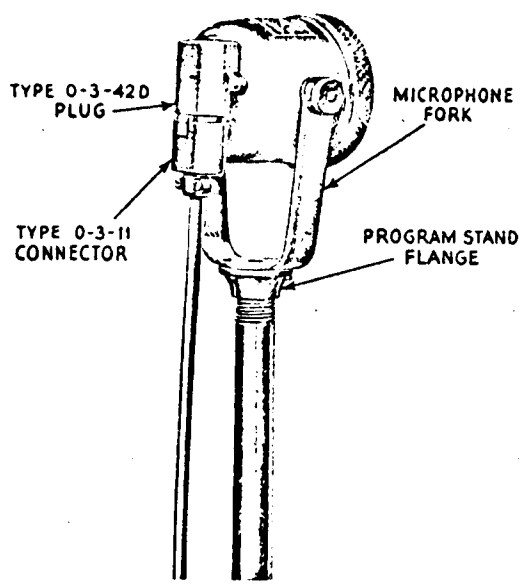

Figure 2—Type 50-A Microphone Mounted on a Program Stand

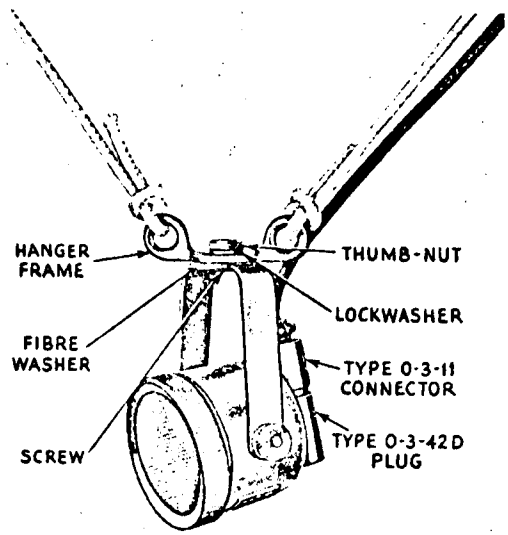

Figure 3—Type 50-A Microphone Suspended from a Type UP-4277 Suspension Hanger

Care must be taken in making the electrical connections to the microphones, pre-amplifiers and mixers to see that the circuits are all in phase. If this is not done, distorted and garbled reproduction may be the result when two or more microphones are used in the same pick-up. The internal connections of the various units are phased at the factory, so that it is only necessary to connect the duplicate external circuits in an identical manner in order to achieve the proper phase relationship.

To connect the microphone to match a 50-ohm circuit instead of a 250-ohm circuit, remove the two screws in the microphone connector at the end opposite the contacts, remove the top of the connector, unsolder the blue lead from terminal No. 1 and connect in its place the brown lead which will be found, taped up, in the connector. Tape up the blue lead and replace the top of the connector. Be very careful, when performing this operation, not to break the compound seal where the leads are brought out of the microphone case.

5. Technique of Inductor Microphone Placement.—The proper placement of the microphone is essential in order to obtain the best results of which it is capable. For this reason, the following instructions should be carefully studied, and close attention should be given to the results of any special placement with a view towards further improvement of the technique. These instructions can of course only serve as a guide, and a study should be made to determine the best microphone placement for each condition.

The source of sound, speaker, announcer, or musical instrument, should not be placed closer to the microphone than one foot. Greater distances

may be, and frequently must be, used, particularly in the case of musical ensembles, orchestras, bands, sound effects, etc. For approximately the same results this microphone must be placed at 0.577 times the distances used with the Type 44-A velocity microphone.

To obtain the greatest fidelity of reproduction, the microphone must be aimed directly at the source of sound. Like any other pressure operated microphone of the same size,it is relatively non-directional at the lower frequencies and directional at the higher frequencies. Thus, when it is not aimed directly at the source of sound a certain amount of frequency discrimination results, which has the effect of reducing the volume of the upper harmonics of musical instruments and the human voice, particularly the sibilant sounds of speech. This effect becomes most noticeable in extreme cases by an apparent increase in the depth of the music, a muffled tone to the voice and a reduction in the intelligibility of speech because of the difficulty in distinguishing the sibilants.

These ordinarily undesirable effects have been made use of to considerable advantage in many cases, for example: A small orchestra can be made to sound heavier and more impressive by conducting the broadcast in a reverberant studio. In such a studio, the lower frequencies are predominantly reflected. Also, the directional characteristic of the microphone is such as to discriminate against any reflected high frequency sounds approaching the microphone from side or rear directions. The general effect of these two factors is to deepen the general tone of the reproduction, create a rather pleasant slurring of the lower register, and, apparently, produce an illusion of a larger group than is really present.

The presence of too much reverberation (of echo) in a studio will, however, carry these effects to a point so pronounced as to be displeasing to the ear and is a condition to be guarded against.

When placing the microphone, its location and that of the artists, musicians, etc. (if at all convenient), should be so chosen that all are within a 90-degree angle with respect to the microphone, *i. e.*, 45 degrees on each side of the axis of the microphone. Where the space available or other limiting conditions render it impossible to comply exactly with these instructions, the bass instruments such as the tuba, string bass and, to a lesser extent, the bassoon, French horn, tympani and traps may be placed outside of the 90-degree angle. In the case of the tympani and the traps, however, it must be borne in mind that when wire brushe, are used on the drums, or when a xylophone vibraphone, bells or cymbals are played, some of their characteristic high frequency tones are reduced in volume, and they must, therefore, be placed closer to the microphone than would otherwise be the case.

Ordinarily the distance from the microphone to the various instruments should increase with the relative volume of sound obtained from the instrument, except where it is particularly desired to emphasize that instrument for solo parts, etc. This order should be approximately as follows, when receding from the microphone:

(1) Violins, (2) Violas, (3) 'Cellos, (4) Guitars, (5) Harps, (6) Pianos, (7) Flutes, (8) Clarinets, (9) Oboes, (10) Bassoons, (11) Saxophones, (12) French Horns, (13) String Bass, (14) Tuba, (15) Tympani and Traps, (16) Trombones, (17) Trumpets. The loation of a soloist (voice or instrumental)

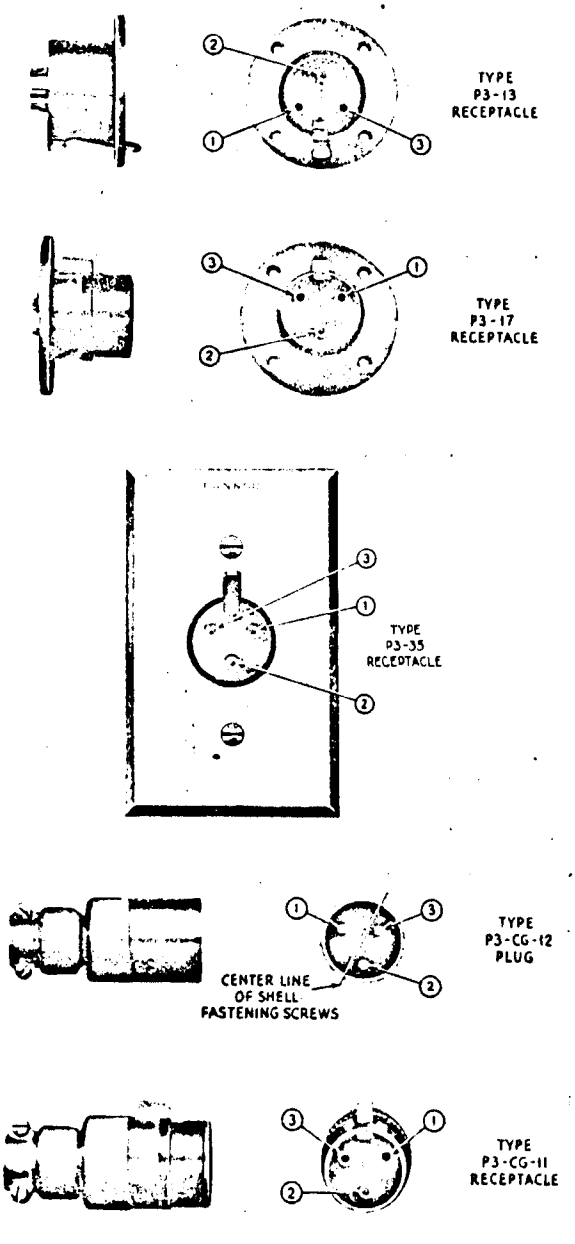

Figure 4—Plugs and Receptacles Frequently Used for Microphone Connections

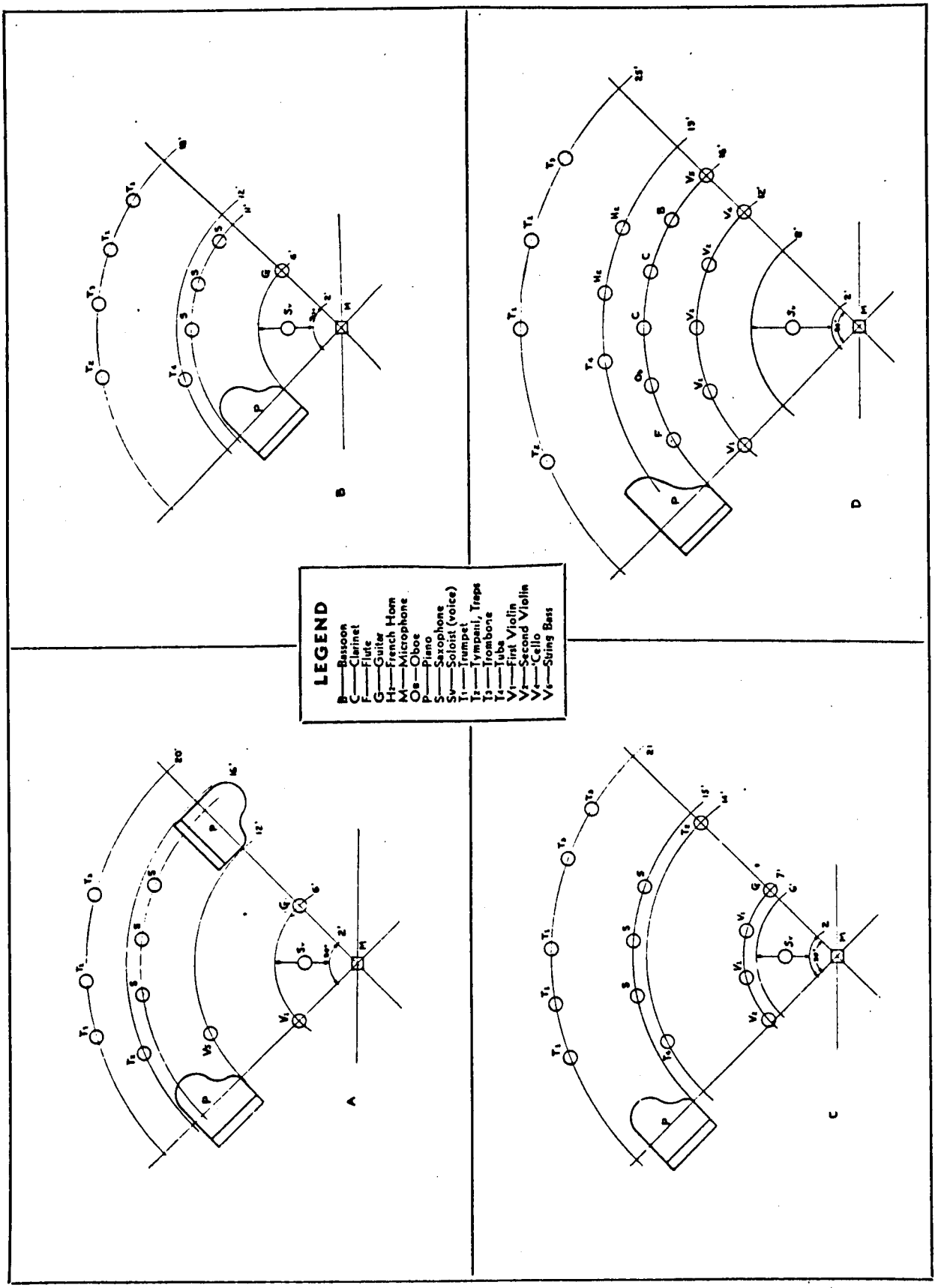

Figure 5—Various Orchestra Arrangements for Use With a Single Type 50-A Inductor Microphone (P-705495)

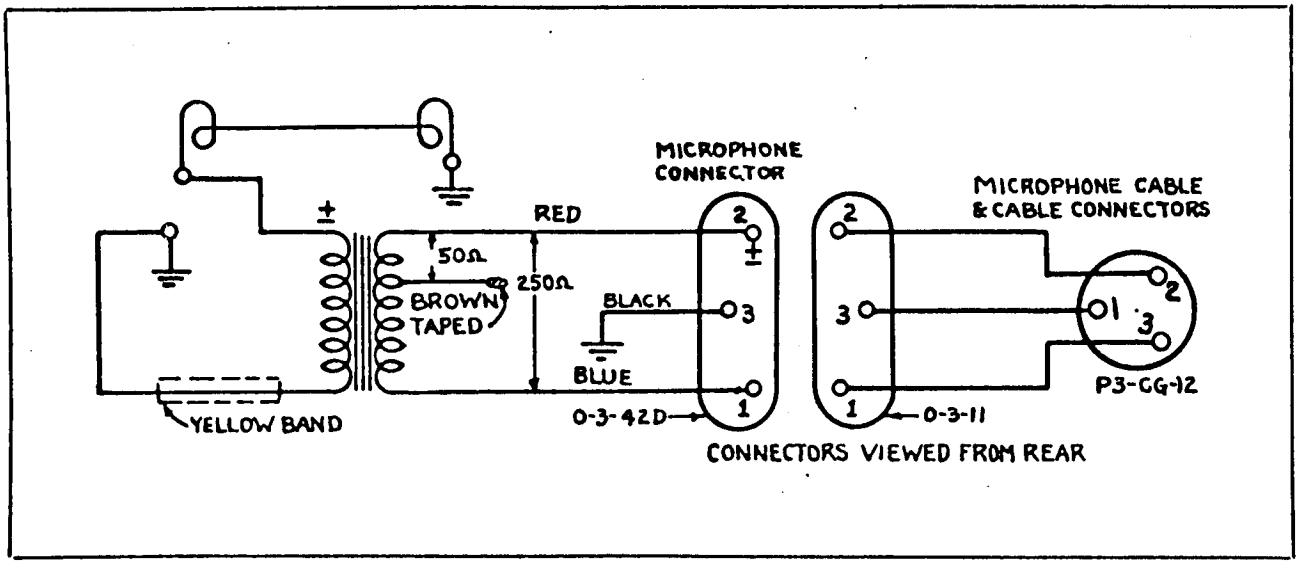

Figure 6—Schematic Wiring Diagram of the Type 50-A Microphone and Connecting Cable (K-819800)

is, of course, determined by the volume range of the voice or instrument and the relative volume desired with respect to the accompanying instruments, and, because these factors vary so greatly, no general rule can be given.

It must be remembered that in different selections and different arrangements of the same selection the relative importance of the instruments may be changed considerably. Generally speaking, there is little difference between the volume range of a number of the instruments adjacent to one another in the above order, and they ally themselves in natural groups, which may be placed so that each instrument of a group is approximately equidistant from the microphone. For example: One group may contain the violins, violas and 'cellos; a second group, the piano, harp, flutes and clarinets; a third group, the oboes, bassoons and French horns; a fourth group, the string bass, tuba, tympani and traps; a fifth group, the trombones and trumpets. In dance orchestras, the guitar is usually placed in the first group, the saxophone with the third group, and the banjo with the fourth group.

Several arrangements which exemplify these instructions are depicted in Figure 5—A, B, C and D. The orchestral arrangements illustrated in Figure 5—A, B and C—are for dance orchestras and, therefore, the tympani and traps, tuba and string bass (and banjo if used) are moved a little closer to the microphone in order to emphasize the rhythm, which is usually carried by these instruments.

In Figure 5-A the arrangement is intended to bring out the voice of the singer with the violin and guitar predominating over the other instruments. The two pianos are placed so that, when opened, their tops face toward the microphone.

In Figure 5-B there is little essential difference between this arrangement and that in Figure 5-A. Less physical space is required by the smaller orchestra, and the instruments as a group are moved closer to the microphone. In Figure 5-B the tuba and traps are relatively farther from the microphone than the string bass and traps in Figure 5-A in order to reduce the emphasis upon these instruments.

In Figure 5-C is shown a somewhat larger dance orchestra, which is arranged generally after the plan of that shown in Figure 5-A, but which includes but one piano.

In Figure 5-D is shown a concert orchestra arrangement for a unit of 19 musicians. In this case, as in all others, the placement of the soloist will vary greatly depending upon the volume range of the singer's voice and the desired balance between the voice and instruments.

In many cases where the space is not sufficient to permit selective spacing of the instruments, two or more microphones may be used to advantage, the proper balance between instruments being obtained by the proper control of the individual microphone circuits in a suitable mixing device. In these cases the instruments before each microphone should be spaced as a group with regard to that microphone. Each group and its microphone should be placed so as to minimize the pick-up of sound by a microphone of another group. Even when space need not be considered, the use of a second microphone for picking up a soloist, or a group which is to be featured, greatly facilitates the attainment of the desired musical balance.

6. Operation and Maintenance.—In general, the microphone will operate satisfactorily and require very little attention. It should give the normal output listed in section 2.

The microphone may be mounted in several ways: on a Type AZ-4090 program stand, on a Type 59-A collapsible program stand, on a Type AZ-4191 announce stand (with a Type AZ-4234 adapter, or suspended from a Type UP-4277 suspension hanger. (See section 4.)

The Type AZ-4090 program stand is adjustable as to height. The center of the inductor microphone may be located at any height from 55 to 75 inches above the floor. In order to raise or lower the stand, the vertical column clamping screw should first be loosened. If it is desired to raise the microphone, all that is necessary is to lift it to the desired point and there the stand will lock itself automatically. Usually, it will remain fixed at this position unless there is vibration, or the microphone and stand are moved about. This moving or vibration may cause the stand to slowly collapse. The clamping screw is provided in order to prevent this. However, if the microphone does not tend to creep, it is then not necessary to use the clamping screw. When it is desired to lower the microphone stand, the clamping screw should first be loosened, then the inner tube of the stand should be raised slightly while pressing the sliding column latch which projects at the side of the locking device. This will release the lock and allow the microphone to be lowered to the desired position, at which the latch should be released and the stand will lock itself. The clamping screw may then be tightened, if desired.

The Type 59-A collapsible program stand is also adjustable as to height. The center of the inductor microphone may be located at any height from 36 to 63 inches above the floor when this stand is used. Three telescoping tubular sections fitted with clamping screws are provided to permit this adjustment.

The Type AZ-4191 announce stand was designed especially for the Type 44-A velocity microphone but, when provided with a Type AZ-4234 adapter, it may also be used with the Type 50-A inductor microphone.

It is not recommended that the customer attempt to repair the microphone, but, rather, that it be returned to the RCA Manufacturing Company, Inc., 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.

7. List of Parts and Accessories.—

Description	*Type*	*MI-No.*
Inductor Microphone	Type 50-A	MI-4030 MI-4030-A MI-4030-B MI-4030-C
Program Stand (Studio Type)	Type AZ-4090	MI-4050 MI-4056
Program Stand (Portable Collapsible Type)	Type 59-A	MI-4059
Announce Stand (Adapter is required)	Type AZ-4191	MI-4058
Adapter, for Announce Stand	Type AZ-4234	MI-4060
Suspension Hanger *(see Figure 3)*	Type UP-4277	———
Cable and Plug (30-foot cable with a Cannon Type 0-3-11 Plug on one end)	Type AP-4233	MI-4077-A
Microphone Connector *(see Figures 2 and 3)*	Cannon Type 0-3-11	†MI-4623
Flush Type Wall Receptacle *(see Figure 4)*	Cannon Type P3-13	‡MI-4622
Surface Type Wall Receptacle *(see Figure 4)*	Cannon Type P3-17	‡MI-4621
Flush Type Wall Receptacle *(see Figure 4)*	Cannon Type P3-35	†MI-4624
Female Cord Connector *(see Figure 4)*	Cannon Type P3-CG-11	†MI-4620 ‡MI-4620-A
*Male Cord Connector *(see Figure 4)*	Cannon Type P3-CG-12	†MI-4630 ‡MI-4630-A

NOTES:—*This connector will mate with all other connectors and receptacles in this list except the Cannon Type 0-3-11, MI-4623.
†Aluminum, Bronze finish.
‡Aluminum, Natural finish.

1B-23801-3
S. O. 854134 1500

Printed in U. S. A.