specifications in their present form will be reviewed. Attention will be given to several sections of the specifications wherein there has been considerable variance in audiometers of different manufacturers.

14. A Moving Coil Pistonphone for Measurement of Sound Field Pressures. RALPH P. GLOVER[1] AND BENJAMIN BAUMZWEIGER,[2] *Shure Brothers.*—A standard of low frequency sound-pressure was developed following the general theory of previous investigators. The dynamic pistonphone consists of a chamber about 50 cc in volume and a piston 0.3 cm in diameter driven by a moving coil mechanism, capable of executing strokes of approximately 1.0 cm at frequencies between 20 and 100 c.p.s. The stroke is measured by means of a telescope and scale, and the pressure developed is computed assuming isentropic law. A small crystal microphone is used as a pressure indicator within the pistonphone chamber, and becomes a calibrated microphone for the measurement of sound field pressures. The device appears to be more simple and easier to use than pistonphones previously described in the literature.

[1] Chief Engineer, Shure Brothers, Chicago.
[2] Development Engineer, Shure Brothers, Chicago.

15. Field Calibration of Microphones. G. S. COOK, *National Bureau of Standards (Introduced by V. L. Chrisler).*—The first requirement for the making of field calibration of microphones is a space in which free field conditions are realized as nearly as possible. A room has been constructed 16′×16′×12′. The treatment of the room is the same as that used in a similar room constructed at the Bell Telephone Laboratories with the exception that there is a four-inch layer of rock wool outside the layers of cloth. Exploration of the room shows a marked pattern as was found in the room at the Bell Telephone Laboratories. However, fair conditions are to be had when both the sound source and receiver are near the center of the room. The results of microphone calibration show fair agreement with those of other laboratories. When observations are made at short frequency intervals there are variations in the apparent sensitivity of a microphone sometimes greater than 1 db. These are evidently due to interference. Such variations are to be expected even with walls having a reflecting power of about one percent. It seems desirable to make a group of observations over a short frequency range rather than several observations at the same frequency.

16. Absolute Sound Measurements in Liquids. ELIAS KLEIN, *Naval Research Laboratory.*—The fundamental problem of absolute sound measurements in liquids is discussed. Regarding acoustic determinations, reference is made to certain inherent differences between air and water. An outline is presented of three methods now available. A modified radiation pressure apparatus is described which permits a dual check of the basic measurements involved, and at the same time makes possible microphone calibration for secondary standards.

17. A Calibrator for Sound Level Meters. J. M. BARSTOW, *Bell Telephone Laboratories.*—Experience has shown that a secondary acoustic standard suitable for calibrating sound level meters would be desirable and a certain amount of experimental work has been done toward the development of such a device. A model which generates a sound having a level of 84 db (40 db loudness weighting) and a frequency composition closely simulating that of a general type of room noise has been produced. The apparatus is to be demonstrated and it is suggested that its output be measured with the various sound level meters present as a means of checking the reference points employed.

TUESDAY, MAY 3, 1938, 2:00 P.M.

18. A Study of the Tuning of Pianos. O. L. RAILSBACK, *Eastern Illinois State Teachers College.*—Measurements of the pitch of each note on the piano were made immediately after tuning by means of the chromatic stroboscope.[1] Sixteen grand pianos and twelve upright pianos were included in this study. Different makes of pianos were used and the tuning was done by different tuners. Averages were computed for each of four tuners, using three grand pianos by each tuner, to discover whether or not different tuners follow different patterns of tuning. The conclusion is that they follow, on the average, about the same pattern with individual differences on the extreme ends. With this established the average was then taken of sixteen grand pianos to determine the slope of average deviation from the equally tempered scale. A line drawn to true fifths much more nearly coincides with the line of averages than does the line of true octaves and is very close for the middle five octaves. At the ends the departure is considerably greater. For the twelve upright pianos the departure is still greater. A variety of causes seem to contribute to the "stretching" of octaves. Inharmonic overtones in the bass and over compensating to avoid "flatting" are probably most significant.

[1] J. Acous. Soc. Am. **9**, 37 (1937).

19. An Adjustable Tuning Fork. O. HUGO SCHUCK, *C. G. Conn, Ltd.*—A portable tertiary frequency standard, adjustable over a small range, is described. The frequency determining element is a valve-maintained tuning fork, adjustment of whose frequency over a relatively small range is accomplished by changing the position of movable weights on the prongs. Calculations are simplified by the design of the fork, which permits the assumption of lumped constants. The weights may be moved while the fork is running without interfering with its operation. Indication of their position is by means of a pointer reading on a scale graduated directly in frequency units. A precise method of calibration is given. Mechanical arrangements are described for obtaining a uniformly spaced scale, and the possibility of using