Clinical Audiometer **AC40**
- Efficient Hearing Examinations

Audiometry *precision*

The **AC40** is a comprehensive audiometer specifically designed for advanced clinical applications. Pre-programmed and automated testing features are simple to access and save valuable time. The AC40 comes standard with high frequency audiometry, multi-frequency, MLD, built-in free field amplifiers and more. The large LCD screen provides a large view of your test parameters without obstructing your view of the patient.

leading diagnostic solutions

Interacoustics®

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Applications

The AC40 is a state of the art two-channel clinical audiometer which can provide an advanced clinic with all of the necessary capabilities to perform traditional threshold and supra threshold examinations. The AC40 offers exceptional flexibility with selections of pre-programmed tests, user programmable tests and several automated tests.

Educational institutions appreciate the wide range of pre-programmed tests for teaching a variety of human auditory phenomenon. Classic tests like the ABLB, MLB, MLD, SISI, DLI and DFI are presented with their own dedicated screen display. This facilitates the ease of use and clear understanding of the rationale behind the test.

The front panel layout is intuitive with color coded buttons and light indicators to guide you through your day to day operations - even in a darkened examination room. The large LCD display lets you visualize the test results in an audiogram format or with large numeric indicators and yet the profile of the AC40 is low enough to enable the operator an easy view of the patient. The click free attenuators, silent tone switches, synchronous masking, variable pulse and warble signals provide high quality performance that you expect in a clinical audiometer.

In a modern healthcare setting the ability to interface clinical instrumentation with a computer is mandatory. The AC40 is easily interfaced with a variety of supporting software for this purpose, including NOAH 2.0 and 3.0.

Two Independent Channels

The true independent channels of the AC40 make it stand above other audiometers. The AC40 lets you simultaneously present different frequencies to opposite ears. This flexibility allows for tests like the MLB but more importantly for complex signal mixing situations like speech in noise simulations.

Multi-Frequency

The user has the capability to program up to 1/24th per octave increments. This feature is beneficial for evaluating tinnitus patients and ototoxicity cases, as more discrete audiometric data can be obtained – even out to 20kHz.

High Frequency Audiometry

A high frequency headset is standard equipment on the AC40. A special high frequency audiogram display lets you get the big picture – especially when combined with the multi-frequency function. Audiometric data in the high frequency selection can be shown in HL or SPL.

Speech Display

A tabular display for speech testing allows for quick data entry of SRT, multiple word recognition test scores with a variety of transducer selections. Two buttons on the front panel enable you to quickly score the tests and enter them into the display. All masking information is provided automatically. An alternate speech audiogram display is available for calculation of the PBI.

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

Pre-Programmed Tests

Loudness Scaling for evaluating subjective loudness growth includes direct comparisons with standard curves for normal perceived loudness.

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

The Békésy test features continuous or pulsed tone presentations and can be performed using fixed or sweep frequencies up to 16kHz.

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

SISI test includes a familiarization feature and automatic score calculation.

Masking Level Difference (MLD) test offers a mixture of phase controlled tone and noise stimuli for testing retrocochlear function and CAPD.

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

Monaural Loudness Balancing (MLB) is included for evaluating recruitment in binaural hearing losses.

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Optional Sound Field

The AC40 can be supplied with built-in free field amplifiers. When connected to high efficiency speakers, free field output levels of 90dB SPL for speech are typical. External amplifiers may be connected to increase output levels as high as 105dB SPL with warble tone and NB noise signals.

Optional Insert Phones

The AC40 allows for direct connection of insert earphones as well as the standard TDH39 phones. Independent calibration is maintained within the AC40 software. The flexible setup menu allows the user to initiate the AC40 with the user's preference of transducers. Alternating between transducers is accomplished with the press of a button.

Speech Testing and Communication

Live Voice

A built-in goose neck microphone is standard. An optional operator headset with boom microphone is available. Calibration of the output to the patient is controlled via adjustable potentiometers on the front panel with easy to view LCD VU meters. The talk-forward function is also adjustable for volume.

CD/Tape Inputs

The AC40 provides connections for commercially available CD and Tape players. Functionality of the AC40 allows for all recorded speech materials including CAPD recorded materials.

Talk Back Microphone

A lapel microphone is standard on the AC40. An optional EMS400 microphone stand is available and can be placed on a table or mounted on a sound chamber wall.

Monitoring

Test signals, masking and talk-back are audible via the built-in speaker and both channels have independent volume controls. An optional monitor headset with or without a boom microphone is available for operator convenience.

Patient Assistant Monitor

The AC40 comes standard with a patient assistant monitor headset with independent volume control. This is an extremely useful function which allows the operator to communicate with an assistant when testing infants, children and difficult to test patients. An assistant can monitor the test signal presentations to help during play audiometry and conditioning.

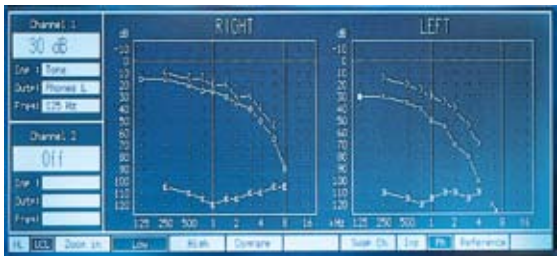
Remote Control

The AC40 has a unique ability to allow the operator to present test signals to the left or right ear by pressing the patient response switch. This is valuable when testing infants, children or difficult to test patients when conditioning is necessary and no assistant is available. This will reduce the need to refer some patients to other clinics thereby saving time and money for your clinic.

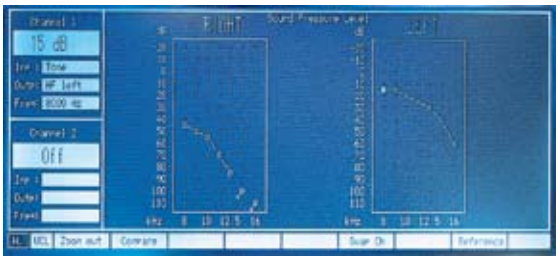
The optional EMS400 talk back microphone which may be installed in a sound booth either mounted at the table or on the wall.

Sound cabin installation panel AFC13

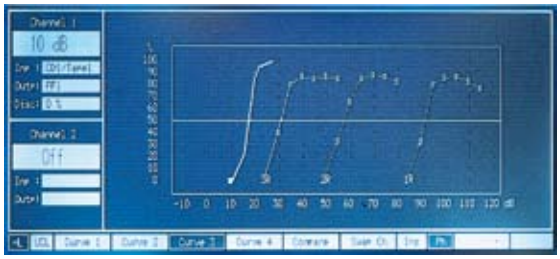
The optional external AP70 Power Amplifier is medically approved.



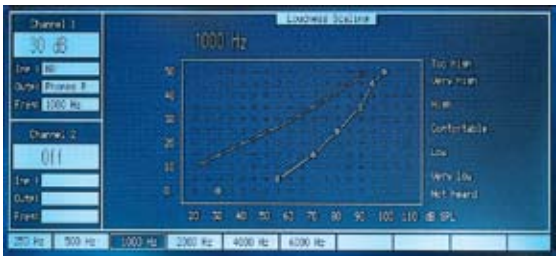
Full information on AC thresholds, BC threshold and Uncomfortable Levels can be displayed. Left and Right thresholds may also be shown on the same audiogram for comparison purposes (not shown).



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



Speech audiograms may be directly compared with normalized 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.

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NOAH

The AC40 is ideally suited for hearing aid fitting applications as it will communicate directly with NOAH. Unlike many audiometers, the AC40 can transmit all test data to the NOAH audiometry module eliminating the need for time consuming manual data entry.

OtoAccess™

Interacoustics® also offers OtoAccess™. This is an independent database program that can store and retrieve patient data, including audiometry. In addition, OtoAccess™ communicates with other Interacoustics® products, allowing impedance, ABR, VNG and OAE data to be stored conveniently in the same patient file as the audiometry. Networking the software allows users secure access to patient data from other office computers at any time.

Professional Reports

Full page audiometric reports can be printed using the PrintView program. Color audiograms include appropriate audiometric symbols and clinic and patient information. A standard IBM type keyboard can be connected to the AC40 which then allows the user to input patient information for the reports.

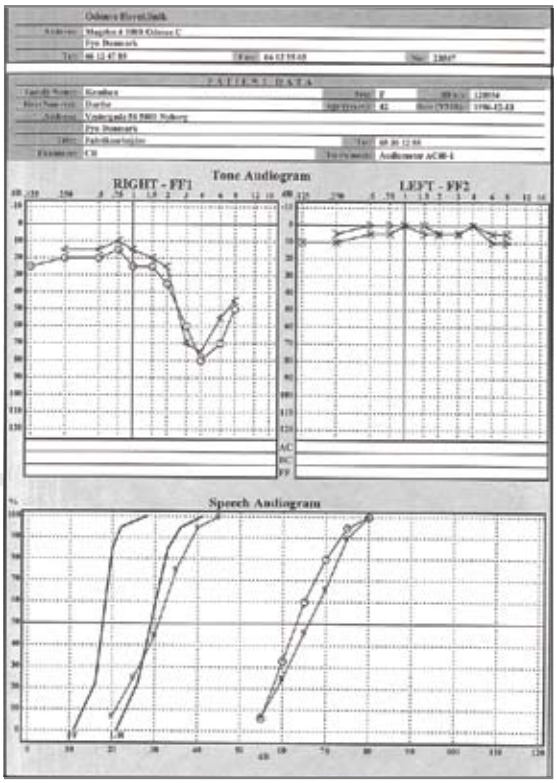
Transducers and Accessories

Ear-Tone 5A (optional)
The addition of insert earphones reduces the need for masking and are useful to eliminate the possibility of collapsing ear canals. Some patients prefer the insert earphones from a comfort standpoint to the TDH39 especially during prolonged evaluations.

Koss Headset (standard)
The Koss headset is provided as a standard transducer for the purposes of performing high frequency audiometry. Separate hardware and software output is provided with the AC40.

Amplivox Audiocups (optional)
Noise excluding headsets may be installed with the TDH39 transducers upon request for an additional cost.

Bone Conductor (included)
B71 is a standard accessory.



Printout via computer.

Some of the included accessories

General Technical Specifications

Standards:
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.
Safety: EN 60601-1. **EMC:** EN 60602-1-2.

Medical CE-mark:
Interacoustics A/S meets the requirements of the Annex II of the Medical Device Directive 93/42/EEC. Approval of the quality system is made by TÜV – identification no. 0123.

Channels: Two independent channels.

Frequencies and Maximum Hearing Levels:

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 (dBSPL)		95 (dBSPL)
20000	110 (dBSPL)		95 (dBSPL)

»**Extended Range**« allows air conduction intensities to be limited to 20 dB below max output.

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 operation 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.

Interconnections

AC40

IFC69

Software for PC:
PrintView
OtoAccess™
NOAH Modules

General Technical Specifications - continued

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:

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

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:
Graphically compares the threshold measurements with and without masking.
Weber:
250Hz to 8kHz with dedicated graphical presentation.
ABLB:
Individually adjustable pulse speed and pulse length.
TTdecay:
Calculation according to Rosenberg (1958).
Masking Level Difference (MLD):
Noise out of phase and signal out of phase. Automatic calculation.
Monaural Loudness Balancing (MLB):
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.
Doerfler-Stewart 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)

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

Dimensions: (LxWxH): 50x47x20 cm/ 20x19x8 inches.
Weight: 13 kg/29 lbs.

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

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

Consumption: Max. 180 VA.

Included Parts:

TDH39 Audiometric Headset
B71 Bone Conductor
High Frequency Headset
2 APS2 Patient Response Button
Power Cable 110 or 230 V (please specify)
PCR-AC40 Dust Cover
200 AF12 Audiogram Charts
Operation Manual on CD
Multilingual CE Manual

Options:

AC40-APD Built-in 2x12 watt Power Amplifier for FF

Optional Parts:

AP70 2x70 Watt Power Amplifier
ALS7 FF Loudspeaker (AP70)
EM400 Electret Microphone for Talk Back
EMS400 Wall Mounted Talk Back Microphone
21925 Audiocup Enclosures
50250 Peltor Noise Reducing Headset
EAR-Tone 5A 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)
IFC59/IFC69 RS232C Computer Connection Cable
OtoAccess™ Database Program
PrintView Software Program
IA-NOAH-Aud Software Program

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Interacoustics A/S
Phone: +45 6371 3555
Fax: +45 6371 3522
E-mail: info@interacoustics.com
Web: www.interacoustics.com
Mail: Interacoustics A/S
DK-5610 Assens, Denmark

Sales and Service in your area:

Interacoustics®