DE KUNSTMAAN

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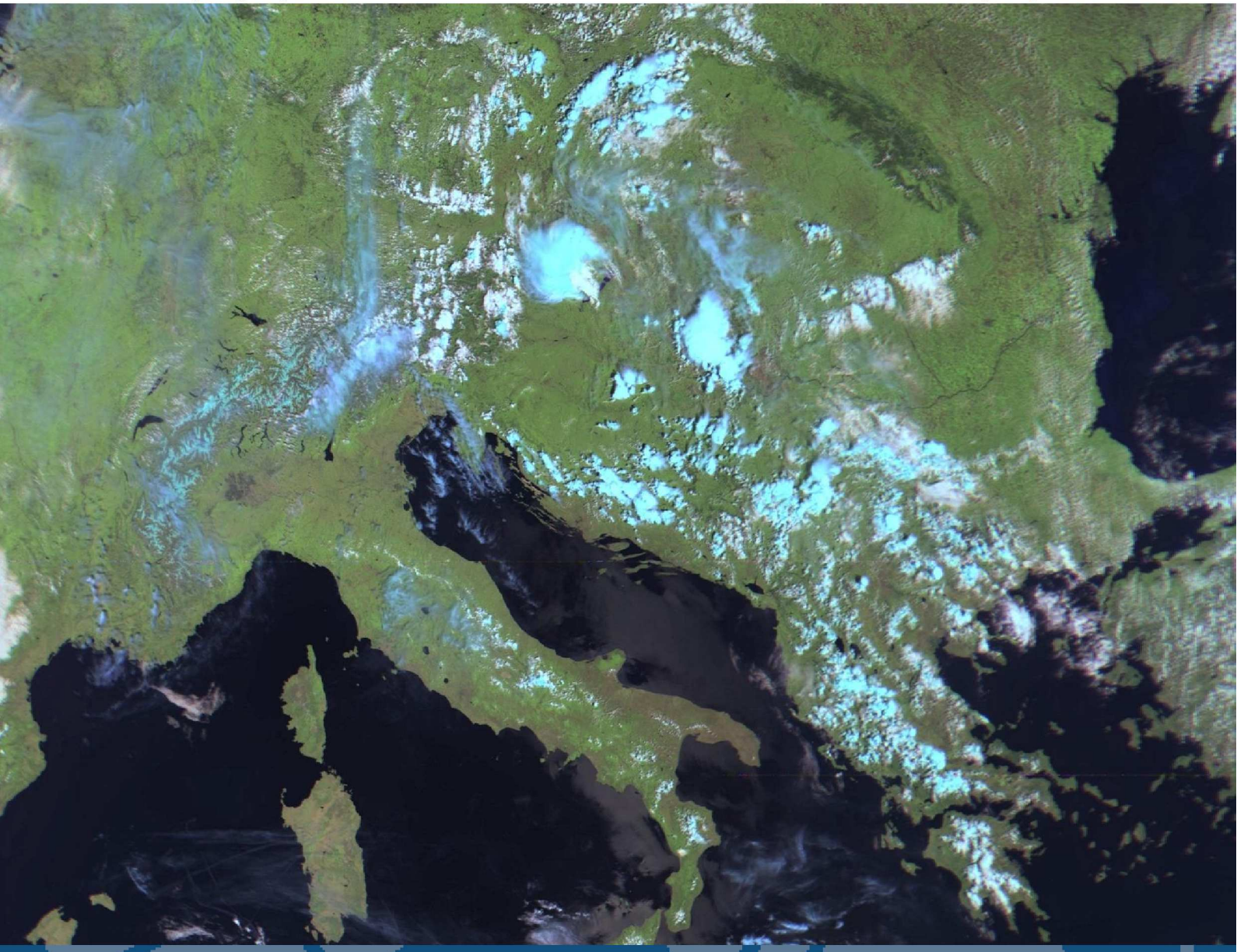

In dit nummer o.a.

Jaeger-rotoren

Meteosat-7

en nog veel meer

Dear member,

This pdf contains translated articles of our Dutch magazine “De Kunstmaan”.
Translation for each article is mostly done by the author, using Google Translate. Mostly some corrections are done afterwards. But for sure these translations are not perfect! If something isn't clear please let u know.

Figures are not always added; in that case please use the “paper” (Dutch) magazine together with these translations.

Internet links mentioned in the articles can also be found at our website; see under menu 'Weblinks' at:
www.kunstmanen.net

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

Rob Alblas
werkgroep Kunstmanen
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Content

Photo frontpage: FENGYUN 3C, May 23, received and decoded using QPSK-receiver and Fengyun-decoder

Preface

On May 13, the General Members Meeting of our Working Group was held. With 21 members it was a nice turnout. Around the May holidays it is always questionable how many members there are.

Last year in June Kunstmaan circulated the survey. The results of the survey you still owe and is included in this Kunstmaan.

QPSK receiver

In December and March Kunstmaan has been described by the QPSK receiver. In total, we have 20 subscribers to record. At the last meeting we have been able to distribute the first component packages. Unfortunately, we have not been able to make everyone happy. It is expected that the next series will be held around the September meeting.

In retrospect, it was quite a lot of work to complete the packages. Ordering parts from multiple suppliers, distributing smd parts, programming the Arduino microcontroller, soldering and testing of the LT5546 has cost a lot of nights, but it was worth it! Harrie, this place thanks to test the UV916 and SAW filters.

As seen in this Kunstmaan, with the new receiver to receive fantastic images of FengYun3. The many spectral bands make beautiful color pictures as possible. Rob has been able to decode, super! In this Kunstmaan an article of his hand about the data format of the FengYun.

With this receiver, the number of satellites we can receive is increased to nine: NOAA15, 18 and 19, MetOp-A and B, MeteorM-N2 and FengYun3-A, B and C.

If there are any more enthusiasm for the construction of this receiver, let it know soon. Some parts are poorly available or have a long (months) delivery time. Remember: If you want to do something with this receiver, you must have a tracking system with a tracking system, downconverter and a HRPT decoder with the GODIL!

Note: to receive QPSK you need a movable dish. You calibrate the receiver on the HRPT signal. Check first with an existing HRPT receiver and tracking system the functioning of the downconverter.

The GODIL

The real-time decoding of the Metop and the FengYun is possible by enclosing the Viterbi decoder in the FPGA. This is not something you just do! Rob this has made possible a receiver that has no equal in amateur circles.

However, because we are sitting against the boundaries of the GODIL FPGA and the USB interface (based on the FTDI FT245R chip), it is not said that the decoder remains in this form. The FPGA is very full and there surely must be some trics and be removed to get the data on the USB interface. For the USB interface, we are looking at the FT232H with half an eye, with ready-to-use modules.

But for the moment, the current decoder works (you need to have a new bit file).

Wsat

Rob has released a new version of Wsat on the fall of this Kunstmaan . In version 2017.3, it is possible to translate FengYun images. The Oleg program is no longer necessary. Live reception of the FengYun can now also.

Downconverter

In the previous Kunstmaan, a prototype of a downconverter was in place. Here we have done with some tests and came to the conclusion that the downconverter can be simpler in design. In September Kunstmaan comes more about this.

What will happen then? Rotors! Harrie has contributed in this Kunstmaan to the Jaeger rotors still available in England. With him, these rotors have been turning out without problems for years. Will there is now also a control system for DC motors such as are used in the Jaeger rotors based on the Arduino next to the stepper motor?

In this Kunstmaan there are many more details. Harrie breaks a lance for the "old" Jaeger rotors and Rob writes about decoding the FengYun 3 that we can now also receive. Fred has a good reception system. From my hand an article about connecting the QPSK receiver's prints.

It remains for me to wish everyone a nice summer holiday and I hope everyone will be able to meet again at the September meeting. Many entertainment and construction fun!

Weather satellites in Vietnam (24) **Fred van den Bosch**

Summary
My experiences with weather satellites etc. in Vietnam.

HRPT
Setting up a rotor ...
When submitting the version for the previous Kunstmaan, it was completely disassembled to be painted. A good opportunity to check the balance again and then add additional weight. There had to be 1 kg. on each side. Unfortunately, the shop only sells weights from 2 kg. So the big grinding wheel on it and I mounted half on each side. Resolved. Then I brought the whole to the roof, looked for a good place and mounted everything. To test it all, I pulled the cables outside the house to the first floor and temporarily put the receiver there.

… and testing
That was a problem. One of them was that the roof was a little sphere to drain the water to the sides. That's the theory. In practice, it is built by Vietnamese and therefore all tiles are more or less skewed, so the antenna support also. First a quick and coarse adjustment with level and compass so that there was a picture. Then extended fine tuning on the sun. But whatever I did, I kept interfering lines on the strangest places in the picture, for example, where the dish is almost straight up. And because there is also a GSM mast on about 200m, I never knew what caused the disturbances. During the test period, the weather also changed and pulled a thick cloud cover every morning to my piece of Vietnam. No way to adjust to the sun.

Ben came with to me one of his most brilliant ideas ever:
Do you have a spirit level and put the standpipe vertically? Then turn the rotor to 90/90. Then mount a string with a weight to the enamel. The gravity will show you whether the dish is on the zenith. If this is not the case, rotate the rotors until the dish is in the zenith.

Well, you need something to do. At first, I improvised a bit: I had to hold the string myself and arrange the alignment with sticks under the support. And that did not work at the same time, despite my high ape factor. Just googling for who does not know that concept. The weight is not yet exactly in the middle of the dish. Nevertheless, the first pass was the best one ever almost without lines and I could see Indonesia in HRPT for the first time! A huge success!

After that, I modified a cable tensioner was converted so that I could mount it to the helical, everything adjusted and more accurate and ...
• On the N-side well above the Himalayas
• on the S-side under Indonesia.
Better is not possible: the only obstacles-and so disturbances-are still the mountains, the trees, the water tank and the mast for PITA and weather stations. And there is nothing I can do, unfortunately. By the way, I cannot really grumble at all. The reasonable part of the picture often starts at 4-5 gr. elevation. The mountains around me run to about 7-8 gr. And my rotors are not modified and therefore do not go less

than 10 gr. In short, a gift of 5 gr. extra and a perfect reason not to rattle further on the rotors.

Cable tensioner
Om the picture the cable tensioner can be seen under the helical, shielded with a dark plastic bus. It is attached to the wire end, which keeps the helical in place. A cord with weight will then hang down. If the rotor is 90/90, the weight must point to the hole in the center.

Although, the only obstacles ... After adjusting, I got back the lines on the most strange places. In the end, the abominable quality of the Vietnamese / Chinese cable and plugs proved to be the cause. Rusting, tough soldering, etc. Soon looking for some better quality.

Photo
This is one of the best recordings I have received so far. He is from NOAA-19 on 14-5-17 at 14:53. At the bottom it starts at about 5 gr. elevation and Indonesia is well situated. At the top, the wide noise bar, which I have left for this picture, starts at about 5 gr. elevation. Unfortunately, there are a lot of clouds over the Himalayas, but there are still some mountain ranges visible.

Rotor
I attached the rain jacket, which is around the rotor, with a hose clamp. Of course, they are not of that size (23 cm.), So I made from 2 clamps one. Unfortunately, the mechanism also appears to be gigantic to rust here in this climate. Plastic clamps larger than about 10 cm. I have not seen at all. So again I improvised.

At my regular PVC shop, they have 22 cm closure caps. From such a cap I cut a ring with a cutter saw, cut a slit on the inside with a round grinding stone in the column drill. This falls around the round base of the dish antenna where the ribs are attached. Then I sawed it and used a hot air gun to transform the strip. Drilling holes and voila ...

Wsat and xtrack
As this project progresses, these two programs are increasingly refined and improved. Based on testing, updates appear regulary. Whoever uses these programs should definitely check out Rob's website for the latest version. [1]

Panoramic photo
I made a series of photos on the roof and merged them in Adobe Lightroom into a panoramic photo. For the time being I simply printed the result with a laser printer on an A4. Soon I want to mark the degrees so that I can see what obstacles there are before the actual transition.

Miscellaneous
Weather Forecasts
At the Astroforum there is an extensive topic on weather forecasts [2].

Mysterious glitters

The mysterious glare of satellite images of the earth can now be explained. See [3].

References

[1] Rob Alblas, see website
[2] Weather Forecasts, see website
[3] Mysterious glitters, see website

End of Meteosat 7

Summary

On March 31 st 2017 the Meteosat 7 was switched off. This ends the Meteosat First Generation program. A lot of amateurs were inspired by this satellite to receive the images.

The Meteosat First Generation. Behind the hole is the camera. At the top are the antennas on one individual during the rotation of the satellite were switched on. In Meteosat 7 did one of these antennas is not good and this gave a small dip in the signal level.

Introduction

On March 31, the Meteosat-7 was deactivated. This has put an end to a successful set of geostationary satellites. The first Meteosat was launched on November 23, 1977. The latter, Meteosat-7, was launched on September 2, 1997 and therefore has nearly twenty years had an active life in space.

Meteosat First Generation was an initiative of the European Space Agency for observations in real time to deliver "the atmosphere around the equator. For a lot off amateurs it was a good occasion to build its own receiving station as a tracking system was not necessary.

Special was that it was relatively easy to do direct receipt of these satellites because the broadcast format (WEFAX) similar to the APT format. In addition, there were also high-resolution broadcasts (PDUS).

Ground station

The pictures were first sent to the ground station in Fucino Darmstadt, and then sent to Darmstadt for calibration, the addition of borders, etc. After that, they were returned to the Meteosat which they then sent out to the end users. It is similar to EUMETCast but they do the re-broadcasts through television satellites.

Hendrik to the control stick of the Meteosat 7 in Darmstadt. Right on the picture the Indian Ocean in water vapor.

A typical amateur reception station consisted of:

- 120 cm dishwasher

- Low Noise Amplifier on teflon pcb

- The LNC1700, the downconverter

- APT or PDUS receiver. Different types have been designed by members of our workgroup

- For PDUS: HRI decoder

- Computer for storing the pictures

Broadcasts

Broadcasts are in three spectral bands:

- 0.5 - 0.9 um Visually

- 5.7 - 7.1 um water vapor

-10.5 - 12.5 µm infra-red

The whole globe was broadcast in pieces. The C format was for visible light, D for infrared and E for water vapor.

The earth divided into pieces. In the infrared and water vapor recordings, the earth was divided into nine pieces.

The C03 capture of Western Europe in visible light like "everyone" knows this.

False color images were also possible.

The second generation

On January 29, 2004, the MSG-1 became operational and renamed Meteosat-8. The Meteosat-7 was then moved to the Indian Ocean where they supplied images from December 5, 2006 to March 2017.

Closure

As a point of appreciation, I asked EUMETSAT to send out the following text:

"The Workgroup Kunstmanen thanks EUMETSAT and the MFG-satellites for providing splendid images of the world. We were very happy to be able to receive them."

This unusual request has been honored and they have broadcast it. However, via the EUMETCast broadcasts we have not been able to find it. Probably the text was sent as an admin message via PDUS or Wefax. So,if someone reads this of 30 - 31 last March we would like to hear.

The final picture as it is passed through EUMETCast, just turned the switch off.

With the end of the Meteosat-7, one end of a series of satellites which has led to the existence of the workgroup as a kind of thread. Looking at the quality of the images, the new generation has greatly improved, unfortunately, the DIY aspect is much less. When I speak to myself, self-building is a big part of the charm of our hobby, fortunately there are the polar satellites!

Connection of QPSK-HRPT receiver

Summary

This article describes the various connectors of the new QPSK-HRPT receiver

UV916 print

CON1 12V stabilized in. This connector is at the back (on the same side where the entrance to the UV916 sitting.

D2 LED: Indicates whether the receiver is switched on

D3 LED indicates whether the receiver is in lock.

P1 Tuner switch. This goes to the 12-pole rotary switch for the adjustment. At pin 1 is 5V, the runner is in the middle and pin 3 is GND. Between the 12 terminals of the switch come resistors of 3k3 to 10k.

P2 Connection for the I2C display. At pin 1 is GND, pin 2 is 5V.

P3 If you use the LNC1700 down converter (with a mixer frequency of 1557 MHz) place than a jumper between the pins D11, and D12. For the new downconverter (with a 1GHz mixer frequency) you do not put a jumper. The other header pins to the Arduino are for experiments.

P4 Band cable to P6 on the demodulator print. As short as possible due to the 36 MHz signal.

P5 Not required. I2C connector for experiments.

P6 Not required. This is an output of 5V / 12V, for example for the decoder or HRPT-down converter.

P7 Not required. Header pins to the Arduino, for experiments.

P8 Not required. Header pin to the analog input A2 of the Arduino, for experiments.

P9 Not required. For Arduino in-circuit programming, with the FTDI "USB to TTL Serial Cable"

QPSK demodulator

P2 I and Q output to the oscilloscope. Middle pin is GND. The pin on the side of the 74HC4053 is the I signal, to the pin on the side of C11 is the Q signal.

P3 The output to the HRPT decoder (GODIL). The middle contact is GND. Left, on the side of C5 is the I signal, the right is the Q signal.

P6 Band cable to P4 on UV916 print. As short as possible due to the 36 MHz signal.

JP1 Jumper 1: QPSK pulse from the processor, not in use yet, leave open

JP2 Jumper 2. This jumper determines the modulation type. This goes to a change-over switch on the front panel. The center contact goes to JP2, on

the side of C5. One side of the switch to GND (QPSK), the other side open (HRPT). In the future this will be sent by the Arduino.

P1 Not required. The power for the demodulator print comes through the band cable of the UV916-print.

P5 Not required. HRPT fine-tuning with a potmeter of 100k. Connect between +5V and 150k to GND. See also the text on page 18 Kunstmaan December 2016.

P7 Not required. Measuring point, here 2.5V must be on.

P8 Not required. Measuring point for the VCO voltage, the value you see on the LCD display.

To help build the demodulator print, a picture is shown below. On request this is also available digitally, so that you can show them large on your screen when building.

Here the completed demodulator print. The LTC1566 does not have such a clear pin 1 mark. The side where pin 1 is located is bevelled, the other side is straight and is perpendicular to the side. From the top of the chip it is seen with a loupe. Formally, you cant use the imprint to determine the orientation of the chip.

Connect to the decoder

The I and Q signal from the receiver must be connected to the HRPT decoder:

Connector K4	**GODIL con**	**FPGA con**	**Name**
1	D1	P91	Generator Out (I)
2	B2	P12	Generator Out (Q)
3	D3	P11	Decoder in (I)
4	B4	P10	Decoder in (Q)

Connector K4 is located to the right of the GODIL (on the side of the 74HC04). The I and Q inputs are on pin and 4. The outputs of the generator are 1 and 2.

Note that there is also a GND connection between the decoder and the receiver.

Information about the QPSK-HRPT receiver

The following information is available about the construction of this receiver:

Kunstmaan December 2016

- Schematic and description of the demodulator print.
- Schedule and description of the UV916 print
- Schedule and description of the display print

Kunstmaan March 2017

- Schedule and spare parts list of the new UV916 print. This eliminates the display board, which is now on the UV916 print integrated.

Zip file, on request

- Parts list
- Schemes
- Component Setup

JAEGER ROTORS FOR ANTENNA TRACKING

The simple mechanical alternative.

Harrie van Deursen

Summary
Harrie presents an antenna rotor that works for more than 17 years. It is based on Jaeger SMR-99g rotors. The rotors seems still to be available in the UK. Shipping costs are very high. Perhaps one of our UK-based members can advise in purchasing multiple rotors and shipping them to the Netherlands? We would be very thankful.
In this article Harrie also discusses the differences between azimuth-elevation and X- Y-rotors. The construction of the azi-ele rotor is much easier. For the XY-rotor the tracking-speed for high elevation is never a problem.
In the future the Elektor processor board with the 80C32 should be replaced by an Arduino.

History.
In June 1998, I successfully purchased 2 Jaeger SMR-99g HH rotors for the amount of 398 Dutch Dutch guilders. Then I went to figure out what those things were performing and how I could drive them with Celestrak's track data.

Fig. Offset-dish mounted at the elevation rotor

HH stands for Horizon to Horizon and then we speak about a range of at least 180 degrees. That sounded like a good opportunity for HRPT.

Fig. Bottom of the azimutrotor

Of course I have opened the construction. On the output shaft we see a gear that can be capable of up to 220 degrees twist. The gear is driven by a worm wheel which is pressed with an adjustable resilience and thus makes clearance free.

Fig. The Jaeger rotor opened

At the bottom, the gear wheel rests on a ball bearing. Above the output shaft for 38mm tube it turns into a plastic tube which must catch the lateral forces of the weight of the (maximum 120cm) dish. Too bad that there is no ball bearing, I think .....

Fig. The Jaeger Basic Block with the worm printing spring

Fortunately, after 17 years of faithful service and sufficient lubrication, the whole thing still works well with support of both outgoing axes in my azimuth elevation configuration.
Then the connected motor with delay and pulse generator. Mechanically, loosen a bolt and you can remove the part that drives the worm wheel.

The motor operates at up to 36 volts DC and then does 180 degrees over 30 seconds. Depending on the load, the engine draws a current between 80 and 300mA. He is very strong due to all delays between engine and outgoing 38mm shaft.

Fig. The end switch and pulse generator

In addition, I've investigated how the feedback update works. This is via a rotating magnet above a reed contact giving 3 pulses per degree. Handle such a fully insulated system that allows you to count on all sides to count failure-free pulses and to determine the current position from the reset point.
The reset point is determined by an adjustable microswitch limit switch that interrupts power to the engine, this can never be wrong! Also on the other side of the 180 degree range, you have an adjustable microswitch to prevent you from getting out of range of the gear.
The aluminum cast gear has two cams at the bottom which mechanically hold a greater twist than about 190 degrees, but for an AZ-EL setup we need 220 degrees for the Azimut range.

Fig. The azimuth rotor needs a turning angle of 220 degrees

Just remove the two cams and you're ready for the AZ-EL system, which is now my preference because of the simpler configuration compared to the XY system.

AZ-EL is fully supported by Rob Alblas's latest Xtrack software that accurately predicts whether an East or West transition will take place.
This last played a major role in my preference for AZ-EL over my previous preference for XY control.

Why is the East West prediction important?
The AZ rotor can rotate over 220 degrees. If you assume a north-south transition in Eastern sector, the AZ rotor rotates clockwise between 340 through 90 to 200 degrees.
In the sector west, however, the AZ rotor must turn counter! Rotate between 20 through 270 to 160 degrees. Additionally, the dish must be folded to the other side so that 180 degrees EL becomes 0 again in the west.
The whole system is therefore mirrored in terms of control and the software will handle it for you.
If you start wrong, the AZ rotor will clamp towards its final position.
In my AZ-EL software, I avoid clogging and still returns the system once you reach the AZ. For a while no signal is the result, just above the Netherlands of course!
The overlap in AZ range requires you because the sun-synchronous jobs are almost 10 degrees inclined to the poles.

What are the pros and cons of AZ-EL and XY control of our dishes?
With AZ-EL you have a simple mechanical system that allows the azimuth rotor to rotate in a range of 220 degrees. The elevation engine is easy between 0 and 90 degrees and you can balance it perfectly with a counterweight to compensate for the weight of the dish.

Disadvantage: At a high turn, the azimuth rotor must rotate 180 degrees in a short time to get south to north (or vice versa), and this can sometimes cause a weakening of the signal.
Additionally, you must now use an Intel BASIC-52 Controller from the 2000s that is in EPROM on the 80C32 board of Elektor. However, it will continue to work perfectly.
Our hope is based on members who transfer my BASIC program to a single version for the current Arduino, so that the relatively large 80C32 BASIC board can be replaced by one small Arduino processor.

Then the XY system. The advantage is that both rotors rotate symmetrically 180 degrees, and there is never a signal failure at high elevations. The disadvantage is that the mechanical construction is a lot more difficult due to the Rotor-on-Rotor and that you can

only balance the lower (NZ rotor) to compensate for the dish weight including the upper rotor. Speed problems only occur at a very low elevation.

Advantage is the available XY control at Arduino level. This was developed by Harry Arends for Peter Smits's unique stepper engine setup. Whether there is a well-functioning version available for DC motors like the Jaegers with pulse generator and feedback, I do not know.

My AZ-EL system has been working for 17 years and recently I have made an improved BASIC version, which allows you to select an EL offset via the selector switch and the speed of the program is increased.
Controls run from the PC via the serial port to 19k2 in the form of x, az, el where x = 1 for an east and x = 0 at a western passage.

As a challenge, I have built up an XY system with two Jaeger rotors and developed matching BASIC-52 software with the east-west rotor (x-axis) on the dish.
Conversion of AZ-EL to XY takes place in this program, with the LCD display remaining current in AZ-EL, as that says much more.

Fig. Jaeger rotors in an XY setup

Mechanically, there is little ready to choose if you want 180 degrees and at the AZ-EL system, even 220 degrees.
After searching the Jaegers appear still for sale in the UK for 86.58 Euro at www.plutodirect.co.uk called Geotrack SMR 99g Silent Gold HH Mount. Unknown shipping costs to the Netherlands are still included. Joint shopping seems sensible: sign up with our chairman Ben Schellekens.

Future
The Future We Should Work As a Workgroup!
Controlling the Jaeger rotors through an Arduino processor instead of the 80C32 Electrical board. The driver operating on 36v DC via a 24V AC transformer is still a working option, even though it could also be smaller. We need 3 control signals per rotor: ON-OFF, LR, High-Low speed. From this sign, 3 pulses per degree of rotation come out per rotor.

After a reset, the rotors go to the limit switches to stop the pulses, easily detected in the software. This position is then at least 1 degree below the 0 degree, so you will never get to the limit switch during normal operation, as the software does not allow it.

Then you send the rotors to the desired starting positions such as AZ = 180 degrees and EL = 90 degrees, the storm stand! Also after a transfer, you send the dish back to the storm stand.
In principle, the system must be able to count perfectly the 2 rotor pulses and versus the axial and elevated track data can send the rotors in the right direction.
Who dares to convert my BASIC-52 software to an Arduino processor yet to be chosen?
Of course, I give all information about the current control. There's work to be done!

Decoding from Fengyun

Or: Why doing it easy if it can be done difficult?

To start with the subtitle: If anyone can explain me which benefit the Fengyun decoder's design has over the METOP decoder, then he/she is invited to explain this to me!

After reviewing the format as broadcasted by METOP, it is the turn of Chinese Fengyun satellites. These satellites form a welcome addition to METOP and NOAA satellites, and additionally have 10 instead of the 5 channels of METOPs and NOAAs.

The Fengyun satellites broadcast in the same 1700 MHz band, and modulation is the same as with METOP: QPSK with approximately the same data rate (slightly higher): 5.2 to 5.6 Mb / s (Metop: 4.6 Mb / s). The already published QPSK receiver of Harrie v. Deursen is suitable to receive this.

The Fengyun satellites also use Viterbi encoding, but the way this is arranged is completely different (and I think it's unnecessarily complex) compared to METOP. So, unfortunately, a special adaptation is required to the decoder to also decode Fengyun.

For the sake of clarity: we are talking about the Fengyun-3 series, not the Fengyun-1 series, which released CHRPT (also supported by the decoder), and of which one was shot “down” by the Chinese with a rocket, to the glory of themselves.

To put in a framework, first an overview wil be given of the different ways a bitstream of a weather satellite is broadcasted.

NOAA, METEOR

Here, the bit stream is transmitted one-to-one; see fig. 1. Simple, no error correction possible.

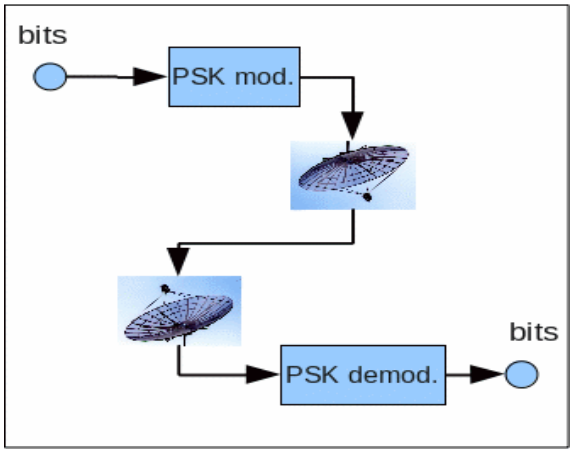

Fig. 1 NOAA/Meteor data transmission.

MSG

Just a trip to geostationary satellites. Meteosat 2nd generation can be received directly, i.e., without Eumetcast in-between. The bitstream is Viterbi encoded. The Viterbi decoder has been discussed before ([1], [2], [3]). The encoder has a 1-bit input and a 2-bit output,

so the number of bits to be transmitted is doubled. Since MSG broadcasts in BPSK, the two bits must be time-multiplexed (one by one) transmitted. See the "switches" in Figure 2. On the receiving side, the serial bitstream must be converted to 2 bits in parallel before it can be offered to the decoder.

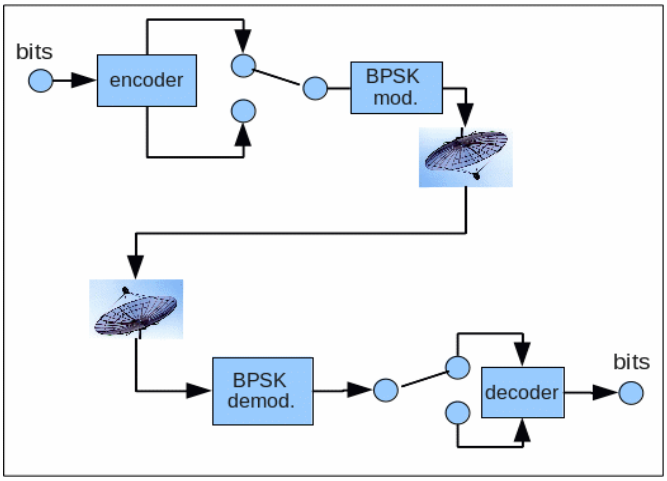

Fig. 2 MSG datatransmission

METOP

Again back to the polar satellites. METOP has already been discussed extensively. METOP also uses Viterbi encoding, but the "punctured" version. The latter does not matter right now; here too, the bitstream is doubled initially, but only 2 of each 3 pairs of bits are transmitted. However, it remains pairs of bits. Because Metop broadcasts in QPSK, which means that actually 2 bits at the same time are sent, this matches very good with Viterbi encoding. See Figure 3.

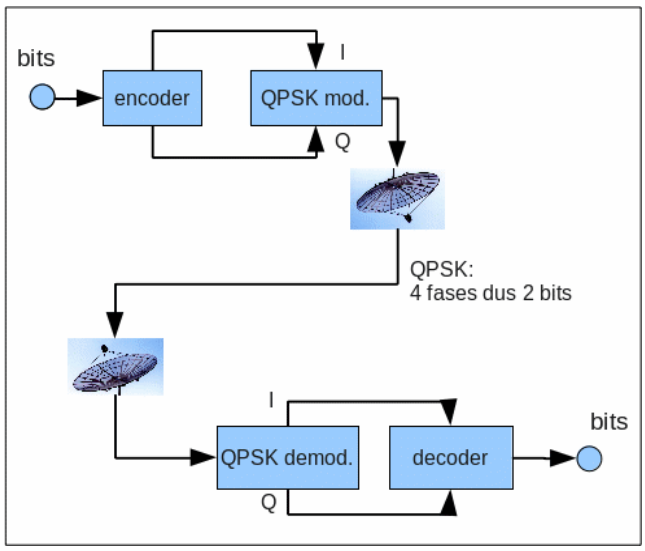

Fig 3 METOP datatransmission

And now:

FENGYUN.

Also QPSK, also (punctured) Viterbicoded, basically the same as METOP, but with a

completely different layout. See Figure 4.

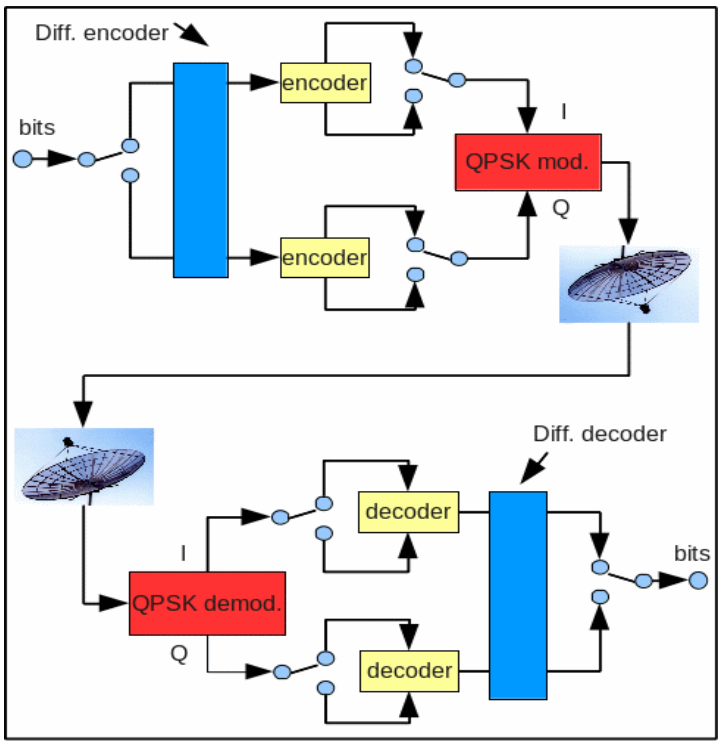

Fig 4 Fengyun datatransmission

Here the bitstream is first divided into even and odd bits. The two bitstreams first go through a differential encoder (discussed later on), and are then offered to two separate Viterbi encoders. This results in 4 bits, while only two bits can be transmitted with QPSK at the same time. This is solved by time multiplexing, so actually like MSG is doing for the entire bitstream. The resulting bitstreams are then transmitted via the I and Q channels, respectively.

On the receiving side, the entire party can be executed in reverse order, which also means a dual Viterbi decoder. This is precisely the part of the decoder that requires the most logic, a single decoder just fits with the rest of the logic in the GODIL module. With a trick, I managed to put both decoders in a single GODIL. So we can still move forward with the current GODIL module.

Differential Encoder / Decoder

This is a function we have not yet encountered in the various decoders. I'm not exactly sure what the purpose is. Maybe I'll come back later, and if you know ....

In terms of logic it does not matter very much; a couple of gates, a few flipflops.

Duplicate Viterbi decoder

As mentioned, two Viterbidecoders are needed for Fengyun. Unfortunately, there is no space for these in the GODIL-FPGA.

A digital circuit like the Viterbidecoder can be roughly divided into two types of blocks:

- AND / OR gates (combinatorial)
- Flip-flops (memory elements)

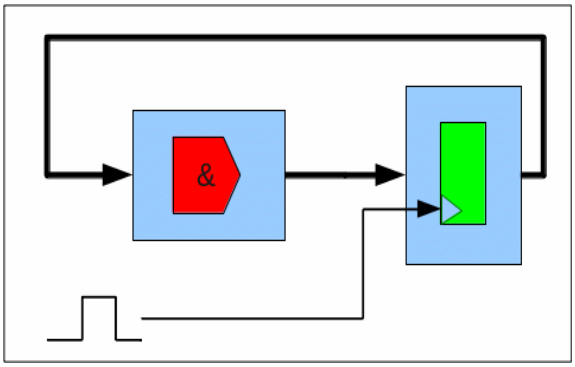

Fig. 5a Digital circuit.

Figure 5a shows (very schematic) how these are connected to each other. The flipflops are controlled by a so-called clock (square wave); at each beat, the outputs of the flipflops are processed through combinatorics and then stored in the same set of flipflops for the next stroke.

In the Viterbidecoder, especially the amount of combinatorial is large; there are enough flipflops available.

By means of time multiplexing the logic can do the calculations for one decoder in half the time and the calculations for the other decoder in the other half. (The clock speed must be doubled then.)

The amount of flipflops is doubled, but there are plenty of it; the amount of combinatorial will be slightly bigger but by far not doubled. See Figure 5b.

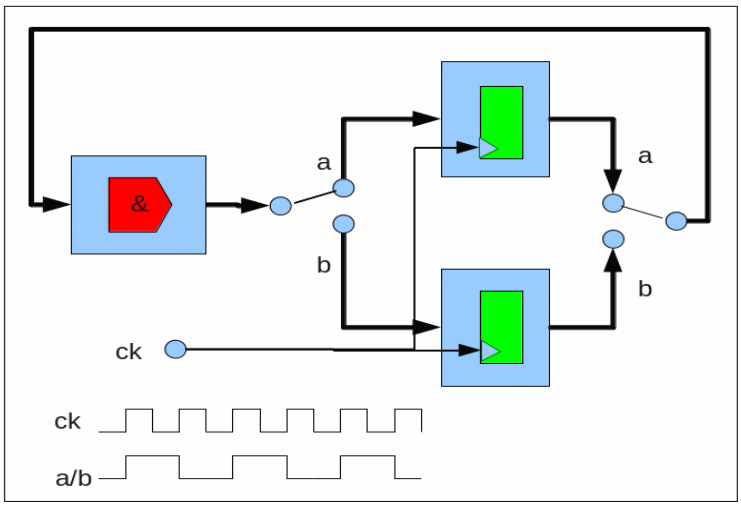

Fig. 5b Time multiplexing.

As a result, in the GODIL a single Viterbidecoder is implemented, used for METOP or for Fengyun. In the latter case, the time multiplexing is enabled to actually get two Vitrebi decoders.

Software processing

Finally, if the received and decoded bitstream is transferred to the PC, a picture must be extracted. For METOP this has already been extensively discussed in KM1. [4] For Fengyun, the layout seems to be the same at first, but .... at some point, China's “syndrome” comes up again: it must be just a bit different. Of course, there is a difference because Fengyun broadcasts 10 channels (metop: 5), but that is not fundamentally different. The separation in lines is really different.

Where at METOP the lines are transmitted separately (see [4]), Fengyun sends all data of a particular kind as one large bulk. Separation of the lines takes place by means of an additional sync word. For a data block of 26050 bytes the following format applies:

- Bytes 1-3: sync = 0x845BF5
- Bytes 4-26050: 25600 bytes for pixels, 447 bytes for calibration data

The wsat program allows for both recording and translation in a visible image. Wsat can also translate the received data into the hpt format (Metop) and C10 format (Fengyun); these formats can be read by HrptReader for further image processing. But also with wsat, beautiful colour images can be made.

Utilities

By finding out how the Fengyun format is constructed, I had a lot of support from 2 items.

In addition to the decoders, the GODIL-FPGA also has a data dumper. This allows the received I / Q bits to be stored directly in a file without any further processing. This makes it possible to first create and test the decoders in software. If that works, converting to hardware is not that hard anymore.

I do not have a reception station yet. Harrie v. Deursen, developer of the QPSK receiver, has recorded the raw data and sent it to me, after which I could get started. The KM magazine No. 1 of this year, at page 3, shows the result of the software decoder. A narrow band, but enough to prove that the decoder is working.

Looking at the decoder data, it's easy to see that data is OK: if the sync words are there, and in the right places, ie every 1024 bytes, then that's a good sign.

Of course, a picture must be produced afterwards. In particular, for Fengyun, it is difficult to find information about how this fits together. Here I had a lot of profit using Oleg's MetFY3x program [5]. This program translates the frames into a hpt format (Metop) or C10 (Fengyun). As a result, it was possible to quickly create a first test image. Ultimately, it is preferable to do everything in one program.

(The hpt format is, as far as I know, introduced by David Taylor, (or was it Timestep?) as a format to store NOAA data. It's a way to store 10-bit words with 8-bit bytes. The C10 format is a derivative of this, for the 10-channel Fengyun satellites. Both formats are supported by e.g. HrptReader.)

An overview of how the aids mentioned here are used are shown in Figure 6.

The top "red" branch shows the experimental road using the data dumper, software decoder and MetFY3x.

The bottom branch shows the final path, with the ability to use MetFY3x for hpt / c10 format, if desired.

There are 3 types of files available here:

- I / Q: raw data of the dumper
- Frame: after decoding; Here in a hex dump the synchronization words can easily be recognized.
- Hpt / C10: The 2 formats that HrptReader can read for Metop and Fengyun respectively.

Actually, the hpt format is NOAA format, to which METOP has been translated, and C10 format is CHRPT, the first generation Fengyun format.

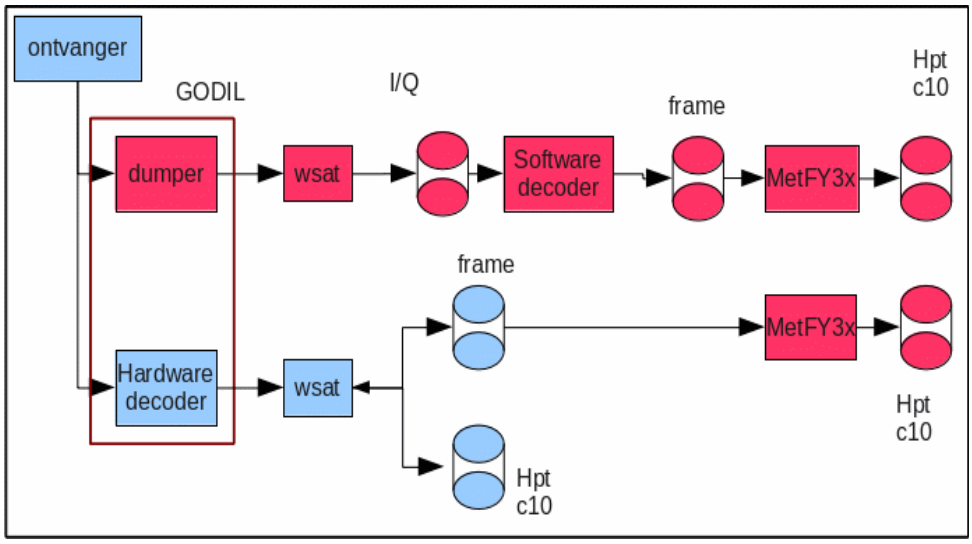

Fig. 6 Experimental (red) and ultimate setup of decoding.

Where are we now

Harrie v. Deursen has already made some recordings of Fengyun; with a clever combination of some of the 10 channels very nice images can be made. See the front page. There are still some improvements possible; at the end of a track, many stripes appear. Furthermore, due to the deviating frequency of Fengyun, the trimmer needs to be turned in the decoder when switching between Fengyun and one of the other satellites. This needs some more work to do.

The MetFY3x utility is no longer needed; Wsat can do all edits, and also display the image 'live', while receiving the data.

Fengyun sends out different data forms, including:

- VIRR day
- VIRR night
- MERSI

So far wsat only shows “VIRR day”, but if the other channels also provide interesting images then a choice option will be made in wsat.

Literature and links

[1] Receiving and decrypting LRIT. De Kunstmaan nr. 1, 2012, p. 18.

[2] Punctured Viterbi. De Kunstmaan No. 1, 2014, p. 20.

[3] Direct receipt of METOP. De Kunstmaan nr. 4, 2016, p. 7

[4] Direct receipt of METOP part 2. de Kunstmaan nr. 1, 2017, p. 13.

Report of the members meeting 13 May 2017.

Opening by the chairman.

We hold the General Assembly today.
Ben has been busy making component packages for the new QPSK receiver. It turned out more work than expected; Among other things because the Arduino's had to be programmed. A soldered LT5546 also belongs to the package, but this has to be done yet. People who want to try to solder the LT5546 themselves can take the parts with them, otherwise Ben will solder and send them by post. The UV916 and SAW filters have been tested (these are used parts). There is a list of what should be in the package; The request is to check that the package is complete. Indicate if you need the UV916 (this is the same tuner as in WRX1700). It saves you 12 euros; also, we have limited stocks. The SMD parts are not of the smallest type, but you may need a special “glasses-with-magnifying glass”. There are some redundant PCB’s available to practice SMD soldering.
It is advisable to first solder the SMD components (the print can then be placed flat on the table) and afterwards the "higher" parts.
To receive the METOP / Fengyun satellites, a new bit-file is required for the GODIL decoder, and the decoder needs a 2nd input (QPSK receiver has 2 outputs: I and Q).
There will be a Wiki site with information about building / adjustment of the receiver.

Setting the agenda
No comments.

Financial auditing committee.
The treasurer explains the figures (published in the March Kunstmaan). We continue to suffer loss, despite the fact that we have been able to sell some parts from donations last year. For the time being, we still have enough cash, but in due course the contribution will be increased. Moreover, the contribution has not been increased for at least 25 years (apart from a small 50 guilders to 25 euros increase in 2001).
The members of the Cash Control Commission (Wim Bravenboer and Peter Kuiper) were unfortunately unable to attend, but by chance, they sent their findings by email.
Our librarian Paul reads the statement:
"I went through the documents and can find no irregularities or shady practices. The auditing committee therefore grants the Board from liability for their financial policy for the period 2016. "
Discharge must ultimately be granted by the (present) members, which is done.
The chairman then asks for discharge in respect of the policy pursued, which is also granted.
Wim goes off for the next period; Job de Haas indicates willingness to take part in the commission. So he does that with Peter Kuiper.

Management
No changes.
Currently a lot of attention is being paid to setting up a new web site.

Satellite status
Given by Arne; See further in this Kunstmaan.

Anything else
It is reported that the directions on the website to reach Nimeto by public transport are no longer correct. This will be adjusted.

Arne: has ordered ebay amplifiers, these are as good as the much more expensive Mini-Circuits. They do, however, amplify a bit less, but are certainly worth the effort to consider.

Closure

Reading: Interdigital filter

Given by Jos Disselhorst, known as one of the organizers of the Radio Amateur Day. He has been educated as instrumentalist and has worked at the Kamerling Onnes lab in Leiden.
His motto:
Measuring is knowing, Guessing is missing, Gambling is docking.
Jos explains what to look for when building an interdigital filter. This begins with the search for a suitable aluminium profile in which the filter can be built. The filter consists of a number of (2 or more) bars with length approximately ¼ wavelength, attached to the wall of an aluminium box, opposite a screw. The rod behaves like a coil with impedance 0 at the attachment and impedance infinity on the other side. The space between that end and the screw behaves as a capacity; by turning the screw the capacitor is adjustable so that the filter is adjustable.
The lid on the box must be securely fastened, with many screws; It must be in good contact with the box. Also, the fixed end of the bars in the box must make good electrical contact.

There is a program in which the sizes can be entered, after which the pass characteristic and many other graphs can be displayed. Please refer to the following web sites:

http://www.changpuak.ch/electronics/interdigital_bandpass_filter_designer.php
http://www.ok2kkw.com/00000104/preselector/bpf_23cm.htm (in Tscjechisch)

An article by Paul Wade can be found at:

http://www.w1ghz.org/QEX/Waveguide_Interdigital_Filters.pdf

Then Jos gives a demo of the program on the "changpuak" site mentioned here.

Hereafter, Jos tells about the use of a spectrum analyzer in combination with a tracking generator, essential for adjusting the filter.

More computing software:
Other related websites:

The links can also be found on www.kunstmanen.net, under menu 'Weblinks->KM links 2017'.

Rob Alblas
(Secretary AI)

survey 2016

A survey form is included in the June 2016 Kunstmaan. Also, the survey was on the website. The result of this survey are a bit delayed. Below are the results.

A total of 22 members completed the survey. We take a lot of life experience with it, most of our members are 60 years and older, in only a few age begins with a 3, 4 or 5.

Very instructive was the reaction on the questions about the working group, the future and how we can attract more members.

Meetings

11 respondents attend the meeting 3 to 5 times a year. Those who don't do so because of lack of time, distance or illness. To lower the frequency is a bad idea.

About the location (the Nimeto). The location and accessibility are good, the parking is moderate until only experienced. The time of 11:00 is good, two respondents opted for 13:00 and Sunday. The lectures are appreciated. Yet there were five (of those who attend) indicating that it does not matter whether there is a lecture. Suggestions for lectures: GHz radio technology, new developments in the field of satellites, explanation of software and hardware issues, DIY.

Kunstmaan Magazine

The respondents were unanimous about the frequency of four times a year, this is good and the Kunstmaan is completely read.

The balance between easy and difficult items is good. Which subject, more or less does not come out clearly. There could be chosen from: self-building, HRPT, software, PC hardware, microcontrollers, FPGA and measuring instruments. Suggestions have not been given.

Eleven members are willing to contribute to an issue, some help is needed with a contribution.

Internet / Email

The website is poorly visited. Half of the respondents visit the site less than 1 x per month. The digital newsletter is unanimously appreciated. Social media: Whether there is no need or it is unknown. One member responded to finding it useful.

Suggestions for the website (only come from one person to the survey on the website have filled in): too little change, if you do not see what has changed. However, the site has many subjects with little content. It would be nice if the "hardware" page indicates in which the Kunstmaan the WRX1700 is discussed and the content of the "Werkgroep Handbook". Interesting is to collect the newsletters on the site.

Receiving equipment

Three quarters of respondents have receiving equipment (mostly self-build, MSG receivers are purchased) that operates. Eleven have a HRPT reception system.

Areas of Interest

The subjects SDR and GPS are called something more often than the other subjects. As a suggestion, the receipt of Inmarsat and measuring equipment also came.

Skills for the working group

Many give too little time to make sense for the workgroup.

Memberships

Some members are also members of Veron, the GEO or Benelux QRP Club.

Library

The use of the library is minimal. A single person uses it regularly.

Future

The future perspective often looks gloomy, the concern is expressed that the younger generation does not feel so attracted to our hobby.

Bring new interest

Through the bigger media to publicize our association. Community and TV bulletins to copy ask to fill their pages with free association news.

"Due to the development of remote participation by the younger generation and the unwillingness to come to meetings virtual meeting through social media future." On the workgroup information website placing the items discussed at the meetings.

More brochures that you can hand out the Day for the Radio Amateur. Some members are members of other associations and can also distribute the folder. But hanging posters at MBO and HBO engineering departments and more promotion in primary / secondary schools.

Entry articles for the young. Juvenile interest for using FPGA. Make something for the smartphone. Virtual gathering because young people are not willing to travel. Interesting projects quickly bring them off Are and work.

Functioning of the Working Group

In general, the assignment is to continue on the current path. Some suggestions: once a year a measuring day / building day. Soldering, sawing, drilling and welding metal as not everyone has a workshop available home.

Difficult components already mounted on board (we do this allready for the QPSK receiver). Joint purchase Eumetcast receivers, etc.

Concluding remarks

It is now up to the board to get started with these outcomes. One of the first action points is to pick up the website that has to be a spell in communication.

Everyone thank you for completing the survey. We have received a lot of suggestions for recruiting new members. Given the responses from the survey shows that the involvement is high.

Annual Report 2016

The Working Group

This year may well be called a very successful year. The many time invested in new QPSK receiver has paid in an efficient receiver that is unparalleled. As far as I am familiar, we as the working group are the only ones who have been able to design such a receiver in normal electronics parts. This receiver can also be used for receiving HRPT and the MHRPT!

The number of members of our group fell slightly at the end of 2016 with 107 members compared to the previous year. On the 24th of March, Jelte Hornstra died at the age of 82, in memoriam in the 2nd Kunstmaan. Huug deceased on October 29 at the age of 73, the In Memoriam is in the 4th Kunstmaan. In Jelte and Huug we lost two loyal members who regularly came to the meetings.
The new members are Job de Haas and Tim Holdsworth (England). Job offers fresh ideas about new satellites that we can receive new rotors etc. Also nice that we foreign members get there!

Meetings

As usual, there were five meetings of the working group. On 9 January, the first meeting with traditional and cozy New years drink. 18 man turnout was less than previous years. It's nice that Fred his visit to the Netherlands as, he was again present at the first meeting of the year! After the official part we looked at the drink for several rotors which had brought everyone.

On March 5th the second meeting, with an appearance of 18 men. After the official part, there was a lecture by Jan Meijer on the use of cavity filters of old mobile phones. Members are asked to bring old mobile phones so that the filters can be used. With diamond drills (old dentist brushes), the filters are cut to size.

On May 14, the General Membership Meeting was granted discharge on the policy pursued by 2015 and approval by the Cash Control Commission (consisting of Wim Bravenboer and Herman Grotenhuis) on the annual figures for 2015. The annual figures were published in the March Kunstmaan and show a loss of 534 Euro. With 17 members the turnout was low.
After the official part the chairman gave a lecture on software for designing circuits like Visual Studio for Arduino, AppCAD For RF and microwave circuits, Kicad for print design and RFSim99 for filter design.

On September 24th, later than usual, was the fourth meeting of this year. With 19 members, the rise was slightly higher. Rob gave a lecture on the techniques used to send digital signals. Especially when receiving the Metop this has become a reality.

On November 12th, the last meeting of this year, again 19 members were present. The lecture with pride was presented the new QPSK receiver. Your chairman took care of the introduction, Harrie told about the demodulator and Rob about the decoder. Peter Kuiper asked to take place in Cash Control Commission, fortunately no one has to designate ...

Management

In 2016 there were no changes in the composition of the board. The vacancy for the position of secretary is still not completed and is passionately observed by our treasurer.
The activities of the coordination of the rallys are with the chairman. The webmaster vacancy has not been filled in yet. Rob performs the minimum adjustments that are required.

Exhibitions and events

The Working Group was on March 19th at our regular spot on the Bossche Flea present in Autotron Rosmalen. The stand crew were: Arne, Ben, Hendrik, Rob, Wim and Timo.

On November 5th we were on the Day for the Radio Amateur in Apeldoorn. The DIY exhibition, where we always stand, is on the first floor. The number of builders who wanted to show their concoctions is low. The packed lunches were tasted with taste.

The Kunstmaan

The Kunstmaan in 2016 is published four times in full color. In total, 112 editorial pages were published, by 2015 these were 120. Each Kunstmaan consisted of 28 pages. In my bookcase there are already eight beautiful Kunstmaan in A4 format, something to be proud of.
Our editor Harry Arends took with great care of the first two. Due to health issues, September and December Kunstmaan was composed by Fred and your chairman. The Satellite Status of Arne was a fixed heading. Another integral part of the Kunstmaan is the report of the meetings recorded by our treasurer / secretary ai Rob Alblas.

Fred van den Bosch placed an article titled "Weather Satellite in Vietnam" in every Kunstmaan. Fred described herein his experiences with the reception of weather satellites in Vietnam, and where he used to be in the pursuit of the hobby.

Paul sends cute contributions from the library. Where is he in his own way the world through the eyes of a librarian to consider.

In the March Kunstmaan, the idea was suggested to publish a member list to promote mutual communication.
Further in this Kunstmaan, a short overview of the dumps that has served the former (board) member Mooyenkind to the Working Group, including an image drum suitable for incinerator paper!
Fred writes his first First Image. On February 2 was the historic day that he received his first HRPT recording.
Rob describes a channel selector for EUMETCast that is suitable for the new type receivers which are controlled via Ethernet.

Your president was busy with a power meter from Mini Circuits. The output of the ZX47-40-S is read by an Arduino and converted to dBm on an LCD display. The whole is not calibrated, but appropriate to do comparative measurements.
Elmar has made an expansion on the WRX-1700: an automatic antenna switch. The WRX-1700 is suitable for catching both APT and HRPT-signals. The RF relay is converted via the Arduino of the display board.
This Kunstmaan also has the financial report 2015.

In the June Kunstmaan, the first prototype of the UV916 receiver print is shown.
Fred describes the Autohotkey program that allows you to automate keystrokes and mouse movements. Very useful if you have to boot to get a picture. Autohotkey is a full-fledged script language. After recording, you can easily make adjustments. Fred also has looked or a telescope mount is suitable for rotor control, the answer is unfortunately no.
Timo has described a complete preamplifier around the PGA103, including print.
Harry Arends transformed the Arduino into a version with screw terminals. Much more convenient if the wires are to be stuck.
Rob has made a series of shots showing the sometimes spectacular cloud formation, this over a period of 3.5 hours. Xrit2pic can be used to make auto / continuous movies.
Since December 31, 2014 EUMETCast you can only receive a "DVB-S2 VCM" receiver, these are still expensive receivers. An amateur has managed to hack the TBS-5980 receiver so that it is suitable for reception of EUMETCast. With this receiver, it is not possible to receive HVS (high volume). Unfortunately, the recipient is not in regular trading but only on eBay, Marketplace etc. Arne describes how to use this receiver.

Rob has written a report about his visit to the GEO Symposium at the National Space Center in Leicester. He presented a presentation and recruited a member for the workgroup.
An attachment of the June Kunstmaan was a questionnaire on the working group. The survey has also been on the website. 19 members have taken the trouble to complete the survey. Also in this Kunstmaan the annual report 2015.

The September Kunstmaan has the First Image article about the receipt of the Metop satellite with the new QPSK receiver. The data was recorded with the HRPT decoder data pump. The viterbi decoding was in GNUradio. The picture was eventually made using Oleg and David Taylor's software.
Rob describes how you can make with xrit2pic movies and sometimes the moon is seen in images of Himawari geostationary satellite.
Fred describes the free upgrade of WxToImg to the professional version and how to make "3D recordings" with the BasRelief program.
Aligning the dish for EUMETCast is often difficult. Arne describes how to do this with a compass and Google Earth "simple" can do. Due to the many transponders, a satfinder is no longer suitable for setting up your dish.
Hendrik was behind the millingmachine to create such interdigital filters for the 1700 MHz. Unfortunately, filters are increasingly needed to stop the interference signals.

The last Kunstmaan of the year shows the LT5546 soldered on an adapter board on the front page. The LT5546 is the new receiver's QPSK demodulator. Difficult of this chip is the LT5546 to be soldered on the underside.
Now that we can receive the Metop, there must also be a decoder, Rob describes what it should meet. In comparison with HRPT is decoding become much more complex: the I and Q can be rotated 90 degrees, which have to come to the "punctured" bits, and the bit stream can be inverted. This will all be resolved in the decoder.
Harrie describes the new QPSK demodulator and your president the UV916 receiver and display print.

For our foreign members (who do not read Dutch) we make an English translation by Google translate. This is very much appreciated and brings new members.

The Digital Kunstmaan
In addition to the Christmas wish, the Digital Kunstmaan has been released five times in 2016. As far as is possible, the Digital Kunstmaan is read well. Openings percentage of around 80 percent is very high. Let everyone who has a great news for the digital Kunstmaan pass this to redactie@kunstmanen.net.

Purchase
There are purchase actions by Mini Circuits (Christmas Offer) and Mouser. Elmar organized a purchase at Reichelt and Pollin several times.

At RS you must have a KvK number and can not be ordered as a private individual, our Workgroup can be ordered from RS.

Handbook
This year is the third part of the handbook released and distributed at the May meeting.

Library
Last year we were subscribed to the Electron (from the Veron). Of course we are a member of the GEO as a working group. In addition, we were a member of the Dutch Association of Aerospace.

The loan of equipment to members of the working group is still too little. We have the miniVNA and Marconi transmitter available! The miniVNA is approximately permanently lent.

Traveling
Rob has been to the GEO Symposium. There were no travel activities.
ESTEC had its open day on October 2. There is nothing else organized around here.

Website
We have a Facebook page, a Facebook group and a Twitter account.
On Twitter we have reported about our new recipient and responded very well. In addition, we have watched Youtube videos from Metop's direct receipt. This tastes like more.
The website deserves to get attention again, with the vacant position of webmaster will not improve.

Satellites
At the end of 2016 the APAs NOAA15, 18 and 19 were available. HRPT was there of NOAA15 (weak signal), 18 and 19.
The Russian Meteor N2 transmits MHRPT. from, the broadcasts LRPT unreliable.
The N1 has failed.
Besides the two Metop satellites, we can now decode the Chinese Fengyun 3A, 3B and 3C satellites. This brings the number of satellites that we can decrypt with direct reception on nine pieces!
On February 16, the Sentinel-3 was launched.
Through EUMETCast is among others to receive Meteosat-10, but also with NOAA and the world on recordings.

Ben Schellekens, Chairman

satellietstatus

Arne van Belle, per June 9th 2017

POLAIR	APT (MHz)	HRPT (MHz)	Pass
NOAA 15	137.620	1702.5	morning/afternoon, HRPT weak
NOAA 18	137.9125	1707.0	early morning/late afternoon
NOAA 19	137.100	1698.0	morning/afternoon
FengYun 3A	none	1704.5	AHRPT new high speed format
FengYun 3B	none	1704.5	AHRPT new high speed format
FengYun 3C	none	1701.3	AHRPT new high speed format
Metop-A	uit(137.100)	1701.3	LRPT/AHRPT
Metop-B	none	1701.3	Only AHRPT
METEOR M N1	uit(137.100 LRPT)	1700.0	Black image
METEOR M N2	137.100 LRPT	1700.0	LRPT / MHRPT
NPP	none	7.75-7.85 GHz X-band met 15Mbits/s	

Fengyun 3A, 3B and 3C only transmit AHRPT out, this is not to be received with a standard HRPT receiver and decoder. Unfortunately, this AHRPT is not fully according to the standard so that even a Metop AHRPT receiver is not suitable for the FY-3 series!
Fengyun 3C has different data rate than 3A and 3B (3.9 Mbps). Harrie van Deursen is receiving and demodulating these satellites.
Unexpectedly Meteor M N1 was active again after it suddenly failed in September 2014. Unfortunately, there are problems with the stabilizer so that the images were often useless and probably is the satellite therefore expelled since March 21.

NPP (NPOESS Preparatory Project) only transmit on the X-band of 15 Mbit / s. It is recommended a tracking dish with diameter of 2.4 m! The successor JPSS-1 will transmit only on the X-band.
http://npp.gsfc.nasa.gov/sciencedocs/2015-06/JPSS-1SpacecraftHRDtoDBSRFICDRev-May302012-470-REF-00184.pdf
Sentinel-3A is successfully launched, this long-awaited successor Envisat will not receive directly but via EUMETCast.
http://www.esa.int/dut/ESA_in_your_country/The_Netherlands/Sentinel-3A_met_succes_gelanceerd

Active satellites in the FengYun program

GEOSTATIONAIR	APT (MHz)	(SDUS)/PDUS (MHz)	Position
MSG-4 (MET-11)	1691 LRIT	1695.15 HRIT	3.4 degrees West, in test
MET-10	1691 LRIT	1695.15 HRIT	0 degrees West, operational
MET-9	1691 LRIT	1695.15 HRIT	9.5 degrees East, RSS
MET-8	no LRIT	-	3.5 degrees East, Back-up
GOES-E (no. 13)	1691 LRIT	1685,7 GVAR	75.0 degrees West via Eumetcast
GOES-W (no. 15)	1691 LRIT	1685,7 GVAR	135 degrees West via Eumetcast
GOES 14	1691 LRIT	1685,7 GVAR	105 degrees West, Backup
GOES 16			Moves in Nov to GOES EAST, 75 degrees West
Elektro-L1	1691 LRIT	1693 HRIT	76 Degrees East, via Eumetcast
MTSAT-1R	1691 LRIT	1691 HRIT	140 degrees East, Backup of MTSAT2
MTSAT-2	1691 LRIT	1687.1 HRIT	145 degrees East, via Eumetcast
Himawari-8	no LRIT	no HRIT	Operational, only via HimawariCast
Himawari-9			launched op 2-11-2016
FengYun 2D	-	-	86.5 degrees East
FengYun 2E	-	-	104 degrees East, nu via Eumetcast
FengYun 2F	-	-	112.5 degrees East, Backup
FengYun 4A	-	-	86.5 degrees East, is being commissioned

MET-10 is now the operational satellite can be received via EUMETCast.

Launches	
FengYun 3D	launch in 2017
MetOp-C	launch in oktober 2018
JPSS-1	(NOAA 20 after commisioning) 23 September 2017

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

In order to further growth of the amount of data transmitted via EUMETCast in the future to allow for EUMETSAT is proceeded in August 2014 to DVB-S and DVB-S2 with VCM mode.

The new transponder sits on Eutelsat 10A, 11263 MHz H and which is positioned 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 most of the "DVB-S2 without VCM" recipients no longer usable. With a special driver, some recent DVB-S2 receivers to make more suitable for Basic Service Only. (only the TBS-5980 and Skystar 2 eXpress HD, unfortunately this is not true for the Skystar HD USB box)

The signal at 10 degrees East has higher bandwidth and therefore weaker than before.

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

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

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

In the EO Portal can EUMETCast users log on and access their personal data and settings and adjust if necessary. Also, registration as a new user and extending the license is possible here. You can choose online which products you want to receive your EKU.

The new improved Tellicast Client is finally out. You can receive this via EUMETCast "Info Channel 1". Only on request Eumetsat will send a new CD. Incidentally, the new client is only really necessary if you want to receive High Volume Service faultless.

Thanks to David Taylor and Douglas Deans for the info.