

SHURE**MICROPHONES AND ELECTRONIC COMPONENTS**

EVANSTON PHONE DA 8-9000 • CHICAGO PHONE SH 3-1600

DATA SHEET**MODEL 545S UNIDYNE III
MICROPHONE****UNIDIRECTIONAL DYNAMIC****Dual Impedance**

GENERAL: The Model 545S "Unidyne III" is a slender moving-coil microphone, built to provide wide-range reproduction of music and voice and featuring an excellent directional pickup pattern. The unidirectional characteristic of the microphone provides highly satisfactory operation under adverse acoustic conditions. It permits placement of the microphone at a 75% greater distance from the performer than is possible with non-directional (omni-directional) microphones.

The smooth frequency response and attending faithful reproduction are largely due to a specially designed diaphragm attached to a sensitive coil suspended in a magnetic structure. The microphone is ruggedly built to withstand rough usage and is unaffected by temperature and humidity variations. The Model 545S has a built in on-off switch to control the microphone circuit. The switch is an integral part of the receptacle assembly and is a slide-to-talk locking type switch.

The case is modern in design with attractive streamlining and grille treatment. The Model 545S is small in size and is ideal for installations where it is desired to keep the microphone size to a minimum and still retain maximum operating efficiency. A new self-aiming swivel permits aiming the microphone at the source of sound.

The 18-foot (5.5m) high-quality, shielded three conductor cable is supplied with a microphone plug equivalent to the Amphenol 91-MC4M plug.

APPLICATIONS: The Model 545S is ideal for high-quality public address, theatre-stage sound systems and recording applications.

The true unidirectional characteristics of the Model 545S provide an easy solution to the feedback problem in reverberant locations, facilitates orchestral placement, permits best utilization of space in small studios, and provides practically complete exclusion of unwanted noises.

INSTALLATION: Figure B shows the internal wiring of the Model 545S as supplied. The Model 545S has a standard $\frac{5}{8}$ "-27 thread and may be mounted on any conventional desk, banquet, or floor stand. To avoid A.C. hum induction when long lines are used care should be taken that the cable does not parallel A.C. power lines for long distances.

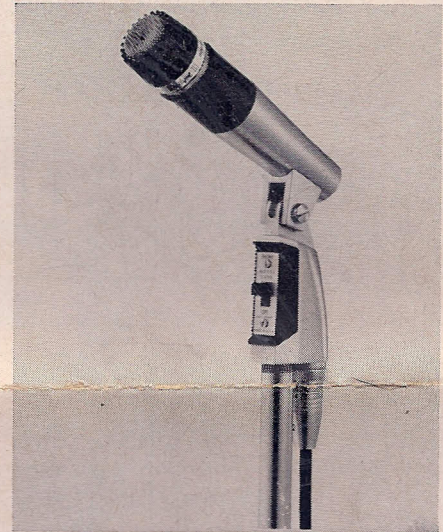
CONNECTIONS: The Model 545S "Unidyne III" Microphone is a dual-impedance microphone. It may be connected directly to a 50-250 ohm line, or high impedance input. Selection of either impedance is accomplished by using the proper connections at the end of the cable. (See Figure A).

The microphone cable plug is equivalent to the Amphenol 91-MC4M plug. The cable shield is connected to the #1 pin and plug shell; the red conductor is connected to the #2 pin; the white conductor is connected to the #3 pin; the black conductor is connected to the #4 pin.

The #1 pin of the microphone receptacle is connected to the ground side of the high impedance winding and, also, is connected to the metal parts of the microphone cartridge. The #2 pin is the "hot" conductor for connection with high impedance amplifiers as shown in Figure A-3. Pins #3 and #4 are the "hot" conductors for balanced line connections to a standard low or medium impedance input amplifier (Figure A-1).

The low impedance connection is recommended where long cable lengths are required or under conditions of severe hum disturbance. The permissible cable length is practically unlimited, since neither response nor level is appreciably affected. For use with high impedance amplifiers, Shure Model A86A Cable-Type Transformer is available for coupling the low impedance line to the amplifier input as shown in Figure A-2. The double winding primary of the Shure Model A86A transformer permits coupling a 50-250 ohm line to the high impedance input.

The high impedance connection in the Model 545S Microphone may be used with any high gain amplifier with an input impedance of 100,000 ohms or more (See Figure A-3). To connect the amplifier plug to the shielded cable supplied with the microphone, connect the shield lead to the ground terminal of the amplifier plug, and connect the red lead to the "hot" terminal of the amplifier plug.



The maximum recommended length of cable between microphone and amplifier when used in the high impedance position is 25 feet (7.6m). Longer cable may be used with a loss of approximately 2db at 5000 c.p.s. for each additional 25 feet (7.6m) of cable. In using longer cable the 3 conductor shielded cable furnished with the microphone could be replaced with a single conductor shielded cable. When this is done, the shield of the cable must be connected to pin #1 of the microphone plug and the center or "hot" conductor must be connected to pin #2.

The shield, chassis or amplifier ground should be securely connected to a water pipe or similar ground to prevent shock hazard during operation of amplifying system.

When used with amplifiers using the grid leak type of bias at the input tube, it may be desirable to use a .01 mfd. condenser between the microphone and the input grid circuit.

OPERATION: No special precaution beyond ordinary care is necessary in the operation of the Model 545S Microphone. It will operate efficiently and dependably in hot and cold climates. To retain the full strength of the highly efficient permanent magnet and to maintain alignment of the structure, dropping or other severe mechanical shocks should be avoided.

The swivel adapter fits conventional floor stands, desk stands, and the Shure S33 and S33B Desk Stands. The microphone may be easily removed from this adapter for use as a hand microphone.

ACOUSTIC CONSIDERATIONS: The front response-frequency characteristic of the Model 545S is shown in figure D. The smooth wide-range characteristic is excellent for high-quality reproduction of music and speech.

The polar characteristic resembles a cardioid. But, unlike most directional microphones, this polar characteristic is the same both in the horizontal and vertical planes. There is a wide useful pickup angle at the front of the microphone, while the response at the sides is down 6db from the front response. The rear response is down typically 15db to 20db. The Model 545S fulfills these requirements over a broad range of frequencies. (See figure E).

The true unidirectional characteristic of the microphone should not be confused with the relatively slight directional effect at high frequencies which can be produced by baffle effects in the conventional pressure microphone.

The result of this true unidirectional characteristic is elimination of acoustic feedback at volume levels which would cause considerable feedback with conventional semidirectional or omnidirectional microphones. In practically all cases it is possible to increase loudspeaker levels when a Unidyne III is installed. By directing the dead side (rear) of the microphone towards the audience or other source of interfering sound, pickup can be concentrated on the desired source. Reverberation energy pickup is decreased approximately two-thirds. The microphone can be placed close to reflecting surfaces without objectional effects if the rear side of the micro-

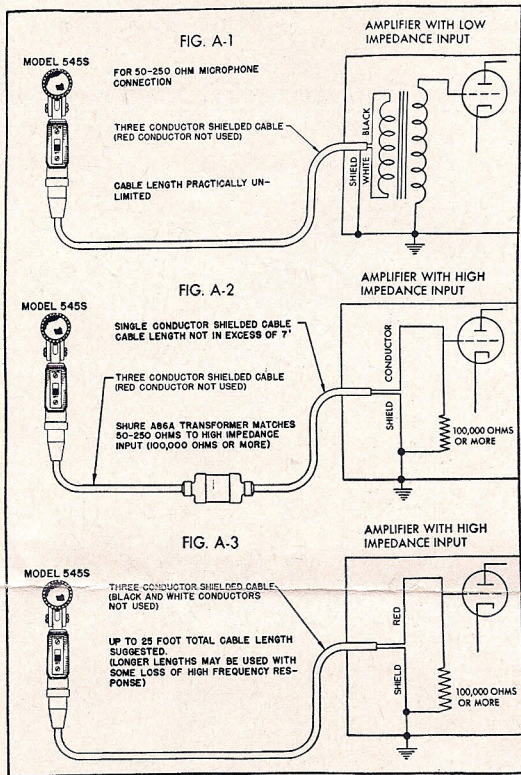
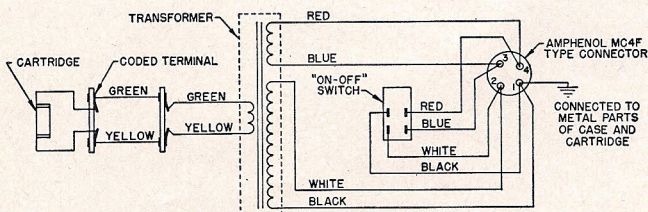
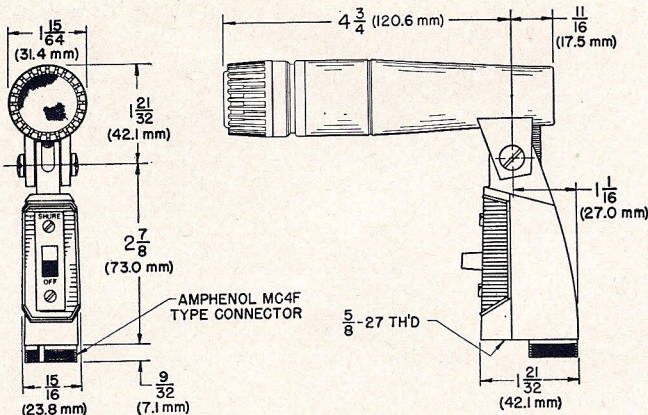


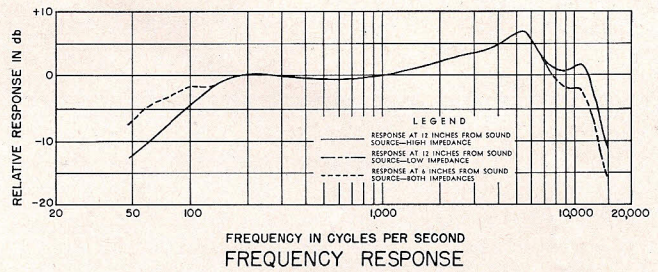
FIGURE A



**INTERNAL WIRING
FIGURE B**



**OVERALL DIMENSIONS
FIGURE C**



phone is toward the reflecting surface. This is particularly valuable in small broadcast studios. It is desirable to experiment with microphone placement and orientation in order to secure the greatest benefits from the unidirectional characteristic.

SPECIFICATIONS

1000 c.p.s. Response

Model 545S Low Impedance

Open circuit voltage line	78db*
Loaded with 250 ohm	83db*
Power level into 250 ohm	57db**
RETMA Microphone Rating G_M (Sensitivity)	149db***

Model 545S High Impedance

Open circuit voltage level	55db*
Loaded with 100,000 ohm	58db*
RETMA Microphone Rating G_M (Sensitivity)	151db***

- (*) 0db = 1 volt per microbar.
 (**) 0db = 1 milliwatt with 10 microbars.
 (***) RETMA Standard SE-105, August 1949.

Recommended Load Impedance

Model 545S Low Impedance Connection	50-250 ohms
Model 545S High Impedance Connection	100,000 ohms or more

MODEL 545S	
Nt. Wt. Less Cable	14 oz. (397g)
Cable	18 Foot, (5.5m) 3 Conductor Shielded
Dimensions	See Figure C
Finish	Chrome and Black
Packaged Wt.	2 1/4 Pounds (1021g)

GUARANTEE: Each microphone is guaranteed to be free from electrical and mechanical defects for a period of one year from date of shipment from factory, provided all instructions are complied with fully. In case of damage, return the microphone to the factory for repairs. Our guarantee is voided if the microphone is subjected to accident or abuse or if the case is opened.

MODEL 545S

Architect's Specifications

The microphone shall be a moving coil type microphone with a frequency range of 50 to 15,000 c.p.s. This unit shall have a "cardioid" horizontal polar characteristic. The cancellation at the sides shall be approximately 6db and the cancellation at the rear shall be 15 to 20db. The microphone shall be a dual-impedance microphone having rating impedance of 150 ohms and 40,000 ohms. The microphone rating G_M (sensitivity) at 1000 c.p.s. shall be within ± 3 db of the following levels.

Low impedance	148db
High impedance	150db

The microphone shall be provided with a swivel, a built in on-off switch and a receptacle equivalent to the Amphenol 91-MC4F capable of connecting to a three-conductor shielded cable plug. The microphone shall mount on a stand having 5/8"-27 thread. The overall dimension shall be 7 29/32" (200.8mm) $\pm 1/64$ " in length, 1 21/32" (42.1mm) in depth and 1 15/16" (31.4mm) $\pm 1/64$ " in diameter.

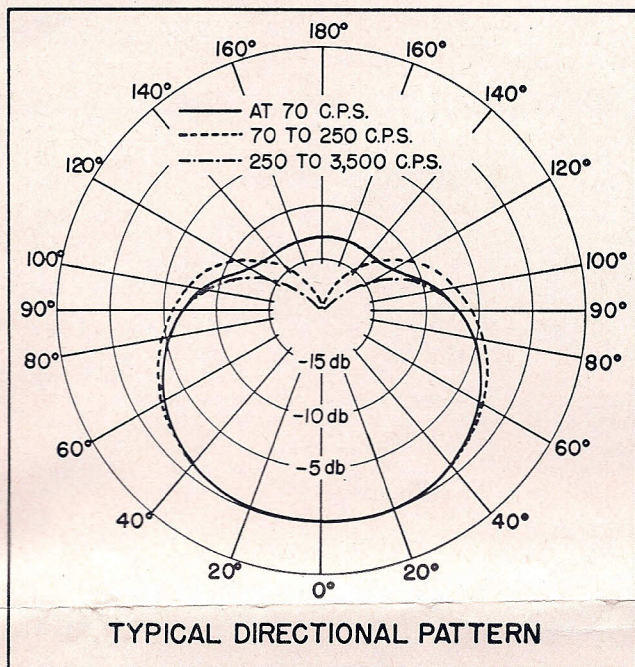


FIGURE E

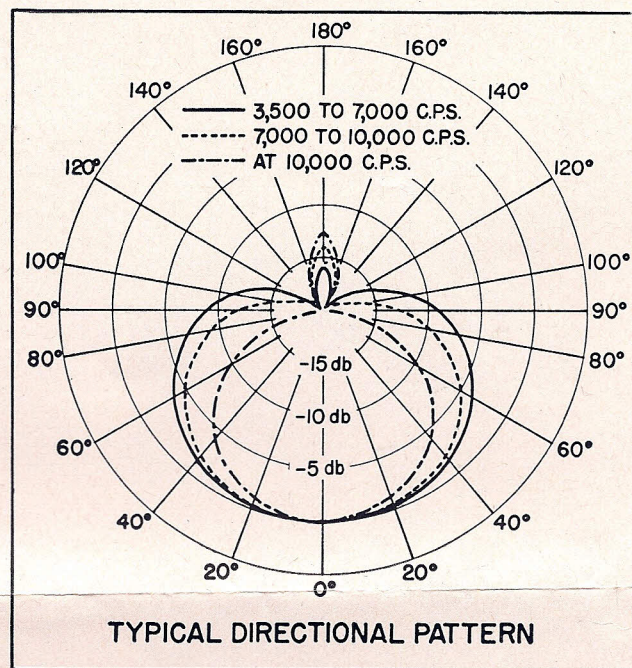
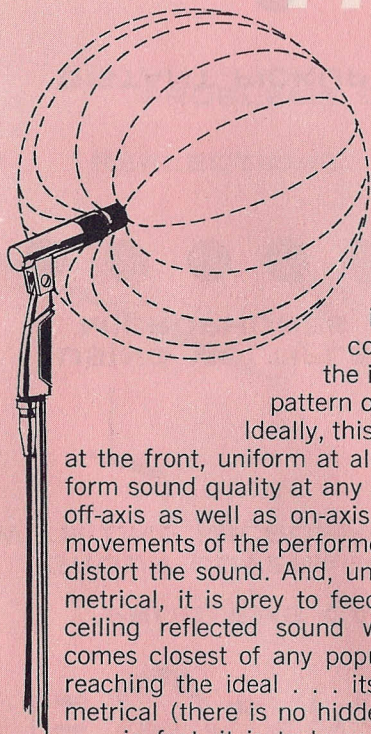


FIGURE E

FACT: *not all "cardioid" microphones are alike*

FACT:

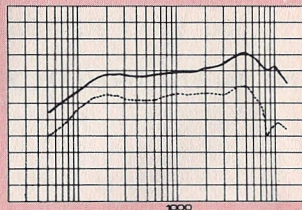
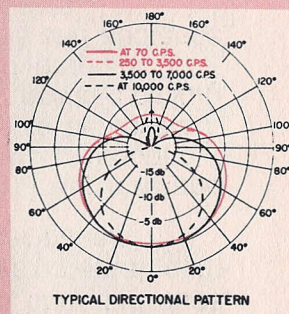
*the **SHURE** UNIDYNE III approaches the theoretical ideal of the cardioid pickup pattern. This means completely uniform pickup pattern about the axis at all frequencies!*



Imagine a perfectly round balloon — now, poke your finger into one side of it and push in hard . . . the resultant configuration represents the ideal symmetrical pickup pattern of a cardioid microphone.

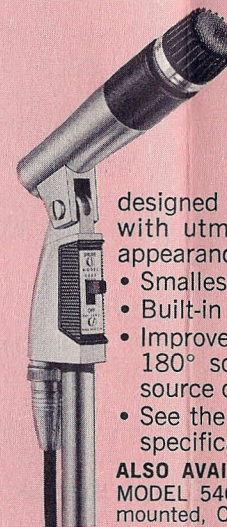
Ideally, this pattern should be broad at the front, uniform at all frequencies—with uniform sound quality at any point within the pattern, off-axis as well as on-axis. Otherwise, even slight movements of the performer about the axis tend to distort the sound. And, unless the pattern is symmetrical, it is prey to feedback-creating floor and ceiling reflected sound waves. The Unidyne III comes closest of any popular P.A. microphone in reaching the ideal . . . its pattern is totally symmetrical (there is no hidden top or bottom bulge) . . . in fact, it is truly cardioid at frequencies as low as 70 cps!

WHAT TO LOOK FOR:



This is the pickup pattern of the Unidyne III. Note its relative uniformity at ALL frequencies. Compare this to the patterns of other microphones which become sharply less directional as frequency drops until at very low frequencies, they become omnidirectional.

Note that the Unidyne III on-axis (solid line) and off-axis (dotted line) response is virtually the same. Note also the smoothness of response. The controlled roll-off at the low end prevents "boomy" sound. *Test for pickup pattern symmetry yourself*—rotate the Unidyne III while talking into it from various off-axis angles (45°, 90°, etc.). You will note that the volume and tonal quality of the microphone remain constant about the axis.



MODEL 545S UNIDYNE III

The world's finest moderately priced dynamic cardioid microphone for general purpose and public address system use. In addition to its outstanding pickup characteristics, the Unidyne III is designed throughout for superior reproduction with utmost convenience and distinguished appearance:

- Smallest of the Unidirectional Microphones
- Built-in on-off switch
- Improved swivel permits tilting of head through 180° so microphone can be "aimed" at the source of sound
- See the back page of this folder for complete specifications

ALSO AVAILABLE IN THE UNIDYNE III FAMILY:

MODEL 546—Broadcast version of Unidyne III. Shock mounted, Cannon connector, etc. Write for data sheets.
 MODEL 545—Compact, true "probe" design model of Unidyne III. Can be removed from stand in a second—without tools. No switch.
 MODEL 544—Gooseneck mounted Unidyne III for use in dispatching and paging stations, language labs, etc.

SPECIFICATIONS

for models 545S

UNIDYNE III

TYPE: Dynamic

FREQUENCY RESPONSE: 50-15,000 cps.

OUTPUT LEVEL:

Low: -57 db (0 db = 1 milliwatt per 10 microbars)

High: -55 db (0 db = 1 volt per microbar)

IMPEDANCE: Dual. Choice of 50-250 ohms or high

POLAR PATTERN: Cardioid. (Uniform with frequency, symmetrical about axis)

MAGNETIC CIRCUIT: Uses Alnico V magnet

CASE: Die cast zinc and "Armo-Dur"

FINISH: Satin chrome and black

SWIVEL: New improved self-adjusting "positive action" lifetime swivel permits tilting of the head through 180° so that the microphone can be aimed at the source of sound

CABLE CONNECTOR: Equivalent to Amphe-nol MC4M plug

CABLE: 18 ft., 3-conductor shielded

STAND THREAD: 5/8"-27 thread

DIMENSIONS (not including swivel): 1 1/4" diameter, 5 1/8" length

NET WEIGHT: (less cable) 3/4 lb., packaged weight 2 1/2 lbs.

OPTIONAL ACCESSORIES: Model A86A Cable Type Transformer. Model S36A Desk Stand. Model S39A Vibration-Isolation Stand. Model A-47 Quick-Disconnect Isolation Unit.

SHURE BROTHERS, INC.

222 HARTREY AVE., EVANSTON, ILLINOIS

CARDIOID* UNIDIRECTIONAL MICROPHONES

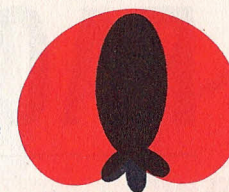
FACT & FICTION

*(The term **Cardioid** refers to specific unidirectional characteristics of a microphone, defined and limited by a precise mathematical formula.)

FICTION:

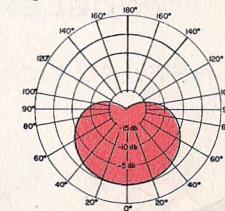
FICTION: all "cardioid" microphones have similar pickup patterns

In fact some so-called "cardioid" microphones actually pick up much sound from the rear at certain frequencies (particularly at low frequencies)! Others have side and rear pickup "lobes" at many erratically different frequencies. Some patterns are extremely "narrow" at high frequencies while being virtually omnidirectional (360° pickup) at critical low frequencies.



FICTION: all "cardioid" patterns are symmetrical about the axis

Very few "cardioid" patterns are symmetrical about the axis in all planes. The pickup pattern in planes other than that for which cardioid data is published, often is not cardioid and actually is an undesirable pickup pattern. This can lead to all sorts of feedback problems from "floor bounce" and other reflected sounds. *Test for pickup pattern symmetry* by rotating the microphone while talking into it from various angles (45°, 90°) off-axis. Is the volume and tonal quality of the microphone consistent about the axis?



Ideal Cardioid Pattern

FICTION: the quality of sound is uniform with direction of pickup for all "cardioid" microphones

A serious shortcoming of most "cardioids" is that off-axis pickup has markedly different tonal quality than on-axis pickup. *Test for uniformity* of tone by walking around the microphone placed on a stand and talking into it from various angles. The volume should vary, but the tonal quality should not.

FICTION: the narrower the pickup pattern, the better the microphone performs

Actually, for most cases the exact opposite is true. A very narrow pattern creates more problems than it solves in attempting to obtain good, uniform sound reproduction. Ideally, the REAR hemisphere rejection should be very great, while the front pickup should be both broad and uniform about the axis, and at all frequencies.