

AMBCO 2500 AUDIOMETER SYSTEM WITH FIVE YEAR WARRANTY



Model 2500 Audiometer with Printer and OTO–Chek Biological Test Simulator

MICROPROCESSOR CONTROLLED PURE TONE AUDIOMETER AUTOMATIC, SEMIAUTOMATIC, MANUAL HEARING TESTS INTERNAL MEMORY FOR STORAGE TESTS COMPUTER COMPATIBLE



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Model 2500 – User Manual

The AMBCO Model 2500 is an easy to use microprocessor controlled air conduction pure tone audiometer for testing hearing.

OUTSTANDING FEATURES

- AUTOMATIC, SEMIAUTOMATIC, MANUAL TESTS
- PRINT AND STORE TEST AUTOMATICALLY
- INTERNAL MEMORY STORES UP TO 260 TESTS
- COMPUTER COMPATIBLE
- LARGE CHARACTER LCD DISPLAY
- MONITOR TEST CONDITIONS IN PROCESS
- INPUT SOCIAL SECURITY NUMBER FOR ID
- LARGE PRINT OUT OF RESULTS
- CALIBRATION DATE, TEST DATE ON REPORT
- FAST PRINT (Less than 20 seconds depending on printer)
- VISUAL AND AUDIBLE ALARMS
- PAUSE, RESUME FOR OPERATOR CONTROL



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1.0 ABOUT THE 2500

The AMBCO Model 2500 is a microprocessor controlled air conduction pure tone audiometer designed for the testing of hearing.

The Model 2500 user interface has been expanded with scrolling help messages, system switches and extended automatic, semi-automatic and manual test modes.

Please familiarize yourself with the 2500 by reviewing this manual so that your testing will be easy, accurate and fast.

1.1 FEATURES AND SPECIFICATIONS OF THE MODEL 2500

Meets performance requirements of ANSI S3.6-1989

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

PRODUCT TYPE: Pure Tone, Type 4 Audiometer

TEST FREQUENCIES

AUTOMATIC (HZ): 500, 1000, 2000, 3000, 4000, 6000, 8000 (with validity check at 100 Hz)

SEMI-AUTOMATIC & MANUAL MODES: 250, 500, 750, 1000, 1500, 2000, 3000, 4000, 6000, 8000 (see Appendix V to disable 8000 Hz in automatic mode)

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

TOTAL HARMONIC DISTORTION: Less than 3%, typical 1%

HEARING LEVEL RANGE: 0 to 95 dB in 5 dB increments (250 and 8000 Hz, 0 to 85 dB)

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

AC Adapter Output: 12VAC nominal at 1000mA

HEARING LEVEL ACCURACY /Attenuator linearity: ± 1 dB

STIMULUS: Steady or pulsed

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

STORAGE CAPACITY: Up to 260 Audiograms

DISPLAY: 0.375" high, 2 line by 16 characters, backlight LCD

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

PC STORAGE SYSTEM: Contact AMBCO for availability

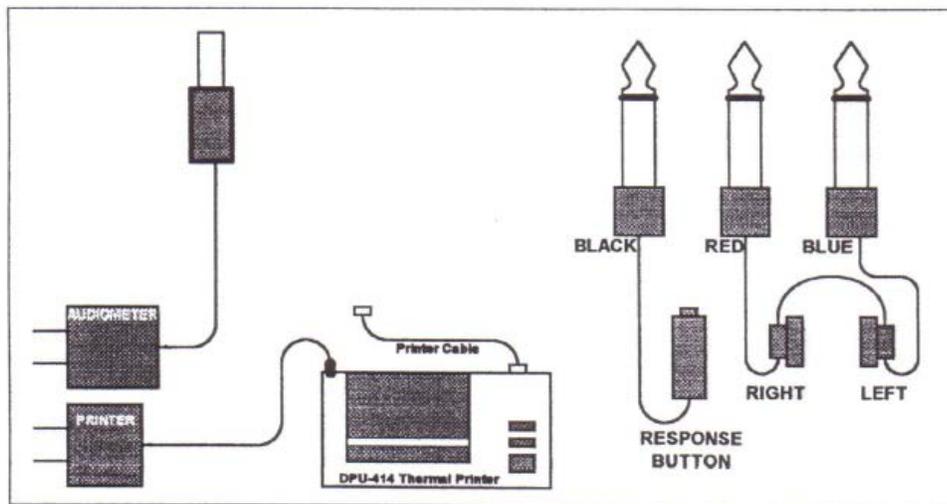
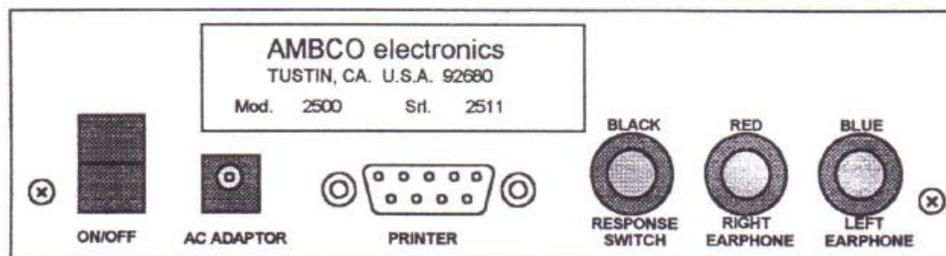
1.2 TO GET STARTED

Packing List:

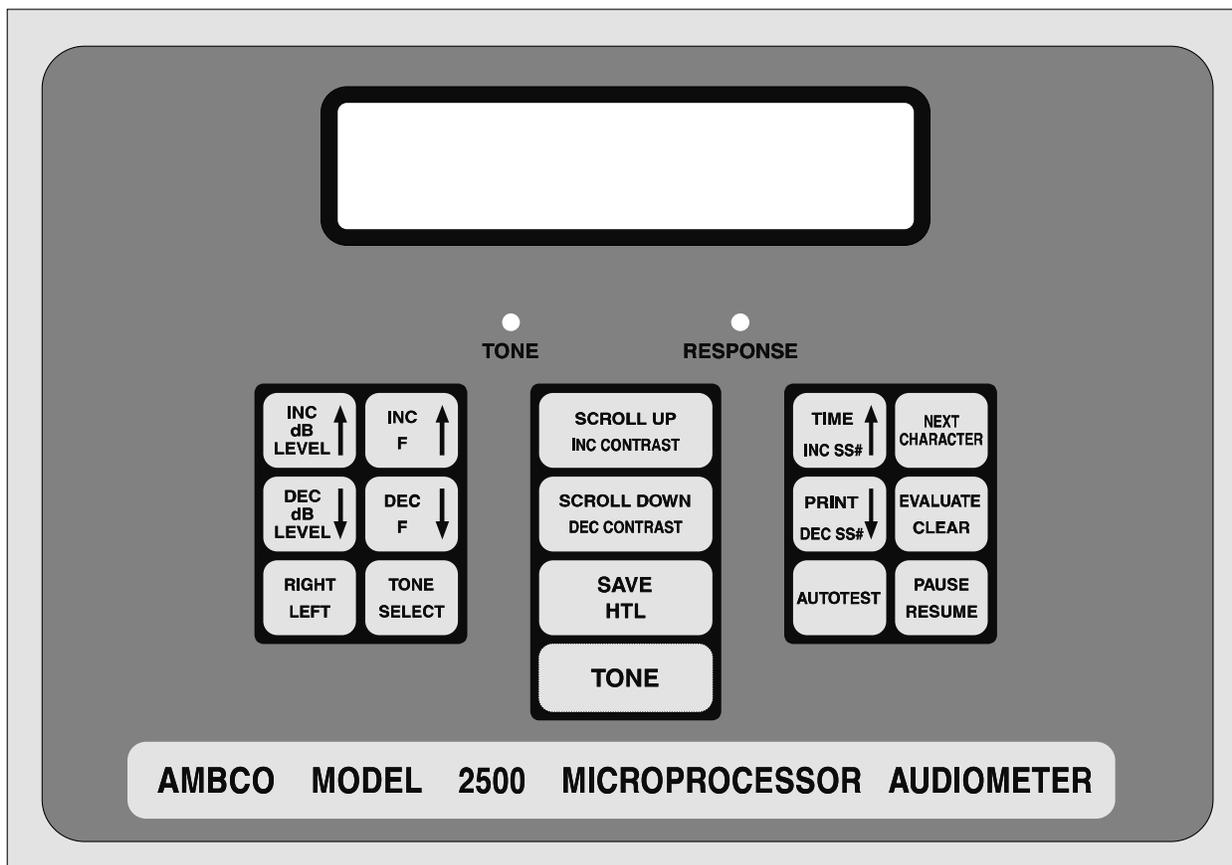
- 1 – 2500 Audiometer base unit
- 1 – 12 VAC wall mount adapter
- 1 – Pair of TDH-39 headphones
- 1 – Patient Response Switch
- 1 – Instruction Manual
- 1 – Printer interface cable

Unpacking your 2500 Audiometer – Remove the 2500 from its shipping container. Check for any visible damage, and contact AMBCO or an authorized distributor if any damage is noted. Place the 2500 on a flat table, and connect the AC adapter to the AC jack on the back panel. Connect the patient response to the BLACK jack, and right and left earphones into the RED and BLUE jacks, respectively. If you have a printer, connect the printer cable to the printer connector on the back panel and to your printer.

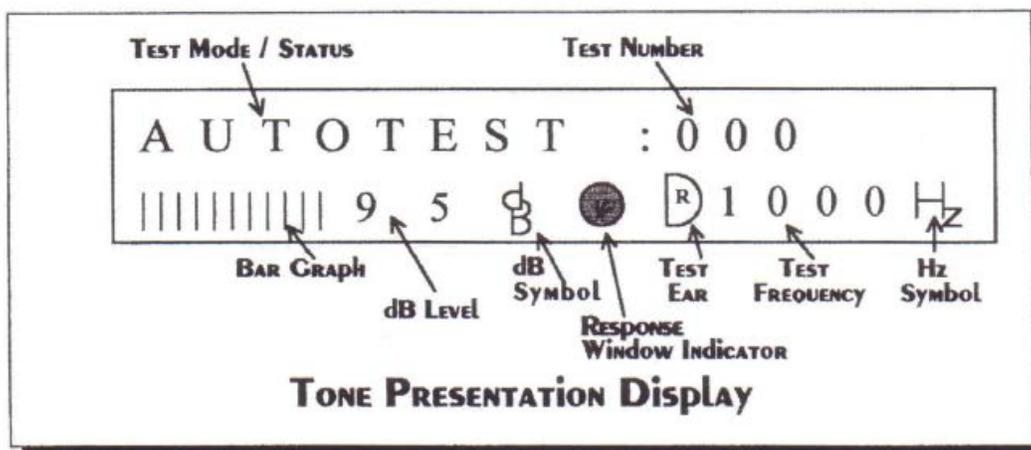
1.3 CONNECTIONS ON THE BACK PANEL



1.4 FRONT PANEL BUTTON LOCATIONS



1.5 THE AUDIOMETER DISPLAY



2.0 QUICK START REFERENCE

Plug the AC adapter labeled 'AUDIOMETER' into the jack on the back panel, and plug the adapter into 117 VAC. Turn on power switch located on the back panel. After the Model 2500 conducts an internal check, the display shows the Time and Date:

'Time 10:31'

'Date 01/01/96'

2.1 CHECKING YOUR INSTRUMENT

If you have an OTO-CHEK or similar type of biological simulator, connect it to the 2500 prior to checking your instrument. Press the **'AUTOTEST'** to start test sequence. The display will show SS#. Press the **'AUTOTEST'** button twice more to begin a test. After a complete cycle has been completed, an alarm will sound. Press **'PRINT'** to output the threshold levels to your printer. If you did not connect an OTO-CHEK, **'N/R'** will be printed as the response level (no response). Your AMBCO 2500 is now operating correctly.

2.2 INSTRUCTING THE PATIENT HOW AND WHEN TO RESPOND

- The patient should be instructed to respond only when a tone is heard.
- Respond immediately when the tone is heard, preferably while the tone is on.
- Respond by pressing and RELEASING the patient response switch.
- Inform the patient that the Model 2500 is programmed to present pure tones of varying frequencies and intensities at random intervals.
- The Model 2500 recognizes and monitors false (guessing) responses and will alarm if the patient registers 4 false responses at any frequency.
- Most importantly, this is a test to establish the patient's true hearing threshold level, therefore the speed at which this test is given is not necessarily significant.

2.3 STARTING A STANDARD AUTOMATIC TEST

The **'AUTOTEST'** button is used to run a completely automatic hearing test. Press **'AUTOTEST'** to start test and enter patient information per Section 2.4.

2.4 HOW TO ENTER PATIENT INFORMATION

Before a new test begins, you may enter the patient's Social Security # and Job ID #. Change each digit using the **'INC SS#'** and **'DEC SS#'** buttons, then move the cursor right using **'NEXT CHARACTER'** or left using **'EVALUATE/CLEAR.'** By pressing **'AUTOTEST'** a second time, you may skip the SS# entry (SS# = 000000000), and again to skip the Job ID entry (uses the current Job ID Number). AUTOTEST will begin, displaying the test frequency, ear and dB level being presented (see Section 4.0).

2.5 PRINTING AND STORING YOUR COMPLETED TEST RESULTS

When all required testing has been completed, press and release the **"PRINT"** button to output the audiogram to a printer or PC and save the test record in memory. Press **'PRINT'** to obtain additional hard copies if needed.

2.6 HOW TO INTERRUPT AN AUTOMATIC TEST

During an automatic test sequence, you can interrupt the test in progress by pressing the **'PAUSE'** button. Use this feature if the patient is having difficulties, or if you wish to conduct a manual test. The 2500 will complete the current tone presentation, displaying the message 'Pausing 000.' After the current test stops, the message "Test 000 PAUSE OPTION..." indicates that you are in Pause mode. You may press the following:

'TONE'	Manually outputs tones to the patient, records responses
'EVALUATE/CLEAR'	Halts all testing and erases the test
'PAUSE/RESUME'	Continues the current automatic sequence
'PRINT'	Ends current test, prints out the test, saves test in memory

2.7 IF YOU NEED TO PERFORM A MANUAL TEST

To give a manual test with a printout, press **'EVALUATE'** then press **'PAUSE'** 3 times (waiting 1 second between pushes). The 2500 is now in manual mode. Frequency, dB levels, ear select and tone select are set by the operator. Upon completion of testing, press **'PRINT'** to print results of manual test.

2.8 TESTING INDIVIDUAL FREQUENCIES

To test a single frequency and ear, select the dB level, frequency and ear you wish to test, then press the **'EVALUATE'** button. If this is a new test, you will be prompted to enter the patient SS# and Job ID # before starting the evaluation per Section 2.4. To bypass, SS# and Job ID #, press **'AUTOTEST'** twice to start test. When you have completed all required testing, press the **'PRINT'** button to output results to the printer or PC and store the test in memory.

2.9 WHEN YOU NEED TO TRANSFER MEMORY TO A COMPUTER

The internal memory can store up to 260 tests for transfer to a computer. Start your PC software. Be sure to follow the instructions specific to your software. Connect the 2500 to your PC, turn it on, and press and hold the **'PRINT'** button for 4 seconds. All stored test records are output starting from 000 to the last test recorded, displaying each test number as it is transferred. You may transfer memory as many times as needed, even if the audiometer is turned off and on. **IMPORTANT! – To erase all memory contents, simply start and save a new test anytime after transferring memory. This erases all previously recorded tests.**

3.0 BASIC AUDIOMETER CONTROLS

3.1 HOW TO ADJUST THE dB LEVEL

By pressing **'INC dB LEVEL'** OR **'DEC dB LEVEL,'** the operator can adjust the tone output level for semi-automatic or manual testing.

3.2 SELECTING THE TEST FREQUENCY

Pressing **'INC F' / 'DEC F'** increases or decreases the selected frequency for semi-automatic and manual modes.

3.3 WHICH EAR IS BEING TESTED?

Right or left earphones are selected by pressing ‘**RIGHT / LEFT.**’ The selected earphone is displayed on the LCD panel as **R** for right and **L** for left.

3.4 THE TONE TYPE BEING PRESENTED

Pressing ‘**TONE SELECT**’ toggles the presentation sequence from Pulsed to Steady mode. Each press of ‘**TONE SELECT**’ will toggle between Pulsed and Steady tone presentation modes. Pulsed mode is selected when you turn on the 2500.

3.5 PRESENTING A TONE TO THE PATIENT

The ‘**TONE**’ button is used to present operator specified frequencies and dB levels to a patient being tested. By selecting the frequency/ear/dB level in the idle mode (displaying time/date), a ‘Sample Tone’ may be presented to the patient prior to starting an automatic test. If the Steady tone has been selected, the tone output will remain on until the ‘**TONE**’ button is released.

4.0 PROCEDURES USED FOR AUTOMATIC TESTING

Pure tone, air conduction testing is done according to established audiometric procedures. A tone of controlled length (see Figure 6.1) is presented to the patient, and then the unit waits for a response from the patient response hand switch.

AUTOTEST mode always starts at 30 dB, 1000 Hz, right ear. A positive response will decrease the dB level by 10 dB (stopping at 0 dB) until there is no response, at which point the dB level is increased in 5 dB increments until the patient responds twice at the same dB level, thus establishing the **Hearing Threshold Level** for that frequency and ear. If there is no response to the initial tone presentation, the dB level will increase in 20 dB increments until there is a positive response. If there is no response to the highest dB level, a NR (No Response) is recorded. If a response occurs outside the response window (false response), the tone presentation is repeated at the current settings.

4.1 TONE PRESENTATION SEQUENCE AND RESPONSE WINDOW

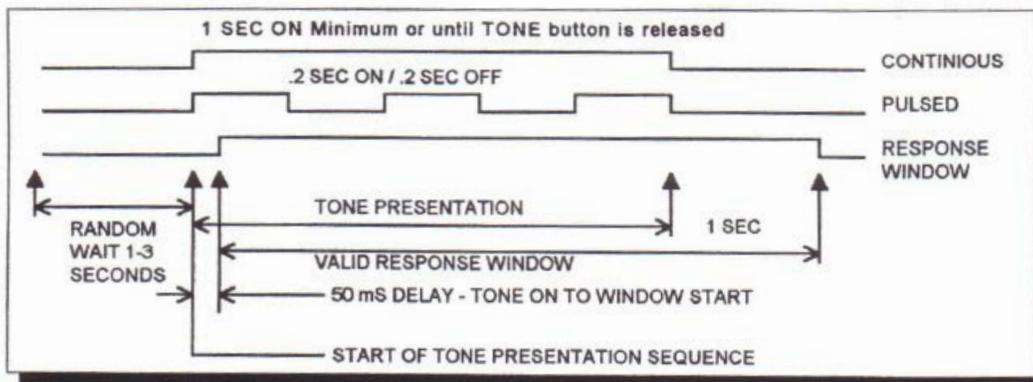


Figure 6.1

Test Procedure Example

Start of test – ‘30 dB R 1000 Hz’ is displayed (Semi-Automatic mode):

- 1) Positive response (within the response window), audiometer steps down to 20 dB
- 2) Positive response (within the response window), audiometer steps down to 10 dB
- 3) No response at 10 dB, audiometer steps up to 15 dB
- 4) No response at 15 dB, audiometer steps up to 20 dB
- 5) Positive response (within the response window), threshold is established at 20 dB, 1000 Hz, right ear.

4.2 ENTERING THE PATIENT TEST INFORMATION

If there is no current test record started, a test initialization sequence begins. The operator is prompted for a 'SS# 000000000,' with the cursor located under the first digit. Operators should enter the patient's Social Security number using the **'TIME / INC SS#'** and **'PRINT / DEC SS#'** buttons to change the number above the cursor. This number is important in identifying the test when transferring to a database. Set each digit and move the cursor one step to the right with the **'NEXT CHARACTER'** button or left with the **'EVALUATE / CLEAR'** button.

4.3 SETTING THE JOB ID FOR SEVERAL TESTS

After all 9 digits are correct, the last press of **'NEXT CHARACTER'** leads to the JOB ID # entry prompt. The same process used to set the SS# is used here also. Notice that the JOB ID # has not changed since the last time it was altered, allowing multiple tests with the same JOB ID #. Change the JOB ID # if required, or use the current number by pressing **'AUTOTEST'**, which will start the automatic test sequence.

4.4 WHAT IS VALIDITY CHECKING?

During an AUTOTEST, the 2500 first establishes the HTL for 1000 Hz in the right ear. The frequency changes to 500 Hz, determines the threshold, and returns to establish a second 1000 Hz threshold (validity). The first and second thresholds must match within 5 dB to pass validity. If the difference is greater than 5 dB, AUTOTEST tries a second time, and sounds an alarm if the second attempt fails (see APPENDIX II). After passing the validity check, AUTOTEST establishes the patient's threshold for 2000, 3000, 4000, 6000, and 8000 Hz for the right ear. Next, the left ear is tested starting at 500 Hz and 30 dB, continuing on to 1000, 2000, 3000, 4000, 6000, and 8000 Hz (to skip 8000 Hz, see APPENDIX V). When complete, an alarm will sound (if enabled), indicating that AUTOTEST is done. Press the **'PRINT'** button to cancel the alarm, print out the current test and record the test in memory.

4.5 ENTERING PAUSE MODE AND TEST OPTIONS

A new feature of the Model 2500 is the ability to momentarily suspend an automatic test. This is useful if the patient has an obvious problem, and you need to conduct certain test frequencies manually. Pressing the **'PAUSE'** button will put the current test on hold, thus entering in to Pause Mode (display 'Test 000 PAUSE OPTION...'). There are four functions that are possible in Pause Mode:

'TONE' Select the frequency, ear and dB level to test manually.

'EVALUATE / CLEAR'

**'PAUSE / RESUME' or
'AUTOTEST'**

'PRINT'

Then press **'TONE'** to present a tone sequence to the patient. A valid response is added to the current test record, replacing any existing data.

Clears all test data and patient information. The next new test will reuse the same test number.

Continues the automatic test, retaining any additional data recorded, as well as skipping any added frequencies.

Ends the current test and outputs an audiogram to the printer or PC. Also stores the test in memory for transfer to your computer later.

4.6 IF PATIENT HAS TROUBLE DURING AN AUTOMATIC TEST

Pause mode allows the operator the opportunity to perform any manual tests that may be required. For example – A patient has an obvious loss of hearing in one ear or at certain frequencies. The operator can pause the test by pressing **'PAUSE,'** and then set the required dB level and frequency values. The operator then presses **'TONE'** to present a manual sequence to the patient. Any valid patient response is added to the current test record data, replacing any existing data.

4.7 DAILY BIOLOGICAL SIMULATOR TESTS

The 2500 has a special mode used to verify that your 2500 is operating correctly. Connect your OTO-CHEK (or similar biological simulator) to your audiometer and press and hold the **'AUTOTEST'** button. The OTO-CHEK mode will rapidly present all frequencies, and record the established HTL's, then print them out upon completion.

5.0 SCROLLING TEST DATA

5.1 CHECKING YOUR TEST DATA FOR ACCURACY

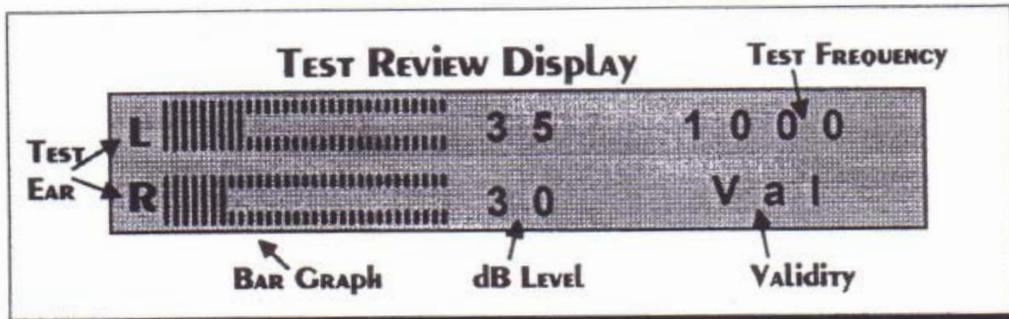
The Model 2500 now has the ability to review the current test information prior to storing in memory or printing. The system switch 'Display Test' must be on to use this feature (see Section 6.2 or Appendix V for more information). When an AUTOTEST finishes, or the **'PRINT'** button is pressed, the LCD begins displaying the current test data on the LCD before printing or storing a test. The three buttons in the center of the 2500's front panel are used in the Display Test mode.

The top and middle buttons are the **'SCROLL UP'** and **'SCROLL DOWN'** buttons, and will scroll the data panels up or down the display. A bar graph on the left side of the LCD displays right and left data starting at the highest frequency containing a valid response. Frequency is displayed on the right side along with 'Hz' or "Val" for validity. Two additional panels are also displayed – 1) test number / test date and time, and 2) SS# / JOB ID. Use the **'SCROLL UP'** and **'SCROLL DOWN'** buttons to flip through the current test record.

5.2 RECORDING YOUR FINAL TEST RESULTS IN MEMORY

The 'SAVE HTL' button is the third button down (just above the 'TONE' button). Press this when the current displayed test is acceptable. This will continue the normal print output and memory store cycle. The current test will be recorded and no further alterations or additions to the current test record will be possible.

5.3 TEST REVIEW DISPLAY



6.0 SYSTEM SWITCH SETTINGS

6.1 MAKING ADJUSTMENTS TO THE CLOCK

Pressing the 'TIME / INC SS#' button when the 2500 is in idle mode (displays time / date) starts the time / switch settings menu. If adjustments to the 2500's clock are required, each press of the 'INC SS#' and 'DEC SS#' buttons will increase or decrease the clock in 1 minute steps. When the setting is correct, wait without pressing any button for 2 seconds, and the message 'System Settings Change?' will appear. Press the 'TIME' button to record the change, or wait without pressing any button to abort the change.

6.2 CHANGING THE CONTROL SWITCHES

System Switch Functions:

<u>Display</u>	<u>Default</u>	<u>Switch Function</u>
Print SEIKO	OFF	Turn on for darker printing on DPU-414 printer.
Remote monitor	OFF	Prints out patient's errors for remote monitoring.
Patient alarm	ON	Turns the beeper on or off.
Display test	OFF	Turn on to review test data prior to store / print.
Test memory	ON	Turns off storage. Caution: No test data is stored.
English display	ON	
Print form	OFF	
Custom mode	OFF	ON eliminates 8000 Hz from test.

6.3 IF YOUR DISPLAY IS HARD TO READ

The LCD display may be hard to read at some angles or temperatures. When the 2500 is idle, pressing the top two center buttons (see front panel diagram in Section 1.5) will vary the LCD's contrast. The contrast will reset to the default value at each power up.

6.4 DISPLAYING THE SYSTEM INFORMATION

Pressing the 'NEXT CHARACTER' button when the 2500 is idle (displaying time / date) will start scrolling your system information on the display. Information consists of Model, Serial Number, Calibration Date, Calibrating Company, Calibration Due Date, Total Test Count, and Software Release Version. The same information is printed out each time your audiometer is calibrated. Note: The display will fast forward scrolling messages when any button is pressed. Be careful, as the button you use to fast forward may perform unwanted operations when the message ends.

7.0 OPTIONAL ACCESSORIES

- PC transfer kit (2 RED connectors and cable)
- Patch cord, P/N AMPC-3
- SEIKO thermal printer, P/N DPU-414
- Thermal paper (box of 5 rolls), P/N PT-411
- OTO-CHEK – Biological Calibration Simulator, P/N OTO-CHEK

7.1 AMBCO 5 YEAR LIMITED WARRANTY

This warranty is extended to the original purchaser of the audiometer by AMBCO through an approved Special Instrument Distributor or through AMBCO directly, and covers defects in materials or workmanship for a special period of 5 years from the date of delivery to the original purchaser.

Defects will be corrected at no cost to the purchaser within the first 5 years, except for shipping charges to and from point of service. This warranty does not apply to those parts that are subject to normal wear and tear, such as cords, ear cushions, headband, and power supply, which are warranted for one year. Replaceable parts which may deteriorate with use will be supplied at reasonable cost. The manufacturer's liability under the above warranty is void if the audiometer is repaired by someone other than AMBCO or an authorized AMBCO Special Instrument Distributor.

AMBCO ELECTRONICS Model 2500

Serial No. _____

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APPENDIX

I. TURNING OFF AN ALARM

Press any button to cancel an alarm caused by a patient error. System errors cannot be turned off and indicate that a serious problem has occurred.

II. ERRORS CAUSED BY THE PATIENT

HOLDING BUTTON ERROR – Patient is holding down the response button. Instruct the patient to press and release the response button only when a tone is heard.

TONES PRESENTED ERROR – The 2500 has presented 15 tones at one frequency. The patient either stopped responding, or did not respond to the same threshold level twice (the patient may be guessing). Review the patient instructions and continue testing.

FALSE RESPONSE ERROR – The patient has responded outside the response window 4 times at one frequency. This usually indicates the patient is guessing.

TEST VALIDITY ERROR – The AUTOTEST sequence could not establish similar 1000 Hz HTL's (within 5 dB) twice in a row. In most cases, the patient is improperly responding or may be guessing.

III. WHAT TO DO WHEN THERE IS A TEST OR SYSTEM ERROR

MEMORY FULL ERROR – The internal storage is full. No further testing is possible after 260 tests have been stored. When your 2500 displays '**MEMORY FULL**,' you will need to either transfer, print out, or discard the stored 260 tests.

- To transfer to a PC, refer to Section 2.9.
- To print out tests, press and hold '**PRINT**' until printing begins.
- To discard or simply clear the memory, disconnect printer connector from back of audiometer; press and hold '**PRINT**' for about 4 seconds, allow 2500 to cycle through all tests, then reconnect printer and resume testing.

CALIBRATION DUE – The calibration date is older than 1 year. You may override the error and continue using your 2500 by pressing any button. Only a limited number of calibration due overrides are allowed before the 2500 will stop operating completely. Please have your 2500 calibrated as soon as possible.

TIME ID ERROR – Internal time clock error – CONTACT AMBCO!

NVRAM CS ERROR – Internal temporary memory error – CONTACT AMBCO!

CAL CS ERROR – Internal calibration memory error – CONTACT AMBCO!

EEPROM ACK ERROR – Internal test memory error – CONTACT AMBCO!

IV. CONNECTING TO A COMPUTER FOR DATA TRANSFER

All data formats (printing and PC transfer) contain the same information. Only tested frequencies with valid responses will be printed or transferred. All data is transferred in a standard ASCII character set with tab, line feed, carriage return, and underline (see sample audiogram). Start your PC software, connect the 2500 to the PC using the RED DB-9 connector on the audiometer, and RED DB-9 connector on your PC. To initiate a data transfer, press and hold the '**PRINT**' button any time the

2500 is not currently conducting a test. The display will show ‘Hold to Transfer Memory!,’ indicating that no test is currently being conducted.

V. SETTING THE SWITCH OPTIONS – Contact AMBCO

The following section provides details about each switch function. Refer to Section 6.2 on changing the Control Switches for more information.

Print SEIKO	Use only for the SEIKO DPU-411 + DPU-414 printer to improve print quality.
Remote monitor	When turned ON, any patient error will be printed out as well as displayed. Use this option in combination with the Patient Alarm to conduct side by side testing with multiple 2500’s. The operator can monitor several audiometers remotely for any errors without disturbing other patients. Default is OFF.
Patient alarm	When turned OFF, this switch disables the 2500’s beeper. Alarms will still be displayed on the LCD, except at the end of an automatic test. The alarm is skipped, jumping directly to the print and store step. Default is ON.
Display test	The 2500 will scroll the current test data on the LCD when this switch is turned ON. Use the ‘SCROLL UP’ and ‘SCROLL DOWN’ buttons to review the test, and the ‘SAVE HTL’ button to continue with the normal print and store step. Default is OFF.
Test memory	To use the 2500 in non-storage mode, turn the Test memory switch OFF. Test data will not be recorded in nonvolatile memory; however, you can print as many copies of each test as needed. The test number is used for reference only, and resets to 000 every time you turn on the audiometer. Default is ON.
English display	Keep ON.
Print form	Keep OFF.
Custom mode	When turned ON, 8000 Hz will be eliminated from test.

TONE LIGHT

The RED Tone light performs 3 different functions.

- 1) Pulsed or steady light any time a tone is being presented to the patient.
- 2) Blinking light for all alarms (even if beeper is turned off).
- 3) Steady light during printing indicates printer is offline.

VI. WHAT IS PRINTED ON AN AUDIOGRAM

The Serial Number of your 2500

The last time it was calibrated

The person or company who calibrated it

When the calibration is due

The test number, date and time

The patient's Social Security Number

The test or group Job ID

Each frequency tested

The Hearing Threshold (in dB HTL) of the tested person

AMBCO 2500		Serial# 2525
Calibration Date: 01/03/96		by:AMBCO
Calibration Due Date: 01/03/97		
Test: 010	Date: 02/28/95	Time: 16:24
Patient _____		
SS# 00000000	Job ID: 2525	
FREQ	L/dB	R/dB
500	35	30
1000		30
2000	40	
Examiner: _____		

VII. OTO-CHEK

OTO-CHEK[®]

BIOLOGICAL AUDIOMETER CALIBRATION SIMULATOR

**OTO-CHEK SPECIFICATIONS**

TEST FREQUENCIES:	Full range 125 to 8K Hz.
STIMULUS FORMAT:	Continuous or pulsed.
POWER SOURCE:	AC Adapter (output 14V DC 220mA) or 9 Volt battery.
WEIGHT:	Less than 2 pounds.
RESPONSE OUTPUT:	Normally open relay contacts.

MEETS OSHA AND OTHER REQUIREMENTS FOR BIOLOGICAL AUDIOMETER CALIBRATION CHECKS.

OTO-CHEK can be used with any manual audiometer or automatics with NORMALLY OPEN RELAY CONTACTS.

READY TO USE

Simply place the earphones over right and left couplers of OTO-CHEK.

For **MANUAL TESTING** turn OTO-CHEK on. Present the tones as in manual testing and record the frequency and HL when there is positive **RESPONSE** by OTO-CHEK, red light on. Retain these baseline results and use them to compare future tests. **ESTABLISH NEW BASELINE** every time the audiometer is re-calibrated.

For **AUTOMATIC TESTING** place the earphones on OTO-CHEK, plug the response switch from OTO-CHEK to response jack on audiometer. Turn OTO-CHEK on. Turn automatic audiometer on and initiate automatic test.

If printer is connected to the audiometer, results will be printed. Retain these baseline results and use them to compare future tests. **ESTABLISH NEW BASELINE** every time the audiometer is re-calibrated.

SIMULATED CALIBRATION CHECK RESULTS

The periodic audiometer calibration check must be with (plus or minus)(\pm)5dB of baseline (e.g. if baseline at 1000Hz is 60dB, any results of 55 or 65dB are acceptable).

Authorized Distributor:



15052 Redhill Ave., Suite D
Tustin, CA 92780
800-345-1079 714-259-7930 FAX 714-259-1688

VIII. 2500 QUICK REFERENCE

AMBCO 2500 Rel 3.4 OPERATION - QUICK REFERENCE

(Please study the Model 2500 Rel 3.4 Operation Manual)

AUTOMATIC TESTING

INSTRUCT THE PATIENT ON HOW AND WHEN TO RESPOND BY PRESSING AND RELEASING THE PATIENT RESPONSE SWITCH. ADJUST AND PLACE THE HEADSET ON THE PATIENT'S HEAD, RED EARPHONE COVERING THE RIGHT EAR, BLUE THE LEFT. MAKE CERTAIN THE PATIENT IS COMFORTABLE. STRESS TO THE PATIENT TO RESPOND ONLY WHEN TONE IS HEARD.

PRESS AND RELEASE THE BUTTON. TO SKIP THE SS# AND JOB ID, PRESS TWICE MORE TO START THE TEST. ENTER THE SS# USING THE BUTTON TO INCREASE, OR BUTTON TO DECREASE THE DIGIT ABOVE THE CURSOR. MOVE THE CURSOR RIGHT USING THE BUTTON, OR LEFT USING THE BUTTON TO SET ALL 9 SS# DIGITS. AFTER THE LAST SS#, YOU CAN OPTIONALLY CHANGE THE JOB ID# (USE SS# BUTTONS) OR PRESS TO START THE TEST. WHEN THE TEST IS COMPLETE, THE ALARM WILL SOUND (IF 'PATIENT ALARM' IS ON). PRESS TO PRINT AND SAVE THE TEST.

PAUSING AN AUTOMATIC TEST

PRESSING THE BUTTON ANYTIME DURING AN AUTOMATIC TEST WILL DISPLAY 'PAUSING 000'. WHEN THE LAST TONE SEQUENCE HAS ENDED, YOU HAVE 4 OPTIONS:

1. PRESSING WILL PRINT AND STORE THE CURRENT (INCOMPLETE) TEST.
2. TO CLEAR THE TEST, PRESS THE BUTTON.
3. MANUAL TEST DATA CAN BE ADDED TO THE CURRENT TEST BY CHANGING THE dB LEVEL / FREQUENCY / EAR AND PRESSING THE BUTTON. ANY VALID PATIENT RESPONSE WILL BE ADDED TO THE TEST DATA.
4. YOU CAN RESUME THE AUTOMATIC TEST BY PRESSING THE OR BUTTON.

EVALUATING INDIVIDUAL FREQUENCIES

SELECT THE FREQUENCY AND EAR YOU WISH TO EVALUATE USING THE AND BUTTONS. PRESS THE BUTTON AND ENTER THE SS# AND / OR JOB ID# (SEE ABOVE), OR PRESS TWICE TO START TESTING. WHEN ALL REQUIRED FREQUENCIES HAVE BEEN TESTED, PRESS THE TO PRINT AND STORE THE TEST DATA.

IX. OTO-CHEK QUICK REFERENCE

OTO-CHEK Biological Simulator Mode

To perform an OTO-CHEK (or similar biological simulator), press **AUTOTEST**. Press **AUTOTEST** TWICE MORE TO BEGIN AN OTO-CHEK TEST. WHEN OTO-CHEK IS COMPLETE, PRESS THE **PRINT DEC SS#** button TO PRINT AND STORE THE OTO-CHEK TEST DATA.

Adjusting the Display Contrast

AFTER TURNING THE 2500 ON, USE THE **SCROLL UP INC CONTRAST** AND **SCROLL DOWN INC CONTRAST** TO ADJUST THE LCD'S CONTRAST.

Changing the Clock

PRESS THE **TIME INC SS#** button TO DISPLAY THE MESSAGE 'Adjust Time - XXX'. USE THE **TIME INC SS#** AND **PRINT DEC SS#** BUTTONS TO ADVANCE OR DECREASE THE CLOCK SETTING. WHEN THE CORRECT TIME IS DISPLAYED, RELEASE BUTTON; THE MESSAGE WILL SWITCH TO 'CHANGE SYSTEM SETTINGS?'. PRESSING **TIME INC SS#** WITHIN 2 SECONDS WILL RECORD THE NEW CLOCK SETTINGS.

Changing System Switch Settings

THE APPROPRIATE SETTINGS HAVE BEEN PRESET BY THE MANUFACTURER. IF YOU CHOOSE TO CHANGE ANY SETTINGS CONTACT AMBCO FOR INSTRUCTIONS.

To clear 'MEMORY FULL' first DISCONNECT THE PRINTER CONNECTOR FROM THE BACK OF THE AUDIOMETER, PRESS & HOLD 'PRINT' FOR ABOUT FOUR SECONDS UNTIL UNIT DISPLAYS: 'PRINTING00, PRINTING01...'. AFTER SEQUENCE STOPS (ABOUT 2 MINUTES) RECONNECT PRINTER CONNECTOR TO AUDIOMETER AND RESUME TESTING.

SYSTEM ALARMS

MEMORY FULL	MAXIMUM OF 260 TESTS IN MEMORY
TEST VALIDITY ERROR	FIRST TO SECOND 1000 Hz HTL TEST DIFFERENCE GREATER THAN 5 dB
FALSE RESPONSE ERROR	PATIENT IS RESPONDING WHEN THERE IS NO TONE
TONES PRESENTED ERROR	15 TONES HAVE BEEN PRESENTED WITHOUT A VALID HTL
HOLDING BUTTON ERROR	PATIENT IS HOLDING THE RESPONSE BUTTON DOWN

AMBCO Electronics
(714) 259-7930 (Office)
(714) 259-1688 (Fax)

MY AUDIOMETER NEEDS RECALIBRATION AND/OR REPAIRS – WHAT DO I DO?

- 1) Find a box that will fit your unit and accessories. Please ensure that your unit and accessories are packaged with packing material, so as to possibly prevent any damage during the shipping process. Also, it is important to ensure your audiometer.
- 2) Next, fill out the following form and send it along with your audiometer and accessories. **Remember, the audiometer and headset is required to perform a recalibration.**
NOTE – Rentals are available if you cannot be without an audiometer. Normally, AMBCO has a turn-around time of **10-14** business days or less “in shop,” so the majority of the time that the unit will not be available to you will be due to shipping.
- 3) If you need us to call you with an estimate before repairing the unit, please specify this information on the following form. AMBCO will automatically replace all broken parts and repair any “out of specification” problems, unless instructed otherwise.
- 4) When sending the unit, remember that how you send it to us is how we will send it back to you, as in Overnight = Overnight or Ground=Ground. Remember, AMBCO charges for return shipping fees and the calibration itself, so please include a P.O. # if applicable.

Fill out and return the following page along with your unit. Thank you!



Ship to: AMBCO ELECTRONICS
ATTN: REPAIRS
15052 REDHILL AVE., SUITE D
TUSTIN, CA 92780

Please fill out the following form and include with your package:

Your Company Name _____

Shipping Address _____

Billing Address _____

City _____ **State** _____ **Zip** _____

Phone # _____ **Ext#** _____ **Fax** _____

Contact Name _____

Email _____

PO #(Must have if your company uses them): _____

AUDIOMETER: MAKE _____

MODEL _____

SERIAL # _____

Please remember that the audiometer AND HEADSET are required to perform a recalibration. The patient response button and power adapter should also be sent to us so they can be checked along with the unit.

Use the following lines for any problems, questions, or special instructions.
(If necessary, the back side of this page may be utilized as well)

Notes _____

For AMBCO’s Internal Use ONLY: (Do Not Fill Out this section)

Date Received: _____ **Carrier:** _____ **Method:** _____ **Model:** _____ **SR#:** _____

Items Received: ()Audiometer ()Headset ()P/R ()A/C ()Bag () _____