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2003 / 2004
October/Februari

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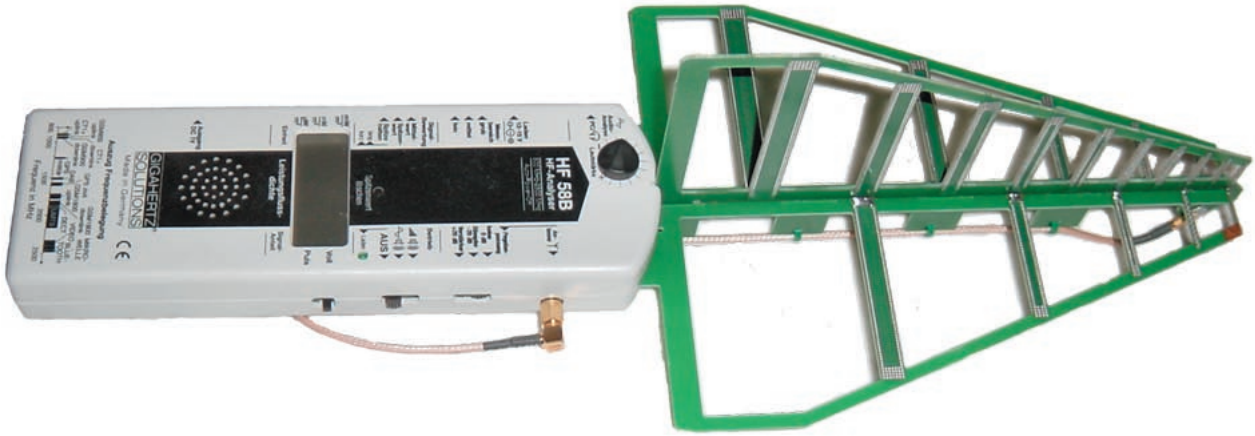
Healthier Living
Elektrosmog
HF Meters



Content

Colodings & else

At **www.Gigaherz.ch** the following was to be read in April 2003. A group volunteers was actively busy in cleaning up in a protected nature reservation (Baettwil). It was a beautiful clear day with cloudless skies. Suddenly, a number of bats fluttered back and forth, notably in daytime, which is strange. Someone got an idea and asked the others if they had their mobile phones perhaps switched on. An unanimous *YES * sounded on it. Within two minutes, after the phones were switched off, the bats had disappeared into their hiding places. Bats are very sensitive animals, with radar-similarly equipped organs, on which radio signals of the phones were awakened and attracted. Thus, if you go walking in a nature area, think then of the present animals and switch off your mobile phone!

Wolfgang Maes described it also some time ago. Ultrasound (ultrasonic) Scans, which pregnant mothers use in order to see the unborn babies, may be a cause for disaster. During the 90's a number of studies referred to it. Research showed, that subtle brain damage with humans, who should be genetically right-handed, now may become left-handed. They also run a high risk for conditions such as learning problems to epilepsy.
A team of Swedish scientists have recently confirmed the earlier studies regarding the effects of Ultrasound with convincingly proof that unborn babies are affected by these scans. They compared 7,000 men, of which the mothers had undergone scanning in the 70's, with 170.000 men of which the mothers did not do so, and considering and regard of the difference between left- and right-handed.

Crucial was the fact, what they found, with those born after 1975, when the physicians prescribed a second scan later during the pregnancy. Such men had 32 % more prospect to become left-handed than those in the control's group.

During their publication in the magazine Epidemiology the researchers warned that in many countries the scans in advanced pregnancies now have become routine.
Today's test results suggest a 30% risk increase for left-handedness with boys who are prenatal exposed to ultrasound. If this association is compatible with brain damage, points this to 1 to 50 male fetuses.
Normally left-handedness is genetic; the chance with two left-handed parents is 35%. With two right-handed parents that is 9%.
And it is when the left-handedness surpasses above the normal statistics, that scientists start worrying that the brain damage in or another form, can be a factor.

HF Analyser

Nothing is so variable as opinions and views. Many years Gigahertz Solutions proclaimed that they would only concern themselves exclusively with measuring instruments for low-frequency electromagnetic fields. For that they have a expanded program of measuring instruments. Into the low-frequency area (from 1 cycle per second to approx. 1 MHz) the electrical alternating fields and the magnetic alternating fields are buttoned in each other (as is the case with high frequencies from ca. 1 MHz till in the GHz reach), and they must be measured therefore separately.
The electrical alternating fields in V/m (volt per meter) and the magnetic alternating fields in nT (nano Tesla). Actually two separate measuring instruments are necessary.

Gigahertz has these two measuring fields joined into only one measuring instrument, and the separate measuring can be achieved by means of a switch between both methods.
There are different versions of meters, according to frequency range. The most expensive one has a measuring range from 5 cycles per second to 400 kHz. With this one, and with a separate dish of 30 cm, also computers monitors can be measured according to TCO or MPR II standards. There is also a complete equipment with everything fixed, but that one is more expensive actually. Computer monitors, which may not correspond the TCO standard are not to be sold anymore; thus measuring has little sense anymore.

In order to measure magnetic alternating fields, the X-, Y-, and Z- axis are to be measured. These values need to be squared and added. From this sum, the root has to be computed. A calculator is indispensable thereby.
Since these magnetic alternating fields can show considerable deviations over the time, Gigahertz has a 3D measuring instrument with logger in development. The ISOlogM40 and the ISOlogM50. They will appear later on on the market.

For years it stood on the website of Gigahertz to read that one would be occupied certainly not with high frequency things and would leave this to others. But market tendencies and own experiences changed this opinion and they succeeded in a very short time in developing its own program of measuring instruments for high frequency.
As is the case for the low-frequency program, they created a difference at options also here, so that everyone can have a choice after need and purse. And the need does not need to hold a same step with the purse!

There are six types HF Analyser. On the next side the characteristics stand. Personally, I find the first type, the HF32D a little bit to short in its possibilities.
I would select as entrance model the **HF35C**.
There are two measuring ranges; 1-1999 µW/m² and 0,1-199,9 µW/m².
And, which I consider important, there is the audio analysis of the spurious signal over a good loudspeaker and a volume controller (with this type there is no signal audio output bus, in order to use headphones or registering the signals for later analysis on the computer).
But one can measure average value and peak value. That is important, because that is what our nerves have to deal with

But now first the professional **HF 58B**. The still more extended HF 59B comes in the middle of 2004 (and that is really soon).

Hochfrequenz-Analyser

27 MHz / 800 MHz bis 2,5 GHz

GSM, DAB, DECT, UMTS, Bluetooth, Mikrowellenherd

Innovative Elektronik
Meß- und HF-Technik
Made in Germany

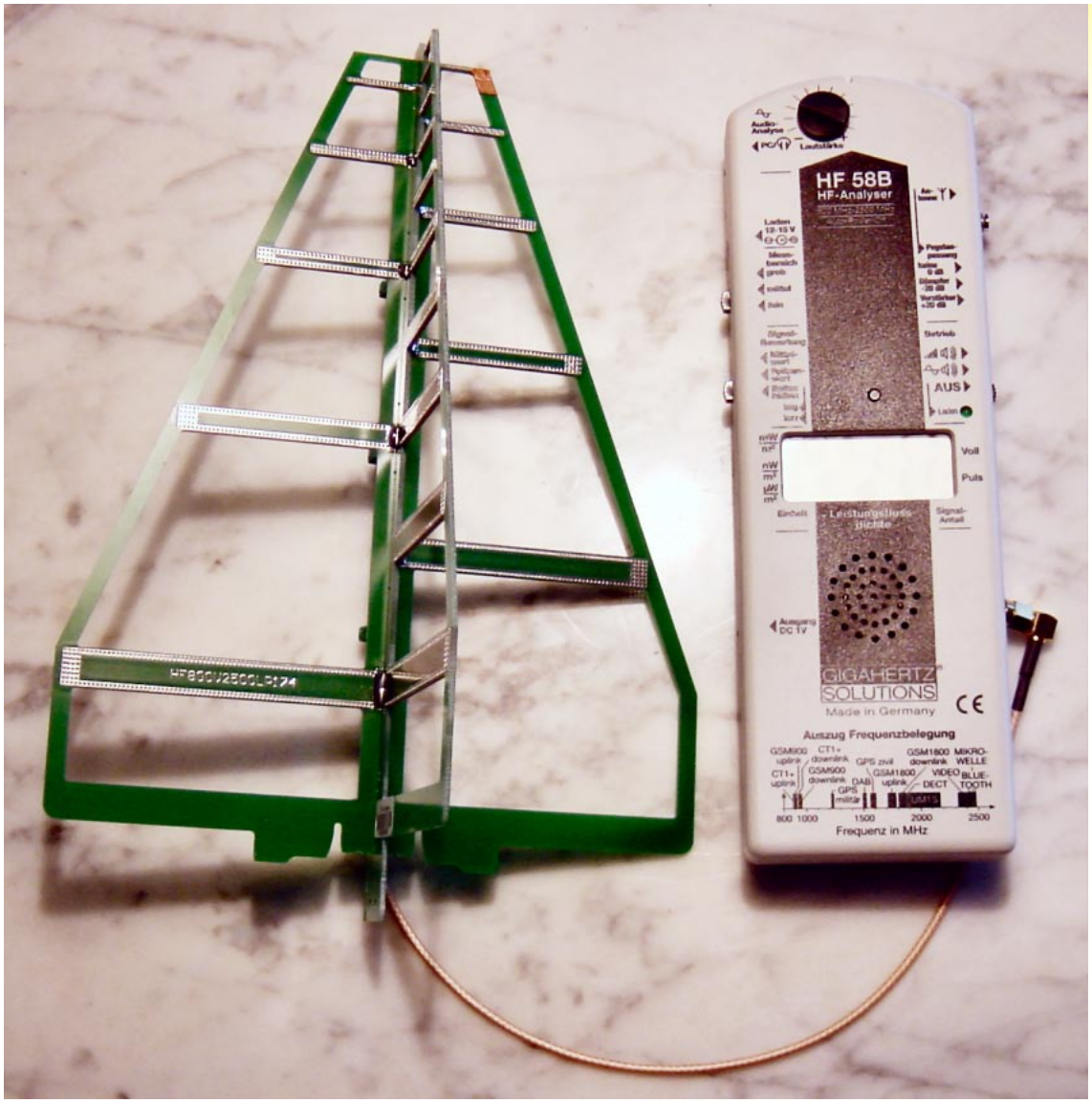
GIGAHERTZ SOLUTIONS®

typischer Einsatzbereich:	einfache Bewertung der Belastung			professionelle Analyse		
HF-Analyser 800 MHz - 2,5 GHz (HF59B: Basisgerät: 27 MHz bis 2,5 GHz)	**HF32D**	**HF35C**	**HF38B**	**HF58B**	**HF58B-*r***	**HF59B** ab27MHz
Listenpreise in Euroländern (zzgl. Mwst.) Listenpreise inkl. 16 % Mwst.	150 EUR 174,00 EUR	240 EUR 278,40 EUR	395 EUR 458,20 EUR	590 EUR 684,40 EUR	685 EUR 794,60 EUR	825 EUR 957,00 EUR
Messbereiche (1) (Dynamik pro Messbereich ca. 33 dB)						
10 - 19990 µW/m²					✓	✓
1 - 1999 µW/m² d.h. ~ -50dBm minimale Auflösung	✓	✓	✓	✓		
0,1 - 199,9 µW/m² d.h. ~ -60dBm minimale Auflösung		✓	✓	✓	✓	✓
0,01 - 19,99 µW/m² d.h. ~ -70dBm minimale Auflösung			✓	✓	✓	✓
Dämpfungsglied (macht das Gerät um Faktor 100 unempfindlicher; Zwischenstecker f. starke Quellen)	opt.	opt.	opt.	opt.	opt.	opt.
Dynamikerweiterung (Faktor 10 emfindlicher und Faktor 100 unempfindlicher; umschaltbar)				optional in Vorbereitung		
Genauigkeit (einschließlich Antennenfehler)	+/- 6 dB	+/- 6 dB	+/- 6 dB	+/- 4,5 dB	+/- 4,5 dB	+/- 3 dB
Antenne, logarithmisch-periodisch (800 MHz bis 2,5 GHz. im Lieferumfang inkl. Antennenkabel. Aufgesteckt oder separat mit Kabel verwendbar, Patent angemeldet, AZ 103 07 085.0)						
einfach polarisiert	✓	✓				
einfach polarisiert mit verbesserter h/v-Entkopplung und minimierter Welligkeit			✓	✓	✓	✓* * kompensiert
Weitere Antennen für die Profigeräte:						
- **kompensierte log.-per-Antenne für Frequenzen unter 800 MHz** (nur HF59B; 2. Quartal 2004)				optional in Vorbereitung		
- **horizontal *und* vertikal polarisierte log.-per. Antenne**						
- **isotrope Antenne für Langzeitaufzeichungen**						
Digitalanzeige: 3,5-stellig in µW/m²	✓	✓	✓	✓	✓	✓
Akustische Analysemöglichkeiten						
feldstärkeproportionales Tonsignal (Piezo-Signalgeber)	✓	✓	✓	✓	✓	✓
frequenzproportionales Tonsignal zur akustischen Analyse gepulster Strahlung (genauer: amplitudenmodulierter Strahlung) (40mm Membranlautsprecher)		✓	✓	✓	✓	✓
Lautstärkeregelung (für Lautsprecher / Kopfhörer; HF58/59: ganz abschaltbar durch Blindstecker)		✓	✓	✓	✓	✓
Digitalanzeige des Gesamtsignals (Patent angemeldet AZ 103 17 805.8)						
Spitzenwert	✓	✓	✓	✓	✓	✓
Mittelwert (Patent Nr. DE19809784)		✓	✓	✓	✓	✓
Spitzenwert halten (HF58B / HF58B*r* / HF59B: mit Schnellrücksetzungs-Taster und 2 Zeitkonstanten)			✓	✓	✓	✓
Spitzenwert halten "radaroptimiert" (min. Pulsbreite 0,5 µS)					✓	✓
Digitalanzeige nur des gepulsten Signalanteils (genauer: des "amplitudenmodulierten Anteils"; hier in der Praxis zusätzliche Toleranz +/- 1 dB)				✓	✓	✓
Mittelwert / Spitzenwert / Spitzenwert halten (wie für das Gesamtsignal, umschaltbar)				✓	✓	✓
Frequenzfilter (Patent angemeldet, AZ 103 58 159.6))						
Externer, variabler "Trap" mit 20 dB Unterdrückung (= Faktor 100) für frequenzselektive Analysen (HF59B: Als Einführungsangebot bis 31.3.04 im Lieferumfang, danach optionales Zubehör)			opt.	opt.	opt.	✓ / opt.
Externer, variabler "Trap" mit 40 dB Unterdrückung (= Faktor 10.000) für frequenzselektive Analysen mit höherer Auflösung			opt.	opt.	opt.	opt.
Signalausgänge						
DC-Ausgang für Langzeitaufzeichnungen (HF59B: umschaltbar 1 oder 2 Volt fullscale)				✓	✓	✓
Audio-Ausgang (moduliertes AC-Signal) für PC (Soundkarte) / Kopfhörer / Spektrumanalyser				✓	✓	✓
Zusätzlicher, *normierter* AC-Ausgang (mod. Signal) für Spektrumanalyser / FFT-Analyser						✓
Digitale Erweiterungsmodule (werkseitig nachrüstbar)						
Anzeige in V/m, µW/m², dBµW/m², Messbereichserweiterung auf 4999 Digits (Frühj. '04)				optional in Vorbereitung		
Loggermodul inkl. PC-Auswertungssoftware (Sommer 2004)						
Stromversorgung (Batterie bzw. Akku im Lieferumfang)						
9-Volt Akalimangan-E-Blockbatterie	✓	✓	✓			
9-Volt NiMH-Hochleistungsakkupack (8 x AAA-Zellen, vom Benutzer einfach austauschbar)				✓	✓	✓
Netzteil (zum Laden des internen Akkus oder zur externen Spannungsversorgung)				✓	✓	✓
Schnelllade-Modul (werkseitig im Gerät nachrüstbar)				optional in Vorbereitung		
Antenneneingang fernspeisefähig (z.B. für aktive Antennen und Filter, Verstärker, Entzerrer etc.)				✓	✓	✓
Mittlere Betriebsdauer pro Batterie / Akkupack	10-12h	6-7h	6-7h	7-8h	6-7h	6-7h
Koffer für Messgerät und Antenne(n)				opt.	opt.	✓

(1) Anmerkung zur Messwertdarstellung in µW/m²: Um diese in der Praxis vorteilhafte Darstellungsweise frequenzunabhängig zu ermöglichen, wird der Einfluß von Frequenz und Antennenfaktor mittels der speziellen Ausformung der Antenne bzw. deren Steuerleitung und durch eine geeignete Entzerrerschaltung noch vor der Detektordiode kompensiert.

Stand: 15.1.2004, V16

Here the HF Analyser program overview as dated 15-01-2004.
The first four types are already available.
The top model HF59B must still come.
The type HF 58 B will be available in 2 versions; normal and special for radar optimized.
One can see from the list that there will be many beautiful additions and a lot of features for building biologists.



The equipment is supplied as a sturdy housing and accompanying detachable antenna. The antenna is pushed into the opening (see fig., next) into the housing and the antenna cable is screwed into the socket to the right side. This socket is a very small type. No BNC sockets fit on it. The Schwarzbeck USLP9143 antenna fits with a special insertion piece (not available yet).

The antenna sits firmly in the housing. It looks rather vulnerable, but practice shows differently. It withstands a drop test well. The housing not, because of its electronics.

The antenna is simply polarized, with improved horizontal and vertical uncoupling. Its type is logarithmic periodic, and works as a directional antenna.

There is a quantity of buttons, and it seems complicated, but at closer view it is not.
The large clear digital display is pleasant, where the measured values are indicated direct in µW/m². There is no need to calculate anything. In front of the values, a small vertical line stands off. If down standing, the announcement is in µW/m². stands the line above, then there is mW/m², and stands the line above AND down, then the value is in nW/m².

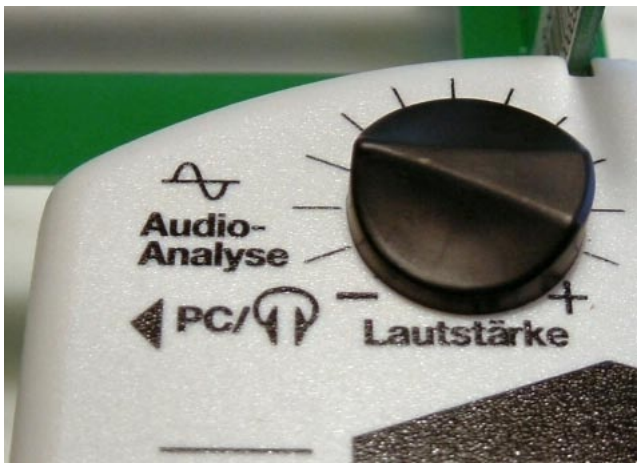
µW/m²

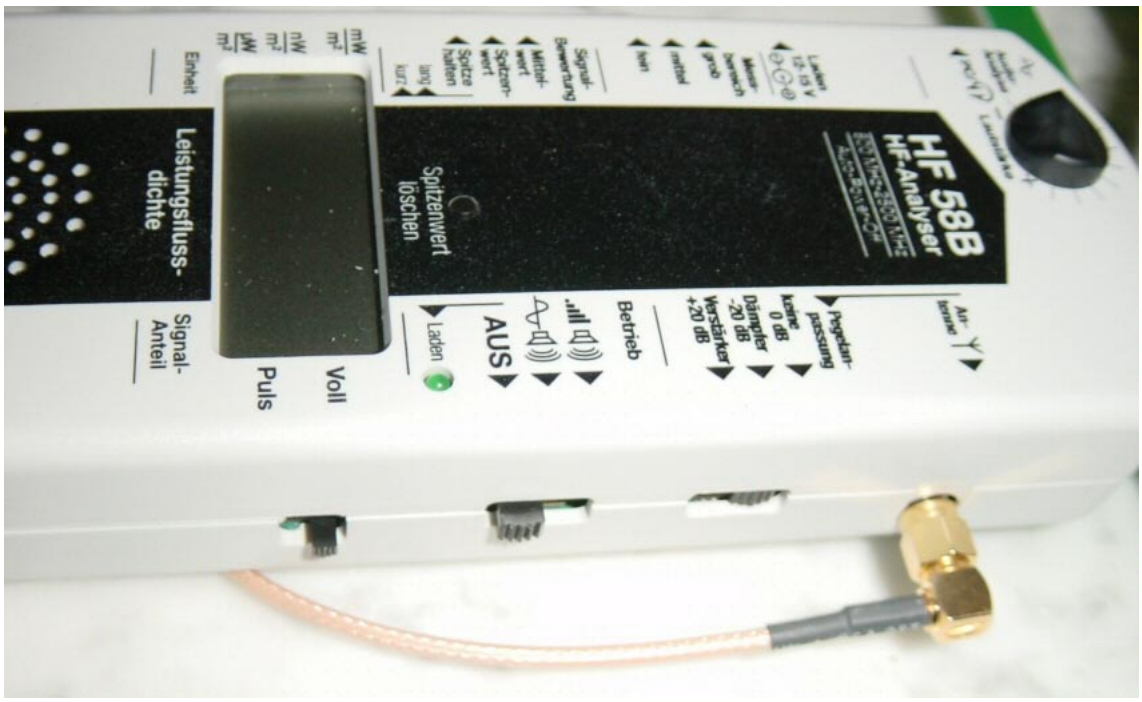
mW/m²

nW/m²

1 W/m² = 1.000.000 µW/m² = 1.000 mW/m² = 1.000.000.000 nW/m²

Next to this, one sees the rotary button of the volume knob for the audio analysis. If the switch **Betrieb** (located right side) is switched to the upper position, the volume knob should be turned anti-clockwise to - (minus). A Piezo tone signal sounds according to field strength. If the switch **Betrieb** is in the middle position (audio analysis) the knob regulates the volume, even when a headphone is jacketed into the PC/headphone bus.

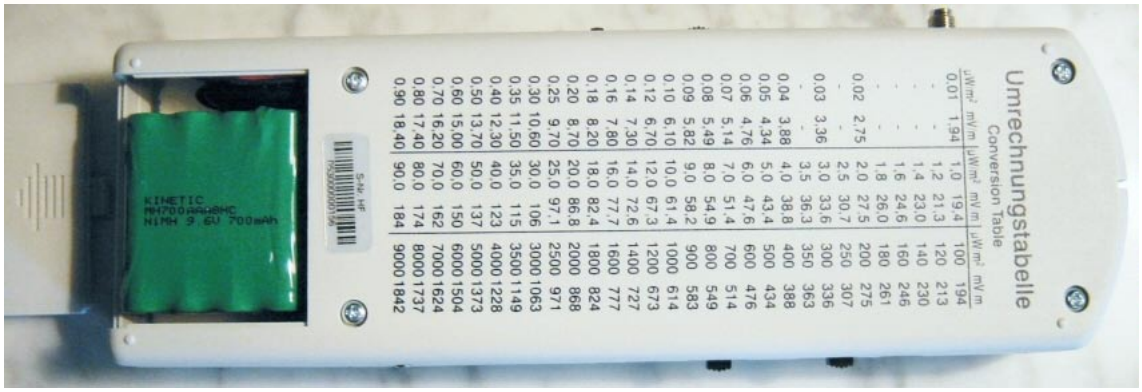




Here the right side of the equipment. Switches from right to the left. Completely right is the socket, on which the antenna cable is screwed on. Next, a sunken shorter switch, *Pegelanpassung*, with which in upper position all measurements are *normal*. The middle position subdues -20 dB, when too much radiation surpasses the max. capacity of the meter 1999,9 µW/m². For using that, one needs the accessory piece *Dämpfungsglied*, which must be screwed between the bus and the antenna. (Values now in mW/m², not µW/m²) In reality one measures from 10 to 19990 µW/m².

The lower position give a straight reinforcement of +20 dB, for the case that the signals are too weak (accessory not available yet). One needs for this the upcoming necessary modules!
The switch *Aus* means Off. On the first position the equipment is switched on and indicates the audio analysis. In the top position, the Piezo effect works.
Under the word *Aus* is a diode, which indicates that the accu is loading, and if he is full, the diode does not blink anymore.
The switch under it stands for *Voll* and *Pulse*. When on *Voll* the entire signal is measured. On *Pulse* **only the pulsed part** of it is indicated.

The back surface of the meter contains the accu and an imprinted conversion table for those, who like to see µW/m² converted in V/m.



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Here the left side of the meter. Switches from left to the right. Above on the left the audio output bus, where a headphone can be attached or a cable to the PC, in order to be able to evaluate a deeper analysis of the audio signals. I recorded successfully on a digital voice recorder.

The next bus is the socket for connecting the loadadapter for loading the NiMH-accu. This load adapter is included. It is only to be used with the supplied NiMH-accu.

Messbereich sets the measuring range. On top is **Grob**, from 1 to 1999 µW/m². Middle **mittel** goes from 0,1 to 199,9 µW/m² and the last **fein**, from 0,01 to 19,99 µW/m².

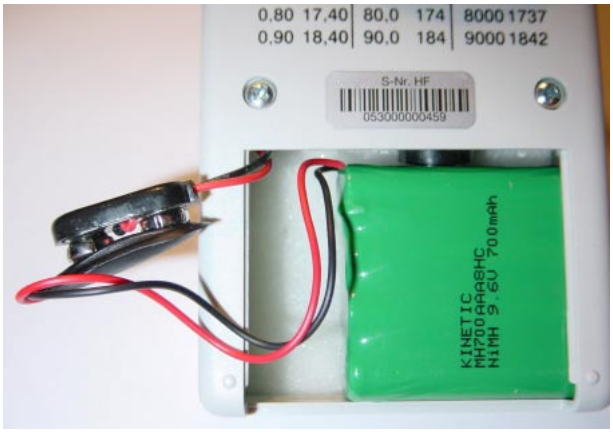
The next switch regulates **Signal-Bewertung** or the signal evaluation, or in what way is to be measured. The upper conditions are for **Mittelwert** or **average value**, as regulatory the limit values are measured. We however, get the higher **peak values** to digest, and therefore we are now able to measure these, in the middle position with **Spitzenwert**. The bottom shows **Spitze halten**, i.e., which holds the measured peak value (stored).

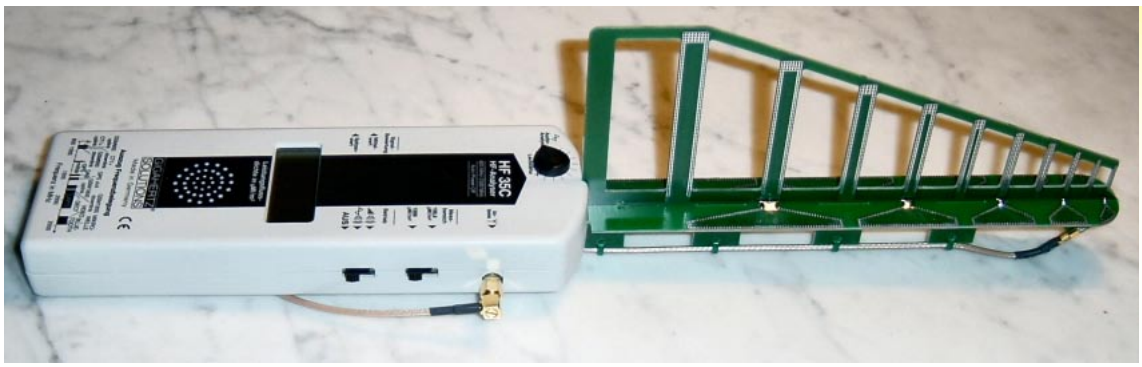
Just above the display (and in the middle of the meter) is the button **Spitzenwert löschen**. With this one, the stored peak value can be erased manually.

Next of the button **Signal-Bewertung**, is a shorter sunken button **lang** and **kurz**. With this button, the constant time factor can be adjusted and the return of the held peak value set for long or short return.

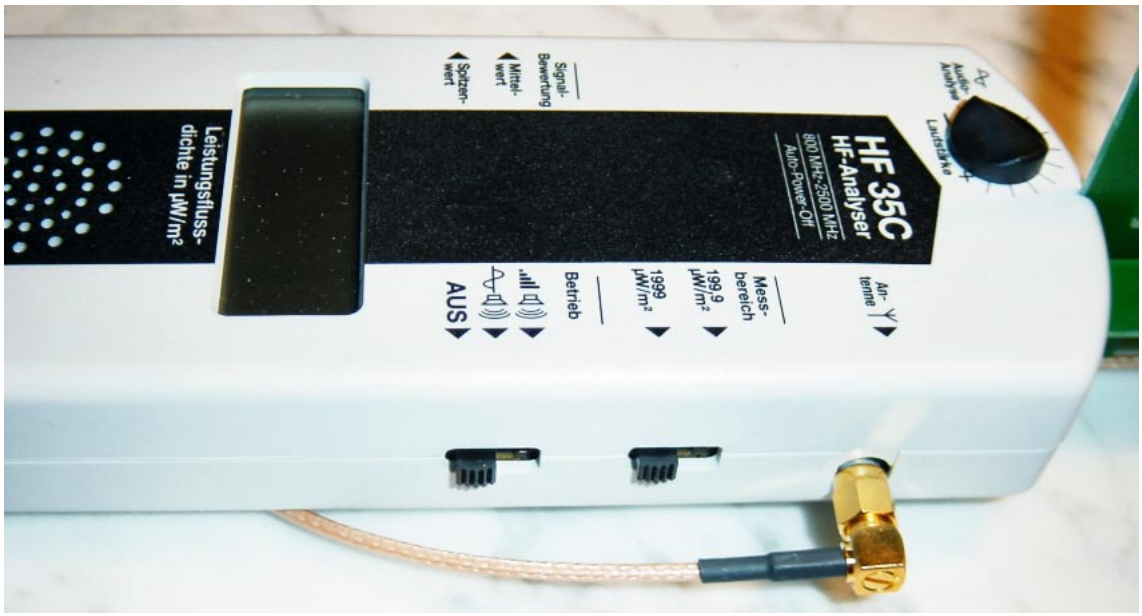
Completely down is the socket **Ausgang DC 1 V**, a DC voltage exit, with which long-term recordings can be made (e.g. to the laptop).

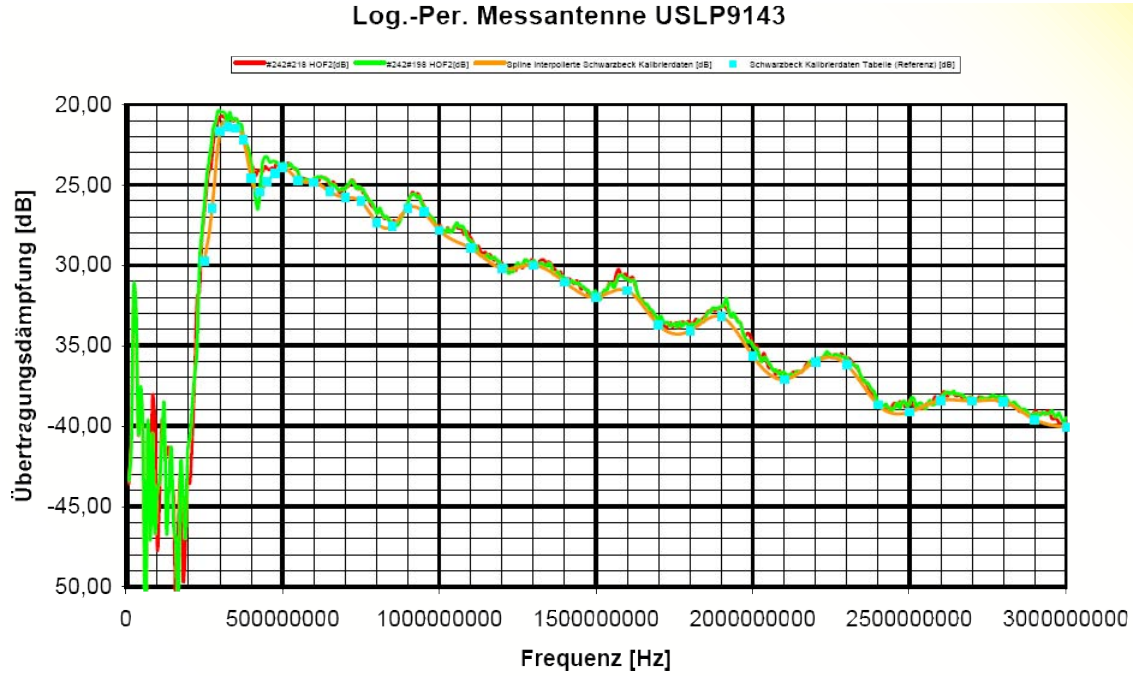
A NiMH-accu battery charger is provided. The provided NiMH Accu can be replaced by a 9V e-block battery. The picture next shows that the * button connection* from the accu simply can be connected to a 9V battery. I use rechargeable 9V batteries for most of my measuring instruments, and have always some in reserve with me. For the devices with a fixed accu, I have portable power pack, which gives 9 and 12 V of DC.





Now something about the HF35C. It is clearly obvious that it has less switches.
To the right side of the meter, the antenna socket, and next,
a range switch from 0,1 - 199,9 µW/m² and for 1 - 1999 µW/m².
On top of the meter is the vulume turn knob.
On the left of the meter, a switch for signal evaluation: Average value or peak value.
A 9V Alkaline battery is provided.
The antenna is simply polarized; the basis is quite narrower.
The display only shows µW/m².

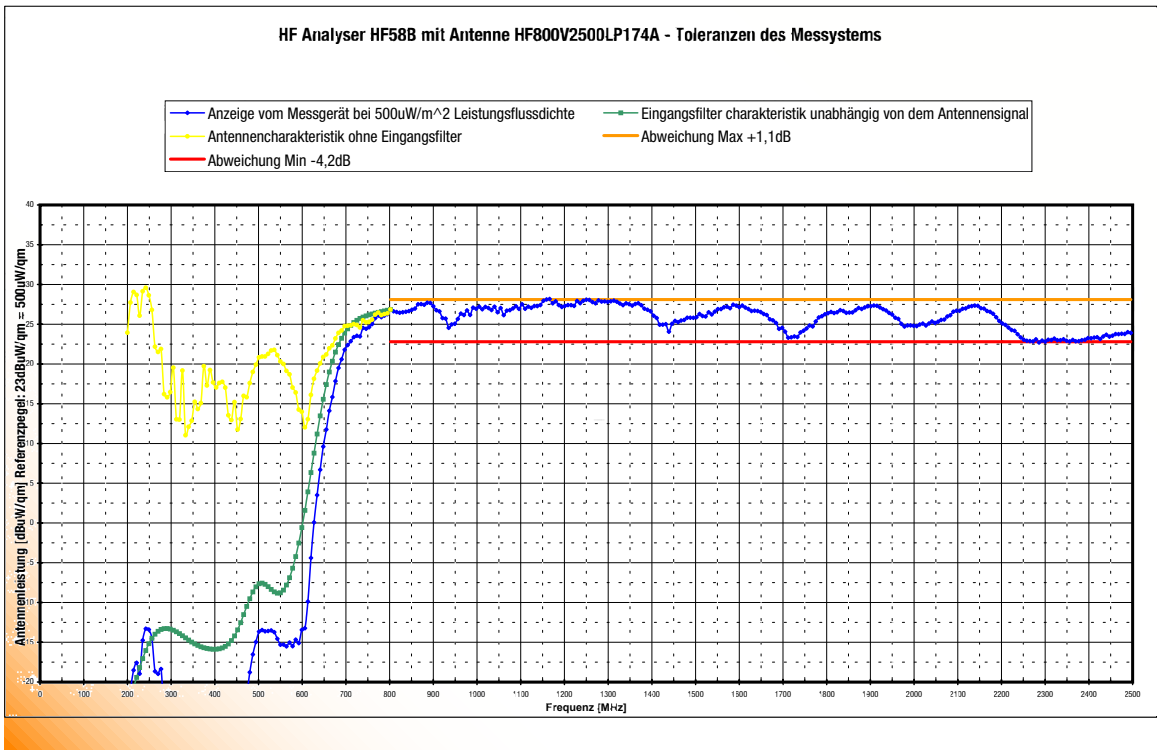




A characteristic of a logarithmic periodic antenna is, that at higher frequencies the sensitivity slows down a little bit. As a reference, the antenna USLP 9143 from the company Schwarzbeck is very well known.
Above-mentioned diagram shows, that Gigahertz succeeded in following nearly exactly the Schwarzbeck antenna. The calibration shows an accuracy from -0,2 to +0.8 dB over the whole frequency range.
The Gigahertz antennas have been tested and performed an accuracy of +/- 0,5 dB.

The first four types of the HF Analyser program run with frequencies from 800 MHz to 2.5 GHz. The coming type HF 59B goes from 27 MHz to 2.5 GHz.

The image below shows a new improved curve of the HF 58B revision D.



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Notes to the HF Analysers due to current further inquiries .

1. ***Housing shielding***
Against highfrequency radiation as an disturbing element to the meter, only a small part of the meter must be shielded. Therefore, in all HF Analysers a metal matchbox-sized, special HF shielding element is placed directly behind the antenna input bus. Its shielding amounts to approx. 35 to 40 dB.

2. ***No falsification of the results of measurement by FM and television stations etc..***
Television, Fm radio and similar transmitters below the portable radio frequencies (starting from approx. 900 MHz) cause usually multiple stronger electromagnetic fields, than much closer sending mobile phone installations.
If these are not directly suppressed by a steep entrance filter additionally to the antenna characteristic substantially, they can cause substantial faults in measured value with wide-band HF field strength meters without this filter. By the usually existing acoustic analysis possibility of pulsed radiation with adjustable volume also a very small pulsed signal is noticed as dominant. This can entail substantial false evaluations: While the display suggests a pulsed signal, in reality due to unsatisfactory suppression only e.g. an unpulsed television signal is measured, to which a less strict limit value applies. The consequences for the source detection and definition of measures of reorganization are obvious.
All HF measuring instruments of Gigahertz Solutions (also the cheapest) have such a steep entrance filter which suppresses frequencies under 800 MHz and for frequencies below 600 MHz a suppression of at least 35 to 40 dB is reached (thus to factor 10,000). This is an absolute unique feature. That has otherwise no one.
With the HF 59B this filter is build-in in the antenna plug. There will be compensated, quantitatively reliable logarithmic periodic antennas for frequencies below 800 MHz, with an appropriate filter for still lower frequencies.

3. ***Audio frequency analysis***
The audio frequency analysis is different from those of other manufacturers There is a fundamental difference between our sound module and those of all other manufacturers: Others use a so called AGC (Automatic Gain Control = automatic level adjustment).

Function of the AGC: The AGC amplifies at small levels the strongest signal up to approx. 20 dB in order to bring it at a preset standard level. If this is reached, the signal is send through uninfluenced. For the audio frequency analysis this means that very small amplitude-modulated signals e.g. DECT signal are still acoustically represented, but the audio signal is not proportional to the real flow density.

Function Gigahertz Solutions tone:
Here the level at the loudspeaker is always exactly proportional to the level of the amplitude-modulated signal. And in such a way, that with the maximum value on the display, the loudspeakers are yet not overridden.

Advantage AGC: Also the smallest signals are clearly represented, since the AGC tries to bring them to a standard level. Very well in order to show and demonstrate the problem to the customer (DECT telephone of three houses further, phone receiving only under the building-biological appoximate values etc..)

Disadvantage AGC: The reality is represented distorted. Example: A continuous DECT

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signal sounds as the strongest signal. When now someone begins to speak somewhere with the GSM mobile phone, and this becomes now the strongest signal, then this will be identified by the AGC as maximum, pulled to the standard level, but at the same time the DECT signal, although it stays continuously strong, will be presented more weakly. It suggests naturally that it would have become actually weaker, which however is not the case. Besides, one hardly notices acoustically with small levels, if the signal becomes stronger, because the AGC always regulates this approximately.

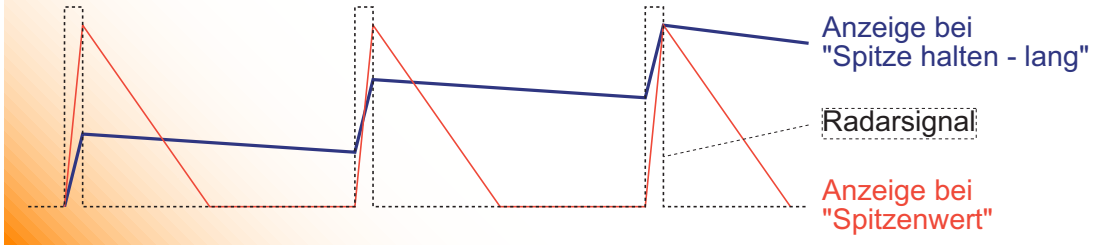
Advantage Gigahertz tone:
Realistic representation of the weighting of different levels. Is better suitable as demonstration criterion to show the, what the germans call **Wellensalat** or *Wave salad*, as representing, which will be regulated by the characteristic of the AGC. From the analytical/measure technical viewpoint, the advantage of a proportional representation is quite obvious.

Disadvantage Gigahertz tone:
Because of the fact, that with the full display values (2000 digits) the proportional tone representation, it is possible that the tone at small levels is very weak. With the consequence that very weak signals can go down acoustically in the background noise.

Future Gigahertz tone:
Later on, a small amplifier (small insert) can be supplied for the HF 58B and HF 59B. This strengthens the HF signal internally about 14 dB, according to the factor 25. The sound signal is thus strengthened with fine resolution around the factor 25, so that a similar acoustical enhancement be obtained, like the devices with AGC. (Notice: on the display only a factor 10 of reinforcement is made visible, in order to maintain sufficient distance to the background noise and to be able to use the last digit of the display, and no wild conversion tables are needed.) This module will be switchable and also contains an absorption piece (page 7), so that it can remain on the equipment. It increases the dynamics of the display of 0,001 µW/m² to 199,900 µW/m² or 199 mW/m², i.e. more than 80 dB. (the background noise with this module is still to be determined, probably approx. 0,003 µW/m²)

4. *Peak hold*

Apparently the *long* Peak Hold of the Gigahertz devices run back faster than with devices with LED display. This impression is deceptive and justifies themselves by the rougher grid and the logarithmic structure of LED displays.
Example: A decrease around 2,5 dB corresponds on the linear display in µW/m² a decrease around approximately 44 % (e.g. 100 µW/m² on 56 µW/m²). In the switching position **Spitze halten** (long) last this decrease -ty minutes. With the switching position **Spitze halten** (short) one may choose a shorter time constant stop, so that e.g. a radar signal in the frequency range after approximately three to five runs of the radar beam is indicated with the full level.
(this is unfortunately only mentioned in the guidance Rev. 2,5, which is not packed with the devices already delivered, but they can be downloaded from www.gigahertz-solutions.de). With the digital module, which is planned for the middle of 2004, the problem belongs to the past. Then one can use an *eternal* peak hold problem-free.



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Completely down on the housing the frequency area stands mentioned. Although the UMTS stands also between them, it is the question if they can be properly measured, because the signals are different, and not yet properly sending around under working conditions. That is by the way a question for all marketable HF measuring instruments, since UMTS seems to be somewhat special and deviated.

Ready for use the HF 58B is 44 cm long, and the HF 35C proudly 45 cm. That is not something one places into a hollow tooth. Although the antenna can be dismantled well, I do not feel it should be done everyday. I keep the antenna mounted and put the whole into a thicker document suit-case.
All in all, it is sturdy and stable equipment. It measures fine and the fluctuations into the signals are well recognizable and visible. It also measures nicely at particularly very low flow densities. Many holes in shieldings can be very well indicated. The antenna is suited for directional orientation and is relatively precise thereby. After working with meters with AGC, one has to get used to this signal rendition, but it is more correct.

The digital numbers in the display, with pertinent decimal places, are very precise, and much more exactly than with e.g. bright diodes announcement. The fluctuations in the send capacities of phone masts are clearly visible.

The HF Analysers form the third generation of measuring instruments for high frequency. By using certain filters, the tolerances are kept well within the tolerances, and the HF Analyser form their own class of measuring technique.
The first four types of the HF Analyser program run with frequencies from 800 MHz to 2.5 GHz. This has to do with the filters mentioned.
The coming type HF 59B measures from 27 MHz to 2.5 GHz. Thus one can measure also the TETRA or C2000 or Astrid network. I am curious what innovative technology Gigahertz has put in there.

official homepage of Gigahertz Solutions GmbH: **http://www.gigahertz-solutions.de**

official Partner for North Amerca: **http://www.enviratest.com**

Distributors: **http://www.priggen.de.vu**

http://www.lessemf.com

Question marks by an investigation

Behind that door, it all happened. That is the door of the *anechoic* room of the TNO physical and electronics laboratory at Scheveningen which is made radiation free. The walls should absorb all sorts of electromagnetic fields and no reflection should occur.

In this space *elektrosensibles* as well as a *healthy* controlgroup are *irradiated*. The results are described in the TNO report FEL-03-C148. The URL of the TNO Report is:
http://www.ez.nl/beleid/home_ond/gsm/docs/TNO-FEL_REPORT_03148_Definitief.pdf

Above-mentioned investigation with the name COFAM (Cognitive Functions And Mobiles) has been done by TNO on the order of the ministries of Economic Affairs (EZ), Public Housing, Environmental Planning and Environmen (VROM), and the ministry of Public Health, Welfare and Sport (VWS).

I am not familiar with what took place exactly and in what way one has acted. Therefore I can only make conclusions on what is mentioned in the report. Just like the rest of the world. On the next page stands a survey of how things are placed as well as a list of the used equipment. The images shown are from the TNO report.

My question marks are only related to the technical measuring execution of the tests, as described in the afore-mentioned report.

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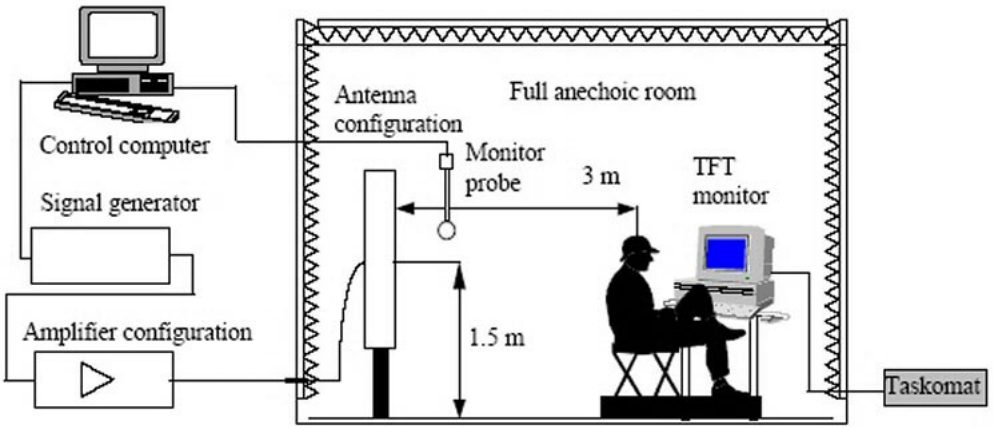

Figure 3.1: Setup in the full anechoic room.

The output of the signal generator is applied to an amplifier configuration consisting of a separate amplifier for each frequency and a coaxial switch box, see Figure 3.2.

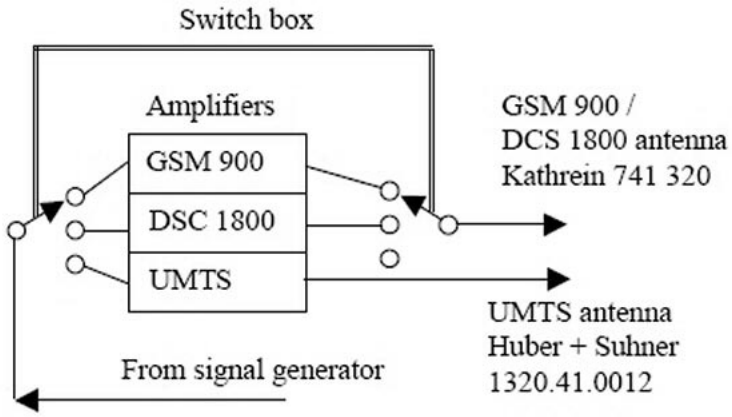

Image from TNO-rapport: overview of equipment placings

The measuring equipment consisted of the following items:

- Signal generator, Agilent E4437B.
- Amplifiers:
  - ENI 603L serial number 894, 3 Watt, used for GSM 900.
  - Varian VZL-6941-K1 serial number 7517, used for DCS 1800.
  - Varian VZS-6951-K1 serial number 7514, used for UMTS.
- Switch box, Comtest Instrumentation model 1405.
- Antenna configuration:
  - Kathrein 741 320 (GSM 900 and DCS 1800).
  - Huber + Suhner 1320.41.0012 (UMTS).
- Monitor probes:
  - Holaday HI-4433-GRE, serial number 96651.
  - Holaday HI-4433-GRE, serial number 96653 (spare).

Image fromTNO-rapport: list of used equipment

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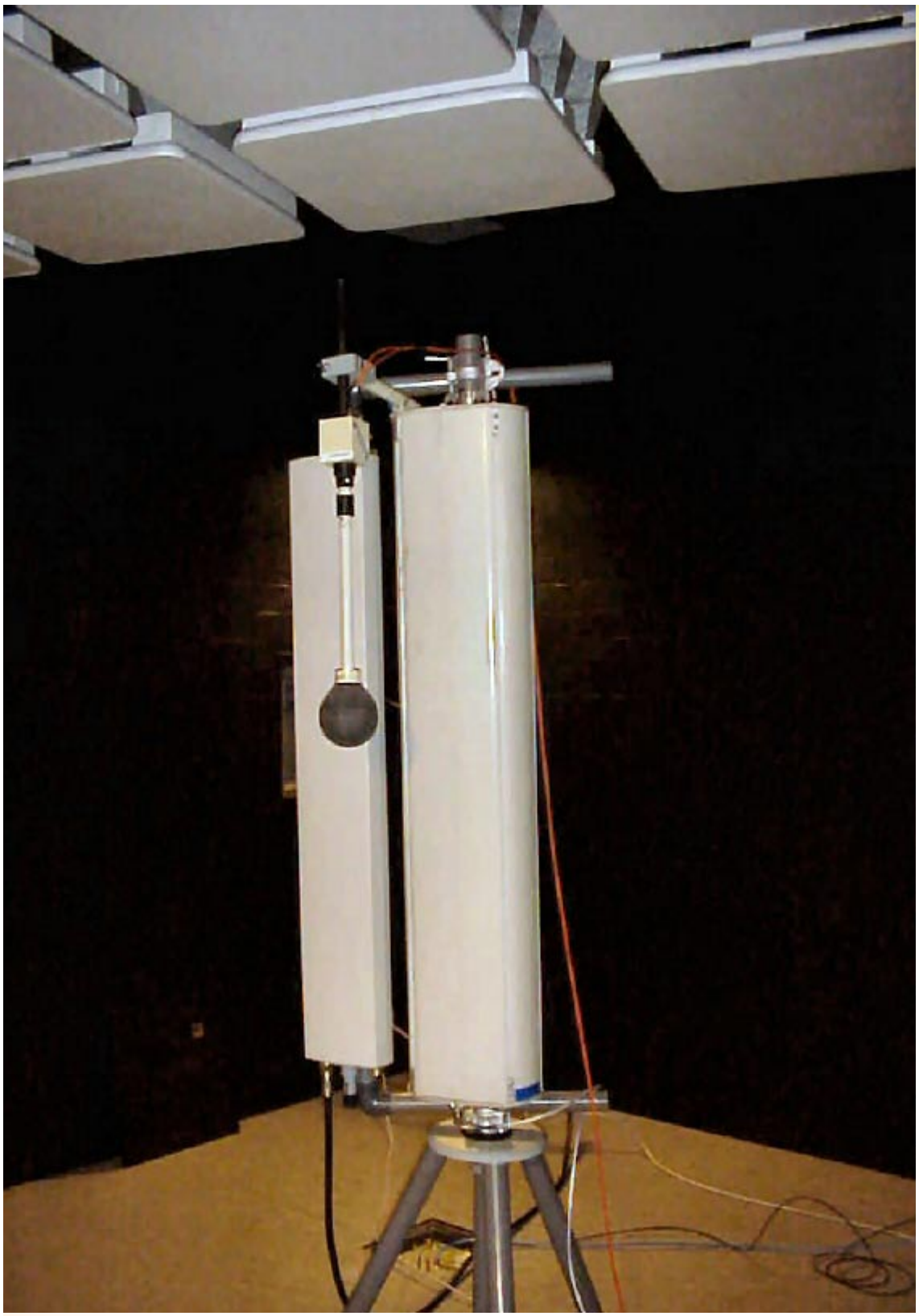

Image from TNO-rapport showing the two send antennas; a combined one for GSM 900 and 1800 MHz, and the other one is for UMTS 2150 MHz (left). Notice how close the measuring probe is placed in front of both antennas.

It could be quite possible, that everything had been organized very well, that all was measured correctly, and other supplementary equipment was used, but that is not clear in reading from the report. Therefore I place a number of question marks by this TNO-Report, in the form as it is published.

1. First of all, I find it strange that they did not measure close to the exposed persons in order to check, how much radiation, in µW/m², these persons were subjected to. That would be scientific. It could be possible, that they have measured with a spektrumanalyser and an accompanying probe, the quantity of radiation in µW/m². But that appeared not in the report. The electrical probe hangs in front of the antennae, estimated about 20 cm in front of; the test subject sits thus 2.80 meters farther away. So they did not measure at the person; they have applied solely an extrapolation for the distance. In this case that is not allowed.

2. **Lowfrequency** variable fields we name everything between 1 Hz and ca. 1 MHz. Here the electrical- and the magnetic variable fields are yet separate, and every separate field must be measured separately. From 1 MHz up to in the GigaHz we name it high frequency. The electric variable field and the magnetic variable field are here interwoven in each other. Through the measuring of one field, in general the electric one, the other can be calculated.

As a general rule, nearby antennae the electric variable field and the magnetic variable field are not yet interwoven with each other; they are still in the so called **nearby field**, and each field must be measured separately. These values are to be multiplied in order to know the density value.
Outside the nearby field, in the so called **far field**, it is sufficient to measure only one component, generally the electric field, from which the flow density is calculated. Within the nearby field, that is not allowed. 1 V/m is not 1 V/m. In the far field, 1 V/m comes to the same thing as 2652 µW/m².
In the nearby field, without considering the magnetic field in nT, the number in µW/m² of the flow density will amount much less.

Generally, the border between nearby field and far field lies at 10 x the wavelength, intentionally for *large* antennae as here applied. That means for GSM 900 that is 3,20 m, for GSM 1800 that is 1,60 m and for UMTS that is 1,40 m.
Nowhere in the report is a mention of a **magnetic probe**, so one may assume, that only the electric variable fields are measured, nearby the antenna and that the value for the test subject 3 meters far away has been determind by extrapolation. That is not allowable. The test subject was also yet within the near field! In other words, the flow density near the test subject, will probably much less in reality, than intended.

3. The electric probe used is indicated as a Holaday HI-4433-GRE. On the website of Holaday this type stands between a number of others named; the specifications say: Measuring range starting **from 3 V/m to 300 V/m**. In the report is described, that one used 1 V/m and resp. 0,71 V/m. How that probe could manage to register that outside its range is a riddle to me. (Messing about with the amplifier and again extrapolate is not right)
Supposing they succeeded by some magic in measuring at the probe one way or another this 1 V/m, the radiation, with a dose so low, arriving at the 2,80 m further sitting person, will possibly be much less by distance loss, perhaps only 0,25 V/m. In that case the report must be looked at in quite another daylight. Look, it could be possible, that the probe was used there only to determine if the antennae delivered a signal at all. In that case, during the tests nobody measured at how much radiation, the test persons have been exposed to.
And that would have been extremely unscientific and not careful.

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4. The report mentions an *__UMTS-like__* signal. With some programming, an UMTS signal can be imitated fairly well. Every UMTS-signal has an organization channel which can be determined with a spektrumanalyser. That amounts to approximately 10% of the total capacity. The remaining UMTS-signals are broadband. Telegram frequency - word frequency - bitfrequency, kHz till GHz. The bearer signal is however always around the 2,2 GHz. Seen the graphs, one can speak here of a reasonable UMTS signal. On the other hand, it is confusing that they speak about a TDD signal, which will however not be used in the practice. In the phone world only a FDD signal will be used. From the Report it appeared also, that the UMTS signal was pulsed with 15.000 Hz.
However, what cannot be imitated with a signal generator is a GSM-signal. That is absolute unstable and changes several times within a second 1:100 and that without a fixed patron.
A big question is, if during the investigation the used GSM signals were really very fast changing and unstable, like in real life, or that it consisted of a **simple nice constant block curve**.
This makes naturally a gigantic difference for the test subjects. It was better for the test subjects to be put in front of a real base station.
Why only 4 of the 8 time slots were used sets another question mark.
The verdict, that GSM radiation is harmless, cannot be upheld, because the test subjects were not subjected to a real GSM-signal. The equipment was not suited for that!

5. It is well commendable, that TNO dared to bring out the reactions to UMTS. On the other hand, the providers are hoping in getting a delay with the construction of UMTS, because in the first years there is nothing to earn. It must have been a disappointment, that minister Brinkhorst requires that UMTS proceeds. It is not the providers that want the UMTS, it is the government that requires the construction of UMTS antennas.
WLAN according to standard IEEE 802.11b has a maximum data transfer of 11 Mbit/s. The newer IEEE 802.11g allows speeds of 54 Mbit/s. On the other hand UMTS hits with at most 2 Mbit/s a bad figure. While moving with an UMTS phone, the speeds falls to 380 kbits/s. Logically that KPN gladly would drop out! Moreover, WLAN or Wi-Fi is much cheaper in construction, in use and faster.

6. Public opinion has not yet understood, what this report in fact has come up with. Until now, the official viewpoint was, that only *getting warm* were the only effects that could do any harm; the so called **thermal effects**.
The **a-thermal effects**, proven in hundreds of reports, where there are biological effects on the humane body without getting warm, are dismissed and referred to the background. *There are no long-term studies* became the standard answer. Meant are low quantities of radiation over a longer period (for instance 10 years). This TNO-Rapport has demonstrated, that those biological effects occur, by low quantities over **a very short period** (45 minutes), by elektrosensible as well as the healthy controlgroup. (1 V/m is low compared to 50 or 80 V/m.) If this already is the case, one can imagine what the effects will be, as UMTS starts blowing 24 hour a day!
Before the tests, they determined that at the position of the test subjects, the radiation should not exceed the 1 V/m. That was before. Nobody knows for sure how much it was while the tests were running. If my estimation is correct, and the actual radiation was only 0,25 V/m, than the situation is much worse

Aside above- mentioned remarks, I have questions regarding *baubiological* aspects. Did they check for *earth beams* (HF radiation intensifies the negative working of it), did they compensate the Schumann frequency (in an anechoic room this is also shielded off), what about the magnetic variable field of the lighting, etc.? All can be measured with electronic meters.
PS. I am not the only one with questions. Others see yet more difficulties.
If I can find that on internet, others can do that also!

colofon het bitje

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