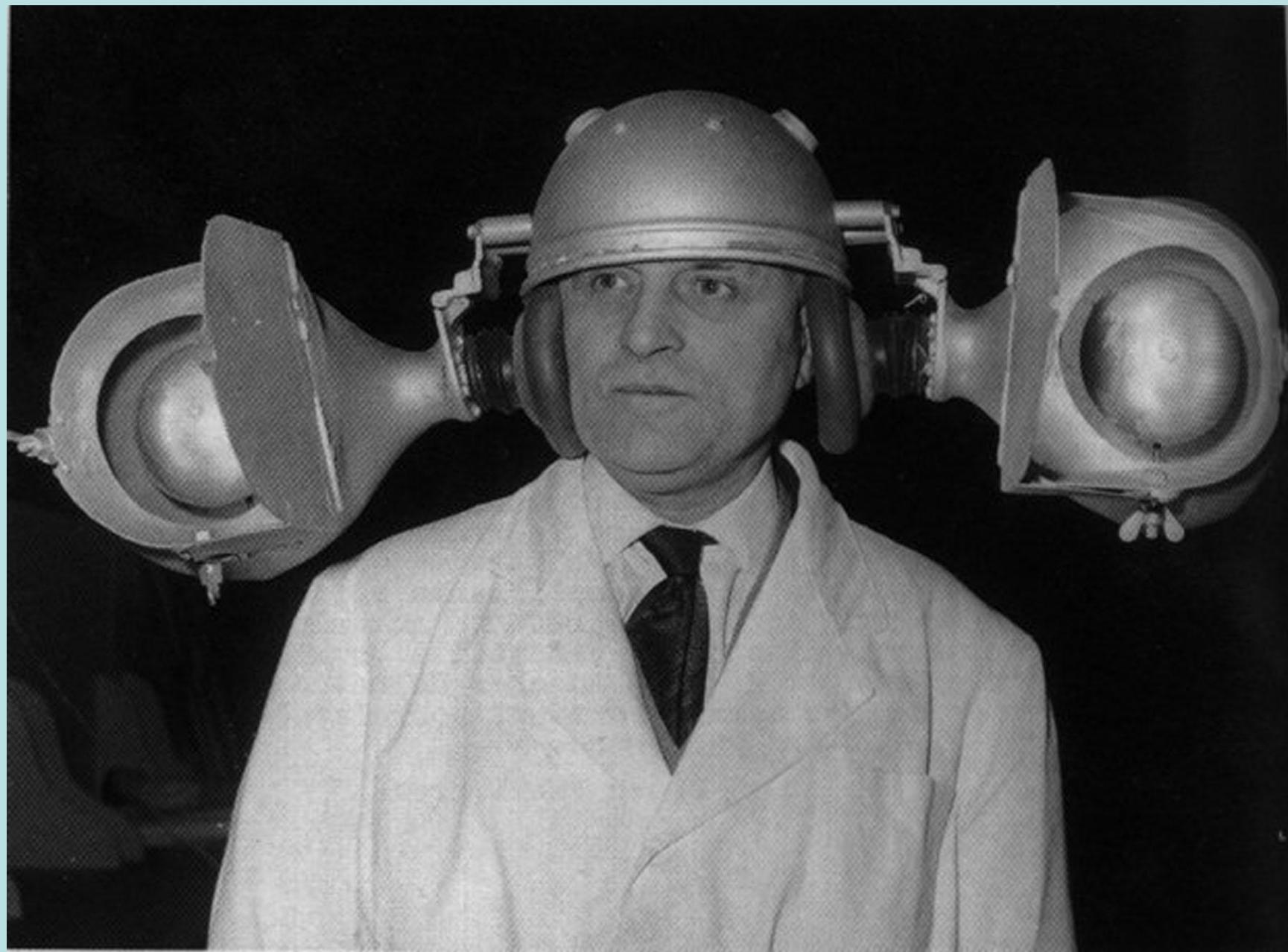


Loudspeakers and Speech Intelligibility

A pictorial history...



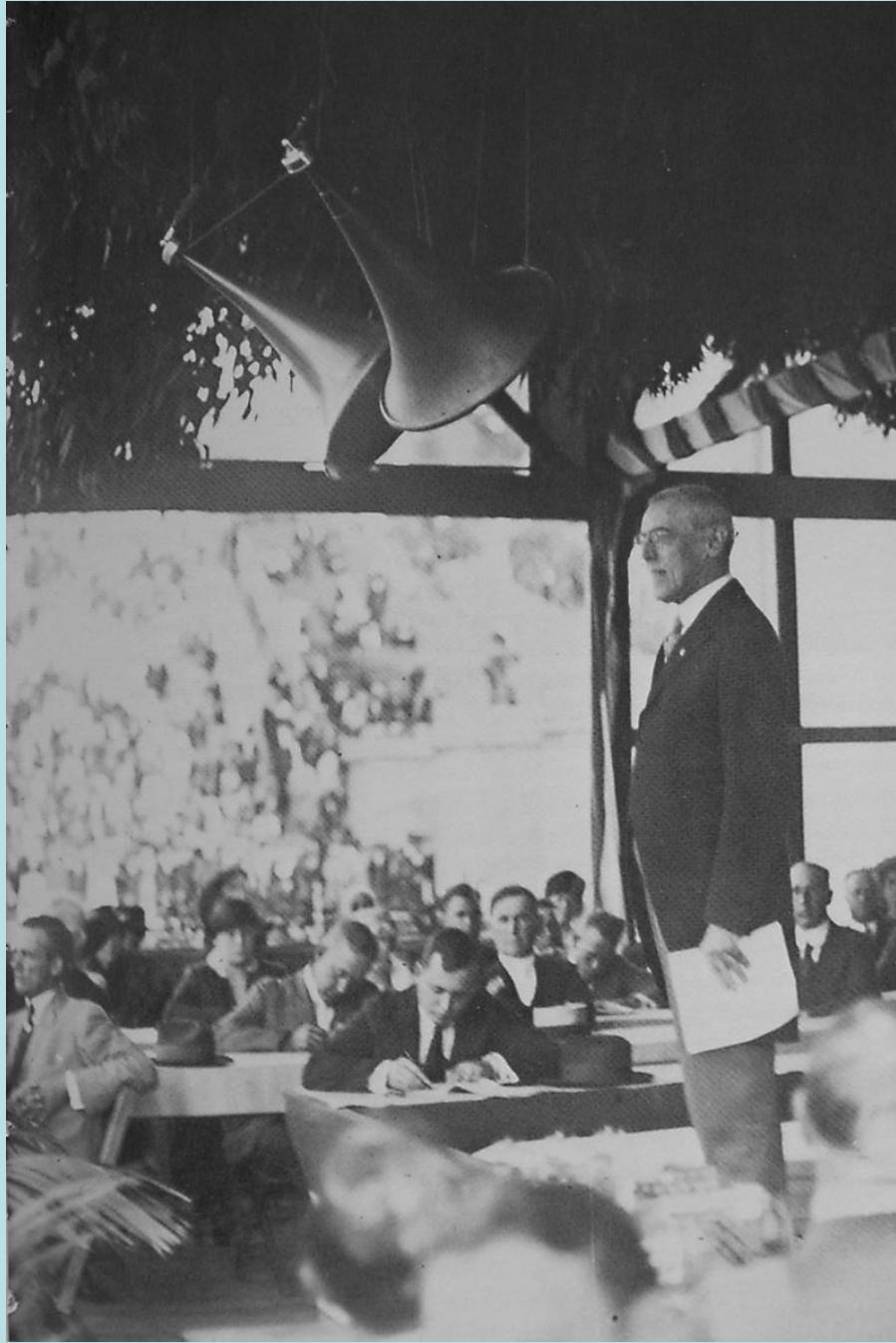


1915 - Peter L. Jensen and the
Magnavox Loudspeaker

1919 - Woodrow Wilson in San
Diego, 50,000 people outdoors

1920's - various horns "trumpets"

1938 - RCA develops the first
column loudspeaker array

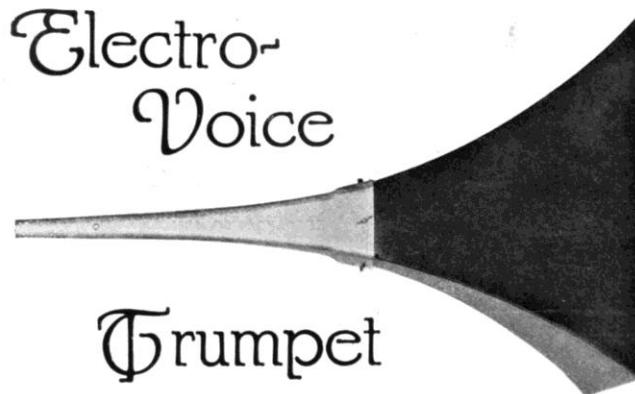


1915

Woodrow
Wilson







The Electro-Voice Trumpet was engineered in view of meeting actual working conditions, facing the user. It was a delicate task, blending the requisites of a perfect horn, but after careful designing, we offer a trumpet, correct in every detail, as outlined below.

Correct exponential design, insuring highest efficiency.

Square bells that are easy to hang and Cluster.

Thoroughly storm proof, can even be EMERGED in water without injury.

The aluminum ferrule is half the length of the horn, making it the strongest horn ever offered, yet preserving lightness.

Looks distinctive and substantial, adding permanency and eye-appeal to any indoor or out-of-doors installation.

Replacable bell, therefor a permanent investment.

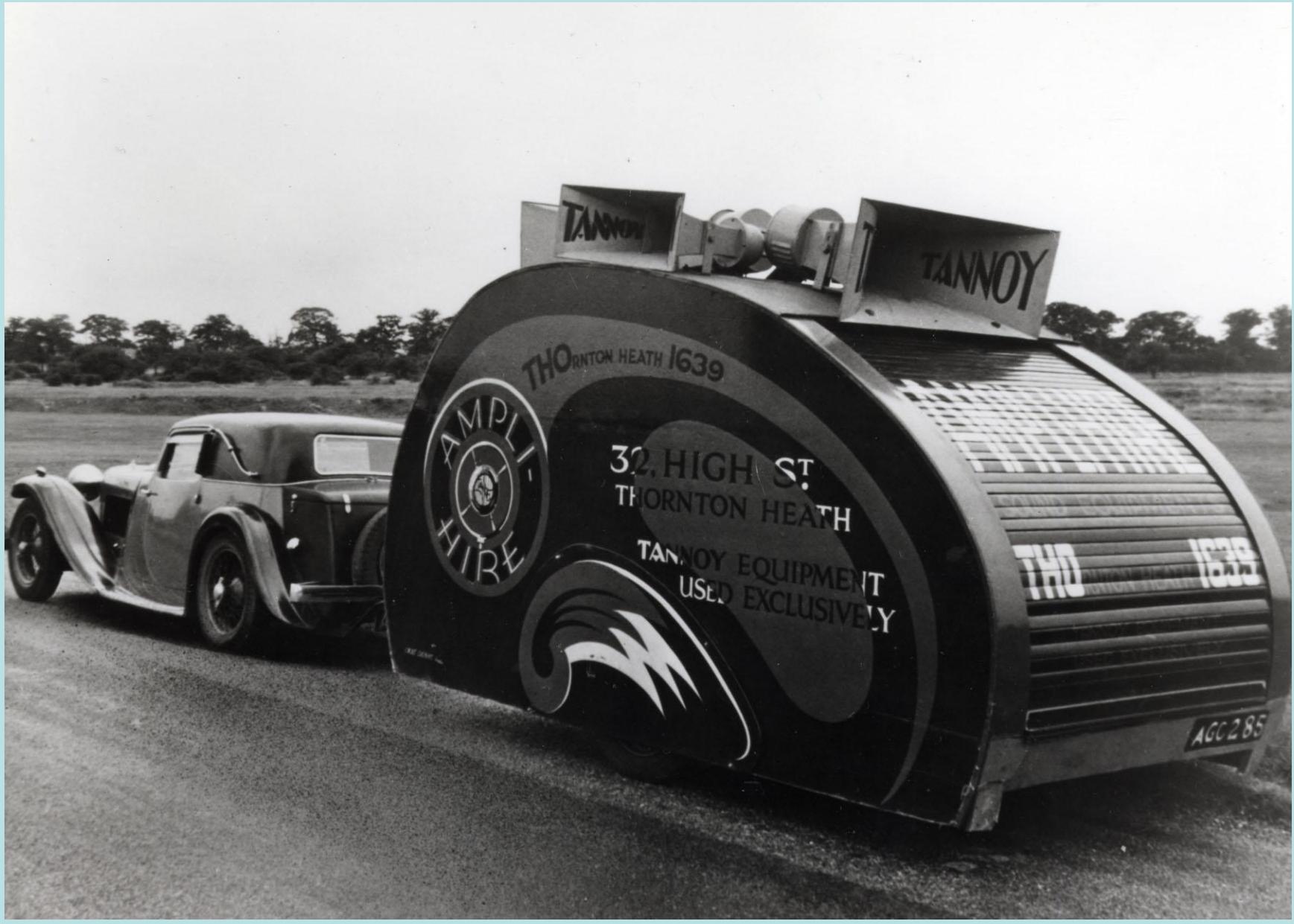
Detachable bell for ease of carrying and portability.

This horn carries a one year guarantee against EVERYTHING.

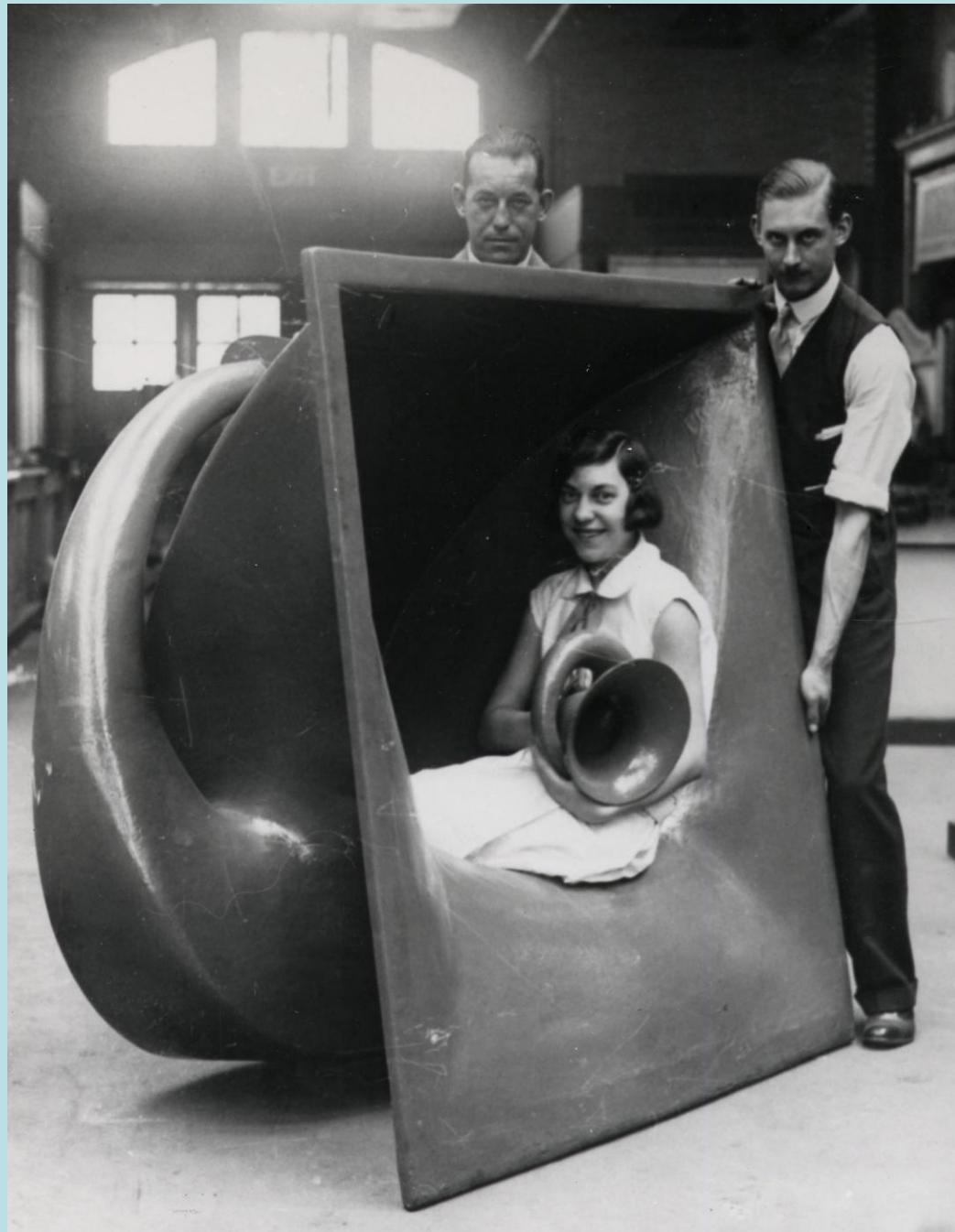
SPECIFICATIONS: Length; 4 feet, Bell; 2 $\frac{1}{2}$ inches; Weight; 7 $\frac{1}{2}$ pounds, Color; Tan. List price \$35.00.

The Electro Voice Mfg. Co., Inc.
119 West Colfax Avenue
SOUTH BEND, IND.

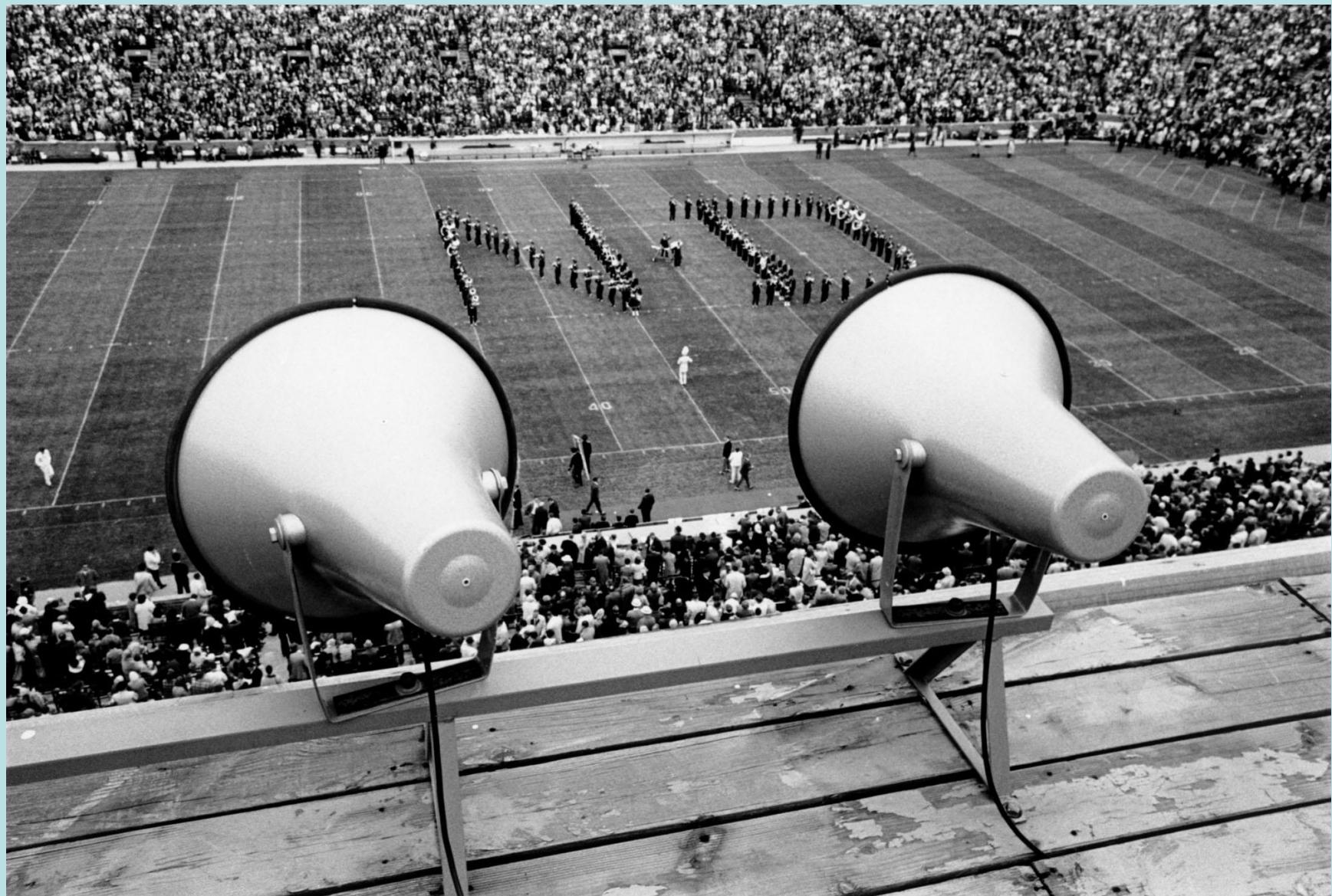








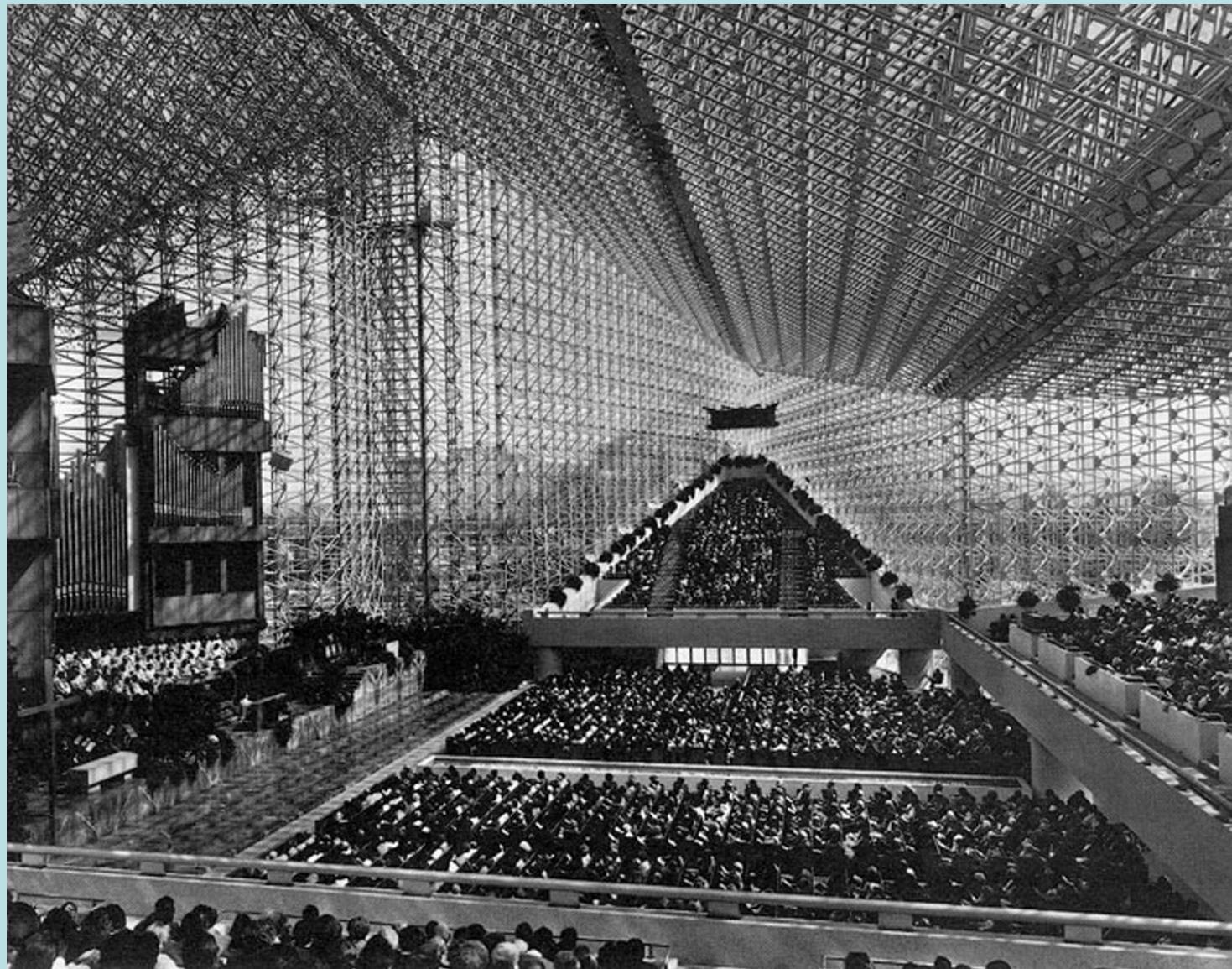




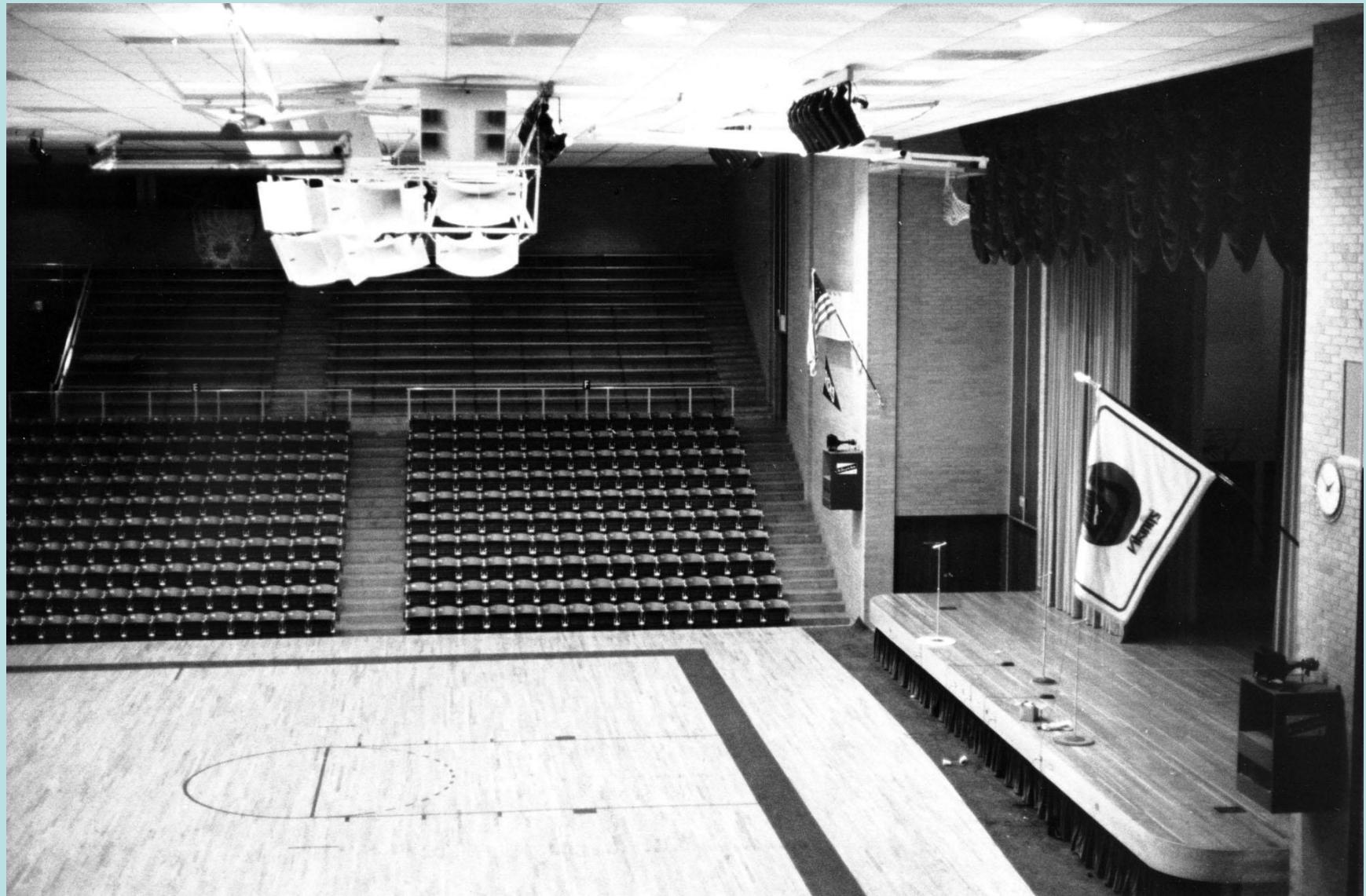
1964











1974

1976
Yankee
Stadium





1984







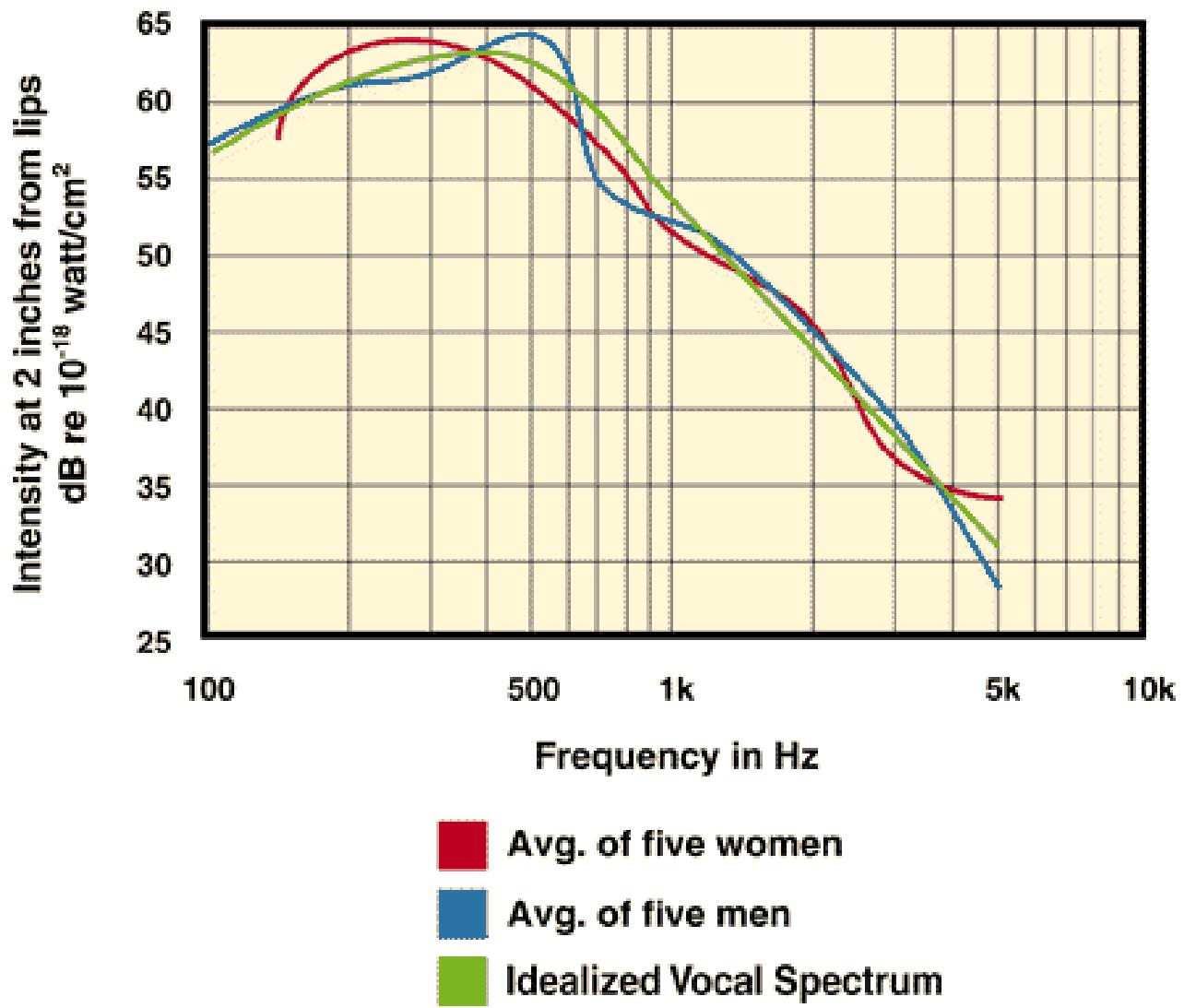
1984

Speech reproduction is more demanding than music:

Human speech is a continuous waveform with a fundamental frequency in the range of 100-400 Hz. (The average is about 100 Hz for men and 200 Hz for women)

Formants - Series of changing harmonics called “formants” (resonant characteristics) that are multiples of the fundamental; they form Vowels

Consonant sounds, which are impulsive and/or noisy, are located in the range of 2-9 kHz



Sound power in speech is carried by vowels, which average from 30 to 300 milliseconds in duration

Intelligibility is imparted chiefly by the consonants, which average from 10 to 100 milliseconds in duration and may be as much as 27 dB lower in amplitude than the vowels

High-quality speech systems need to cover the frequency range of about 80 Hz to about 10 kHz. Extremes in frequency response can actually mask speech.

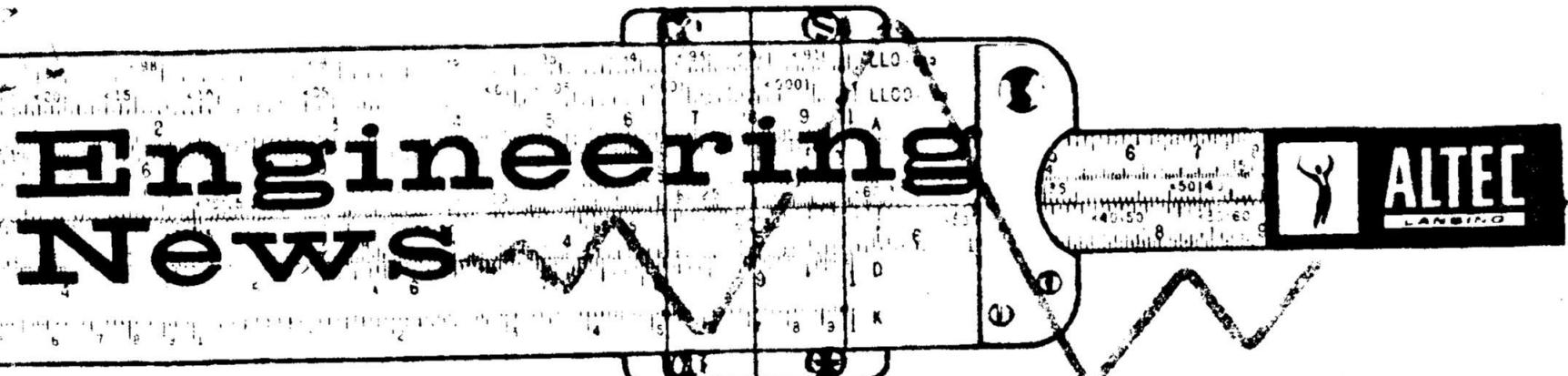
Intelligibility

Source

Acoustic environment

Ambient noise

Reflections (reverb)



ALTEC LANSING

A Division of BRYLING ALTEC, INC.

1515 S. Manchester Avenue,

Anaheim, California

TECHNICAL LETTER NO. 107

ESSENTIAL REQUIREMENTS FOR SPEECH REINFORCEMENTS SYSTEM

A speech reinforcement system is required in auditoriums to provide the listener with adequate speech signals when it is not possible to obtain intelligible speech directly from the talker.

There are two required features for such a sound system:

1. Intelligibility
2. Naturalness

Essential requirements for speech reinforcement system

Intelligibility

Naturalness

Directionality; reducing reflections
(reverberation)

Loudspeaker System

Frequency response

Directivity

Amplitude and phase distortion

Other (?)

Loudspeaker System Configurations shown today

Horn

Line Source

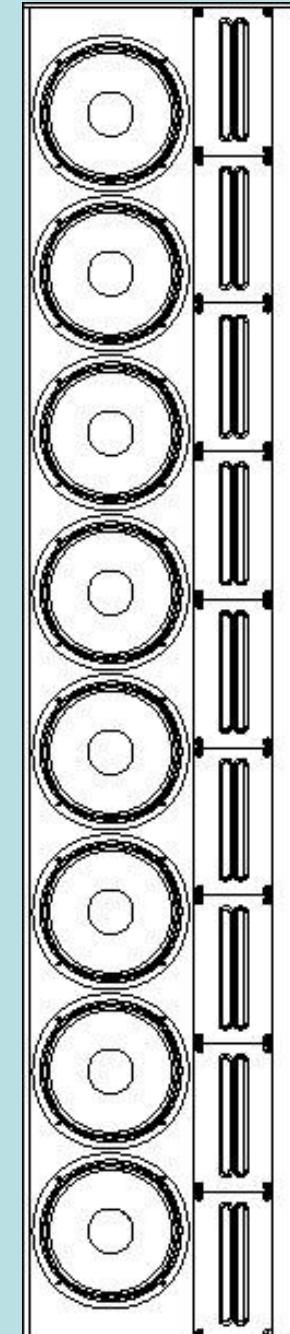
Digitally controlled ("steered") line source

Column height: Lowest frequency (longest wavelength) at which the system controls vertical beamwidth

Driver spacing: Highest frequency at which output is free of “grating”

Driver type and size: Horizontal dispersion

Driver bandwidth: Frequency response



Thoughts:

Which reflections are most harmful?

Dense but low in amplitude (broad range of reflections in terms of frequency response)

Random but higher in amplitude (spurious reflections of unrelated frequencies)