Earscan® 3

ES3S

Pure Tone
Screening Audiometer

User's Manual

Rev 1.14

Micro Audiometrics
CORPORATION

Precautionary Notes: Earscan® 3S Audiometer

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

2. When installing batteries in the Earscan® 3S, 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 adapter (wall cube) with the Earscan® 3S. Use of any other power adapter will invalidate the warranty and may result in damage to the audiometer.

4. If the Earscan® 3S has only external power available (low batteries or no batteries installed), be aware that unplugging the mini DIN connector will result in power loss and potential data loss. If it is necessary to disconnect the mini DIN in this case (e.g., to switch from USB cable to printer cable), it is advisable to turn the instrument off, make the cable change, then turn the instrument back on.

5. The Earscan® 3S does not implement handshaking protocol on the serial port. This means that the ES3S will not detect an unconnected serial port or a 'printer not ready' condition.

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INTRODUCTION

The ES3S is an easy to use, customizable, pure tone, full frequency air conduction audiometer, with the talk over feature. It is designed to be powered with (4) AA alkaline batteries but can also be powered with the included AC wall cube or USB cable to your computer.

Manual Conventions

The following conventions are used to indicate interactions with ES3:

KEY Presses appear in { }; e.g. {▲} means press the ▲ key.
Basic menu navigation is done using {▲} / {▼} and {◄} / {►}.

Use the {O} key to **present tones, select menu items**, or **select list items.**
It's the navigation key in the center of the array:

▲

◄ O ►

▼
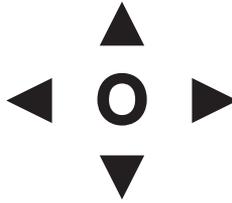
Menu sequences appear as ┏**Menu1** ┏**Menu2** ┏**Menu3.** The **"┏"** symbol is used to indicate "scroll to Menu Item and press the **O** key.

Use {◄} / {►} to select digit position and {▲} / {▼} to scroll through digits when entering time, date, and ID numbers.

Keypad

The ES3S audiometers have a green keypad/overlay and 5 unlabeled keys (see **Figure 1**). The numbers in outline (e.g., '**3**') are used to represent key **positions** for reference purposes.

Figure 1. Keypad

```
            E S 3 S

   5  u n l a b e l e d   k e y s

   N u m b e r s   i n d i c a t e
      K e y   p o s i t i o n s
```

1	2	3	4	5
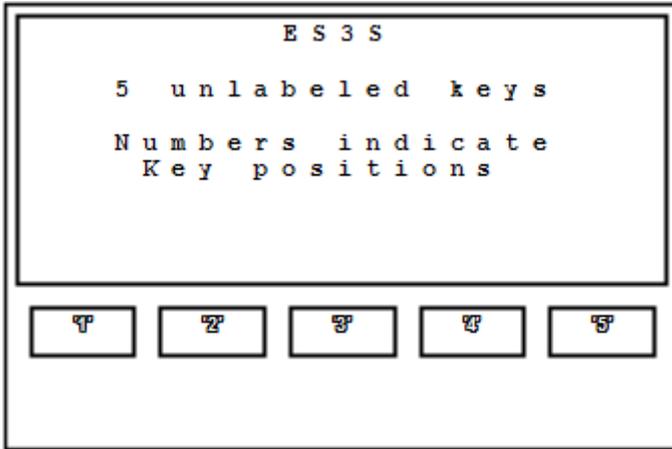
Menu Navigation

The menu system is designed for intuitive use. Navigating through menus is as simple as using the **{▲}, {▼}, {►}**, or **{◄}** keys to highlight a selection and then pressing **{O}** to make a selection. The **{Menu}** key is used to exit test mode and enter the menu system, and also to move from 'lower' to 'higher' menu screens. Press **{Menu}** while in manual audiometry mode to enter the 'top level' of the menu system. If the user has navigated 'down' into the menu structure, each **{Menu}** press will return to the next 'higher' menu level until the 'top level' menu is reached. Menu sequences shown in this guide assume that the user begins at the 'top level' menu.

> **Note: The 'top level' menu can always be reached by repeatedly pressing {Menu}.**

Function Keys

At times, 'actions' or 'toggles' will be displayed on the bottom line of the LCD. The keys just below the display are then used as 'function' keys to perform an action (A), or to toggle between two possible parameter values (a/b).

Figure 2 illustrates how keys are mapped to actions or toggles shown on the LCD.

Figure 2. Mapping Function Keys to LCD Text

```
      Upper   screen   area
        displays   text.

Last   line   may   display
text   OR   function   key
assignment;   e.g.,


Auto   L/[R]   Send   Clr   Talk
```

```
  [1]     [2]     [3]     [4]     [5]
```
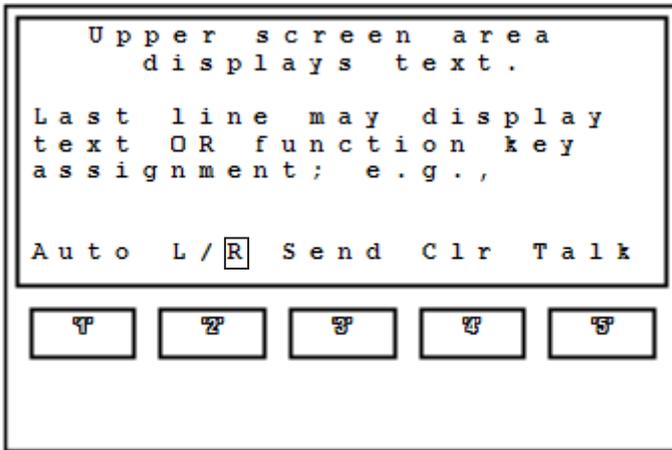
In this illustrative example, there are four 'Actions' (Auto, Send, Clr, and Talk) assigned to 'Function' keys **'1', '3', '4',** and **'5'**. Press **{'1'}** to perform action Auto, **{'3'}** to perform the action Send, **{'4'}** to perform action Clr, and **{'5'}** to perform action Talk. The 'L/**R**' shown above {'2'} indicates an L/**R** toggle with 'R' currently selected. Pressing **{'2'}** will toggle between the two possible states, and the state selected will be highlighted (e.g., **R**).

SETUP

Cable Connections

ES3S audiometers can be powered by 4 AA Alkaline batteries (battery compartment is accessible from the back of the instrument). Optionally, power from an AC adapter or USB bus power can be supplied via the 6-pin multi-purpose "mini DIN" connector on the top of the instrument. The AC adapter may be plugged directly into the ES3S mini DIN socket if serial communication is not required, or it may be plugged into the power adapter receptacle at the end of a printer cable or optional computer interface cable (RS-232). The headset and response button cable assembly plugs into the 15-pin connector on the top of the instrument.

For installations that require patching through a booth wall, optional booth adapter and headphone adapter cables are available. The booth adapter cable replaces the headphone/response button cable and terminates in three ¼" phone plugs compatible with standard booth patch panels. The headphone adapter cable provides ¼" mono phone plugs for TDH-39 headphones.

Power Up

Press the **{On}** key, and the ES3 logo will scroll onto the screen unless scrolling has been disabled (see Power Up Logo), or the instrument was last powered down due to an inactivity time-out. When power-up initialization is completed, enter **{1}** to begin a new test or enter **{2}** to continue a previous test automatically saved by the ES3S at its last power down. If "**New Test**" is chosen, previous test results will be lost. Be sure to Print or Send before starting new test.

If you choose to begin a new test, the ES3S will prompt you to enter the Patient ID and an Operator ID. The manual audiometry screen will then be displayed and the instrument is ready to begin testing.

Note: When the ES3S powers down due to an inactivity timeout or in response to ⌐**Turn Off**, current test data is automatically saved to non-volatile memory. This prevents loss of data in case a test is interrupted. When the ES3S is powered back on, pending data will be restored and the test can be continued, if desired, or a new test can be started.

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 ES3S is battery powered (see **Screen Properties,** pg.22).

Table 1. Power Settings

AC
  Backlight
    ⌐Setup ⌐Power ⌐A/C ⌐Backlight
	30 seconds
	1 minute
	2 minutes
	5 minutes

AC
  Power Down
    ⌐Setup ⌐Power ⌐A/C ⌐Power Down
	Never
	1 minute
	5 minutes
	(15 minutes)
	30 minutes
	1 hour

Battery
  Backlight
    ⌐Setup ⌐Power ⌐Battery ⌐Backlight
	5 seconds
	10 seconds
	(20 seconds)
	30 seconds
	1 minute

Battery
  Power Down
    ⌐Setup ⌐Power ⌐Battery ⌐Power Down
	15 seconds
	30 seconds
	(1 minute)
	2 minutes
	5 minutes

Beep Volumes

Key presses are silent when in test mode, but produce audible 'beeps' when in the menu system. The volume of these beeps can be set via the menu sequence **⌐Setup ⌐Beep Volumes ⌐Key Volume** {Low/Medium/High}. The ES3S also produces an alert sound when certain errors occur and to indicate the completion of an automatic test. The volume of this alert can be set via the menu sequence **⌐Setup ⌐Beep Volumes ⌐Alert Volume** {Low/Medium/High}.

Talk Over

Talk over mode may be entered by pressing **{'5'}** while in audiometric testing mode. There is no specific microphone 'opening'; sound arrives at the microphone through other openings in the cabinet (e.g., the slot in the side). Talk over volume may be adjusted with the **{◄} / {►}** keys. It is recommended that a normal speaking voice be used at a distance of 1 to 2 feet, and volume adjustment used to compensate for hearing status of the listener. Press **{1}**, **{Menu}**, or **{O}** to exit talk over.

Time and Date

The ES3S has a battery-backed up real time clock to maintain time and date. The clock is set at the factory prior to shipment. See section Real-Time Clock Settings (pg. 22) for details on how to check or set the time and date. The backup battery is a lithium rechargeable type and will be recharged whenever ES3S power is on.

Note: If the ES3S is not powered up for many months, the battery may become discharged. In this case, the time and date will need to be reset and the instrument should be left powered up for some time to recharge the clock battery. Normal instrument usage is sufficient to keep the battery fully charged.

MAIN MENU (ES3S)

AUDIOMETRY	Enters manual test mode
DISPLAY RESULTS	Displays test results on 1 - 2 screens

DEMOGRAPHIC INFO

Patient ID	Up to 21 digits
Operator ID	"
Prompt for ID number	No / Yes

NEW TEST	Begins new test, <u>overrides previous test</u> **PRINT OR SEND PREVIOUS TEST RESULTS** **BEFORE STARTING NEW TEST**
SEND DATA	Transmits to printer or computer via serial port with supplied cables
SETUP	User options selected and saved for all tests. Can be changed when desired, resaved. **After Powerup, press MENU key 2 times to** **get to SETUP.**

Audiometry Setup	**Audiometry options**
Frequencies	Select from list

Manual Audiometry	**Manual aud. options**
Ear	Left / **Right**
Starting Level	10 / 15 / 20 / **25** / 30 / 35 / 40
Starting Freq.	Select from list (**1000**)
Tone Mode	**Pulsed** / Continuous
Increment Amount	**5** / 10 / 20
Decrement Amount	5 / **10** / 20
Binaural Stimulus	**No** / Yes

Automatic Screening	**Automatic Test Options**
Ear	Left / **Right**
Frequencies	Select from list
Levels	Select from list
Direction	Up / **Down**

Communicatiions	**Serial Communications Options**
Default Output	**Printer** / Computer
Baud Rate	**9600** / 19.2/ 57.6 / 115.2
Insert Linefeed	No / **Yes**

Date	**Date Options**
Set Date Format	**MM/DD/YYYY** or DD/MM/YYYY
Set Date	Enter date (use current date format)
	(Use "arrow keys" to scroll up & over tochange)
Set Time Format	24 hour / **12 hour**
Set Time	Enter time (use current time format)
	(Use "arrow keys" to scroll up & over to change)

Power		**Power Handling Options**
A/C		When operating on A/C or USB power
	Backlight	30 sec. / 1, 2, 5 minutes
	Power Down	Never / 1, 5, **15**, 30 min / 1 hour
Battery		When operating on battery power
	Backlight	5, 10, **20**, 30 sec / 1 minute
	Power Down	15, 30 sec / **1**, 2, 5 min

Display	**Display Setting Options**
Contrast	Adjust as desired
Brightness	Adjust as desired
Scroll Logo	**No** / Yes

Beep Volumes	**Volumes for key 'tick' and audible alerts**
Key Volume	**Low** / Medium / High
Alert Volume	Low / **Medium** / High

General	**Other Options and Information**
Calibration Dates	Display last calibrated and due dates
Perform Calibration	Password protected
Earscan Information	Displays ES3S information
Lock Settings	Password protected

Reset Settings	Yes / **No**

TURN OFF	Turns unit off

MANUAL AUDIOMETRY

To insure that pending data is cleared, always begin a new test via the main menu sequence ⌐**New Test** to **clear pending test data.**

When the ES3S enters the manual audiometry mode, the screen format shown in **Figure 3** will be displayed (assumes factory defaults for starting frequency and level).

Figure 3. Manual Audiometry Display

```
Frequency   1000         Hz
Level        20          dB
Ear         Right

         Untested


Auto  L/R  Send  Clr  Talk
```

```
┌────┐ ┌────┐ ┌────┐ ┌────┐ ┌────┐
│ 1  │ │ 2  │ │ 3  │ │ 4  │ │ 5  │
└────┘ └────┘ └────┘ └────┘ └────┘
```
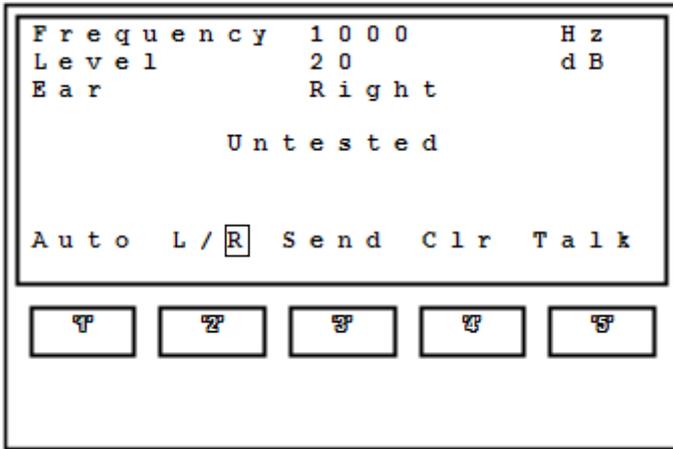
Once a threshold has been obtained, the display will change to show the threshold value (the 'm' indicates threshold was obtained via manual testing).

Figure 4. Display of Threshold

```
F r e q u e n c y    1 0 0 0          H z
L e v e l              2 0 m           d B
E a r                  R i g h t



A u t o    L / R   S e n d   C l r   T a l k
```

```
┌──────┐  ┌──────┐  ┌──────┐  ┌──────┐  ┌──────┐
│  1   │  │  2   │  │  3   │  │  4   │  │  5   │
└──────┘  └──────┘  └──────┘  └──────┘  └──────┘
```
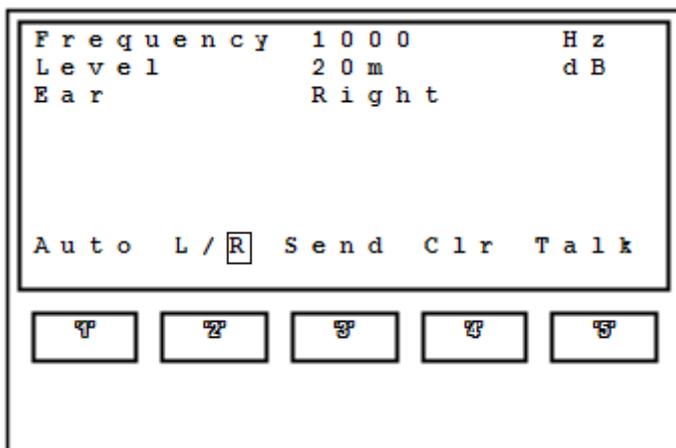
The threshold may be cleared (Clr) by pressing key **"4"** (e.g., to retest a threshold). Only the currently-displayed threshold is cleared.

The test ear, signal mode, starting frequency and starting level are all user selectable, so these values may differ from the ones shown. The example shown indicates that a threshold of 20 dB has been obtained for the right ear at 1000 Hz.

Manual Audiometry Key Functions

Table 2 lists the functions of keys that are active in the manual audiometry mode. The second column indicates the action of the function keys.

Table 2. Manual Audiometry Key Functions

{◄}/{►}		Select next lower/higher enabled frequency (Hz)
{▲}/{▼}		Increase/decrease level by current step size (dB)
{1}	Auto	Exit manual test mode and enter automatic test mode
{2}	L/R	Toggle between Left and Right ear
{3}	Send	Send the test data to computer or printer
{4}	Clr	Clear the current threshold
{5}	Talk	Exit test mode and enters talk over mode
{Menu}		Exits manual test mode and enters the menu system

Testing Procedure

1. Instruct the patient to raise his/her hand or press the patient response button (if available) whenever a tone is heard.
2. Position the headphones over the patient's ears (Red over Right ear, Blue over Left ear).
3. Press {2} if necessary to toggle to the desired test ear.
4. Select the test frequency using the {◄} / {►} keys.
5. Use the {▲} / {▼} keys to adjust the hearing level and the {O} key to present the stimulus to the selected ear. When testing with Continuous signals, stimulus duration should be about 1 second; the minimum duration allowed is 200 ms.
6. Continue using the {▲} / {▼} and {O} to present stimuli consistent with the test paradigm being used (typically Hughson-Westlake) until threshold is determined.
7. Use the {◄} / {►} keys to select the next frequency to test.
8. Repeat steps 4 through 7 until threshold has been determined for each frequency for the selected ear.
9. Change the test Ear by pressing {2}.
10. Repeat steps 4 through 8 until threshold has been determined for each frequency for the second ear.

Manual Audiometry Options

Frequency Selection

The frequency set to be used for manual testing may be viewed or modified via the menu sequence ⌐Setup ⌐Audiometry Setup ⌐Frequencies. 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 {►}, {▲}, {▼} and {◄} keys to move the highlight to a frequency to select or deselect for testing, and press {O} 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, plus the 1k/P validity check.

Once selections are completed, press {Menu} to exit frequency selection mode and return to the menu system.

Other Options

Additional manual audiometry options listed in **Table 3** may be accessed via the menu sequence ⌐**Setup** ⌐**Audiometry Setup** ⌐**Manual Audiometry.** To change an option, highlight the option to modify using the **{▶}, {▲}, {▼}** and **{◀}** keys, and press **{O}**. Use the **{▶}, {▲}, {▼}** and **{◀}** keys to select the desired setting for the option, and press **{O}**.

Table 3. Other Manual Audiometry Options

Ear	Ear to be tested first.	Left, (Right)
Level	Initial level when new test is started	10, 15, (20), 25, 30, 35, 40
Frequency	Initial frequency when entering manual test mode	125, 250, 500, (1000), 1500, 2000, 3000, 4000, 6000, 8000, 1k/P
Tone Mode	Stimulus mode	(Pulsed), Continuous
Increment Amount	Increment step size	(5), 10, 20
Decrement Amount	Decrement step size	5, (10), 20

AUTOMATIC SCREENING AUDIOMETRY

To insure that pending data is cleared, always begin a new test via the main menu sequence ⌐**New Test** to **clear pending test data.**

Automatic screening audiometry is a screening exam at selected levels and frequencies automatically conducted by the ES3S. Automatic screening mode is entered by pressing **{1}** (Auto) while in the manual audiometry mode.

Automatic screening audiometry presents signals in either an ascending or descending level sequence depending on user selection. For an ascending sequence, the test will begin with lowest level selected and test at each level, up to the highest level selected, or until the patient presses the response button after a presentation. Once the patient responds to a presentation, that presentation level is recorded as the screening result.

For a descending sequence, the test begins at the highest level selected and tests at each level down to the lowest level selected. Once the patient does NOT press the button after a signal presentation, the level of the previously presented signal is recorded as the screening result.

Figure 5 shows the display format during an automatic screening test. This example indicates that a response has been recorded for a screening level (indicated by the "s") of 40 dB for 2000 Hz at the Right ear.

Figure 5. Screening Audiometry Display

```
Frequency    2 0 0 0        H z
Level        4 0 s          d B
Ear          Right




Man
```

```
[ 1 ]   [ 2 ]   [ 3 ]   [ 4 ]   [ 5 ]
```
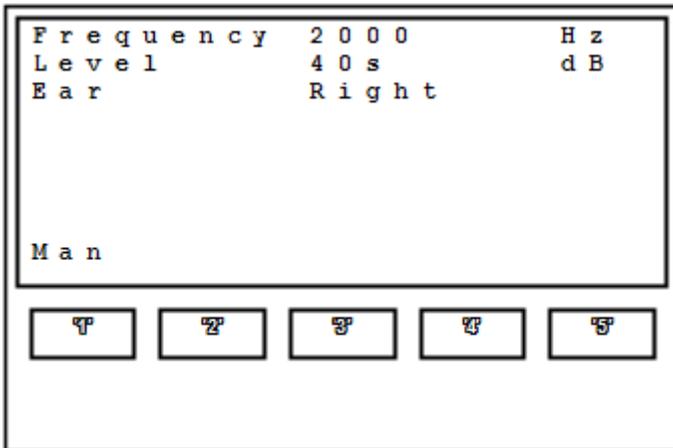
Automatic Screening Function Key

Pressing **{1}** (Man) during an automatic screening test will exit the automatic screening mode and return to manual audiometry mode. Note that exiting automatic screening mode does **not** clear the data. Automatic screening mode may be re-entered and continued from the point at which it was interrupted.

Testing Procedure

1) Instruct the patient to press the patient response button whenever a tone is heard.
2) Position headphones over patient's ears (Red over **Right** ear, Blue over **Left** ear).
3) From the manual audiometry screen, press **{1}** to start the automatic screening test.

Automatic Screening Audiometry Options

Frequency Selection

Frequencies selected for screening are separate from those selected for manual audiometry. Screening frequencies are selected via the menu sequence: ⌐**Setup** ⌐**Audiometry Setup** ⌐**Auto Screening** ⌐**Frequencies.** The default frequencies for automatic screening mode are 1000, 2000 and 3000 Hz.

Move the highlight to the frequency to select or deselect for testing by using the **{◄}, {►}, {▲}** and **{▼}** keys. Once you are at the frequency use the **{O}** key to select or deselect the frequency. Frequencies that are selected have a check mark (√) next to them. Once frequency selection is complete, use the **{Menu}** key to exit the automatic screening frequency selection mode and return to the menu system.

Level Selection

The default levels for automatic screening mode are 10, 20, 30 and 40 db HTL. These can be changed via the menu sequence ⌐**Setup** ⌐**Audiometry Setup** ⌐**Auto Screening** ⌐**Levels.**

Move the highlight to the level to be selected or deselected using the **{◄}, {►}, {▲}** or **{▼}** keys. Once the desired level is selected, use the **{O}** key to select or deselect the level. A (√) next to a level indicates that the level is selected for testing. Once level selection is complete, use the **{Menu}** key to exit level selection mode and return to the menu system.

Sequence Direction

The level sequencing direction for automatic screening audiometry is set via the menu sequence **⌐Setup ⌐Audiometry Setup ⌐Auto Screening ⌐ Direction** {Up/ Down}.

Ear to Test First

The ear to be tested first during a screening test is selected via the menu sequence **⌐Setup ⌐Audiometry Setup ⌐Auto Screening ⌐ Ear** {Left/Right}.

TEST RESULTS

Audiometric test results can be displayed on the LCD or transmitted to an attached PC or printer.

Displaying Results on the LCD

Test results are displayed via the menu sequence **⌐Display Results.** Threshold levels obtained via manual testing are displayed with an 'm', and screening levels obtained via automatic testing are with an 's'. **Figure 6** shows partial results obtained in automatic screening test mode for the Right ear and results for the Left ear obtained in the manual testing mode.   The **{◄}, {►}, {▲},** or **{▼}** keys are used to scroll up or down through the results list.

Figure 6. Audiometric Test Results Display

Hz	Left	Right
500	20 m	25 s
1000	20 m	20 s
2000	25 m	20 s
3000	30 m	
4000	25 m	25 s
6000	20 m	
8000	20 m	

1	2	3	4	5

Display Results Key Functions

Table 4 lists the valid keys when in the display test results mode.

Table 4. Display Test Results Key Functions

{◄}, {►} {▲}, {▼}	Scroll the display screen
{Menu}	Exit display mode and return to the menu system

Quantifying Hearing Loss

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

Table 5. 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

SERIAL COMMUNICATIONS

The ES3S can transmit data to a **computer** or to a **printer.** The default output device is selected using the menu sequence ⌐**Setup** ⌐**Communications** ⌐**Default Output,** and data is transmitted using the ⌐**Send Data** main menu option. Note that the ES3S implements **no handshaking protocol** for serial communications. This means that the ES3S cannot detect an unconnected serial port or a 'not ready' state. It is the user's responsibility to verify that a serial cable is connected and that the external device (printer or computer) is powered up and ready for communications before attempting to transmit data.

NOTE: While an Earscan 3S is attached to the PC using the supplied USB cable, it is automatically configured for output to a PC at a baud rate of 9600, and no setup changes are required.

Transmit Options

Table 6 lists optional settings associated with transmitting data.

Table 6. Data Transmit Options

Default Output	Output data destination	(Printer), Computer
Baud Rate	Serial port BAUD rate	(9600), 28.8k, 57.6k, 115.2k
Insert Linefeed	Insert linefeed after each line (for printer use)	No, (Yes)

SCREEN AND CLOCK OPTIONS

LCD brightness and contrast are user adjustable to allow optimizing the display for differing viewing conditions (e.g., ambient lighting or viewing angle). The contrast setting has no appreciable effect on battery life, but higher brightness settings require more power and will decrease battery life. The amount of time that the backlight remains on during periods of inactivity is also user settable, and should be set to as low a value as is convenient to preserve battery life.

The ES3S includes a real-time clock with rechargeable lithium battery backup to maintain time and date. Time can be set/displayed in either 12- or 24-hour format. Date can be set/displayed in dd/mm/yyyy or mm/dd/yyyy format. The battery is recharged when the ES3S is powered on. When fully charged it should maintain the real-time clock for at least a year, even if the instrument is not used. In the unlikely event that the clock battery should become discharged, the time and date would need to be reset and the instrument left on long enough to recharge the backup battery.

Screen Properties

The LCD Screen is preset at the factory with typical contrast and brightness settings. Adjusting either setting may necessitate adjusting the other; e.g., increasing screen brightness may require changing contrast for optimum viewing.

LCD contrast can be adjusted via the menu sequence ⌐**Setup** ⌐**Display** ⌐**Contrast.** Use the **{◄} / {►}** keys to adjust contrast to the desired setting. Press **{O}** to save the setting, or press **{Menu}** to exit without changing the contrast setting.

LCD brightness can be adjusted via the menu sequence ⌐**Setup** ⌐**Display** ⌐**Brightness**. Use the **{◄} / {►}** keys to increase or decrease brightness. Press **{O}** 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.

Power-Up Logo

At power up, the logo can either scroll slowly onto the screen or just appear as a full-screen display. This option is set via the menu sequence ⌐**Setup** ⌐**Display** ⌐**Scroll Logo**. Select "Yes" for the scrolling display, or "No" for the full-screen display.

Note: If the ES3S powers down due to an inactivity timeout, the logo display will be skipped when the instrument is powered back up to minimize re-start time. Re-start will proceed directly to the manual audiometry screen.

Real-Time Clock Settings

The date format is selected via the menu sequence ⌐**Setup** ⌐**Date** ⌐**Set Date Format**. The format may be set to **mm/dd/yyyy** or **dd/mm/yyyy.** The date may be set (or viewed) via the menu sequence ⌐**Setup** ⌐**Date** ⌐**Set Date**. A new date must be entered in the currently selected date format (i.e., dd/mm/yyyy or mm/dd/yyyy).

Use **{◄} / {►}** to select edit position and **{▲} / {▼}** to select digit. Press **{O}** to save a new date setting, or **{Menu}** to exit without changing the date setting.

The time format (12 or 24 hour) can be selected via the menu sequence ⌐**Setup** ⌐**Date** ⌐**Set Time Format**.   The real time clock can be set (or time viewed) via the menu sequence ⌐**Setup** ⌐**Date** ⌐**Set Time.** A new time must be entered in the currently selected format (12- or 24-hour).

Use **{◄} / {►}** to select edit position and **{▲} / {▼}** to select digit. Press **{O}** to save a new time setting, or **{Menu}** to exit without changing the time setting.

LOCK SETTINGS

All user selectable instrument settings may be "locked" if desired via the menu sequence ⌐**Setup** ⌐**General** ⌐**Lock Settings**.   Enter a password and press **{O}** 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.

To unlock settings, enter the menu sequence ⌐**Setup (password)** ⌐**General** ⌐**Unlock Settings** and enter the password that was used to lock the settings.

RESET SETTINGS

All user selectable instrument settings may be returned to factory default values via the menu sequence ⌐**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.

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CALIBRATION

Micro Audiometrics recommends that audiometers be calibrated annually. About one month before the annual calibration due date, the ES3S will begin displaying a reminder at power up that the due date is approaching. This reminder will be cleared once the instrument is calibrated. If the calibration due date passes and the instrument has not been calibrated, a caution will be displayed regarding potential test data invalidation.

The last calibration date and calibration due dates may be viewed at any time via the menu sequence ⌐**Setup** ⌐**General** ⌐**Calibration Dates.** Please see the ES3 **Calibration Guide** for more detailed information regarding headset management and calibration.

TECHNICAL SPECIFICATIONS

ANSI S3.6 Type:	**4**	
Frequencies (Hz):	**125, 250, 500, 750, 1000, 1500**	
(+/- 1%)	**2000, 3000, 4000, 6000, 8000**	

Levels		**ES3S**
TDH-39	**125 Hz**	**-10 to 55**
(60 Ω)	**250 Hz**	**-10 to 80**
Phones	**500 thru 6000 Hz**	**-10 to 80**
(+/- 1 dB)	**8000 Hz**	**-10 to 80**

Attenuation:	**5, 10, 20 db steps**
Presentation:	**Pulsed or Continuous**
Repetition Rate:	**Random intervals**
Test Modes:	**Manual, Automatic Screening**

Display:	**128 x 64 Backlit LCD**
Clock:	**Real-time with lithium battery backup**
Communications:	**USB, RS-232**
Headset:	**TDH-39 60 Ω**
Power:	**4 AA Alkaline Batteries, A/C adapter, USB Bus**

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 after a manual power-down, the ES3S logo should either scroll onto the **LCD** or appear quickly, depending on the scroll setting, and the backlight should be on. After an inactivity timeout power-down, the logo is bypassed. In either case, the ES3S should proceed to the "Select An Option:" screen and should respond to keypad control.

Keypad operation can be tested by pressing keys and verifying that the appropriate response occurs (e.g., pressing **{▲}** increases level, **{►}** 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. Set frequency to 1000 Hz, set level to 70 dB HTL, and press **{O}**. A tone (pulsed or continuous) should be heard at a comfortable loudness level. Verify that the signal is heard at the correct ear. Press **{▲} {O}** and **{▼} {O}** to verify that signal loudness increases or decreases, respectively. Press **{2} {O}** and verify that the signal is presented to the other ear.

Plug in a **response button** and verify that pushing the button causes the "*****" symbol to appear near the center of the display.

Enter the menu sequence **⌐Setup ⌐Date ⌐Set Time** and verify that the time is correct and that the seconds count is incrementing.

Attach the printer, verify that printer output is selected via the menu sequence **⌐Setup ⌐Communications ⌐Default Output**, and transmit data to the printer via the **⌐Send Data** main menu option.

TROUBLE SHOOTING GUIDE

Problem	Possible Solution
ES3S 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/response button 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.
Subject response button does not work.	1. Verify that headset/response button cable connector is securely attached and that mounting screws are snug. 2. Disconnect response button plug from headset/response button cable, clean plug, and reconnect.
Data is not properly sent to computer.	Reference: "Transmitting Data" 1. Verify that 'output to computer' is set. 2. Verify that baud rate matches computer baud rate. 3. Verify that interface cable is in place and computer is ready to receive data.
Printer fails to print or prints incorrect characters.	Reference: "Transmitting Data" 1. Verify that 'output to printer' is set. 2. Verify that printer is attached, power is "On", and printer is ready to print.
The Seiko printer does not properly feed paper.	Verify that paper is installed correctly and not jammed.
The Seiko printer appears to be printing, but nothing shows up on the paper.	Paper is in backwards. Thermal paper prints only on shiny side.

EXTERNAL INTERFACE

Connectors

The ES3S form factor necessitates a non-standard approach to headset and interface cable attachments. 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 ES3S wall cube, printer/power cable, USB cable, or serial computer/power 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 top of instrument)

Pin	Function	Pin	Function				
1	Ground	4	USB D+			6	5
2	+5 V In	5	RS-232 RX	4			3
3	RS-232 TX	6	USB D-			2	1

Notes:

1) The wall cube connector uses pins 1 and 2 for power.

2) Serial cables use pins 3 and 5 for RS-232 and pins 1 and 2 for power (assuming wall cube is plugged into the cable's mini DIN 'pigtail').

3) The USB cable uses pins 1 and 2 for USB bus-power (requires about 120 ma) and pins 4 and 6 for USB data.

Headset Connector

15-pin high density D-Sub (pin configuration is shown as viewed from top 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	RspButton	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
```

DPU-414 Printer Switch Settings

The setup switches on the Seiko Instruments DPU-414 printer should be set as follows to ensure compatibility with Micro Audiometrics ES3S audiometers.

SW1 - 1 - OFF	SW2 - 1 - ON	SW3 - 1 - ON
2 – ON	2 - ON	2 – ON
3 – ON	3 - ON	3 – ON
4 – ON	4 – ON	4 – OFF
5 – ON	5 – ON	5 – OFF
6 – OFF	6 – ON	6 – ON
7 – ON	7 – ON	7 – ON
8 – ON	8 – OFF	8 -- ON

EARSCAN 3 INFORMATION

General Earscan 3 information is displayed via the menu sequence ⌐**Setup** ⌐**General** ⌐**Earscan 3 Info**. (e.g., see **Figure 7**). Serial number and firmware revision are important when upgrades, updates, and/or service are being considered.

Figure 7. Information Display
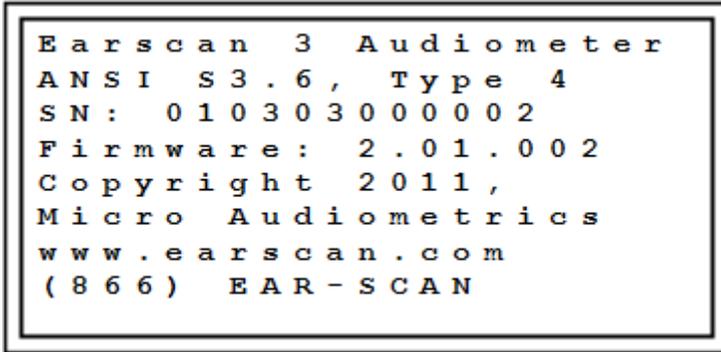
```
Earscan  3  Audiometer
ANSI  S3.6,  Type  4
SN:  0 1 0 3 0 3 0 0 0 0 0 2
Firmware:  2 . 0 1 . 0 0 2
Copyright  2 0 1 1 ,
Micro  Audiometrics
www.earscan.com
( 8 6 6 )  EAR - SCAN
```

WARRANTY

MICRO AUDIOMETRICS CORPORATION
LIMITED WARRANTY

EARSCAN 3S 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:

Micro Audiometrics Corporation
1901 Mason Ave, Suite 104
Daytona Beach, FL 32117 USA

Phone: (386) 888-7878
Toll-free: (866) 327-7226

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

For product information or inquiries, send email to:
sales@microaud.com

For product support or technical issues, send email to:
support@microaud.com

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