

User manual

Vanderveen Arta-2



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Manufactured by Tentlabs

Version : 1.1
Date : 21-10-2011
Based on : "Arta", "Steps", "Limp"
(www.fesb.hr/~mateljan/arta, also available on data CD)

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1) Introduction, general description

The Arta-2 Measuring unit is a calibrated interface between the stereo soundcard of your computer and the audio equipment that you wish to measure. The unit contains Left-Right inputs (to measure signals) and Left-Right outputs (to deliver test signals).

The input impedances each are 100 kOhm, while per channel the input Gain can be set at 0.01/0.1/1/10. The internal reference voltage level is set at 1Vrms = 0dBV, meaning that, depending on the selected Gain, the maximum input signal level can be: 100/10/1/0.1 Vrms (translated in dBV = 40/20/0/-20 dBV).

Although any soundcard has large input capacitors, the Arta-2 unit extra has switchable (DC/AC) decoupling capacitors at their inputs to enable AC measurements in a high DC voltage environment (600 Vmax), like in valve amplifiers.

The L-R outputs have a stereo volume control to set the level of the test signals, and deliver a calibrated 1 Vrms when turned completely clockwise. The L-R output impedances are 10 Ohm.

Several extra switches enable the right input to be directly connected to the left output, and the left input to receive the left output signal through a calibrated series resistor of 100 Ohm (impedance measurements).

The Arta-2 measuring unit communicates through the shielded cable (with two 3,5 mm stereo jacket plugs) with the analog inputs (BLUE) and outputs (GREEN) of the soundcard. This communication is low impedance (10 Ohm) to prevent cross talk and at a reference voltage level of 1 Vrms to prevent overdrive of the soundcard.

A single 9V battery powers the unit. The current consumption is 20 mA max, a lifetime of 25 hours is expected. The battery is placed in a holder at the backside.

2) Software

The software (Windows) that communicates with the soundcard of the computer is designed by Ivo Mateljan and can be downloaded and paid for at www.fesb.hr/~mateljan/arta.

A fully functioning try-out version is on the CD. Please test this software and if accepted, please pay Ivo Mateljan for his excellent work. This software is divided into three parts: Arta, Steps and Limp.

Arta measures the spectrum, frequency transfer, THD and IMD and all results belonging to the impulse response.

Steps measures linearity of amplification and distortions as function of stepped frequencies.

Limp deals with loudspeaker (Thiele-Small) parameters and impedance measurements as function of the frequency. Excellent manuals are also on the CD, explaining all measurements in detail with their complete mathematical background.

3) Calibrated measurements

In order to perform calibrated measurements, the settings and sensitivities of the soundcard should be checked. First switch off inside the soundcard settings all extra's like tone control, super stereo and any other effect. Make sure that the output of the soundcard only reads wav files (switch off line and internal mike) and the amplification of the input volume control of the soundcard is set at a 100 % line level (approx. 1Vrms).

Perform the following actions in **Arta and in Steps**:

- 1) Go to <setup>, <audio devices> and switch "left and right preamp gain" = 1.
- 2) Set the "gain" selector at 1 of the left and right inputs of the Arta-2 measuring unit.
- 3) Go to <setup>, <calibrate devices> and measure (with external function generator and oscilloscope or voltmeter) the output and left/right input voltages as asked for and fill in the fields requested and validate by pressing <accept>. If an extra mike preamp is used, then calibrate this amp as well.
- 4a) Select in **Arta** in "**Spa**" (spectrum analysis) <generator>, <configure> and change "Peak Level (dB FS)" until "RMS voltage" equals 1.00 Vrms. Now your output level in the unit, in clockwise turned "Cal" position, generates exactly 1.00 Vrms at any frequency.
- 4b) Do the same in **Steps**; go to <setup>, <measurements>, fill in by <generator level (dB re FS)> the same dB-number as you have found in Arta for "Peak Level" (dBFS).
- 5) For any more detailed information about calibration, please refer to the manuals.

4) Other important settings and advises

- a) If you change the gain-setting at the measuring unit, then also do it at <setting> <audio devices>, else the program does not know it.
- b) For 16/24/32 bits or sampling rates of your soundcard, please refer to its specifications. Check all settings and try them, some work excellent and others might create internal distortions, which should be avoided.
- c) When starting, you often have to use simple measurement conditions, which you know well, in order to learn how to work with this measurement unit. Please also study the excellent manuals. The math used often asks for external conditions to be fulfilled, which should be checked.
- d) In the starting phase, do not trust any measurement you make. Check and understand and check again. Nice graphs and pictures do not mean that the measurements are reliable. It is you who has to do everything right. This will take learning time, but the more you practice, the more reliable the results will be.
- e) An example: you apply a 2 Vrms signal to the input, while the Gain-setting is at 1. In this case your input is overdriven, creating nasty distortions, not caused by the device you are testing, but caused by having forgotten the maximum 1 Vrms level for Gain=1 as mentioned in the introduction.
- f) $dBV = 20 \times \log(V_{rms})$; $dBV/V = 20 \times \log(A)$ where $A = V_{out}/V_{in}$ of the device you measure.

g) Despite of the protection circuits at the inputs, it might occur, due to too high input voltages or wrong setting of the various knobs, that the internal IC(s) become damaged. Then easily replace it by a new OPA2134. there might occur conditions that we have not envisioned. Then low cost replacement of IC's ensures functioning of the measurement unit.

h) Low battery is indicated by less light of the front LED and by extra distortions in the measurements. So, please check the battery before making measurements. When you measure 8.5 V unloaded or less, then you are in the danger zone.

5) Questions

Mail me at <info@mennovanderveen.nl> and if possible also visit the training sessions that I will organize in The Netherlands. During ETF2011 I will give trainings as well, and if requested, I might repeat those at ETF2012.

