colofon

DE KUNSTMAAN

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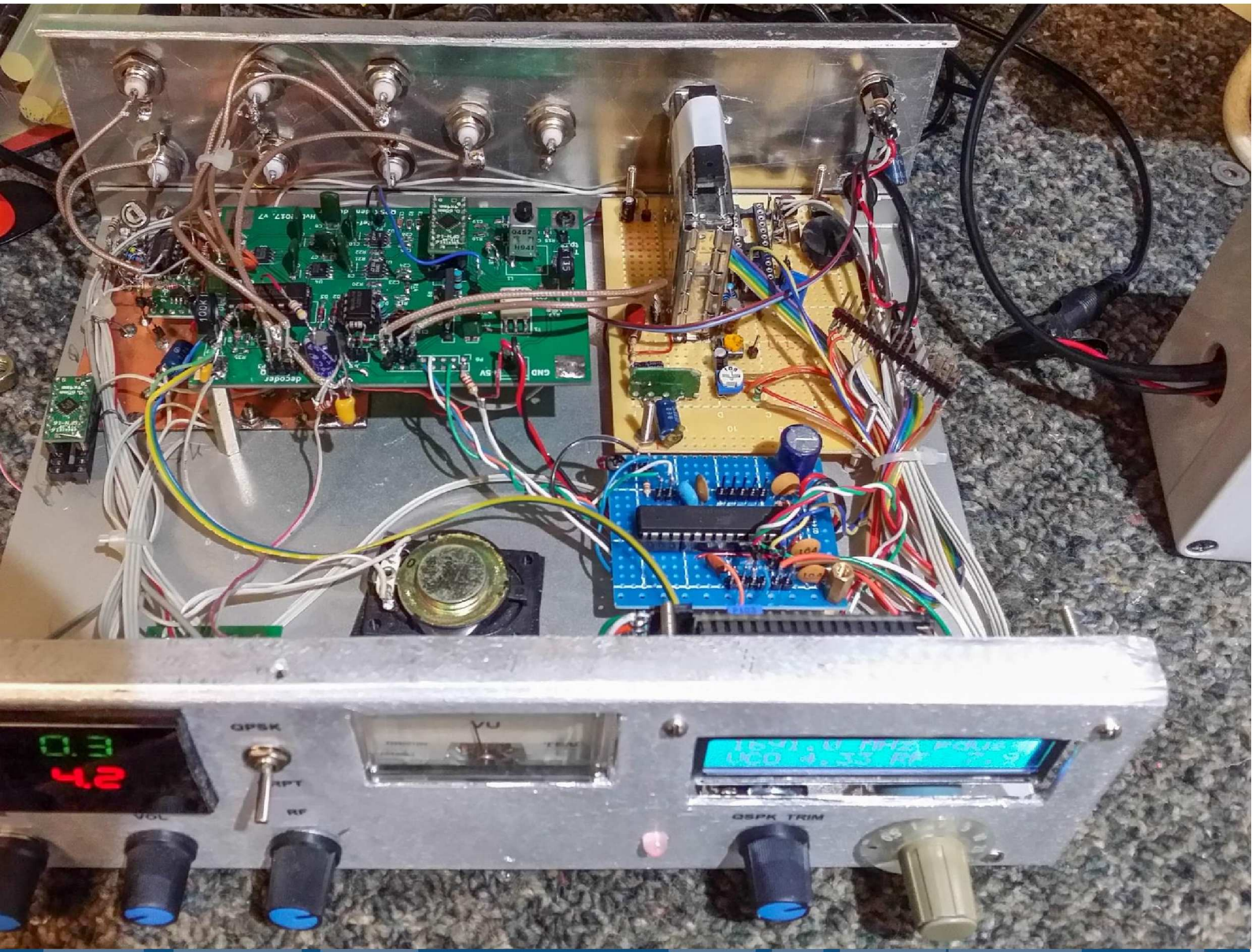
Uitgave van de Werkgroep Kunstmanen



In dit nummer o.a.

- Eumetcast kanaalselector
- Uitrichten van een X-Y schotel
- UV1316 Tunerprint
- 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 added as much as possible, so the “paper” (Dutch) magazine is not always needed to have at hand.

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.

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Content

Photo frontpage:

QPSK receiver built by Michael Still. See page 4 and 43.

Preface

Ín the last meetings we admired several spectrum analyzers that could be measured by various interdigital filters.

Filters and more filters

Interdigital filters you have to do yourself to build. They are not for sale for the frequency that we are interested in. Access to a turning / milling machine is necessary. You also have to work very carefully (up to the 1/10th mm) and you need a spectrum analyzer to adjust everything .

Arne and Peter measure interdigital filters with spectrum analyzers from Siglent

QPSK receiver

The QPSK receiver is also doing well. Seven pieces have been built, so about 10 pieces have to be finished by the members. This Kunstmaan an article about the UV1316 which is the successor of the UV916. Actually had this article should be in the previous Kunstmaan, but this failed due to lack of space. That also happens!

We are running out of parts. So I am through the SAW filters and other parts are "end of live". Maybe just make a small inventory for our beautiful hobby?

Compiling and searching for parts takes quite some time. In the coming months I want to do one more order round and after that it is up to the members themselves to gather together. That this can proves Michael Still who only got the PCBs and has built a well-working receiver.

What we still miss is a kind of step-by-step plan that you can follow if the receiver does not. Now it seems that 80 percent of the problems are soldering problems, but with that observation your problem has not been resolved. The advantage is that the receiver consists of two pcb's , the error search is therefore a lot easier .

And higher

I told you something about the reception of the 7.8 GHz during the meeting. Remember that I am not an (experience) expert, I only pass on the information. Rob has made a very brief summary in his report of the meeting .

It is alive, several LNBs have already been demolished to see if they can be modified. You still have a new one feedhorn . Job is already designing a homebuilt down converter .

And further

In this Kunstmaan the report from Fred from Vietnam is not missing. Rob writes about the EumetCast channel selector. From my hand another article about an attenuator that I bought on a rally. This is to encourage people to experiment. In addition, the mandatory reports of the meetings and (financial) annual report.

In recent times I have been busy to clean up my attic and office. Crates with lots of stuff that you do not do anything with. At the May meeting I take it with me, maybe that I can make someone else happy with it.

At the time of this writing, the dates of the meetings are not yet known in the autumn. The next meeting is on May 19 (later than normal), so we have our mandatory ALV. And clear your attic!

Weather satellites in Vietnam (27) **Fred van den Bosch**

Summary
My experiences with weather satellites etc. in Vietnam.

HRPT
Satellite PC

"I'm curious how long he will last this time. I will already look around for a successor. " was the end of my previous contribution. Well, the answer to this question did not last long: very short. A hard knock or a bit of bouncing brought the whole thing back to life, but for something that in principle has to work continuously, this was not really optimal.

Because it was Tet in mid-February (the Vietnamese New Year) and almost all stores are closed, I have just waited buying a new PC. In the near future I will go to Nha Trang. The reception of HRPT has simply continued with a very old laptop.

Dish antenna

Because after the first repair of the dish there were still too many lines of interference in the photo - this also depending on the track - I disassembled the dish once more. First I modified a piece of rectangular pipe, so that I could check if the ribs were still straight in the longitudinal direction and if necessary, pull them slightly right. Then I put the dish on the edge of our well. This is the only thing we have of a decent diameter (1 m.) and is well rounded. Then again some pushing and pulling on a few ribs until they all lay neatly against the edge of the pit. I also immediately made new cables and plugs to connect the rotors.

And yes, after that the results were as usual. OK, with a stray line here and there. Right on the first photo for the first time the snowy mountains of the Himalayas. See fig. 1. In a separate article I describe my –now thoroughly tested- alignment procedure.

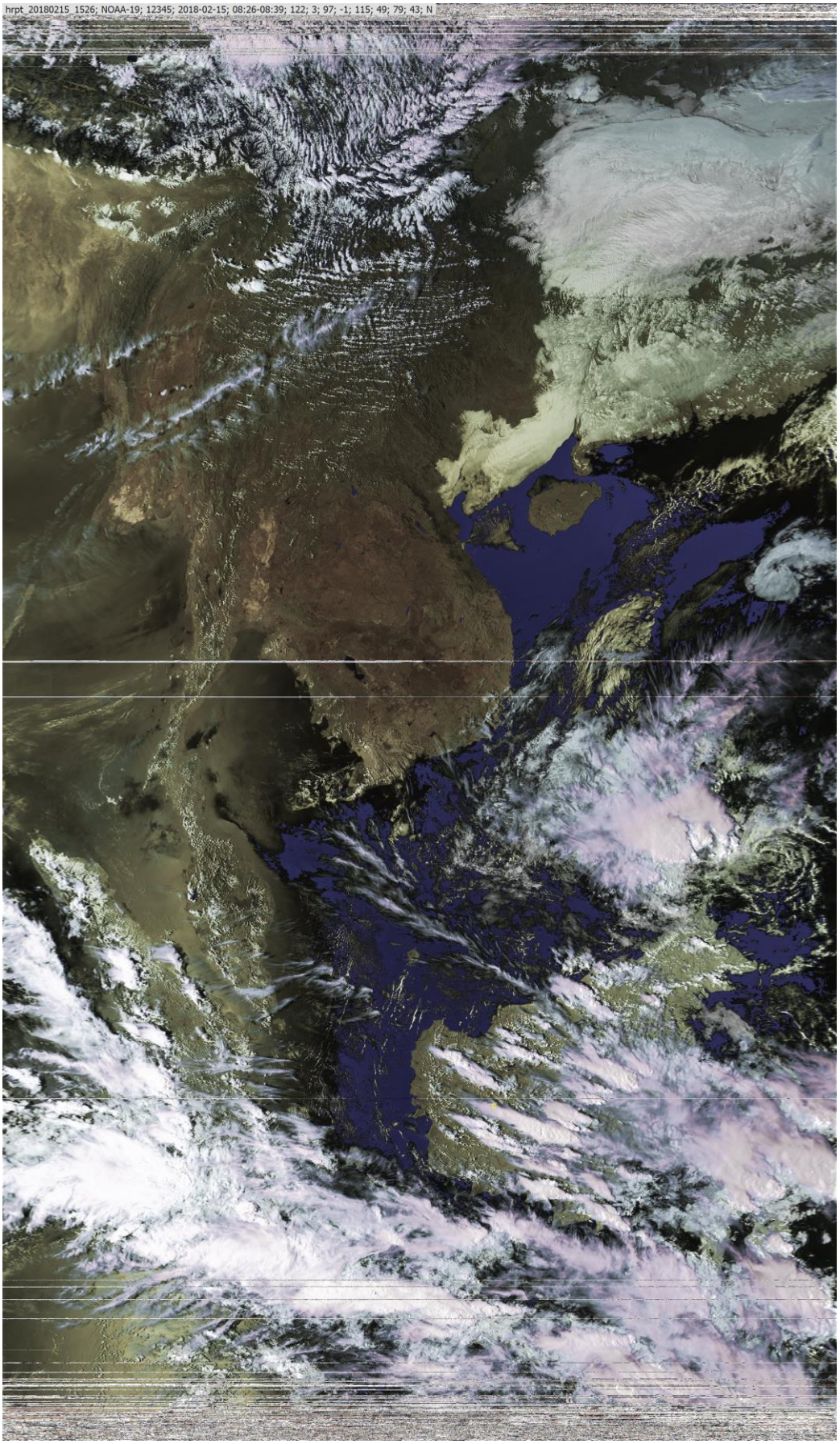


Fig. 1 2018-02-15-1426-NOAA-19

Receiver and cabinet
From the Netherlands I have taken a QPSK receiver and a corresponding cupboard made by Peter Kuiper. Because I also wanted to have my Diseqc control in the cupboard some extra holes had to be drilled. In addition, I needed some loose stuff as a pair of switches, potentiometer and chassis parts. These parts, plus the receiver, were purchased and installed in the cabinet. I only have to look for a suitable 5-V power unit.

Now that the antenna is working well again, I will soon be able to connect the new receiver to the existing cabinet with GODIL and Diseqc control and see what happens. I am very curious.

Photo book: Small companies in Vietnam, a look from the inside
Something completely different. In the past year, besides the satellite events, I spent a lot of time in a project, where I have photographed and described small companies from the surrounding area.

The big problem here in the countryside is that there is virtually no work. Most grow rice. However, there are only a few periods of the year in which there can be harvested, so people look for extra income. And have little choice in doing so.

Some are going to work in a factory in the neighborhood to peel shrimp. Others have their own company, usually at home, sometimes elsewhere, eg on a market. Almost always small-scale: only the owner and sometimes a single helper. Some work on land or carry out more specific activities. This often makes it easier to combine different activities. The disadvantage is that it yields virtually nothing.

The e-book gives a good impression of life and especially of working here in the Vietnamese countryside:
• the physical hard work
• the very long days that some make
• the often meager earnings
• and the amount of work that children have to perform in addition to their normal school activities.

The e-book "Small businesses in Vietnam" covers more than 300 pages.

I ask for a modest amount for this pdf-book. The proceeds will be invested in a number of projects that we are working on for the children in the area. See the website below.

More about the book, the author, the revenue targets and the method of ordering can be found on the website of my daughter [1]. This is because it already has the entire infrastructure for sales. A free demo version can also be downloaded here, including the complete table of contents. The entire website and infrastructure were made by my grandson.

Miscellaneous
Windy
A little too late for the typhoon in Vietnam or the heavy storm in the Netherlands on January 18, but this site [2] gives a nice animation of the wind movements. An app is also available.

The high-speed brains of Westerbork
Nice video about the new supercomputer that was used at Westerbork [3].

Batteries
On [4] there is an informative presentation about batteries. And a visual film on [5]:

Dead batteries
A trick to bring dead batteries back to life [6]. I have not (yet) tested it myself.

Analemma
An analemma (Greek word (ανα λεμμα = uptake from above)) in astronomy is a curve on the celestial sphere, with which the position of a certain celestial body (usually the Sun) is described at a fixed moment of the (synodic) day. Source: Wikipedia.
In [7] someone describes his project, to make a photo of the sun every day for a year, where possible. The attached photos are beautiful.

Apollo missions
NOS-TV has put movies about the Apollo missions online [8]

References
[1] Photo book: Small businesses in Vietnam, see website
[2] Windy, see website
[3] Westerbork, see website
[4] Batteries, see website
[5] Battery film, see website
[6] Dead batteries, see website
[7] Analemma, see website
[8] Apollo missions, see website

Eumetcast channel selector

Summary

A channel selector for Eumetcast, supporting the new Tellicast formatted channel files.

In the past I have already discussed a selector with which Eumetcast channels can be easily activated / deactivated:

tqchansel [1]

The program manipulates the recv_channels.ini file, which is used by Tellicast to set the data of various channels to HD or not.

With the new Tellicast version, this file has a different format. Furthermore, there can now be several files, for example for the H (igh) V (olume) channels. An adaptation of tqchansel is therefore necessary. I have taken this opportunity to set the matter better and easier. The new version, ecast_chansel, can therefore not be used alternately with tqchansel, but there is no reason for that either. The following changes have been made:

- Can handle both the old and new format
- Can handle up to 4 channel files
- The original channel files are not modified or renamed, instead new files are generated based on the selected channels
- No separate preferences file is required to preserve channel selection and other settings.

The file (the files) with which the selector works is standard:

- Tellicast:
  - recv-channels.ini
- new Tellicast:
  - cast-client-channels_bas.ini
  - cast-client-channels_hvs-1.ini
  - cast-client-channels_hvs-2.ini
  - cast-client-channels_ter-1.ini

Fig. 1 shows the program. In this case, 3 channel files were read, resulting in 3 tabs, one for each channel file.

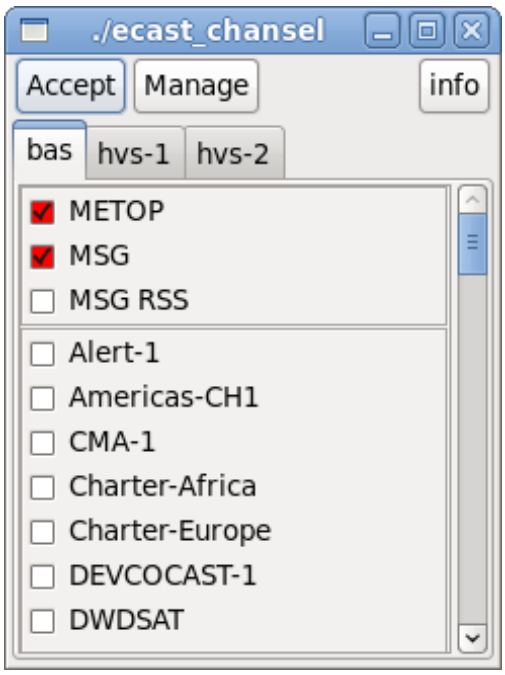


Fig. 1. The selector, started with 3 channel sets.

Channels can now be switched on and off with the buttons. This is only effected with the "Accept" button. This generates a new one from the ini file:

- Old Tellicast:
  - recv-channels.ini gives recv-channels.ini_sel
- New Tellicast:
  - cast-client-channels_bas.ini gives cast-client-channels_bas.ini_sel
  - cast-client-channels_hvs-1.ini gives cast-client-channels_hvs-1.ini_sel
  - etc.

These are copies of the original files in which the non-selected channels are deactivated. In the Tellicast configuration files:

- old version:
  - recv.ini
- new version:
  - cast-client_bas.ini
  - cast-client_hvs-1.ini
  - etc.

must now be referred to these generated channel files instead of the original:

- *old version:*
  - *channels_file = recv-channels.ini_sel*
- *new version:*
  - *channels_file = cast-client-channels_bas.ini_sel*
  - *etc.*

How does it work:

Starting from the file *cast-client_bas.ini*; the same applies to the other channel sets:

As a one-off preparation:

- All channels in which you are interested must be activated in the original *cast-client_bas.ini*, ie without a comment mark ('#'). All other channels can be provided with a '#'; there are no buttons in the selector for that. The list of buttons will otherwise be very long (although that is not a problem in itself).
- Location where the data should end up has to be indicated in the usual way, behind *target_directory* .
- In *cast-client_bas.in* i: change the line:
    - *channels_file = cast-client-channels_bas.ini*

in:

    - *channels_file = cast-client-channels_bas.ini_sel*

Afterwards:

- When starting *ecast_chansel, cast client_bas.ini* is read*;* all channels that are active in this file receive a button. (See fig. 1.)
- Check all channels that need to be recorded and click on 'Accept'. This generates the *cast-client_bas.ini_sel* file in which all unselected channels are deactivated ('#' for the respective rules).
- Do the same for the other sets (if desired) by first selecting the appropriate tab.

Once all the desired channels have been selected in this way, ecast_chansel will no longer do anything. The program can then possibly be stopped. On restart, the program reads both the unchanged *cast-client_bas.ini* and the modified *cast-client_bas.ini_sel* , and the buttons of the channels that were activated in the previous session will automatically be checked. This also works after restarting the PC. Incidentally, there is nothing against the channel selector always 'on'.

Alternative channel names

Normally, the channels listed with the buttons in the selector are the same as those in the *cast-client-channels_bas.ini* file. *These* are not always significant names. Therefore, each channel can be given an extra name which is then shown in the program. Eg. *Eumetsat Data Channel 2* can then be displayed as *MSG* .

These names can be entered by clicking on 'Manage', see fog. 2.

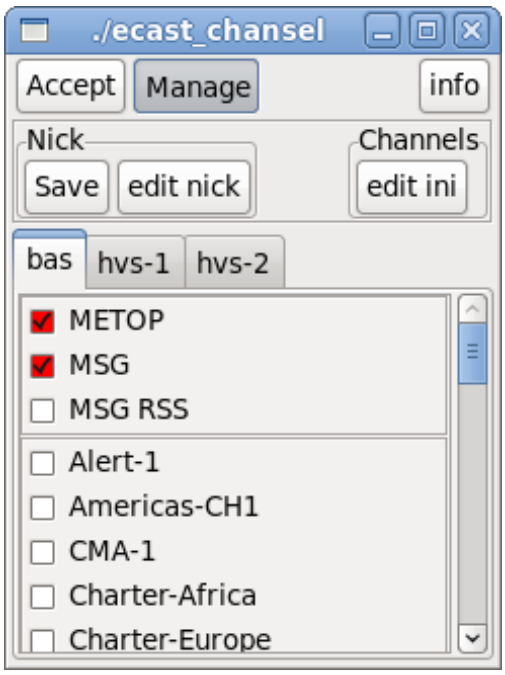


Fig. 2. 'Manage': extra buttons for configuration.

With " *Edit nick* " the following window appears:

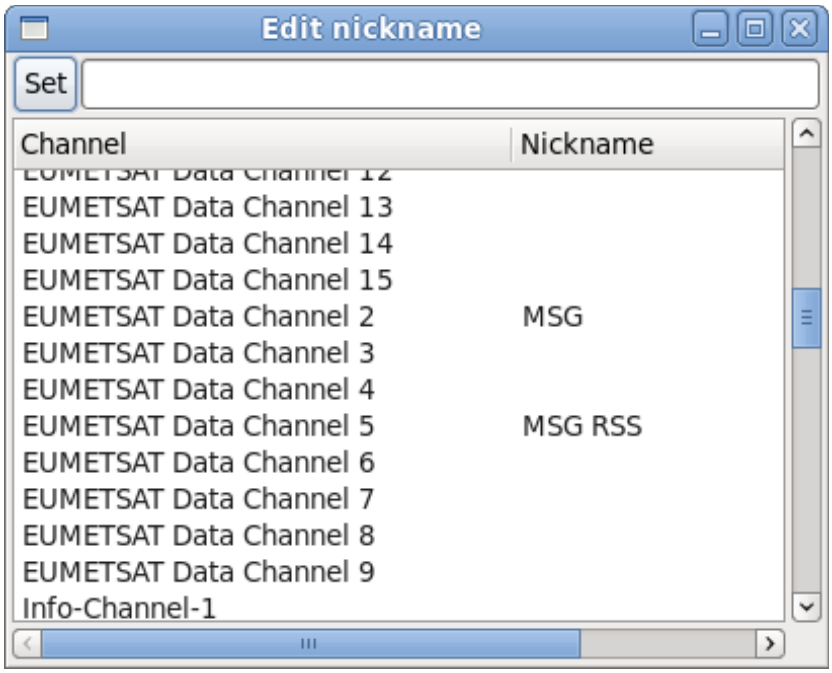


Fig. 3. Add alternative name ("nickname").

Select the channel that should be nicknamed, enter the desired name in the top field and click on 'Set'. Do the same for other channels. Finally, close in the main window with 'Save'.

The new name is saved in the .ini_sel file as a comment so that Tellicast does not stumble.

In the main window, all channels with a nickname are shown first, and below that the rest of the channels. In this way all important channels can be put at the top, regardless of where they are in the ini file. In Fig. 1, 3 channels have been given a nickname: METOP, MSG and MSG RSS.

Example with cast-channels_bas.ini

This file can include:

 # [channel]
 # name = EUMETSAT Data Channel 4
 # target_directory = data / eumetcast / bass / EUMETSAT_Data_Channel_4
 # tmp_directory = data / tmp / bass

[channel]
name = EUMETSAT Data Channel 5
target_directory = data / eumetcast / bass / EUMETSAT_Data_Channel_5
tmp_directory = data / tmp / bass

This shows that *EUMETSAT Data Channel 4* is off; no button will be displayed for this channel. *EUMETSAT Data Channel 5* does get a button.

In the cast-channels_bas.ini_sel will now be placed:

 # [channel]
 # name = EUMETSAT Data Channel 5
 # target_directory = data / eumetcast / bass / EUMETSAT_Data_Channel_5
 # tmp_directory = data / tmp / bass

After activating this channel it becomes:

[channel]
name = EUMETSAT Data Channel 5
target_directory = data / eumetcast / bass / EUMETSAT_Data_Channel_5
tmp_directory = data / tmp / bass

If a "nickname" is defined then a line is added:

[channel]
 # nickname = MSG RSS
name = EUMETSAT Data Channel 5
target_directory = data / eumetcast / bass / EUMETSAT_Data_Channel_5
tmp_directory = data / tmp / bass

The additional line *# nickname = MSG RSS* is ignored by Tellicast because of the '#' comment mark. *ecast_chansel* recognizes this rule and will therefore show MSG RSS at the button instead of *EUMETSAT Data Channel 5.*

Start
When starting the program, it must be indicated which ini files must be included. The standard names are stored in the program so that only a number needs to be given to determine which ini files should be included:

- ecast_chansel (or ecast_chansel -n 1):
  - only uses cast_channel_bas.ini, so 1 tab
- ecast_chansel -n 2
  - uses cast_channel_bas.ini and cast_channel_hvs1.ini
- ecast_chansel -n 3
  - uses cast_channel_bas.ini, cast_channel_hvs1.ini and cast_channel_hvs2.ini
- ecast_chansel -n 4
  - uses cast_channel_bas.ini, cast_channel_hvs1.ini, cast_channel_hvs2.ini and cast_channel_ter1.ini

In the second case there are 2 sets (under the tabs) with channel buttons, in the third case 3 sets etc.

It is also possible to specify the channel file yourself, eg:

- ecast_chansel -i cast-client-channels_hvs-2.ini -i cast-client-channels_bas.ini

Therefore, the order of tabs can be changed.
The name of the tab is the same as the part of the filename between 'cast-client-channels_' and '.ini'. This can also be adjusted, eg:

- ecast_chansel -t high_vol_nr2 -i cast-client-channels_hvs-2.ini

For the old tellicast one must specify:

- ecast_chansel -i recv-channels.ini

The options listed here can be specified with a start icon at 'Properties'. It can also be specified in which location the program should be started (this can be another location from where it is installed!). The channel files are expected at that location. See fig. 4 for Windows.

- At ''Target' is the start command, and the option '-n 3' is added.
- At 'Start in' is the location (here C: \ ecast) where the Tellicast files *cast_channels_bas.ini* etc. are situated. The *cast_channels_bas.ini_sel* etc. files generated by ecast_chansel will also appear here .

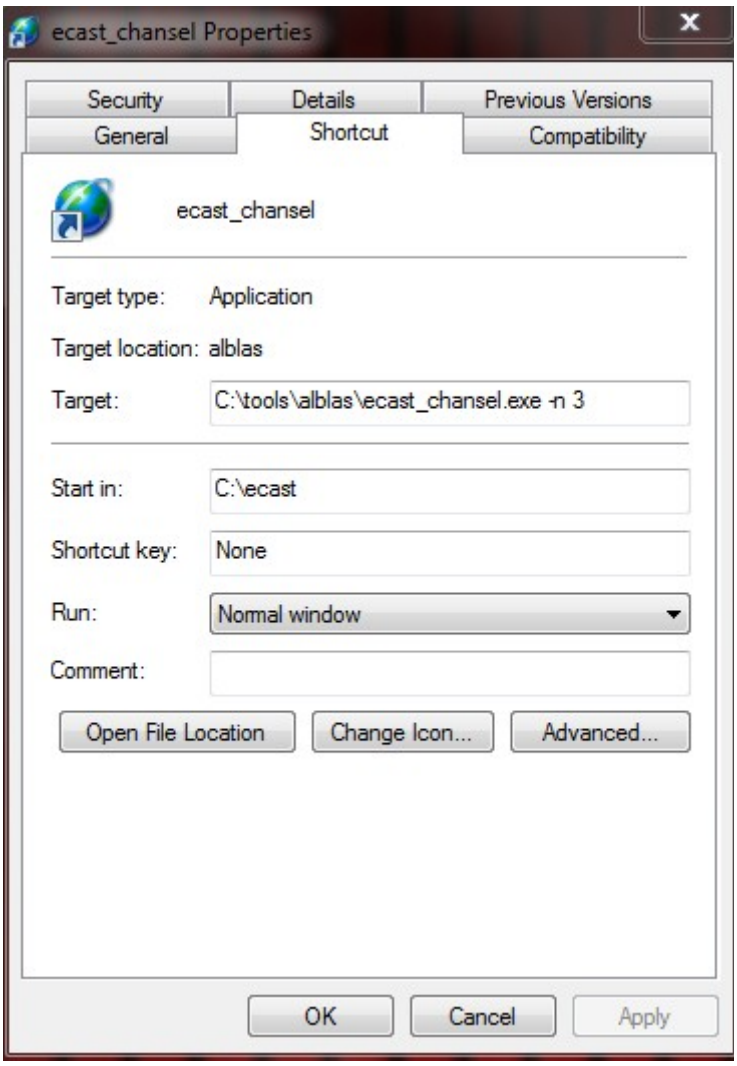


Fig. 4. Set start icon for Windows.

Of course there is a version available for both Linux and Windows.
The program can be downloaded from my web-site:

www.alblas.demon.nl/wsat/software/ecast_sel.html

[1] A channel selector for Eumetcast. De Kunstmaan no. 1, 2007, p. 12

Aligning an X-Y-dish **Fred van den Bosch**

Summary
This article describes a procedure how to align an X-Y antenna installation.

Preface
The reason for this article was a mail from Peter Smits about the alignment of his dish. He did that on the sun. I then gave my - something different - procedure and asked if there were any additions. The comments from Ben, Rob, Arne and Job have been incorporated in this article into a hopefully working procedure for everyone.

The most important difference between Peter and me is that I have not been doing anything with the sun for a while when I am setting up the dish. Rob on that: "*You have to have reception, that is, your receiver has to work AND your rotor must be well oriented. Otherwise you will not know what is wrong with no reception. If you have already done this story several times then that sun is not so necessary, but to start with, first check if your antenna is running properly, "X / Y on dish" set up etc., and it is also once clear, then that sun can be pretty handy. Has a very long track time ... "*
OK, good point. I have expanded my procedure with two points:
• an initial test if everything is connected properly
• use the sun for extra control on the north.

Procedure
This is the custom procedure.

Initial testing
When the installation is first set up, it is a good idea to test the whole initially. This can be done by sending the dish to N, Z, O and W via xtrack and checking whether this actually happens. If not, the connections and / or settings of xtrack must be checked.

Antenna standard to the north.
This sounds easier than it often is. Compasses can deviate, especially with all metal that is usually used in the antenna system and also the house. More accurate can be a point in the landscape, preferably exactly in the north or south and at least 10 km away, which you can use as a target.

Adjust with plumb.
Condition is that the wind is not blowing.
First of all, both rotors will be pointed at 90 gr.. For my plumb, I made a special connection, which I can screw on the axis of the helical. This will be different for everyone, depending on the construction of the helical. Then adjust the installation so that the plumb line points to the middle of the dish. With me this can be done by pressing the rotor slightly differently on the support for O-W, for N-Z I have to slide something under the support.

Testing on the sun

If it is a sunny day, the sun can be followed. This must then give a shadow through the helical in the middle of the dish and preferably continue to do so during the following. Here, if necessary, some minor corrections can also be made, for example to the north. If the corrections become a bit larger, it is recommended to use the plumb again. You now know for sure that everything is set up correctly.

Testing on a satellite.

And then the ultimate test: tracking a satellite. If the previous steps have been performed accurately, you must receive something. If not, then it is in any case not the following.

Stripes on the photo

One of the reasons that I sometimes check the position of the dish are lines in the picture. I have a GSM mast at about 200 meters to the NO. And I do not know if that is the cause of the disruption or maybe a non-optimal antenna.

Ben: "*Unfortunately, a false signal is a false signal, you do not recognize the source. What you could do is see if the signal level is higher during the failure. "*

What I have interpreted for my convenience as:

- Signal level higher = failure (GSM?)
- Signal level lower = antenna not optimal (not well aligned o.i.d.).

Rob added to that: *"The stripes you see are not 'failures during the whole stripe'. This line is because the decoder is out of sync due to a (possibly very short) major fault. Then you get bitslip, and depending on whether that is "forward" or "backward" slip, all bits are moved up and (at HRPT) the MSB of the next channel is set to the LSB of the current channel, or the LSB of the previous channel on the MSB of the current channel. That is nice! Only at the beginning of a new frame can the decoder re-sync. I think there must be some improvement here. Most would be if a VCXO (so with crystal) could be used, which of course must be able to follow the Doppler shift. "*

Good luck with aligning!

UV1316 print

Summary

This article describes a PCB for the UV 13 16 tuner. The IF is available on headerpins and can be used for various child or receivers. Also included is the powersupply for the UV13 16. This pcb is the successor of the UV916-pcb for the QPSK receiver.

Preface

It has been ten years since we started the development of the WRX-1700. At that time, the UV916 was still reasonably NOS, " New Old Stock". For the development of the QPSK receiver, the UV916 was a logical choice because we had good experiences with it.

Now that several QPSK receivers have been built, the tuner turns out to be a much more critical component than just APT or HRPT reception .

There appear to be many different types and manufacturers. This makes the recovery security difficult. We have discovered the following differences:

- Different supply voltages. There are also models that only work on 5V
- Balanced or unbalanced output
- Different chipsets
- Different manufacturers

It seems that the UV916 is a kind of generic device , with mutual differences that you have to take into account. The availability of the tuner is really a problem because you do not know which type you buy.

During the quests through the caves of the internet I came across the UV1316. Given the version number, it looks like a modern tuner. The datasheet that I found comes from 2004. This model is probably 10 years younger than the UV916. The copies I have found are all from Philips (... it's okay ...) / NXP.

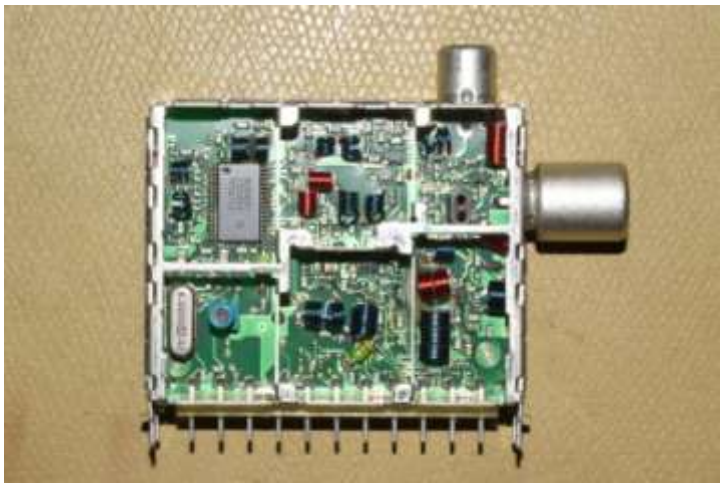
UV1316

What are the major differences of the UV1316 with the UV916

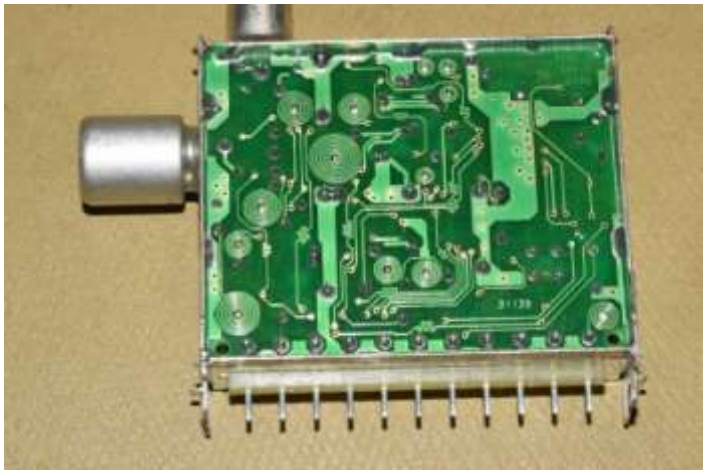
- Only a 5V supply is still needed , no more 12V . A tuning voltage of 33V is unfortunately still needed
- The tuner can is slightly smaller than the UV916
- The pin sequence is different from the UV916
- Other I2C address and other bytes

In the test set-up I had made a adapter pcb to be able to mount the UV1316 on the UV916-pcb.

The interior of the UV1316 also does not betray much. There is one IC with the print "WINNER1 K3P03S". This gives zero hits on the internet. Fortunately, there is a datasheet , easy to find with "UV1316 datasheet".



Top of the UV1316. Above left the IC that regulates everything. At the bottom left a crystal of 4 MHz. Top right a connector whose function is unclear.



Underside of the UV1316. Except for some inductors in the form of print tracks, there is little to see here.

Main functions

The UV1316 print has a number of functions:

- It houses the UV1316 tuner and its control
- The ATmega328 with Arduino boo t loader is also on this print. The microcontroller can also be programmed in the print.
- Connectors for tuning switch , LCD display , LEDs etc.
- Filtered 5V power supply
- AGC scheme

Power supply

The QPSK receiver requires a stabilized 5V supply voltage. If only the receiver has to be fed then 1 A is sufficient.

Because a lot of switched power supplies will probably be used, a large suppression coil of 100 uH is included. Together with an elco of 1000 uF , this must prevent all sorts of dirt that enters via power supply. Be careful with the use of inexpensive USB plug-in power supplies . They can give a lot of pollution and can be dangerous (fire, short circuit, electrocution).

For relatively little money, you can buy short-circuit proof and protected against over load power at Conrad, Reichelt or Mouser. For example:

https://nl.mouser.com/ProductDetail/MEAN-WELL/SGA12E05-P1J

Tuning voltage of 32V for the UV1316. This is done with the MC34063 as a step-up converter . Note that diode D1 is type 1N5819 because of the high voltage that is generated. In comparison with the previous pcb, C13 has been added, according to the datasheet and the coil has been increased to 560 uH . This significantly reduces the interference pulses on the power supply line. The 34063 is preferably from Texas Instruments.

AGC-control

An AGC signal from the demodulator board is used to control the gain of the UV 13 16. With an op-amp, the derived signal "RFlevel" is made which is displayed on the LCD display.

New pcb

In view of the above changes, a new tuner pcb has been designed .

A jumper block to GND has been made for the digital pins D8 - D13. In the previous version, a digital output layer was made low because there is no GND pin was present .

Another important adjustment is the connector to the demodulator. In the previous version it had to be connected to a cable . Here, there is always a small risk that the tape cable will not function properly . This pcb uses right-angle connectors. The rows are thus exchanged on this pcb. The demodulator - print layout has remained unchanged. The demodulator pcb must be a right-angle male connector 2 so that the printing can be coupled directly

Arduino script

New print, also written but a new Arduino script . For example, the tuning frequencies for the APT satellites are no longer required . I can send the script on request.

Construction

The construction will not cause problems. Note that at the bottom all SMD parts are included. Check the polarity of electrolytic capacitors , ICs and diodes . Do not place the ICs and the tuner yet. Check with a loupe that all smd parts
are properly soldered and that there are no solder bridges. When soldering the resistors it is so neat that the orientation of the text is the same everywhere, this makes checking much easier.

Connector P5 and P6 do not need to be mounted. Connector P5 is useful when you want to see what happens on the I2C bus. Connector P6 can be used if you need 5 or 12V at other places in the receiver. My advice is to assemble everything, you never know where it is needed.

Connect a stabilized 5V supply to connector CON1 and see if there is no smoke coming out. Check on the IC- feet if there is 5V in the right places.

Mount U2, the MC34063, pay attention to the orientation! This is the step-
up converter that has to supply the 33V tuning voltage. On the fourth path from below of the UV1316 is now 33V. Current consumption is around 10 mA.

Mount U4 and IC1, the microcontroller. Check the orientation .

Connect the I2C display with the ribbon cable. Pin 1 of P2 is the GND. This goes to the GND of the display. The current consumption now goes to the 48 mA. The LCD display should light up and the setting pixel on the adapter print of the display will make the text visible. At startup you will see a version number , this must be at least version 1 .3 5 .

If you want to program the ATmega328, you can do this via connector P9. Pin 1 (left) is the GND. There is a programmed ATmega328 in the parts package of the workgroup .

Then now is the time to mount the UV1316. I did this through two header pins on the GND pads to solder and solder the UV1316 to it. The connection to the pins is done with short wires.

The built-up prototype. The angled connector on the front connects the demodulator board . Furthermore, the large input coil is clearly visible to stop interference.

After switching on, the UV1316 print will draw 180 mA. N a a pair of second n, when the tuner frequency is put on the power consumption is 200 mA.

If you want to see if the UV1316 print does it without using the demodulator, you can do this. You have to put the AGC on the connector P4 to GND. If you do not do this then the gain of the UV1316 will be completely reduced.

Jumper D11 you need places to put the tuner in the low
band (or reset the receiver). This is for both the old LNC-1700 and for the use of 150

MHz as a test frequency.
Set the transmitter to 150 MHz with a level of -30 dBm . Right away scope you measure on the IF- pins 400 mVpp .
Turn the tuning switch, and you will see the frequency on the scope vary.

Without jumper D11 the receiver starts from a downconverter with a local oscillator of 1 GHz , this is the new version. The tuner then tunes between 698 and 708 MHz.

O p pin 2 of the UV1316 you can measure the tuning voltage. When the tuning frequency changes , the measured voltage will vary .

Conclusion

If you have the UV916 tuner- print , do you have to use this tuner? No that is not necessary. The quality of the reception does not go up.

If you do not have a tuner yet, I would use the UV1316 because it is only available in one version and therefore has less uncertainty about the quality.

A programmable attenuator from the dump

Summary

This article describes the modification of an MCE / Weinschel attenuator to work with I2C. The original PIC microcontroller is replace d with an ATtiny84 acting as an I2C slave.

Preface

The nice thing about radio fairs is that you can browse and run into nice things that you think that are usefull. This also applies to the programmable attenuator of MCE / Weinschel which I could purchase for 10 Euro . Also on eBay are these attenuators for sale, search for " Weinschel programmable attenuator " . The attenuator I have is suitable for the frequency range of 800 to 2500 MHz and has a programmable attenuation of up to 64 dB. You could use the attenuator if you have an SA that you want to use as a transmitter, where the output level is too high (often -20 dBm).

Another story is to get this attenuator working, that is what this article is about.

Scavenger hunt

The biggest puzzle is of course how the 10 pin pinheader connector must be connected. The first thing to do of course is to open the attenuator. There was a PIC microcontroller. The datasheet was easy to find. After examining the pins , there appeared to be an I2C connection, but it was to be expected . With the multimeter I could trace which pins on the connector were used for I2C communication. With the multimeter I could easily measure what the + 5V and GND connections are.

The big chip with sticker is the PIC, which controls everything. Power supply and I2C enter via the tape cable.

What I was hoping for was that I send a byte (with the attenuation) to the attenuator via I2C and that it then works. Finding the I2C address is no problem with an Arduino script . Search the internet for "i2c scanner arduino ". Install this script on the Arduino and connect your I2C device and run the script. You will see the I2C addresses found in the serial monitor.

Then I wrote an Arduino sketch with which I started bombarding the attenuator with bytes. There happened however nothing. Then you just search the internet for manuals, specifications etc. It appears that the protocol that runs via I2C is confidential, in itself understandable. The PIC is therefore useless.

In order to be able to continue and hopefully do something with this attenuator, I have removed the PIC microcontroller. Control via I2C is handy, you only need three wires (GND, SCA and SCL) . The idea now is to mount an ATtiny84 in the attenuator instead of the PIC.

To reach 63.75 dB the attenuators have the following values: 32, 16, 8, 4, 2, 1, 0.5, 0.25 dB, this counts up to 63.75 dB. From 8 pins of the PIC microcontroller, print tracks run to logic ICs that control the eight attenuators. The attenuator on which print job will have to be experimentally invented. A SA or a power meter is then a handy tool.

Very clearly you see eight compartments where the various attenuators are involved. In my attenuator this is not visible because it is sealed with foil.

With loose wires, I switched on and off each attenuator and looked at how much the attenuation was. The order was quickly determined.

ATtiny84

The ATtiny84 is a 14-pin microcontroller that comes with a Arduino -sketch can be programmed (without a bootloader). In the past I have described how you could program the ATtiny85, this is similar.

For the attenuators we need 8 IO pins , for the I2C connection another two. It should therefore fit.

The ATtiny84 will act as an I2C client / slave . You are not free to determine the SDA and the SCL of the I2C interface, these are on PA4 and PA7 (pins 9 and 7). Furthermore, PB3, the reset input can't be used as an output. We do not need a crystal, the ATtiny84 runs on its internal clock.

Sketch for the ATtiny84

The only thing the sketch has to do is listen on the I2C bus until a message with the correct address comes along. This message contains one byte (eight bits), which we write to the attenuators.

```
// I2C Client for MCE Weinschel attenuator
#include <Wire.h>

int OutputPins[] = {0, 1, 2, 3, 10, 7, 8, 9};

void setup() {
  Wire.begin(8);                // join i2c bus with address #8
  Wire.onReceive(receiveEvent); // register event

  for (int i = 0; i < 8; i++)
    pinMode (OutputPins[i], OUTPUT);
}

// function that executes whenever data is received from master
// this function is registered as an event, see setup()
void receiveEvent(int howMany) {
  int x = Wire.read();    // receive byte as an integer

  for (int i = 0; i < 8; i++)
    digitalWrite (OutputPins[i], bitRead(x, i));
}

void loop() {
  delay(100);
}
```

On line 4 an array is defined with all output pins . The pins 4 and 6 are not used because they are the I2C connections .

On line 7 is the I2C address .

On line 8 a so-called event initialized . This event is called when data is received via I2C .

Lines 10 and 11 define output pins . If there is only one line in the for-loop then you do not need braces "{ } ".

On line 16 starts the function that is called when something comes in.

On line 17 the read-in byte is placed in the variable x.

On line 19 and 20 is a for loop that reads bits (bitRead) and writes to the output pins (digitalWrite).

On lines 23 and 24 the infinite loop, from here the sketch jumps to the event function when a byte enters.

The I2C master

```
// I2C Master for MCE Weinschel attenuator
#include <Wire.h>

void setup() {
  Serial.begin(9600);           // start serial for output
  Wire.begin(); // join i2c bus (address optional for master)
}

byte x = 0;

void loop() {
  Serial.println(x);         // print the integer

  Wire.beginTransmission(8); // transmit to device #8
  Wire.write(x);              // sends one byte
  Wire.endTransmission();    // stop transmitting

  x++;
  delay(200);
}
```

This is a sample sketch to control the I2C client. This sketch allows the attenuator to increase in increments of 0.25dB.

On line 13 the I2C communication is started to I2C address 8 .

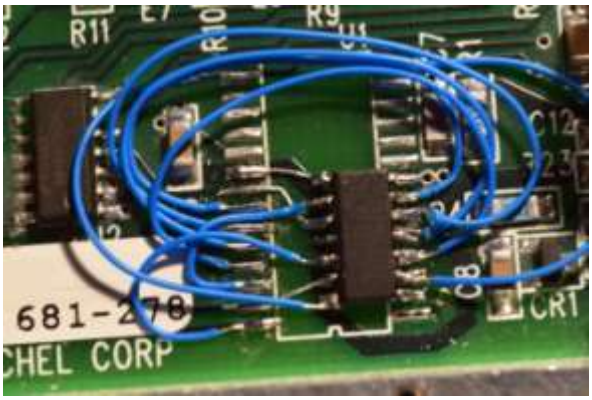
The byte is sent on line 14 .

On line 15 the I2C communication is closed .

On line 17 the value in variable X is increased by one .

Construction

Fortunately, I was able to solder the ATtiny84 on one side at the location of the PIC microcontroller with thin wires to the circuit boards of attenuators. It was quite a hassle to solder the loose wires on the chip, next time I use an adapter board.



A hassle to solder the wires well

I have programmed the ATtiny84 in the attenuator. You then have to solder four wires and bring them to an Arduino that functions as a programmer .

Conclusion

Remember that this attenuator always has a minimal attenuation. With my attenuator this is around 3.2dB, so you do not come under. This has to do with connectors , printed circuits, semiconductors etc.

You are (more than) an busy sweet to find out how it works. But the result may be there. For the price where you do not get two attenuator from China, you now have a professional attenuator that can be set up very comfortably.

Again an aluminum box with connectors at the collection!

From the library

Summary
New legislation concerning privacy and its impact for our workgroup is being discussed.

Dear people,

Usually I keep far from politics and from possibly controversial social developments. Today this must be different and that is due to the arrival of the new General Data Protection Regulation (AVG in dutch). What's up? In the Netherlands we are not allowed to just collect personal data and use it for personal gain.

Until recently, this was a matter for the Dutch Authority on personal data and the 2000 Law on Protecting personal data (Wbp). This system is now being replaced by a new system with the same intention from the European Union.

The General Data Protection Regulation (AVG in dutch) will apply as of 25 May 2018. This means that from that date onwards, the same privacy legislation applies throughout the European Union (EU). The old law then no longer applies. The AVG is also known under the English name: General Data Protection Regulation (GDPR). The Dutch Authority on personal data is being replaced by the Dutch Data Protection Authority.

The new regulation imposes higher demands on privacy processing, proposes sanctions (part of worldwide turnover etc), but does not give clear criteria for implementation. The new regulation, however, also affects our club:

The impact is small for these reasons:
· We already have a justification for the personal data we keep.
· Members volunteered and submitted relevant data.
· We are not a commercial companywith the possible complications.
· We already have a very central organization / no other working method is necessary.

We also already have a policy in this:
· We have a treasurer / membership administrator with secondary the chairman to manage the data excluding others.
· The list of members is limited to relevant items: name, email address, telephone number.
· Listing on members list only takes place with the permission of mentioned members.
· Of this, only the name and address is provided to the print shop for shipping the Kunstmaan.
· Members had and will have access to information, with right to view, change, be forgotten and transfer of data.

Actions to be taken are:
· Member lists will only be distributed to natural persons.
· The treasurer / member administrator will also set up and manage a formal processing register.

Comments from your side are welcome to the board. More information can be found on the site of the Dutch Data Protection Authority.

Your librarian

[1] the Dutch Data Protection Authority, see website

Annual report for 2017

The first meeting in the new year was on January 7, the first Saturday of the month. Fred was out of Vietnam again. The weather forecasts were not good, for the night from Friday to Saturday, sleet and snow were predicted. Still decided to let the meeting go because it was too late to cancel. The planned lecture by Jos Disselhorst did not take place because of the weather. Our new member Job gave a short lecture about his home installation, including beer brewing ! The Nimeto has already been opened for us specifically. Because the heating was not yet at full power, it was still a bit chilly.

A registration list for the new Metop receiver was ready. Eight people have registered.

During the survey, Harm showed several "brews": a control of the FM1216 tuner from Philips coming from a PCI card , a USB interface for the HRPT decoder built on an experimental board and a silicon tuner .Furthermore, the topic of rotors has been extensively discussed by Harrie.

With seventeen people present it was a pleasant gathering / drink, offered by the board.

March 18 was the second meeting of the Working Group, not the second Saturday because we stood at the fair in Rosmalen. With 24 attendees much more interested than in January. After a long period of illness Harry could also be present again.

Prior to the board meeting was a discussion with Roel and Job about setting up a new website based on MediaWiki .

Harm showed a self - build IQ generator / measuring transmitter for the 1700 MHz.

Ben, Rob and Harrie have told us what the state of affairs is with regard to receiving (A) HRPT. Rob zoomed in on Metop and FengYun and Harrie on the Jaeger rotor he had brought in an XY configuration .

After the presentation there was live-reception of NOAA19 by Roel and Job. Roel had a V-dipole and an RTL dongle . Job used a self-built Quadrifilar Helix antenna, designed by Rob Hollander. The receiver software was Gqrx Linux.

On May 13 was the General Members' Meeting, with 21 members this was fairly busy. The agenda was as usual. Unfortunately, we are faced with a structural loss, but it is not yet dire. Donations from members have contributed to the loss being less. Something will have to happen in the long run.

The lecture by Jos Disselhorst about "interdigital filters" that was planned for January has now been made up. If you may believe it, it does not all sound that narrow. Try to see what is available on standard aluminum tubes or use a waveguide. Very useful calculation programs are available on the internet that can help you.

Jos gave another bonus with a lecture about the spectrum analyzer. He had also taken this along, so there was also enough "hands on ".

At the meeting, the first parts packages of the QPSK-HRPT receiver were also handed out.

On September 9 was the first meeting after the summer, with 20 members a nice turnout. Some members had built the QPSK receiver and this could be adjusted at the meeting. Harrie van Deursen had his home-built QPSK measuring transmitter and Job de Haas a measurement transmitter based on GNUradio and HackRF . The UV916 print sometimes has a small problem in the 33V power supply. This will be further explored outside the meeting. Peter Smits, Hugo van Velsen, Peter Kuiper, Henri Mulder and Job de Haas have a well-functioning receiver of the parts packages that have been awarded.

And on November 11 was the last meeting of 2017, 19 members present. Rob, our treasurer, was prevented due to vacation. Arne picked up well during the survey with all kinds of goodies from China. For many exotic chips, pcb modules have been created with which you can easily experiment.

Job gave a lecture on the use of GNU Radio as a measuring station for HRPT and QPSK signals. It was a lot of research, also which hardware was the most suitable to serve as a channel.

On July 22, Peter Smits, Job and your chairman went to Harrie to arrange the first built receivers. We have looked at three receivers in total. The first receiver of Peter did the same, the second had small solder problems that we could solve immediately. Job's receiver was difficult to get in-lock . This later turned out to be a nutritional problem in the 33V. We were able to see his GNU radio transmitter in practice right away. We used this session immediately to write an article about the adjustment of the QPSK receiver.

Exhibitions , meetings and presentations

On 11 March, we were again present at the fair in Rosmalen. The stand crew was Rob, Ben, Timo, Hendrik and Roel for the first time. Arne unfortunately could not be present. It was a pleasant day with lots of people interested in the Workgroup. Several people have indicated that they want to become a member.

On 17 June, your chairman gave a presentation in the Science Park in Utrecht. Roel was at this event with the " Spacekeet" where he showed live reception of weather satellites .

In the first week of July I was on vacation in Curacao . Peter Kuiper had put me in touch with the chairman Brett Ruiz van Verona , the counterpart of the Veron on Curacao , because it seemed nice to me to give a lecture about the

reception of weather satellites. In the evening on 5 July, I gave more than two hours of different presentations about the different facets of our hobby .

The Day for Radio Amateur was on November 4. It was getting up early again at 8:00 in Apeldoorn. We stood there with four men: Arne , Job, Wim and the undersigned. For Job it was the first time that he participated. His rotor control attracted a lot of attention. Due to illness, Hendrik unfortunately could not come along unexpectedly. It was improvising for a moment because Hendrik always makes for a neat stand. Rob was also absent because of his vacation. Arne managed to realize live reception of Eumetcast . It seemed that this year the number of participants in the DIY exhibition was bigger than last year. It was a fun fair and fun to meet all kinds of acquaintances again. Next year in Zwolle.

Roel Roscam Abbing has taken a very nice initiative: the spacekeet . In an old construction mobile home he has made a mobile ground station for weather satellites. This spacekeet was on the campus of the Utrecht SciencePark. There was also a program of it lectures from all sorts of 'satellite amateurs' who share their insights shared about the subject. With the spacekeet he hopes to get answers to questions such as "what is the meaning of things when we no longer see the big picture". He then refers to the Sterretoren of Sjoerd Wouda. In gratitude for the assistance given from the working group, he made a small gift to the working group. More info about the spacekeet on http://keet.space .

De Kunstmaan

De Kunstmaan has appeared four times in full color in 201 7 . A total of 104 editorial pages were published, in 201 6 these were 112 .
Our editor Harry Arends has put together the Kunstmaan with great care.
The Satellite Status of Arne was a regular section. 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 in each Kunstmaan titled "Weather satellites in Vietnam". In this, Fred described his experiences with the reception of weather satellites in Vietnam and where he encountered the practice of practicing the hobby. Our librarian Paul provided several nice contributions from the library.

In the March issue there was a list of members as an individual annex . The front plate was decorated with a nice umbrella as an antenna. When asked what this has to be proposed, we are still guilty of the answer .
In this Kunstmaan also the introduction of a new down converter. No adjustment points and fits on a print of 33 x 75 mm.
Rob describes the dataformat of the Metop.
The QPSK receiver is still not finished. In the March issue the description of a combined tuner and display print.

In the June Kunstmaan a small article about turning off the Meteosat-7, who has not grown big?
Furthermore, an overview of how the QPSK receiver should be connected.
Harrie writes an article about Jaeger rotors that can still be delivered (probably old stock). He breaks a lance for azimuth elevation, which has worked well for him for over 17 years now .
Rob describes the decoding of the FengYun, which is a lot trickier than the Metop, but it has succeeded. A sequel appears in the September Kunstmaan.
Furthermore, the elaboration of the survey that we conducted in 2016.

In the September issue a description of my hand from the FT2323H module from Adafruit that can be controlled with Python scripts and can serve as an I2C device. The FT232H is likely a replacement for the FT245 USB interface on the HRPT decoder because it is no longer delivered.
On eBay you can purchase the ADF4351 for little. This is an integrated synthesizer and VCO running up to 4400 MHz. With the hack of a Cypress module, the computer thinks that a real evaluation board from AnalogDevices is connected!

In the last issue of 2017 an update on the QPSK receiver where the step-up converter causes a bit of interference.
Peter Kooistra has a very nice article of his SDR solution for the reception of Metop and FY. He follows the dish by hand, so an expensive rotor installation is not necessary.
Hugo Van Ruyskensvelde writes about the EUMETCastView program he has written . The program can be downloaded free of charge from github .
Job de Haas has a contribution about his weather station in the making. He uses the rotor design of Satnogs with self- printed parts / gears.

The Digital Kunstmaan
In addition to the Christmas week , the Digital Kunstmaan was released four times in 201 7 . As far as can be ascertained, the Digital Kunstmaan is well read. The open percentage is between 70 and 80 percent , which is very high.
The date of the next meeting is always mentioned. Please note, it is certainly not always the second Saturday of the month.
Let everyone who has a nice news for the digital Kunstmaan give this to redactie@kunstmanen.net.

Purchase promotion
Elmar organized several times a purchasing campaign at Reichelt and Pollin .
At RS you must have a Chamber of Commerce number and you can´t order as a private person, our Werkgroep can order at RS.

Website
In spite of all good intentions, not much concrete has yet been done regarding a new website.

Satellites
Meteosat 7 has come to an end. On March 31, 2017, it was disabled.
In the 7.8 GHz band, the JPSS-1 e s FY-3D launched. The launch of the Meteor N2-1 has unfortunately failed.
The NOAA15, 18 and 19 are still available for APT . HRPT there is the NOAA 18 and 19, and the Meteor N2.
From the " QPSK satellites " in the 1.7GHz band we can receive the Metop A and B, FY 3A, 3B and 3C

Financial annual statement in 2017; budget 2018

This is an overview of income / expenditure for the calendar year 2017. The actual income / expenses can be (partly) made in another year.

The 2018 budget is also included here. The loss in 2017 is slightly less than last year, partly thanks to a little profit on the sold components. Unfortunately, the expectation is that this loss will increase again in 2018. For the time being we can bear this loss, but in the long term we will have to look at measures.

Looking at the absolutely necessary expenses for 2018: printing / shipping costs KM, Nimeto and bank charges, we come to an expenditure item of 3270 euros. Members' income is 2550 euros. So there is a structural gap of more than 700 euros! This corresponds to a "member deficit" of at least 28.

If there are any questions about this overview, I would like to hear that before the annual meeting (May 2018) so that I can explain on that day.

Uitgaven	2016	2017	2018			Inkomsten, bezit	2016	2017	2018
	realised	realised	forecast				realised	realised	forecast
printing, postal costs	€ 2,255.00	€ 2,370.00	€ 2,400.00			income membership	€ 2,555.00	€ 2,585.00	€ 2,550.00
Hire Nimeto	€ 319.00	€ 319.00	€ 320.00			Info + kunstmaan verkoop	€ 32.00	€ 0.00	€ 0.00
Hire 2 Nimeto	€ 400.00	€ 400.00	€ 400.00						
fairs subscribe	€ 116.00	€ 116.00	€ 120.00			interest saving account	€ 21.10	€ 8.62	€ 0.00
fairs private costs	€ 0.00	€ 0.00	€ 0.00			Sell equipment gifts	€ 132.00	€ 0.00	
expenses projects	€ 0.00	€ 1,168.70	€ 50.00			gifts	€ 0.00	€ 200.00	
Abonnementen bibl.	€ 103.78	€ 84.00	€ 90.00			verk. onderdelen proj.	€ 25.50	€ 1,905.00	€ 0.00
Internet abonnement	€ 49.75	€ 57.20	€ 60.00			handboek inkomsten	€ 8.00	€ 0.00	€ 0.00
bankkosten	€ 126.83	€ 138.00	€ 150.00						
paypal kosten contr.	€ 8.76	€ 16.86	€ 20.00						
Kantoorbenodigdheder	€ 0.00	€ 30.70	€ 30.00						
handboek drukkosten	€ 20.00	€ 0.00	€ 0.00			Lost	€ 650.52	€ 626.84	€ 1,090.00
return membership	€ 25.00	€ 25.00							
return projexts.	€ 0.00	€ 600.00							
Result expenses	€ 3,424.12	€ 5,325.46	€ 3,640.00			Result income	€ 3,424.12	€ 5,325.46	€ 3,640.00

Balance 31-12-2017

Activa	2016	2017		Passiva	2016	2017
ZKI savings account	€ 8,625.60	€ 8,634.22		equity capital	€ 8,699.86	€ 8,186.60
Bank account	€ 1,045.26	€ 707.38		income membership next y.	€ 1,090.00	€ 1,155.00
hardware	€ 119.00					
Total	€ 9,789.86	€ 9,341.60		Total	€ 9,789.86	€ 9,341.60

Overview of end-of-year accounts.

	2012	2013	2014	2015	2016	2017
Savings account	€ 10,101.44	€ 10,220.41	€ 9,905.62	€ 9,354.50	€ 8,625.60	€ 8,634.22
Bank account	€ 1,533.93	€ 1,675.72	€ 1,628.19	€ 1,409.25	€ 1,045.26	€ 707.38
cash	€ 8.82	€ 1.82	€ 1.82	€ 0.00	€ 0.00	€ 0.00
Total	€ 11,644.19	€ 11,897.95	€ 11,535.63	€ 10,763.75	€ 9,670.86	€ 9,341.60

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

Overview of members and income.

	Actual 2016		forecase 2017		Actual 2017		Forecast 2018	
	nr.	income	nr.	income	nr.	income	nr.	income
Netherlands	77	€ 1,925.00	72	€ 1,800.00	74	€ 1,850.00	73	€ 1,825.00
Foreign	21	€ 630.00	21	€ 630.00	24	€ 720.00	28	€ 840.00
Special members	9	€ 0.00	9	€ 0.00	9	€ 0.00	9	€ 0.00
Total	107	€ 2,555.00	102	€ 2,430.00		€ 2,570.00		€ 2,665.00

The number of members actually increased slightly in 2017. Discussions that have arisen as a result of the disappearance of the GEO Quarterly magazine, the article about our working group in the latest GEO number and our new QPSK receiver have contributed to this. We now also have members in Sweden and USA. Two members are members for six months in 2017, which is why the number of members in table 1 above is lower. The table below shows the membership progress in the past 5 years.

year	lost	added	total amount members
2018	-4	6	110
2017	-9	10	108
2016	-6	1	107
2015	-8	2	112
2014	-10	9	118

Rob Alblas

treasurer

Report of members meeting 6 January 2018.

Opening by the chairman.

The chairman pronounced the best wishes for the new year, also on behalf of Peter Kuiper from Curaçao. Francis Bell of GEO also passes on his best wishes to all members of the working group. The chairman thanked the members for their efforts in 2017.
With regard to "Good intentions", reference is made to that of the previous year:
Finish projects, and ensure that the built device is neatly placed in a cabinet.
Further: cleaning up the attic, in March you can take discarded items for which perhaps others are interested.

In 2017, the membership base rose slightly, also due to the discontinuation of the GEO Quarterly edition and the subsequent discussions on the GEO mailing list.
The share of foreign members is now around 24%, compared to 14% in 2012.

A number of issues from the past year are recalled, such as lectures (about the interdigital filter).
Our magazine "de Kunstmaan" has come out 4x again, as a PDF in English.
For the QPSK receiver, up to now 17 packages have been sold.
Furthermore, the working group has been dealing with new downconverters and rotor cases; the latter has also been published in the magazine of the Veron (Dutch radioamateurs).

What can we expect for 2018:
First of all: membership contribution remains the same.
For the HRPT decoder a new print has to be made, which also fits the new USB interface.
Furthermore, the 1.7 GHz band goes into "disuse"; the newly launched satellites, including Fengyun-3D and JPSS (NOAA20), transmit in the X-band at 7.8 GHz. Oleg ([1], [2]) receives it already, with a 3m dish, and using professional receivers bought via Ebay.
Here we have to design something ourselves as a working group. This concerns the entire process that needs to be tackled: from dish via LNA, downconverter, receiver, decoder to the software. Other measuring equipment will also be required.
A meeting will be held in March after the regular meeting.

Report meeting 11 November, this is published in the December Kunstmaan.
There are no comments.

Setting the agenda
No additions.

Administrative affairs
Because of health, Harry resigns as an editor. He has been involved in this since October 2004, first as a 2nd editor and from November 2005 as editor-in-chief.
Harry is thanked for his efforts for more than 12 years, and is offered a small present.

Satellite status
Given by Arne; see later in this magazine.

Any other business
Harrie v. Deursen: Reports that there are upconverters of 2V to voltages up to 28V. The IC only costs 0.50. The converter works internally at 1.2 MHz, so the required coil can be small.

Wim Bravenboer reports that he already has some experience with reception at 7.8 GHz. The dish must actually be "closed", so no mesh to be used.

There is a question about GEO, whether they really stopped. Answer is yes, regarding the release of the GEO Quarterly. It is still possible to return articles that are then formatted and made available as a pdf together with other received articles.

Arne bought several items from China. Among other things, a soldering station, to be built yourself. The soldering point is at temperature within 30 seconds. Power is variable up to 70W. Different soldering points are available for 3 euros each.

He also shows a "brushless" engine, bought at Deal Extreme [3]. This motor can be controlled via pulse width. Pretty strong, with 6 Nm, especially if there is a gearbox behind it. This motor could be suitable for making a variable speed rotor necessary for reception of 7.8 GHz.

Arduino-related matters.
He also shows an ADF4351 for only 9 euros. This is a programmable VCO, which can be controlled with an Arduino.

It is also worth mentioning a Mini-scope for 50 euros, not much larger than 10x10x2 cm.

Closing

After this the traditional New Year's reception will take place, followed by:
Lecture: Use of wsat
Rob Alblas passes on the most important issues of wsat. With this program all data from the HRPT decoder, incl. Metop and Fengyun, can be recorded. There is also a tracker built-in. In principle, the whole can run continuously, automatically following and recording successive satellites; there are still some adjustments needed, such as setting the correct frequency of the receiver and switching between different types of satellites. Setting the frequency should be possible via i2c, to be generated via the decoder hardware, provided the decoder and receiver are not too far apart.
If there are any problems with the program, please let me know!

Rob Alblas
(secretary AI)
The links below can also be found on the web-site:
menu 'Weblinks', 'KM links 2018'

[1] https://twitter.com/meteooleg
[2] http://www.sat.cc.ua/index.html)
[3] http://www.dx.com/ .. ..

Report of members meeting 3 March 2018.

Opening by the chairman.
The amount of present people is very low; there are only 11 members present. Reason: the flu, spring break and possibly the weather.

Ben is going to order again at Minicircuits, contact him if you need anything.

About the QPSK receiver: As far as we know, 7 are now being built and running. The receiver is also built abroad.
Regarding components: the SAW filter must be ordered again. There will be a last delivery round, after that, builders will have to find and buy te components themself.

On March 17th we will be at the fair in Rosmalen. Besides Ben, Arne and Rob, Hendrik, Timo and Herman will man the stand.

Report meeting January 6:
See elsewhere in this magazine.

Setting the agenda
No additions.

Administrative affairs
No changes.

Satellite status
Given by Arne; see later in this Kunstmaan.

Any other business
Timo: has made an LF amplifier to measure phase noise. Making the amplifier enough noiseless itself is difficult but has now succeeded.

Arne: bought a waveguide filter on a fair and adjusted it for 1.7 GHz. It seems to work very well.

Closing

Ben now gives an overview of all aspects of the 7.8 GHz band. The newer weather satellites, such as NOAA20 and Fengyun-3D, work in this band and no longer at 1.7 GHz, so we have to work here as a workgroup. The 7.8 GHz is required because of the higher data rate and with it the higher required bandwidth.

Who has some work on this band?
- OLEG (https://mobile.twitter.com/MeteoOleg)
- reception of deep-space spacecraft: 8.4 GHz (Willy Vonck)

There is nothing to find in terms of equipment; satellite TV is too high (12 GHz). There may be something in the dump to find but then it is just what you happen to encounter.

Dish
The deviation in the structure must be a maximum of 1/10 of the wavelength. For 7.8 GHz

that is 3.8 mm. Finer mesh is needed. Building yourself as for 1.7 GHz is difficult. A TV dish would be a solution. It is heavier, and the pivot point will also be further backwards (ie larger moment). A 120 cm dish should be sufficient.
The opening angle is then 2.2 degrees, (at 1.7 GHz this would be 10.5 degrees).
This means that the antenna rotor must be more accurate. (Kepler data (TLE) for tracking are sufficiently accurate.)
The whole construction must also be firmer (influence wind) and the rotors stronger.

LNB
It is possible to take an existing TV LNB, which then has to be adjusted. Whether this is feasible depends on existing filters.
These LNBs are also linear, but we need circular.

Job de Haas is trying to build an LNB himself. The question is whether FR4 board is suitable for 7.8 GHz. (Better alternative: Teflon PCB is very expensive.)

Downconverter
This must be such that the frequency can be picked up by a receiver. For a TV tuner that would be below 900 MHz. However, the UV1316, which we now use in the 1.7GHz receiver, is too narrow in bandwidth.
RF Hamdesign would have something in this area

Receiver :
As mentioned, the UV1316 is unfortunately too narrow.
The LT5546, which we now use as a demodulator, should meet 17 MHz.

Decoder
The operations (Viterbi decoding) are identical to what we have now, however the current hardware (GODIL module with FPGA) can not handle the speed (15 Mb / s). It has to be seen whether the design can be modified, otherwise another FPGA is needed.

A first test in the area of 7.8 GHz could be to mount an LNB in a TV dish and then use a spectrum analyzer to check whether the signal is 12 dB above the noise.

Conclusion: Work to be done!

Rob Alblas
(secretary AI)

This is the antenna installation by Michael Still. See the front page. He mailed about this to Ben:

“As you can see I have increased the size of the dish, bit more signal. The receiver locks up quite happily in QPSK and HRPT from 5 degree elevation, lots of signal. The constellation viewer I am using is just a quick homebrew one, as it's nice and small..I have also been experimenting with x band, bit more challenging, just got a sniff of FY3D today, need to make a better lna.
I'm picking up a wefax signal from zero degrees, which I think is Meteosat it is very week, around -132db as you say I thought it was decommissioned, so surprised to hear it there, I still picked it up on the 1.5m dish.
I have enabled Reed Solomon, which has helped clean the picture up, QPSK reception is now as good as the HRPT.”

Arne van Belle, as of March 15, 2018

POLAIR APT HRPT Arrivals
(MHz) (MHz)
NOAA 15 137,620 1702.5 morning / evening, at HRPT weak
NOAA 18 137.9125 1707.0 early morning / afternoon
NOAA 19 137.100 1698.0 afternoon / night
FengYun 3A no 1704.5 AHRPT 2.80 Msym / s
FengYun 3B no 1704.5 AHRPT 2.80 Msym / s
FengYun 3C no 1701.3 AHRPT 2.60 Msym / s LHCP!
FengYun 3D no 7820.0 X-band afternoon MPT 60 Mbps
Metop-A off (137,100) 1701.3 LRPT / AHRPT 2.33 Msym / s
Metop-B no 1701.3 Only AHRPT 2.33 Msym / s
METEOR M N1 off (137.100 LRPT) 1700.0 Black image
METEOR M N2 137.100 LRPT 1700.0 LRPT on / MHRPT on
NPP no 7812.0 X-band HRD 15 Mbps
JPSS-1 / NOAA 20 no 7812.0 X-band HRD 15 or 30 Mbps

NOAA 15, 18 and 19 are the last satellites that still broadcast APT.

The LRPT signal from METEOR M N2 can be received with an SDR dongle.

NPP (NPOESS Preparatory Project) and JPSS-1 (NOAA-20) only transmit on the X-band with 15 Mbit / s. A tracking dish with a diameter of 2.4 meters is recommended ! https://goo.gl/1mXkAZ
https://goo.gl/k6hAbi

FengYun 3A, 3B and 3C broadcast AHRPT, which can only be received with the new QPSK receiver from Harrie and Ben. This AHRPT is not entirely according to the standard so that even a Metop AHRPT receiver is not suitable for the FY-3 series!
FengYun 3C also has a data rate other than 3A and 3B. Rob has expanded his GODIL decoder and can now demodulate HRPT, Meteor HRPT, METOP and FY3A / B and FY3C!

FY-3D was launched on November 15th, but this satellite, just like NPP and JPSS-1, only broadcasts on the X-band!

Sentinel-3A, the successor of Envisat, can not be received directly, but images can be received via EUMETCast HVS-1.

GEOSTATIONAIR APT (SDUS) / PDUS Orbit position
(MHz) (MHz)
MET-11 (MSG-4) 1691 LRIT 1695.15 HRIT 0 degrees, operational
MET-10 1691 LRIT 1695.15 HRIT 9.5 degrees W, RSS parallel operation
MET-9 1691 LRIT 1695.15 HRIT 3.5 degrees O, RSS
MET-8 no LRIT 1695.15 HRIT 41.5 ° degrees O, IODC
GOES-E (no. 16) 1686.6 GRB 1694.1 HRIT 75.2 degrees W via Eumetcast
GOES-W (no. 15) 1691 LRIT 1685.7 GVAR 135 degrees W via Eumetcast
GOES 14 1691 LRIT 1685.7 GVAR 105 degrees W, Backup
GOES 13 1691 LRIT 1685.7 GVAR 60 degrees W, Backup
GOES-17 137 degrees W, in test phase
Elektro-L2 1691 LRIT 1693 HRIT 78 Degrees O, via Eumetcast
MTSAT-1R 1691 LRIT 1691 HRIT 140 degrees O, Backup for MTSAT2
MTSAT-2 1691 LRIT 1687.1 HRIT 145 degrees O, via Eumetcast
Himawari-8 no LRIT no HRIT 140 degrees O, via HimawariCast
Himawari-9 no LRIT, no HRIT, Backup for 8
Feng Yun 2E - - 86.5 degrees O
Feng Yun 2F - - 112.5 degrees O, Backup
Feng Yun 2G - - 105.5 degrees O
Feng Yun 4A 1697 LRIT 1681HRIT 99.5 degrees O, Operational

GOES-S was launched on March 1st, 2018 from Cape Canaveral. Named GOES-17 after launch and with the same instruments as GOES-16, it will replace GOES-W by the end of 2018.

Launches
Sentinel-3B Launch 25 April
MetOp-C Launch 17 September
Elektro-L no 3 Launch 22 October

EUMETSAT will stop direct LRIT broadcasts at 1691 MHz !
https://goo.gl/n4p3vQ
We will miss this signal at 1691 MHz, it was a good reference for receivers and rotors!

Unfortunately, DVB-S and most "DVB-S2 without VCM" receivers are no longer usable for EUMETCast. With a special driver some recent DVB-S2 receivers can still be made suitable for Basic Service Only. (only the TBS-5980 and Skystar 2 eXpress HD, unfortunately this does not apply to the Skystar HD USB box)
The signal at 10 degrees east has a larger bandwidth and is therefore weaker than before.
Recommended dish diameter is 80-90 cm for Basic Service and at least 120 cm for High Volume Service 1 and 2

The 2nd EUMETCast transponder T2 was converted to full bandwidth on July 3 2017 and slightly shifted to 11387.500 MHz Horizontal, The Symbol Rate and mode is now the same as HVS-1 (33000 kSym / s DVB-S2, CCM mode, MODCOD 16APSK2 / 3) Only broadcast HVS-2.
For good reception the same applies as for HVS-1, in good weather a 90 cm dish is sufficient but you reallyy need120 cm for reception under all weather conditions.
https://goo.gl/Ak2GYA
Users can receive GOES 16 data live on T2 / HVS-2 after request. Unfortunately this is in NetCDF format. In addition to SNAP, EUMETCastView by Hugo van Ruys can display this format.
http://hvanruys.github.io/
David Taylor has written an experimental netCDF reader: http://www.satsignal.eu/software/NetCDFreader.zip

Eumetcast users have been plagued by the spring "solar outage" in which the sun is at the same height as the satellite to be received at 10 degrees East.
http://www.geosats.com/solaroutages.html
In addition to a mountain of noise that displaces the signal for several minutes, the sun can heat your LNB so that the hood bursts. So check whether the cap is still intact before water enters the LNB!
http://www.skyinmadrid.com/images/cracked_lnb.jpg

Since July there have been strong signal strength variations on EUMETCast transponder T1 on 11263 MHz Horizontal. Unexpectedly, Eutelsat, the satellite operator, has started another service at 11263 MHz Vertical!
Due to "congestion" in the TV satellite world, we see that more and more transponders are being used on Eutelsat 10A. For optimal signal quality (SNR) you have to turn the LNB (Skew) so that this vertical transmitter is attenuated as much as possible. A LNB of moderate or poor quality can now suddenly give problems if it has poor attenuation for the vertical signals. This is called Cross-polarization isolation. This value should be better than 22 dB and indicates how much a vertical transmitter is attenuated when the LNB receives horizontally.
But also on neighboring satellites such as 7 East and 13 East, transponders are now active on or around 11263 MHz. Here you can do nothing with a better LNB, dishes smaller than 120 cm have a larger opening angle and will experience more interference from neighboring satellites.

Eumetsat recommends that you repeat the fine-tuning of your dish every year and pay attention to proper rotation (Skew) of LNB. If possible, also check the focus (sliding in and out towards the dish).
If the old SNR values are no longer feasible, it may be necessary to replace the LNB with one with better "Cross-polarization Isolation".

See "EUMETCast Europe Link Margins Explained" at https://goo.gl/8bB4Jj