



AMBCO 1000+P AUDIOMETER



AMBCO ELECTRONICS

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1. ABOUT THE 1000+P AUDIOMETER

The AMBCO Model 1000+P is a microprocessor controlled pure tone air conduction audiometer with automated screening and automated threshold test feature.

2. FEATURES AND SPECIFICATIONS OF THE MODEL 1000+P

Meets performance requirements of ANSI S3.6-1996

OPERATING TEMPERATURE: 15° to 30°C (59°F to 86°F)

PRODUCT TYPE: Pure Tone, Type 4 Audiometer

TEST FREQUENCIES

AUTOMATIC THRESHOLD MODE (HZ): 500, 1000, 2000, 3000, 4000, 6000, 8000 (with validity check at 1000 Hz)

AUTOMATIC SCREENING MODE (HZ):

TEST 1: 500, 1000, 2000, 4000

TEST 2: 1000, 2000, 3000, 4000

MANUAL MODE: 250, 500, 1000, 2000, 3000, 4000, 6000, 8000

FREQUENCY ACCURACY: Less than 3% – Typically better than 2%

TOTAL HARMONIC DISTORTION: Less than 2.5%, typical 1%

HEARING LEVEL RANGE: 0 to 90 dB in 5 dB increments

POWER SUPPLY: 107-127 VAC 60 Hz, 10 Watts, UL approved (Optional 220 VAC 50/60 Hz available)

AC Adapter Output: 12V DC nominal at 500mA

HEARING LEVEL ACCURACY /Attenuator linearity: ± 1 dB

STIMULUS: Continuous, pulse or warble

Rise/fall time: 20 - 50 ms

DATA OUTPUT: RS-232 9600 Baud, 8 bits, no parity, DTR handshake

EARPHONES: TDH-39 or DD45, 10 OHM

CASE: Injection molded, impact resistant A.B.S. plastic

DIMENSIONS: Width 10 inches, Length 8 inches, Height 4.2 inches

TOTAL WEIGHT: 4.0 Lbs.

WARRANTY: 5 Years on base system

PRINT TIME: Typically less than 20 seconds (printer dependent)

3. SETTING UP THE AMBCO MODEL 1000+P with the Printer

3.1. Connect the printer cable securely to the audiometer and to the printer by completely tightening all four thumbscrews, two thumbscrews on each end of cable. Connect the printer AC adapter to the printer and the audiometer AC adapter to the audiometer recheck to be sure that both adapter plugs are fully inserted into each jack.

3.2. Locate the red & blue plugs on the cord connected to the headset and the black plug on the cord connected to the patient response switch. The three plugs need to be

connected to the three jacks located on the rear jack panel. Insert the blue plug into the blue jack, the red plug into the red jack and the black plug into the black jack.

- 3.3. Turn on the audiometer power switch located on the rear jack panel. The dB and Hz windows should display visible frequency and decibel numbers.
- 3.4. Turn on the printer, the power switch is located on left side of printer, move the switch towards the back to turn printer 'ON'. The lit green LED located on the left side of the front panel indicates the printer is on and a second green LED just above indicates that the printer on line.

4. GETTING STARTED – PATIENT INSTRUCTIONS

- 4.1. Turn audiometer ON. The power switch is located in the bottom left-hand corner of the front side of the audiometer.
- 4.2. Select **TONE** (Continuous, Pulse or Warble). Press TONE SELECT for choice.
- 4.3. Test the RIGHT ear first, press EAR for choice.
- 4.4. Inform the subject that you will place the headset over his/her head and the receivers will cover the ears. You will present tones, thus the patient shall respond by using the patient response switch. Make certain the patient understands the instructions, in that they will respond by pushing and releasing the hand switch as soon as they CLEARLY HEAR A TONE.
- 4.5. Adjust the headset, making certain the patient is comfortable. Place the right receiver (RED) over the right ear and the left receiver (BLUE) over the left ear.

5. THRESHOLD TESTING – ESTABLISHING HEARING LEVEL AT SELECTED FREQUENCIES

- 5.1. Follow the steps in Section 4 – Getting Started.
- 5.2. Present familiarization tone. Set HTL at 40 dB and FREQUENCY at 1000 Hz.
- 5.3. Press PRESENT TONE (lower center of panel) for 1-2 seconds. RED light above TONE indicates tone is being presented.
- 5.4. The patient responds by pressing hand switch. The green light shows a RESPONSE. If there is no green light, there was no response. SEE ALSO Section 5 - Negative Response.
- 5.5. If positive response, proceed with test by setting HTL at 30 dB and selected frequency, i.e., 500 Hz.
- 5.6. Press PRESENT TONE for 1-2 seconds.
- 5.7. Positive response, set HTL at 25 dB, PRESENT TONE, 1-2 seconds.
- 5.8. Positive response, set HTL at 20 dB, PRESENT TONE, 1-2 seconds.
- 5.9. Positive response, set HTL at 15 dB, NO RESPONSE.

- 5.10. This indicates the patient's hearing at 500 Hz in the right ear is 20 dB. The patient responded to 20 dB, but not to 15 dB.
- 5.11. Record result per Section 7 – Recording Results.
- 5.12. Set the HTL at 30 dB and FREQUENCY at next desired level, i.e., 1000 Hz and repeat Steps 1-11.

TYPICALLY, THRESHOLD TESTS ARE SPECIFIED BY PHYSICIANS. COMMON THRESHOLD TESTING INCLUDES FREQUENCIES 500 Hz, 1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 6000 Hz, 8000 Hz. THE STARTING dB LEVEL IS OPTIONAL. IF THERE IS NO RESPONSE AT ANY BEGINNING FREQUENCY (FIRST TONE PRESENTED AT ANY FREQUENCY), PROCEED TO SECTION 6 – NO RESPONSE.

6. NO RESPONSE

- 6.1. NO RESPONSE to familiarization tone or the first tone at any selected frequency. Proceed with the following instructions.
- 6.2. Increase the dB level by 10 dB – present the TONE until there is a positive response, i.e., at 30 dB and 1000 Hz, there is no response.
- 6.3. Increase HTL to 40 dB, PRESENT TONE, no response.
- 6.4. Increase HTL to 50 dB, PRESENT TONE, positive response.
- 6.5. Decrease HTL by 5 dB increments to 45 dB, PRESENT TONE, positive response.
- 6.6. Decrease HTL to 40 dB, PRESENT TONE, no response.
- 6.7. Results – Patient hearing at 1000 Hz is 45 dB. Positive response to 45 dB, but not to 40 dB.

7. RECORDING RESULTS

- 7.1. Using a common pad, Figure 1, you may record the results as in the following example.
- 7.2. Write the results above and below the frequencies on bottom of audiogram pad.
- 7.3. To graph results, frequencies are listed on top of diagram and the HTL dB on right and left.
- 7.4. First locate the frequency on top, go straight down where it crosses the dB level, i.e., at 500 Hz, left ear dB is 10. Where the 500 Hz crosses the 10 dB line, put an X – it represents the left ear. The dB is 20 on the right ear, therefore where the 500 Hz line crosses the 20 dB line, put an O – it represents the right ear.
- 7.5. Plot all of the results accordingly as shown in the above example, Figure 1.

Results	R	L
500Hz	20dB	10dB
1000Hz	25dB	10dB
2000Hz	30dB	15dB
3000Hz	20dB	10dB
4000Hz	25dB	10dB
6000Hz	20dB	10dB
8000Hz	30dB	30dB

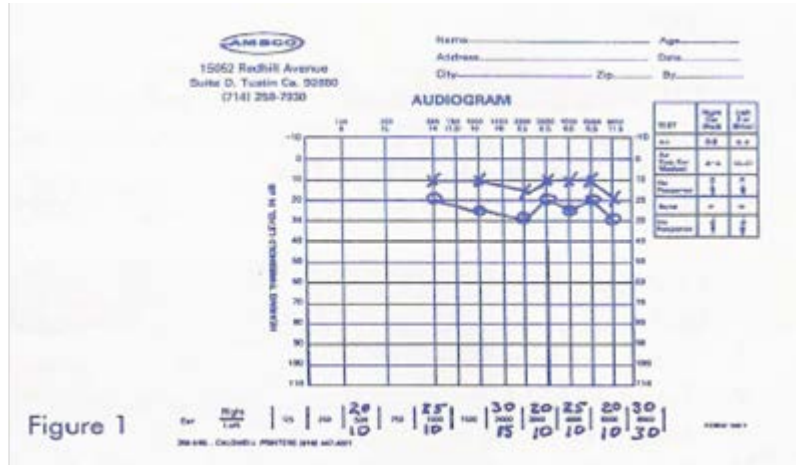


Figure 1

8. MANUAL TEST PRINT-OUT

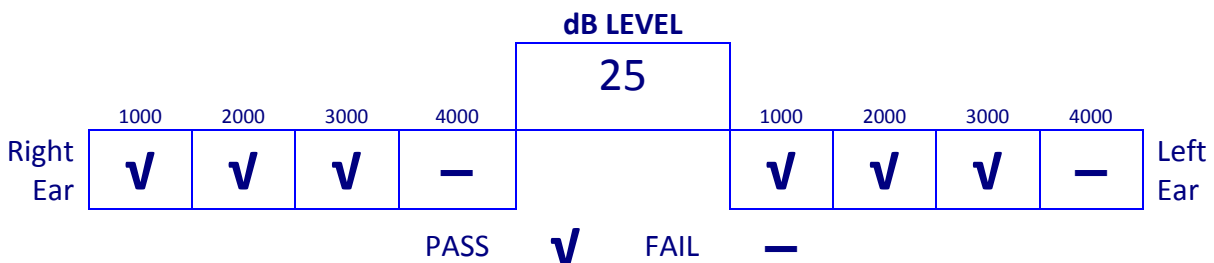
8.1. For printed manual test results, screening, threshold testing press and hold 'EAR' twice (1-2 seconds).

9. MANUAL SCREENING

With the audiometer on and ready, as in Section 4 – Getting Started, follow the following instructions:

- 9.1. Select a familiarization dB level, i.e., 40 dB, and then set frequency to 1000 Hz.
- 9.2. Press PRESENT TONE for 1-2 seconds. Look for patient's response, either with the hand switch or a hand signal.
- 9.3. Select the screening dB HTL, i.e., 25, press PRESENT TONE for 1-2 seconds.
- 9.4. With every positive response, select the next frequency, i.e., from 1000 to 2000 to 3000 to 4000 Hz and repeat Step 3, testing both the right and left ear.

SCREENING IS PASS OR FAIL. THE RESULTS CAN BE RECORDED AS FOLLOWS:



At 25dB the patient failed at 4000Hz both ears

10. INSTRUCTING THE PATIENT ON HOW TO TAKE THE TEST CORRECTLY

THIS IS THE SINGLE MOST IMPORTANT STEP !!!

- 10.1. Instruct the patient using the following phrases, “you are about to take a hearing test, it is not a contest so do not guess, respond only if you are sure you hear a tone (or set of tones if ‘PULSED’ is being used)” and it’s best to respond during the tone (or tones).”
- 10.2. Show the patient the correct way to respond; by pressing once then releasing the P/R switch to indicate the tone was heard. It is impossible for the instructions to be repeated to many times; “don’t guess, please remember to respond ONLY when you’re sure you hear a tone (or set of tones if ‘SELECT TONE’ is set to ‘pulse’) and that it’s always best to respond during the tone (or set tones if ‘PULSED’ is being used”.
- 10.3. Hand the P/R switch to the patient, ask if the patient understands that they must respond by pressing and releasing the hand switch once. You can have them try the response button now to see if they understand while you watch to see if the green response LED on front panel lights up once for each press of the push button.
- 10.4. Place the headset on the patient’s head with the red earphone over the right ear, the blue over the left ear, allowing the patient to adjust until the headset is comfortable.
- 10.5. You’re now ready to start the test when the patient indicates they are also ready.
- 10.6. The test begins when the ‘AUTO-TEST’ (‘PRESENT TONE’) touch pad is pressed.

11. AUTOMATED SCREENING TEST

Turn on – follow SECTION 4

Patient instruction – follow SECTION 10

- 11.1. To give an automated screening test, turn the audiometer on, press the ‘AUTO-TEST’ touch pad. The yellow ‘READY - IN PROGRESS’ LED turns on and the two digital display windows change. Use the left (dB HTL) knob and window to select the screening dB level from 10 to 35 dB-HTL. Use the right knob and window to select which frequencies will be screened. {1000, 2000, 3000, 4000 Hz} or {500, 1000, 2000, 4000 Hz}
- 11.2. Press ‘SELECT TONE’ to choose between the three types of tones to use;
- 11.3. Choose either continuous tone pulsed tone or warble tone.
- 11.4. Press ‘PRESENT TONE’ to start the test, which begins with a 40 dB HTL familiarization tone before continuing at your set dB level.

- 11.5. No response to the familiarization tone causes the alarm to sound, pressing any key stops the alarm. Then press 'EAR' for a print out of the error message, TEST FAILED AT FAMILIARIZATION TONE.
- 11.6. If there is a response to the familiarization tone, the test will proceed at the chosen dB level and the selected frequencies, testing the right ear first, then switches for the left ear. The screening continues sequentially with each response. If there is NO RESPONSE at any frequency, the patient is presented the same tone again. If there is a response to the second presentation, the test continues to the next frequency. If there is no response to the two tones the print out will show FAILED at that frequency.
- 11.7. When the screening is completed, the alarm will sound. PRESS EAR to stop the alarm and PRESS EAR again to print the results.

12. AUTOMATIC THRESHOLD TEST

Turn on – follow SECTION 4

Patient instruction – follow SECTION 10

- 12.1. Press 'AUTO-TEST' twice, the yellow READY LED and the red POWER LED are lit to indicate the audiometer is ready for automatic threshold testing.
- 12.2. Press 'PRESENT TONE' to start the test.
- 12.3. When the test is completed the alarm will sound, press EAR button to stop the alarm and press 'EAR' again for print out.
- The completed test print out shows the frequencies tested and the lowest dB level responded to at each frequency for each ear. NR indicates no response by the patient.
- 12.4. To conduct the next automatic threshold test, press 'AUTO-TEST' again until the yellow READY LED and the red POWER LED are lit.

13. ALARM

- 13.1. Whenever the alarm sounds, before completion of the test, press EAR button to turn off the alarm and PRESS EAR button again to print the message.
- 13.2. The print out will indicate the problem and instruct you to resume the test.

14. EXITING AUTO TEST MODE

The operator may exit AUTO-TEST at any time.

- 14.1. To exit AUTO-TEST MODE, press AUTO-TEST when the green light indicates the AUTO-TEST MODE is ON.

14.2. Exit AUTO-TEST after FAIL by pressing AUTO-TEST twice.

15. INTERPRETING RESULTS

The hearing test results are interpreted by qualified persons such as physicians, audiologists, or nurses.

Numerous factors affect hearing, such as age and background noise. This list below may be used as a general guideline to compare hearing test results.

AVERAGE THRESHOLD LEVEL (dB)*

00 – 15 dB	Normal hearing
16 – 25 dB	Slight hearing loss
26 – 40 dB	Mild hearing loss
41 – 55 dB	Moderate hearing loss
56 – 70 dB	Moderately severe hearing loss
71 – 90 dB	Severe hearing loss
91+ dB	Profound hearing loss

* Generally, if a person can hear as low as 25 dB at the test frequencies, his/her hearing is considered acceptable.