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Uitgave van de Werkgroep Kunstmanen

In dit nummer o.a.: "HRPT Lock Indicator voor de WRX-1700• Weersatellieten in Vietnam deel 16 • 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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Content

Preface

Ben Schellekens

Satellite dish

The summer months invite you to go outside and with antennas and rotors to get started. Now, this may be: The group is in possession of a 3 meter dish! Fred alerted me to one of the astro forum had this antenna in his garage and from there wanted. The antenna was offered on the Internet. Z incompetent to bring the metal farmer n!

The antenna is designed for the reception of satellite TV in the 4 GHz and b.
The dish is made up of four segments by means of bolts which are connected to each other. The segments consist of an aluminum frame with 4-mm wire mesh. With a square iron plate, the dish mounted on the stand. The default is 150 cm tall and designed for permanent installation. The antenna can be adjusted in azimuth and elevation. On the front page you can see the built makeshift antenna, thanks to Peter.

The quality of the dish, we need to examine. By transport (from Indonesia) is in some places the mesh which dented. It would appear that with some strips and wires, the mesh can be put in the right place.
Now, not everyone has the space to put a 3 meter antenna. We will see if we have a mobile standard can make where it can be temporarily placed. Another issue is transportation: The segments are 1.5 meters high, this does not stop you in your car. You need a trailer.

On 3 May last year we went to Dwingeloo / Camras to receive the LRIT signal MSG -3. This probably did not succeed because the illuminator is not sensitive to the 1.7 GHz. Applying a private setter is an option but it's quite a hassle. Now the working group on its own 3-meter dish features we do not have to Dwingeloo to receive a signal loud popping!

Another story is about a satellite dish to this follow. An XY control is probably not feasible because the use of counterweights is only partly possible. The advantage of an azimuth - elevation rotor is that it can be completely balanced. Stay in touch if you have suggestions bt hey engines and overbrenge rs who are able to serve such a dish. It should not be that the shipment was destroyed by a blast of wind. A wiper motor is probably too light.

Jupiter GPS module

In the December 2014 issue of the Kunstmaan I wrote an article about a 10 MHz reference by a Jupiter GPS receiver. There I like the note made at that if you want to build d hese you should go to first behind the receiver.
The good news is that V an Dykes Electronica this module down again. Even the matching antenna with MCX connector is available there. I have already purchased a copy, but this did not tested. For more info refer to the December 2014 issue.

Eumetsat
If you read this, probably bringing some of our group members visited EUMETSAT in Darmstadt. It seems to be a quadrennial tradition. In the September issue is a comprehensive report.

Metop
With the direct reception of Metop we come step by step further. In this issue of the Kunstmaan a description of what I did to conjure up an image with GNU Radio. We are also working to connect the QPSK demodulator Harrie on the FPGA in order to get the data stream to the PC Rob has bit -. File for the FPGA and WSAT adjusted. In this Kunstmaan more about this.

GNU Radio
In this issue of Kunstmaan an article on the reception of Metop. Many are reluctant to GNU Radio to get started because it is known for its steep learning curve. A few years ago this was so, but nowadays people are busy to write readable instructions which provide a good basis to work with GNU Radio.
Go to the website and look under the "Guided GNU Radio Tutorials" [1], unfortunately in English.

WRX-1700
During the last meeting, the question was asked what information is correct about the WRX-1700. In the past, there is much about the development and construction of the WRX-1700 written. Eventually there will be one item / construction description to come, these will also be included in the handbook. Due to time constraints, I am here not yet gotten around to. Below is a brief overview which relevant articles were published:

- Kunstmaan December 2012: Schedule and parts list mainboard
- Kunstmaan September 2012: Schedule display board
- Kunstmaan September 2013: Parts List display board
- Kunstmaan July 2014: New version of the display board

For those interested: printing and tuners are still available.

Do not hesitate to send a message when there are questions in the construction or adjustment will be.

Below is a high-resolution photo of the WRX1700. This is also available in digital form. Handy if you want to check component setup.

Figure 1. High-resolution photo of the main board of the WRX1700. Some C's are soldered as SMD. This is not a requirement.

Meteor

With the advent of the Meteor there is renewed interest in the 137 MHz band. In this Kunstmaan you will find a drawing of a turnstile those years ago was designed by Arne. Let the results to know if you have built this antenna.
Paul-Jan van Gils QFH discloses an antenna which can be used also for the reception of the Meteor.

It remains for me to wish everyone a nice summer holiday and I hope all of you to greet you at the meeting on 12 September. Enjoy reading this Kunstmaan.

Links

[1] GNU Radio Guided Tutorials
http://gnuradio.org/redmine/projects/gnuradio/wiki/Guided_Tutorials

Weather satellites in Vietnam (16) **Fred van den Bosch**

Summary
My experiences with weather satellites, etc. in Vietnam.

Introduction
I've been busy the last few months. In addition to the necessary activities to house, garden and engine I built the satellite dish, Xtrack combined with the tested rotors, rotors tested dish, created a new X / Y-rotor, all built in cupboards, a logic analyzer to talk got my website tweaked, in short, I was in the street. The details.

HRPT
What loose points
- The Godil with the rotor is accommodated in a control cabinet
- I have (temporarily?) Opted for a "loose" design: everything is in separate tables and is put together, including the associated power supplies.
- After a new tip again in Nha Trang extensive searches for materials such as aluminum. A piece or three business items, but unfortunately ....

Satellite
The kit of Peter Cooper was quite a tricky project. I could viz. Doing nothing wrong because no material is for sale here. So I regularly get a whole while lying if I hesitated. The dish is now ready. The mounting of the mesh is a beast job. I have days with sore fingers walking around because I pulled open continuously to the sharp protrusions.

Because I did not firmly grasp the base of my imager enough (PCB) I have the last piece of aluminum from the junk box created a new base. Again, I have done the same reasons, much longer than normal.

On the advice of Peter K. I bought an automatic center punch. I saw prices from around € 20, but in Rotterdam, I found one for € 7. Beforehand I was afraid for Vietnamese quality, but he is still doing well. Excellent advice!

Also here in Nha Trang purchased pneumatic popnageltang has done a good job. Can also really no different from a machine, where in large letters "TOP, high quality air tool Germany Standard" on it. Still ... ??
When I more or less as a joke reported on the engine forum, a tool salesman replied: "Good thing, Taiwanese make. People love to believe that something is German. Just look at the bigger Einhell sales, which now also collective scream "German tool".
Gosh, he is better than I expected. Usually here you get the real authentic Chinese "quality". Well, Einhell. State including in my drill press (and in small print underneath "Made in China"). Gang!

The dish is then mounted on the rotors in order to test the combination. But unfortunately ...

Rotors
Issues
In [1], I described how I made an X / Y-rotor. Well, tear those pages but the KM, because it works with the assembled dish -at least to me- not good. The Y-rotor I can move nicely to the extreme positions, but once the X-rotor under 45 gr. comes, it is with the fun. He then stops moving. It still works if I use the Y-rotor to 0 or 180 gr. move. Presumably, the weight of dish (approximately 4 kg.) + Y-rotor still too much for the X-rotor. Undoubtedly makes my way of building in the length direction and thus further away from an excessive load on the X-rotor.

I've experimented with a different feed, counterweights and with feathers, but that's not really succeeded. There is at the present building is actually no room for a good solution.

Verhernieuwbouw (adapted from the Biereco's)
Luckily I had the picture of Arne's rotor on the front of KM 2014-1. And Ben came to the website of one Oleg [2], which also has an X / Y-rotor rotors with the same as I have. So under the old motto "better well stolen than badly invented" I started with version 2. After much staring at the pictures of Oleg's rotor to mine, the original Arne, much deliberation and a series of sketches and notes make I finally decided to start converting my rotor to Arne's design. That turned out to attack them hard. I only had to wait a while until Hai, my welder, was available. When he had time, and what trifles had welded I could test.

Version 2, it is clear better than its predecessor, but with the Y-rotor 90 gr. it is below 20 gr. for the X-rotor still very difficult. After extensive testing, I could conclude the following. If the Y-rotor between about 75 and 110 gr. state and the X-rotor below 20 gr. comes, does the X-rotor nothing more. Because this extremely east or west, and undergoes no satellite at that place or comes out, I think I will not suffer as much from it. I have done some simulation runs with high and low jobs and all went well. Really ideal, it is not natural. But as long as the sun but I do not follow ...

Adapting and testing the rotors actually not that much time seized. The real test could start only when the dish was ready. Altogether there is a lot of time to sit in wait: wait until I was sure of a particular solution / process, had to wait until Hai time, waiting for the afternoon sun was to settle down the matter, etc. It is still not optimal but I go for the time being perfunctory and love Oleg's solution in mind. We'll (hopefully) be, sooner or later ....

Oh, and do not forget the Rob in [3] as laagomige resistance for protection. Who saved my circuit in a time when a Vietnamese quality plug (no, not quality plug!) That the supply is connected to the rotor, died. Presumably I put another fuse in line with it: you can never be too careful.

Testing with Xtrack
I have the program extensively tested in combination with the GODIL and my X / Y rotors without dish. E.e.a. initially proved not to be correct at all. By Rob are then adjusted some points. One of them is that there is a control panel for the rotors has been added. It is now possible to include "flipping" the institutions of a rotor. This makes the program independently of the construction of the rotor. You can test this very well by example. To choose a geostationary satellite Meteosat 7 -for me and to ascertain the direction in which it belongs. Then, the X / Y values of Xtrack enter into the debug window and see what is wrong rotor. Furthermore, it is by entering the rotor type, if necessary, take into account the smaller scope of certain rotors (like mine: from 10-170 gr.).

I Finally, the settings of Xtrack on the rotors checked with an angle gauge. Was exactly. Either the entire process Xtrack-GODIL drivers rotors work. The support with the rotors and later including the dish was prepared for all that time in my work room easily test, which is difficult to enter.

Reception
The rotor + dish placed on the support on the covered terrace. Then adjusted the whole on the advice of Ben first:
- The dish to the zenith to point (by Xtrack)
- Use a spirit level (on a bar) on the dish, the support so that the adjustment plate is horizontal.

- Do this also rotated 90 degrees to the horizontal, namely the dish must be horizontal in all directions.
- Aim for the sun, which is low, eg 45 degrees.
- Turn the set-up until the shadow of the imager middle falls into the dish. Maybe put the arrangement on a plywood board to run "simple".
After some verhernieuwbouw and adjust stood the shadow of the beautiful setter in the middle of the dish. Then it was the turn of Meteosat 7. That for me is a beautiful place: around 30 gr. elevation and an unobstructed view. For broadcast times see [4]. To call without preamplifier aimed the antenna and, like Peter [5]: ABSOLUTELY NOTHING, just noise. This is the state of affairs at the time of delivery of this epistle. Hopefully the next time a better message.

Imitating
Someone who now starts with this design should be able to have fairly quick results. There are 2 options: Arne or Oleg's design. I personally would now opt for Oleg's design, mainly because of the good opportunity for a counterweight and the way it has been completely mounted. Almost certainly I build that yet. Oleg works with a dish of 1.90 m., So the rotors need a dish of 1.20m. Handle easily. Xtrack, GODIL and drivers have been tested and work well. In short, the X / Y-rotor is a relatively inexpensive and working solution.

Mind map
Last time I mentioned that I used a MindMap to monitor progress and add new ideas. This has been a very good plan. I had not only continuous survey of what is done or should be bought on the view I could regularly add new insights and actions or improve existing. I would also have used colors: blue = default (to do), buy yellow = red = can not and green = ready. You can see at a glance what you need to do.

Again recommended to keep a project too once in this way.

Weather
Digital Atmosphere
I have long been virtually nothing done with the program. All knowledge was completely sunk. But fortunately I have ever had the foresight to include the articles on DA in the Manual. And it came in handy. For who among others link the plates will wxtoimg with Digital Atmosphere should definitely ch. 9.5 View of the Handbook. I currently use the composite photos from wxtoimg in combination with wind, air pressure and temperature. See my website [4]. The future must still recover a series weather maps.

Website
Because the content was surely very outdated I am that at the same time it clean. I specially WebBuilder 10 purchased. The official version where my old website was created, was version 5. There are many options have been added. Take a look at [6] and [7]. For those hoping to create a website WebBuilder is definitely recommended. From personal experience: it is much more pleasant than WordPress. Only that is not free and WebBuilder.

PVC
There have been several structures made of PVC in the Kunstmaan stood. I also happy to work there. Moreover, it is here very cheap. To bring people ideas: the support of my 19 "monitor was broken. I then PVC pipe created a new aid, which the loose screen from above can be retracted and then slightly reclined against the upright pipe. See picture 1. This has worked well for over a year. Recently also the monitor itself fail, so the support is now out of business.

Arduino
GPS module
I have stopped in a cabinet with the front display and a switch to turn off the display lighting. A GPS-controlled clock adjustment for the PC is unfortunately nothing came. Remains on the ToDo list. Nobody suggestions for a good program?
Those who still want to do more with the GPS receiver must surely agree on [8] watch.

Arduino Pro Mini
As an Arduino still quite "big" and "expensive" and too extensive for many applications I also experimented with an Arduino Pro Mini. See [9] for a detailed description. To program the mini I use a similar FTDI module in the article. Because both males pens feature I prick them with the components side facing each other in an experiment plate. A quick test with the blink of an LED demonstrated that it works completely. As soon as I will have mini actually used for something I describe it here.

Saleae Logic Analyzer
Following the story of Ben about his USBee [10] I have recently bought a Saleae clone [11]. Elsewhere in this Kunstmaan an article about the "Poor man's Logic Analyzer". There are now also clips with Lê in order.

Everything
Space and astronomy
Nice practices, inter alia, with dongles on:
http://sterrenwachtleeuwarden.nl/index.html

A member of the astro forum has made an extensive document on batteries for telescopes. The content may be also useful to others.
https://dl.dropboxusercontent.com/u/102781611/Accu%20keuze%20telescoop.pdf

Those that want to see where were the six Apollo moon landings find extensive information on:
http://www.skyandtelescope.com/observing/how-to-see-all-six-apollo-moon-landing-sites/

Http://www.astroforum.nl/showthread.php/158574-Bescheiden-beginnen-met-astrofotografie is an enthusiastic article on how you can easily start with a digital camera with astro-photography.

For whom a protractor needs of a specific format found on http://www.astroforum.nl/showthread.php/158772-Programma-om-gradenboog-te-tekenen a Python program to make it yourself.

Left
[1] The Kunstmaan April 2014, p. 32 Making an X / Y-rotor DiSEqC
[2] http://sat.cc.ua
[3] The Kunstmaan July 2014, p. 57 Driving an X / Y-rotor with DiSEqC.
[4] http://www.eumetsat.int/website/wcm/idc/idcplg?IdcService=GET_FILE&dDocName=PDF_MET7_IODC_DISS_SCHEDULE&RevisionSelectionMethod=LatestReleased&Rendition=Web
[5] The Kunstmaan December 2014, p. 154, Report Meteosat-7 reception
[6] http://www.fredvandenbosch.nl/weather_daily_images.html

[7] http://www.wysiwygwebbuilder.com/
[8] http://www.sigrok.org/blog/sigrok-unix-awesome-part-iii-fun-and-games-gpsd
[9] https://learn.sparkfun.com/tutorials/using-the-arduino-pro-mini-33v
[10] The Kunstmaan April 2014, p. 37 USBee Logic Analyzer & Signal Generator
[11]
http://tw.taobao.com/item/42600183261.htm?spm=a1z3o.7406521.101.12.y3QWDd&abtest=
_AB-LR517-PV517_1274

Poor people's Logic Analyzer **Fred van den Bosch**

Summary
This article describes my "playing" with a Saleae Logic Analyzer clone and ook some modifications I found on the internet.

Introduction
Ben described in [1] his experience with the USBee Logic Analyzer. Something seemed too nice to play again, especially in combination with the Arduino + accessories. Only the price mentioned by Ben I found little on the high side for what spielerei. So I let Lê the Arduinoshop googling on the known addresses. She came back with the message that her normal shops had nothing but another great shop [2] though. I then there USBee entered in the search field and got 50 hits back, esp. Of the USBee AX. For the price, of course, a clone.

Further googling yielded more information. Like the fact that you have to change it otherwise makes official USBee-software ensure that it no longer works after the first time.

So it was a difficult decision which one to take. Until I get a link with open source software [3] found. Based on the list of hardware that can handle the software I've chosen a Saleae (photo 1) [4].

The amount allocated Lê (VND 300,000 = approx € 13) I did not find too high for an experiment. So the order placed with her. Maybe if I had ordered it myself that I had been out slightly cheaper. But this was much easier. Moreover, they had time stopped and therefore rightly deserves also to some. In addition, I think her corpse still need more. For me win-win.
Photo 1 Saleae clone
Eventually he was even slightly cheaper because they still had time for one sales order. I therefore have some information about how I got to it mailed the case to the talks. Again, in the long term win-win I think.

Restrictions Saleae
Compared to the USBee SX of Ben (which is therefore also more than 10 times more expensive), there are of course a number of limitations to this clone.
- Structure.
The internal structure of the USBee (photo 2) is clearly different. He eg. No HC245 bidirectional bus driver. See also "Add Output".
- Software
The acclaimed by Ben official software of the USBee or those of Saleae does not work or makes the hardware unusable. Hence the choice of Sigrok.
- Clips
Unfortunately, there are also no fancy clips to. I must in due course Lê once to scan for. On-site Sigrok is there an extensive story with pictures.
- Signal Generator
He can not act as a signal generator, there is no output mode on. But on the Internet was to find a modification. It is described below.
- Only TTL.
The entrance, as indeed the USBee, suitable only for TTL: -0.5 - 5,25V. For RS232 be, depending on the power supply used, generally signal levels of ± 5 V, ± 10 V, ± 12 V and ± 15 V used [7]. So too high. Again, I found a modification.

Photo 2 USBee SX Ben. Compare this one with photo 1.

Program Sigrok
I have chosen to use Open Source software from the Sigrok project. The main reason was not to sit with a useless box of parts as the official software overwrites affairs. Also, you do not have to pay for necessary drivers.

Sigrok is OpenSource software for a wide range of platforms and a wide variety of hardware, including oscilloscopes and logic analyzers. The website will be given a lot of information about the various analyzers, osciiloscopen, etc., but also eg. Probes before. A visit is also more than sensible.

Options Logic Analyzer
The screens eyes what Spartan than that of the USBee. Nevertheless, there is sufficient functionality on board. An overall description of the options, as shown from left to right on the icon bar.
Open
From sessions included here can be opened and played. There is also provided a range of examples of sessions.
Save As
Recorded sessions can be stored with a different lay-out.
Zoom / Show cursor
A portion of the screen can be selected and can be switched in and out thereon.
Device etc.
Subsequently, a number of buttons to select a device, which channels it should be shown, the buffer size and sample rate.
Run
These then start the measurement.
Protocol decoders
There are now included some 50 protocol decoders, including I2C, DCF77, Stepping Motor, USB, PWM etc. Per protocol, you can specify which line the signal state. Then, the value thereof is shown. Photo 3 shows an example of measurement of an I2C protocol.
Channels
All 8 channels can provide a name and color. Compare pictures 3 and 4. Each channel can indicate whether and if so which should be triggered. That choice will appear as an icon on the right side of the screen.

Photo 3 I2C protocol

Installation and testing
Here's just a Windows installation. For other platforms, see the website [3].

Windows
Download [5] pulse view-NIGHTLY-installer.exe and install it. The program can now be viewed in demo mode.

Driver
According to the website the normal drivers do not usually work. WinUSB a driver must be installed. Go to [6]. Be downloaded from "Device specific USB driver" may, "Zadig executable" and then installed.

Pulse View
Start by Pulse View. At the top of the bar is an input field "Connect". Choose the Saleae the option "fx2lafw". This is also indicated on the webstie. If it's good it must now be active.

Try
The first test was rapid with a function generator. Stand and TTL square wave, connected to one of the channels of the LA, click <Run> and there must be behind the corresponding channel to view a square wave to be.

Arduino then hung onto the L.A.. Sketch to blink loaded the LED, LA connected to pin 13 and sure enough, again a square wave at the screen. It seems to be working.

To test multiple channels at once, I have changed as a Arduino sketch so that a series generates various pulses. That worked. See picture 4. Who wants to sketch but should just mail.

Photo 4 Different pulses from an Arduino
Modifications
On the Internet, a number of adjustments to find the hardware. These are basically the USBee AX-clone, but that is as far as I can ascertain, internally identical to the Saleae.

Add Output
On [8] is an extensive story about how you can switch the AX also for export. Below is the translation. Photos on the website [8].

Translation
Unfortunately, the hardware supports only a digital input, but no digital output, even though the software does. But you can add output capability with a nice little hack. This way you get a logic analyzer, a frequency generator, frequency counter, PWM generator, random digital signal generator, ...! All in one.

Of the LA The hardware consists essentially of a CY7C6813A which controls USB communication, and a bi-directional bus driver HC245. Yes bidirectional! After some debugging showed that gives CY7C6813A digital signals as soon as the software requests it. The only problem is that the direction of spin of the HC245 hard when input is connected.

How to change it.
Required:
• A soldering iron with a small tip
• A 10k resistor (or any value between, say 10k and 100k)
• A piece of enamelled copper wire
• A small switch
• Maybe some superglue

Take a knife or a scalpel and cut with a red arrow marked by job. Solder the resistance marked by the contact as GND and use the copper wire to connect it to the pin connected to the track, which is just by cut. Take a small switch-I just took what I had liggen- and connect it to the direction pin and VCC. See the diagram.

You can use the knife to create an opening for the switch in the housing, and with super glue then the switch is to gluing. Ready ...
Now you can switch between input and output mode. Be careful that there are no outputs are connected to the device when switching to output mode. I used hot glue instead of superglue so it looks quite ugly, but I do not care.

This is a 1 MHz signal at the output:

RS-232 level
Translation
This USBee clone is for TTL level signals only. In order to analyze RS-232 signals, there is a simple hack to make it work. Connect a suitable series resistor between RS-232 signal levels and logic analyzer input. The resistance will weaken the signal to levels which can be treated together with the protection diodes on the input-buffer IC. I found that 12 Ohm resistors seemed to work well. No damage to the protection diodes (in the worst case there is less than 2 mA through the protection diodes) and the signal seems nice to get through (I've tested with only 9600 bps serial data, but I think that for higher speeds also works.)
(Source: Internet)

Finally
I have to immerse myself in the expanded operation of the LA and the Sigrok software. For now the most important task was to get the whole talk. And that is actually relatively simple succeeded.

The Saleae with the described modification to RS-232 in a bigger box built. I now have two sets of inputs: one for and one for TTL RS232.

Eventually I not dared to make the Output change. I had watched the adjustments, scalpel, resistance and wire were ready. I looked at the tip of my soldering iron, then to the soldering -ie The tiny dots that purpose should goings through and sighed "no, that is not him." An additional point was that it is unclear whether the software is suitable for a signal generator. All this together did it. If anyone ever dare I like to hear the results.

For those who want to try it too, just google gives a lot of places where you can buy this kind of cloning. Wide choice. Check here also the Sigrok site to check if a particular type is already supported.

Left
[1] The Kunstmaan April 2014, p. 37
[2] http://tw.taobao.com/
[3] http://sigrok.org/wiki/Main_Page
[4]
http://tw.taobao.com/item/42600183261.htm?spm=a1z3o.7406521.101.12.y3QWDd&abtest=_AB-LR517-PV517_1274
[5] http://sigrok.org/wiki/Windows#Windows_installers
[6] http://sigrok.org/wiki/Windows
[7] http://nl.wikipedia.org/wiki/RS-232
[8] http://tubbutec.de/blog/adding-output-capability-to-a-10e-logic-analyser/

QFH and RTL-SDR dongle Paul-Jan van Gils, PA1PJ

Introduction
To try out an SDR RTL dongle for receiving and decoding the signals APT NOAA required a new antenna. I chose to make a QFH antenna, the turnstile antenna had for many years been on the roof but had to be replaced. Also, I describe how the ADSB signal using the cheap RTL SDR dongle can be decoded.

QFH Antenna
The materials used are white PVC pipe 32mm, 16mm white electricity pipe and copper tubing with a diameter of 4.8 mm and 50 Ohm coaxial cable. To calculate the sizes I used John Coppens website (1). At the time of writing this website is not working properly, he is working on converting its website. The sizes of my antenna:

Length short walk 230.1 cm
Length 242.0 cm long barrel
Distance feed point to lower short 69,5 cm
Distance feed point to lower long-barreled 73.1 cm
Diameter 30.1 cm internal short walk
Internal diameter 31.7 cm long barrel

<Insert file: QFH.jpg>

The PVC materials are available in the building trade (in Belgium that can still pose a problem, since these materials are not always available). The copper brake line can be obtained from a well-equipped car material thing. I bought this in Amersfoort at Star-Automaterialen (2), a company with several branches in the country. For a length of 5 meters 4.8mm diameter I paid 28 Euro, ABS manufactured article 95105 (3).

At the first free test set at a height of about 12 meters with open views around were the plates at various agreements on approximately noise-free 2 gr. above the horizon. Later I put the antenna at my other antennas which clearly affect the other antenna radiation pattern.

See my website to receive APT plates with this antenna decoded by WXtoImg. (4)

SDR-RTL dongle
The required dongle is a version with RTL2832U / R820T chip / tuner combination. The dongle is on " normal " use a DVB-T receiver to bekijken.Ik got the dongle for about 12 euros via E-bay house in the PC free DVB-T television. Keep in mind that longer delivery times, when I was 3 weeks. The dongle is also available at Van Dykes electronics (10) in Groningen, but is more expensive.

With the aid of a different driver, the dongle to be used as a receiver in the frequency range of about 24 MHz to 1800 MHz. In this range are including FM broadcast band, 144 and 432 MHz amateur bands, ADSB signal at 1090 MHz, and of course the weather satellites on 137 MHz.

On the website of RTLSDR.org (5) to read much information about the configuration software and various applications. Use or install at least not

in the included drivers Dongle but only Zadig drivers.

I have tried two applications:
ADSB reception
ADSB reception at 1090 MHz with ADSBsharp and virtual radar (6) and plotting software for the screen.If antenna I have a ground plane made each stands about 12 meters high, the radiator and the four radials are 66mm long and I mounted on an N-connector. This his aircraft to about 300 km traceable from my location. The falling / rising aircraft at Schiphol from a height of about 800meter.

The antenna supplied with the dongle can also be used to provide an indication of the possibilities hebben.Zie enclosed pictures of the receiver and the GP screenshot of virtual radar.

<Insert file: gp.jpg>

<Insert file: virtualradar.jpg>

On the website of the ARRL is a general-released piece of ADSB with virtual radar from QST january 2014 (11).

NOAA reception
NOAA reception and decoding, with sdrsharp as SDR-receiver (7), wxtoimg (8) and vb-audio cable (9) as well as software-based compound of the audio signal to wxtoimg, it is possible to decode to receive the NOAA and at the same time on 1 PC See the attached screenshot.

<Insert file: noaa.jpg>

The antenna connector on the dongle is an MCX-type. Adapters are available for this type I have one myself from MCX to BNC. Or use the antenna cable with the MCX connector which is supplied with antenna on the dongle.

There are other possibilities regarding receipt for instance receiving AIS signals from ships with the possibility of plotting the ship's position. AIS provides location, speed, ship name. For receiving antenna height is important or a location near a (pressure) navigated route.
All software used by me running on Windows XP. If some software is not available via the Internet please send an email to me: pa1pj (at) wia.org.au, I still have a lot of software on disk that is needed for the above applications.

Internet Links:

1. http://www.jcoppens.com/
2. http://www.starautomaterialen.com
3. http://www.absallbrakesystems.com
4. http://www.pa1pj.nl
5. http://www.rtl-sdr.com/
6. http://www.virtualradarserver.co.uk/
7. http://www.sdrsharp.com/
8. http://www.wxtoimg.com/

9. http://vb-audio.pagesperso-orange.fr/Cable/index.htm
10. http://www.vandijkenelektronica.nl/
11. http://www.arrl.org/files/file/QST/This%20Month%20in%20QST/January%202014/VirtualRadarJan2013QST.pdf

Construction of the satellite decoder.

Rob Alblas

Summary.

This article Describes our HRPT decoder at block level. A little bit of design methodology has been added, using the hardware description language *VHDL.*

(This article derives from a talk I gave last May for the working group.)

In "The Kunstmaan" of March 2011 ([1]) is a (then) new satellite decoder described, based on the GODIL module. In the course of time, the decoder is already quite a few times extended, not only by new decoders, but also with, inter alia, a rotor control.
Adjusting always this hardware requires that the whole is structured. Extensions must be able to be done in such a way that all existing parts can not or hardly need to be adjusted.
I will try to describe the (block diagram) building the whole.
(NB The GODIL-module is a ready-to-use small module containing an FPGA which, among other things. This is a programmable piece of hardware that allows an arbitrary digital circuit can be realized. Modifications, additions, etc. are possible without soldering., See [1] .)

Structure.
The decoder currently consists of the following components:

- decoders and generators:
  - NOAA HRPT
  - Fenyung 1D CHRPT (unfortunately this type of satellite is no longer active)
  - Meteor HRPT (2 versions)
  - LRIT (direct reception of MSG, GOES etc.)
- rotor control: DiSEqC (see [2])
- I2C control (can be used to adjust the frequency of the receiver)
- RS232 output

Furthermore, there has recently been added to a data dump truck, with which a double-data stream originating from a QPSK demodulator can be collected without further processing and can be stored on hard disk. This dumper (a decoder I would not call it) therefore has two inputs (I and Q). The bit rate is adjustable; so can eg. both METOP (4.6 Mb / s) as LRPT Meteor (80 kb / s) to be recorded. In order to complement the thing, there is also a generator 2 that allows data signals (I and Q) may be generated.

Block diagram.
Figure 1 shows the block diagram of what is currently programmed into the GODIL. The red block "decoders" is where it actually all about; It includes the already mentioned decoder variants. Because the decoder must lock onto the input signal is externally added a VCO Voltage Controlled Oscillator), with the low-pass filter (LDF). Together with a phase detector in the programmed GODIL this acts as a PLL.
The second red block "generators", contains all the data generators, one for each type of decoder. The generator is driven by a xtal generator, which also sits on the GODIL. So this is an oscillator that is independent of the VCO that controls the decoder. As a result, it is to test the locking of each decoder with the aid of the signal of the associated generator.

Coming back to the decoder, which must transmit its data via a USB connection to the PC. On the one hand, the decoder gives off a constant flow of bytes, on the other hand, the PC can not always receive data directly. Therefore behind the decoder installed a FIFO (First In-First Out, the yellow block). It is now sufficient for the *average* rate at which the PC, the data can take at least as large as the data flow that comes from the decoder.

Figure 1. Block diagram of the decoder.

The output of the decoder does not go directly to the USB port, but through a controller because the USB connection to be used for more things.

As mentioned, there are several decoders / generators which must be elected. Either via jumpers on the module (left, 'select') but it is much more convenient to do this via the PC. To do this, the block "regmap" which consists of a number of flip flops that can be put in a certain position from the PC.
Conversely, the PC can also read back what is in the regmap. This makes it possible that the software *(WSAT, [6])* can "see" the decoder is enabled, even if the decoder-selection is done with jumpers.
Through the regmap can therefore written both business (software for hardware) as read (hardware to software).

Now this regmap construction still exists it can also be used for other things. Left, against the regmap-block, can be seen a block "version". This is a fixed code (including the creation date), which is unique to each hardware version. The version code can be read via software; in this way is to see what is programmed into the FPGA. Very handy if there are different versions of the FPGA contents are in circulation.

In the FPGA controller is also arranged a rotor in the form of two DiSEqC controllers (see [2]). The X- and Y-angle (azimuth or elevation and is used as such a rotor configuration) can be calculated by the PC and sent to the regmap via the USB connection, there are hence made DiSEqC signals of which at pins of the Godil are available.
Here, the necessity of the additional FIFO is clear; during the recording should also now and then a new position to be passed through the same USB connection. Then there just no data is sent. The FIFO ensures that data will be stored until the USB connection is available again for data transfer.

Further see here are a RS232 and I2C output. Which have so far not really used, but thanks to the regmap construction which could easily be put in.

Generators.
In FIG. 2 shows the construction of the generator block. It is quite simple in another; a number of generators are connected via a multiplexer to output pin SDO. The input "sel", at the top, is connected to the previously mentioned regmap. You can also see a generator QPSK. This block is not much; it is a 2-bit counter having two outputs I and Q, each of which (when QPSK is selected) to go to its own output pin SDO.

Figure 2. The generator block.

Decoders (fig. 3).
The decoders are divided here in three sets. Topping the HRPT-like (NOAA old FenYung, METEOR), including LRIT, and finally the QPSK dumper.

Although HRPT decoders for different satellites on details vary, the principle is the same: split-phase ingangssgnalen, solid frame construction. With the selection of a particular decoder to be parameters such as bit-rate, frame length and synchronization word set.

The LRIT decoder has a completely different structure, herein is including a Viterbi decoder (see [3]).

The QPSK-dumper, finally, does not contain much more than a bit-extractor. This block, also present in the other decoders, takes care of the synchronization of the VCO at the incoming data stream.
The bit rate for the different decoders is quite different: approx 300kb / s for LRIT, 1.3 Mb / s for CHRPT, and a (not shown here) METOP decoder would be about 4 Mb / s . By including an adjustable divider behind the VCO, the VCO-frequency for all types nonetheless be the same. These factors are part fixed for each type of decoder, but for QPSK dumper I made the factor adjusted. As a result, this dumper may, inter alia for both Metop (2x 2 Mb / s) as LRPT (2x 40kb / s) can be used. All of this is easily accomplished by simply extending the regmap with more flip flops.

Figure 3. The decoder block.

The decoder choice not only ensures that the data of the selected decoder to pin PDO is conducted, but also that the correct phase detector is selected (top-right, pin 'phd).

USB; regmap (fig. 4)

This part takes care of the control of the whole.
On the far right you can see the aforementioned Register Folder section. It contains a number of addressable registers. The software displays via USB first address byte on being left-upper address bits stored as 6 and 2 controll bits (one of those bits determines whether written or to be read). This is one of the registers is selected on the right. The second byte is then on the block 'data' sent to the selected register, or (in the case of reading) the contents of the selected register is returned to the USB port.
The set of registers behaves towards USB fact and a RAM (1 addressed register while reading or writing), but to the other side all the registers are available simultaneously.
At the bottom is the data from one of the decoders within. This can be up to 10 bits per word, so rounded up 2 bytes. These are in order, and to put the USB output.
Normally, this is done continuously, only when what needs to be sent to or from the regmap this data stream is interrupted momentarily. The multiplexer bottom left will therefore always switch between the 2 lower signals (as the decoder 10-bit releases), or run continuously on the lower signal (decoder allows 8 bits off). Only if some of the regmap read the top signal is transmitted on the mux.
If what the regmap is written must be disconnected from USB or we have 'short circuit'.

Figure 4. The controller and USB connection.

Realization.
As mentioned, the entire decoder structure-programmed in an FPGA. For complex circuits easy to adapt / expand a hardware description language is essential. I uses the VHDL language. Note that an FPGA is not a processor! Programming therefore not done in a language like basic, C, etc., but in a specially developed language like VHDL. This makes it possible to describe parallel processes. In hardware works, after all, all components simultaneously, and not one by one, as in software.
A VHDL description can be translated into the hardware available in the FPGA; such translator is called synthesizer.

In [code1] is a simple piece of vhdl. It starts with a block called 'ENTITY'. Here are all described inputs and outputs of the module to achieve. In this case, therefore, an input "CLK" and an output "pulse", both consisting of a single bit.
The second part, the "architecture", contains the actual description of the functionality.
Here is a 4-bit counter is described. The declaration of this counter, 'counter' is done as an integer. Here we see a simple example of a higher (abstract) level pulling a description; it is not necessary to describe all the signals as bits, although the eventual implementation will indeed contain bits. The translation of integer bits to let the so-called. Synthesizer on.
Because an integer in vhdl contains 32 bits and we need only 4 bits is a "range (0 to 15) is defined.

The actual counter is described in a block 'PROCESS', something we do not know of software languages. The first rule in this part, "wait until clk = '1' indicates that it is waiting for a positive edge to input 'clk'.
After this, the counting function is executed: 'counter is incremented by 1, then it is again waiting for a positive edge of CLK.
The hardware after synthesis is 4 flip flops that contain all the input signal 'CLK' work. Things like "vipers," "half-adders', 'carry' etc. are all handled through the synthesizer, all low-level cases where we are not interested in higher level (but to be indeed created naturally).

Outside the PROCESS block is output "pulse" created. This is a non-clocked process; once 'counter' mode 4 is reached 'pulse' immediately '1'.
Output "pulse" could be made within the "process mode block, then it is a clocked output. How do you describe what is true depends on what is needed; There is only given a very simple example.

Transfer blocks.
Modules should be able to be connected with each other. This can also be in VHDL; See [code2]. Here are two modules of the previously described counter merged. In such a manner in the satellite decoder, all decoders, generators etc. connected to each other.

Test.
Before a circuit is going to be programmed into an FPGA is it wise to simulate the whole first. The advantage of simulating is that all the internal signals may be viewed as a scoop, even if those signals in hardware does not come to be on a pin.
In description [code3] is called. See test bench, again written in vhdl. In this case, the entity does not contain any signals; There are no input or output signals. Instead, this block generates the required signals itself, in this case, only signal "clk".
The rule:
clk <= NOT CLK after 50 ns
resulting in inverting signal "CLK" every 50 ns. So this will give a square wave with a period

duration of 100 ns or 10 MHz.
This signal goes to the block 'test', in which the numerator is defined.

For the simulation, I use the programs modelsim. That's very simple. First of all vhdl must be compiled:
VCOM tb.vhd
VCOM test.vhd

After that, the simulator can be started:
vsim tb
Then it is a matter of selecting signals you want to view, and then make the case for a certain time running, eg .:
Run 3 us

Then, thus there are 30 periods of 10 MHz to go through. In FIG. 5 shows the result.

"Modelsim" is a simulator used in the professional world and it's very expensive, but in a reduced form it is to get free from the Internet. That simple consists, among other things that there are restrictions to the complexity of the VHDL to simulate, and that this release is slower than the expensive variant. For our designs games that restrictions hardly a role.

Figure 5. The simulator "in business."

Need for self started
There are complete software packages that vhdl can be written and simulated. But it can also through some simple individual programs:

- a text editor to enter the vhdl (ASCII, no word or so!)
- modelsim: the simulator, see [4]
- ISE design tools, the synthesizer vhdl into FPGA components. ISE is from Xilinx, which is also the manufacturer of the FPGA we use.
- ISE Labtools: the synthesizer is a bit file to be programmed into the FPGA. This is done with 'Impact', part of the so-called. "Labtools.

All these programs are available free of charge; For ISE you have to register at Xilinx.

During the lecture I offered to assist people who want to do something with this design method. There is already a lot to do and learn with only the simulator and a simple text editor. For a Dutch book on vhdl, see [5].

References
[1] Kunstmaan March 2011: A new HRPT decoder.
[2] Kunstmaan, July 2014: The DiSEqC format
[3] Receive and decode LRIT
[4] Download free Modelsim:
http://www.mentor.com/company/higher_ed/modelsim-student-edition
[5] Download free book on VHDL, in Dutch:
http://wwwhome.cs.utwente.nl/~molenkam/DownloadVhdlBoek.htm
[6] WSAT see:

http://www.alblas.demon.nl/wsat/software/soft_win.html

First Image: Metop

Ben Schellekens

Summary
This article Describes the r ece pt ion or AHRPT-signals from Metop and decoding them into an image. The Ettus B200 is used in combination with GNU R adio. The LNC1700 is used to bring the signal down to an intermediate frequency c y or 144.3 MHz. You will need a parabolic dish with tracking and an LNA. Basically the same setup as for HRPT-reception. The data output file is processed with software by Oleg and HRPT Reader from David Taylor.

Introduction
It managed to receive pictures directly from the Metop! You get the images not real time, such as NOAA satellites to see. But it is a start. In this article I will describe my host configuration. Take as a starting point HRPT reception system.

Dish
A mesh dish of 130cm diameter. This is probably big enough. Official specifications of the antenna I have not found. The documentation of Eumetsat is an example receiving station with a dish of 180cm and an LNA with a noise figure of 0,6dB.
The dish is on the well-known bicycle rotor. Control is even with 8052-h et board and the control board of Harry. Videre allows for converting the K Epler job data to the rotor command control board.

Lighting technician
Helical Antenna with immediately after a bandpass filter for the 1,700 MHz. After bandpass-filter, the LNA of Minicircuits the ZX60-242GLN +, with a gain of 31 dB. The band-pass filter for the LNA to prevent overdriving of the LNA. I probably near strong GSM signals that the LNA (temporarily) to help soap.

Cable
About 25 meters Belden satellite TV coax H125 to go indoors.

LNC1700
The standard Meteosat downconverter to transform the signal to the 144,3 MHz.

USRP receiver
So far nothing else than at the normal HRPT-reception system. The actual recipient is the USRP B200 created by Ettus [1].
T B200 has a frequency range from 70 MHz to 6 GHz. A special chip, the AD9361, designed by Analog Devices makes this possible. The AD9361 are 12-bit AD and DA converters. You can use the B200 also emit a signal, this latter I have not tested.
The highest bandwidth is 56 MHz, with a sampling rate of 61.44 M samples per second. To take receipt of Metop d e B200 4M samples per second.
In order to enable this high bandwidth to the PC use is made of a USB3 connection.
The UHD (USRP hardware driver) is support from GNU R adio possible.

Fig 1. The print of the USRP B200. Right are the inputs and outputs. On the left in the middle of the USB3 connector. You can also add a GPS stabilized oscillator or a 10 MHz reference. In the middle of the print is the Xilinx FPGA and right of the AD9361.

The B200 is the loose print, so comes without housing. Unfortunately, the print is slightly shorter than the standard Euro format. I bought a proma housing at Reichelt and this shortened. The drilling of the front panels is always wrong. How accurate you measure the holes are always in the wrong place. If someone has a tip please let me know please.

Computer

Apart from the PC to control the antenna, you need a PC for the USB3 connection and GNU R adio. One concern is the USB3 chipset. It appears that not all USB3 chipsets are compatible with the B200 [2]. Of course there is such a wrong chip in my PC. The B200 acts as USB2 device.

GNU R adio

I have a solid state disk 120GB purchased where I installed the latest version of Ubuntu and GNU R adio on. Because I want to use the latest version of GNU Radio I downloaded and compiled the sources. This is a time-consuming but automated process. To make this possible, makes use of GNU Radio PyBOMBS (python build overlay managed bundle system) to install them also all the dependencies software. The installation manual [3] let himself follow.
All GNU Radio is doing in this step is tuning of the B200, writing the samples directly to disk, 5 GB in a few minutes!

Fig 2. GNU Radio flowgraph for receiving the Metop baseband signal. Left the USRP which works with 4 Ms / s. Right equal write to disk. There is also a QTGUISink, this shows the spectrum of the received signal sig, similar to Figure 4.

GNU radio gr-Wesa

For further processing e is a second GNU R adio (software) installation required. Last year I got in touch with Martin Blaho who has done pioneering work in GNU Radio to receive Metop.
He GNU Radio modules / examples written for Viterbi decodering of the Metop and BSPK (MSG-3).
Do you want these modules use an d GNU Radio needs to be recompiled with other viterbi.c and viterbi.h files. Because it has not succeeded to re-compile the latest version of GNU Radio I've done it in an old version of GNU Radio. This old version is on a USB stick.

Figure 3. The actual Metop receiver with the Costas loop and the Viterbi decoder

What happens in this receiver:

- Above left the Filesource where the samples of the B200 are read. Exports are complex numbers of 32 bits.
- Thereafter, the samples pass through the throttle. This is a hardware-brake to prevent the computer from going to spend all his time to process the samples. In GNU Radio, this is a usual part if there is no consignee or sound that can slow down the processing of data.

Fig. 4 The 4 MHz wide spectrum where you zi e t such that the signal 20 dB above the noise.

- Followed by an AGC, and a RootRaisedCosine-filter, the latter is likely to be a band-pass filter.
- VirtualSink for connecting to the next line.
- The CostasLoop with Clock Recovery, these two always go together. The values that are used in these blocks come from the example of Martin. Treadmill Width of Costas Loop I or reduced in order to get a better lock. Very nice to GNU Radio is j e can simply add a slider that lets you vary the value and can immediately see the effect.

FIG. 5, the QPSK constellation diagram. The title of the screen is not correct. The clouds are pretty separate, so they should see it out.

- The WXGUIScopeSink shows the constellation diagram.
- The last line shows the module of Martin where he held t actual work: V iterbi decoding of complex data coming from the Costa Loop. The puncturing pattern for the I signal, and is 110 for the Q-signal 101.
- In the block Unpacked Packed To the bitstream (packed in bytes) extracted to bytes: each bit is a byte.
- This is necessary for the cadu_deframer which checks to see if the sync word is present 1ACFFC1D.
- The result is written to a file.

The result of this processing is a CADU file (Access Channel Data Units). In this file are the synchronization markers at the beginning of the file. These markers are visible.

METFY3x processor

Back to the Windows PC. Oleg has written a convert to the CA DU file to an HPT-file to switch [4].

HRPT Reader

David Taylor I use HRPT Reader to convert the HPT file to an image. The colors I can not really more attractive.

You also see there is a piece missing or moved. No idea where this comes from. Is the dish still too small? You look at the constellation diagram you not think so. The four clouds are well separated from each other.

Or you lose samples because the computer is too slow or the USB connection is not optimal. More experimentation will tell.

The result is the following image:

Fig. 6 The result of 5 GB of data. A small part of a transit across Netherlands. On the left is England. It seems that part of image missing or moved. It is unclear what is going on here.

Conclusion

It's nice that it worked. Because this receiver in GNU Radio is built, you can see exactly how it's done.

The biggest drawback of this solution is that it is anything but real - is time. How beautiful it is to see the same image to build? Iceland we get if we see the Nile Delta?
Additionally, you will have to dig deep into their pockets for a fast PC and USRP.

That's why we want to walk the route with the Working Group of the QPSK demodulator in hardware, Viterbi decoder in FPGA. The rest of the processing in the PC. Probably we have a solution that works in real time. We are not there yet but the setup described above shows that receipt of the Metop by amateurs is possible.

Links

[1] Ettus USRP B200
http://www.ettus.com/product/details/UB200-KIT

[2] USBR200 chipset compatibiteit
http: //www.ettus .com / kb / details / USRP-b200-and-b210-usb-30-streaming-rate benchmarks

[3] Installation GNU Radio PyBOMBS
http://gnuradio.org/redmine/projects/pybombs/wiki/QuickStart

[4] Oleg METFY3x processor
http://www.sat.cc.ua/page5.html

HRPT lock indicator WRX1700

Ben Schellekens

Summary
This article Describes an add-on for the HRPT demodulator at the WRX-1700. When the signal is strong enough HRPT sweeping the VCO will lock o n the signal. The described indicator shows the sweeping process s of the VCO. A LM3914 and a LED bar is used.

Introduction
This article describes an LED bar indicator for HRPT demodulator. This way you can see easily when the VCO sweeping or in-lock is.

In the demodulator in the HRPT-WRX-1700, the 36.4-MHz signal from the SAW filter mixed down to zero Hz. This is done with a sweep-using VCO t lock on the carrier wave which is partly present.

When the HRPT-receiving in-lock is, then the voltage on the varicap standing around the 5V. Here is the recipient tuned. Is the receiver in - lock, it n the minimum voltage variations (in the mVolts). Oddly enough, you do not see a voltage variation by the Doppler effect.
In the WRX-1700 is a test point on the board arranged to be able to measure the voltage at the varicap. This measurement point is at pin 1 of IC3, that is the OP-AMP following the SA612 mixer. The voltage at this measurement point varies between 0 and 11 volts.

Upon the reception of a satellite hold voltage e d i at the measuring point is always in the holes. It is a good indication of whether there is a HRPT-signal. The VCO lock will always be a few seconds earlier than the HRPT-n decoder. A few times it happened that the receiver mistakenly lock to a strong source of noise. The receiver just to put another frequency is the VCO o f HRPT demodulator again sweep and then he (hopefully) it locks in the desired HRPT signal.

I was looking for a more elegant solution than a voltmeter. This hey b I found in an LED bar which is controlled by an LM3914. The LM3914 can 10 L EDs control. Make sure you have the LM3914 and LM3915 or LM3916 not where I first went to get started. The LM3914 has a linear scale and is therefore suitable as a voltmeter. The LM3915 has a logarithmic scale and the LM3916 is often used as a VU meter in audio systems. For the fans: these ICs can be connected in series to control as even more LED's, it is also possible to use the display in bar-graph fashion.. When this indicator is becoming a single LED. For more information about this IC, I refer to the detailed datasheet [1].

Scheme
The schedule is simplicity itself and is literally on page 2 taken from the datasheet. Besides the LM3914 and the LED bar are three resistors and capacitors are required.

Figure 1. Scheme of the datasheet. The resistance values are for our indicator differently.

Below is the formula by which the maximum scale (Ref Out) is define d:

For R1 I took 1k2. The current through the LED's is around 10 mA.

The desired range (11 V) is not feasible because we feed the indicator with 12V. The maximum is 2V below the supply voltage of the LM3914.
I have chosen to the fifth and sixth LED, at 5V simultaneously highlight. The simultaneous illumination of two adjacent LEDs is done in a very small voltage range. This is so designed to provide a smooth transition from one LED to get the other.
The rightmost LED (high voltage) remains slightly longer burn.

Determining R2 I have done with a trimming potentiometer. Pin 5 was connected to a 5V source and the trim control to be adjusted so that LEDs 5 and 6 light up simultaneously. After that I measured the resistance of the trim control, in my case this was 6k435. With two resistors of 10 k and 18 k parallel I came out just right. On the internet there are many calculators that can calculate the most appropriate combinations of resistors.

Building
Because I just wanted to have a PCB, and not a circuit on a prototyping board, I myself a print design. I have not bothered to draw a diagram but have drawn the same print. This saves a lot of time, and as I said it is not a difficult print.
To save space (and having to drill fewer holes), I took the three resistors in 0805 SMD version. For R2, you can put two resistors in parallel so that you can realize precisely STEL particular resistance.
The parts are not difficult to obtain. The LM3914 I ordered through eBay and actually worked this well! Reichelt, Dick Best, etc. can also supply the parts.
Construction will pose any problems. Note the orientation of the LM3914 LED bar and the capacitor. Have fun with the construction and use!

Figure 3. The accumulated print

Connect
On the PCB are three connectors (from left to right, LED bar upstairs, component side:

- GND
- + 12V
- HRPT point. On the PCB this is the right SA612

After the WRX-1700 is turned on and it is on a HRPT frequency then you see a beautiful "chaser". Is the receiver on the lock vi jf the LED will light left. In mi ne receiver you sometimes see six LED lights flashing.

Links

[1] Datasheet LM3914
http://www.ti.com/lit/ds/symlink/lm3914.pdf

Interessedag Amateur Satellites

Ben Schellekens

Summary
On April 25th a group of radio amateurs Gathered in Apeldoorn. There were presentations about the reception or amateur satellites.

Introduction
On April 25 the Veron organized the VHF day. This year, this combined with the "Interessedag A Mateur satellite." The last time that this day was organized in 2013.
About 150 participants attended the Denksportcentrum in Apeldoorn.
V arious lectures georga e n ted and was in between the lectures there is possibility to receive live amateur satellites.
The interest for this day was great. There have been calls to organize this day next year. It might be fun if we as a group can also give a lecture or can drop a small setup.

The first lecture was given by Wouter Weggelaar and went over the FUNcube-5. We witnessed a world first: this autumn cubesat Nayif-1 will be launched. The Nayif-1 will inter alia, geg evens the space returned to Earth. Amateur radio will be installed improved UHF to VHF lineaire transponder. About the frequencies of these new satellite, like the launch date is still unknown.

Photo1: Engineering model of the FUNcube-1.

Then the group split. We were warned that the reading of Nico Janssen satellite tracking was only for experts. As a member of the Working Group on Satellite you automatically, so this lecture I followed however. All lectures this was considered to be the most interesting.

Photo 2: During the lunch reception of amateur satellites.

During the exquisitely organized lunch there was an opportunity to listen downlink signals to the CW of the HOPE-1 satellite or to make connections the FUNcube-1.

In the afternoon Jan van Gils gave two presentations. The first one was about what it takes to receive satellite signals. Then he gave a lecture on what amateur satellites are active.

Nils Storch gave a lecture on Delfi program, in especially the Delfi-n3Xt and DelFFi missions.

Rob Hardenberg gave a nice lecture on the receipt of deep space spacecraft in the amateur bands He has four different 15 -. 16 tested elements yagi antennas for the 70 cm band. The length of these antennas is between three and four meters. Four antennas are combined to

achieve an even stronger signal. If receivers he uses SDR receivers. The main motivation is that it o p waterfall spectrum you well see if you can get some, you're not dependent on whether the receiver is in exactly the right frequency.
With his reception facility he knew in December 2014 to receive the Artsat2 at a distance of 4.6967 million km!

Satellite tracking
In early May, the problems with the Russian Progress M-27M [1] missile in the news. This rocket was a freighter to supply the ISS but came in a low orbit around the earth up. The freighter could be considered lost and would burn up in the atmosphere. This finally took place on May 8 2:20 UTC.

Based on what elements of the presentation Nico Janssen, I want to explain some things you can see in the Kepler data.

Photo 3: Presentation of Nico Janssen

Two Line Element Set (TLE) of the P rogress M-27M
Kepler below details the Progress rocket, over a period of three days, I've Space-Track.org, I've created an account to download course data. This is called a primary source, Celestrak where we download our Kepler data is derived source.

5-5-2015 9:31
1 40619U 15024A 15125.18663507 .01359298 12133-4 24349-3 0 9998
2 40619 051.6423 295.3413 0031955 111.6062 249.3800 16.30047024 1127

5-5-2015 19:57
1 40619U 15024A 15125.55422785 .01331841 12160-4 22075-3 0 9998
2 40619 051.6490 293.2880 0029488 111.3239 249.0566 16.31050171 1187

6-5-2015 8:14
1 40619U 15024A 15125.86040663 .01533866 12183-4 22103-3 0 9991
2 40619 051.6354 291.5924 0030895 117.7297 242.5952 16.32216152 1231

7-5-2015 19:09
1 40619U 15024A 15127.69084936 .07711073 00000-0 15802-3 0 9998
2 40619 051.6280 281.3450 0005187 283.3849 076.7251 16.46720355 1531

8-5-2015 7:55
1 40619U 15024A 15127.81228385 .06736651 12531-4 10653-3 0 9993
2 40619 051.6438 280.6115 0008840 127.8365 232.4708 16.47715957 1553

8-5-2015 23:00

1 40619U 15024A 15127.81228385 .06736651 12531-4 10653-3 0 9993
2 40619 051.6438 280.6115 0008840 127.8365 232.4708 16.47715957 1553

Job Height

An important parameter of the job data from the satellite to the orbit altitude. Because this is difficult to determine (from where do you measure it?) Is the here-related parameter " number of cycles per day (mean motion) "is used. The lower the number of cycles per day, the higher the job. For a geostationary satellite is something more than one.
Looking at the Kepler data from the Progress M-27M, you see that over time increases the number of rounds per day (red values). Nico said that it is not possible that the number rounds one per day over 16, 7 comes out, then the object will burn in the atmosphere. That you see very clearly in the data of the Progress M-27M. The last two TLE are identical. The time w here the TLE set to true: 15127.81228385 remains the same, there will be no new TLE -set because the rocket crashed.
Another parameter is the change of the acceleration (decay) This is the second derivative with respect to time of the number of cycles per day:. Orbits per day per day per day.
These numbers are green. Why the value of 7-5 at 00,000-0 is I do not know, probably an unreliable perception.

Determining TLE's

For amateurs, it is also possible to determine tracking data. For example, you can check it on the basis of doppler-curves of a transmitted signal or the Kepler details are correct.
Job data is done by optical observations. This is the only method for satellites in high orbits, including geostationary satellites, radar is not so far. You can be very accurately record the position relative to the stars. The downside is that it should be cloudy. Further, the satellite in the sun and the observer to sit in the dark.
Radar observations are also using amateurs by piggybacking on existing radar.

Concluding remarks

The presentations of the day are on the Internet. [2] In particular, the presentation of Nico Janssen is quite interesting [3].

Links

Real-time job information
http://www.n2yo.com/satellite/?s=40619

Website Interessedag Amateur Satellites
http://amsat-nl.org/satday2015/

Presentation Nico Janssen
http://amsat-nl.org/satday2015/download/SatellietTracking.pdf

Report meeting May 2, 2015.

Opening by the Chairman.

Some members went to the satellietdag of the VERON. This is held every other year, which may change to 'every year. We may go there next time itself give a lecture.

Web site: we have now arranged a place to put recently received images (again) satellites. So if you receive something interesting please contact one of the board members.

On July 2 there by GEO arranged a visit by EUMETSAT, Darmstadt. You can sign up via the web site of GEO (a link is available on our web site). It is still uncertain whether there for 3 July, which is organized; ESOC will not be possible because it is launched on one of these days MSG-4.

Explanation of the figures 2014 + Statement cash audit committee

The financial control committee, comprising Timo Lampe and Herman Big House, have reviewed and approved the documents. Timo will be repaid; At the next meeting we hope to have a new volunteer for the next 2 years.

Budget 2015

The losses increase. For now there are no problems, but it is important to get more members, including from abroad. The KM is already being translated into English, which is well received by our foreign members.

Discharge Board on policy in 2014

Attendees accept the policy properly.

Satellite Status

See elsewhere in this KM, as always looked after by Arne.

Any other business

Peter Smits asked whether the full schedule can be published with component list of the WRX receiver. That's been done (in December 2012).
Suggestion is to put this on the web site. Older KM are anyway pdf put on the web site.

Robert Langenhuyzen:
The paieren KM is nice but too expensive. It is worth considering to issue the KM only in digital form.
Herman Big House notes that the VRZA this path is already gone, and referred to as "club" has ceased to exist. Whether this (whole) is due to the "going digital" is questionable.
Ben notes that many members only joined because of the leaf. The crowd is mostly counter the entirely digital. It is therefore whether the move to a digital KM our group will do well.
One of the reasons that our sister organization GEO is partially transferred to digital (of 4 sheets

per year, there is only one paper version) is that the fee could be reduced in this way. It is hoped in this way to get more members. We wait to see if this catches on. As yet there are no plans to replace the paper KM whole or in part by a digital version.

Paul Baak notes that the blade in one way or the other is a "binding social thing." He laid on the reading table in desperation monochrome copy ë n GEO for inspection.

Elmar has again a few things in his "shop".

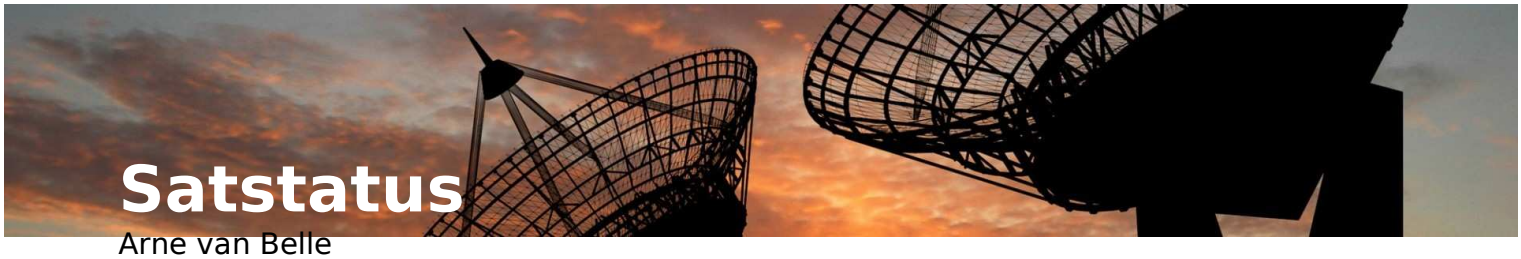
Arne viewed a spectrum analyzer to 4.4 GHz. It is a relatively inexpensive device, but it can not simultaneously be used as a generator and monitor.
He also bought a RF meter (about 1,000 euros), which many hf things can be measured (up to 3.3 GHz). There is still much to discover.

Closure

The next meeting is on 12 September.

The following is a lecture by Rob Alblas, on the design of the satellite decoder. Elsewhere in this KM you will find a report.

Rob Alblas
(Secretary AI)



Satstatus

Arne van Belle

per 22 Juni 2015

POLAIR	APT (MHz)	HRPT (MHz)	Overkomst
NOAA 15	137.620	1702.5	ochtend/avond, op HRPT zwak
NOAA 18	137.9125	1707.0	vroege ochtend/namiddag
NOAA 19	137.100	1698.0	middag/nacht
FengYun 3A	geen	1704.5	AHRPT nieuw hoge snelheid formaat
FengYun 3B	geen	1704.5	AHRPT nieuw hoge snelheid formaat
FengYun 3C	geen	1701.3	AHRPT nieuw hoge snelheid formaat
Metop-A	uit(137.100)		1701.3 LRPT/AHRPT
Metop-B	geen	1701.3	Alleen AHRPT
METEOR M N1	137.100 LRPT	1700.0	Sinds 23 september is contact verloren
METEOR M N2	137.100 LRPT	1700.0	MHRPT in test fase
NPP	geen	7.75-7.85 GHz X-band met 15Mbits/s	

Since 23 September, there is unfortunately not heard from METEOR M N1.

Fengyun 3A, 3B and 3C transmit only AHRPT out, this is not to be received by a standard receiver and HRPT 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!

Meteor M N2 LRPT is to receive 137 100 with RTL dongle!

See https://groups.yahoo.com/neo/groups/GEO-Subscribers/info

MHRPT is in test phase, this mode is not compatible with HRPT but can be decrypted with the new Rob Alblas decoder!

NPP (NPOESS Preparatory Project) only transmits the X-band with 15 Mbit / s. It recommends a tracking dish with a diameter of 2.4 meters!

Lanceringen

Sentinel-2A	23 Juni 2015
Metop-C	2017

GEOSTATIONAIR	APT (MHz)	(SDUS)/PDUS (MHz)	Baanpositie
MET-10	1691 LRIT	1695.15 HRIT	0 graden W, operationeel
MET-9	1691 LRIT	1695.15 HRIT	9.5 graden O, RSS
MET-8	geen LRIT	-	3.5 graden O, Backup
MET-7	1691	1691	57.5 graden O, Wefax alleen test
GOES-E (no. 13)	1691 LRIT	1685,7 GVAR	75.0 graden W via Eumetcast
GOES-W (no. 15)	1691 LRIT	1685,7 GVAR	135 graden W via Eumetcast
GOES 14	1691 LRIT	1685,7 GVAR	105 graden W, Backup
Elektro-L1	1691 LRIT	1693 HRIT	76 Graden Oost, via Eumetcast
MTSAT-1R	1691 LRIT	1691 HRIT	140 graden O, Backup voor MTSAT2
MTSAT-2	1691 LRIT	1687.1 HRIT	145 graden O, via Eumetcast
Himawari-8	geen LRIT	geen HRIT	Test fase, alleen HimawariCast
FengYun 2D	-	-	86.5 graden O
FengYun 2E	-	-	104 graden O, nu via Eumetcast
FengYun 2F	-	-	112.5 graden O, Backup

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

Lanceringen

MSG-4 8 Juli 2015 (laatste van Second Generation serie wordt MET-11 na lancering)

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

To further increase the amount of data transmitted via EUMETCast in the future to allow for EUMETSAT has passed 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 are some recent DVB-S2 receivers even for Basic Service Only. (Only the TBS 5980 and Skystar 2 eXpress HD, unfortunately not this true for the SkyStar HD USB box)

The signal at 10 degrees East has a greater bandwidth and is therefore weaker than we were used to.

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

The reception of EUMETCast data is for amateurs free of annual fees, you must, however, register with EUMETSAT. Once you have software (60 Euro) and key purchase (40 euros).

In the EO portal can log EUMETCast users view their personal data and settings and adjust. Also, registration for new users and extend the license is possible here. You can choose online what

products you want on your EKU. Existing EUMETCast users have received an email with an explanation and a login code and password.

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

EPS 10 MetOp AVHRR

EPS 15 NOAA GAC

EPS EPS 18 News Service

Eumetsat last week a test version of the new Tellicast Client (version 2.12.1) sent via "Info-Channel 1" to a limited number of "manufacturers" and testers. I expect that soon all EUMETCast users can receive this new client.

The new client is the "database file" put in the memory rather than on disk and is completely suitable for the High Volume Service. In principle, therefore, the R amdisk (required for interference-free reception of eg Metop and other large files) will be abolished.

But if you only get basic service then there is no need on upgrade immediately. Because unfortunately the syntax of recv-channels.ini and modified a number of filenames and folders. Taking over from your old settings so requires some work.

Thanks to David Taylor and Douglas Deans for the info.

Arne van Belle