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EQUIPMENT REVIEWED

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FILM INDUSTRIES TYPE M.8 RIBBON MICROPHONE

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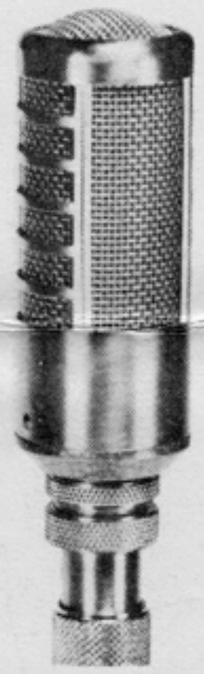


Manufacturer's Specification: Frequency Response: 35-13,000 c/s ± 3dB. **Source Impedance:** 30 ohms standard, with built-in transformer. Other impedances available up to 57 Kilohms 12-ft. twin screened cable.

Manufactured by Film Industries Ltd.
Station Avenue, Kew Gardens, Surrey.

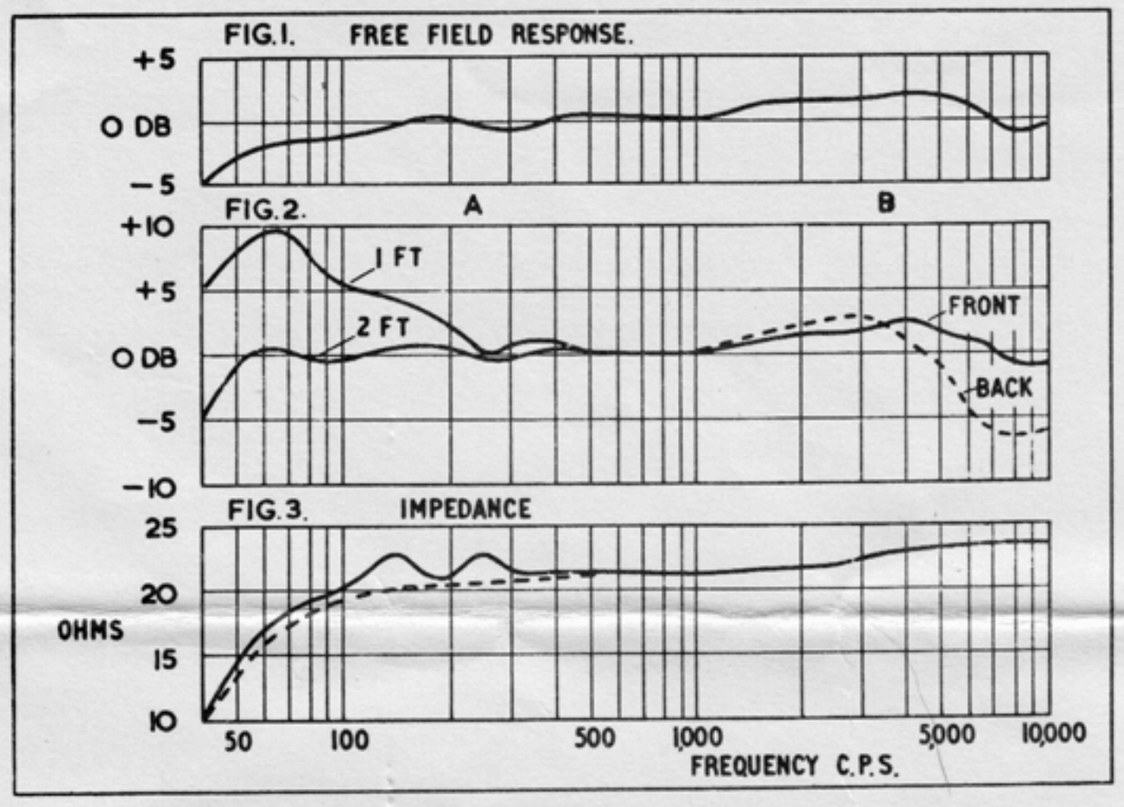
THIS neat and compact ribbon microphone is an excellent example of the modern trend towards reducing the size of such units by using high-efficiency magnetic materials. This leads to a shorter, narrower ribbon than was common a few years ago, with resultant improvements in frequency response, polar response, and general robustness.

The slim design is not cluttered by external plugs, sockets, or swivelling joints. The head plugs directly into a 4-in. length of semi-flexible tubing which allows adjustment to any desired angle, and which can be screwed into a floor stand or the table base shown in the photograph. The microphone is fitted with 12 ft. of screened, two-core cable; extra cable can be obtained from the manufacturers at 2/- per yard. The secondary of the line transformer is not earthed to the case, so that true balanced line operation is possible for minimum hum pickup on very long extensions.

Frequency Response

The free field response, with a plane progressive wave approaching the front face of the microphone, is shown in **fig. 1**. It will be seen that the response is sensibly level from 50 c/s to 10,000 c/s within plus or minus 2 dB.

Fig. 2A shows the effect of bringing the microphone close to a small sound source, as in close talking. This "proximity effect" is caused by the differential sound pressure between the front and



Frequency runs on the Film Industries M.8 Ribbon

back of the ribbon increasing at long wavelengths when the wave front is spherical; a bass cut must always be used with this type of microphone, when it is used at a distance of less than two feet.

The high note response is well maintained to at least 10Kc/s—the limit of my white noise calibration gear—but pure tone tests showed a measurable response at 18 Kc/s. The figure-of-eight polar diagram becomes very one-sided at frequencies above 4Kc/s; the response from the rear of the ribbon is shown in **fig. 2B** The natural response of a simple ribbon microphone falls whenever the distance from front to back of the ribbon, around, the pole pieces, approaches half a wavelength of the incident sound. Theoretically, when the distance becomes one wavelength, the difference in pressure, which moves the ribbon, becomes zero; but in practice there are so many alternative routes from front to back that some force is always available. Nevertheless, various artifices must be used to compensate for the fall in response above about 5Kc/s; in this case it is a standing wave or resonance effect within the semi-circular magnets which cup the rear of the pole piece assembly. The difference in response on the two sensitive sides of the microphone should be borne in mind when balancing voices or musical instruments.

Impedance

Fig. 3 shows the measured impedance over the frequency range. The two small peaks are caused by harmonics of the main ribbon resonance, and the slight rise at high frequencies by leakage reactance of the line transformer. The fall in impedance at low frequencies is caused by low primary inductance in the transformer; this fall is introduced deliberately to damp the ribbon resonance electromagnetically, by a 'short circuit' effect.

Further damping of the ribbon is achieved by adding acoustic resistance in the form of fine gauze wire and fabric screens, placed around the ribbon and pole piece assembly. By muffling the microphone in heavy cloth, to increase the acoustic damping still further, the contribution of the motional impedance of the ribbon was almost eliminated, and the dotted curve obtained. These tests are important, as they indicate that the ribbon resonance is critically damped so that the ribbon approximates to a simple mass-controlled system. Large peaks in the impedance curve caused by ribbon resonance would indicate the strong possibility of low frequency transient distortion.

Sensitivity

The sensitivity was found to be −90dB ref. 1volt/dyne/cm², or 0.03 millivolts open circuit voltage across the 20 ohm source impedance. This means that a matching transformer with a ratio of 50 to 1 will deliver 1.5 millivolts per bar to the grid of a valve, or to the high impedance input jack of a tape recorder. This is about the same level as that obtainable from a high grade crystal microphone of equivalent frequency response, and about half that of one of the cheaper, but more peaky, diaphragm crystal microphones. Care must be taken to keep the capacity low across the secondary of such a transformer, to avoid resonance with the leakage inductance, which could produce a peak in the audio range followed by a sharp cut in response.

The microphone head was fairly sensitive to electromagnetic hum fields, and it should not be used within a few feet of equipment containing mains transformers or motors.

Subjective Tests

Careful listening tests confirmed most of the objective measurements. High note response was smooth and sweet with none of the hardness common to many diaphragm pressure microphones. The thorough damping of the ribbon resonance virtually eliminated low frequency transient distortion. A badly designed ribbon microphone can give a low frequency colouration to any sharp noise, such as a handclap, and is also subject to stand and handling noise. The microphone under review, however, showed none of these faults; indeed the unit could be used as a hand microphone with few concessions to the fact that it was a ribbon microphone.

A—B tests were made against a very wide range miniature condenser microphone, and, although there were subtle differences, it was difficult to state a definite preference for either. There was perhaps a very slight hint of heaviness on male speech at 2 feet distance, but there was no suggestion of boominess. Careful listening showed that some of this effect was due to the slightly different quality of the acoustic ambient background noise, and room colouration; open air tests showed very little difference indeed.

To sum up, this microphone shows evidence of careful design, and the workmanship, technical performance, and styling are excellent. It can be thoroughly recommended for studio or semi-professional use, or for home use where the associated equipment can do justice to its very wide range response.

A. Tutchings