New trial: Aaronia Spectran

The updated Aaronia high frequency measuring devices Spectran Rev. 3 prove to be even worse in some points than the previous model Spectran Rev. 2.

By Siegfried Zwerenz

In the spring of 2006, we published a test in our members' journal 1/2006 comparing the high-frequency measuring devices of Aaronia to those of Gigahertz Solutions.

Test: High frequency measuring devices - fiction and reality (www.buergerwelle.de).

We'd found out that the high frequency measuring devices of the type Aaronia Spectran Rev. 2 did not by far fulfil the qualifications stated in the advertising messages, and had to grade the devices with the mark "inadequate", while at the same time the devices by Gigahertz Solutions could be graded excellent. Aaronia's answer was a juridical preliminary injunction with the aim of trying to avoid the distribution of the test. In its correspondence with the court, however, Aaronia made false statements which we were able to easily prove wrong. The District Court of Hamburg annulled the preliminary injunction, allowing us to carry on publishing our test reports. The judgement is legal. Aaronia had to come up for the costs, also for those of Bürgerwelle.de.

Aaronia has now started new promising campaigns in the internet as well as by mailings to their customers with the aim of promoting a new version of the Spectran. It is now called Rev.3 (Revision 3) instead of the former Rev.2 (Revision 2) after the type designation.

New problem reports

In the meantime, we have had several calls from people who have done "measurements" with an Aaronia Spectran and obtained very high values of exposure. One example which appears especially worth mentioning is that of an affected person who was very concerned after his measurements, and went as far as contacting public authorities. Field investigations proved, however, that there was no such transmitter anywhere near, and that the Aaronia Spectran had furnished immense mismeasurements.

In reality one does not know prior to measurements whether there is an exposure to high frequency or not, and if so what type of exposure it may be. That's what you want to find out when applying a measurement device. Therefore, it is of utmost importance for a measuring device to show exact values of the actual condition, and not just anything. You do, after all, want to rely on the measurements obtained, so as to take remedial action if need be. For this reason, tests are done with the aim of looking deeper into the matters - practical tests to show the limits of the devices so as to prevent inexperienced users from severe misinterpretations.

The anew reclamations by people concerned motivated us to test the Rev.3 of the Spectran. Optically, the new device does not at all differ from the Rev.2. You will neither find "Rev.3" on the new devices, nor "Rev.2" on the old ones. This is quite astonishing. One would think a producer ought to label his devices in such a way that the customer will know which device he's using.

This time we did field tests with the second cheapest device, the Spectran HF 2025E Rev.3, as well as with the most costly device, the Spectran HF 6080 Rev.3. If not explicitly mentioned otherwise in the text, we are always talking of these two devices.

Field test took place here

Ghost frequencies remain to be the problem

For our members' journal no. 2/2006 published in December 2006, we had done small tests with measuring devices in the 5 GHz sector. These tests showed that the Aaronia Spectran Rev.2 indicates ghost frequencies even if the antenna is not connected to the measuring device. Ghost frequencies are frequencies not existing in reality. (Please note: due to the current circumstances we shall also publish this test in the internet).

The above mentioned test motivated us to first of all check whether the Spectran still shows ghost frequencies (even without antenna!). We did measurements with the Spectran without antenna, and, as a matter of fact, it no longer indicated any transmitters in the region first chosen by us. Very good, we thought, Aaronia has managed to correct this deficiency. When we connected the antenna to the device, it showed various transmitters in the region. Yet our investigations proved that some of the signals identified by the Spectran were not really there, a fact which caused concern. We drilled a hole into the case of the Aaronia measuring devices, so as to be able to lead the antenna cable through the case. The aluminium case of the Spectran causes an attenuation of 20-30 dB (factor 100 to 1000), depending on the frequency. So if the antenna is inside the case, and the case lid is open, the Spectran will show the (supposedly) identified transmitters.

When closing the lid, the indicated values should have gone down by a factor of 100 to 1000. We closed the lid, and much to our astonishment, the values remained equally strong. Therefore, the identified transmitters were, once again, only ghost frequencies caused by the Spectran itself.

Aaronia has in the meantime obviously programmed the Spectran in such a way that it can in many cases detect that the antenna is disconnected and then simply delete the ghost frequencies with the help of the microcontroller.

In doing so, Aaronia has merely improved the suppression of the error, not, however, managed to correct it (see box on microcontroller). Yet, the user will now think that the deficiencies we had criticized in our journal 2/2006

Value shown on the Spectran with the case open

Same value as above but with the case closed

concerning the ghost frequencies of the Spectran have been taken care of, although this is not the case. But the fact that the ghost frequencies are caused by the Spectran itself is now no longer obvious to the user.

Aaronia's attempts to wind out

1. Ridiculous attack on the testing method

After our test "High frequency measurement devices - myth and reality" in the spring of 2006, Aaronia and the developer of the Spectran accused us of having applied signals not conforming to the standards. A ridiculous accusation. Whether or not a signal complies to the standards may well be of importance for the functioning of a mobile phone - however certainly not for a measuring device, as a measuring device ought to also be able to locate signals not complying to the standards!

Of course we also tested the devices with standard signals, having taken measurements, for instance, at mobile phone masts in the surroundings ("field tests"). The results here were also more than unsatisfactory. An absolutely reproducible laboratory situation seemed to make more sense though for comparative tests.

In order to prevent the same unsustainable accusations from arising, we will this time publish the results of our field tests (also those with the standard signals demanded for by Aaronia) concerning the actual field strength measurements/power flux density measurements.

For this purpose the high frequency situation near the location of the Bürgerwelle was measured with a high quality reference spectrum analyser from Anritsu. Corresponding comparative measurements were taken with the Spectran Rev.3.

2. Aaronia backs out

During our tests in 2006, the Spectran indicated a DECT telephone where we measured an electrical network transmitter, but Aaronia as well as Mr. Bartels, the developer of the Spectran, fiercely denied this. We were even forced to publish a counterstatement by Aaronia and Mr. Bartels on our homepage. (Please note: According to the press law, counterstatements must be printed or published, no matter whether they are true or false).

In the meantime, the following can be found in the DECT-measurement manual (p. 26): An interspersing mobile phone would, in contrast, be displayed as a consistent accumulation of almost equally high peaks, similar to a 'lattice fence'. This way, the signal types can easily be differentiated.

With this statement, Aaronia inconspicuously admits that a mobile phone can be read as a DECT. The 'lattice fence' described by Aaronia and caused by a mobile phone, is, however, not visible in the pixel display.

For Aaronia it obviously appeared unnecessary to indicate that GSM transmitters are still displayed as DECT phones.

3. Rather dubious: accuracy specifications not valid for pulsed signals

In addition to the measurements with mobile radio transmitters, the 2007 field tests included measurements with a WLAN, a CT 1+ phone, a DECT phone, a D-net mobile phone, and an E-net mobile phone, as these are typical sources often causing for concern.

Except for the CT 1+ phone, they are all pulsed or frequency modulated signals. Pulsed signals are of specific importance for the building biology and for medical evaluations.

The data sheet of the new Spectran reads: Depending on the frequency and the setting, the information concerning the measurement range, the sensitivity, and the measurement accuracy can vary. The accuracy statements correspond to the Aaronia reference standards under specific testing conditions. All information stated here is valid only under the following conditions (unless otherwise stated): Surrounding temperature 22±3 degrees Celsius, relative humidity 40% to 60%, sinusoidal signal (CW), and effective value (RMS).

How interesting! The Aaronia Spectran devices are, all of a sudden, only specified to sinusoidal signals (CW) (also called permanent signals), and this at a temperature of 19° to 25° Celsius and a humidity of 40% to 60%!!!

So even if the temperature and the humidity values were within the range stated by Aaronia, the Aaronia specifications would not be valid for pulsed signals such as obtained from mobile radio transmitters, mobile phones, DECT, WLAN, Wimax, radar, Bluetooth, and TETRA.

And, moreover, Aaronia can now react to complaints about false measurement values of pulsed transmitters with the excuse that these are not within the stated specifications.

Considering the fact that for our tests we of course analysed the performance of the devices with radio signals of the every day life, which are usually pulsed, and the Aaronia Spectran Rev.3 is only specified to sinusoidal signals (CW), it wouldn't surprise us if Aaronia would now sue us for having done measurements with pulsed signals this time.

Once again, we filmed our tests with a camera, this time in the high-resolution HDTV-format, and are well prepared for a possible further legal dispute with Aaronia. Parts of this film can be found in the internet.

The workmanship seems to be a problem, too

After several test measurements we came to the conclusion that the Spectran could no longer even identify a CT1+ phone. An astonishing fact, considering that the Spectran Rev.2 had indeed been able to identify such unpulsed ("CW"-) signals. So we started an error search, and discovered that the connecting sockets of the antenna did not jut out far enough from the device casing. The nut of the cable is connected tightly to the antenna terminal, but there is still a loose contact in the cable. Alarm: This was the case with both types of devices (see video no. 2). A device with such serious defects ought not to be sold by its producer!

Naturally, we wanted our tests to be fair, so we used the antenna HyperLog 6080 of the Spectran Rev.2 for our tests.

We took the opportunity of these new tests to also once again scrutinise the Gigahertz devices, including the WLAN tests.

For these tests we connected a WLAN transmitter (Access-Point) to the power supply voltage without transmitting any data. So the WLAN device was in the pin mode. The Aaronia Spectran devices were not able to find the WLAN signal on their display. Yet, the 10 Hz continuous signal of a WLAN Acces-Point in the pin mode (the most common state) is especially harmful.

The typical WLAN 10-Hz tacker sound could hardly be heard out of the loudspeaker. In contrast, the Gigahertz devices immediately captured the WLAN signal, making it clearly audible as well as showing it correctly on the display in microwatt/m≈.

In its manual on p. 32, however, Aaronia already admits the fact that the Spectran cannot find WLAN in the pin mode. Aaronia states: In order to measure WLAN, the data must be transmitted continuously. It often does not suffice to use the system in a pin mode.

Well, here we ask ourselves what's going on! The user will not find out that WLAN in the pin mode is hardly detectable until reading the manual! But at this point he's already bought the device! Besides, the manual has over 60 pages, so it may take time for the user to get to this point and then to digest it.

Furthermore, in practice, the reason for doing measurements is to find out the exposures and transmitters in the area without knowing beforehand what you're surrounded with.

In order to be able to reliably detect WLAN with the Spectran, you would first have to ask the neighbours or people around you to constantly transmit data via possibly available WLAN for you to be able to measure the exposure to WLAN! You will not only make a fool of yourself with this request, but also what will you do if the person asked refuses? - False measurements will be the result!

Incidentally, more and more people are wiring up their internet access, thinking that this way they are free of exposure to WLAN. This is, however, unfortunately often wrong, because, for instance, Telekom sells WLAN devices which can indeed be wired up by the customer, but where the integrated WLAN transmitter is still active unless deactivated by the user! Sometimes the transmitter can't even be deactivated by the user himself. With the help of the Gigahertz devices HF58B, HF58B-r, and HF59B with additional amplifiers and the variable frequency filter VF4, we were, for example, able to detect and localise WLAN-transmitters in the houses of two of our neighbours even at a distance of over 40 meters. Measurements with the HFW35C, a meter ranging from 2.4 to 6 GHz, were possible without variable frequency filter, as this device only shows frequencies from 2.4 GHz upwards, and thus automatically omits frequencies such as those from GSM transmitters or DECT telephones. When asking the neighbours about the WLAN transmitters in their houses, they assured us it could not be possible as they were wired up. When we explained why they were still unintentionally exposing themselves and others to WLAN, they were amazed and immediately deactivated the WLAN transmitter. With an Aaronia Spectran, these WLAN transmitters in the pin mode could not have been detected, and the neighbours would continue exposing themselves and others to radiation.

Field tests with unacceptable outcome

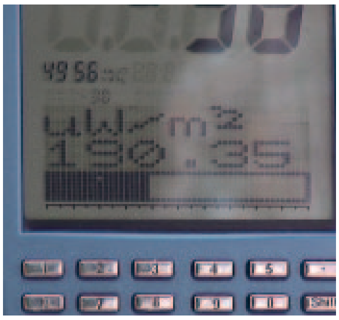
Just a reminder: During the field tests, we measured frequencies and power flux densities caused directly by the transmitters ("standard"). Comparing the frequencies displayed on the Aaronia Spectran with the data on a frequency chart, you can see what type of transmitter was measured.

Extract from the test results: (The Spectran HF 2025E Rev. 3 can only be adjusted up to a value of 2500 MHz. Therefore, the results above 2500 MHz only refer to the Spectran HF 6080 Rev.3)

- D-net mobile radio transmitters erased by a CT1+ telephone.
- GSM transmitters and GSM mobile phones shown as DECT telephones.
- WLAN access points only found when continuously transmitting data. The continuous data transmission is uncommon though. The more common 10 Hertz continuous signal of a WLAN access point in the pin mode cannot be detected.
- E-net transmitters shown at, for instance, 3700 MHz and interpreted as directional radio.
- D-net mobile phones shown at, for instance, 2671 MHz etc., and interpreted as directional radio.
- D-net mobile phones shown at, for instance, 5415 MHz, and interpreted as a very strong weather radar or an on-board aircraft radar.
- E-net mobile phones shown at, for instance, 3536 MHz, and interpreted as airport radar.
- E-net mobile phones also shown at, for instance, 5304 MHz, and interpreted as weather radar or on-board aircraft radar.
- WLAN transmitters with 2.45 GHz while continuously

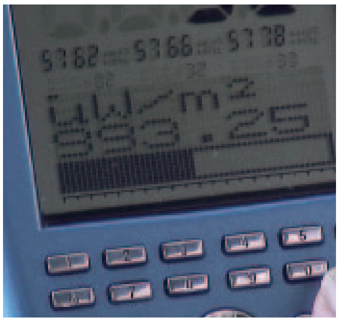
transmitting shown at, for instance, 4830 MHz, and interpreted as directional radio.

- CT1+ phones at 932 MHz shown at 1864 MHz, and interpreted as E-net transmitter.
- Many ghost frequencies shown with partly extremely high levels.



With the setting "no pulse" and a span of 4940-4960 MHz, the Spectran HF 6080 Rev.3 finds a ghost frequency at 4956 with over 190 μW/m≈.

With the setting "pulse" and a span of 4940-4960 MHz, the Spectran HF 6080 Rev.3 finds a ghost frequency, and within the range of measurement additionally "finds" innumerable transmitters which in reality are non-existent.



With the setting "pulse" and a span of 5760-5780 MHz, the Spectran HF 6080 Rev.3 finds ghost frequencies up to 993 μW/m≈, which do not exist in reality.

The actual total exposure due to continuous transmissions of 800 MHz to 7000 MHz on the testing area was at a level of approx. 80 microwatt/m≈. Please note: this value is already far too high according to the building biology health assessment.

The Aaronia Spectran HF 6080 Rev.3 even found frequencies above 55,000 microwatt/m≈ (μW/m≈), non-existent frequencies!

If one was to believe such information, one could be more than worried. As members of the Bürgerwelle, we are in a position to compare these absurd Aaronia Spectran measurements with reference devices, and can therefore calm down. But what about a measuring person who is not as well equipped as we are, and who relies on the Aaronia devices? He will definitely feel uncertain, start to worry or even panic!

Unpractical operation

According to the instruction manual of the Spectran, pulsed signals can only be measured with a span setting (frequency range) of 20 MHz. If you intend to investigate the existence of pulsed signals within a frequency range of only 1 GHz (1000 MHz), you would need 1000 : 20 = 50 measurements. Every time you want to switch over by swivelling, you would need about 5 minutes for 20 MHz. This means you would need a time period of 5 x 50 minutes (= 250 minutes), and end up with a sore thumb. To need about four hours for setting and measuring when investigating a frequency range of only 1 GHz is totally unpractical and hardly suitable. If, for example, you wish to search for pulsed signals within the complete frequency range of up to 7 GHz with a Spectran HF 6080 Rev.3, you would need far more than one whole day non stop only for settings and measurements!

Conclusions:

If the Aaronia Spectran shows a transmitter, it may be there or it may not, as the Spectran itself also causes ghost frequencies (frequencies which in reality do not exist). If the Aaronia Spectran shows no transmitters, then maybe there really aren't any, or maybe there are, but the Spectran just can't find them.

This has nothing to do with reliable measurements.

The operation of the Spectran is complicated, and even experienced users are prone to make mistakes with the settings.

The Aaronia high frequency measuring devices Spectran cause pulsed high frequencies themselves (up to 20 μW/m≈ at a distance of 30 cm), thus causing an additional exposure for electro sensitive people.

The listed deficiencies prove that one cannot rely on the measurement results. Measurements taken with a Spectran meter should definitely be repeated with a reliable device.

Having done measurements with an Aaronia Spectran and detected extremely high levels of exposure, which do not really exist, the measuring person might carelessly cause panic, and if his mismeasurements are discovered, he might even have to live with the reputation of being an incompetent scaremonger.

On the other hand, if the measuring person cannot, for instance, detect WLAN Access Points in the pin mode, or radar, or anything similar, he might in turn have to live with the reputation of being an incompetent trivialiser who is not able to help people in need.

Conclusion:

With their new high frequency measuring device Spectran Rev.3, Aaronia did not succeed to eliminate important deficiencies of the preceding types. Indeed, they have in some aspects turned even worse. They are of no use when aiming for a reliable analysis of an unknown exposure situation, which is the purpose of any electro smog measurement.

The Aaronia Spectran HF-2025E Rev.3 and Spectran HF-6080 Rev.3 have failed the tests spectacularly. If we were to grade with school marks, they would be given an E or a FAILED!

It is of special importance for our movement to obtain measurements with reliable results. If measurements done, for instance with the Aaronia Spectran lead to false assessments, critics of high frequency will appear ridiculous, and it will be of harm to the credibility of our movement.

As this is a matter of great importance, we will keep at it for you, and will take the occasion of this test to carry on investigating the market of measuring devices, thus allowing for its transparency.

We will continue keeping our readers informed about the topics considering the measuring technology. Next we're planning tests with low frequency measuring devices.

Laboratory technology applied:

Spectrum Analyser Anritsu MS 2667C 9 kHz-30 GHz
Ser.No. 6200105202

Schwarzbeck LogPer antenna 1-18 GHz ESLP 9145
Ser.No. 9145214

Cables from Huber+Suhner Sucoflex 104 PA SN 5122 / 4PA

Manufacturers' addresses:

Aaronia AG
Gewerbegebiet Aaronia AG, D54597 Strickscheid
Tel. 06556-93033 / Fax 06556-93034
Mail: info@aaronia.de
Internet: www.aaronia.de

Gigahertz Solutions
Am Galgenberg 12, D-90579 Langenzenn
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Internet: www.gigahertz-solutions.de

What is a microcontroller?

A microcontroller is similar to a computer. It can, for instance, alter data delivered by a measuring device. These alterations are, of course, only necessary if the measuring device is badly constructed and therefore delivers incorrect data.

These alterations of the measurement results are conducted with an 'if - then' command. This way it can, for instance, diminish or amplify measured levels. In the programming language it could sound as follows: if the frequency lies between 1880 and 1900 MHz, then the level is to be displayed 8 times higher.

Let's say the measuring device in our example finds a transmitter with a level of 100 microwatt/m≈ (µW/m≈) within a frequency range of 1890 MHz, it will, due to the way it's programmed, show 8 x 100 µW/m≈ = 800 µW/m≈ instead of the 100 µW/m≈ actually measured.

If programmed correspondingly, the microcontroller can also produce the following: Let's say the measuring device detects a transmitter at 932 MHz with a level of 200 µW/m≈, it can, for example, simply delete a further transmitter at 942 MHz with for instance 180 µW/m≈ completely from the display. So the measuring device will in the end only show the one transmitter at 932 MHz. This way, the microcontroller can also blank out non-existent ghost frequencies. It will, however, at the same time blank out really existent transmitters, which is an unacceptable fact. This is exactly the deficiency we made out during our test with an additionally activated CT1+ telephone, where the Aaronia Spectran simply "beamed off" two GSM transmitters by merely activating the CT1+ phone.

To conclude, any results delivered by a measuring device can be optionally altered with the help of a microcontroller. This will cause a major problem, though, because a microcontroller can produce absurd measurement results, whether or not intended by the producer.

We would like to mention at this point that in the meantime also the Spectrum Analysers of Rohde & Schwarz are equipped with microcontrollers in order to, for instance, simplify their operation.

The microcontroller software can easily be re-programmed by the producer. The user then simply needs to load the new software onto the measuring device.

The software is made available for download in the internet by Aaronia. Now, of course, we're full of suspense whether Aaronia will try to use the microcontroller so as to palliate or even to beam away the massive measuring errors we discovered. It is probably possible to diminish or completely delete the ghost frequencies we detected, but in turn really existent transmitters will probably be shown too weakly or not at all - a totally unacceptable situation.