

GECOM Technologies GmbH, Kühlingerstr.28, 27777Ganderkesee

Lieferanschrift
 GECOM Technologies GmbH
 Kühlingerstr.28
 27777 Ganderkesee

Werks-Kalibrierschein
Proprietary Calibration Certificate

Kalibrier-Nr.: 29 h 00 384 <i>Calibration-No.</i>

Gegenstand <i>Object</i>	CD-Demagnetizer	<p>Dieser Kalibrierschein dokumentiert die Rückführbarkeit auf nationale Normale, Normalmesseinrichtungen und -verfahren zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem internationalen Einheitensystem (SI). Die Kalibrierung erfolgt durch Vergleich mit Bezugsnormalen deren Anschluss an die nationalen Normale direkt über die Physikalisch Technische Bundesanstalt (PTB) oder den Deutschen Kalibrierdienst (DKD) erfolgt. Für die Kalibrierung und deren Dokumentation trägt der Aussteller dieses Kalibrierscheines die alleinige Verantwortung. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.</p> <p><i>This calibration certificate documents the traceability to national standards, standard measuring equipment and methods for the realization of physical units of measurements according to the International Systems of Units (SI). The calibration is performed by comparison with reference standards whose connection to national standards is directly above the Physikalisch Technische Bundesanstalt (PTB) or the Deutscher Kalibrierdienst (DKD). The issuing company is solely responsible for the performance and the documentation of the calibration. The user is responsible for the observance of a suitable recalibration period.</i></p>
Hersteller <i>Manufacturer</i>	HiFi-Tuning	
Typ <i>Type</i>	HiFi-Tuning's CD / DVD / BluRay-Demagnetisierer Type HT-2	
Fabrikat/Serien-Nr. <i>Serial number</i>	none	
Ident-Nr. <i>Ident number</i>	----	
Auftraggeber <i>Customer</i>	Fa. HiFi -Tuning Bernd C. Ahne Wiciefstr. 11 10551 Berlin Germany	
Auftragsnummer <i>Work order No.</i>	294 h 03793	
Anzahl der Seiten des Kalibrierscheines <i>Number of pages of the certificate</i>	9	
Datum der Kalibrierung <i>Date of the calibration</i>	29.06.2009	

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Firmenstempel
Company seal

Ausstellungsdatum
Date of issue
29.06.2009

Unterschrift
Signature

Kalibriergeräte

Geräteart	Hersteller / Typ	Seriennummer	Kalibrierung fällig
Spektrumanalyzer	HP 3585A	3127A00345	04.10
FFT-Analyzer	HP 3562A	2847 A 01256	03.10
Leistungsanalyzer	Norma D 5135	2180759	04.10
Magnetfeldmesser	Bell 640	DE 3476	01.10
Magnetfeldsonde	Bell SAE-4-0808	1277-566	12.09
Koppelspule 1mH	GECOM 1 mH	433	11.09
Microvoltmeter	Keithley 181	622348	11.09

Kalibrierverfahren

Durchführung des Performance Verification Tests gemäß Herstellervorgaben.
Diverse Bereiche neu abgeglichen, deshalb keine Abweichung von Sollwert

Messunsicherheit

Die Messunsicherheit ist separat ausgewiesen.

Umgebungsbedingungen

Temperatur in °C : 23 (+/- 1)
Feuchte, rel in % : 50 (+/- 10)

Messbedingungen

Zusätzlich zum Performance Verification Test werden, auch wenn diese nicht gefordert sind, alle Schnittstellen des Gerätes, wie Plotterausgang, IEEE, etc. auf Funktion überprüft.
Die Geräte haben eine Warmlaufphase von mindestens 2 Stunden.

Das empfohlene Kalibrierintervall beträgt 12 Monate.

Completed Measurements

To understand the basically principle of CD/DVD – demagnetizers you'll find a good documentation on the site of Acoustic Revive:

http://www.acoustic-revive.com/english/rd3/rd3_01.html

Measurements of absolute values and comparisons with Furutech RD-2 / RD.-3

1. Measurement of magnetic field strenght AC RMS.

- | | |
|-------------------------|-------------------------|
| a. Furutech RD-2: | 95 Gauß |
| b. Acoustic Revive RD-3 | 97 Gauß |
| c. HiFi-Tuning HT-2 | 240 Gauß (Switch pos.1) |
| | 245 Gauß (Switch pos.2) |

Measurements done with: Bell 640 magnetic field strength meter and Bell SAE4-0808 magnetic field probe.

Measurements done with CD in place, probe axle 90 degree vertical to CD.

2. Input current at line voltage 230,0 V AC

- | | |
|-------------------------|---------|
| a. Furutech RD-2: | 0,137 A |
| b. Acoustic Revive RD-3 | 0,126 A |
| c. HiFi-Tuning HT-2 | 0,312 A |

Measurements done with Norma D 5135 Poweranalyzer und 1 Amp. Shunt.

Measurements done with CD in place.

3. Time for demagnetisation (one side)

- | | |
|-------------------------|------------|
| a. Furutech RD-2: | 15,76 sec. |
| b. Acoustic Revive RD-3 | 16,15 sec. |
| c. HiFi-Tuning HT-2 | 7,47 sec. |

Time measured from starting of process, till LED is extinguished..

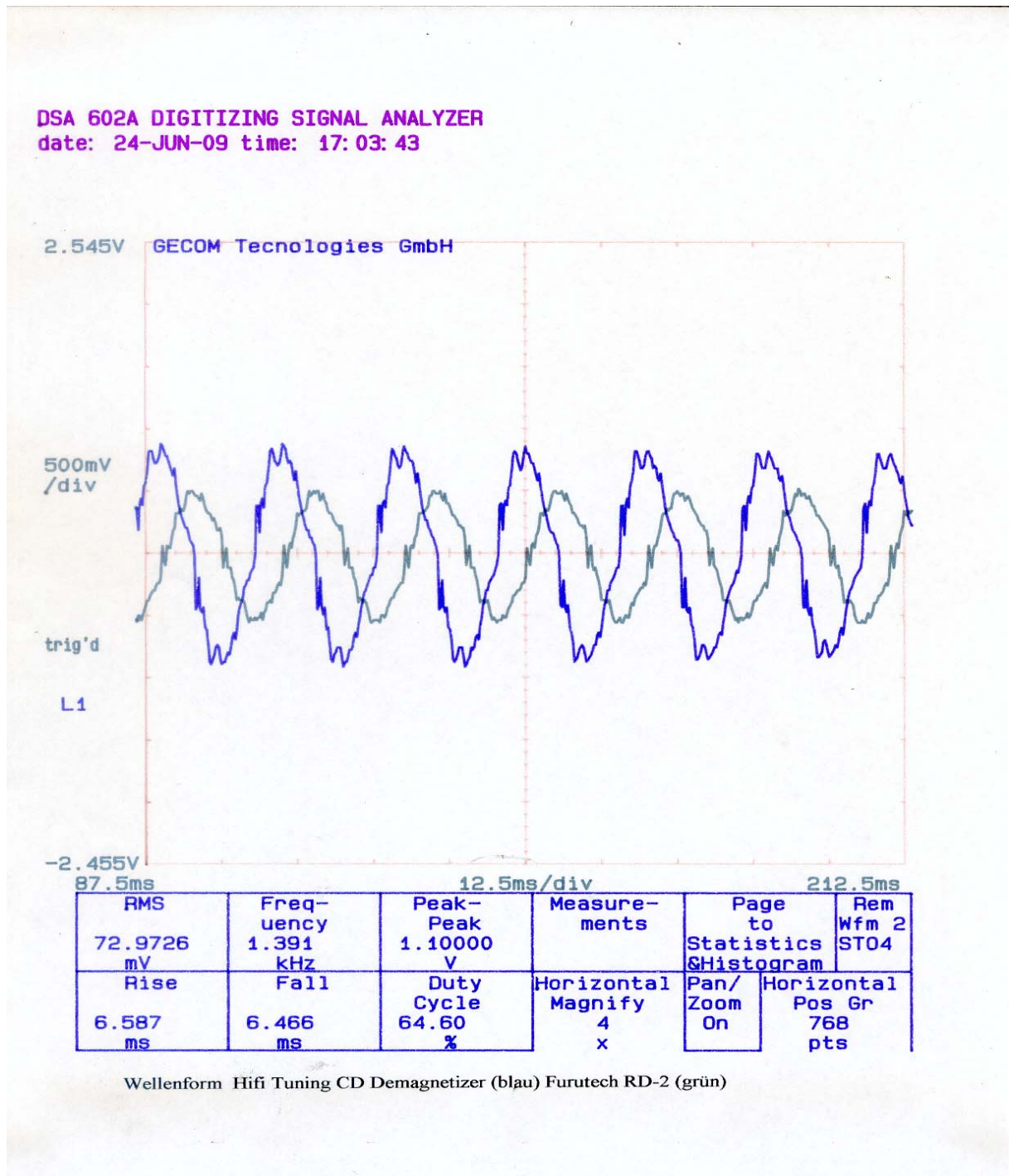
The time is varying with all three units under test about 10%. Times given are an average of 10 measurements.

A draw back is the time of about 5 minutes which needs the HiFi-Tuning HT-2 between demagnetisation of two disks, so it's not possible to do a number of measurements in quick succession. That waiting time is specified in the operating Manual of the HT-2. Without that 5 minutes break the HT-2 doesn't operate or only very briefly flash the LED.

4. Measurements of output waveform

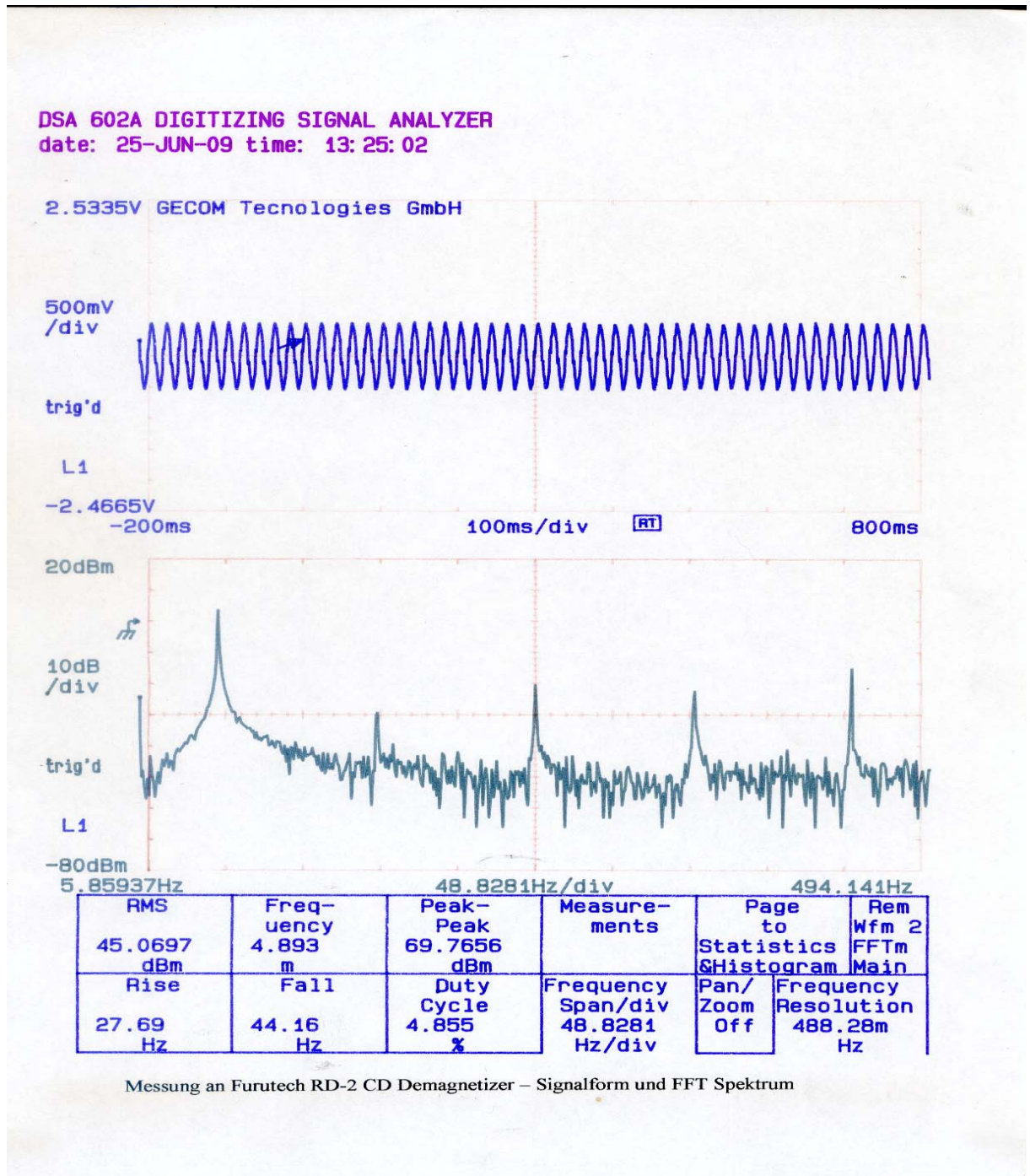
Measurement configuration:

The units under test were positioned on a wooden table, minimum 3 ft away from any sources of stray fields. Measurements were done with CD in place. On top of the CD was placed a measurement-coil with 1 mH inductance. So the field going through the CD was measured. Signals were evaluated with a Tektronix DSA 602A Analyser and 11A33 differential input plug in.



Results of measurement:

1. Signal amplitude of HiFi-Tuning HT-2 is significantly higher (blue Trace) as the one of Furutech's RD-2 or Acoustic Revive's RD 3 (green Trace, Waveform of RD-2 and RD-3 identical)
2. Of importance are the spikes on the waveform of the HiFi-Tuning HT-2. They are created by a second frequency of about 2 kHz which is mixed with the main 50 Hz signal.

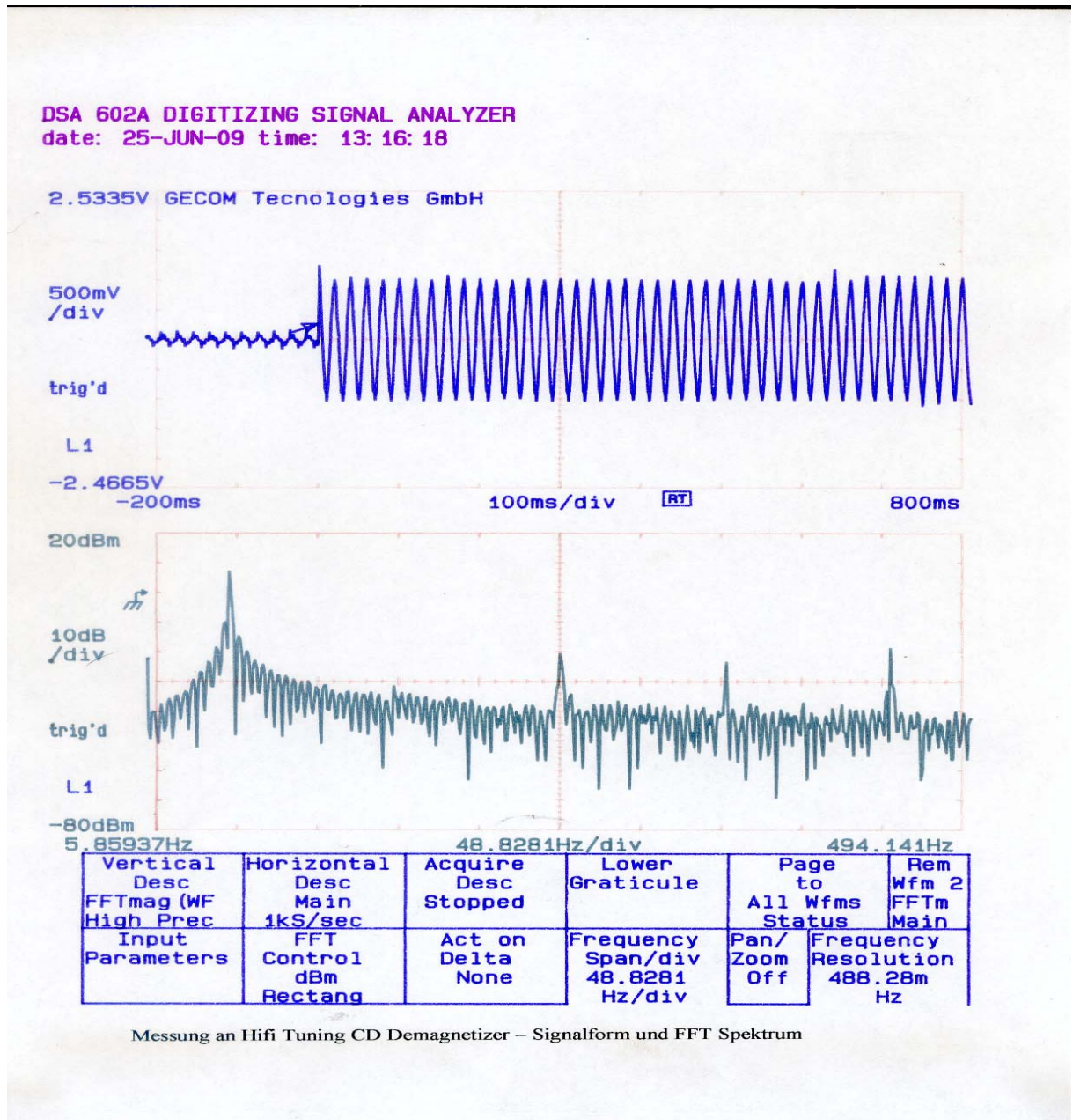


Results of measurement:

Measured: Furutech RD-2, Acoustic Revive RD-3 are identical.

The top blue trace shows the same waveform as the plot above. The lower green trace shows the FFT spectrum of that signal. Frequency spectrum of the signal generated.

Clearly visible are the odd harmonics. This is the typical spectrum of a sine wave of 50 Hz with distortion of about 10 %.



Results of measurement:

Same configuration as the measurements of the Furutech RD-2.

The FFT-spectrum of the HiFi-Tuning HT-2 (green trace) shows less harmonics, which means less distortion of the signal and a lot of comb like small spikes resulting from intermodulation of the above mentioned second generated frequency of about 2 kHz.

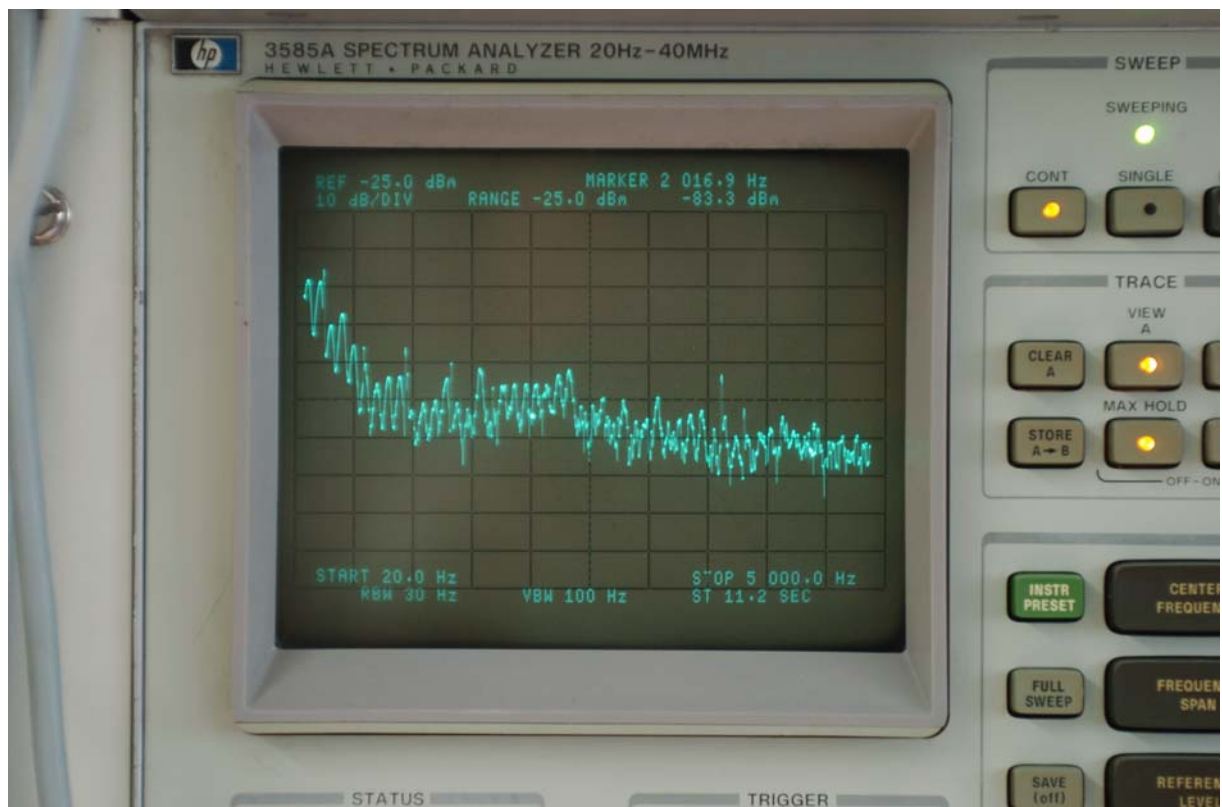
Further measurements of the spectrum of the generated waveforms:

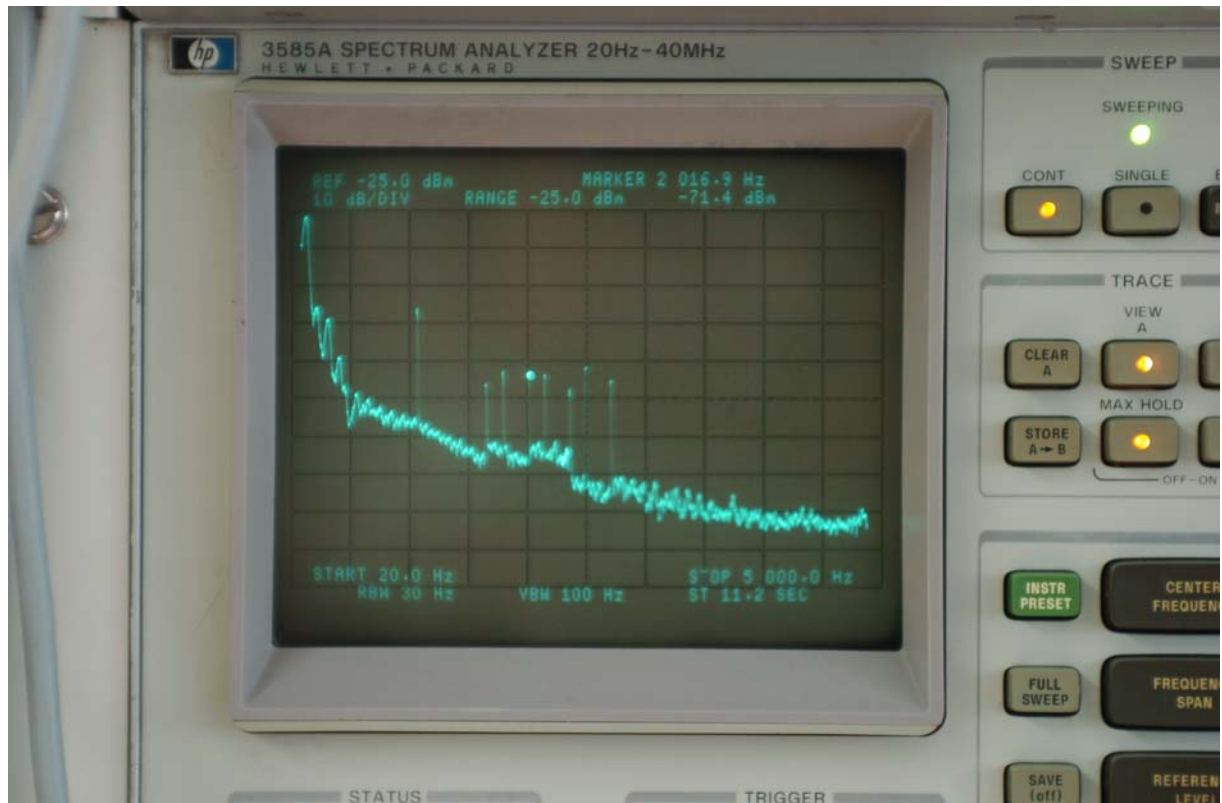
Same configuration of measurement, except this time a real time spectrum analyzer HP 3585A was used.

Measurement results:

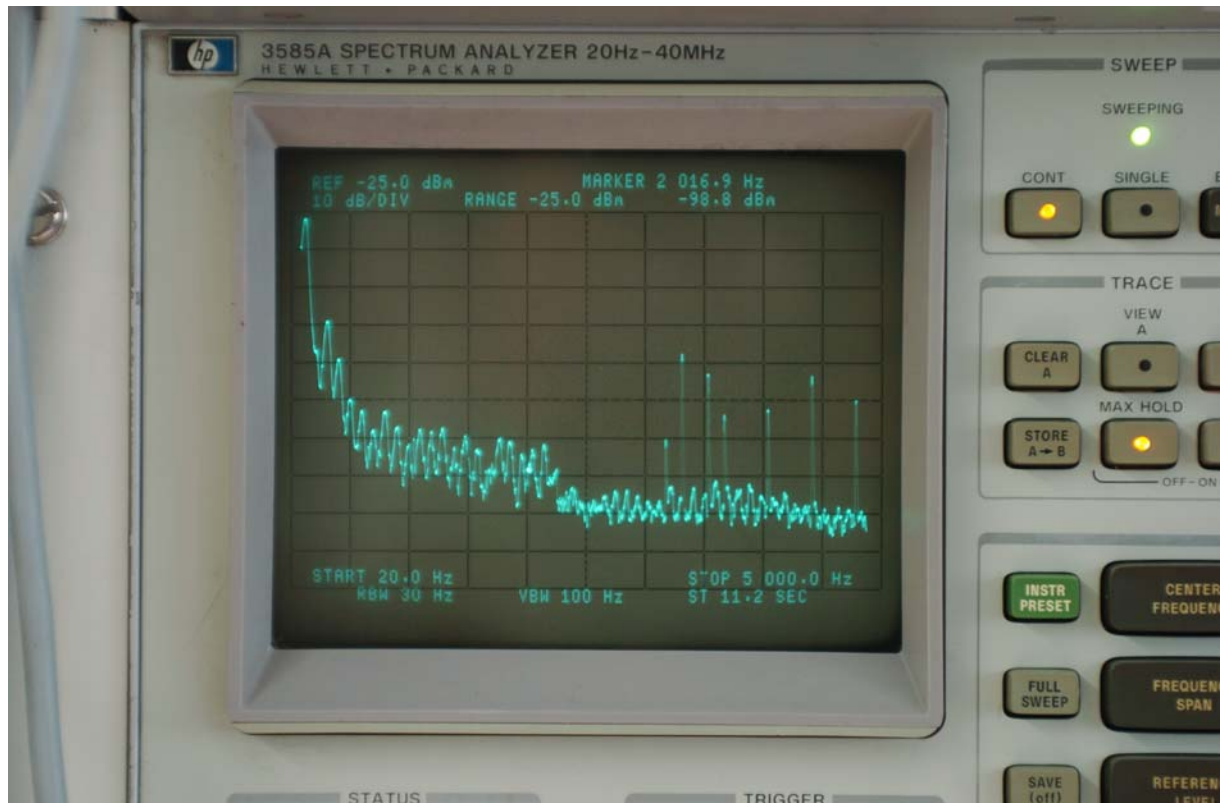
Unit under test HiFi-Tuning HT-2

Shown is a frequency range from 20 Hz to 5kHz. Clearly can be seen a wide dispersion of frequencies. For better understanding: the area beneath the shown trace equals the complete dissipated energy. Also has to be mentioned the scale of power is “dBm” which is a logarithmic scale.





Here you see in comparison the same measurements of the Furutech RD-2. The complete area underneath the trace is much smaller, which means simply less energy dissipated. Also clearly can be seen the spikes of the harmonics of the 50 Hz signal (second and third peak from the left) Also some spikes of intermodulation can be seen on the right.



Measurements of Furutech RD-3

In comparison to RD-2 a bit higher total dissipated energy and some higher frequencies with intermodulation products.

5. Measurements of remaining magnetism after demagnetisation:

Configuration: A not treated CD is measured before and after demagnetisation. Before demagnetisation the measured value is about 0,04 Gauß. Measurements are very complicated, because they are near the noise level of the magnetic field meter. Results are as expected by the measurements before.

Measurement of DC field strength RMS:

- | | |
|-------------------------|-----------|
| a. Furutech RD-2 | 0,02 Gauß |
| b. Acoustic Revive RD-3 | 0,02 Gauß |
| c. HiFi-Tuning HT-2 | 0,01 Gauß |

Conclusion:

Basically all three units under test are quite similar. The power used for demagnetisation is in the same range: The Furutech RD-2 and Acoustic Revive's RD-3 work with half the amplitude, but about double the time, compared to the HiFi-Tuning HT-2.

An advantage of the HiFi-Tuning HT-2 is the higher energy-density and broader applied frequency spectrum. By those facts the demagnetisation is more effective.

A listening test proved the results of the measurements. All three units showed the same kind of improvement on CD's – less harshness, better definition and room-reproduction. Going all in the same direction, the HiFi-Tuning HT-2 showed the best results.

By technical performance and also the results in the listening tests, the HiFi-Tuning HT-2 is the superior unit.