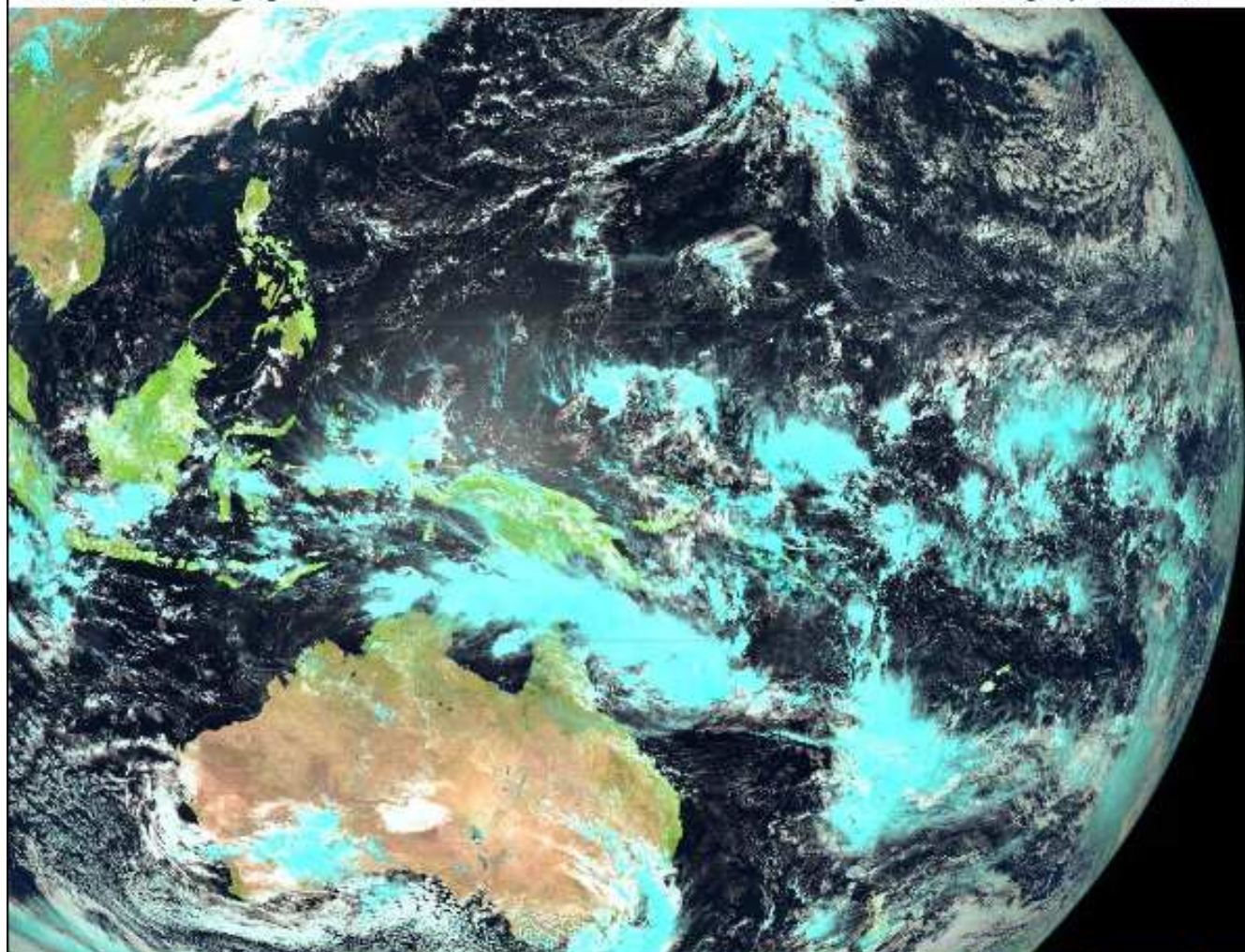




DE KUNSTMAAN

Maart 2016, 43e jaargang nr. 1

Uitgave van de Werkgroep Kunstmanen



In dit nummer o.a.
First Image
Power meter met Arduino
en nog veel meer



Dear member,

This pdf contains some translated articles of our Dutch magazine “De Kunstmaan”.
Google Translate is used; none or very few corrections are done afterwards. Results may be sometimes incorrect or hard to understand, but mostly I think it is usable.
Figures and pictures are partly left out. Please use the “paper” (Dutch) magazine together with these translations.

I hope these translations will help you to understand the Dutch articles.

Please check also our web-site, which has now a translated version:
www.kunstmanen.net
(middle of home page, “English version”).

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Preface

Last Saturday was the second meeting of this year, a week earlier than normal. Unfortunately, the turnout was not so high, maybe the weather and spring break was playing tricks.

Jan Meijer gave a nice presentation how cavity filters which can adapt sitting in a cell phone to 1700 MHz.

Figure 1 Cell phones ready to be removed from the cavity filters.

Henry had taken his two-meter dish, but not removed from his car roof. This DIY dish consists of two parts and can accommodate up to about 5 GHz.

Figure 2 2-meter dish consisting of two parts

Figure 3 and an 8-meter tall mast in the trunk

GEO Symposium

From this place I want to bring the attention GEO Symposium to be held on April 23. We are invited Working Group to come. The Symposium will in Leicester at the National Space Centre site. On this day, various speakers include EUMETSAT, ESOC give a lecture. In particular, it will be stopped at the Sentinel satellites that fantastic images of Earth.

Let us know if you are interested to go to England, maybe something can be combined.

Member List

It's a bit of a name: Work Group. As a group, we try to make the reception of satellites as possible. It is a group activity because not everyone has all the skills to build a receiving station.

To promote mutual contact group we consider making available the list of the members of the working group. Because it is making contacts would suffice mentioning name, address, email and phone number. This list comes only in the Kunstmaan and not in a mailing or other digital form. Let us know what you think of this, even if you do not wait for is here.

Figure 4 Harry explains the rotor control by Peter

Standardisation

Have you created something will not always right to do what you expect. A far proven method is to record your concoction in an arrangement that you know works. Does your receiver do not you take it to your fellow group member or to the meeting and see what it does there.

It is very useful if you can exchange the parts without much trouble. You do not spend much time figuring out how something should be connected with the risk that this goes wrong.

We are talking about connectors, cables and the signals going over.

I do a cross:

- N connector on the helical
- Antenna cable Belden H125 with F connectors.
- Input WRX-1700 BNC
- Data cable for analog rotor motors: UTP with RJ45 connectors
- etc

Who will find what and how we can finish this list?

May 14 AGM

The next meeting is on May 14, this is the General Assembly. This Kunstmaan the figures recorded for 2015. The agenda of the AGM is the end of this Kunstmaan.

Spring Cleanup

Now it has become like spring weather, it is a good practice to do a spring cleanup. Several (former) members has received the Working Group on equipment we are very pleased me. interested parties can take this for a small fee. The income benefit the club's. This Kunstmaan a selection in the section "Supply and demand". Do you have surplus equipment from wherever you want? Take this on May 14 note to Utrecht!

In this Kunstmaan there are articles for all tastes. Very nice article Elmar to switch easily between APT and HRPT. Those who want to experiment can read my article with an Arduino and a power meter. Rob has an article about a new channel selector for the EUMETCast Ethernet receivers. Also from the library is another contribution, and last but not least: Fred receive HRPT in Vietnam, it has some doing in the rice fields but sent a DiSEqC rotor from Xtrack in WSAT received HRPT beautiful plates. Congratulations! I hope this is an incentive for others to build on the receiving system.

Happy reading and hopefully until May 14th.

Ben Schellekens

summary

My experiences with weather satellites, etc. in Vietnam.

HRPT

The previous episode ended in quite minor: broken rotor, no reception, no eye pattern, no lock-using GODIL. Much worse could barely. I spent the holidays in Holland to (leave) from e.e.a. search. Ben, thank you for any help!

Rotor

I almost completely disassembled, incl. The gearbox. It was necessary to remove the motor. On the advice of Arne I put him one night in gasoline to make him clean inside. But after a "short duration test" yet he turned to the eternal electronic hunting grounds. Presumably still short between the windings.

I then emailed several large modeling business in Holland. Nowhere to buy. On the day of my departure to Holland I have some by the electronics district in Ho Chi Minh City astray. All affairs a la Radio Twente in The Hague, but an entire neighborhood. Unfortunately, also here can not find a motor for the rotor. Well, after a lot of questions, right-angle plugs.

In the US you can buy separate motors with gearbox, but a new rotor in Holland, costs about the same. So when SatTV in Venray [1] but bought a new Powertech DG380 rotor. The rotor had to be modified later. At last it was done by Arne. If I would have to re-create the rotor should I use Oleg design [2]. Another advantage is that the rotor may be closed, so you do not forfeit your warranty. For those who still want to recreate, I made a few photos of the interior with the modifications to the current version. By email me to ask.

Subsequently, the separate parts joined together again to an x / y-rotor. A suggestion of Ben is to the raincoat, that there should be around it to provide aluminum foil to the solar heat which to reflect. Just think what I can use for this.

LNA

One of the parts where I had my doubts. Ben has put him in his own installation and yes ... defect. The newly purchased was just before I left inside. And a big surprise: Have had managed to repair the faulty again. So I like a spare. Class!

I also by Harry in his article [3] thread of 44mm. soldered to the helical. Fingers crossed that the LNA therewith longer maintains.

Receiver

Ben has also helped with this. A first test was to put a voltmeter to test HRPT output. During the sweeping of the VCO needs to these show a voltage between 0 and 12V. The VCO was not too sweeping. After further measure appeared finally somewhere loose a ground connection. After soldering worked recipient: VCO swepte your

heart's content, the GODIL lockte immediately when a satellite came through and the scope was actually an eye pattern visible.

Experiences

The rotor is still on the terrace because I can easily check the matter in that way and, if necessary, make adjustments. And so, on February 2 I managed to receive HRPT for the first time. This is described elsewhere in this Kunstmaan in "First Image".

This time so a jubilant lock.

LRIT

I have now also appointed a USB stick to try something with GNU Radio. Because the HRPT-happen some time cost, I have done much more just with this. However, one comment. In the story of Ben [4] allows the receiver to C: \ must be installed. This appears necessary because with him occurred many problems when the receiver was installed on the stick.

weather

Since I already had a lightning strike here in Vietnam, I wanted to have a lightning meter. But dammit, what are these bitches expensive: around € 230- € 260. The cost of € 70 was by my brother, who has himself, discouraged: too many messages.

But The Weather Specialist [5], where my weather station Davis comes from, now sells the Ventus W266 for just under € 100. That's a weather station with the extra measure a color, storm detection and UV radiation, options are missing from my Davis.

"Fortunately," I have no experience with the storm detection. That means that the weather has been good here. But this year there will come a time that he "can go against it."

Everything

Space and astronomy

There have been several articles about photographing the ISS stood in the KM. This [6] looked like a completely different caliber. But unfortunately, there soon came suggestions from fake. And after some time has also been admitted by the author that it was a composition. To show that you can shoot decent ISS before Saturn see [7].

A site entirely dedicated to Satellite Watching [8]

NASA has released some great new posters [9] of their missions in years-60 scifi style.

And for those who want to receive something other than weather satellites can try to detect meteors. [10] The required equipment is simple and may already be present in several members.

Who install an iPhone or iPad can SatSat a tracking program. For a quick overview it works quite well.

References

- [1] SatTV, (see web site)
- [2] Oleg Website: (see web site)
- [3] The Kunstmaan, December 2015, p. 7
- [4] The Kunstmaan, December 2015, p. 16
- [5] Weather Station (see web site)
- [6] ISS before Saturn (see web site)
- [7] ISS passes Saturn (see web site)
- [8] Satellite Watching: (see web site)
- [9] NASA Poster: (see web site)
- [10] Detecting meteors (see web site)

summary

My struggle for and success in receiving HRPT in Vietnam.

YES !!!

This loud cry rang on February 2, 2016 by the house. A historic day for me, I received the first lines of my first HRPT recording. There were only a few, because WSAT problems indicated by tracking the satellite -I happen to live in a different time zone I could do with some tricks (follow Xtrack and then quickly switch to WSAT) just a very small piece of a transit meepakken. There were actually to see what clouds.

A few days later there was a new version of WSAT and I could receive my real First Image. And this is it !!

improvements

A first picture is obviously amazing after so many efforts. You are looking at just about all the pixels, enlarged him as far as possible, trying to see all the details and recognize you try quick to make the picture a little better, etc. Then you stand back with both feet on the ground and you know there -of course- on all sides is possible a lot of improvement. A couple of points, some of which have already been adjusted.

The recording is relatively short. This is because the dish below is a covered terrace. Easily testing, but many obstacles in receiving. And by the view only the western about agreements provided that not more than about 60 ° by the projecting roof. Therefore only 1-2 useful on contracts per day.

It also appeared WSAT adjusted so established that he stopped when no signal was received last. The entire transit are actually 4 photos, 3 of which much interference. Those three I discarded. The image shows the part where the antenna has a clear view to the west. The signal here was about 77 and found plenty.

WSAT provides various settings in order to adjust the picture and / or to improve. I'll have to go some more deepen me this. The recorded picture is created with the default settings.

my HRPT

General.

Under the title "Weather Satellites in Vietnam" I recently my progress and sometimes regression described around the entire HRPT project. The final result is, nevertheless somewhat to my astonishment and surprise, a (at least currently) operating system.

Problems there were plenty. Many materials are eg. For sale in Vietnam. That meant in many cases very carefully and accurately. I often leave work for a while until I was sure how I would perform it. I sometimes had to wait for my vacation to the Netherlands to bring new materials to repair things.

Benefits were obvious too. Hai, my welder, counts for Dutch standards very low prices for materials and welding. Also mesh for the dish is pretty cheap.

Below is a brief summary of the individual parts of my receiving station with here and there some possible adjustments. Quite to the MijHRPT articles by Ben [1]

Dish.

Unfortunately, one of which is not-available materials also aluminum. And mesh satellite dishes appeared here hard to find or very expensive. Fortunately brought Peter Cooper outcome. He has put together a kit for a dish of 1.20m. Which fit exactly into the case. All of the individual parts to size and, if necessary, curved in the right shape. The building itself was partly due to the vast description therefore not difficult: drill some holes (most were already drilled), riveting, confirm and gauze ready. Mesh is here to obtain more than in all shapes and sizes. Whoever wants to start HRPT should definitely here to contact Peter. Such a kit will save an enormous amount of time and effort.

helical

This is made according to the original design of Harrie van Deursen [2]. Thereafter, the coil is shortened according to Peter Cooper [3]. Fine-tuning according to the design of Harrie van Deursen [4] is still on the program.

LNA

For this I bought on the advice of the Ben ZX60-242GLN + of mini-circuits. The recording was indeed made with the repaired LNA. The new package is still in the reserve.

Rotor.

This requires two pieces Powertech DG380 DiSEqC rotors used [5]. These are available from stock at SatTV from Venray [6]. This was the first rotor, which has been reconstructed according to Arne's design. That meant here and there puzzle to get the whole functioning. The rotors have a range of 10° - 170° . For me, no problem considering the hills around. Eventually a few counterweights added for smoother operation. (Think body not too long) term, I want to make a new rotor based on the design of Oleg [7]. I expect the whole than can balancing easier.

Rotor control.

Here was the problem that a number of exotic components used in the original design are not for sale here. Rob then created a customized design with "normal" bugs [8].

down Converter

I own the LNC in 1700, described in the book by Rene Reudink [9]. This has been difficult to obtain. It is considered within the working group on a successor.

Receiver

Obviously WRX1700. This is described in detail in several episodes of the artificial satellite [10].

Decoder

The GODIL. Also several articles on this subject. [11]

Software.

Because the rotors used a range of 10-170 gr. have also had Xtrack [12] and WSAT be adjusted accordingly. There are a lot of hours to sit in the testing of the whole (partly just in my office). Also, I live in a different time zone which also several adjustments resulted. There is also put in a lot of time by Rob to adjust both programs and where possible / necessary to be closed to each other.

My test setup

During the time that the antenna was on the terrace I stand on a camping table inside the plant. The cables came through the open sash. I could see inside what the dish was doing (and whether he even did something). To the right of front to back with the GODIL rotor control, the receiver and the down converter. In addition, half behind the laptop PC scoop.

future Plans

The rotor is still on the terrace. For me very handy because I can easily check the matter in that way and, if necessary, make adjustments. Before it all the way to the roof moves -and there I see forward because then at least I can also Vietnam in the picture must receive proper remains to be done:

- Check all bolts and nuts
- The whole finishing neatly and paints
- Helical rotors and waterproofing
- Secure all cables neatly
- Pull the roof down Cables: signal + power for the rotors and LNA
- Tune the helical.

Hmmm, I'm afraid it will be some continue to take some space on the terrace.

generation

There is now also a complete and working system with DiSEqC rotors. There are no exotic parts for all the parts are readily available, the dish even as a kit, nothing needs to be programmed, the rotor control is an extremely simple circuit. WSAT and Xtrack software has been modified and if necessary I can publish my settings.

Hopefully this will encourage other members to also begin. If I can have many others absolutely can. Who on a particular part would like more information can always send an email. The board has my email address.

Acknowledgments

Big thanks to everyone who helped in one way or another to get everything up and running, and in particular: Ben, Rob, Arne, Peter K. and Harry v.d. Without your help it was certainly not succeeded.

References

For internet links go to www.kunstmanen.net and choose menu: <Links | Links from KM>.

- [1] The Kunstmaan, 2011-3, p. 128, 2014-4, p. 166 My HRPT
- [2] The Kunstmaan, 2012-3, p. 116, 2012-4, p. 156 Helical Antenna for HRPT
- [3] The Kunstmaan, 2014-5, p. 154, Report of Meteosat-7 reception
- [4] The Kunstmaan, 2015-4, p. 7 Make the most of your dish & helical
- [5] The Kunstmaan, 2011-2, p. 99, X / Y-rotors
- [6] SatTV, see website
- [7] Oleg's rotor, see website
- [8] The Kunstmaan, 2014-2, p. 57 Driving an X / Y rotor DiSEqC
- [9] Manual Weather Satellite reception, Rene Reudink, p. 113, LNC 1700
- [10] The Kunstmaan, WRX1700, inter alia, 2011-1, 2012-2, -3, -4, 2013-3
- [11] The Kunstmaan, GODIL, among others 2011-1, -2, -3, 2015-1
- [12] The Kunstmaan, Xtrack, among others 2013-3, -4,

A channel selector for EUMETCast.

Summary: A channel selector for EUMETCast is Discussed. This selector was described Earlier, but is now adapted to be used with Ethernet receivers. Linux only ...

In the past I have described a number of channel selectors for EUMETCast. With such a selector can by ticking buttons easily choose what is to be received: MSG, METOP etc. Without such a selector, it must adapt itself to the file "recv-channels.ini." difficult, and mistakes are easily made. The first selector, tqchansel ([1]), took advantage of customizing recv-channels.ini fact in the same way as you would with the hand. This selector is for both Windows and Linux.

The second selector (for Linux) that I have described, ecast_cfg ([2]), works in a completely different way. Here, the channels may or may not be passed on to Tellicast; Tellicast itself looks at all incoming data. In recv-channels.ini is simply:

```
[*]
```

and this does not continue to be adjusted. Selection is then no longer done by Tellicast.

The reason for me to handle this method is that I did not find it so attractive to modify a file programmatically.

Incidentally, in lieu of simply "[*]", also all channels which they wish to receive any, are mentioned separately (all of them activated). The advantage is that you can then optionally locks each channel to a separate folder. With only "[*]" will all be in the same folder.

A disadvantage of the above-mentioned method is there. Tellicast works something like this:

The "arrival" of data is through the so-called. "TSL Announcement Channel" (see footnote 1), as it were announced. The information who may receive this data is here. In combination with the ECU and the list recv-channels.ini "knows" Tellicast that data is expected to be put on the hard drive. Within a certain time data should have come in, otherwise an error message in the log file, eg.:

```
Channel "TSL Announcement Channel": 1714719 Lost message (message dissolves)
```

Normally "knows" Tellicast what data has been selected (via recv-channels.ini), but now the selection made outside Tellicast to and thus on each channel that is expected but is not passed by the selector given an error message. Not pretty, but it does not hurt (the maximum size and number of log files is finite; adjustable recv.ini, old log files are regularly discarded by Tellicast).

Now back to the selector 'ecast_cfg': this was originally designed to work with USB DVB receiver. This data must first be converted into Ethernet packets (see footnote 2), via a so-called. Dummy Ethernet "connection" (dummy as exists only by software in the computer). Then will only be sent to the selected channels to Tellicast over again a dummy Ethernet connection (commonly used address "192 168 238 238" here).

With the advent of DVB-S2 requires a new receiver. Here is a (for us) new type emerged: recipients not to be connected to the PC via USB but via Ethernet. This is part of ecast_cfg (the part that USB data revenue dummy Ethernet packets) superfluous. Data now come through a "real" Ethernet connection and ecast_cfg just need to ensure that a connection is made between the chosen dates and Tellicast.

A new option "-eth eth0" is ecast_cfg automatically for Ethernet receivers when Ayecka SR1. (If the data through an additional Ethernet ports enters the option eg. "-eth Eth1.")

ecast_cfg only works on Linux and can be found on my website: [3].

Note 1:

This explains why this channel (PID 100) must always be activated.

Note 2:

An Ethernet packet is nothing but a group of bytes, which among other things, added a source and destination address; the cry "IPV4" is probably known (an address consists of 4 bytes).

Fig. 1. The selector in operation. HRIT (currently Msg3) and (obviously) enabled "TSL Ann Channel".

[1] A channel selector for Eumetsat. Kunstmaan the no. 1, 2007, p. 12

[2] ... the EUMETCast with Kunstmaan no. 2, 2012, pp. 64-73

[3] <http://www.alblas.demon.nl/wsat/software/ecast.html>

From the library

At the new year reception one of the club members came up to me and immediately and without any hesitation confessed to reading this section. He also wondered whether it should all be so cynical. Unexpectedly, for me this became a precious moment of deep reflection and heartfelt repentance. Should it so harshly? Can it not be more positive, warmer, more human? Yes, of course we can! We'll start right away.

Ideals die in court. You know, I know, and in the Arduino army camp they know now as well, or rather, in both Arduino army camps. One of the "friends-founders" has set the Arduino brandname for himself, without the others of course, and so will have all royalties now in the wallet. Smart! The result is that there are two Arduino army camps. Lawsuits on both sides of the big ditch are still running.

One army camp has Genuino brought to life because they are not allowed to carry the name Arduino in Europe. They teamed up with Intel and now sell without laughing a dual-core 32-bit Intel Something as "logical successor" of the old 8 bits UNO. Intel will gladly hang its products under the name of an open source project. Blame them. What to do with 32 bits in the world of measurement and control, I don't know; for my aquarium three bits will suffice (lamp, heater, pump). Disagree anyone?

But here's the weird thing why I mention it here: in magazines, and also a recent book, no word on controversy. At most, there is smooth talk over it: "from the Arduino community is now ...", "there are now launched several products ...". They will realize that bad news will not hold any audience. Are you there, anyway?

Nice. Because as we speak I get to face the Elektuur of march. If you simply want to unravel the tangle, just know that now Arduino.cc and Arduino.org exist. If you want to chase the perpetrator of this heinous crime, then go to .org and if your sympathy goes to the saddened stragglers, then go to .cc. Many in-depth reading material here:

<http://makezine.com/2015/03/19/massimo-banzi-fighting-for-Arduino>.

One of the forum commenters wants to settle things in classic Italian way, but I am strongly opposed against it: it reflects so badly towards us and our hobby. I myself am always positive and will buy tomorrow a family package UNO's at my favorite electronics shop. I will have stock for years ahead. No one will not catch me out.

Pluto! Best planet ever, whatever they may say of him! Misunderstood, despised and degraded, but he holds on his own on his side a whole circus rotating. New Horizons has been visiting for a full-color glamor photo shoot. Now, you would expect the magazines to show off a nice double folder beauty in the middle of the magazine. With also a staple in the middle. You know it still from your youth; carefully pry out and with much sticking tape above your bed. But unfortunately, missed opportunity for the blades, especially the Ruimtevaart of the NVR. There are just some small little pictures with already known facts. Maybe later when we have more inside pictures arriving on earth, but this will take the year to come.

I am reading the magazines mainly looking for the nice new techniques, schedules and whatever else. Unfortunately, I did not find much interesting recent months. An oscillator / crystal tester for example ... nothing wrong, but nothing special. It strikes me that we ourselves are in a innovative field. What struck me in the Electron / VERON was a self-build components tester. The device searches yourself or a fet or triac or whatever it is. Pretty piece of softwork. The basis is made up by ... an Arduino. The tester is still being developed but is also ready for sale at Conrad, 60 euro.

And then hardware. Which mainly comes from China, still the factory of the world. At the club's management, you will find little esteem if you do not run your own production line to China. Electronics is quite cheap in China, but ...

Our hobby swallows terabytes. A cloud picture here, a movie there, it adds up (on the March meeting a data stream of 360 GB per day was mentioned!) So when my daughter offered last year to buy a diskdrive in Shanghai I was all ears. Thirty euro (here about 90) for 2 TB, it is not an unusual ratio. Connected and the first GB's rapidly flew into the disk. But.

It was noticed that the disk did not show the slightest vibration and the led burned very weak. Actually not burned at all. There was a neat (fill in + send) guarantee form, however, no Samsung return address. Upon further upload the disk hung up and the disc was not and never ever not recognized. Screwed open and there was an naked USB stick. Apparently intended to survive a superficial demo in the store. Some thick rusty nuts within it stuck with glue to simulate the weight of a real disk. The fake LED was a blob of glue. The included USB cord had a doubled A-jack suggesting the high power consumption of a real disk.

Long story made short: there is widespread cheating over there and it is actually a kind of accepted there. Here you have something like the Chamber of Commerce (well, at least it's something), and here you have Radar and Kassa (consumer telly programs), but with China it's just wait and see. Sometimes it is the real thing, sometimes it is not real but it works okay, sometimes it works underpar or short, and sometimes, as here, it's plain cheating. On the Internet, there is a lot to find out about and NM0810 disk is notorious. Well, then again return to the mall here in town?

You have been warned now. Otherwise you could have been warned. Namely, by

Your librarian.

Power meter with the Arduino

Introduction

The Arduino is used with a power detector from Mini Circuits to create an easy read-out of the Measured power.

What is a power meter

You could describe a power meter as a signal strength meter. It measures the RF power at the input and converts it into an analog signal. This analog signal is measured by the Arduino and shown in dB on an LCD display.

With a power meter various measurements can be made to the design of RF circuits can be very useful:

- The measurement of the output power of an oscillator. This is important because trucks must be operated with a certain power.
- To tune an antenna. A directional coupler and a signal generator are required.
- Adjusting filters up signal.

These measurements can nevertheless also be made with a spectrum analyzer? That's right, but there are nevertheless some important differences:

- The power detector used here go up to 8 GHz. A spectrum analyzer is up to 8 GHz (for me) priceless, the N9322C Keysight costs more than \$ 10,000!
- A spectrum analyzer can be much more, it shows a spectrum. But if you want to measure only ability you do not need these.

So I gave a presentation last year where I get a VCO sweep through this to send a function generator. The VCO output I connected to a filter and you could see the frequency response with an oscilloscope in XY mode. This was an example of a "poor-man's" spectrum analyzer.

Important to keep in mind is that you power measurement regardless of the frequency. Measure your eg. The output of a mixer then also measures the ability of all mixing products.

Power detectors Mini Circuits

Various models power detectors are provided by Mini Circuits. They vary, in particular, in the power that they can measure. The most sensitive model starts - measure 60dBm. In comparison, the WRX-1700 receives signals with a strength of -100dBm!

Another variable that you must take into consideration is the VSWR, the degree of alignment in a 50 ohm system. The more this 1: 1 approximates the better since the signal is reflected back to the least signal. The power meter is a part of your circuit and you will have to imagine how the circuit looks without power meter (eg. A 50 ohm resistor in place).

Fig 1 ZX47-40 The power detector

I purchased the ZX47-40. This can measure a power of -40 to +20 dBm. The VWSR is the frequency in which I am interested (from 1 to 5 GHz) around 1.10. See also the datasheet [1].

Figure 2 Evolution of power and voltage.

Over a range of 60dBm, it is a straight line. Want to measure less power than you can use an amplifier, you have more power an attenuator. The voltage is measured across a load of 1 ohm. Typical for these power detectors is a value of -25 mV per dB.

dBm and dB

Just a very brief explanation of the terms dB and dBm. we talk about dB then this is always relative to another measurement: the signal is 10 dB stronger than ... To be precise: dB (decibels) is calculated by $\text{dB} = 10 \log (P1 / P2)$. Wherein P1 and P2 power presents. Twice as much power = $10 \log 2 = 3.01$ dB.

we are talking about dBm then it is an absolute power, measured relative to 1mW. Thus, the ADE-11X needs an oscillator power of +7 dBm. The conversion loss is about 7 dB, read: 7 dB lower than the applied signal.

The Mini Circuits ZX47-40 Power Detector is a voltage that varies between 0.50 and 2.10 volts.

Here, it is not easy to deduce from the number of dBm. Now, could you translate this voltage with an op-amp circuit to -4 to +2 V with a voltmeter you can read the number of dBm (or multiply by 10).

Because I'm not so good with opamps I decided to use the 10-bit-wide AD converter from the Arduino. Running the Arduino 5V, this means that the maximum resolution $5V / 1023 (2^{10}) = 4.89$ mV. It is a shame that you can not use the entire range (0 to 5V) of the Arduino.

We can amplify the signal with an opamp but we can also set the reference voltage of the AD converter to an external (lower) source. This is done with the instruction:

analogReference (EXTERNAL);

By setting the reference voltage at 2.5V, we have already doubled the resolution! The resolution is: $2.5V / 1023 = 2.4438$ mV. According to the datasheet, the ratio (mV / dB) of ZX47-40 -25 mV. Every step of the AD converter is $2.4438 / -25 \text{ dB} = -0.0977517$.

reference voltage

The reference voltage of 2.5 V does not just fall from the sky. Several manufacturers (Texas Instruments, Microchip) supply voltage references in different voltages (2048, 2500, 4.096V etc). I also had to take the 2,048, for a slightly higher resolution.

With two resistors is easy to create a voltage reference.

Fig 3, the voltage reference LM4040 soldered to a pcb.

What's not

The power detector has an output for the temperature measurement. An ambient temperature of 20 degrees gives 0.6V. The datasheet mentions temperatures ranging between -40 and +85 degrees. I do not measure, so we do nothing with it at these temperatures.

The Arduino sketch

The sketch's no big deal. By out-commenting you to use an I2C or LCD display or print out the WRX-1700. At the end of this article is incorporated throughout the listing. In a couple of things I want to stand still.

Function read samples

To get out too much variation to resources I have written a function that takes 10 samples at intervals of 10 mS.

In the integer "total" (which may contain a maximum value of 32,768) Ten samples are summed. With return statement is the value of "total" return.

```
int read samples ()
{
    int total = 0;
    read int value = 0;
    for (int i = 0; i <10; i ++)
    {
        read analog value = read (DCOUT);
        total = total + value read;
        delay (10);
    }
    total = total / 10;
    return (total);
}
```

Function for calculating the number of dBm

This with an accuracy of one position after the decimal point.

Again, I have written a separate function:

```
float calcdbm (int samples)
{
    float dbm = 0;
    dbm = samples * -0.977517;
    dbm = round (dbm);
    dbm = dbm / 10;
    dbm = + 39 dbm;
    return (dbm);
}
```

```
}
```

The feature is called "calcdBm" and returns a float. A float is a number with decimal places.

```
dbm = samples * -0.977517;
```

The variable dbm filled with the number of times ten dBm (0.977517 instead of 0.0977517). E.g. 456 samples = 456 * -0.977517 = -445.75. This is done in order to complete.

```
dbm = round (dbm);
```

The Arduino round function () can only rounding to integers. So is -445.75 -446.00.

```
dbm = dbm / 10;
```

The result is now -44.6.

```
dbm = + 39 dbm;
```

Because there is an offset of 39 dB, this time is added. The result is -44.6 + 39 = -5.6.

the main program

This now represents not so much for.

```
void run ()
{
    StrValue String = String ( "dBm");
    sample value = read samples ();
    db = calcdBm (sample value);
    // If there is a change in the sample value print this on row 2 of the LCD.
    if (sample value! = OldValue)
    {
        strValue = strValue + String (db, 1) + "";
        lcd.setCursor (0, 1);
        lcd.print (strValue);
    }
    OldValue = sample value;
}
```

With the String object is simple in Arduino to process chunks of text. On the LCD display, we have a clear text display!

```
if (sample value! = OldValue)
```

To get a restless read because it is constantly sent text to the LCD is first checked whether there is a different value.

```
strValue = strValue + String (db, 1) + "";
```

The calculated number of dBm's is back "dBm" stuck, followed by two spaces. The spaces are needed because at shorter values, the old underlying value is still partly visible.

Is the first measurement example, -35.8, and the new 3.4, the display shows "3,4,8" (the "8" is the previous measurement).

Showcase

I want to measure the attenuation of 30m satellite coaxial cable at 1700 MHz. First I need a signal of 1700 MHz, for which I use the ZX95-1750W Mini Circuits. According to the datasheet provides that around 5 dBm. In order to exclude harmonic of the VCO, I use the VLF-1700, a low pass filter.

Figure 4 Baseline with a short coaxial 10 cm.

The first measurement we do without the coaxial cable. We measure a -7.0 dBm. Then, the measurement with the coaxial cable, which gives a result of -16.2 dBm. A loss of 9.2 dB.

Figure 5 Measuring 30 meters H125 coax

According to the datasheet [2] H125 is the attenuation of 100 m cable at 1750 MHz 27.9 dB. 30 meter cable than a loss of $27.90 / 100 * 30 = 8.4$ dB. On a slight difference with the value found.

Measurement with the WRX-1700

The WRX-1700 also has a signal strength meter. It is connected to the RSSI-uitvang of the SA615. To see how this translates into dBm I connected the receiver to my measuring station and at various levels recorded signal strength. The chart below came from there.

Figure 6 Signal on the WRX-1700 vs. dBm

This shows that the gradient to -60 dBm is a pretty straight line. The SA615 and SA604 are very suitable for making signal strength meters! However, the scale is not 1: 1. Denotes between -80 and -70 dBm then you read a value from between 70 and 90, a ratio of 1: 2. So 20 points lower on the display is 10 dB less.

Disclaimer: I have no idea how differences among the recipients. The numbers presented here, I measured my receiver. My Marconi test transmitter is I think 1980 and no idea when it is calibrated, at least not in the last decade.

Conclusion

A power detector can measure up to 8 GHz, this is not always necessary. For whistling through filters and cables there are (cheaper) alternatives. Find yourself on ebay on NWT4000, you're here, incidentally or in a PC.

On occasion I would like to calibrate this setup against a known source. This signal strength meter is now suitable only for relative measurements.

If anyone have any remarks please let me know. In due time I'm going to build the whole into a decent table and then a beautiful instrument I am again.

left

[1] Datasheet of ZX47-40

<http://194.75.38.69/pdfs/ZX47-40-S+.pdf>

[2] Datasheet H125

<http://www.farnell.com/datasheets/80476.pdf>

```
/* * PowerMeter for the Mini Circuits ZX47-40 +
- Reads value from the ADC and displays dB
- External voltage reference 2.5V
- Works with the display board of the WRX1700 and I2C display
* /
#include <Wire.h>
// #include <LiquidCrystal.h>
#include <LiquidCrystal_I2C.h>
#define DCOUT 0
// RS E D4 D5 D6 D7
// Liquid Crystal LCD (12, 11, 2, 3, 4, 5);
// Addr, and, rw, rs, d4, d5, d6, d7, bl, blpol
LiquidCrystal_I2C LCD (0x27, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);
Sample int value = 0;
OldValue int = 1;
float db = 0;
int read samples ()
{
    int total = 0;
    read int value = 0;
    for (int i = 0; i <10; i ++)
    {
        read analog value = read (DCOUT);
        total = total + value read;
        delay (10);
    }
    total = total / 10;
    return (total);
}
float calcdBm (int samples)
{
    /* AREF is 2.500V
    Each step from the ADC = 2,500 / 1023 = 2.4438 mV
    The slope (mV / dB) of the ZX47-40 is -25 mV
    So each step = 2.4438 / -25 = -0.0977517 dB * /
    float dbm = 0;
    dbm = samples * -0.977517;
    dbm = round (dbm);
    dbm = dbm / 10;
    dbm = + 39 dbm;
    return (dbm);
}
void setup ()
```

```
{
    analogReference (EXTERNAL);
    Wire.begin ();
    Serial.begin (57600);

    lcd.begin (16, 2);
    lcd.home ();
    lcd.print ( "Power Meter");
}
void run ()
{
    StrValue String = String ( "dBm");
    sample value = read samples ();
    db = calcdBm (sample value);
    // If there is a change in the sample value print this on row 2 of the LCD.
    if (sample value != OldValue)
    {
        strValue = strValue + String (db, 1) + "";
        lcd.setCursor (0, 1);
    }
    lcd.print (strValue);
}
OldValue = sample value;
}
```

UNIVERSAL AUTOMATIC ANTENNA SWITCH WRX-1700 RECEIVER

Elmar Bögels
Summary

Introduction

Some years have passed since the WRX-1700 receiver was published in our magazine "De Kunstmaan". In an early state late Jo Jongen and I decided to build this project. After reading the September 2012 issue about the display board for the receiver we came to the decision to make some modifications in this design. The display with a size of 2 * 16 characters was for us too small and we wanted to use a display with a size of 4 * 20 characters. This display would be tall enough to display more information on the display like your own name or ham radio call sign, the name of the satellite and any other information. The change would only be possible if we were to gain access to the source code for the microcontroller on the display board. The former PIC microcontroller was now replaced by an Arduino microcontroller and since I already programmed some microcontrollers using the Arduino IDE, it would be no problem for me to modify the source code for the new display. Inquiries to our chairman Ben Schellekens gave me the source code on which I had soon adapted the source code for the larger display and granted access to the operation on how to control the receiver. This would be of great benefit to the modifications, which would soon follow.

Antenna inputs

When Jo and I were brainstorming together, Jo said that it was a pity that the receiver did not have two antenna inputs, one for APT and one for HRPT. Jo had access to both an APT antenna that he had bought at a flea market and a radio operator HRPT dish with tracking system which he used for many years with an Italian HRPT receiver and down converter.

I came up with the solution that the two inputs could be switched by a simple RF relay and automatically driven by the display board. Since we were in possession of the source code and there were a few unused I/O lines on the microcontroller it could be possible.

Adjustments

A look at the source code showed that there is an I/O connection that was used for switching between APT and HRPT, namely the APT + 5V signal. In the source-code this was defined as a control signal to switch off the HRPT oscillator upon APT reception. So why could this signal not being used for the RF relay to switch between the APT and HRPT inputs? Just a matter of a PNP transistor switching stage (two resistors and extinguishing diode 1N4007 or similar type) which activates the relay at HRPT- and deactivate it at APT reception.

I chose this method of switching as more and more users will use HRPT receiving and on a switched off receiver is the APT input connected to the tuner of the receiver and the HRPT input disconnected. This method of switching is used because of possible discharges during thunderstorms.

Explanation: During a thunderstorm the air is electrically charged, and each antenna picks this up too. Between the centre core and shielding of the connector sparks can occur, static discharges. On a switched off receiver is the centre pin of the APT-connector through the changeover contact of the RF relay connected to the tuner input, and the centre pin of the HRPT connector is not connected to the tuner input. As a result, the centre pin of the HRPT input is slightly better protected by the electrical interruption of the RF relay. But nevertheless, you must disconnect the coax cable from the receiver during a thunderstorm.

Connectors

A printed circuit board would consist of this transistor switching stage, relay and two BNC connectors print. Why BNC connectors I hear various electronic

technicians say? Everyone has his own preference and with a maximum frequency of 150 MHz I prefer a BNC connector. Just a quarter turn and the plug is unplugged and at a frequency of up to 150 MHz, the attenuation is marginally higher than with an N or SMA connector where you have to turn for half an hour to unplug. Very useful if you hear an approaching thunderstorm. And later, try to fiddle the N- or SMA connector back on at the backside of the case.

Version 1

Printed circuit board

It almost did not pay off to make a PCB with just a few components. But this would change soon when the following idea came up. Can we automatically turn on the HRPT decoder at HRPT reception? Why would you leave the HRPT decoder powered up when you are receiving APT? At that time I was looking for a miniature RF relay and found one with two changeover contacts at Reichelt in Germany where I practically order all my entire electronic components. With one changeover contact I had sufficient to switch the two inputs, so why not use the other changeover contact to switch on and off the power of the HRPT decoder according on receiving HRPT or APT?

Power supply

Around the same time came another idea to turn on and off the power supply for the HRPT down converter and/or APT preamplifier. This idea was included in the decision to design a PCB, but there would be something else added to the design. Both HRPT down converter as the APT preamplifier can be powered in two ways. With a separate wire connection between power supply and down converter/pre-amplifier or powered via the coaxial cable, called Bias-T or phantom power. All these capabilities are now included in the PCB design.

PCB size

The last question was, how big do we make the PCB? There are not many components but it should be handy enough with enough distance between the BNC connectors for (un)plugging and other wiring connectors, and small enough to cut a maximum number of printed circuit boards with little or no waste out of a Euro card size PCB of 16 * 10 cm. I elected a board size of up to 8 * 3.3cm, so 6 PCB can be manufactured out of a Euro card size PCB. 8 cm is wide enough to have two print BNC connectors far enough from each other for (un)plugging and is mechanically stable in order to mount the PCB on the backside of the case by drilling two holes with a distance of 40 mm for the two connectors, and fixing them with just two nuts. This was also a reason to use BNC connectors, the easy assembly.

Design

The design of the PCB was drawn directly into Eagle. Note, there was no electronic schematic drawn, but the components were placed on the Eagle layout and connections drawn between the components. Hence, there is no schematic of this design. I think drawing the schedule takes longer than drawing the mounted components and connections, and the auto route function does not always give me a satisfactory result in terms of placement of the components and connections. For a small design my brain still possess the best auto route function, after all a PCB has not only to function but also has to look good, and a tangle of connections by the auto route function of Eagle does not always produce the best results.

The main problem in the design was the construction of the Bias-T, phantom power or power via the coax cable. I had this section taken from the design of the Italian receiver of Jo, since the Italian HRPT receiver provided power for the down converter. After I made the first version of the PCB, I used the loaned MiniVNA of our association to measure the attenuation between the antenna input and output (input for tuner) and the channel separation between the two inputs. Since the attenuation of the RF miniature relay in the data sheets is at 150 MHz about -0.2 dB and a channel separation of about -30 dB, I actually expected

substantially the same values. Great was my surprise that the attenuation between input and output was at about -3 dB, and the peak was just at about 137 MHz. The MiniVNA that I borrowed had to be returned at the next meeting and I had to wait until I could borrow it again at the next meeting.

This was not the greatest loss of time, waiting until I had access to the MiniVNA, but the sudden death of Jo Jongen. The necessity to quickly finish the PCB was gone, and so the design ended up in the closet. It would take some time before I went back to the design.

Version 2

Preamplifier

In March 2015 "The Kunstmaan" issue fell onto my doorstep and the construction design of the 137 MHz amplifier drew soon my attention. A beautiful design and the first preamplifier was soon built, encased, tested, calibrated and power was supplied with a power cable directly from the 12 Volt power supply. It was a little bit tricky to feed a power cable in the case and the Bias-T lurked around the corner. In the design of the preamplifier there was already a bias-T to split the power from the RF signal in the form of a 100 nF capacitor and a coil of 1 μ H.

I then decided to build a separate Bias-T that you could place in the coax cable between amplifier and receiver with these components. In Germany I found a manufacturer who makes small tin cans for filters, and this case was ideal to place the Bias-T in with two BNC connectors and a power connector. (See Figure 1) With the MiniVNA I measured an attenuation of below the -0.5 dB at around 137 MHz. Perfect to use in my PCB design, and after I changed the components on my circuit board this worked great. The measurement results were at about -0.5 dB and a channel separation around the -28 dB channel.

Figure 1: Single Bias-T.

Printed circuit board.

Time to give the PCB design the final "finishing touches" and create a second version. The only difference between the first and second design is the use of a different RF miniature relay.

The electrical data of the RF relays are identical, however the relay is slightly flatter and the footprint of the second relay is slightly wider so that I could easily make a ground shield between the RF section and power section. After measuring with the MiniVNA there is no difference between version 1 and 2. We continue with the component placement on the PCB.

PCB component placement.

The component placement on the PCB can be seen in Figure 2 and the print layout in Figure 3. Left is the APT part, right is the HRPT part and in the middle the terminals RX and Gnd for the coax cable to the tuner. C1, L1 and C2 form the Bias-T for the APT part and C3, L2 and C4 for HRPT part. If you do not need a Bias-T for APT than C1 and L1 can be omitted and C2 can be replaced by a wire. If you do not need a Bias-T for HRPT then C3 and L2 can be omitted and C4 can be replaced by a wire. C1 and C3 provide an RF decoupling for the DC power supply, L1 and L2 take care of the DC link to the BNC connectors and C2 and C4 provide the DC decoupling, so that only RF signals, and no DC voltage is passed to the tuner.

Then there are 5 different connectors. K1 is the connector to the display board that controls everything and provide power to turn on and off the RF relay. The + 5V is branched off from the display board connector K4 pin 2, Gnd of the display board connector K4 pin 16 and APT + 5V of the display board connector pin K4 pin 4.

Power supply.

K2 is the power supply connection for the APT preamplifier, HRPT- down converter and decoder. The power feed Vin of K2 is at APT reception diverted to Vin of K3 and at HRPT reception diverted to Vin of K4 and K5.

If you want to feed your APT preamplifier by a separate power wire connection, then you can connect the + terminal on Vin of K3. If you want to feed your HRPT down converter by a separate power wire connection, then you can connect the + terminal on Vin of K4. If you want to feed your HRPT decoder then you can connect the + terminal on Vin of K5.

If you want to feed the APT preamplifier via the Bias-T, you can connect Vin to Vout of K3 using a jumper. If you want to feed the HRPT down converter via the Bias-T, you can connect Vin to Vout of K4 with a jumper. The Bias-T's are powered via the Vout inputs (a bit confusing, I admit). Take care that the power supply voltage on K2 is equal to the input voltages for the preamplifier APT, HRPT- down converter and decoder.

Do you need a different power supply voltage when using the APT preamplifier and/or HRPT down converter? You can use voltage down converters and up converters. Do you need for example a lower voltage you could solve this by using voltage regulators such as the 7805 for 5 Volt.

The input of the voltage regulator can be connected to Vin, the output to Vout and do not forget Gnd. The voltage regulator can be mounted for cooling on the housing and use 3 wires to the connector.

Figure 2: Component placement.

Figure 3: PCB Layout

However, these kinds of voltage regulators are in my opinion a bad choice. For example: You have a 12 Volt power supply and you need 5 Volt at 100 mA. Therefore 7 Volt needs to get "lost" at 100 mA which means that 0.7 watts of power must be dissipated as heat by the regulator. On the Internet you get for 1 to 2 Euros a small PCB with a switching power supply regulator with high efficiency. In this case, there will be 50mA current drawn from the power supply at 12 Volt, supplied is 5 Volt at 100 mA. So only 0.1 watts of power need to be cooled and the higher the efficiency, the less power is converted into heat. There are also voltage converters available that deliver a higher voltage than they are fed with, but you have to feed them with more current. For example, your power supply provides 12 Volt and your down converter needs 24 Volt at 100 mA. In this case doubling the voltage will need a little more than 2 times of power supply current, whereby this slightly more depends on the efficiency of the inverter.

So, I think that all forms of power supply, directly or handled via coaxial cable are concluded, so I can justifiably say that this antenna switch is universally applicable.

Kits

From the universal automatic antenna switch and the APT preamplifier there are kits and ready-made units available from me. A built specimen is shown in Figure 4. If you may have questions and/or comments you can always come to me during the Kunstmaan meetings in Utrecht.

Finally

This is for me the opportunity to speak to those people who you do not see at the meetings. There are always about 25 members attending each meeting and we have over 100 members in our association. Why do you not attend a meeting? You will receive more information than what is published in the "De Kunstmaan", you can ask anyone about your questions and problems, and there is almost always someone who possesses the necessary measuring equipment and electronic parts. You can borrow measuring equipment. For example: The MiniVNA that was purchased for the entire association. Incidentally, I do not longer need this service since I bought a second hand MiniVNA at the end of last year, so thanks to the board for all the times I could borrow it.

Figure 4: Built version.

If it is the distance from your home to Utrecht, I can recommend the railway. Before, I always rode along with Jo Jongen who died almost two years ago. The drive from South Limburg to Utrecht would be too expensive by car for me, but with offers of Dutch railway day tickets which cost about 14 Euros that are on sale in several shops and with good bus service between Utrecht Central and the Nimeto building, keeps travel costs within affordable limits and you will be dropped off almost at the front door of the Nimeto building and picked up again (about 300 meters).

So what reason do you have not to attend a meeting? Maybe we'll see you at the next meeting and then afterwards there is still time for shopping or eating out in the centre of Utrecht? For me, these meetings are a reason to go out again and in between I will be waiting for the next meeting.

Incidentally, I think for future reference to connect a DCF-77 (German atom-clock) receiver to the display board and of course customize the source code so that you always have the correct time and date displayed. It's just a thought. So, that was it from the South Limburg and maybe we see us at the next meeting.

Report meeting January 9, 2016.

Opening by the Chairman.

The President wishes the audience a good 2016.

Looking back at the past year, he mentions a number of points.

Jene Langevoord, one of our members who regularly attended, unfortunately deceased.

The new format of "Kunstmaan" was well received. There is also a translation published in English, in pdf format, for foreign members.

The WRX1700 must continue. There are printing on.

Harrie v. Deursen has been busy with dish optimization.

Another component which we take in hand, the downconverter. Particularly with regard to construction by others there is something to win.

Past years have been a number of members on tour in Darmstadt, at Eumetsat. It has gradually become a tradition that our sister organization GEO organizes this once every 4 years.

With regards to our web-site we will review this if it has to be modernized.

The President calls his good intention: to finish construction projects, build in a cabinet, and it must still work ... In other words, finish projects.

He has also received direct METOP through the SDR method. It will be difficult, with very large files to be edited afterwards. 'Live' images is therefore not, that's something to work on.

A layout is ordered from Digikey. If one there that want to order it could best be done collectively, because of shipping. Information Ben Schellekens.

adoption agenda

No comments

administration

Nothing changed.

satellite Status

See elsewhere in this radius, as always taken care of by Arne.

Any other business

Harry: Trying to get the helical at 50 ohms. For a loose helical is already the case, it must now be tested in combination with dish. The impedance of the receiver is also not exactly 50 ohms.

Hendrik took a dish with antennerotors (AC motors), which is now running outside.

Harm: Tell something about his adventures with Digikey. The order was sent by UPS, but afterwards he was faced with many extra (shipping) costs (about 65 euros) while according Digikey "free shipping" would be. It is important to look good which means "free shipping". Also specify the value of interest; If you specify 0 then they believe in customs do not go and they determine the value itself. Especially for orders from China, you have to watch this.

Robert Langenhuisen:

Purchased a Red Pitaya. There is software to program this device as SDR.

The name of our group, "Satellite" does not cover what we do. Perhaps we should consider to come up with a sub-name, which covers the load better. Here, the board will examine.

Timo: There are prints ordered for the PGA103 preamplifier, which goes up to 2.5GHz. Which will soon enter. The preamplifier is also used in Lopik, send signals down from the top. (Since the fire in the tower Smilde allow any more devices to be placed at the top of this type of towers, hence signals are first sent down through long cables. The PGA103 is apparently used to compensate the loss in the cables.)

Peter Smit has made another (really working) very small rotator.

Elmar: used for making printing a photosensitive film that you iron on the board (in dim light). The layout is a transparent film printed with a laser printer (negative), and then is exposed in the normal way, developed and etched. This gives good and reliable results even with many narrow lines close together. With a few euros to foil you can create multiple print on euro format.

He also bought a field strength meter from China, but unfortunately the text is displayed in Chinese. The thing is still useful because the essential figures are in "normal" script.

Ben: Has bought a Zybo development board, and has some "play" with it. The aim is to see if there is a full-HRPT station can be put. The board consists of a Xilinx FPGA and a connection for an Arduino and a display.

Robert Langenhuisen is also working with FPGAs, he has his eye on a MAX board with an Altera FPGA and connection for Arduino.

Harry took his rotor system.

Rob took his "totem pole rotor."

Paul: Is bombed by Elektor with all sorts of offers. He purchased a smart scope, which can be used in combination with a PC, tablet or smartphone.

Closure

After this there is ample opportunity to admire each other rotors, while enjoying a snack and drink for the New Year's reception.

Rob Alblas
(Secretary AI)

Report meeting March 5, 2016.

Opening by the Chairman.

On April 23 there is a GEO symposium in Leicester. Maybe Rob goes ; Elmar is interested; Arne cannot go. The delegation will therefore anyway be very small.

At Digikey is to obtain a 1 GHz synthesizer (Abracom). This is interesting in order to make a down converter for 1700 MHz. At Digikey you pay excl. VAT, which ultimately has to be paid to the carrier.

With home-made equipment the way different parts are connected together is chosen by the builder. For example the connectors. The result is, however, that parts are not interchangeable. Standardization could solve this problem. Rob reports that there also needs to be looked at electrical level voltage levels, polarity, impedances. The question is whether there are members who want to deepen this.

A survey will be drawn. It is a way to hear members who never attend a meeting.

Furthermore, we see if we can send out a memberlist. This is also done by many organizations. Of course, we do take into account privacy; we still have to see what information exactly is in that list (email address, phone number?)

Parking at Nimeto there is place next to the building to drop your car for free. First served, on public roads it is paid parking.

We do have some equipment was offered by people who quit the hobby. We offer to members, there will be a list in the Kunstmaan.

On March 19, there is again the flea market in Rosmalen. There are 6 places for stand personnel.

adoption agenda

No comments

administration

Nothing changed. We are still looking for a webmaster.

satellite Status

See elsewhere in this radius, as always taken care of by Arne.

Any other business

Harrie: Has also looks at optimization of a helical. This can be done outside of the dish, after placement in the dish will change little.

Wim: asking the state of the handbook. Part 3 is still in the making, problem is lack of time. So we have to choose what works and what does not in the handbook. Items such as the WRX1700 are not in the handbook; this we refer to the relevant articles in the Kunstmaan. Articles about how eg. Build'll get there in a HRPT station.

Paul: Look beyond what the magazines which we subscribe. Tips on interesting articles in magazines are welcome.

Elmar: has again exposed a number of issues in his "shop".

Arne: In early March there was again a so-called "colinearity." sun, satellite dish and are then placed in one line. By solar radiation, exactly focused in LNB, can become so hot that cracks come in. It is therefore important to check this.

Further, Arne reported a very common virus that is now in circulation. It is disguised as a rar file, but if you shrugging then all files "compromised" on your hard drive.

Ben reports that Mr Dankmeyer is deceased. There is a list of items that are for sale.

Ben: Itead (Chinese company) offers PCB production for a low price. Dimensions eg. 10x10, double-sided, drilled and plated through, 10 for only 28 euros, incl. Shipping. Smaller prints you can best combine into a 10x10, and then saw off the sub-prints by yourself. PCB programs Kicad and Eagle can be used to design the print.

A Eurocard-print is quite a lot more expensive.

Rob: has added some things to xrit2pic. There can now 'live' to generate a continuous film, with limited length. If the set maximum length has been reached then added to each frame there is a taken away at the beginning. This can run continuously without the hard drive becomes full. He is working to expand WSAT so that it can simultaneously control a rotor and can receive images. This has been working with Fred, there still have some things to be streamlined.

Ben and Rob have been yesterday at Space Expo in Noordwijk, to talk about a weather satellite station to install. We're going to deliver this support.

Closure

Lecture by Jan Meijer, about how to apply filters in cell phones for our receivers.

Cell phones contain filters on 900 MHz; there are types that can be adapted to make them suitable for 1700 MHz filter. This customization does take some skill; using diamond drills (discharged dentist drills) are custom cut parts. It is an accurate drawing, which you must ensure that you do not too much removal rate.

He also tells something about his experiences with receiving FUNcube's.

Rob Alblas
(Secretary AI)

Financial annual overview 2015; budget 2016

This is a list of income / expenses in the calendar year 2015. The actual revenue / expenditure can (partially) be done in another year.

The balance sheet also includes hardware issues that can still be sold.

The 2016 budget is also included here. The loss in 2015 is higher than last year, as was expected. Unfortunately, it is expected that this loss will not diminish in 2016. For now, we can bear this loss, but will ultimately be still looking at measures.

Looking at the indispensable expenses 2016: printing / shipping KM, Nimeto and bank charges, then we arrive at an expenditure item of 3080 euros. Income of members is 2525 euros. There is a structural gap of more than 550 euros! This corresponds to a "members deficit" of at least 20.

If there are any questions about this survey then let me know before the annual meeting (May 2016) so that I can explain on that day. For the tables with figures please have a look in the 'paper' magazine.

balance 2015

Overview value hardware intended for sale; end 2015

Overview bills end-year.

These are the amounts of the various accounts at the end of a calendar year.

Overview membership and revenues.

The number of members continues to decrease. 2016 5 members have terminated their membership, so we are now at 106 members. This must at the time of this writing still pay two membership fee. (Yet to be recovered: 50 euros)

The following table shows the attrition seeing the past 5 years.



Rob Alblas

treasurer

Satellite status

as at 19 March 2016

Arne van Belle

Polar satellites

See table in “de Kunstman”, page 26

- Fengyun 3A, 3B and 3C transmit only AHRPT out, this is not to receive a standard HRPT receiver and decoder. Unfortunately, this is not entirely AHRPT according to the standard so that even a Metop AHRPT receiver is not suitable for the FY-3 series!
- Fengyun 3C has different data rate than 3A and 3B (3.9 Mbps).
- Unexpected Meteor M N1 is active again after it suddenly failed in September 2014. Unfortunately, there are problems with the stabilizer so that the images are often unusable.
- LRPT Meteor M N2 is no longer observed after December 12, may be a problem with switching to 137.9125 MHz.
- MHRPT mode is not compatible with HRPT but can be decrypted with the new Rob Alblas decoder!
- The next in the series Meteor-M N2-2, followed by Meteor-M N2-1: Launch of being both verwacht in December 2016
- NPP (NPOESS Preparatory Project) only transmits the X-band with 15 Mbit / s. It is recommended a tracking dish with a diameter of 2.4 meters!
- Sentinel-3A is successfully launched, this long-awaited successor Envisat will not receive directly but via EUMETCast.

Launches:

- Meteor-M and M N2-2 N2-1: December 2016?
- Metop-C: 2017

Geostationary satellites

See table in “de Kunstman”, page 27

- MET-10 is now receiving operational satellite via EUMETCast.

Launches:

- GOES-R: further delayed to 14 October 2016
- Himawari-9: third quarter 2016

EUMETCast since Dec 31, 2014 receive only DVB-S2 VCM Eutelsat 10A at 10 degrees East!

To further increase the amount of data sent over EUMETCast in the future to allow for EUMETSAT is transferred in August 2014 from DVB-S to DVB-S2 VCM mode.

The new transponder is on Eutelsat 10A, 11263 MHz H, which stands at 10 degrees East.

The broadcasting standard DVB-S2 8PSK 3/5 VCM (Basic Service) or 16APSK 2/3 (High Volume Service) with a symbol rate of 33 Msps. Unfortunately, DVB-S and the most "DVB-S2 without VCM" recipients no longer usable.

With a special driver, some recent DVB-S2 receivers to make more suitable for Basic Service Only. (Only 5980 and TBS Skystar 2 eXpress HD, unfortunately this is not true for the Skystar HD USB box)

The signal at 10 degrees East has a greater bandwidth and is therefore weaker than before.

Recommended dish diameter of 80-90 cm for basic service and at least 120 cm for High Volume Service.

During heavy rains, the signal will disappear sooner and longer.

Please note that last month stood behind the sun East 10 degrees, check if the LNB cover is waterproof!

The reception of EUMETCast data for amateurs free of annual fee, you must, however, register at EUMETSAT. Once you have software (60 Euro) and purchase key (40 Euros).

The EO Portal can EUMETCast users log on and view their personal data and settings and adjust if necessary. Also registering as a new user and extending the license is possible here. You can indicate on-line which products you want to receive your EKV. Existing EUMETCast users have received an email with an explanation and a login code and password.

To receive MetOp and / or Modis is using a ramdisk necessary the following EPS data channels are recommended:

EPS 10 MetOp AVHRR

EPS 15 NOAA GAC

EPS 18 EPS News Service

In February a test version of the new Tellicast Client (version 2.12.1) was sent by Eumetsat via "Info-Channel 1" to all users. However, there is no installation version, you have yourself put the files in the appropriate folder. This new client is only required if you wish to receive HVS data.

From 4 February a test conducted with simulated Sentinel-3A data transmission over HVS was done. On certain days alone on HVS 365 GByte per day was received! A fast PC and hard drive (or SSD) is required if you want to save Basic Service and HVS. Unfortunately, this data already stopped on March 17. Once the test phase of Sentinel-3A is over will be sent this data on HVS.
<http://www.eumetsat.int/website/home/TechnicalBulletins/CopernicusUserPreparation/index.html>

Thanks to David Taylor and Douglas Deans for the info.