APPENDIX D

AUDIOMETRIC TEST EQUIPMENT

D-1. Pulse Tone and Self-Recording Audiometric Test Equipment.

a. In the event that pulsed-tone audiometers are used, they shall have a tone on-time of at least 200 milliseconds.

b. Self-recording audiometers shall comply with the following requirements:

(1) The chart upon which the audiogram is traced shall have lines at positions corresponding to all multiples of 10dB hearing level within the intensity range spanned by the audiometer. The lines shall be equally spaced and shall be separated by at least 1/4 inch. Additional increments are optional. The audiogram pen tracings shall not exceed 2dB in width.

(2) It will be possible to set the stylus manually at the 10dB increment lines for calibration purposes.

(3) The slewing rate for the audiometer attenuator shall not be more than 6 dB/sec except that an initial slewing rate greater than 6dB/sec is permitted at the beginning of each new test frequency, but only until the second subject response.

(4) The audiometer shall remain at each required test frequency for 30 seconds (±3 seconds). The audiogram shall be clearly marked at each change of frequency and the actual frequency change of the audiometer shall not deviate from the frequency boundaries marked on the audiogram by more than ±3 cycles.

(5) It must be possible at each test frequency to place a horizontal line segment parallel to the time axis on the audiogram, so that test audiometric tracing crosses the line segment at least six times at that frequency. At each test frequency, the threshold shall be the average of the midpoints of the tracing excursions.

D-2. Audiometer Calibrations.

a. Daily Functional Test. The functional operation of the audiometer shall be checked before each day's use by testing a person and by listening to the audiometer's output to make sure that the output is free from distortion or unwanted sounds. Deviations of more than 5dB shall require an acoustical calibration.

b. Annual Acoustical Calibration. Audiometer calibration shall be checked acoustically, at least annually, according to the following procedures. The equipment necessary to perform these measurements is a sound level meter, octave-band filter set, and a National Bureau of Standards 9A coupler. In making these measurements, the accuracy of the calibrating equipment shall be sufficient to determine that the

audiometer is within the tolerances permitted by American Standard Specification for Audiometers, S3-1969.

(1) Sound Pressure Output Check.

(a) Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.

(b) Set the audiometer's hearing threshold level (HTL) dial to 70dB.

(c) Measure the sound pressure level of the tones at each test frequency from 500 Hz through the 6000 Hz for each earphone.

(d) At each frequency the readout on the sound level meter should correspond to the levels in Table D-1 or Table D-2, as appropriate, for the type of earphone in the column entitled "sound level meter reading."

(2) Linearity Check.

(a) With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70dB.

(b) Measure the sound levels in the coupler at each 10-dB decrement from 70dB to 10 dB, noting the sound level meter reading at each setting.

(c) For each 10-dB decrement on the audiometer, the sound level meter should indicate a corresponding 10dB decrease.

(d) This measurement may be made electrically with a voltmeter connected to the earphone terminals.

3. Tolerances. When any of the measured sound levels deviate from the levels in Table D-1 or Table D-2 by $\pm$3 dB at any test frequency between 500 and 3000 Hz, 4 dB at 4000 Hz, or 5 dB at 6000 Hz, an exhaustive calibration is advised. An exhaustive calibration is required if the deviations are greater than 10dB at any test frequency.

c. Exhaustive Calibration. An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.2; 4.1.4.3; 4.4.1; 4.4.2; 4.4.3; and 4.5 of ANSI 3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from the calibration.

D-3. Audiometer Test Room Background Noise Levels. Rooms use for audiometric testing shall not have background sound pressure levels exceeding those in Table D-3 when measured by equipment conforming at least to the Type 2 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

Table D-1. Reference Threshold Levels for Telephonics - TDH-39 Earphones

Frenquency (HZ)	Threshold Level (dB)	Meter Reading (dB)
500	11.5	81.5
1000	7	77
2000	9	79
3000	10	80
4000	9.5	79.5
6000	15.5	85.5

Table D-2. Reference Threshold Levels for Telephonics - TDH-49 Earphones

Frenquency (HZ)	Threshold Level (dB)	Meter Reading (dB)
3000	9.5	79.5
4000	10.5	80.5
6000	13.5	83.5

Table D-3. Maximum Allowable Octave Band Sound Pressure Levels for Audiometric Test Rooms

Octave-band center frequency (Hz)	500	100	2000	4000	8000
Sound pressure level (dB)	40	40	47	57	62