Earscan® 3

ES3M

Manual Pure Tone Audiometer

User's Manual

Rev 1.05

Micro Audiometrics
CORPORATION

Precautionary Notes: Earscan® 3M Audiometer

1. The Earscan® 3M is designed for use with (4) alkaline 1.5 volt AA size batteries.

2. When installing batteries in the Earscan® 3M, you must observe the correct polarity. If one or more cells are installed with reversed polarity, the instrument will not operate in the battery-powered mode, and the audiometer may be damaged.

3. Use only the factory-supplied, medical grade power adaptor (wall cube) with the ES3M. Use of any other power adaptor will invalidate the warranty and may result in damage to the audiometer.

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INTRODUCTION

The ES3M is a manual pure tone air conduction audiometer with talk over. It provides manual screening and threshold test capability. The ES3M is an easy to use audiometer with considerable functionality. It is user customizable and can be battery or AC powered. One of the most powerful features of the instrument is the ability to be updated or upgraded via a PC attached to the Internet. Using factory supplied software, firmware updates/upgrades can be downloaded from the Micro Audiometrics website and installed on the ES3M. Micro Audiometrics will be periodically adding new features to the firmware, and these features can be downloaded from the Micro Audiometrics website or obtained from an authorized Micro Audiometrics distributor.

Basic Operation

The ES3M audiometer has a yellow keypad/overlay with nine operational keys. The **ON** key provides a single function; it powers up the audiometer. The **MENU** key enters the menu system and also navigates 'upward' in the menu structure; that is, if you have navigated to a particular menu point, repeatedly pressing the **MENU** key will return you to the top level menu, and pressing the **MENU** key while in the top level menu will return you to test mode. The **TALK** key toggles talk over mode. The remaining keys provide test control when in audiometry mode, and provide menu navigation and selection control when in Menu mode.

In this manual, when key presses appear in **{ }**, this means that you should press the indicated key. For example, **{Hz▲}** means press the **Hz▲** key, **{L}** means press the **L** key, **{MENU}** means press the **MENU** key, etc.

ON – Turn instrument power on.
MENU – Enter Menu mode or move "up" in the menu structure.
TALK – Enter/exit talk over mode.
Hz▲ – Increase frequency or move up in a menu list.
Hz▼ – Decrease frequency or move down in a menu list.
dB▲ – Increase level or move up in a menu list.
dB▼ – Decrease level or move down in a menu list.
L – Present Tone to the Left ear or select a menu item.
R – Present Tone to the Right ear or select a menu item.
L + R – Present Tone to Both ears.

Press the  logo key to display the ES3M Information screen. Press any key to exit the information display screen.

The Menu System

The ES3M default mode is manual audiometry test mode. There are, in addition, a number of user-selectable options that may be accessed via the menu system. For example, the display screen contrast, back light brightness, power-down timeout delays, and key "click" volume may be adjusted through the menu system. Audiometric test defaults, such as starting test level, frequencies to test, and tone presentation mode (pulsed / continuous), may be selected through the menu system.

The menu system is designed for intuitive use. Press **MENU** while in manual audiometry mode to enter the 'top level' of the menu system. Once you are in the menu system, **{MENU}** will move from 'lower' to 'higher' menu screens; that is, if you have navigated several levels 'down' into the menu structure, **{MENU}** will return you to the next 'higher' menu level until the 'top level' menu is reached. Pressing **{MENU}** again will return you to test mode ("Press Menu to Return to Testing" will be displayed at the bottom of the main menu screen).

Menu accesses shown in this guide assume that you begin at the 'top level' menu. Menu sequences are represented as **⌐Menu1 ⌐Menu2 ⌐Menu3,** where the **"⌐"** symbol is used to indicate "scroll to Menu Item and press the **L** or **R** key".

Navigating through menus is done using the **{Hz or dB ▲}** or **{Hz or dB ▼}** keys to move up or down through a menu list (highlighted text indicates currently selected item) and then pressing **{L}** or **{R}** to make the selection.

For example, **⌐Audiometry Setup ⌐Frequencies to Test** means that you should enter the menu system by pressing **MENU**, navigate to Audiometry Setup (e.g, using **Hz or dB ▼** key), press the **L** or **R** key, navigate to Frequencies to Test and press the **L** or **R** key.

Note: You can always return to testing mode by repeatedly pressing {MENU}.

ES3M SETUP

Cable Connections

The ES3M audiometer can be powered by 4 AA Alkaline batteries (battery compartment is accessible from the back of the instrument). Optionally, power from an AC adapter can be supplied via the 6-pin multi-purpose “mini DIN” connector on the top of the instrument.

The headset cable plugs into the 15-pin connector on the top of the instrument and is held in place by two screws.

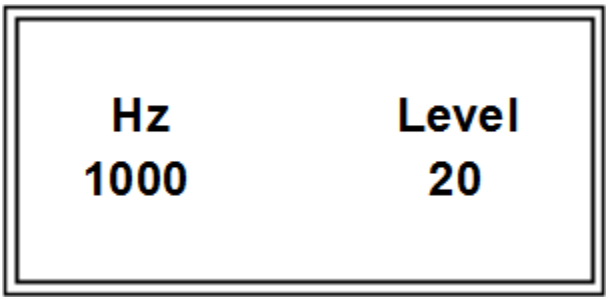
Power Up

Press the **ON** key, and the ES3 logo will appear and a beep will be heard. The instrument will then enter audiometry mode and is ready to begin testing. Note that the instrument’s last calibration date is displayed on the screen at power up (e.g., Last Cal: 02/14/2024).

MANUAL AUDIOMETRY

When the ES3M is in manual audiometry mode, the screen format shown in **Figure 1** will be displayed. This display example indicates that the frequency is 1000 Hz and the test level is 20 dB HTL.

Figure 1. Manual Audiometry Display



Testing Procedure

1. Instruct the patient to raise his/her hand whenever a tone is heard.
2. Position the headphones over the patient's ears (**Red** over **Right** ear, **Blue** over **Left** ear).
3. Select the test frequency using the **{Hz▲} / {Hz▼}** keys.
4. Use the **{dB▲} / {dB▼}** keys to adjust the hearing level and **{L}** and/or **{R}** to present the stimulus to Left, Right, or both ears. When testing with Continuous signals, stimulus duration should be about **1 second**; the minimum duration allowed is 200 ms.
5. Continue using **{dB▲} / {dB▼}** and **{L / R}** to present stimuli consistent with the test paradigm being used (typically Hughson-Westlake) until threshold is determined.
6. Use **{Hz▲} / {Hz▼}** to select the next frequency to test.
7. Repeat steps 3 through 6 until threshold has been determined for each frequency for the selected test ear.
8. Repeat steps 3 through 7 until threshold has been determined for each frequency for the second ear.

Quantifying Hearing Loss

Table 5 provides a general reference for converting threshold in decibels to degree of hearing loss.

Table 1. Scale of Hearing Loss

0 – 20 dB	Hearing within normal limits
25 – 40 dB	Slight to mild hearing loss
45 – 55 dB	Moderate hearing loss
60 – 70 dB	Moderately severe hearing loss
75 – 90 dB	Severe hearing loss
90 dB+	Profound hearing loss

Talk Over

Talk over mode may be entered by pressing **{TALK}** while in audiometric testing mode. There is no specific microphone 'opening'; sound arrives at the microphone through various openings in the cabinet (e.g., connector cutouts). Talk over volume may be increased using **{dB ▲}** or **{Hz ▲}** and decreased using **{dB ▼}** or **{Hz▼}**. It is recommended that a normal speaking voice be used at a distance of 1 to 2 feet while using volume adjustment to compensate for hearing status of the listener. Press **{TALK}** or **{MENU}** to exit talk over mode.

Audiometry Options

Selecting Frequencies

The frequency set to be used for manual testing may be viewed or modified via the menu sequence **⌐Audiometry Setup ⌐Frequencies to Test.** The display will show the list of available test frequencies and there will be a check mark (√) next to the ones currently selected for testing. Use the **{Hz or dB ▲}** or **{Hz or dB▼}** keys to move the highlight to a frequency to select or deselect it for testing, and **{L}** or **{R}** to toggle between 'selected' and 'deselected'. Repeat this process as necessary to select or deselect other frequencies. The default frequency set includes 250, 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz.

Once selections are completed, use **{MENU}** to exit frequency selection mode and return to the menu system.

The test starting frequency may be viewed or modified via the menu sequence ⌐**Audiometry Setup** ⌐**Starting Frequency**. The display will show the list of available test frequencies and the currently selected starting frequency will be highlighted. Use the **{Hz or dB ▲}** or **{Hz or dB ▼}** keys to move the highlight to the desired starting frequency and press **{L}** or **{R}** to select the frequency.

Selecting Levels

The level set to be used for manual testing may be viewed or modified via the menu sequence ⌐**Audiometry Setup** ⌐**Levels to Test.** The display will show the list of available test levels and there will be a check mark (√) next to the ones currently selected for testing. Use the **{Hz or dB ▲}** or **{Hz or dB ▼}** keys to move the highlight to a level to select or deselect it for testing, and **{L}** or **{R}** to toggle between 'selected' and 'deselected'. Repeat this process as necessary to select or deselect other levels. The default level set includes 10, 20, 30 and 40 dB.

Once selections are completed, use **{MENU}** to exit level selection mode and return to the menu system.

The test starting level may be viewed or modified via the menu sequence ⌐**Audiometry Setup** ⌐**Starting Level**. The display will show the list of available test levels and the currently selected starting level will be highlighted. Use the **{Hz or dB ▲}** or **{Hz or dB ▼}** keys to move the highlight to the desired starting level and press **{L}** or **{R}** to select the level.

Lock or Unlock Settings

Audiometry setup settings may be "locked" if desired via the menu sequence ⌐**Audiometry Setup** ⌐**Lock Settings**. Enter a password and press **{L}** / **{R}** to lock all user settings at their current state.

Caution! Be sure to record or memorize the password used to lock instrument settings. This password will be required to unlock settings.

When audiometry settings are locked, the menu selection will change to Unlock Settings. To unlock settings, enter the menu sequence ⌐**Audiometry Setup (password)** ⌐**Unlock Settings** and enter the password that was used to lock the settings.

Advanced Settings may still be changed when Audiometry Settings are locked.

Reset Settings

All user selectable instrument settings may be returned to factory default values via the menu sequence ⌐Audiometry Setup ⌐Reset Settings. Calibration data will not be affected.

> **Caution!** 'Reset Settings' will return all user-selectable settings to factory defaults. User settings that differ from factory defaults will be lost.

ADVANCED SETTINGS

Power Options

Inactivity timeouts automatically turn off the LCD backlight and power after selectable periods of inactivity to conserve energy and extend battery life (see **Table 1**; ( ) indicates default setting).

Note: The backlight requires considerable battery power. Setting the backlight power-down interval longer than necessary will decrease battery life when the ES3M is battery powered.

Individual time-out values may be selected for AC powered and battery powered operation. Table 1 shows the setting options for AC Power, and Table 2 shows the options for Battery power.

Table 2. AC Power Timeout Options

⌐Advanced Settings ⌐A/C Power Settings ⌐Backlight	(Never) 30 seconds 1 minute 2 minutes 5 minutes
⌐Advanced Settings ⌐A/C Power Settings ⌐Power Down	Never 1 minute 5 minutes (15 minutes) 30 minutes 1 hour

Table 3. Battery Timeout Options

⌐Advanced Settings **⌐Bat. Power Settings** **⌐Backlight**	5 seconds 10 seconds (20 seconds) 30 seconds 1 minute
⌐Advanced Settings **⌐Bat. Power Settings** **⌐Power Down**	15 seconds 30 seconds (1 minute) 2 minutes 5 minutes

Screen Properties

The LCD Screen is preset at the factory with typical contrast and brightness settings, but both are user adjustable to allow optimizing the display for differing viewing conditions (e.g., ambient lighting or viewing angle). Adjusting either setting may necessitate adjusting the other; e.g., increasing screen brightness may require changing contrast for optimum viewing.

The contrast setting has no appreciable effect on battery life, but higher brightness settings require more power and will decrease battery life. Brightness should be set to as low a value as is convenient to preserve battery life.

Adjust Contrast

LCD contrast can be adjusted via the menu sequence **⌐Advanced Settings ⌐Adjust Contrast.** Use **{Hz / dB ▲} / {Hz / dB ▼}** to adjust contrast to the desired setting. Use **{L} / {R}** to save the setting, or press **{MENU}** to exit without changing the contrast setting.

Adjust Brightness

LCD brightness can be adjusted via the menu sequence **⌐Advanced Settings ⌐Adjust Brightness.** Use **{Hz / dB ▲} / {Hz / dB ▼}** to increase or decrease brightness. Use **{L} / {R}** to save the setting, or press **{MENU}** to exit without changing the brightness setting.

Note: A brighter backlight requires more battery power. Setting the backlight brightness to a value greater than needed will decrease battery life.

Key Volume

Key presses are silent when in test mode, but produce audible 'beeps' when in the menu system. The beep volume can be set via the menu sequence **⌐Advanced Settings ⌐Key Volume** {Low/Medium/High}.

Calibration

The ES3M supports a Telephonics TDH-39 headset. Special hex screws are used to attach the headset cable to the ES3M. Use of these screws serves as a reminder that headset assemblies should not be casually exchanged, which could invalidate calibration. As a further safeguard, calibration mode is **password protected** to minimize the risk of inadvertent changes (e.g., while 'browsing' through menus).

Micro Audiometrics recommends that audiometers be calibrated annually. The last calibration date is displayed in the lower left-hand corner of the logo screen each time the instrument is powered up to serve as a calibration "due date" reminder.

Please see the ES3 **Calibration Guide** for more detailed information regarding headset management and calibration.

TECHNICAL SPECIFICATIONS

ANSI S3.6 Type:	**4**
Frequencies (Hz): (+/- 1%)	**250, 500, 1000, 2000, 3000, 4000, 6000, 8000**
Earphones:	**TDH-39**
Levels (dB HTL):	**-10 to 80 (+/- 1 dB)**
Presentation:	**Pulsed or Continuous**
Test Mode:	**Manual**
Display:	**128 x 64 Backlit LCD**
Headset:	**TDH-39**
Power:	**4 AA Alkaline Batteries, A/C adapter**
Standards Met:	**ANSI S3.6-1996, ANSI/AAMI ES1:1993**

FUNCTIONAL 'QUICK CHECKS'

The following checks can be used to verify instrument operation and to help narrow the focus for solving problems.

At power-up the ES3 logo should appear and the backlight should be on. After a short pause, the ES3M should proceed to Audiometry test mode and should respond to keypad control.

Keypad operation can be tested by pressing keys and verifying that the appropriate response occurs (e.g., **{dB▲}** increases level, **{Hz▲}** increases frequency, etc.). The speaker should produce audible 'ticks' when keys are pressed while in the menu system (keys are silent in test mode).

Next, check signal generation and keypad control. Select 1000 Hz at maximum output level and press the L or R key. A tone presentation should be heard at a comfortable loudness level at the corresponding earphone. Use **{dB▲} / {dB▼}** and **{L} / {R}** to verify that signal loudness increases or decreases, respectively.

TROUBLE SHOOTING

Problem	Possible Solution
ES3M does not power up.	Check batteries or verify that wall cube is attached and plugged in.
Signal is missing or intermittent.	1. Verify that headset cable connector is securely attached and mounting screws are snug. 2. Move or gently bend headset cable to see if problem "comes and goes" – if so, there may be a break in the wiring. 3. Verify that screws holding the "fork" connectors at each earphone are snug.

EXTERNAL INTERFACE

Connectors

The headset attaches to a high-density 15-pin D-Subminiature connector, and is held in place with allen (hex head) screws to minimize the possibility of accidental mismatch of headset to instrument. All other cables are attached via a multi-purpose 6-pin mini DIN connector. The ES3M wall cube or USB cable may be attached to the mini DIN connector. Connector pin outs are as follows:

Multi-purpose Connector

6-pin mini DIN (pin configuration is shown as viewed from back of instrument)

Pin	Function	Pin	Function
1	Ground	**4**	USB D+
2	+5 V In	**5**	
3		**6**	USB D-

6 5
4 3
2 1

Headset Connector

15-pin high density D-Sub (pin configuration is shown as viewed from back of instrument)

Pin	Function	Pin	Function
1	+5 V Out	**9**	Not Used
2	Lt Phn+	**10**	Not Used
3	Lt Phn-	**11**	Ground
4	Rt Phn+	**12**	Not Used
5	Rt Phn-	**13**	Not Used
6	Not Used	**14**	Not Used
7	Ground	**15**	Not Used
8	Not Used		

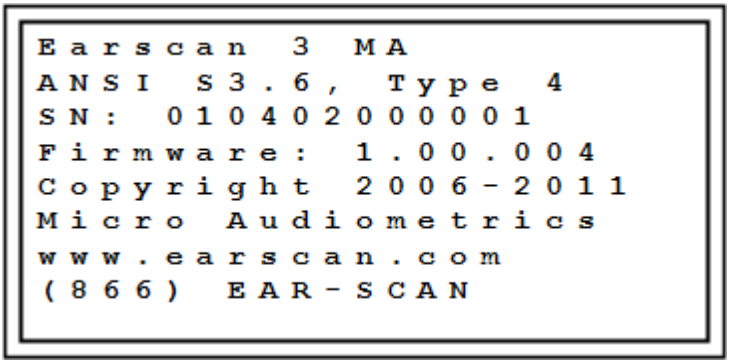
5 4 3 2 1
10 9 8 7 6
15 14 13 12 11

ES3M INFORMATION

Press the logo key to display the ES3M Information screen. Press it again, or press MENU to exit the information display screen.

Serial number and firmware revision are important when upgrades, updates, and/or service are being considered.

Figure 2. Information Display



WARRANTY

MICRO AUDIOMETRICS CORPORATION
LIMITED WARRANTY

ES3M Pure Tone Audiometer

1. This is a “LIMITED WARRANTY” as defined in the Consumer Product Warranty and Federal Trade Commission Improvement Act. This WARRANTY gives you specific legal rights and you may also have other rights that vary from state to state.
2. Micro Audiometrics Corporation warrants this Earscan® 3 Pure Tone Audiometer to be free from defects in materials and workmanship for five (5) years and the headset and patient response button for one (1) year under normal use.
3. This WARRANTY does not cover items subject to normal wear and tear such as cables, earphone cushions, carrying cases, batteries, broken or marred cabinets, or any other accessories used in connection with this product, or consequential damages due to a defect in the product.
4. This WARRANTY does not apply to any product damaged by accident, misuse, tampering, alteration, abnormal condition of operation, carelessness, or if the products were altered or repair was attempted by anyone other than Micro Audiometrics Corporation or one of its Authorized Equipment Service Centers.
5. This WARRANTY applies only to the original customer, and only on units purchased and used solely within the United States and begins on the date of purchase. For your convenience keep the dated Invoice or Packing List as evidence of the purchase date.

Products not manufactured by Micro Audiometrics Corporation (noise reducing headphone enclosures, insert headphones, printers) are covered by their manufacturer’s WARRANTY. Micro Audiometrics Corporation may, at its sole and exclusive option, repair or replace this product with either a new or like-new product provided that it has the functionality equal to the product replaced.

There are no obligations or liabilities on the part of Micro Audiometrics Corporation for consequential damages arising out of, or in connection with, the operation, use or performance of the product including, without limitation, with respect to loss of time, revenues or profits.

This WARRANTY does not cover transportation to and from the point of service. **“Loaner” equipment is not provided while service is being performed.**
*****
In the event of any claim of a defect covered by this WARRANTY, the customer should take the following steps:

- Contact Micro Audiometrics Corporation to discuss the nature of the claim.
- The audiometer and headset to be returned should be packed in the original shipping box. If not available choose an appropriate box with sufficient packing material to prevent damage during shipping.
- Return to Micro Audiometrics Corporation, 1901 Mason Ave, Suite 104, Daytona Beach, FL 32117 or to one of our Authorized Service Centers.

Micro Audiometrics Corporation disclaims all other warranties, expressed or implied, including any warranty of merchantability or for function of fitness for a particular purpose or application.

CONTACT INFORMATION

For additional information or assistance, contact your local distributor or contact Micro Audiometrics directly at:

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Product and company information is available on the internet:
www.earscan.com

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For product support or technical issues, send email to:
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