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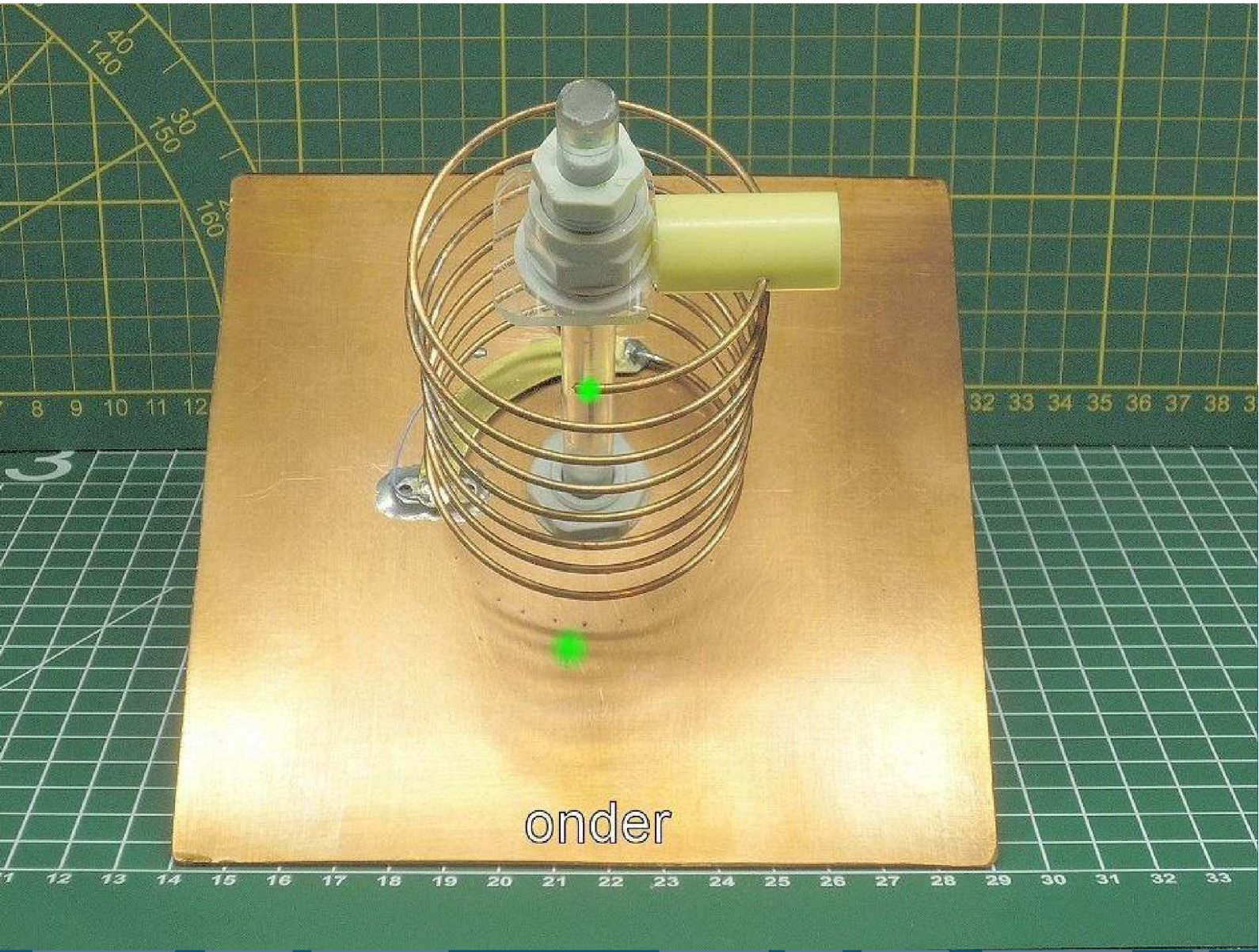

In dit nummer o.a.

XBEE

Periodieke variaties

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

It's always fun to browse through old Satellite. A few things jump than in the eye: the layout and quality has improved by leaps and bounds, the variety of topics and how long we are working on the hobby.

Many members have been a member and focus on aspects of the hobby without even receiving a picture. I recognize in myself too. After years of building it ultimately fails to receive good HRPT pictures, but the installation was demolished. Why, because you always want to improve anything.

The last meeting was very successful. A measurement day was the theme, focusing on adjusting the helical for the satellite dish. To measuring no shortage spectrum analyzers, oscilloscopes, RF multimeter were present. And so at this time of year, always a big gamble, beautiful weather!

Figure 1 Arne meet with its RF multimeter a patch antenna for the 1.7 GHz

Harrie last summer spent much time optimizing the helical. For best results, the helical trial and error will, in combination with the dish, must adjust. In this Kunstmaan his contribution with an ingenious design that allows you super flexible can achieve the optimal setting.

And I thought my dish was good! 130cm in diameter, attenuator necessary because of the high signal level. Looking at the reception of Meteosat-10, which functions as a measuring station, my dish turns out to be as effective as a 70 cm dish! For last meeting I made a new helical, according to the book. A beautiful N connector for a Euro at Quakkelstein on the stock purchased. And a beautiful course Suhner N to SMA connector, considering the price it is on the chimney. Immediately thereafter the LNA, the results are impressive. My dish grew 4 dB in performance. Whether the signal should be further weakened I still have to try. Incidentally, the attenuator is only necessary for the very strong HRPT-signal. For Meteosat-10 and MET-7 does nothing to weaken it.

Figure 2 Left Dish Ben Schellekens and the right of Peter Cooper. Fortunately we were able through the trees watching the MSG-3.

What I want to point out is that you should always have a benchmark against which you can measure your experiments. The experiments Harrie give very clear what you can achieve with a satellite dish. Make sure you have a working installation reception and go with experiment one part at a time. Whether this is a helical, LNA, dish, rotor control, does not matter.

The first article in the series "My HRPT system" dates back to 2011, nearly five years ago. Fred asks (rightly) for the Manual to a merged article. Soon with the new helical should be possible to make a good story for the handbook.

Time passes very quickly, sometimes you would like the new developments that we are doing would go faster with it. Then you notice so that the real work is done by a small group of very active members.

Figure 3 Henry demonstrated his electric roller for bending of profiles for a satellite dish

The June Kunstmaan featured on the front page the 3-meter dish of the Working Group. This dish would have to give more than adequate signal to our tests with the reception of QPSK-signals. When we point the dish in the MSG-3 was awarded this mercilessly through the basket. The result is similar to a dish of 120 cm in cross-section. You want the bottom to make the most of this dish then you should also optimize the helical. But first my own dish of 130cm get well. These would have to be sufficiently large for the reception of QPSK-signals.

USBee

In the first issue of 2014, I wrote about the USBee. A nice USB logic analyzer with beautiful software. Unfortunately, the USBee is no longer made. The producer is stopped. Whether they have earned enough money, or the money ran out, I do not know. Fred has fortunately found a cheap alternative. In any case, I do not need more guilt I feel if my USBee "free" upgrade to the ZX-version.

Fig 4 The spectrum of a QPSK modulator developed by Harm

Have fun reading this Kunstmaan where I think we managed to collect a variety of items. Rob has submitted three items ranging from a channel selector for EUMETCast, a monitor for the Ayecka SR1 monitor and signal variations at geostationary satellites.

Furthermore, Timo has designed a diagram and PCB for the PGA103. Harry comes with two articles in relation to the XY-system on the basis of the Arduino. A system that in my high on wish list. Fred delivers his report from Vietnam, where he was visited by Murphy. This gentleman is like Santa Claus, which can also be present in thousands of places at the same time.

On January 9, the next meeting, followed by the New Year's drink. This promises to be a fun day. Parking at the Nimeto can sometimes be problematic. Are all spaces full simply look on the back of the Nimeto. Behind and beside the container and on the terrace we can also park. In addition, a limited number of parking available which you can park for free.

Finally, I want everyone on behalf of the entire board, wish happy holidays. I hope to meet you all at our meeting on January 9, followed by New Year's drink.

Sincerely,

Ben Schellekens

PS: We remind you to pay your dues for 2016. We keep the membership fee of 25 euro per year for permanent members in the Netherlands and 30 euros for members abroad. An important part of the contribution will be paid to the dissemination of the Kunstmaan, we now cast on A4.

Weather satellites in Vietnam (18) **Fred van den Bosch**

Summary
My experiences with weather satellites etc. in Vietnam.

HRPT
And with the problems again the same situation as last time. The KM this time was not even made up when I had the X-rotor working. Possibly because several people something to the solution have a more detailed story.

Counterweight
Rob has a massive dish to his X / Y-mounted rotor and worked with him well. He has done some measurements and found the following results -and I citeer-:
"Using the data from Figure 1, the rotor is approximately in equilibrium. Torque is 1.8 kgm (5 kg x 0.36 meters). Distance pivot back until dish is 34 cm, with a dish of 4 kg this means that the center of gravity x 5 quarters 36-34 = 11 cm is for the dish (minus the thickness of the plate). E.e.a. is not very accurately measured but gives a good impression of the order of magnitude. "
Fig.1 Torque Measurement

When I repeated the same measurement for my rotor albeit with different numerical I came to the point measurement over the 2 Nm, possibly because the imager projects further with me a lot. And that was certainly the cause of the non-working X-rotor. After some calculations, I found that with a weight of 2 kg. as counterweight around 1.2 Nm in combination had to sit and thus an end would have had to come. That was true. I.e. only to one side. On the other hand he did not come back up again. The cause was quickly found that there were some bolts on the new brackets in the way. The grinder worked wonders. Thereafter, the whole was moving neatly between 10 and 170 gr. (limitation of this type of rotor).

Even during the testing phase I have two pieces of solid steel rods of a little over 1 kg. / Piece replaced by two weights of a dumbbell of two kilograms. each. According to my measurements would balance the whole thereby should be roughly in balance. Sonically it looked like. See the picture. The plastic is a makeshift raincoat, which falls to the weights and the picture even been pushed to the top. The cable is temporarily fixed with duct tape put pending angled plugs of better quality than they sell here.

Locken GODIL
The next problem was the GODIL, who would not lock onto the receiver. First, once the GODIL good through the internal HRPT generator. Ben:
"The trimmer HRPT decoder must adjust you 2.2V (when in lock). Measure the 10K resistor in series with the varicap state (not on the junction with the varicap). "When I could not do that, the voltage was below the 2.2 Q. I have therefore only the" H "adjusted. According to Rob not a disaster: *"The stress itself is not so important, but if he is not against the 0V to 5V or sitting. In other words, you still have enough control-room. The letter H is important, then it is locked AND ge-synced (or: ge-synced and thus locked) ".*

Then hung the PicoScope to the EYE-output of the receiver. Ben gave directions: "I have to go to the settings of my scope watched the eye pattern. Those are 500mV and 100nS. You need to trigger on the rising edge. However, you have the trigger point to the left or right to see the eye pattern. Normally your trigger point in the center of the screen, you will see, however, the sinus. "What this looks like can be found in [1]. But unfortunately...

Murphy
... the eye pattern is still not there, because we had a visit: Murphy came along and is now no longer store away. Besides that, everything is in and around the house gave up the ghost, which include my soldering station, I could suddenly no longer receive. All measured many times, changed plugs, as I had in stock. Once Met-7 heard noisy. During the test gave the same rotor of the previous time again the mind. This time it seems to be an ongoing problem. So this is a new engine or a new rotor, I'm afraid. And the test is for the time being as well as of the web. In any case, in order to test the LNA but take my next visit to the Netherlands.

Try
Testing was indeed enormously time consuming. The temporary arrangement of the dish on the covered terrace, I could only test with about agreements west of my house and lower than about 60 g .. If it was against was that there was only one per day. That was very often zero since it rained regularly in the afternoon and thundered. And since I've seen come into our temporary home here sparks from the modem (my netbookje, I just ran out to work, survived actually) I'm with storm even more cautious than I already was.

Finish
Before all (ever) on the roof is going to be there must still be done a layout: I want to get some parts from each other, where necessary, some neater finish (including where I just quickly have used the grinder between all components by), and dyeing the whole. Then he can hopefully awhile in this climate. The cables must be laid neater and the imagesetter and rotors are made watertight. I immediately enter a balance measurement before it is remounted on the support. Only to verify or correct my assumptions and calculations. I still doubt whether I already partially will start with or that I do but will wait until the rotor working again.

Mondriaan
And I still was operated in the same issue at my beck and call. The cover can now without the dollop of paint may be slightly less artfully, he's definitely improved considerably with regard to layout. As for me remains the artistry in the future of applicable pictures on the front page. Thanks, thanks!

Of everything
Space and astronomy
The Astoforum: Project Apollo Archive, 8900 high resolution NASA images. Looks like this is a new series of albums with high resolution photos. Full Hasselblad negative scans of all the Apollo missions. Complete film warehouses, including failure

(blurred, overexposed) images. [2] For me this is an absolute must, especially for anyone who has experienced the Apollo flights.

Categories on the Astro Forum, which is a (narrow) link with our hobby have in any case "Meteorology" [3] and "Radio Astronomy" [4].

Miscellaneous

For the seniors among us there are probably still some known books on this site [5]. The other pages are mi worthwhile.

An introductory article about satellite dongle to [6].

References

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

[1] The Kunstmaan, 2015-3, p. 15.
[2] Apollo pictures (see web site)
[3] Meteorology (see web site)
[4] Radio astronomy (see web site)
[5] Known books (see website)
[6] Satellite with a dongle (see web site)

Get the most out of your Dish & Helical.

Introduction.

With the slow but sure disappearance of weather satellites in the 137 MHz band, the step up to 1700 MHz is increasingly important.
On 1700 Mhz you need a steerable dish to follow the polar satellites

Currently Rob's Decoder decrypt Noaa18, Noaa19 and Meteor-M2.
These are satellites that transmit with Phase-Modulation and to receive and demodulate with our WRX-1700 receiver, preceded by a converter.

New satellites such as the Feng-Yun and the Metop series broadcast with QPSK modulation.
There you have then a receiver with a QPSK demodulator for that, we remain as a working group so busy to track all the changes.
With QPSK there is no fixed carrier wave longer present in order to tune in to.
The demodulator which must then reconstruct from two sidebands by a Costas loop that needs to tune the receiver to the missing center frequency.
Rob Alblas has written a very informative article on it (KM June 2012).
We already have a prototype receiver with Costas loop into operation and with new to develop software for the decoder, we could see an image provided …..

It appears that you have to receive; because of the increased bandwidth; of this new satellite's a better signal than before to decode properly.

The most-important thing is the relationship between Signal and Noise: S/N.
So many signal and low noise is our mission to make it happen, do your best!
I have done extensive measurements in attempt to find out what the main dependent points are to pay attention on.
Fortunately I have a spectrum analyzer available, the Rigol DSA TG 815 that goes up to 1.5 GHz.

With the Rigol, the S / N excellent to see on the output of our usual Meteosat Converter from 1691 to 137.5 MHz, or on the second channel at 134 MHz.
But how do you get 1.7 GHz best reception without an unmanageable large dish?
The important thing is that you should have the best stuff on the antenna side, which saves many decimeters to unnecessarily large dishes that must also be accurately directed.
On most receivers, a signal-strength meter is a first step to use that for adjusting a Helical Antenna with associated Dish.

It is handy to have a "fixed measuring station" in the space where we can focus on.
The only valid at this time is MET-10 which LRIT images transmitting at 1691 Mhz. The signal is BPSK modulated with 290 kb / s, pretty weak and horizontally polarized.
As our helical is not perfectly circular, it appears that the whole helical including ground plate must be able to be rotated in order to get maximum signal for Met-10.
It will be a combination of matching the helical in diameter, length, twisting of the whole and distance to the dish.
The task is therefore to make all variable in order to get the utmost out there and with simple stuff.

To choose which dish size.

For HRPT reception of the current Noaa's (0665 Mb / s), the Meteor-M2 and the Feng Yun-1D (1.3 Mb/ s) revealed a 90cm offset dish excellent results, more just was not worthwhile and with my old 80cm from 1998 even though it was fine.

The new QPSK-modulated satellite's broadcast with 4.2 Mb / s, but in four stages through while the bandwidth corresponds to 2.1 Mb / s BPSK, here happens a miracle?
No, because the susceptibility to noise and disturbances unfortunately increasing.

The chart shows that the S / N approximately a factor of 1.4 x should be better for the same error rate.

What we need in diameter to receive an interference-free image?

That is without a working system with "on-screen image" a little hard to say.
I try through a combination of theory and experience to answer.

We received Feng Yun-1D with 1.3 Mb / s fine, and now we go to 2.1 Mb / s, that is a factor 1.76 higher bandwidth.
For this reason the dish surface must be 1.27x bigger and with the factor 1.4 included, then you come on a 120 cm diameter dish.

However, we have always received with a SAW filter of nearly 5 MHz bandwidth in our receiver while much smaller would have sufficed.
So we have been living beyond their means in terms of bandwidth, but it worked very well.
This extra bandwidth, so we already had, remains only factor about 1.4, which corresponds to a dish of 106 cm diameter starting from 90 cm.

My feeling is that it should be possible to use a 110 cm dish and optimal gear to receive the new generation of QPSK satellite programs.
Probably our conventional SAW filter is still wide enough for the QPSK signal.
A trial should demonstrate that once Rob's decoder is suitable.

There are still alternatives for sale. The X7251D filter from Epcos Mouser.com example that is for sale (while supplies last) for only 2 Euro ex.
This filter at 36.17 MHz has a switchable bandwidth between 7 and 8 Mhz.

Dimensions versus gain of a dish.

When double the surface, it doubles the gain in power output.

A dish of 160 cm has an area of 2 m2 and give twice as much signal as a 113cm dish has to 1m2 surface.
On the internet you can find various calculation programs to determine the gain in dB's. Usually, based on an effective dish yield of 60 -65%.

0.9 m 22.1 dB

1,1 m 23.9 dB

1.4 m 26.0 dB

1.6 m 27.1 dB

3.0 m 32.6 dB

A doubling in voltage from the LNA corresponds to 6dB gain: 20 * log difference.
But on dishes we use 10 * log difference in received Power, 1,44x in output voltage.

Garden-oriented measurement results.

I had access to a 110cm offset dish Triax from Henri Mulder and a 160cm Prime Focus Mesh dish from Wim Bravenboer.
There I went extensively to measure, and by fine weather this is not a punishment.

The Triax offset dish gives approximately 8 dB S / N, the Mesh Dish 12 dB measured on the output of the Converter at 137.5 MHz.

If you look at the settings of the Spectrum Analyzer, you see that the Triax measured over 2 MHz and the mesh Dish over 1 MHz, hence the different presentation.
In the picture can also be seen all the other settings of the Rigol Analyser.

To look deeply into the noise, you should choose a low bandwidth, in this case 30 KHz.
You can also see that there is a dent in the middle of the signal, so this is the missing carrier at BPSK.
Both sidebands are easy to recognize.
Assuming a level of -72dBm, we can now calculate the antenna signal.
The LNA does 31dB and 22dB from the Converter, along 53dB gain.
The antenna signal is therefore at -125 dBm, is equivalent to only 0.126 microvolts!

Given the mechanical differences in both dishes, measured 4dB difference, best 6dB can be as 160cm mesh dish would have a perfect parabola shape and a larger F / D ratio than 0.5, but more on that later in this story.
The spec of the Triax appear somewhat exaggerated because it measures 100x105 cm and that is more in line with effectively a 100cm dish.
Which dish Either way, you must ensure that the combination of dish and connected helical gear is optimal.

Important issues.

Build a neat helical as described in the KM of September 2012 pp. 116.
That copper can get right through stretching, you feel that happen, then the wire is straight and got ready to wrap around a 50mm PVC pipe.

What else to look for:
I got a better result by making the strip 15 mm longer and to be soldered at 2 mm height above the base plate on the N-connector.
Particularly ensure that the diameter of the turns is the same and the distance too. The diameter is critical, first you should adjust to 60.5 mm outside and then cut the wire as on picture.

My new invented Top-Piece consists of a stiff tube that runs on the plexiglass support.

This makes it possible to accurately set the angle of the first turns.
Plus, you can now easily shorten the wire if you think that gives it improved.
Continue sliding and shearing, readjusted on maximum and continue until you are
ready after the last cut on a new spiral!
Convenient to this way to find the optimal number of turns for your homemade dish after you have already made other improvements.
In a helical offset dish should start looking at the same spot as the LNB holder indicates, which is usually slightly below the middle.

Protection of the LNA.

Protection of the LNA against static discharge is very important, I have experienced.
Solder a netto 44mm long thread (¼ wavelength) between connector and GND, gives no loss at 1.7 GHz but it attenuates unwanted frequencies and thus give double the pleasure.
Stay away with your cell phone because it generates a strong signal at 1.8 Ghz, during adjustments, you dont want to be bothered with all those messages.

Dishes & Dishes.

The height of the helical windings 7,5 is dependent on the F / D ratio of the dish.
With a conventional F / D of 0.6 with an offset dish I get to 95mm.
At 160cm prime focus mesh dish with F / D of 0.5, 80mm with an equal number of turns, as a matter of moving the middle support.
A test with 8.5 windings and 95mm height gave virtually the same result.
Some sites indicate that the first winding must have a curl to a smaller diameter.
After pushing on thread through the top-end, I could give the first turn
another start from small to extra large in diameter.
It all gives no improvement in S / N.

Fewer turns at a very deep dish gives perhaps a little profit, but this
is in my opinion still not an optimal solution for reception of the
relatively low frequency of 1.7 GHz with large / long antennae are needed with respect to TV satellite applications at 12 GHz.

What I saw on the spectrum analyzer is that a longer helical has more gain but sees a smaller part of the dish.
You then lower signal but also receives less background noise along the
rim dish which depressed the result in S / N remains virtually unchanged.

Something like you see when adjusting the strip for 50 Ohm impedance.
Strip lower (low impedance), the noise floor lowers but also reduces the signal strength, if you screw up the strip (higher impedance) then both go up but not equally.

As always there is to be found somewhere an optimum and that is with the strip slightly up from the connector, then the antenna is optimally adapted to the 50 Ohm LNA which is expected.
If you look only at a maximum signal on the receiver, then the strip Up will also give more signal + noise but the S/ N is worse without you've been through.

The top of the helical turns out to be the most sensitive to disturbances from
objects made of metal or plastic that is not HF is suitable. If it gets hot in the microwave is very suspect.

Offset Dish, or Prime Focus and F / D

My feeling is that you're better off with a dish with an F / D of 0.6 because you can use a longer helical.
It may be clear that a long helical will produce more signal which is largely as in a more energy-rich area of the beam present.
The bundled energy naturally decreases towards the center of the dish.
With a Dish with an F / D of 0.5 (figure drawn to scale) is the angle at which the beam of the antenna already reached 106 degrees.

Then there is "something" as the opening angle of a helical.
Too long helical sees only a small part of the dish.
Too short helical looks partly along the dish to the warm earth and that gives extra noise.

In 2004 I along with Arne done many comparative measurements of antennas for 1.7 GHz, also the patch antenna, the globe antenna and the ancient Meteosat bus.
It was clear that the 95mm long helical windings with 7.5 gave the most gain.
At the 360 degree scan; done with HRX-137 + BBC B computer; it can be seen that the -10dB opening angle is less than 90 degrees.

Unfortunately, the opening angle is not sharply defined and can therefore rule out an optimal compromise.
It is usual to select the -10 dB point of the opening angle to the dish edge, and that is true so well with an F / D of 0.6 with the corresponding angle of 89 degrees.

A mesh extention around the dish can help to prevent "look beside the dish".
With an offset dish, horizontal will be the only choice.
On Prime Focus a vertical cylinder can also act as a shield against lateral radiation from GSM transmitters.
Mesh acts as a reflector towards the cold sky.

The distance from the Helical to the dish.

To determine the optimal distance, I made PVC reducing bushes from
32 to 80mm made a sliding and pivoting arrangement, here everything is variable.
The base plate of the helical turns out to have to lie on the focal point of this mesh dish or a little bit closer.

On the drawings could see that in my opinion the lower winding yet to be fully illuminated by the diameter of the HF beam spot.
How sharp focus point which depends on the accuracy of the dish and perhaps the 1.7 GHz wavelength of 17.6 cm also plays a role, let us know if you know more about that .....

The Triax 110cm, I found the same distance as the front of the standard LNB as optimum.
A LNB has its antenna, however, a little further down to the inside, so the
base plate of our helical must lie somewhat in front of the point of focus.

The focuspoint of a Prime-focus antenna can be calculated with the formula D ^ 2 / 16D where D is the diameter and d is the depth of the dish.
At D = 1.6 m and d = 20cm you reach 80cm.
As a test, put some pieces of aluminum foil onto the dish, focus on the sun and look at a piece of paper where the focus is.

The LNA, the Low Noise Amplifier.

An excellent and convenient solution is the ZX60-242GLN from Mini Circuits.
This LNA has a noise figure of about 0.75 and a gain of 31 dB at 1.7 GHz.
From the N connector on the baseplate you should convert to a SMA male.
With this, I came to 12 dB S / N with the 1.6m mesh dish.

A "Golden" angle SMA connector tested, the shine radiates towards you but gives 1.5 dB loss in S / N.
A short SMA - SMA cable also gave a 2 dB loss in S / N.
Between helical and LNA must be placed as little as possible and the quality has to be perfect.
A large dish becomes very quickly a small dish!

I liked testing a new Helical built with a SMA female connector in the base.
Pictures of this latest creation come from there, but beautiful is not always better.
Unfortunately, you still need an SMA male to male coupler necessary to the LNA, the total result was unfortunately 1,5dB S / N worse and mechanically rather shaky.
The poorer result can also be caused by the adjustment strip of printed circuit board with pertinax at the bottom side. (indeed the reason)
Just choose the rugged waterproof N connector with gradient to SMA male and a matching strip with air as islolation to the base plate.

Interference and noise problems.

The Satsignaal at 1.7 GHz is less than 1 microvolt and (GSM / WiFi) signals at 800, 1800 and 2400 Mhz can come so hard that the LNA is overdriven.

A scan up to 1500 MHz shows the problem around 800 Mhz.
On this scale, signal of MET 10 is invisible into the noise!

This interference can be removed with a HP 1320 filter from Minicircuits
which at 1.7 GHz provides an attenuation of ca.0,8 dB at the input of the LNA.
Such a filter between LNA and Converter is also useful to block any DC
voltage and to prevent overload of the converter.
It may be clear that the cable from the LNA must also be low-loss.
Fortunately, there are now TV Sat foam cables with an attenuation
of only 0,26dB per meter at 1.7 GHz as Hirschmann Koka799 and Belden H125.

SMA male to F-female is no problem with an adapter connector, little
sparse but in Leiden is the onlinekabelshop.nl she sells.
The difference between 50 and 75 ohm gives no significant losses as well as other auxiliary pieces are after the LNA having a gain of 31dB is not very critical anymore.
For a very long coax cable, you can consider an additional LNA to supply the
converter and the rest of the chain of sufficient signal.
Better more gain at 1.7 GHz instead at 137.5 Mhz will be the message.
A second LNA may not be as extreme as the first low-noise LNA, you can also place it right in front of the converter.
Perhaps you have an old LNA over with power via the coax, then you are right off of the problem that the LNA of Minicircuits no DC should get on the output.
On the Internet you can find at Minicircuits, a calculation program for the total result with two LNAs.

Jamming Frequencies above 1707 Mhz are harder to remove, this can give a so-called filter Dolf for improvement. Dolf van Delft is the creator of this sharp filter 1657-1707 Mhz.

This filter with two SMA connectors, yields about 1 dB loss in S / N, but can make the difference between whether or not a reception at 1.7 GHz as Ben Schellekens has discountered.
Without Dolf van Delft, Ben had to give up his home at Rotterdam or his hobby.
The first is perhaps wise, the second obviously not .....

During my measurements I noticed that in the course of the day the S / N ratio became worse.
Around 13:45 I earned only 9.5 instead of 12 dB S / N.
It appeared that the sun stood on Azimut same position as Met-10, hence!
If you only look at the signal, then that is just slightly larger because of the sum of this noise plus the Met-10 signal.
The Sun is a major source of interference, but it can also be used as a measuring transmitter to align your tracking system / testing at various azimuth and elevation values.
Adjusting the helical antenna can not be done with the sun as measuring transmitter, because it sends no fixed frequency to tune.

Orbit Calculation programm Videre has standard the Sun on board, also handy for long periods to test your system for tracking.

My recommendations with no guarantee for the future!

I expect it to end up with a 110cm offset dish will have no problem to also
receive QPSK-modulated satellite signals.
Offset has the advantage of ready availability and perfect accuracy.
The focus distance to the helical is to slide along the arm to change easily.
You also do not lose signal because of shading by the antenna.
The weight may be a disadvantage, but there are also aluminum versions for sale.
The angle of the dish on a horizontal tube (AZ-EL system) to look straight UP is sometimes inadequate adjustable.

A 4mm shim under one side of the mast clamp can provide an answer for the Triax.
You can test the Z axis to rotate 180 degrees and see if you are aligned for maximum level at the same EL, so here wobble back and forth with the mast.
This level may be lower than before, but that is because of the difference in horizontal polarization that you will receive under a slightly different angle.

LRIT from Met-10, can we work with that?

For measuring purposes, MET-10 is a useful tool for optimizing our system.
The LRIT pictures at 1691 MHz are less interesting because of the limited resolution though them with a BPSK demodulator / Costas loop in the receiver plus the already existing software in Rob's decoder can also be seen during unencrypted broadcasts.

I'm going to make an effort, the problem is the necessary bandwidth of
approximately 240 KHz that must be much smaller than my SAW filter of 5 MHz.
I now receive mainly noise and the Costas loop will not lock on that.

The same problem we had in Dwingeloo with the Giga-Big-dish of 25
meters (F / D 0.48) and obviously extremely poor antenna for 1.7GHz so
we were on the same RF level as here in the garden with 1.6 Meter.
A factor of 244 difference in surface!
I mean but, in first call the insurance company at Apeldoorn to remove the Birds nest from their antenna and after that optimize a little bit!

Some References.

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LRIT test in Dwingeloo KM July 2014
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1.7GHz experiences Peter Kuiper KM December 2014
KM december 1998 My first dish for HRPT.
Http://www.g-romahn.de/wxsat/goetzhome/hrpt/antenna.htm

XBEE, DATACOMMUNICATIE OVER > 100 MTR

Harry H. Arends

Summary
This article describes how to setup two XBee's to communicate to each other over a large distance of more than 100 meters.

For the connection to the Arduino XY-Rotor-control can be made of several possibilities. The Arduino's with a USB connector have the disadvantage that the connection between the computer and Arduino can be up to 5 meters.

Another possibility is the use of a serial cable with a USB <-> serial converter. However, with 5Volt as a line voltage , the distance here are can't be of agreat lenght. With a data transfer rate of 19 200 Baud can when using the best cable distances up to 15 meters can be bridged. Using good computer CAT5 cable can extend the distance. [6] [7] [8]

A third possibility is to make use of a wireless connection. Distances can be bridged up to 1600 meters. This system is called XBee.

XBee is a trademark of Digi International [1] already since 2005 small modules which produces two-way communication between two modules making possible uses of the 802.15.4-2003 protocol with a maximum speed of 250kbit / s. Initially it transmission power used was 1mW, but already a short time later XBee-Pro came on the market with a power output of 100mW. All modules have a standard "Form-Factor '. In other words XBee all have the same connectors and form. In Figure 1 you see an XBee next ¼ Dollar. The XBee-Pro is slightly longer at the bottom.

Fig.1 – XBee with wire antenna met 1mW transmission power

All XBee can be used with a minimum of connections - Power supply (3.3V), Ground, Data-In and Data-Out for the serial communication. Further, the Reset and Sleep input are also of interest. Furthermore, there are more in and outputs that can be used for the application in which the module is used. For an overview see the datasheet [2]. Since 2010 there is also a fully user programmable version.

The distances bridged for the standard version, depending on the circumstances, are a minimum of 30 meters to a maximum of 100 meters. The pro version with an output power of 100mW has a range of up to 1.6 Km. At present, there are even available modules with a range of more than 40 Km. However, these are not comparable to the first type. The modules are available with a variety of antennas, such as in fig. 2.

Fig.2 – Diverse antenne uitvoeringen

All XBee his z.g.n. Out of the box, in other words connect two modules on two computers, and you have a connection between both.

Before first use

Although the modules are ready to be used, it is still advisable to check the firmware installed and if necessary update. On the Digi website you can pick up this special software called X-CTU [3]. Install it on your computer. Furthermore, we also have two USB <-> XBEE adapters such as the image below shows. These are of DfRobot [4], or Sparkfun [5].

Fig.3 – This is necessary for the test set-up

Now place the first XBee into the adapter and connect it to the computer via a USB cable. If this is the first time you connect an FTDI chip will be installed the necessary drivers first. After that you start the previously installed program X-CTU. First all available communication ports are displayed. There are several English-language tutorials on the internet, but I shall briefly below through the first steps.

After selecting the correct communications port you go to the Tab modem configuration. Here you select the Download New Versions option and the software retrieves the newly available 'Firmware' as shown in Figure 5.

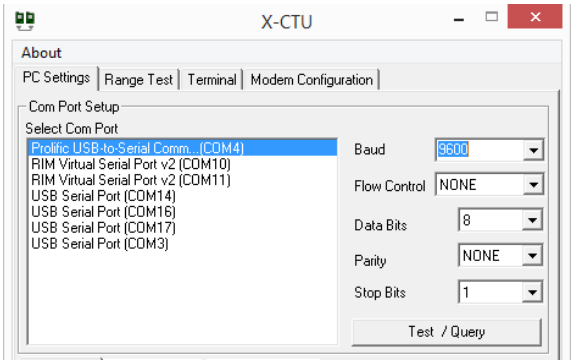

Fig.4 – Available communicatie ports

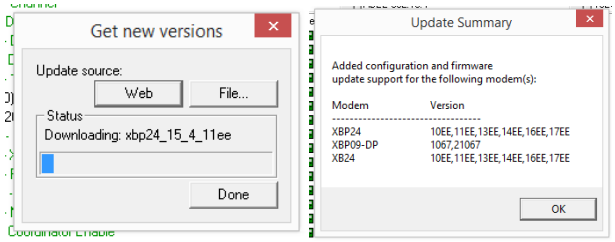

Fig.5 – Retrieve new versions Fig. 6 – New versions

When new versions are available, this is as shown in Figure 6. Then read the contents of the XBee connected and the installed version and all other settings is displayed (Figure 7).

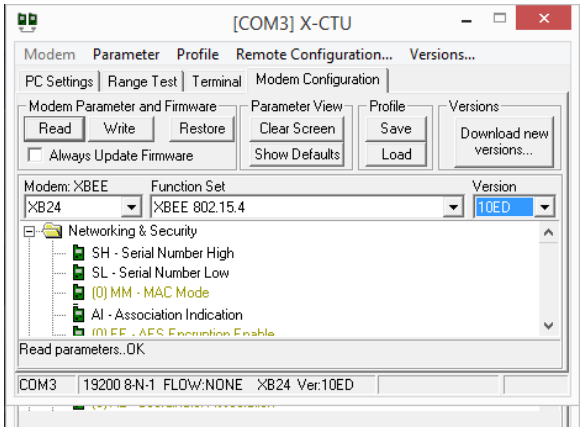

Fig.7 – Available parameters and version

You now have the option to install a new version of the XBee by choosing it from the list Version. Then place a checkmark next to Always Update Firmware and click on Write. The progress is shown in the lower half of the screen. Let this screen are now open. You can for your convenience dragging it to another location on the screen. Open a second screen of X-CTU and repeat the above procedure for XBee number two.

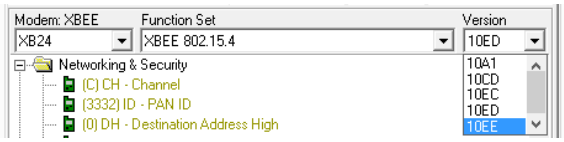

Fig. 8 – Available versions

Connection test

If the second XBee also received a new firmware version if needed, place both windows side by side. Check if both PAN IDs are equal to each other. This may be any number, but there is only communication between modules that have the same PAN.

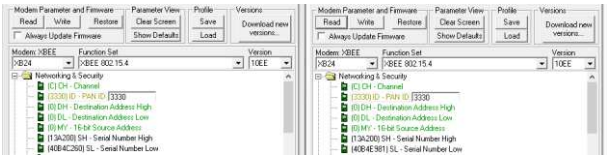

Fig.9 – Check the PAN

Now click on both screens at the Terminal tab and type in one of the screens a message.If all went well, you will see that what is typed in one screen, displayed in the second screen. See figure 10.

Fig.10 – Communication test

To see if it actually goes both ways you type something in the second screen, and voila there is also something in the first screen. You now have a successful connection is established between two XBee's.

Whats next

As mentioned in the introduction, we want to create a wireless connection between the XY Rotor Control and the computer on which it Xtrack Rob Alblas is performed.I have already been testing on two XBee in the test set-up as shown below in Figure 11 the XTRACK output seen in a terminal screen. One is controlled by Xtrack and the other receives the information and show it. In a subsequent article, the connections on the Arduino will be discussed.

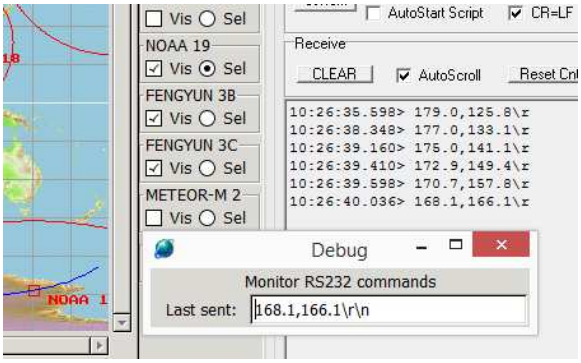

Fig.11 XTRACK <-> XBee test

Referenties:

Voor internet-links ga naar www.kunstmanen.net en kies menu: <Weblinks | Links uit KM>.

Summary

This article Describes the reception or LRPT s image from the Meteor N2 using GNUR adio and software from Oleg.

Introduction

In the previous Kunstmaan I described a preamplifier for the 137 MHz that can be used well for the LRPT reception of the Meteor. Several members have already built the preamplifier and adjusted. Harry has already created a prototype for a print.

There are two methods to receive the Meteor easily:

- Using Windows with SDRSharp. Lately there have been many new developments. Thus, it is now possible to receive real-time images. Search in Google "RTL-SDR Meteor".

- Linux with gnuradio, which I will describe here. Real time reception is not possible here.

In both cases, use is made of an inexpensive RTL SDR dongle.

What do you need

- A round antenna. Many used the Quadrifilaire Helix Antenna. Ruud Jansen has designed two there. The descriptions are in the manual of the Working Group. The construction of these antennas listening rather critical. An alternative is the kruisdipool. I n the previous Kunstmaan and a drawing of a bill kruisdipool designed by Arne van Belle.

- 137 MHz amplifier. This is described in the previous Kunstmaan. Besides strengthening filtering is very important to prevent unwanted signals.

- RTL-SDR dongle. With the included remote control, antenna and CD we do nothing.

Figure 1 The RTL dongle as offered on eBay

- Adapter Cable. The dongle has an MCX connector. Often a small antenna is supplied with an MCX connector. This can be used to make an adapter to BNC or SMA. Or o p eBay are getting much adapter cable to include SMA, BNC (male / female).

- A 64-bit computer with at least 4GB of internal memory. The latter is necessary because in the internal memory, a RAM drive is used to simulate a hard disk. Important to know is that we will make no changes to the computer. We run Linux from a USB stick.

- 16GB USB3 memory stick where we will install Linux on

- Different software packages that you can download for free.

RTL-SDR Dongle

This dongle is easy to purchase on eBay, search for "820T2". Expect between 8 and 10 Euro per payable each, which includes shipping. Older versions had the R820T chip. The new chip has a frequency range of 24-1766 MHz! possible. The sensitivity is also improved.

Will not you order through eBay then you can involve Van Dykes also the dongle at Electronica.

These dongles are designed for DVB-T / FM and DAB reception. Radio amateurs have found that the chipset can be the case that the I / Q data stream can be captured thereby controlled. This has become possible in a very inexpensive way to design a Software Defined Radio.

The maximum sampling rate is 3.2 MS / s (mega-samples per second). In practice, you can not get this. At a sample rate of 2.4 MS / s, you have a reliable transmission of samples.

Figure 2 Two chips do all the work

In the RTL SDR is an AD converter that samples the signal with said sampling frequency. The ADC has a resolution of 8 bits.

Software

Gnuradio is software that runs on the Linux operating system. It is possible to run Linux on your computer without you lose the Windows software.

We do this by running Linux from a USB stick. Nowadays a 16GB USB3 stick for 10 Euro to buy, this is more than enough. Use for the extra speed USB3 at startup. After that it all takes place in the internal memory of the computer and it does not matter whether you are USB2 and USB3.

A Linux installation, including gnuradio installed as downloading from the Internet. This will probably take some time because the file is 2 GB.

Go to gnuradio website for the SDR Live Environment. Do you have a Bittorrent then you can use this, you do that can not then you download an iso.

Figure 3 Select one of the ISOs for download. The ISO is stored in the download directory.

Have you downloaded the ISO file it must be installed on the USB stick. The simplest, this is the program Pendrivelinux. Go to the page of the Universal USB Installer and download the software (press the button "Download UUI." It is a small program of about 1 MB.

Universal USB Installer

The Universal USB Installer (UUI), we are going to install the i mage that we have just downloaded to the USB memory stick. An alternative program is UNetbootin, it is similar, I have no experience with it.

You must first download the UUI of the Internet [1]. Scroll down on this page and press the DOWNLOAD button UUI. It is a small program of about 1 MB.

Stop the UBS memory stick into the computer. Do you have a USB3 stick stop it in a USB3 port, the copy will go much faster. Check in Windows Explorer which drive letter has been given the memory stick.

Operation is simple. After agreeing to the conditions you get the following screen where you must enter the following:

- The Linux distribution Ubuntu

- The ISO file that was downloaded.

Figure 4 Settings for the Universal USB Installer

- The USB drive letter. Check in Windows Explorer that you have the right one! Do you choose Format (this is optional) then everything is deleted on the USB drive as the USB drive is formatted with FAT32.

- The Persistent file size. To save data to the USB-writing room must be reserved. Select the highest value: 4089 MB.

Choose Create then the UUI will install the USB memory stick with the Linux image. You still get a check screen after the creation of the Linux installation will begin. In total, it takes about 15 minutes. At the end of the installation, nothing seems to happen, quietly wait a few minutes and the installation is finished.

Figure 5 Control Display

Fig 6 This step takes a long time

Meteor LRPT receiver

The gnuradio script of the Meteor-receiver is not in the system and must be downloaded separately from Dropbox. After clicking the link you are asked whether you want to be reported to Dropbox, this is not necessary.

The zip file "meteor_qpsk_rx_rtl" is downloaded. Unpack it in a folder, eg:. "C: \ gnuradio \ meteor." Now we can access this folder from Linux, very handy.

In gnuradio is a powerful tool to easily variety of receivers, transmitters etc. design. This is the gnuradio Companion (GRC), a graphics program where you can connect several modules together.

The GRC script, in which all modules are described graphically is not present in the download.

After making your GRC script is converted by gnuradio to a Python script. The Python script is written by Marin Blaho and you can download. Because I was curious what all was present in this script, I copied it in GRC. Below is shown the LRPT receiver in GRC. It gives a picture of what is happening:

Figure 7 LRPT receiver gnuradio Companion

- The RTL-SDR dongle with 1.024 MS / s operated at a frequency of 137.1 MHz.

- The samples will then be reduced by a factor of eight by a low-pass filter and the number of samples.

- Then a throttle to slow down the software. I think this is not necessary, or even desirable, since a hardware-brake is already present in the form of the RTL dongle.

- A AGC

- Costas Loop with the recovery of the clock.

- D e constellation decoder gets the I- and Q-bits from the signal.

- The rail clipping probably puts the analog values to a digital signal. Incidentally you see LRPTOfflineDecoder weather clouds, which resembles an analog signal.

- Eventually wrote a file on the desktop.

LRPTOfflineDecoder

The result of the Meteor LRPT receiver's .s files. Every time you start is written a .s file LRPT the receiver. In the .s files, the modulated data. This can be decoded with the LRPTOfflineDecoder of Oleg.LRPTOfflineDecoder is a Windows program.

Fig 8 The contents of the file s-visualized. On the left side is to detect a synchronization word. In a next Kunstmaan I'll Python script that I made do explained this.

Besides the LRPTOfflineDecoder you should also download the sample ini file and adapt it to your own situation.

To work

Now we have the software installed, it is time to get started. Broadly speaking, this is as follows:

- With your favorite orbit computation when you look over the coming Meteor.

- We start from the USB drive. Start the Meteor LRPT receiver in gnuradio. We wait until we have a tight constellation diagram and stop and then start the same recording. So we get a file s just a good shot. Goes under the Meteor and the recording is poor (four puffs of the constellation diagram disappear) then we stop recording.

- It s file on the desktop state we drag to the local c: \ - drive, and then restart your computer under Windows.

- With LRPTOfflineDecoder we decode the .s file to an image.

Preparations

Make sure that the USB memory stick with Linux in the USB (3) port is located. RTL also put the dongle into the computer, this does not have a USB3 port. Connect the antenna and make sure the amplifier is powered.

Booting Linux

When will you start up your computer then start it from the hard drive. Immediately after turning on the computer, we must intervene in the boot process to ensure that we will start the USB memory stick.Depending on the type or brand of computer, this will differ.

In all cases, you'll get when you turn on the computer in the first screen, the ability to press ESC, DEL or F12 and possibly changing the boot order of drives in your computer.

Here is how this place on my computer.

Fig 9 The screen immediately after turning on the computer. At the bottom you see that you must press the DEL key.

Fig 10 Replace ccording need to change the Boot Menu (Boot Menu). Press F8

Fig 11 This is the difficult part. In my computer there are two hard drives (SSDs) and USB memory stick where we want to start from. The brand of the memory stick is Kingston, the second option I chose. Choose another option here, then the Windows computer on or off (if you choose eg. DVD). Do you have the appropriate option, then start Ubuntu Linux.

Fig 2 By the second button from the top to click we can open the browser and we have access to the local disk of the computer, very handy! We go to the script "meteor_qpsk_rx_rtl" and copy it to the desktop.

Figure 13 We need to change the properties of the script by selecting Right Properties and then adjust the permissions tab.

Fig1 4 We start the script by entering the following commands:

cd Desk top

./meteor_qpsk_rx_rtl.py

To save typing you can after the first letters of the <tab> key and linux will complement the rest:

CD e D <tab>

./m <tab>

And the receiver will start!

Figure 15 The receiver gnuradio. The second tab shows the IQ demodulator. This will get to see if there is no receipt

Now we are waiting for the arrival. Is the satellite above the horizon, then press start. You see a cloud of dots. The signal is too weak now. The signal is strong enough when there are four distinct clouds. When the four clouds are there, stop the receiver and restart. .s A new file will be written with only good reception.

Are the clouds of bad press the <stop> key.

You see that on the desktop the .s files are saved. Copy it to your local c: \ drive. We can now Linux process by clicking on the upper right shut-down and we start on windows.

The program LRPTOfflineDecoder we will convert the .s files to images. For the settings of the program will be made using an .ini file, it must be next to the program. So you can specify in this ini file which s file should be used.

Fig1 6 After booting. Press the <72K> button, then you should select the file s, then the decoding starts and you see the image appear on the screen

Concluding remarks

What really appeals to me is that you can download a USB stick from the Internet with a full operating system which works super well and absolutely do not need to cost. You also have easy RTL

dongle receiver as needed. The only "real" hardware, the antenna and the amplifier. Incidentally, this is incredibly important because the dongle is insensitive.

Want readers to experiment more with gnuradio then I sample GRC scripjes of FM receivers etc. Have fun experimenting.

Left

Real time reception with SDR #

http://www.rtl-sdr.com/rtl-sdr-tutorial-decoding-meteor-m2-weather-satellite-images-in-real-time-with-an-rtl-sdr/

Van Dykes Electronics

http://www.vandijkenelektronica.nl/

Gnuradio live

https://gnuradio.org/redmine/projects/gnuradio/wiki/GNURadioLiveDVD

Pendrivelinux

http://www.pendrivelinux.com/universal-usb-installer-easy-as-1-2-3/

Dropbox with Meteor LRPT receiver

https://www.dropbox.com/s/8kc89wriludrrb8/meteor_qpsk_rx_rtl.zip

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LRPTOfflineDecoder Oleg

http://meteor.robonuka.ru/for-experts/new-lrpt-analizer/

Periodic variations in satellite signal.

Summary.

Periodical signal variations are visible if the satellite dish is a bit mis-pointed. Measurements and causes are be discussed.

The received signal from a geostationary satellite is not always constant. One reason may be atmospheric influences; For example, in heavy rain, the signal is attenuated considerably.

Another effect is that a geostationary satellite is not perfect in one position (to ground) can linger. Irregularities in gravity will push the satellite to an unwanted position. Further, "passing" sun and moon give gravity pushes. This must be corrected every now and then by means of the activation of the jet of the satellite.

In addition to these, there are also influences periodic variations in the position of the satellite, with a period duration of one day:

- The orbit of the satellite has a small angle to the equator (inclination). As a result of the satellite latitude will vary periodically between something north and slightly south of the equator. From our vantage point it looks like the satellite periodically goes up and down a bit.
- The track is not exactly circular, but slightly elliptical. The turnover rate is not constant, so during the day the satellite first drifts slightly to the west and then east again.

These provide two effects results in an 8-shaped movement of the satellite around the ideal point.

The question now is whether these abnormalities affect the signal strength. This of course depends on the size of the dish. For very large specimens, such as those in Usingen (north of Frankfurt) to the immediate receipt of Meteosat (20 m diameter), which is certainly the case. These dishes have even follow the movement of the geostationary satellite. If you visit in the past to the antenna farm at Usingen one could even hear regularly rotate the rotor motor. However, the adjustment was so small that the movement was not observable with the naked eye.

For small plates is follow fortunately not necessary, but it is interesting to try to make the signal variation, and thus the movement of the satellite, visible.

Fig. 1. I have merged a number of plots of. The dish used is a one meter Triax; the recipient a Ayecka SR1. The signal-to-noise ratio is easily readable in an automatic way from this receiver.

Horizontal depicts the time, from 0:00 to 24 pm (UTC). Vertically, the signal-to-noise ratio, in dB.

The upper (red) line shows the curve with the dish pointing exactly to the satellite. A tight line never is, but the course of a day does not show periodic variations. That was to be expected; the opening angle of the antenna is so large that the change of the satellite position does not come into the vicinity of the descending part of the antenna sensitivity.

Fig. 1.

After that I turned the dish about one degree to the west. The green line shows clearly see a (little ragged) sinus, with a maximum around 6 hours UTC.

By slightly off pointing the satellite is a deviation from the satellite position visible in the signal as it

is now received under the expired sensitivity of the dish. See Fig. 2.

Fig. 2. Signal strength as a function of the direction.

I then turned the dish about 1 degrees to the east. Result: the blue line. It is clearly visible now that the sine wave is in phase opposition; Now the maximum is at approximately 18:00.

Unfortunately, by all kinds of perturbations to see quite a lot of rare dipping in the figure, but the sinusoidal variation is still clearly visible.

The question now is whether this truly variations are the result of the above-mentioned inclination and eccentricity of the satellite orbit. Using an orbit computation Xtrack like this is easy to verify. Geostationary satellites are viz. Also Kepler data (track data) available. See Fig. 3. Now, by itself to vary the time (hours) can be displayed directly to the movement of the satellite. Which is very little, but the elevation still shows a deviation of about +/- 0.1 degree. Not enough to see signal variations at a good directional antenna, but with a deviation of the dish first degree (at a one meter dish).

As far as I can ascertain the deviation from the eccentricity is very low; currently it is not even included in the calculation in Xtrack. Yet a look at this ...

For me it was changing the azimuth easier than changing the elevation, which is why I chose the horizontal rotation.

One would expect that with the mis-pointing of the dish in the horizontal plane (azimuth), only the effect of the eccentricity would be visible and with mis-pointing in the vertical plane (elevation) only the effect of the inclination. However, the sensitivity to the edges in both directions will vary more. I therefore think in Fig. 1, primarily the effect of the inclination is to be seen.

Fig. 3. Xtrack shows the position of Eutelsat 10.

A number of people mount the course of the SNR of their receiver to a web-page:

http://www.satsignal.eu/mrtg/performance_eumetcast-europe_snr.php

Mostly nice straight lines, but eg. In Turin you can clearly see a periodic fluctuation. Most likely, therefore, the result of an improperly oriented receiving antenna.

To conclude it is nice to see what Meteosat-7. This was launched in 1997 as the last first-generation Meteosat, and so for 18 years running. He is now over Asia (57.7 degrees East). There is not enough fuel in order to correct the orbit; the inclination has increased significantly. As a result, the latitude ranges between +9.9 and -9.9 degrees. By comparison, Meteosat-10 has a deviation of only +0.3 -0.3 degrees ... and Eutelsat 10, which I have measured just ... +0.1 -0.1 degrees.

It is possible to receive Meteosat-7 in western Europe; the elevation varies between 4.8 and 22.2 degrees. For this geostationary satellite it would be necessary to track it, if you would like to receive it continuously!

Finally, do you want to do yourself these measurements? Choose a time when the weather is calm; no rain, little wind. I did in fact have to register some days to see a pretty nice course for the three cases (the first day was beautiful, hence the sleek red line, then it went wrong ...). In all days, the charts were not so nice but the sinusoidal course was always visible, and the phase stage was consistent.

A smaller dish will have to be some further rotated to see the effect.

A monitor for the SR1

Summary.

An alternative monitor be discussed for the Ayecka SR1 receiver. One of the features is the SNR That can be shown using a (very) big font size.

For Ayecka SR1 receiver is a monitoring program available, see Figure 1. Such a monitor is actually essential for the optimal alignment of the dish.; a signal strength meter is not suitable because of strong adjacent signals.

The monitor looks nice (other than that weird Einstein-figure top-right, no idea what it refers to). The meters with the small needles looks good, but really this is not practical, if you want to read from a few meters away, the signal strength.

Fig. 1. SR1 controller Ayecka.

Fortunately, the state can also be read out programmatically, through a telnet session. All communications with the SR1 runs through the ethernet connection, so both the received data and setting commands and retrieve status. (The SR1 has two ethernet connections, which may optionally be used separately so that data on the one hand and control / status runs through the other terminal.) To retrieve the status similar to the way you are setting such as a modem:. You get on a black screen with a menu numbers, and by choosing the correct number sequence you eventually get the desired status on your screen.

Requesting the status can be automated using SNMP: Simple Network Management Protocol. This is a series of commands to which (in this case), the SR1 can be controlled, which then responds with the requested information.

SNMP is a standard, and thus for all kinds of equipment designed and supported by many manufacturers. To run this well every manufacturer has its own identification code, which each command begins.

Example:

For Ayecka is the code: 1.3.6.1.4.1.27928.101

To request the signal to noise ratio it must be added the following code:

.1.4.4

The SR1 then responds with an integer value, eg. 128, which is to be divided by 10. Thus we get so SNR with one decimal place: 12.8. With different codes can all status information of the SR1 can be requested.

Now it is possible to write your own monitor program; see Fig. 2.

Fig. 2. SR1 status.

This is shown a lot of information in a compact manner. By clicking on the button "Big SNR we get Fig. 3:

Fig. 3. SR1 status with bloated SNR.

These big letters are easily readable at great distances.

First I monitor the program written for Linux in C / GTK, where I also wrote my other programs. Francis Bream (GEO Member) had already made some Perl to get some specific data from the SR1; here I took the knowledge to write the same monitor in Perl. It thus works on Windows, and furthermore one can change the program itself according to individual preferences (eg. Change the size of the SNR-figures).

To get the Perl program working is not so easy under Windows (Linux does this a lot easier). Therefore, there is now also a compiled version.

The monitor is available in three versions:

- Perl script itself can be adjusted; runs under Linux and Windows
- Compiled Perl script for Windows
- C / GTK version compiled for Linux

See:

http://www.alblas.demon.nl/wsat/software/monitor.html#perl

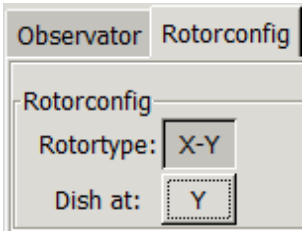
XTRACK INSTELLINGEN VOOR ARDUINO ROTORBESTURING

HarrY H. Arends

Summary
How to let Xtrack correctly communicate with the Arduino XY-Dish steering program.

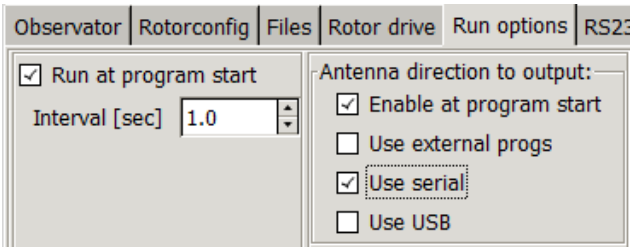
At the working group meeting at the nov.14th it was revealed that it is very important that the program Xtrack of Rob Alblas [1] is configured in the correct manner. First of all, the program is intended to be installed on the computer. [2] At the time of writing, Rob already released version 2015.3 of the program.

Once the program is installed and you have selected the satellites to follow, we now make the settings for using the Arduino. Via menu Edit> Preferences opens a window with various settings. Some have already been pre-defined and will be completed and therefore not covered here. First the type of rotor must be indicated in the Rotortconfig tab. Xtrack can both AZ / EL and XY rotor control systems. In our case we choose XY.

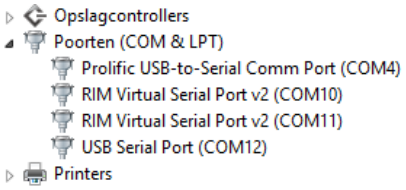


The next tab is Run options. In an automated system, it is convenient that the program will start immediately. This is done by tick Run at program start. Interval defaults to 1, and in our case for the time being sufficient. In the next screen part you must place check marks as shown below. These ensure that the XY values right at the start of the program is available.

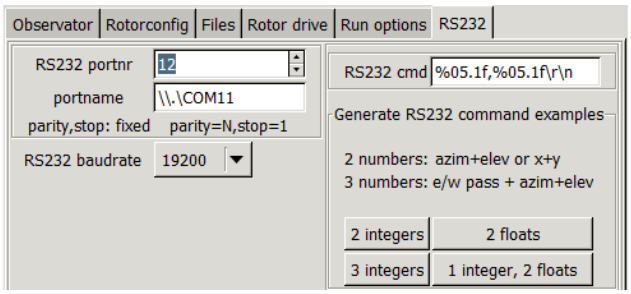
Be sure to select "Use serial" box and NOT "Use USB". We work with the RS232 protocol; Windows converts it under water to a COM port that is connected to USB.



The last tab, RS232, contains the information which must be sent to the communication port. In the left pane, you need the RS232 portnr. so set that "port name" indicates the desired port. Within a Windows system, you can find it as follows: go to Start -> Run, enter devmgmt.msc and click OK. The 'Device Manager' will open and under the "Ports (COM & LPT)" you will find the used port.



To keep the program Xtrack as universal as possible, there are a number of options [2]. You could send even the "old" 8052 Videre system commands. The Arduino expects two values with one decimal place, and ends with a carriage return (\ r) (and a newline (\ n) as below filled in. Now click Save Preferences and then exit. Xtrack is now configured for Arduino.



[1] Xtrack downloaden http://www.alblas.demon.nl/wsat/software/soft_trek.html
[2] Xtrack installeren KM2013 nummer 3, pag. 92
KM2013 nummer 4, pag. 137

Report meeting November 14, 2015.

Opening by the Chairman.
We keep it short, in connection with measurements that we do later outside.
There is a for sale board with FPGA + ARM processor; this business can be useful in combination (eg. a complete HRPT receiver). We still have to see if the FPGA has enough capacity to be able to make future business. If there are people interested than we could possibly make a joint purchase.

The equipment and other goods originating from (former) members who quit the hobby are all sold. It has raised more than 75 euros.

Adoption agenda
No supplement.

Administrative Affairs
We are looking for a webmaster.

Satellite Status
See elsewhere in this KM, as always cared by Arne.

Any other business
Arne is concerned with the testing of a relatively inexpensive USB receiver for EUMETCast. The receiver is not suitable for HVS, but should be good enough for what we received with the old system could receive DVB-S as well.

Harrie has selected a layout in the area of plates and platesetters, in particular how the imager must be optimally dimensioned.

Harm de Wit has an old WEFAX receiver tapped on the head, SSB electronics. He asks if anyone has documentation.
He is busy with QPSK reception.

Henry shows a setup that aluminum rods can be bent for a homemade dish.

Elmar again has a layout in his "shop".

Wim Bravenboer shows a helical he somewhere. Always interesting to see how others do something.

Peter Kuiper has trouble controlling rotors with an Arduino, using programs Xtrack. The same configuration works at Harry okay. We look at it later. (It later appeared in an institution Xtrack not be good.)

Arne has bought a component tester of only 20 euros.

There is a special version of "DishPointer 'for a phone. With DishPointer you can see via Google Maps in which direction the satellite is located. With the phone version is the satellite projected onto the image of the camera; so you can see very handy if there eg. trees are in the way. There are paid and free versions of these Ap. The question is how accurately it is. Arne look at it further.

Ben has tested a 3 meter dish, with Peter Cooper, in a pasture. The result was disappointing; Apparently this dish is not made as accurate.

Closure

Afterwards followed the "measurement day". Luckily it stayed dry for a long time so we have expanded beyond measure. With an MSG-looking dish of 1.5 meters measured signal how many we receive. The signal appeared to be about 6,5dB above the noise floor. Precisely by the imagesetter places we could optimize the reception.
For this measurement, use was made of a HPR137 Rigol receiver and a spectrum analyzer.

In between, there is also an FPGA for the HRPT decoder programmed (this we can now do without hesitation during a meeting) and there is again a lot of talking.
All in all it was a very interesting day.

Rob Alblas
(Secretary AI)

POLAIR	APT (MHz)	HRPT (MHz)	Orbit
NOAA 15	137.620	1702.5	Morning/evening, HRPT is weak
NOAA 18	137.9125	1707.0	early morning/afternoon
NOAA 19	137.100	1698.0	mid-day/night
FengYun 3A	no	1704.5	AHRPT new high speed format
FengYun 3B	no	1704.5	AHRPT new high speed format
FengYun 3C	no	1701.3	AHRPT new high speed format
Metop-A	off (137.100)		1701.3 LRPT/AHRPT
Metop-B	no	1701.3	AHRPT only
METEOR M N1	137.100 LRPT	1700.0	MHRPT occasionally bad scan lines
METEOR M N2	137.100 LRPT	1700.0	MHRPT
NPP	no	7.75-7.85 GHz X-band only 15Mbits/s	

FengYun 3A, 3B and 3C only emit AHRPT and cannot be decoded using a normal HRPT receiver/decoder. Unfortunately this AHRPT is not confirm the Metop AHRPT standard either. FengYun 3C uses a different data rate than 3A and 3B (3.9 Mbps).

Unexpected Meteor M N1 came back to life after they lost contact in September 2014.
To prevent interference, M N1 or M N3 may switch to 137.9125 MHz.
Meteor M N1 and N2 LRPT can be received using an RTL dongle !
See https://groups.yahoo.com/neo/groups/GEO-Subscribers/info
MHRPT mode is not compatible with HRPT decoders but the new Rob Alblas decoder has a special MHRPT mode !

NPP (NPOESS Preparatory Project) only emits on X-band with 15 Mbit/s data rate. A tracking dish with a diameter of 2.4 meter is recommended, making this satellite out of reach for amateurs !

NOAA 16 is said to have broken down into several pieces, see: http://spaceflight101.com/noaa-weather-satellite-suffers-in-orbit-breakup/

Launch dates

Meteor M N3	December 2016 ?
Metop-C	2017

GEOSTATIONAIR	APT (MHz)	(SDUS)/PDUS (MHz)	Orbital position / receive
MSG-4 (MET-11)	1691 LRIT	1695.15 HRIT	3.4 degree W, in test phase
MET-10	1691 LRIT	1695.15 HRIT	0 degree W, operational
MET-9	1691 LRIT	1695.15 HRIT	9.5 degree E, RSS
MET-8	no LRIT	-	3.5 degree E, Backup
MET-7	1691	1691	57.5 degree E, Wefax only test
GOES-E (no. 13)	1691 LRIT	1685,7 GVAR	75.0 degree W via EUMETCast
GOES-W (no. 15)	1691 LRIT	1685,7 GVAR	135 degree W via EUMETCast
GOES 14	1691 LRIT	1685,7 GVAR	105 degree W, Backup
Elektro-L1	1691 LRIT	1693 HRIT	76 degree East, via EUMETCast
MTSAT-1R	1691 LRIT	1691 HRIT	140 degree E, Backup for MTSAT2
MTSAT-2	1691 LRIT	1687.1 HRIT	145 degree E, via EUMETCast
Himawari-8	no LRIT	no HRIT	Operational, only via HimawariCast
FengYun 2D	-	-	86.5 degree E
FengYun 2E	-	-	104 degree E, now via EUMETCast
FengYun 2F	-	-	112.5 degree O, Backup

MET-10 is currently the operational satellite, images can be received via EUMETCast.

Launch dates

Elektro –L2	11 December 2015
GOES-R	delayed up to September 2016

Since 31 dec 2014 EUMETCast is only receivable using DVB-S2 VCM on Eutelsat 10A 10 degrees East !

To enable further expansion of the amount of data transmitted over EUMETCast in near future EUMETSAT migrated in Augustus 2014 from DVB-S to DVB-S2 with VCM mode.
The new transponder is located on Eutelsat 10A, 11263 MHz H on orbital position 10 degrees East.
De mode used is DVB-S2 VCM 8PSK 3/5 (Basic Service) or 16APSK 2/3 (High Volume Service) with a symbol rate of 33 Msps.
Unfortunately are DVB-S receivers and most "DVB-S2 without VCM" receivers not suitable anymore.
Using a special driver, some DVB-S2 receivers can be used for receiving Basic Service Only. (This currently applies only to the TBS-5980 and Skystar 2 eXpress HD but not the SkyStar HD USB box)

The signal received from 10 degrees East uses a larger bandwidth and this shows a lower signal level compared to before the migration.
Recommended dish size is still 80-90 cm for Basic Service but a minimum of 120 cm for High Volume Service.
During heavy rain showers we have seen loss of signal earlier and longer.

Since September 9 there are test transmissions with Himawari-8 data over EUMETCast van (only for users with "manufacturer" status). This is a new format, using 11 spectral channels with 2 km resolution, every 30 minutes. David Taylor, as ever, is preparing updates for his MSG Data Manager! See also http://www.jma.go.jp/jma/jma-eng/satellite/introduction/4_2HRIT.pdf
This data will replace the MTSAT data on EUMETCast.

The reception of EUMETCast data is free of charge for amateurs, but you have to register at EUMETSAT and buy software (60 Euro) and key (40 Euro) once.
EUMETCast users can log on to EO Portal and check or change their personal settings. New users can register here too and you have to extend your license here every three years. By selecting certain data services you can add data /images to your EKU.
EUMETCast users have received their logon credentials by email.

For successful decoding of high volume data like MetOp and Modis, setting up a Ram disk is required. We recommend to keep the services limited to only those that you need, for EPS we recommend data channels:
EPS-10 MetOp AVHRR
EPS-15 NOAA GAC
EPS-18 EPS Service News

Last June EUMETSAT distributed a test version of the new Tellicast Client (version 2.12.1) via “Info-Channel-1” to a limited number of “manufacturers” and testers. Unfortunately this version is has not been distributed to all users yet.
The new client can place its “file database” in memory instead of disk and is suitable for High Volume Service. This could make running high volume data without a Ram disk possible.
If you only receive Basic Service upgrading is not mandatory. Please note that the new version uses a different syntax for channel selection in recv-channels.ini, so you need to adapt you current settings.

To get an idea what the EUMETCast HVS service might bring in the future look at webpage for a mosaic from Europe, composed from 400 Sentinel-1A passes between May and July 2015. The spatial resolution is 120 Meter and the file is 3 GB ! See
http://step.esa.int/main/gallery/ and
http://step.esa.int/images/S1A_Europe_Mosaic_RGB_120m.tif

Thanks to David Taylor and Douglas Deans for info.