

# Clinical Audiometer **AC40**



# AC40

## Applications

The AC40 is a state of the art clinical audiometer developed for the purpose of providing the advanced clinic with a tool for performing all traditional threshold and supra threshold tests. The many pre-programmed and automated tests make it extremely easy to use and time saving when performing standard audiometric tests. As all functions can be directly accessed, performing manual audiometry is very straightforward.

Educational institutions will appreciate the wide range of pre-programmed tests available on the AC40. Many classic audiological tests are presented with dedicated display screens. This facilitates ease of use and often provides a clear understanding of the rationale behind the test.

In modern healthcare settings, the ability to interface clinical instrumentation with a computer is often important. The AC40 has excellent interfacing capabilities and a range of supporting software packages are available for this purpose.



## Two Independent Channels

The two channels of the AC40 function independently, even to the extent that two different frequencies may be presented from the two channels simultaneously.

## Multi Frequency

For detection of small frequency specific variations in an audiogram, up to 24 test frequencies per octave are available. Tinnitus evaluation is also possible using this multi-frequency function, which extends to 16kHz.

## Optional Sound Field Installations - Medically Approved

### System FFAC40

This built-in system is capable of producing an output of up to 95dB SPL. As it is based on the optional built-in amplifier kit AC40-APD, it is very cost effective. The system is approved for medical safety.

### System FF105

An external amplifier, the AP70 and two ALS7 speakers will provide 105dB SPL output. It is approved for medical safety and is a very cost effective high powered system.

### System FF115

This extremely powerful system is capable of an impressive 115dB SPL with both warble tone and NB noise. High efficiency ALS15 speakers are employed with the medically approved AP70 amplifier.

### DHA8

DHA8 amplifier controls up to 8 speakers for both normal free field testing and directional hearing evaluation. Testing in a homogeneous noise field is also possible. Available with a suitable speaker system.



The AP70 Power Amplifier is medically approved.



Sound cabin installation panel AFC13.

## High Frequency Audiometry

High frequency audiometry is possible with the special high frequency headset. Testing may be performed using either Hearing Level or SPL.

## Speech Score Counter

An automatic Speech Score Counter is provided, making speech audiometry much easier to perform. On the screen the status of the speech test can be displayed along with the actual speech audiogram.

## Test Battery

In addition to full manual control of all the audiometer functions, 12 pre-programmed automatic tests are available. Some of these are described below.

**Loudness Scaling** test for evaluating subjective loudness growth includes direct comparison with standardised curves for normal perceived loudness.

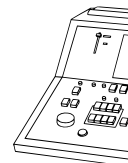
**Auto Threshold** test follows the Hughson Westlake procedure according to ISO 8253.



The AC40 is ideally suited for hearing aid fitting applications and is fully compatible with NOAH. Even loudness scaling results can be transferred to NOAH.

### Computer Connection

The use of a PC for printing, database storage and on-line monitoring is possible using PrintView or laBase95 software from Interacoustics.



### Printing Possibilities

**Built-in thermal printer** is available as an option and will enable very fast and easy printing of test results. Standard size thermal paper is used.

**Any external printer** employing HTML language may be connected to the AC40. This makes possible high quality printing on standard film.

**Bekesy** featuring continuous or pulsed tones, can be performed using either a Fixed or a Swept Frequency. Frequency range up to 16kHz.

**Masking Limen Difference** test with a mixture of phase controlled test stimuli is available for testing retrocochlear functions.

**Threshold Tone Decay** works automatically in a time window of up to 420 seconds. Test results are automatically calculated.

**ABLB** has its own dedicated screen where any recruitment can be shown in a very clear graphical manner.

**SISI** test includes a familiarisation feature and automatic score calculation.

**Monaural Loudness Balancing** is included for evaluating recruitment in binaural hearing losses.

### Connection to Hearing Aids

In addition to full compatibility with NOAH, the AC40 can be used as a hearing aid analyzer which incorporates Real Ear Aided Audiometry. Test results may then be transferred directly to the MS2500.

### Speech Test and Communication

#### Live Voice

The built in gooseneck microphone, an external microphone or a monitor headset with boom microphone may all be used for speech testing. A high quality easy to read VU-meter monitors the speech output.

#### Talk Back

A nicely styled talk back microphone (optional) which may be installed in a sound booth either mounted at the table or on the wall.



EMS400 talk back microphone.

#### Monitoring

A built in loudspeaker enables full monitoring of one or both channels. An external speaker or a monitor headset may alternatively be used.

#### Assistant's Monitor

For sound booth installations a headset may be connected for independent communication between operator and an assistant.

### Transducers and Accessories

**Ear-Tone 3A**  
(optional)



These insert phones feature very low cross hearing and reduce the need for masking. Ambient noise is also attenuated.

**Koss Headset**  
(included)



This headset is used for high frequency audiometry. (Sennheiser HD200 may be used as an alternative).

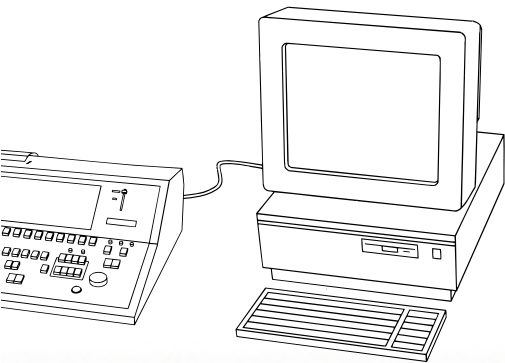
**Amplified cups**



Noise reduction headset supplies audiometric earphone characteristics when used with the Am headset.



- PrintView features on-line monitoring and printing and is very easy to use.
- laBase95 is similar to PrintView but includes a database for general patient data and hearing aid information.
- Various NOAH interface software packages are also available



**al printer**  
P-GL2  
y be directly  
o the AC40.  
provision for  
rintouts in a  
g format.

**Any printer** connected to a computer which has the Windows based "PrintView" software program installed may be used for printing. The database program laBase95 is also suitable for this purpose.

## **id Analyzer MS25**

ne AC40 can interface directly to the MS25  
l Ear Measurement capabilities. Audiograms  
s for ease of operation.

### **ories**

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(optional)



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**Monitor Headset**  
(optional)

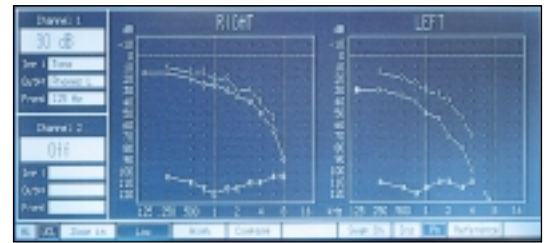


*MTH400 for monitoring by the operator or an assistant. Available with boom microphone for speech testing and patient communication (MTH400M)*

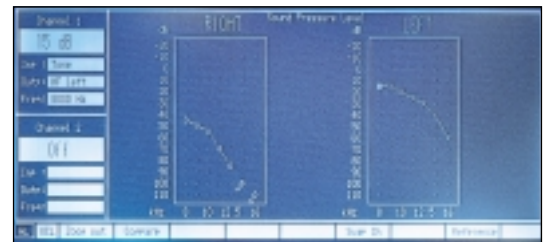
**Bone conductor**  
(included)



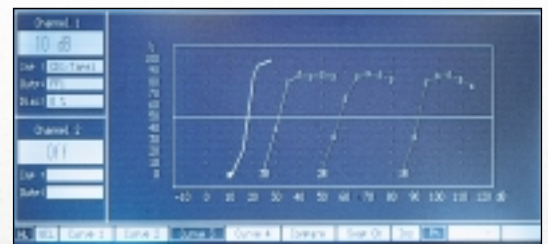
*B71 bone conductor is included.*



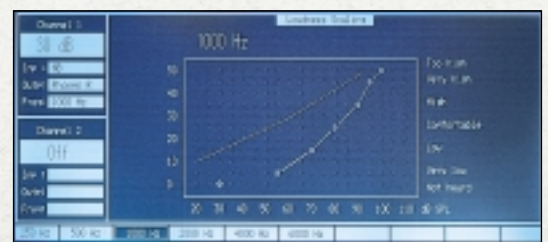
Full information on AC thresholds, BC threshold and Uncomfortable Levels can be displayed. Left and Right thresholds may also be shown on the same audiogram for comparison purposes (not shown).



High frequency audiometry may be performed using its own dedicated screen. Please note the "not heard" symbols.



Speech audiograms may be directly compared with normalised curves. Three speech audiograms may be recorded to allow easy comparison between aided and unaided performance.



A graphical representation of the results obtained from a loudness scaling test provides direct comparison with a standard curve.



Large digits are preferred by some users and are therefore provided as an alternative to displaying audiograms.

## AC40 Specifications

### Standards:

Safety: EN 60601-1  
EMC: EN 60601-1-2.  
Audiometer: EN 60645-1, EN 60645-2,  
EN 60645-4/ANSI S. 3.6.  
Tone audiometer type: 1  
Speech Audiometer type: A or A-E  
Calibration: ISO389-1, ISO389-2, ISO 389-3,  
ISO 389-4.



**Medical CE Mark:** The CE-mark indicates that Interacoustics A/S meets the requirements of Annex VI of the Medical Device Directive 93/42/EEC.

**Channels:** Two independent channels.

### Maximum Hearing Levels dBHL:

Hz	AC	BC	NB
125	90		80
160	95		85
200	100		90
250	110	45	100
315	115	50	105
400	120	65	110
500	120	65	110
630	120	70	110
750	120	70	110
800	120	70	110
1000	120	70	110
1250	120	70	110
1500	120	70	110
1600	120	70	110
2000	120	75	110
2500	120	80	110
3000	120	80	110
3150	120	80	110
4000	120	80	110
5000	120	60	110
6000	120	55	110
6300	120	50	110
8000	110/105	50	100/90
9000	105		90
10000	100		90
11200	95		85
12500	90		85
14000	85		75
16000	75		65
18000	110 (dB SPL)		95 (dB SPL)
20000	110 (dB SPL)		95 (dB SPL)

"Extended Range" allows air conduction intensities to be limited to 20 dB below max output.

## Ordering information

### Included Parts:

TDH39 Audiometric Headset  
B71 Bone Conductor  
High Frequency Headset  
2 APS2 Patient Response Buttons  
Power Cable 110 or 230 V  
(please specify)  
PCR-AC40 Dust Cover  
200 AF12 Audiogram Charts  
Unpacking and Installation Instructions  
Operation Manual  
Instruction for use  
Service Manual

**Channel 1:** Input: Tone, Microphone 1&2, Tape/CD 1&2, NB, SN, WN, PN. Output: Left, Right, Bone L+R, Free Field 1+2, Insert-phones, HF-phones.

**Channel 2:** Input: Tone, Microphone 1+2, Tape/CD, 1&2, NB, SN, WN, PN. Output: Left, Right, Free Field 1+2, Insert-phones, HF-phones, Insert masking.

**Presentations Ch 1:** Manual or reverse. Continuous, single or multiple pulses. Single and Multiple Pulse Speed: Programmable from 50-5000 mS in 50 mS steps.

**Presentations Ch 2:** Manual or reverse. Continuous, simultaneous or alternate to Ch 1.

**Frequency Range:** 125-20000 Hz divided in two ranges: 125-8000 Hz and 8000-20000 Hz.

**Frequency Resolution:** Multi frequency, Programmable in 1, 1/2, 1/3, 1/6, 1/12, 1/24 octave steps.

**Modulation:** Warble: Programmable frequency: 5,10,25,50 Hz and programmable intensity: +/- 0, 0.2, 0.4, 0.6, 0.8, 1,2,3,4,5,10,15,20, 25%.

**Synchronous Masking:** Locks Ch 2 attenuator to follow Ch 1 attenuator.

**Attenuators:** Totally Click free, -10 to 120 dB HL in 1 or 5 dB Steps.

**Tone Switches:** Silent touch switches on front panel and remote controlled switches.

**Patient Response:** Two independent patient response buttons, one for Right and one for Left.

### Communication:

**Talk forward:** 0-110 dB SPL: Continuously adjustable on front panel, built-in goose neck microphone.

**Talk Back:** Microphone input. Level adjusted on operation panel.

**Monitor:** Built in speaker or external loudspeaker. Monitor output level for Ch 1 and Ch 2 adjusted separately on operation panel.

**Assistant monitor:** Output to external earphone.

**Printer:** Output to external Laser Printer (HP-GL/2 language), via 25 pin D connector. Built-in thermal printer (optional).

**Computer Communication:** Built-in RS232C two way computer interface which allows the computer to both monitor and control the AC40.

### Examples of Compatible Windows Software:

laBase95 database program.  
PrintView for on-line PC monitoring and printing.  
NOAH hearing aid fitting software.  
CONNEX hearing aid fitting software.  
PAX hearing aid fitting software.

### Options:

AC40-APD Built-in 2x12 watt Power Amplifier for FF  
AC40-PRT Built-in Thermal Printer with 5 rolls of paper.

### Optional Parts:

AP70 2x70 Watt Power Amplifier  
ALS7 FF Loudspeaker ( for AP70 )  
ALS3 FF Loudspeaker ( for AC40-APD )  
EM400 Electret Microphone for Talk Back  
EMS400 Wall Mounted Talk Back Microphone  
21925 Amplivox Audiocup Enclosures

### Test Types:

**Tone:** Manual, continuous, single pulse, pulsing (variable).

**Speech:** Live voice through goose neck microphone or external microphone, Tape or CD inputs. Score counter: Calculates % of correct score for speech.

**Auto Threshold:** Patient controlled Hughson-Westlake Test after ISO 8253-1. 3 out of 5 or 2 out of 3 as response criteria. Reduced frequency range option for rapid testing.

**Békésy Test:** 125Hz to 16kHz.

Fixed Frequency or Sweep Frequency Békésy. Continuous or pulsed tone.

**Difference Limen Intensity:** 0.0dB - 5.0dB in 9 steps.

**Difference Limen Frequency:** 0.0% - 5.0% in 9 steps.

**Loudness Balancing:** 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 6kHz NB noise with direct comparison to standard curves.

**Difference Masked Unmasked:** Compares graphically the threshold measurements with and without masking.

**Weber:** 250Hz to 8kHz with dedicated graphical presentation.

**ABLB:** Individually adjustable pulse speed and pulse length.

**TT decay:** Calculation according to Rosenberg (1958).

**Masking Limen Difference:** Noise out of phase and signal out of phase. Automatic calculation.

**Monaural Loudness Balancing:** Programmable test setup.

**SISI:** 0, 0.2, 0.4, 0.6, 0.8, 1, 2, 3, 5 dB, 20 increments. Automatic score counter which calculates in % the number of responses to 1 dB increments.

**Stenger:** Pure tone or Speech can be used for Stenger test.

**Lombard test.**

**Dofler Steward test.**

### Free Field:

**System FFAC40:** Built in 2x12W amplifier AC40-APD and two ALS3 speakers. 95dB SPL. (Optional)  
**System FF105:** External 2x70W amplifier, AP70, and two ALS7 speakers. 105dB SPL. (Optional)  
**System FF115:** 2 x external 2x70W amplifier, AP70, and two ALS15 speakers. 115dB SPL. (Optional)

**Display:** Graphic 640x200 monochrome LCD display with (CFL) back lighting. Electronic viewing angle adjustment.

**Dimensions:** L 50xW 47xH 20 cm/20x19x8 inches. Weight: 13 kg/29 lbs.

**Air Freight Packing:** Dimensions: 83x60x30cm/33x24x12 inches. Gross Weight: 22 kg/49 lbs.

**Power:** AC 50-60 Hz. 100-120 V, 220-240 V.

**Consumption:** Max. 180 VA.

50250 Peltor Noise Reducing Headset  
EAR-Tone 3A Insert Phones for audiometry  
HDA200 Audiometric Headset  
CIR22 Insert Earphone for masking and monitoring  
MTH400 monitor headset  
MTH400M monitor headset with boom mic.  
AFC13 Sound Cabin Connection Panel  
APS2 Patient Signal ( 2 are included )  
TPR26 Roll of Thermal Paper  
IFC59/IFC69 RS232C Computer Connection Cable  
laBase95 Software Program  
PrintView Software Program  
IA-NOAH-Aud Software Program  
IA-NOAH-Aud Software Program

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