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SAVOX <> OTOS <> PDP AUDIOMETRIC EDGE - AME

1.10.2025 – short introduction – Ilkka Huhtakallio

19.11.2025 – addition of details for interfacing with CC and Headset

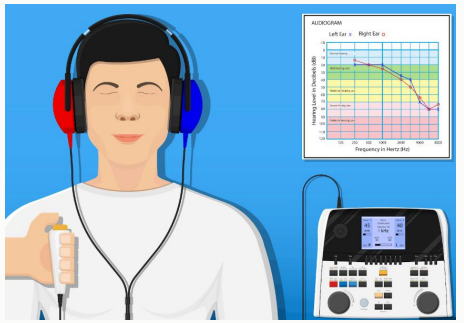
AUDIOMETRIC EDGE REQUIREMENTS FROM SAVOX PERSPECTIVE

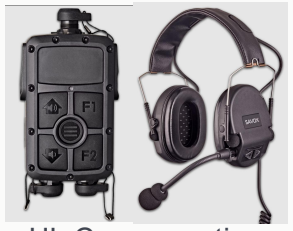
Minimum requirements, must have

Mobile applications:
- Get the Hearing Level (dB) from audiometry station
  - 11 integer values for both left & right ear (Confirm from OTOS)
  - Method of fetching the values from the audiometry station to mobile app can be freely chosen:
    - scanning QR-code, using BLE or other way
- Records the date/time and HL.
  - In case of mild/moderate hearing loss, recommends to re-check HL after 12 months

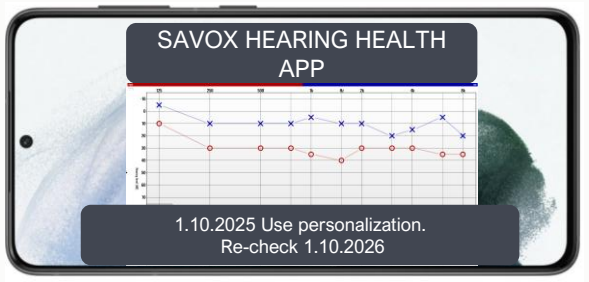
Data transfer:
- Minimum of a single method to easily transfer the HL to Savox compatible hearing personalization device
  - Directly from mobile app using BLE/NFC
  - using NFC tag/card
  - What ever you find to be good solution for the end user

Personalization:
- The speaker signal that is transmitted from the CC-units to the headsets and thus for the user, is being processed in such way, that it compensates mild/moderate hearing damage.
  - EQ / multiband dynamic processing / loudness compensation / other processing





HL Compensation



HL Data transfer to CC units

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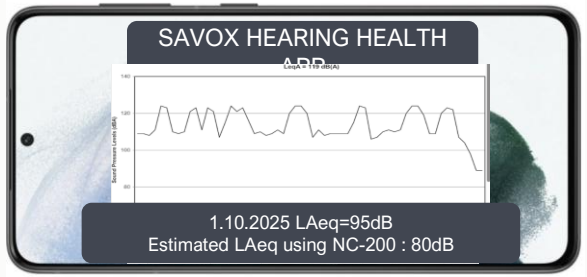
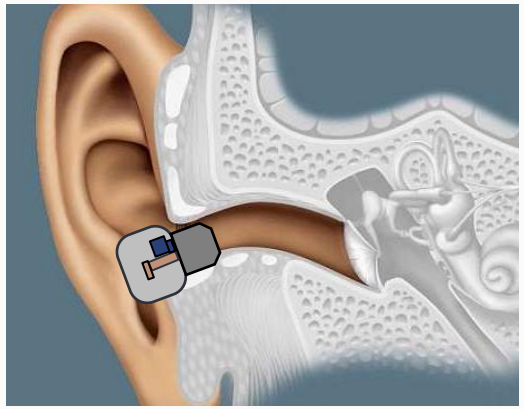
AUDIOMETRIC EDGE REQUIREMENTS FROM SAVOX PERSPECTIVE

Additional requirements, nice to have

Noise dosimetry:
- Monitors and logs the noise exposure over time (LAeq8h)
- Stores the values on internal memory, and syncs with mobile app when connected
- **Stage 1: monitor the noise environment the user is working**
  - For estimating the noise exposure over hearing protection, apply the octave band insertion loss of the hearing protection device (from certified values = constant).
  - Doable with additional microphone in the “add-on”, or using the ht_mic signals available on NC-100.
- **Stage 2: monitor the noise exposure present at users' ear-canals**
  - Takes into account the signal from transparency mode, communication and external noise transmitted over the hearing protection
  - Not feasible with current savox headsets

Fit/seal test:
- Estimates the correct usage, fit and seal of the hearing protection device
- Can be established with comparing the signals present at the ambient microphones (ht_mics) and internal microphones.
  - Note, not fully feasible with current Savox products. POC can be done with NC-100 right side, that has the signal from the ear-canal microphone.
  - POC can be done with additional microphones installed on NC-200. This we can discuss more in details.





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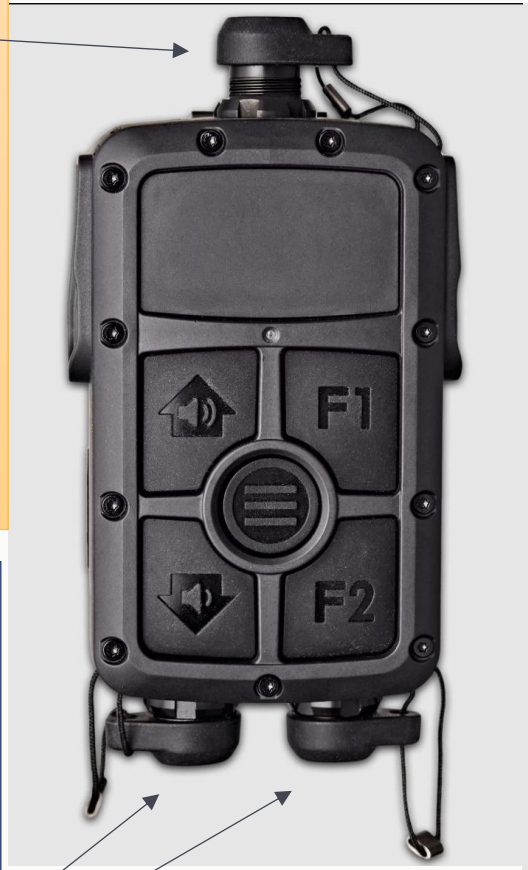
COMMUNICATION CONTROLLERS (CC-UNITS)

Headset port
- This is where audiometric edge prototype will be interfaces
- 14 pin connector
- 2ch audio RX
  - Signals presented to two ears
- 1ch audio TX
  - Signal from headset microphone presented to radio ports

Radio port
- Radios (2 – 4 pcs) are connected here
- Signals (RX) from the radios are routed to headset port
- Signal (TX) from headset port are routed to one of the radios. Communication controlled by buttons on CC-unit



T10

Ci4


C2

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HEADSETS

NOISE-COM 100
- In ear hearing protection headset
- Communication TX/RX
- “Transparency mode” managed by CC units
- 3k9 ID resistor (pins 11-12)

NOISE-COM 200
- Over the ear hearing protection headset
- Communication TX/RX
- “Transparency mode” managed by headset
- 2k2 ID resistor (pins 11-12)

NOISE-COM 100

NOISE-COM 200

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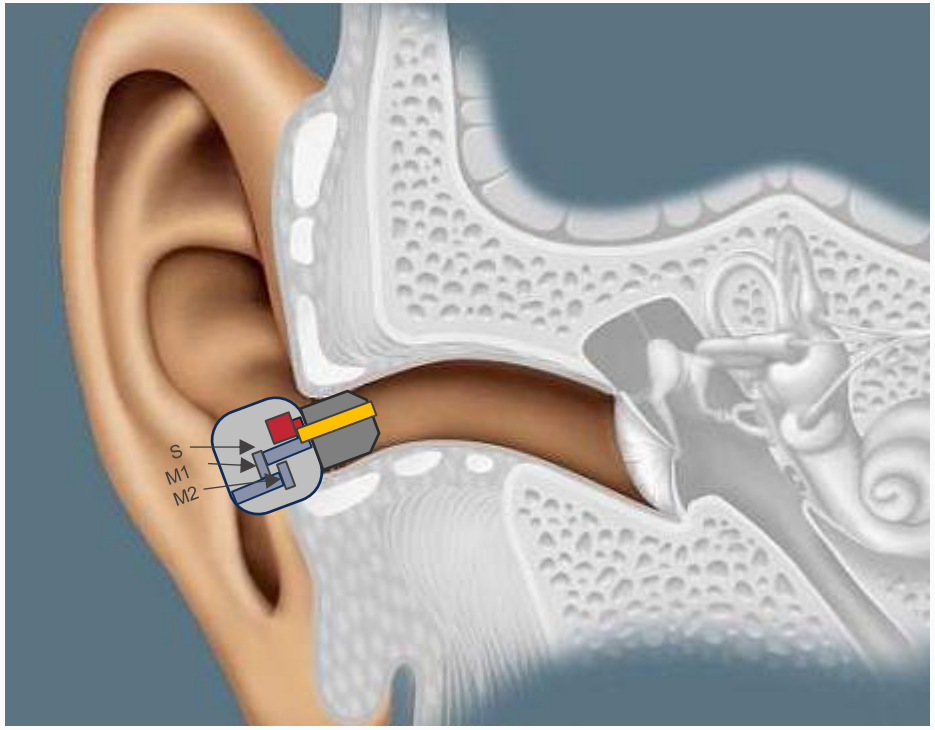
NC-100 General description

- The NC-100 is an ear-plug type hearing protection unit with build in electroacoustic transducers to support a voice communication and level-dependent functions (transparency mode)
- The NC-100 product uses replaceable foam type ear-tips which are available in three sizes.
- The NC-100 provides a wired connection to external processing unit which manages the signal processing and amplification required by voice communication and level-dependent functions.
- NC-100 by itself does not include audio signal processing function nor power amplification circuit. NC-100 is fully passive ear-plug type hearing protection unit if used without external processing unit.



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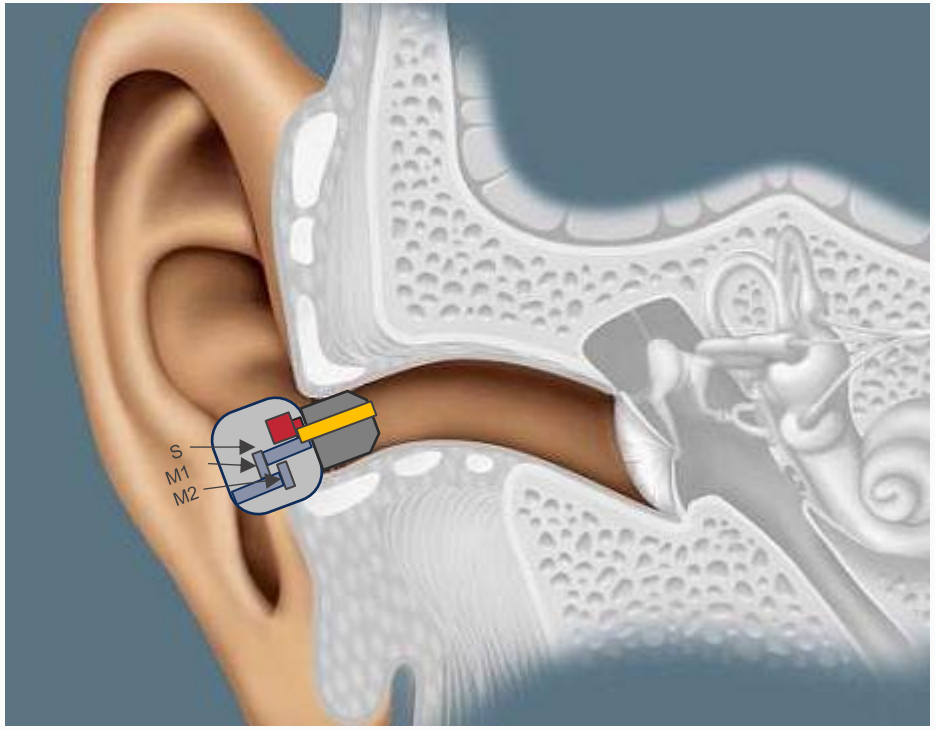
NC-100 Eletroacoustic transducers

- The electroacoustic components are
  - Microphone 1 ported to external sound field
  - Microphone 2 ported to ear canal
  - Moving coil type transducer ported to ear canal for sound production
- Components are interfaced with fixed cable mounted on the housing of the ear-piece
- Microphones 1 and 2 are analog MEMS microphones with differential signal output
- Microphone output are equipped with on-board DC-blocking and RF filtering components



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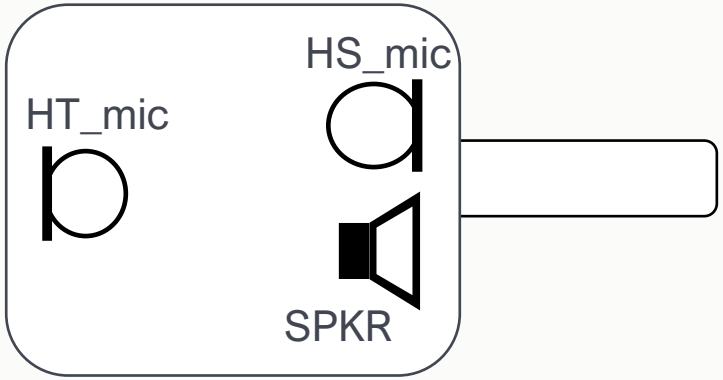
NOISE-COM 100 SIMPLE DESCRIPTION OF TRANSDUCERS



HT_mic: Ambient sounds, transparency mode. Left & right sides
HS_mic: speech pick up from ear-canal. Connected only on right side
SPKR: sound playback to ear-canal. Left & right sides

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CONNECTION OF THE ODU14 USED IN NC-100 STEREO HEADSET

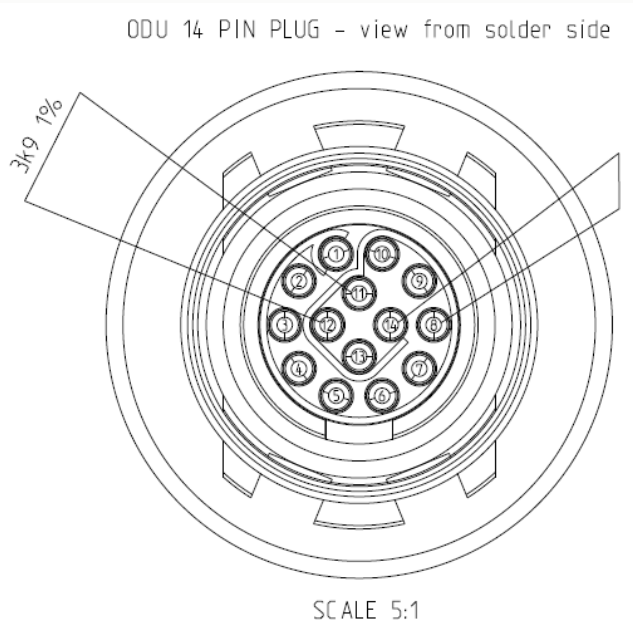
ORANGE AND WHITE WIRES IN CABLE_LEFT_EAR ARE NOT CONNECTED. CUT THEM OF.

3k9 1%

WIRING INFORMATION

ODU 14 pin	COMPONENTS	SIGNAL
1		HS_MIC-
2		HS_MIC+
3		SPKR_RIGHT
4		SPKR_GND
5		SPKR_LEFT
6		HT_MIC_LEFT-
7		HT_MIC_LEFT+
8	SHORT TO 14	CABLE_DET
9		HT_MIC_RIGHT+
10		HT_MIC_RIGHT-
11	RESISTOR 3.9 K 1%	ID_R
12		GND
13		ACC_SUPPLY
14	SHORT TO 8	GND

For chassis mount Socket (female) used in C2,C4&T10



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NC-200 GENERAL DESC.

In short. With NC200, the transparency mode is managed inside the product.
Only HS_mic (communication microphone for TX) and speaker-signals for left and right are available on the connector seen by CC-units

CONNECTION OF THE ODU14 USED IN NC-200 STEREO HEADSET

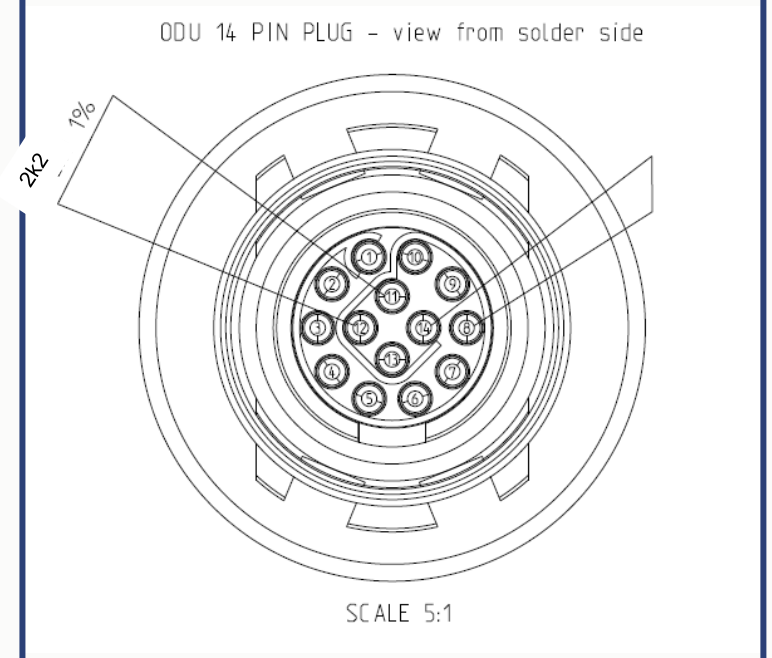
ORANGE AND WHITE WIRES IN CABLE_LEFT_EAR ARE NOT CONNECTED. CUT THEM OF.

2k2 1%

WIRING INFORMATION

ODU 14 pin	COMPONENTS	SIGNAL
1		HS_MIC-
2		HS_MIC+
3		SPKR_RIGHT
4		SPKR_GND
5		SPKR_LEFT
6		
7		
8	SHORT TO 14	CABLE_DET
9		
10		
11	RESISTOR 2k2 1%	ID_R
12		GND
13		
14	SHORT TO 8	GND

For chassis mount Socket (female) used in C2,C4&T10



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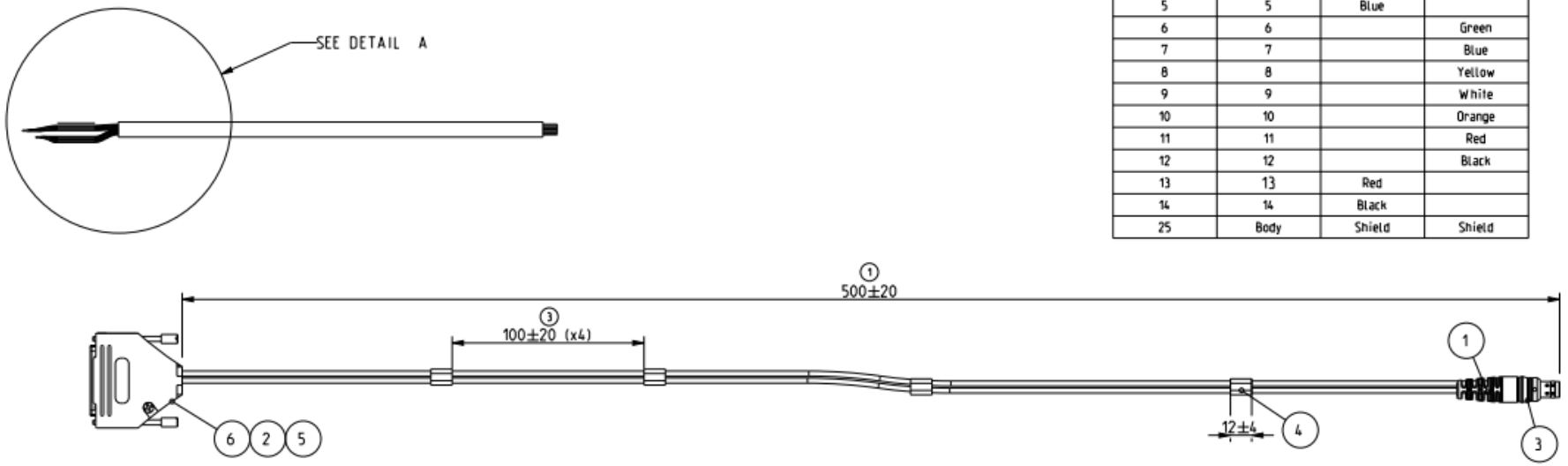
CABLE ASSEMBLY FOR CONNECTING AUDIOMETRIC EDGE TO COMMUNICATION CONTROLLERS

	Wiring Information		
D-Sub Pin No.	ODU 14 pin Pin No.	Cable 1 Core Colour	Cable 2 Core colour
1	1	Orange	
2	2	White	
3	3	Green	
4	4	Yellow	
5	5	Blue	
6	6		Green
7	7		Blue
8	8		Yellow
9	9		White
10	10		Orange
11	11		Red
12	12		Black
13	13	Red	
14	14	Black	
25	Body	Shield	Shield



Manufacturing check points: 1 3 4

Osa Part	Tuote no. Part no.	Nimitys Description	Lisätietoja Information	Kpl Pcs
6	M009591	D-Sub Connector Hood	6560-0605-03	1
5	M009590	D-Sub 25pin Connector	L717SDB25P	1
4	M009570_TUBE	Shrink Tube	-	4
3	M002400	14PIN Cable Mount Connector	CNT07-TGB-1F-014HC	1
2	M001915	SP-SV-192	TPE 65A (Black)	2
1	M001755	Doubble cable bend	TPE 80A	1

Tolerances of linear dimensions Medium ISO 2768-m	
Dimension	Tolerance
0.5 - 3	±0.1
3 - 6	±0.1
6 - 30	±0.2
30 - 120	±0.3
120 - 400	±0.5
For nominal sizes below 0.5mm the deviations shall be as indicated adjacent to the relevant nominal size(s)	

savox COMMUNICATIONS

Yleistoleranssit / Standardit
General Tolerances / Standards
ISO 2768-m

Nimitys: Descript: [redacted]

Tuote no. Part no. M009570

Dokumentti no. Document no. M009570

Scale/Suhde 1:1

3D-Model File: M009570

Drawing File M009570

Materiaali: Material: -

Pinta käs: Treatment: -

Väri sävy: Color: -

Suunnittelija: Designed by: OHa 2017-10-12

Hyväksyjä: Accepted by: SR

Sivu no: Sheet No: A3 1/1

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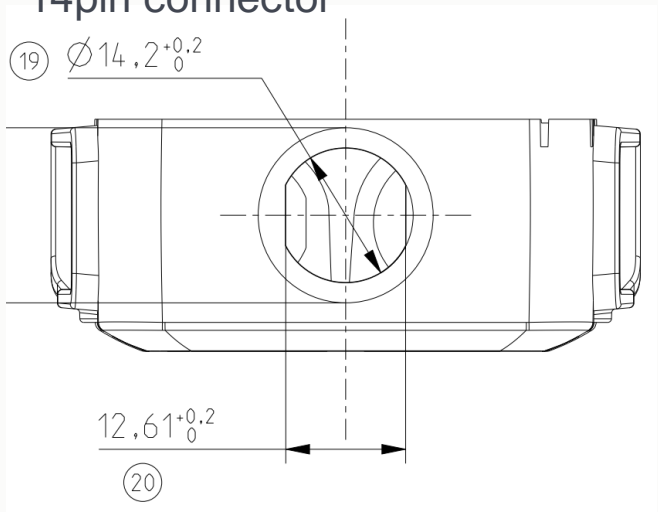
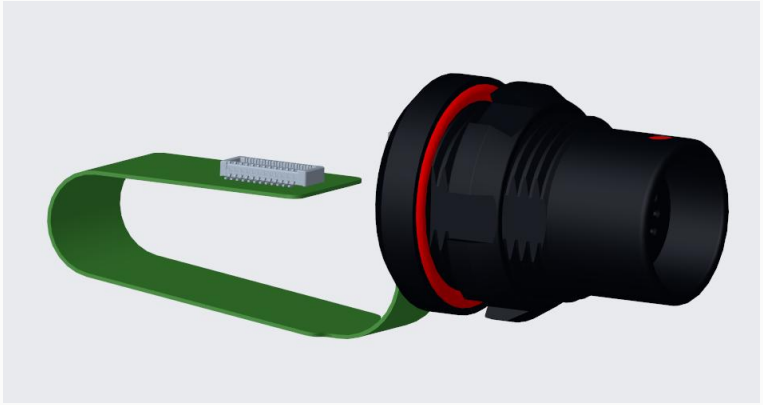
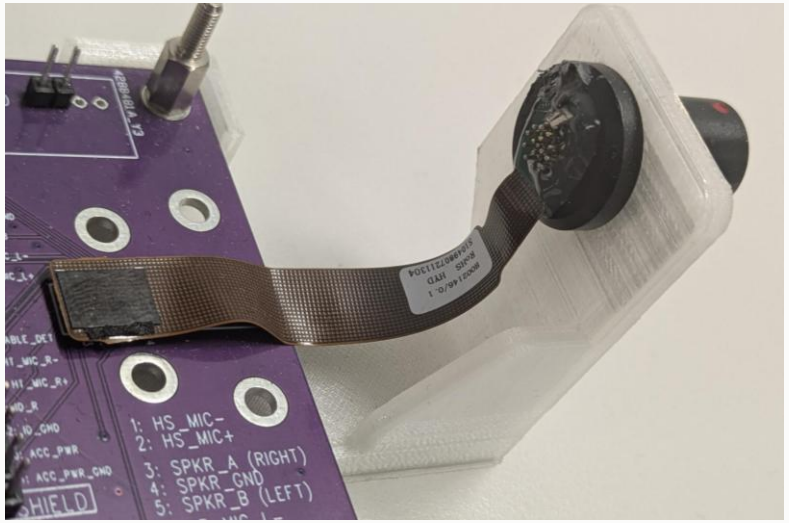
HEADSET CONNECTOR DETAILS

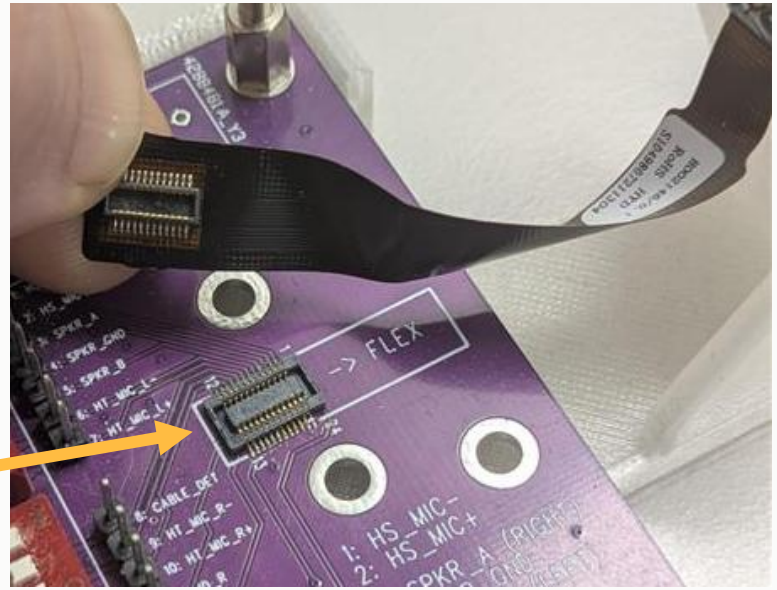
Dimensions for mounting the 14pin connector



14pin FCPA Assembly delivered by Savox







Counterpart for mating with 14 pin FCPA on main board:
Molex_SlimStack_54722-0244_2x12_P0.50mm_Vertical
Mouser: https://mou.sr/3LMT1v1

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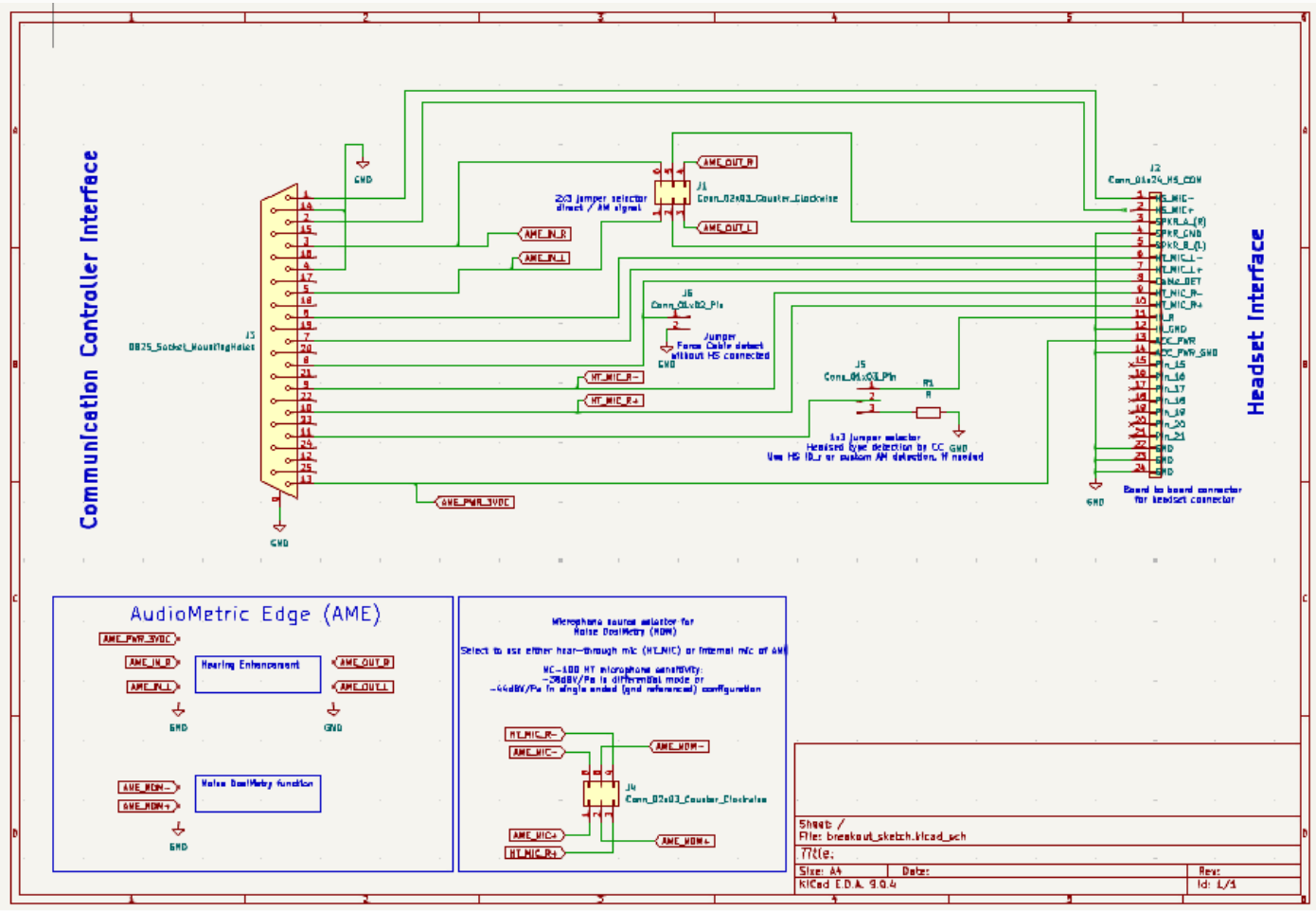
STARTING POINT FOR INTERFACING WITH CC AND HEADSET TO AUDIOMETRIC EDGE (AME)



Kicad project:

- DSUB 25 connector mating the interface cable with CC units
- Molex board to board connector
- Jumper selectors for signal selection of direct pass-through of over AME
- Jumper to pass the HT mic signal of NC-100 to noise dosimetry
- Possibility to force cable detection for CC in case if headset is not connected (for debugging)
- Possibility to assemble dedicated AME cable resistor ID for signal level customization

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POSSIBLE OUTCOMES ID

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POSSIBLE OUTCOMES FUNCTIONALITY

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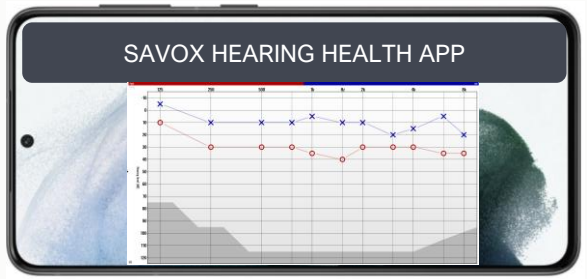

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POSSIBLE OUTCOMES – MARKET RESEARCH, DESCRIPTION OF END-TO-END SERVICE

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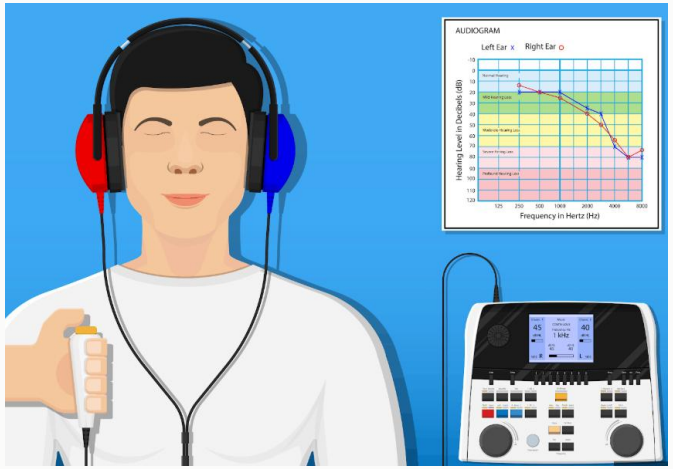
OTOS



Usage in the field

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THANX