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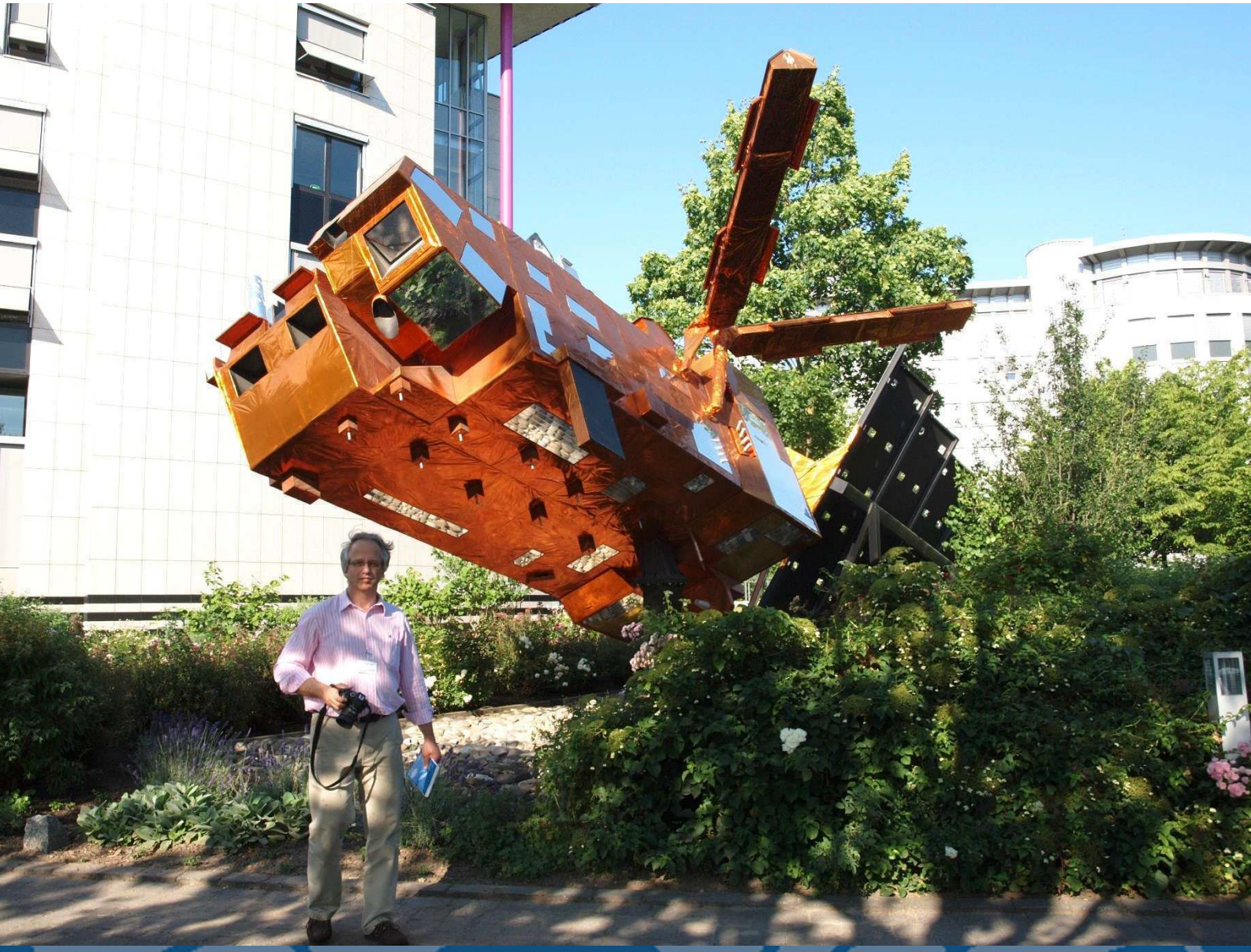

In dit nummer o.a.

de Rigol DS1054Z

PLL met ADF4106

en nog veel meer

Dear member,

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

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

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

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Content

Preface

Ben Schellekens

Kunstmaan

In this Kunstmaan again a variety of articles. Your Chairman has tried to stop the Arduino into a ATtiny chip. If you do not know what to do with your money you can consider purchasing a Rigol DS1054z in this Kunstmaan a review.
In addition, Rob writes about the linearization of HRPT recordings and on our visit to Darmstadt. Fred has unfortunately rotor vicissitudes in Vietnam and is worried about the new layout, but you heard, Fred! Harry has designed a PCB for the 137 MHz amplifier. Paul writes what kind of things has been in the papers.
A few topics that deserve further explanation.

Dish

On the front page a photograph of a test session where we three - meter dish are put through their paces. At this time we can not draw a final conclusion and we do not know how well the antenna it does now. We pick the bottom is not yet out of the can.
The adjustment of a dish, and the platesetter in particular, is an art. It is assumed that the distance between the noise floor and the signal must be as large as possible. Also at my dish with a diameter of 130cm.When these measurements show that the dish does just as well as an offset dish of 80 cm, in spite of the stronger signal coming from the dish. Where is it now? This is something I'm going to investigate the coming months.
The danger in a large dish is spent on making adjustments less concern because there is sufficient signal. Also at the 3-meter dish. What makes it particularly difficult is that the platesetter is not easily accessible to quickly adjust what. The best thing would remotely to be able to adjust the lighting technician: the twist-pull-push mechanism replaced with motors .... This is a separate project.

Low noise

And why do we want to lower noise? For the reception of the Metop and Fengyun with their digital signals. For the reception of HRPT makes it all does not matter so much, da t signal is loud crackling.
In the previous Kunstmaan I have written on the receipt of Metop. With gnuradio and my 130cm dish I could decode signals. We're on the edge, the image had noise and missing parts. In a drive description Eumetsat they talk about a diameter of 180cm, for many this is not feasible.
So the question is: what is the minimum diameter dish we need to receive Metop and Fengyun well, we'll have to take e l part of the chain under the microscope.

Noise on the line

In the past, the Meteosat-7 was used to adjust. Nowadays we can Meteosat - 10 take emitting on 1691 MHz.
What is zoal variable in the entire reception chain? We take as a starting point a parabolic antenna with a helical as a lighting and viewing:
- Focal ratio of the dish
- The focal length determines the place of the helical

- Opening angle of the helical. Fewer turns provides a larger opening angle, you should not look over the edge of the dish. More coils: the helical no longer sees the whole dish.
- Diameter of the helical, this is s uperkritisch.
- Length of helical
- Length of the aanpassingsstripje
- Distance from the aanpassingsstripje to the ground plane
- Noise figure of the preamplifier
- Length / quality of the cable through
- Adjustment of LNC1700 on cable

From the above summary shows that the imager is an integral part of the antenna and can not be adjusted separately. E D combination must be optimal.
In the upcoming Satellite will on these issues is still awaited one and the other.

Down Converter

The LNC1700 - down converter is only available second-hand. We are busy looking for an alternative. In this quest you stumble upon VCOs and PLL circuits. In this Kunstmaan a story about my educational experiment with the ADF4106.
Here, too, it applies that the noise contribution of the down converter to the signal must be minimal. The LCN1700 does certainly not bad. If you have one, keep him and do this not out of hand.

Happy reading desired and let us know how it goes with the structures and experiments that we have coming in Satellite what can write about.

From the library

The regular reader of this magazine may have noticed that summer is not my favorite season. Gray nights, stellar observatories are closed, no meetings by our user group and others. You are even supposed to leave the house for a while; why, I still can't tell you after 60 years. Luckily, my favoured electronics shop remained opened, New Horizons did a nice backward cartwheel next to Pluto and a pile of issues of this magazine always gives comfort and consolation. I will run you through the other magazines.

It is just to early to find anything in these other magazines about New Horizons. Here internet can't be beaten for speed. I know there are more important things on earth, but it's fascinating. 12 Watts on the antenna, about 33 AU away, 15 km a second. A network of receiving dishes, tens of meters in size, at about 8 GHz, we can't beat that (yet).

Electron of september, entering as we speak. With accumulator and battery technology. We got a various landscape last years. There is more on earth than lead-sulphur and zinc-carbon from my youth. If you think you know it all: EMF, types, memory effect, lithium: just read it anyhow. Six pages, worth saving the information. With money-saving hints and a few warnings for poisinous gas as well.

Electron of july has a warning against using certain types of ceramic capacitors in the HF path. Never knew.

Reading those magazines I always look for items trelated to our satellite world. Great surprise here! A description of an XY rotor system over 2 pages. Manufacturer is SPID in Poland. Not a cheap festivity, but it gives you a great step forward. My DIY project isn't really making progress after all. So buy it? No! Our own user group has so many great items itself!

In Guilford (UK) the yearly Space Colloquium was held. Simular to "Satellite Day" in Apeldoorn (NL) this spring - I missed it out. Amsat presented its plans for the next time. Oscar 40 has exploded a little bit because of a nasty engine but they are making it obsolete. Presentations on www.batc.tv.

Electron has to items on noise figure measerements. Up to 2 GHz. Central component...a DVG-T stick. If interested, read it yourself from the library table, it's too complex to explain in a few words.

On 7 november the "Day of the Radio Amateur". Last year Elektron warned for the costs of car parking, but not this time. It seems free of charge this time. Seems. Your librarian, sharp in mind and money, has raised a question with the organization. I will let you know.

On 4 october it's Open Day again at Estec in Noordwijk. Register in advance for a free entrance ticket. I remember from last year that it took great physical perseverence. I will try to write a summary on the subject.

The first two issues of Ruimtevaart kept me reading for ours. The parachutes that brake the speed of planet surveyors - I understand that you can't just throw a blanket sheet out of the window, but it is complicated: it takes a morter to give the parachute a chance for

proper deployment.The morter is now fabricated in the Netherlands as well, with a leading role for TNO (Dutch governmental organisation for applied scientific research)

Space suits, that's a special expertise as well. You won't be surprised if you know the requirements. Ed Kujpers writes on Past and Future of the Space Suit.

Border Sessions 2014 was een technologiefestival in Den Haag met discussies en presentaties over vele onderwerpen. Ruimtevaart was één van de thema's (naast Internet of Things, biotechnologie, stedenbouw, gezondheid.. te veel om te noemen). Minisatellieten die samen als één grote telescoop gaan werken, satellieten die internet bieden bieden aan moeilijk toegankelijke gebieden...In november weer (www.bordersesions.org).

Border Sessions 2014 was a technology symposium in the Hague with discussion en presentation on many subjects. Space travel was one of the subjects, next to Internet of Things, biotechnology, city building, health... to much to list. Mini satellites working together as one big telescope, satellites enabling internet in remote areas.. in November again.

Han Wensink has reported to the minister of Economic Affairs about the Applicatios of Satellite Data. I see it again, our efforts are more than just hobby. Information from satellites are very relevant for agriculture, energy and urban development. In Ruimtevaart 2015/2 a summary for politicians.

And a very nice story. Returned from being away - the Dwingeloo Radio Telescope! Five pages of reading entertainment. The dish is all overhauled and shiny, like being made of silver. Ik was there once with our User Group and I want to pay a visit again.

GEO 46 is still humming with Meteor 2. It is too attractive to oversee: nice results with rather limited efforts. Ans if you suffer some disturbances on a SDR dongle, here are a few hints.

Eutelsat is harder to observe then its predecessor. John Tellick describes his ups and downs with his dish (adjustment is more delicate and the dish with its supplier was disappointing). He also describes beating the rain on the LNB. Using a limonade bottle: smart thinking.

Enough words. I am starting the soldering iron!

Weather satellites in Vietnam (17) **Fred van den Bosch**

HRPT

I ended last time in quite minor: "To call without preamplifier aimed the antenna and, like Peter [5]: ABSOLUTELY NOTHING, just noise. This is the state of affairs at the time of delivery of this epistle. Hopefully the next time a better message. ".

And that's it! Even before KM No. 2 to the printer was I installed the LNA (and "that did the trick") dish on Met-7 focused and SOUND! I had the enormous good fortune to fall exactly into the tail of a WEFAX broadcast. I knew at that moment that the dish, helical, LNA, down converter and receiver worked. Almost the entire train so. After that I was busy with the WEFAX broadcasts, which unfortunately does not take place continuously and not follow the schedule mentioned in the previous number, to optimize the business. This could all day; my antenna is then directed to the west, the view from my terrace.

I left the helical windings and 6 am only by turns to what further stretching or pushing the upper connection and something to run given the signal to a variable 78-84. Adjusting to 50 ohm was also hardly anything out. [1]

HRPT afterwards. That was a lot more difficult because it had to be on West agreements (the free view on my terrace) and no NOAA-15. There remained only about 1-2 per day. The first was the best price right away: a signal strength of 92! Unfortunately, the Godil lockte not on the receiver and -for the second time in succession in minor lockt eindigen- still do not. He does of course that the built-in generator. The reason I am not yet got round to it, because the X-rotor was as described last time, refusing to get up from the 0 position. Exchange of both rotors was something: the original Y-rotor appeared to be a fraction stronger. But these problems still it was difficult to accurately track a satellite orbit. Then refused to make matters worse, the "new" X-rotor suddenly all service. Arne mailed some hints that may also be of interest to others. "Disconnect the engine separated from the main board and try whether the motor is still running when you put 12 volts directly to the terminal lip of the motor. These lips stabbing by the PCB which also contains a pulse detector. + And - does not matter, it is a DC motor that you can reverse the polarity. If the engine is running or it might be something on the board or a faulty relay contact, all pathways on the back are still intact?

There are spare parts for sale [2]. FYI: Clarke Tech HH390 is the same as Powertech DG380. Both with metal gears. The PowerTech 240 is the version with plastic gears and -tandwielkast. The site is a replacement motor for DG240 and DG280, but I think this is a typing error and that they mean DG380. The print is also sold separately and is the same for both types. "

During these experiments, first went to the engine and later the rotor suddenly. First in a totally wrong direction and then suddenly well. Spooky. First I'm going to check everything again quite good and then again creating an x / y-rotor from further tests and see what happens. Read it in the next KM.

The picture shows the current test setup on my terrace. Some cables are provisionally here and there with stitching thread and go through the window in the living room, where a temporary table with the rest of the state apparatus. If the rotors are not in use as an experiment, there is a piece of plastic around it from the rain. That must be advised by Arne due course a piece of (freight) are car inner tube. Also, the helical head yet to be made watertight. I have ideas for it already.

Saleae Logic Analyzer
The clips are inside. A set of 10 pieces. For VND 85 000 (= approx € 3.50) and were assessed by Lê even brought home to me. OK, they had to pick an Arduino GPS receiver that I had tested her. But still. The quality? Well, errr, let's keep it in Chinese.

Mondriaan
The Kunstmaan in the new layout except much nicer and more professional more and more artistic. In several places we see mondriaan particles and on the front is a real mature mondriaan of Panorama Mesdag-like proportions. A real Artificial (ondri) to so.

Obviously, I have nothing. In fact, I irritated me immensely to the intrusive futility of it. The most prominent dollop on the front page ruining my view not only the entire layout but also another completely unnecessary: the magazine is sent only to members who know how to find the Task Force website really. If necessary, see the back of the Kunstmaan. NO !! Not that crosswalk! Sigh .....

OK, my boundless hatred of this useless crap is clear. This triggers in me always a kind of sarcasm that I should like to draw things in ridiculous, see the "new front". But .... seeing is believing so do not forget to keep your € 25 prepaid card-Nokia mobile phone over such mondriaanse paint blob and see what happens. No result? Then quickly buy a real phone, or you'll miss a lot of membership extremely vital information. And that would be a shame, is not it?

Scope
In one of the previous Satellite I wrote that I had purchased a Pico-scope. In the Pico newsletter last August was a link [3] to a movie where the program is explained. I quote:
"This video is a good place to start if you are unsure whether PicoScope is what you need. After watching the video, we recommend that you download your own copy of PicoScope (free on our website) and try it yourself. Most of the advanced features work without an attached scope - except that you can not record your own data, of course. "

Of everything
Space and astronomy
TEDx event at ESA ESTEC Noordwijk with lectures on technology & Space:
Wednesday 11 November 2015
http://www.esa.int/About_Us/ESTEC

Link to info about the event:
https://www.ted.com/tedx/events/15033
http://tedx.esa.int/

Nice movie of the earth and the moon from 1.5 million km.
http://www.nasa.gov/feature/goddard/from-a-million-miles-away-nasa-camera-shows-moon-crossing-face-of-earth

Space Engine. According to the astro forum: "This is quite gigantic beautiful!
http://en.spaceengine.org/
You can have hours of fun with it. Made by one person. Look especially as the tutorial on youtube. "

Links (see "Links" on the website)
[1] The Kunstmaan, dec.2014, pg. 154. Report Meteosat-7 reception.
[2]
https://sadoun.com/Sat/Products/PowerTech/sadoun_powertech_replacement_parts.htm
[3] Pico-Scope
https://www.youtube.com/watch?v=hjY0awuxEyU&list=PLyAXNQGte3qOqOGSklDJm8mYh1nfhxrkE

Arduino in ATtiny85

Ben Schellekens

Introduction
This article Describes how you can program sketches in an ATtiny85. This chip is much cheaper and smaller than the ATmega328.

Introduction
As has been reported in previous articles already Arduino is on the one hand a piece of hardware (a development board, with a microcontroller and a boot loader) and on the other hand, a development environment with its own programming language.
The supplier of microcontrollers Atmel. The simplest Arduino has a ATmega328P, this is a 28-pin microcontroller. It is also used in the display board of the WRX1700. In the WRX1700 it is necessary to many pins at your disposal to Hebbe n, for other applications, this will not always be the case.
Atmel also has smaller chips, with fewer pins. This series is called the ATtiny. Here the Arduino software also runs on. [1]
In the past I used small PIC microcontrollers from Microchip, eg. The 12F675. The first experiments I did this with the WRX1700. On the main board of the WRX1700 is another 12F684, a 14-pin microcontroller.To use the 1000 divisor and the synthesizer control for Minicircuits a 12F675.
Now I do not start a religious war between the supporters and opponents of Atmel and Microchip. There are quite a number of advantages in Stained Glass smell of Atmel microcontrollers over that of Microchip.

Benefits of ATtiny

- The control of the ports on the PIC (with the programming environment MikroC) an incredible puzzle. Uniformity between the models do not exist.
- The programming environment for the PIC is a different than for the Arduino. Ideally you work in one environment. Moreover, the development of the Arduino is very scanty.
- To develop a PIC you need an expensive programmer or development board. The Arduino is this one.
- The pinning of the PIC is "illogical". Pin 1 is 5V and pin 14, 16 is the GND. This in itself is not a problem, connect wrong blows the chip does not.

All in all this surely had a few arguments to see what we can with a small Atmel.

ATtiny family
Atmel has several 8-pin models microcontrollers ATtiny25, ATtiny45 and ATtiny85. For the price you do not have to leave. Reichelt at the ATtiny25 costs 99 cents, the ATtiny45 and ATtiny85 1.20 euro 1.05.
The main difference is the amount of memory. The ATtiny85 has 8 KB of internal memory, ATtiny only 2 KB. Note that the "regular" ATmega328 has 32 KB of internal memory. These ATtiny are not suitable to run large programs! Also, there are differences between the amount of RAM (for the use of variables) and EEPROM (for storing data in the chip).
All versions can run at 20 MHz internal oscillator and I have six O ports. See also the data sheet [2].
You want these little wonders to work choose the ATtiny85, e dez has the most potential.

The ATtiny has the following pin connections. As you can see shared many features. So you can collect the p 1, 2, 3 and 5 analog control.

Figure 1 Connecting the ATtiny85

What do you need?
The Arduino has called a bootloader. The bootloader ensures that you can easily program a program in the microcontroller. After startup or ee n reset the Arduino looks this or a new program to be loaded.
The ATtiny has no (room for) bootloader. We will have to use a separate programmer to load the sketch. Do you have an Arduino in house then you do not need much more. Only the ATtiny to be programmed.In this article I will describe how you can program a ATtiny with an Arduino. There are many other ways you can do this, see the Internet.
It is also useful to have a bread - message board where you have the ATtiny in pricks to program it.

Arduino software
The easiest way is to download the latest version, currently the 1.6.5, the Arduino software and install. Make sure the sof t ware works in conjunction with your Arduino!

Take the following steps:

Recording the ATtiny in the Arduino environment
Y ou need to modify the software for the extra "boards", it d be the ATtiny, which come on.

- Open the Arduino IDE and go to File / Preferences. At the bottom you'll see the text "Addition al Boards Manager URLs". Please copy the following URL:
  https://raw.githubusercontent.com/damellis/attiny/ide-1.6.x-boards-manager/package_damellis_attiny_index.json
- Then press OK.
- Go in the Arduino IDE to Tools / Board / Boards manager. SCRO ll all the way down that "at tiny" state, click it. You get an install button even click it. After installation you will see appear INSTALLED.

Figure 2 Installing the ATtiny in the IDE

- You go into the IDE go to Tools / Board, you will see at the bottom ATtiny.

Figure 3 The ATtiny is visible in the menu

Arduino as ISP
Then you have to program the Arduino as ISP. Choose among examples / ArduinoISP. Program your Arduino.

Fig 4 The sketch to make the Arduino programmer and work

Connecting the ATtiny
To program d e b j e ATtiny hey six connections are required:

- Pin 6: MISO, Master Slave Out
- Pin 5: MOSI, Master Out Slave In
- Pin 7: SCK Clock
- Pin 1: reset
- Pin 8: VCC, between 2.7 and 5.5V
- GND

Fig 5 Wiring to program the ATtiny

Sometimes you need to connect an electrolytic capacitor of 10 uF on the Arduino between Reset and GND. For me this was not necessary.
Also, any connected LEDs, etc. can in programming throw a spanner in the works. Make sure that only the above compounds are present.

Program
For example, you can grab the Blink skit. Watch out port 13 (the ATtiny he eft not) to for example. 0 port.
Choose under Tools / CPU the ATtiny85.

Figure 6 Selecting the processor

In addition, you also need the clock - set speed. Standard must be set to 1 MHz internal. It is possible to run on the clock 8 MHz, see [3]. Never use the external option, you then need a crystal to run the ATtiny.

Finally, you must select the programmer. Select "Arduino as ISP", choose NOT ArduinoISP. The latter is a piece of hardware, a separate programmer.

Figure 7 Select the programmer

Press are compiled on Upload button and the sketch will then be transferred to the ATtiny.

Conclusion
In the article "with the ADF4106 PLL," elsewhere in this Kunstmaan, describes how controlled the ADF4106 with the ATtiny85 get t. For this purpose it works well, great things I have not tried.
It's a bit of hassle to program an Arduino and then upload the sketch. It seems that you need to program the Arduino every time you want to upload a sketch in the ATtiny. In addition, you should every time you bread - board building for programming. Maybe [4] is a solution.

References

[1] - [4] www.kunstmanen.net and then Weblinks -> Links from the KM

The Rigol oscilloscope DS1054z

Ben Schellekens

Introduction

This article is a small review of the 4-channel Oscilloscope Rigol DS1054z. Recording or I2C signals and controlling the scope with an Ethernet interface is looked into. Last but not least we are "upgrading" the oscilloscope.

Introduction

Anyone who has engaged in electronics will sooner or later buy an oscilloscope. Without this device you electr on ic seen just blind. Oscillos c open there to shore and label of the big names and price tags as Keysigh t (<- Agilent <- HP), Tektronix, Rohde & Schwarz to the cheap brands as Owon, siglent etc. Rigol is in between and produces here for others oscilloscopes and also has its own product line.

Recently I bought a new scope, the Rigol DS1054z. This is a four-channel oscilloscope having a bandwidth of 50 MHz. Just before the price increase (due to the expensive dollar) I could buy it for 360 Euro. For this amount you get a solid scope of 3.2 kg with a screen resolution of 800 x 480 pixels (17.5cm diagonal). Please note: part of the screen is permanently occupied by menu items and icons. My Agilent DSO1052B has a smaller screen (14 cm diagonal) but shows equally big wave patterns because the menus folded away.

In this article I would not take the entire scope under the microscope but zooming in on a few things: I2C decoding, the remote control y our oscillosco via Ethernet and last but not least: upgrading the oscilloscope.

Figure 1 The Rigol DS1054z

I2C decoding

One of the properties that are caught my attention was the ability to decode I2C signals. For decoding I use the USBee, here I've ever written about. [1] Fred uses a clone of the USBee [2].

The I2C-decoding can be obtained optionally. Buy the DS1054z then decoding is there as Trial for 30 hours i n. Through a software key, you can activate the I2C decoding (and many other).

Figure 2 The installed options, currently on trial basis

Let's see what's on the I2C bus WRX1700 t happen.

Y ou need to set the oscilloscope to decode I2C signals. Now I must say that I do not really came out with the manual. The manual you should put the trigger on I2C and then the the I2C protocol decoding. I kept difficulties are with the trigger level, to the wrong input and 9.6V. Internet / youtube brought uitkoms t [3].

Like streams d has two I2C signals: SDA (data) and SCL (clock). The scope should, of course, be connected to both. What did I do to get it working the I2C Decoding:

- Make sure the probes and scope are set correctly, ie 10x.

- Set the scope inputs and DC 5V / div

- Adjust the height so that the two channels are visible at the top of the screen

- Set the trigger on single, on the falling edge of the channel that is connected to the SDA and 2V

- Turn the trigger point to the left so you can see the I2C signal gets expanded

- Set the time base of 20 us.

If you set the triggering of the scope on single you get the picture below. On the screen you should read the bits and translate it into hexadecimal values. Which translation we want to do the scope.

Now we must turn the protocol decoding. Press MATH and choose DECODE1. In the scope are two protocol analyzers that can be used simultaneously.

Figure 3 With the I2C-decoding, the displayed values are correct. The decoding only operates on the signals which are visible on the screen. If you look more to the right than the start command is out of the picture and does not decoding. This is not really convenient.

You can do for triggering I2C signals. In addition to the Start and Stop commands can trigger when a data packet with a certain d I2C address comes on the bus. Very handy on a crowded bus. In addition, you also have the history of I2C commands show who come along.

Screenshots

One of my great irritation points is making a screenshot of my spectrum analyzer. You need to stabbing a USB stick in the SA, then super ONH andig enter a filename, then do the recording, stop the USB drive into your computer only to find out that the file is corrupted. Blahhh .... Could this be any easier? With this scope is possible because a network connection is on.

On the back of the scope is an LXI- network connection. LXI LAN eXtensions for Instrumentation stands for. On my spectrum analyzer and signal generator are also LXI connections. On old meetap p aratuur you get the GBIP connector (24-pin "Centronics" connector) against, nowadays it has been replaced with LXI (Ethernet) and USB.

To make this possible, you need to install software. I first installed the included software.

While looking on the internet I came across Peter the program Dreisiebner against allowing easy beeldsch erm copies can be made [4].

Scope set

First you need to connect the scope with an Ethernet cable to a hub.

First check the network settings of the scope. Press Util ity l button, then select "IO Setting" and select "LAN Conf." You will then see the following screen:

Fig 4 Lan settings of the scope

You also have the "IO Setting" menu button LAN, these must be ON. The scope is now ready for use over the network.

Program RigolBildschirmkopie

The program works great simple. Start it up and adjust if required by the language in the menu item clicking Sprache and set to English or French.

Then press the Select button and then click Search. If all goes well, the scope of the list for. By default, the DHCP scope on, there must be a DHCP server present. Often this is the modem or router.

Fig 5 The search of the scope on your network

Take a screenshot by clicking Copy. After some time (to me 20 seconds), the screenshot is hauled. Then you can save the screenshot as PNG with the SAVE button.

A nice option is to invert the image. Very handy for screenshots in magazines.

Figure 6 Ge ï nverteerde screenshot

The program also works with the Rigol DSA815 Spectrum Analyzer, fantastic! The pictures in the article about the PLL, the ADF4106 are made this way.

Remote control

Besides making screenshots you want to remotely control the scope. Sometimes you coming back for to set everything right. Often you through a lot of menu options to set everything right. How convenient would it be if you could automate this.

Python

A well-known scripting language is Python. Python is available on many operating systems. In this article I will not discuss the installation of Python, which is a story in itself. The advantage of a scriptaal is that you fast, simple things can make ends meet. So you can eg. Relatively easy to create a Python script that drives a V CO in the downconverter, your outcome measures and records in a graph with the spectrum analyzer.

Python wants to communicate with the scope have to VISA (Virtual Instrument Software Architecture) drivers are installed. In the supplied software Rigol are VISA drivers are automatically installed. Do not ask me why, but they do not work for me with Python. I had to download VISA drivers on the website of National Instrument s and install [5], j e must leave your email address.

In addition, you must install the VISA module for Python [6]. If all this is unsuccessful, then you can control the scope with a Python script. This happens with SCPI commands (Standard Commands for Programmable Instruments), the program Bildschirmkopie can also pass SCPI commands. Rigol The included software also has a dialog where you SCP I commands can be entered.

SCPI- These commands are described in detail in the Programming Guide. The commands are the alternative to the menu operation. So does the command "channel 3: Display Off" that channel 3 is disabled.Incidentally, in the command only mandatory capital letters. "CHAN3: DISP OFF" means the same.

The Python script begins with the following lines:

```
          import visas
          rm = visa.ResourceManager ()
          print (rm.list_resources ())
          osc = rm.open_resource (192.168.1.56 TCPIP0 :: :: ::
inst0 PLA)
```

The third line is a print command that displays all VISA resources on the network. The scope is selected to be four-line, see that this is almost identical to the VISA address as it is shown in Figure 4.
Then we get the SCPI command in Python format:

```
osc.write (': CHAN1: ON DISP)
osc.write (': CHAN1: COUP DC)
osc.write (': CHAN1: OFFS 10.0)
osc.write (': CHAN1: SCAL 5.0)
osc.write (': CHAN1: PROB 10)

osc.write (': channel2: ON DISP)
osc.write (': channel2: COUP DC)
osc.write (': channel2: OFFS 0.0)
osc.write (': channel2: SCAL 5.0)
osc.write (': channel2: PROB 10)

osc.write (': CHAN3: DISP OFF)
osc.write (': CHAN4: DISP OFF)

osc.write (TIM: MODE MAIN)
osc.write (TIM: MAIN: SCAL 0.00002)

osc.write (: TRIG: EDGE MODE)
osc.write (: TRIG: SWE SING)
osc.write (: TRIG: EDG: SOUR CHAN1)
osc.write (: TRIG: EDG: SLOP NEG)
osc.write (: TRIG: EDG: LEV 2.0)
```

This script does what is described in this article in the section on I2C decoding. The strange thing is that this script twice is to be carried out before the scope is correct. After the first time is the trigger level too high, at 350 Volts! Again something with the trigger level, and e bug in the firmware ??

Free you pgrade

On the Internet, many stories going around that you DS1054z, and indeed many other oscillosc open from Rigol, "free" can and upgrad. With a key-generator on the Internet and an instructional video on You T ube you seem easy to transform the DS1054z to its more expensive brother. Also, you seem to be able to upgrade the bandwidth of 50 MHz to 100 MHz.

When upgrading is a number can be placed t drawings:
- The question is whether your warranty does not cover its own upgrade. What happens if you get new firmware? Is the upgrade then undone or worse, your scope is no longer working?

- The scope sample t with a frequency of 1 Gigabit per second. Use three or four channels than the sampling frequency is lowered to 250 megabits. This is much too low in order to sample a 100 MHz signal.

- T vehicle power the probes up to 150 MHz. How well they can process signals from 100 MHz, I can not judge.

But nevertheless attracted the plunge and do the upgrade. In particular, I was curious about the extra bandwidth.

On the site of hackaday describes the upgrade [7]. Scroll all the way down to find and read up o m the latest situation on the upgradeability.

Figure 7, the generated key. You give the serial number, options and press Generate. The DSER option seems to be without the extra vertical sensitivity, which is not working.

Additional bandwidth

For the upgrade I've done two measurements:

- A 20 MHz square wave signal that comes from the generator Agilent 33220A. This has a rise time of less than 13nS. The higher the bandwidth of the oscilloscope, the more the waveform approximates a square wave. This applies also to the signal generator!

- A 100 MHz signal from the Marconi signal generator to -10 dBm.

Figure 8 20 MHz for the hack

Figure 9 20 Mhz after the hack. One difference I can not detect. This means that the bandwidth is increased. At a higher bandwidth, the signal would have to assume a much more in the form of a square wave.

Figure 10 100 MHz signal to a 50 MHz scope for the hack. On the Internet, the impression that this is unacceptable.

Figure 11 100 Mhz after the hack. You see that the amplitude of 328 to 380 mV is gone.

Conclusion

If we look at the I2C decoding then the USBee much more user friendly but the latter's missing the extensive trigger options. The USBee you can record much more data (until your hard disk is full).

This scope should not buy because it is to hack. About the additional bandwidth that you would get, I have my doubts. First, but my hang signal generator to a true scope to determine the rise time.

What is striking in the scope images is that they do not look as "digital". They try to increasingly approach the image of an analog scope., See below, the eye pattern.

Fig 1 two eye-pattern

The DS1054z is a scope that provides incredible value for money. Very nice is that the scope can be operated remotely.

References

[1] USBee & Logic Analyser Signal Generator
The Kunstmaan April 2014

[2] POOR MAN'S LOGIC ANALYZER
The Kunstmaan June 2015

[3] - [7] www.kunstmanen.net and then Weblinks -> Links from the KM

Linearization of HRPT / LRPT.

Summary: A description with formulas how to linearize images of polar satellites.

Polar satellites scanning the Earth's surface line by line down by a rotating mirror. At HRPT is such a line of 2048 pixels.

The 2048 pixels are distributed linearly on the angular displacement of the mirror. This results in a non-linear distribution of the pixels with respect to the earth's surface.

With APT this non-linearity is corrected in the satellite. APT dates from the days when computers were slow and expensive; a simple receiving station had to handle it without a computer. For proper display of received APT is a computer not necessary. Recording on tape and then write directly on electrostatic paper, it produced stunning images, without requiring a computer in her recovery. A disadvantage of the APT-method is that the correction by the resolution will be lower, in particular for the area directly below the satellite.

At HRPT correction is not done in the satellite and it must be performed in the receiving station. The full resolution will still be available.

By Meteor is the same, only here there are 1570 pixels in a row instead of 2048. This applies to both Meteor HRPT as LRPT. Also LRPT is emitted non-linearized so linearization in the receiving station needs to be done.

The program contains WSAT algorithms for the HRPT variants. With menu "View-> linearize" the linearization can be enabled.

For LRPT there are programs include Les Hamilton to make it happen.

There are two factors that cause the non-linearization:

1. It is "slanted", with different angles, looked at the surface of the earth
2. The curvature of the earth's surface still provides an additional magnification of the angle

In Fig. 1, it can be seen that equal rotations α1 and α2 of the mirror unequal angles β1, respectively. give β2.

Fig. 1. Non-linearity position on Earth relative scan direction.

In order to correct non-linearity, it is necessary for the angle β as a function of the angle α to be determined. For this, only one is required trigonometric equation, see fig. 2.

Fig. 2. Relationship corner and sides: $c^2 = a^2 + b^2 - 2ab \cos(\gamma)$

. Twice used in Figure 3, this gives:

$D^2 = R^2 + (R + h)^2 - 2R(R + h)\cos(\beta)$

$R^2 = D^2 + (R + h)^2 - 2d(R + h)\cos(\alpha)$

with:

- R = radius earth (known and fixed)
- h = height satellite (known and fixed)
- d = distance satellite to earth in the scanning direction (depending on α)

Fig. 3. Relationship scan direction and position on earth.

So two equations in which d is not of interest, but rather the relationship between the angles α and β. The two equations can be combined so that d is eliminated. I will not give the distractions here, the result is.:

$\beta = \text{acos}[(R + h) / R * \sin^2(\alpha), \pm \cos(\alpha) * \sqrt{\{1 - (R + h)^{2/R^2} * \sin^2(\alpha)\}}]$

The angle β can be calculated from the angle α, and therefore it can be deduced a linearity table again.

In FIG. 4 shows the relationship between the x-position (in proportion with α) and the position on the earth in km from the point directly below the satellite (proportional to β). This is based on HRPT, with 2048 pixels on a line. The half line is shown, from x = 0 to x = 1024 (nadir). The part 1024 to 2048 is equal thereto.

The green (straight) line indicates the projection of character position on the x-axis if no linearization would be applied. The error is considerable, at around x = 330, error is about 300 km!

Fig. 4. relationship pixel at position "x" to the remote earth compared to the sub-satellite point.

We can now see how the earth curvature influence. Suppose that the part of the earth which is scanned would be approximately flat, then the relationship between α and β would be:

Fig. 5. Relationship α and β with neglect of the earth curvature.

$R \tan(\beta) = h \tan(\alpha) \Rightarrow \beta = \text{atan}[h / R \tan(\alpha)]$

A much simpler formula, but look at the results in Fig. 4, the blue line. The deviation around x = 300 is about 100 km.

Conclusion: the curvature of the earth must be properly included in the linearization; this contributes about 30% of the non-linearity.

Visit ESOC and Eumetsat

Rob Alblas

Summary: A report of the Darmstadt visit.

It has gradually become a tradition to visit every four years in Darmstadt. Initiated by our sister organization organized by GEO and Eumetsat are bringing some of our members traveled to Darmstadt on July 2 visiting again. The temperature was there to to sit in; 35 degrees or higher is not really fun anymore.

A brief account of the presentations are now following. You can see all powerpoint presentation on the GEO website:
http://www.geo-web.org.uk/darmstadt-2015.php

1 Monitoring weather and climate from space

Some points from the presentation:

- The MSG program currently Meteosat-10 ("normal" service) and Meteosat-9 (Rapid Scan) active; Meteosat-8 serves as a backup.
- METO-A and B are currently the polar satellites, in addition to the American NOAA's.
- Jason-2 observes the surface of the oceans. Jason-3 will more accurately determine the height of the ocean surface, up to four centimeter. (Launching this satellite has been delayed due to problems with the SpaceX Falcon 9 rocket.

A number of future cases:

- Meteosat-7 continues until the end of 2016. It will replace Meteosat-8 (40 degrees East) and MSG4 (Meteosat-11) succsesvol launched. This has now been completed on 10 August.
- Meteosat-11 is the last one of the second generation of geostationary satellites. In 2019 the third generation to be active.

Incidentally, what I heard later, that the MSG series is performing above expectations. Meteosat-8, launched in 2002, is still good; with three geostationary satellites and operates the third generation coming Meteosat-11 is really not necessary. This makes it possible to Meteosat-8 to get to 40 degrees east travel to Meteosat-7 over there to solve (another golden oldie) off. Meteosat-11 is, as mentioned already launched, but is not currently needed and therefore not active. The reason to launch it anyway already is that storage on earth is very expensive. (A satellite's not just a mountain in a shed on it.)

Furthermore, expect a number of new third-party services on EUMETCast:

- Himawari-8 Service: a Japanese geostationary satellite, replacing MTSAT-2
- Copernicus Sentinel 3: a satellite serving polar oceanography.

2 EUMETCast DVB-S2: Operations and Future High Volume Service

In this presentation about the new DVB-S2 service. With a drastic increase in the amount of data that has to be distributed via EUMETCast was this move a necessity. The data rate will increase from approximately 20 Mbps at present to 450 Mbps in 2023. The Copernicus S3 will be put first on the HVS (High Volume Service); This alone gives a doubling of the data rate!

3 Future Satellite Services: Sentinel-3 mission

The highly successful Envisat satellite will have no direct successor. Envisat had many instruments on board, and could also do a lot of different observations. Therefore this satellite was very expensive, which entails a great risk if a launch fails. Therefore, for the future made more smaller (and therefore less expensive) satellites, in order to spread the risk.
This part was mainly about the Sentinel-3 satellite, intended primarily for naval applications.

4 MTG

The third generation contain Meteosat's in addition to the 11 channels that MSG contains 5 additional channels, including 400 nm (blue). This makes it possible to, together with the 500 nm (green) and 700 nm (red) channels of "true color" to make plates. The resolution goes to 1 km (MSG 3 km) and even 0.5 km for some channels. In the presentation "4-Future Satellite Services" on p. 6 to see a table showing the channels of the three generations of Meteosat's stand together. The number of images per hour is from 4 to 6 (Rapid Scan: from 12 to 24). Certain weather phenomena are developing so rapidly that performance of these images provide significantly more information. It will be appreciated that MTG requires a much wider bandwidth than MSG, which is also the necessity of switching from EUMETCast to DVB-S2 makes clear.

Further, the satellite sensors for lightning: the "Lightning Imager".

Besides MTG-I (lean), a second satellite MTG S (ounder) are active. This satellite is specifically designed to be able to observe vertical structures of temperature, wind and pollution.

What we end up with these satellites can view go to be seen. In any case, it seems that "xrit2pic" already MTG data regarding the various spectral channels could process; the data structure will be equivalent to that of MSG, only with more segments, more channels and a higher resolution.

5 Case Studies
In this presentation, a number of examples were shown of what happens to various satellites can all be detected. Such as air pollution, effects of aircraft on clouds etc. The presentation contains many plates illustrating eea.

6 Data center
The archiving of all data requires a huge storage capacity. That is from 2005 to 2013 increased from 100 terabytes to 1500 terabytes (1.5 petabytes). This data is important for institutions that conduct research into all kinds of weather phenomena, pollution investigation, etc. The data can be obtained via the internet.; via a dedicated browser. This is necessary to be able to retrieve the desired information from the vast amount of data.
Darmstadt is a completely new building put down to the archives, where we got a guided tour. Fire safety is tested by controlled to light a fire! What is striking is that this space is not really cool (a "setback" due to the very hot day). With the current technological e this is not necessary; of course, saves a large amount of energy.

The storage is done on tape, not hard drives or similar reason is that a malfunction of a hard disk, it is difficult if not impossible to reach the data yet. With tape, the playback mechanism, as it were kept separate from the wearer of the data. These are of course high quality tapes, not the stuff that was once used for video recorders. Regular rinsing is not necessary.

In addition to the new archive, we also got a tour of the MSG and METOP control areas.

In the evening we had dinner with some of the Eumetsatstaf in Darmstadt.
The next morning we paid a visit to ESOC, the center where the control of satellites as Rosetta runs.
After that everyone went his way, back home, braving the heat.
Another interesting and instructive excursion.

Thanks to EUMETSAT and GEO.

Fig. 1. The President in a full-size model of METOP.
Fig. 2. Archives. It can be 50 petabytes of information stored on tape.

A PLL with the ADF4106 from Analog Devices

Ben Schellekens

Introduction
This article Describes how the ADF4106 from Analog Devices can be programmed with an Arduino sketch. For a prototype a small PCB is designed. The VCO is from Mini Circuits.

Introduction
In the past I have written an article about a 1000 divider which can be used in conjunction with a frequency counter [1] and an article about controlling a synthesizer Minicircuits [2].
In both cases, a PLL-chip Analog Devices to be controlled. T ime therefore to to see if I could make a schedule and a print to make a VCO with PLL control.

What is a PLL
A PLL is a Phase-Locked Loop. It is a control system that generates an output signal to control an oscillator with the result that the oscillator signal in frequency and phase is equal to the input signal. By working with various sub-factors can be customized with the oscillator (within limits) at each frequency.
During the lecture in January I showed you how to make a VCO over a range of 1200 to 2200 MHz can be sweeping.

Figure 1 The ADF4106 are the phase detector and the denominator. The loop filter which drives the VCO is outside the chip.

Voltage Controlled Oscillator
If VCO I use the ZX95-2420-S + Mini Circuits. This has a range of about 1100 MHz to 2500 MHz. The 1700 MHz where we are interested in here is beautiful inside. The 2500 MHz is achieved with a tuning voltage of 20V.
The VCO has an output power of + 5dBm, sufficient to drive the mixer.

Figure 2 VCO from Minicircuits with SMA connector

PLL
Analog Devices provides PLLs in a number of variants: Fractional-N and Integer-N PLL with an integrated VCO. It is called "the forest for the trees you see no more" story. Many models look very much alike.
I chose the ADF4106, this is similar to the ADF4107 I used for the 1000 divisor. The ADF4106 has a frequency range from 500 MHz to 6 GHz. The ADF4107, and many others, can also operate at 1700 MHz.

Splitter
The signal of the VCO needs to be fed back again to the PLL. Here I use to initially splitter ZFSC-2-5-S + Mini Circuits, for only 10 Euro at the fair in Rosmalen bought. The other output of the splitter is for the mixer, spectrum analyzers etc.
The splitting of the signal of course gives an attenuation, this is in the order of 3.5 dB.

According to the datasheet [3] d e ADF4106 expects a signal between -10 and 0 dBm. With an extra 6 dB verzwakk there we sit neatly in the middle. You bet after 5 dBm from the VCO minus 3.5 of the splitter minus 6 dB attenuation gives -4.5 dBm.

But .... h et sin is to recycle half of the precious VCO signal to the PLL and also sufficient less.
A directional coupler can also split a signal. The feedback signal is much smaller (-18 dB) than what comes out of a split t there (-3.5 dB). For an explanation of directional couplers, I refer to the Application Note of Minicircuits [4].
I came up with this idea after reading through the datasheet where in a graph (Figure 6) the inputs to gsgevoeligheid is -25 dBm, this is not in accordance with what in Table 1.
Indeed, the use of the directional coupler ZNDC-18-2G-S tar resul t in 3.5 dB more output signal.

Scheme
The diagram (Figure 3) suggests no big deal and I took over part of the schema of the evaluat ie board of the ADF4106. [5] In addition, I used the free program ADIsimPLL that can be calculated very simple way, the parameters of the PLL.
As mentioned, the VCO is at 2500 MHz needs a tuning voltage of 20V. The ADF4106 can not deliver this. The operating voltage of the Charge Pump (which controls the VCO) can be up to 5V. Hence, an opamp -connection is included to amplify the signal ui t the Charge Pump.

Fig 3 The schedule. The signal from the splitter goes to FREFin inside. The control voltage of the VCO is from P3, OUT.

ADIsimPLL
The free program ADIsimPLL [6] is a very useful tool to generate the diagram of a PLL circuit.
A wizard takes you through all the variables and a schedule rolls out. In ADIsimPLL can choose from different opamp -schakelingen. In the extended help stand the loop filters explained.

Figure 4 One part of the wizard in ADIsimPLL is choosing the loop amplifier with an opamp.

The opamp provides a strengthening of (R10 + R6) / R6 = 4 .3 (Figure 3) of the Charge Pump, this is around 16V. The VCO is then at 2300 MHz.

Another criterion is the sensitivity of the VCO. In ADIsimPLL several VCOs of Minicircuits recorded. I chose the ROS as it is most near the ZX95-2420-S +.

Fig 5 The selection of the VCO

Figure 6 The result from ADIsimPLL this scheme. This is partly included in the diagram of Figure 3.

Microcontroller
In 1000 divider I used a 12F675 from Microchip for controlling the ADF4107. For they PLL I decided to use an Atmel ATtiny85 of programmed the Arduino programming language. See my article elsewhere in the Kunstmaan about the benefits and uses of the ATtiny85 in combination with the Arduino.

Program
The VCO must be tuned to a frequency of 1700 MHz. To view the signal properly assess I want with my spectrum analyzer is unfortunately not above 1500 MHz. Therefore I will now tune the VCO at 1475 MHz because this is just more o the upper limit of the spectrum analyzer. I'm going to just assume if I know how to program the PLL at 1475 MHz, it also succeeds at 1700 MHz.
To calculate the data you send to the ADF4106 can use the Integer-N software [7]. It is an interactive screen. By adjusting a field you can immediately see how it calculates in the registers.

Figure 7 The Integer N PLL software set to 1475 MHz

Important in this story is the "PFD Frequency" in Figure 7, this is the frequency of the signal (the upper signal in Figure 8) that the "Phase Detector" takes effect. In this example the "PFD Frequency" at 200 kHz, this is also the step size of the PLL. The step size is determined by the "Reference Frequency "(20 MHz) / R counter (1 00) = 200 kHz. Please note: the value 0x190 in Figure 7 is not what is in the R-counter, but in the" Reference Counter Latch "In the." Reference Counter Latch "NAA be the R-st counter is also configured in other cases the PLL.
Because we do not so much from the PLL on one frequency, for this test at 1475 M H z, like putting make the step size. The is a different story if you want to tune with the VCO. Additionally, you specify the prescaler (divider), in this case 16. The number of steps is 1475 MHz / 0.2 MHz = 7375.
The B-counter in the N - (A, B) register (see the data sheet 1, p. 4) gets the value 7375/16 = 460 (integer only). The A-counter gets the rest: 1475 - (460 x 16) = 15. Or tewel 7375 (modulo 16) = 15.

Figure 8. This is a simplified version of the block diagram from the datasheet. In comparison with Figure 1, the reference-i ngang has an additional divider (R 14-bit counter). In addition, the "Divide by N COUNTER" from Figure 1, here implemented with much more complex the A-, B-counter and prescaler. The Charge Pump output goes to the loop filter, C4 - C5 - R7 in Figure 3.

Arduino sketch

In the PIC you were from the 1000 divider each mouthpiece named in the program that was sent to the ADF4107. Not really handy if you get the Integer-N software hexadecimal numbers. The ATtiny I wanted to do something more useful: a hexadecimal number is bit-for-bit sent out. Arduino now has a nice feature here: bitRead. This feature allows you to "another" bit of a number on request.

The registers of the ADF4106 are 24 bits long. In the sendCommand function and become a for-loop over all 24 bits and the output written.

In the setup portion of the sketch word and written using different sendCommand commands the values to the registers.

```
// Set ADF4106 at 1475 MHz, 20 MHz clock

nrbits int = 23; // Always one lower: 24 bits -> 23

const int slave select = 0;
const int = 1;
const int clck = 2;

aanuit boolean = true;

void sendCommand (long value)
{
Digital write (slave select, LOW); // chip select is active low
delay (2);



for (int i = nrbits; i> = 0; i--)
{
aanuit bitRead = (value, i);

       digital write (that is, aanuit);
// delay (1);
       Digital write (clck, HIGH);
// delay (1);
       Digital write (clck, LOW);
}

Digital write (slave select, HIGH); // release chip, signal end
transfer
}

void setup ()
{
pinMode (slave select, OUTPUT);
pinMode (which, OUTPUT);
pinMode (clck, OUTPUT);

Digital write (slave select, HIGH); // deselect slave
delay (1000);
// 1. Apply Vdd



// 2. Program initialization latch (11 in two LSBs).
    // 01011111100000000010010011 0x5F8093
sendCommand (0x5F8093);



// 3. Program function latch (10 in two LSBs).
// 01011111100000000010010010 0x5F8092
sendCommand (0x5F8092);



// 4. Do an R load (00 in two LSBs).
// 00000000000000000110010000 0x00190
   sendCommand (0x190);
```

```
   // 5. Do an AB load (01 in two LSBs).
    // 000000011100110000111101 0x1CC3D
      sendCommand (0x1CC3D);



}

void run ()
{
}
```

The control of the PLL is done in the setup routine. When o pstarten the ATtiny it is once called. During the course, which is constantly rotate is nothing else.

Nutrition
I have a separate power supply design where multiple voltages come from:: 3.3, 5, 12 and 24 volts. The last two are adjustable over a limited range. The design is not finished yet, more on this in the future.

The print
As a starting point I took the print of the 1000 sharer. Some parts I posted something neater. Please note that there are eight recorded vias. Drill for the door - metallization rings of holes of 0.7 mm and solder wires on both sides of the solid print.

For those who want to experiment I also have available the Kicad files.

Fig 9 The built-up circuit with the top of the splitter. Bottom right diet print. Between the VCO and the PLL is the splitter-print.

Building
On the order of building the PCB, I am not sure yet. I tend to look a bit to mount the ADF4106 last so you tension and clock signal can measure before you put the chip.

The most-difficult part for soldering the ADF4106, which has a pinafstand of 0,65mm. With a fine soldering iron and a small amount of flux I succeeded (with a hoofdlou pe) for soldering the chip. First tighten two corner pins. Check (with a magnifying glass) or the perfect chip is located above the solder print jobs and then fixed to the rest of the pins.

The ATtiny85 place you in a socket with machined contacts because the socket at the top of the PCB to be soldered. Pin 4 must also be soldered to the ground plane. The remaining holes should be increased on the copper side with a 3 mm drill so they are not shorting.

In the diagram, the capacitors C6, C7 and C8 as a single signed copy. In reality, these two capacitors connected in parallel. When soldering, they are soldered together, SMD components are very handy!

Result
The PLL works, which can be clearly seen on the Spectrum Analyser. You also see that there is interference pulses are present or hear this I do not know, I do not know if you she can get away.

Figure 10 The bottom picture shows the spectrum peaks that do not belong here.

I have a makeshift downconverter made by putting the PLL o p 1557 MHz and stop signal in a mixer. The 1698 MHz signal from the satellite comes in, and there will be 1698 MHz - 1557 MHz = 141 MHz out.This can I receive with the WRX-1700.
The result was disappointing. The decoder lockte little and there were a lot of noise bands into the picture. What could be causing this? Some search directions:

- d e diet of the PLL may be the spoilsport
- the broad range where the PLL is designed for now (1200 - 2400 MHz)
- Fractional-N PLL is a more suitable for this purpose than this integer-N synthesizer?

Fig 1 1 For comparison, the spectrum of the plate j e Minicircuits KSN-1486A-119 also tuned to 1475 MHz. This looks much cleaner out! The food here is better, smaller range of the synthesizer and a Fractional-N PLL.

Conclusion
By sifting through data sheets from Analog Devices, the use of free software and the possibility to receive free samples you can build a working PLL. Do you want to get the most out of it then you should have a decent background in electronics.

The next project is to combine the PLL circuit with the 1000 divider on one print, so we keep busy.

References
[1] 1000 Dealer - Part 2
The Kunstmaan, October 2014

[2] Measurement Transmitter for 1698 MHz
The Kunstmaan, October 2013

[3] - [7] www.kunstmanen.net and then Weblinks -> Links from the KM

Report meeting September 12, 2015.

Opening by the Chairman.

We have managed to secure a large dish (3 meters), with which we experiment. There is a story in the Kunstmaan for December.

On October 4 there is an open day at ESTEC. On November 1, there is the "Space Day", also in Noordwijk. There we have the opportunity to present ourselves as working through a small stand. On November 7, we are back to normal on the Day of the Radio Amateur in Apeldoorn. The Americahal is currently a temporary reception center for asylum seekers, but on November 5, the hall is free again so DvdRA can just continue on the old place. We are looking for stand personnel; Wim Bravenboer log on, so we now have five men. There is still room for one or two men; give to the board (1 November).

The first-next working group meeting is on November 14, this will be the last this year.

There will be a procurement action for components Minicircuits. People who want to order something which can give up to October 4 at Ben Schellekens. At the meeting of November 14 ordered it can then be picked up.

Donations: Due to personal circumstances stop members sometimes with the hobby. They sometimes donate their equipment and / or components to the working group. It is this time to include a scoop, components, receivers, etc. For a very low price (for the club's) interested can take over these matters.

Administrative Affairs
The Cash Control Commission was last year Timo Lampe and Herman Big House. Timo "drop out" (did it 2x); Wim Bravenboer sign up for the committee.

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

Any other business
There is a question about a PLL LNB / low noise oscillator. According to Arne has little sense; variations in reception because the weather is much greater than the gains that can be achieved with such a special LNB. Frequency stability is not an issue; any sequence is captured by AFC.

Two possible new members introduce themselves. They are busy with a satellite tracking system. The rotor system consists of printed gears; therefore only suitable for very light antennae. At this time they still graduate at the University of Amsterdam.

Our librarian says what's new. GEO, which only 1x per year on paper is published (and 3x digital) is available on a laptop.
Robert Langenhuysen Timo is watching to make an affordable backend for SDR. People who want to think are welcome.

Elmar: has a number of surprising things in his "shop".

Ben Schellekens: shows what measurement equipment, which he recently purchased.
He also leaves a number of projects, see what he's doing.

Closure

The following is a lecture by Arne on a network analyzer (KC901S) which he recently purchased.
Here in due course will come across a story in our magazine "the Kunstmaan".

Rob Alblas
(Secretary AI)