

# Equipment Report

## Shure "333" Cardioid Microphone

Reports of this nature on such items as microphones and loudspeakers must necessarily be subject to some criticism because it is not practicable to make measurements of absolute characteristics without elaborate acoustical equipment—an anechoic room, calibrated loudspeakers for testing microphones or calibrated microphones for testing loudspeakers, and laboratory-type measuring equipment—but the observations of trained ears can often supplement the measurements supplied by the manufacturer, and in any case such observations will serve to verify advertised claims. Thus it is with some trepidation that these comments are offered, even though it is felt that they are reasonably valid.

Having some familiarity with the earlier Model "300" Studio Microphone and being thoroughly familiar with its characteristics on both music and voice, we were pleased at the opportunity to put the "333" through its paces. The "300" is a conventional ribbon microphone—referred to by the manufacturer as a "pressure gradient" type—with excellent frequency response, nearly complete cancellation at the sides, and reasonable freedom from wind and "p" noises. We have used this model for many months in numerous applications, and have found it to be responsive to loudspeaker-emitted frequencies up to 22,000 cps—indicating a signal on the VU meter at the output of an amplifier as the tone was keyed on and off, even though no signal could be heard (by this observer) in the room at that frequency. The "300" has been used for all speaker measurements reported here, and has been found excellent for the purpose.

The new "333" is described as a uni-directional ultra-cardioid unit. It consists of a horn-loaded ribbon transducer coupled with a newly-designed phase-shifting network which reduces reverberation, reflection, and undesired random sounds by 73 per cent as compared to a non-directional microphone.

Pickup is uniform within  $\pm 3$  db over an angle of 160 deg., with direct pickup from the rear down approximately 13 db from that at the front. Two null points are noted extending roughly from 120 to 150 deg. from the front on either side, and it is as a result of this type of pattern that over-all pickup is reduced by so large an amount.

Comparative listening between a known reference loudspeaker and a signal picked up from the speaker and fed to another provides a means for checking the fre-

quency response. The "333" reproduces the picked-up signal with good fidelity, giving the characteristic recognized as "high fidelity" by those familiar with studio-quality broadcast microphones. There is no coloration of the sound which is indicative of peaks, and the output appears to be flat throughout the entire audio spectrum.

### Characteristics

The body of the microphone is small—measuring only 3-11/16 in. high, 1-7/32 in. wide, and 1-7/8 in. deep, which is in accordance with the current trend for inconspicu-

switch located in the shock-mounting housing in the base of the unit connects a small inductance across the low-impedance section of the transformer secondary when in the VOICE position. This reduces low-frequency response approximately 6 db at 100 cps, and serves to improve crispness of voice reproduction when used to close the mouth, as microphones are often likely to be used. A male 3-wire Cannon type XL connector is built into the base, with signal leads isolated from ground throughout. The cable shield carries the microphone case ground back to the amplifier.

Experimentally, we attempted to take advantage of the cardioid characteristics of the microphone by placing an interviewee at the sensitive side and the interviewer at the back. In many instances, the interviewer, with more confidence in microphone technique, will use a stronger voice than the less experienced person with whom he is talking. While this technique would undoubtedly work if both persons were out in the open and without the presence of reflecting elements such as walls, furniture, and so on, it failed miserably in a typical room. The effect was as though the two people were at greatly different distances from the microphone—the interviewer appearing to be considerably farther away than the interviewee. This test serves to show, however, just how effective the reduced pickup from the back is, and offers a quick lesson in microphone technique. Talking at a constant volume close to the microphone as it is rotated around its axis shows instantly—without need for measuring equipment—that there is a very definite reduction in response at the back. In actual use in typical night club or studio surroundings for voice reinforcement, the reduced sensitivity at the rear permits an increase in sound output of 10 to 12 db as compared to a non-directional unit, and an increase of approximately 6 db over the output from the "300" ribbon microphone.

The "333" is a professional unit throughout, and consequently is relatively expensive. Many users of microphones might not be able to justify the cost, but those who are fortunate enough to have access to "live" musical groups for recording will undoubtedly find that the quality of the resulting tapes would easily warrant the additional expenditure. The extra sound output resulting from the cardioid characteristic often dictates the choice of this type of microphone in critical applications where acoustic feedback is extremely troublesome, and for this use the "333" is considered extremely suitable.



Fig. 1. The Shure "333" Cardioid Microphone.

ous microphones for TV applications. The case contains a matching transformer with three output impedances—35-50 ohms, 150-250 ohms, and high, which computes from the voltage output at approximately 50,000 ohms, but which is designed to be loaded with 100,000 ohms. A concealed switch at the rear of the microphone case selects the desired output impedance. A voice-music