CQ-DATV

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In this issue

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Editorial

As CQ-DATV starts its 5th year of production, the team thought it would be interesting to look at where we started.

In Issue 1 John Hudson G3RFL set out his plan for an ATV repeater for Lancashire and in each issue it grew as he developed practical solutions to the engineering problems.

These solutions were often unique and bespoke as he went where others feared tread, with ideas like using a YIG for the transmitter, something that, as far as we know, has not yet been implemented anywhere else for an ATV repeater. Today GB3FY is still running and it is the centre piece for an ATV community that has developed and grown around it.

Mike G7GTN has also written a contribution to our new section "Micro Corner" and is looking at motherboards and other accessories for the small EPS micro
Trevor has weighed in with an I2C port for the ESP micro and some BASIC that can be used to control a repeater via the internet. It's interesting looking back at BASIC as a programming language. For those of us old enough to remember the 70's, it was a resident language on all the home computers from Spectrum's to the BBC micro's and was even available on the early PC's and called Q Basic.

This was an interpreted language which was converted from a humanly understandable language to computer understandable code, when the run command was implemented. This had advantages and disadvantages. The major disadvantage was it was slow running.

The major advantage was it ease in editing and customising as it was source code. This also gave it commercial disadvantages and so versions of BASIC that would compile a separate less understandable code, that would run faster and when distributed enabled programmers to keep the more understandable source code under wraps.

Interesting that it has reappeared for running the ESP micro module. So, for some of you writing this code might be a step back, for others it might be something you missed in your formative years. Either way it is a door into programming and enables readers to put micro based projects together without needing to understand the lower level programming of PIC's.

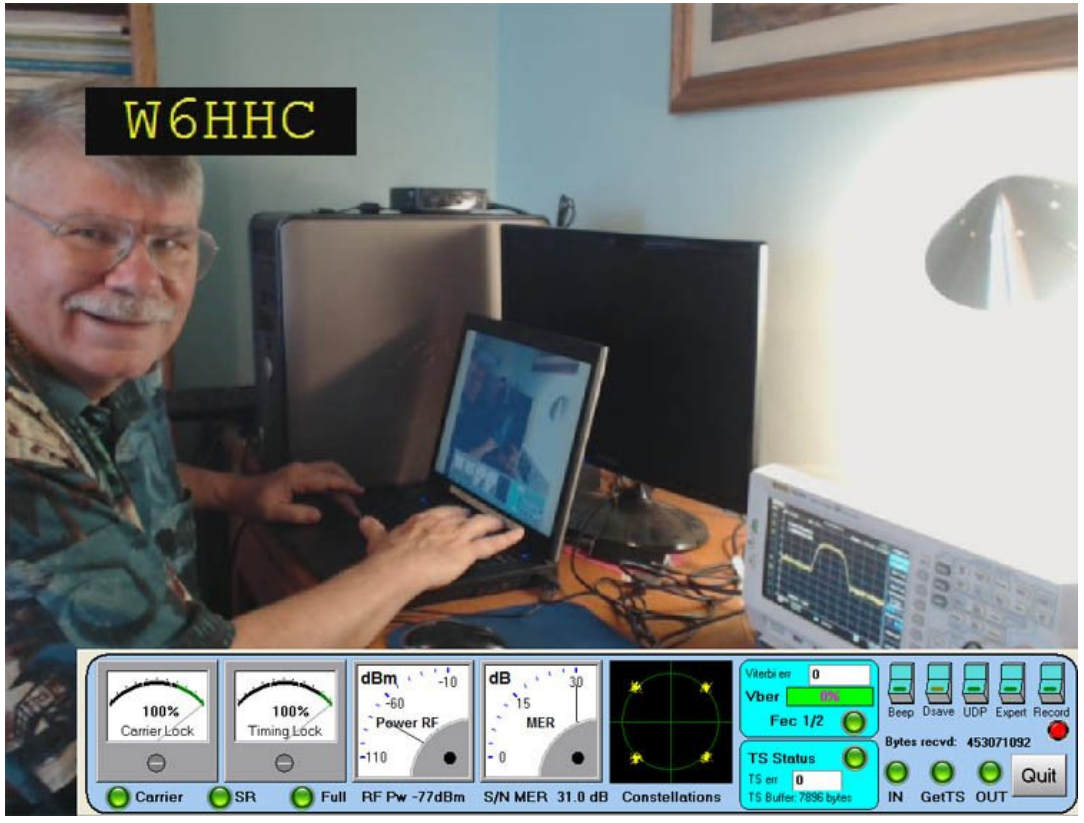
Also in this edition we have Pierre HB9IAM looking DATV express and Rudi Pavič S58RU looking at ATV in Slovenia. From everybody in the editorial office we would like to extend a warm welcome and say thank you for taking the time to put an article together for all our readers.

Somebody you are more used to seeing is Ken W6HHC, Ken has sent in his December DATV express update, including the news that Charles G4GUO is now officially taking a rest from the DATV-Express project for a few months. Charles, it's a well deserved rest.

Enough from the editorial team. Please sit back and enjoy CQ-DATV 44 and lets all see what the second issue of the new year has to bring.

CQ-DATV Production team

DATV - Digital ATV



The DATV-Express project team has now run out of boards again. We never expected that so many people would try to order boards, so soon. As of today, Art WA8RMC has shipped out all 48 working boards. These include shipping boards to all of the PayPal orders that had been received from those "on the standby list" by the January 10 ordering deadline. There are only two boards remaining after failing the hot/cold heat cycling tests that Art performs on all production boards….we will probably reserve those as spare boards.

We are pleased to say we have already started to purchase blanks and component parts in order to build up another production DATV-Express boards.

We are sorry to announce that the PayPal ordering button IS BEING REMOVED from the *www.DATV-Express.com* web site. We will again allow ordering by PayPal after this next production build has been assembled and tested.

"Project speed set to Working Hard on production"…de Ken W6HHC

Google's new image compression tech

Saving you bandwidth through machine learning!

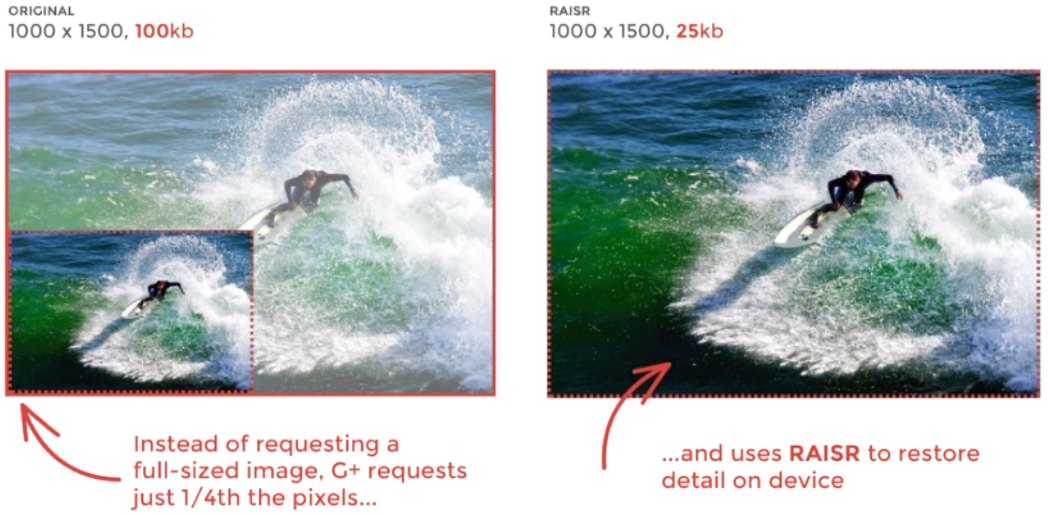
Photographers of all specialities, skills and genres have long made their home on Google+, sharing their work with a supportive community. Whether it's of toys, travel or street art, each photo has a unique story to tell, and deserves to be viewed at the best possible resolution.

Traditionally, viewing images at high resolution has also meant using lots of bandwidth, leading to slower loading speeds and higher data costs. For many folks, especially those where data is pricey or the internet is spotty, this is a significant concern.

To help everyone be able to see the beautiful photos that photographers share to Google+ in their full glory, we've turned to machine learning and a new technology called RAISR (Rapid and Accurate Super Image Resolution).

RAISR, which was introduced in November, uses machine learning to produce great quality versions of low-resolution images, allowing you to see beautiful photos as the photographers intended them to be seen.

By using RAISR to display some of the large images on Google+, we've been able to use up to 75 percent less bandwidth per image we've applied it to.

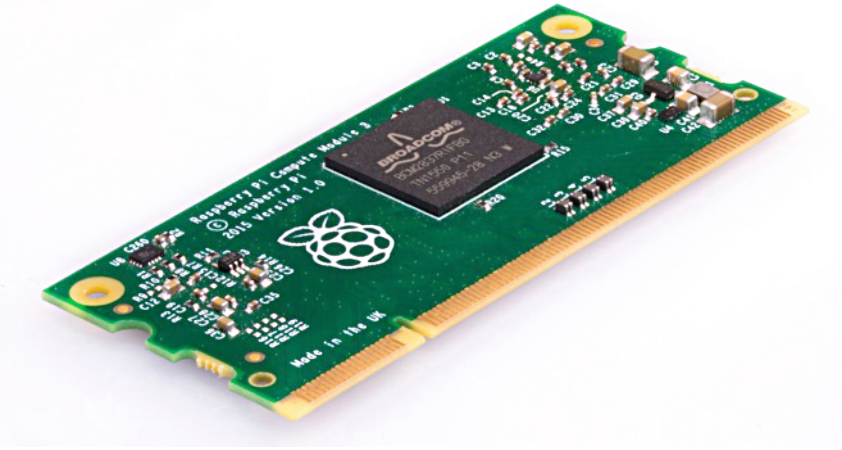


While we've only begun to roll this out for high-resolution images when they appear in the streams of a subset of Android devices, we're already applying RAISR to more than 1 billion images per week, reducing these users' total bandwidth by about a third. In the coming weeks we plan to roll this technology out more broadly — and we're excited to see what further time and data savings we can offer.

Source: Google Blog
https://www.blog.google/products/google-plus/saving-you-bandwidth-through-machine-learning/

Compute Module 3 Launch!

The idea of the Compute Module was to provide an easy and cost-effective route to producing customised products based on the Pi hardware and software platform. The thought was to provide the 'team in a garage' with easy access to the same technology as the big guys. The Module takes care of the complexity of routing out the processor pins, the high speed RAM interface, and core power supply, and allows a simple carrier board to provide just what is needed in terms of external interfaces and form factor.



The module uses a standard DDR2 SODIMM form factor, sockets for which are made by several manufacturers, are easily available, and are inexpensive.

In fact, today we are launching two versions of Compute Module 3. The first is the 'standard' CM3 which has a BCM2837 processor at up to 1.2GHz with 1GByte RAM, the same as Pi3, and 4Gbytes of on-module eMMC flash. The second version is what we are calling 'Compute Module 3 Lite' (CM3L) which still has the same BCM2837 and 1Gbyte of RAM, but brings the SD card interface to the Module pins so a user can wire this up to an eMMC or SD card of their choice.

Back side of CM3 (left) and CM3L (right).

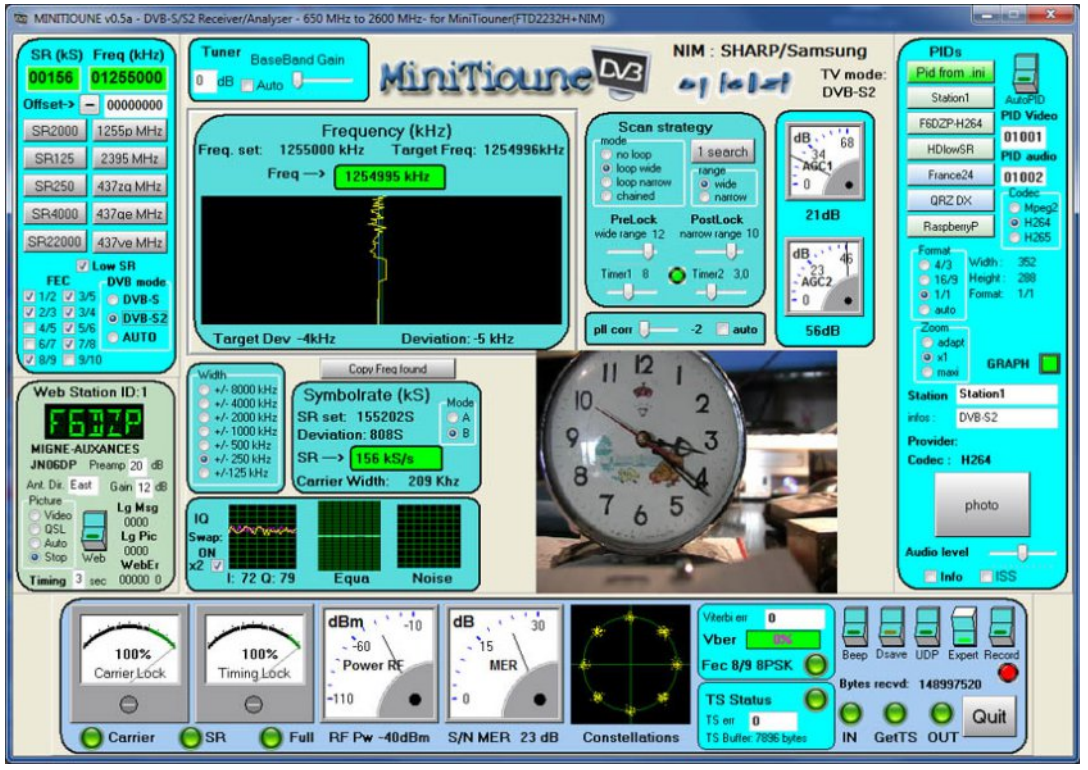
We are also releasing an updated version of our get-you-started breakout board, the Compute Module IO Board V3 (CMIO3).

This board provides the necessary power to the Module and gives you the ability to program the Module's flash memory (for the non-Lite versions) or use an SD card (Lite versions), access the processor interfaces in a slightly more friendly fashion (pin headers and flexi connectors, much like the Pi), and provides the necessary HDMI and USB connectors so that you have an entire system that can boot Raspbian (or the OS of your choice). This board provides both a starting template for those who want to design with the Compute Module, and a quick way to start experimenting with the hardware, and building and testing a system, before going to the expense of fabricating a custom board. The CMIO3 can accept an original Compute Module, CM3, or CM3L.

CM3 and CM3L are priced at $30 and $25 respectively (excluding tax and shipping), and this price applies to any size order.

Source: *https://www.raspberrypi.org/blog/compute-module-3-launch/*

Minitioune V0.5a is available



Main improvements over the v0.4c

- *We can now receive DVB-S and DVB-S2 en QPSK et 8PSK*
- *We can decode video codecs : Mpeg2, H264 and H265*
- *More accurate values for MER and power*
- *Some little bugs fixed*
- *Useful for a PIPO, A click on vu-meter « MER/SN » changes standard/Expert mode*
- *A click on vu-meter « RF Pw » switches the AutoPID button*
- *A click on vu-meter « TimingLock » changes the DVB mode(DVB- S, S2, Auto)*
- *A click on vu-meter « CarrierLock » asks a new lock (= « 1search »)*
- *In standard mode, un click on thea video changes the display format (= Echap)*
- *There are new FEC values for DVB S2*
- *We can preset the BBgain value and the lowSR/highSR mode*

Using only a SR of 156 kS/s

Source: *http://www.vivadatv.org/viewtopic.php?f=60&t=399*

DKARS MAGAZINE

De Stichting DKARS wenst u prettige kerstdagen en een voorspoedig 2017

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Onder de deelnemers verloten we een Icom IC-7300!

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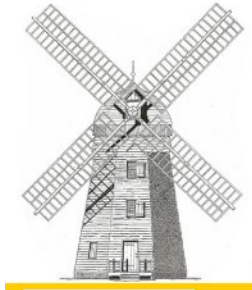

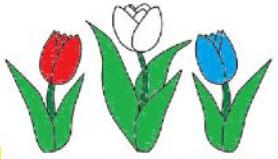

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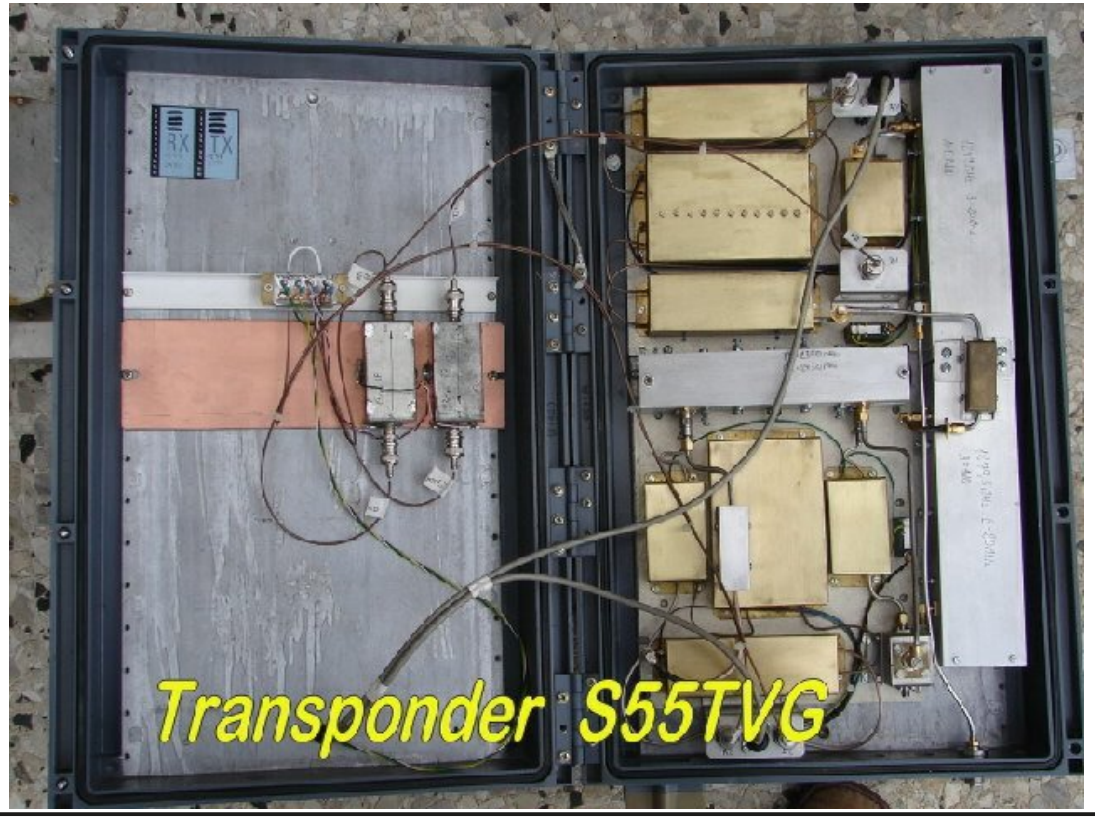
Check out the DKARS website at:-
http://www.dkars.nl/

ATV in Slovenia

By Rudi Pavlič S58RU

More than 30 years ago, when the first video cameras appeared on the market, the first individuals began to build their ATV transmitters for the 70cm band. In Eastern Slovenia the ATV pioneers were S59DBC (ex YU3DBC) and S51ZO Mr. Joze from Radio club Murska Sobota. Soon after, Mr. Stefan from Ljutomer S51L (ex YU3ULU) joined.

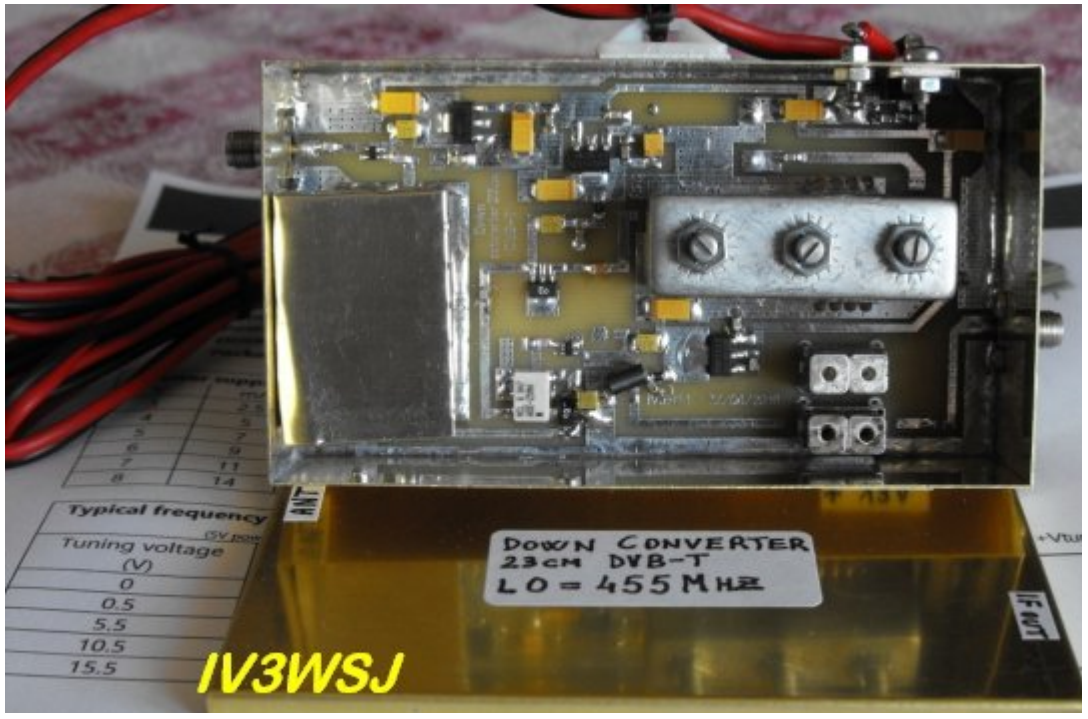
At the same time, Mr. Dolfe (S52DS ex YU3OUX) built the AM ATV transmitter using the same design plan from "UKW /Berichte". He tried to find any contacts in Italy, but nobody was found. Mainly, the ATV activity included transmitting from the driving car and recording the same on the VCR at home.

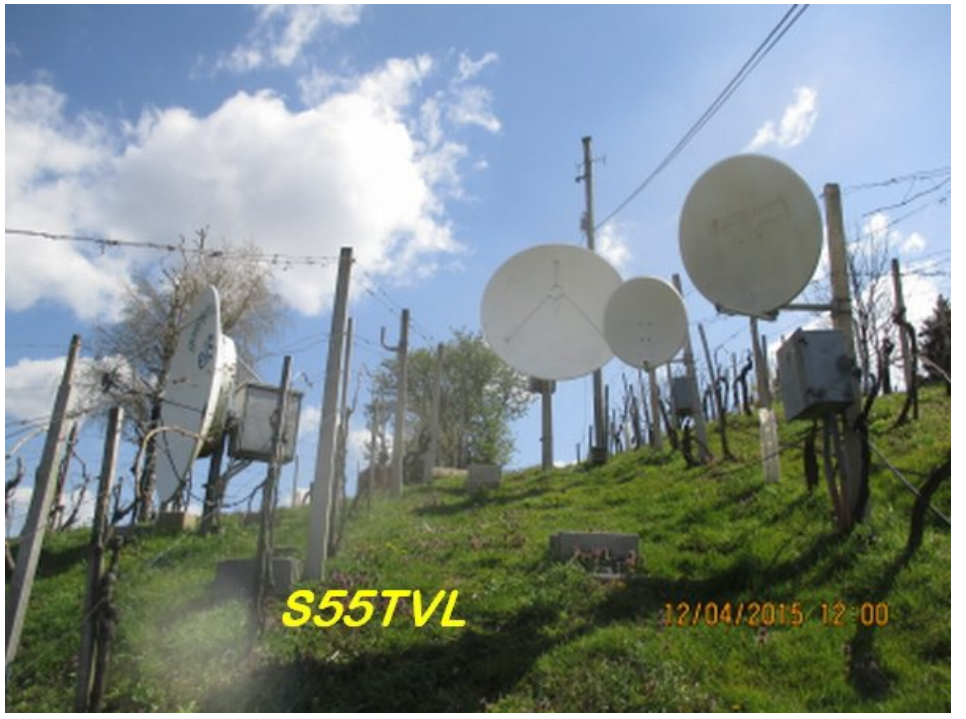


In 1990 transmitting TV picture on 70cm was forbidden, so we began to build FM transmitters for the 23cm band. Mr. Mijo Kovacic (S51KQ) published some ATV designs, and soon after a lot of ATV equipment was built making a good starting point for the overall ATV activity in Slovenia. Thanks to Mr. Mijo we took part in the IARU ATV contests. Later on he organized S5 ATV contests through for several years, with more then 20 competitors per contest.

Since 1994 he has published IARU ATV News. He uploaded it on BBS over the Packet Radio. In 2002 he published the web site (*http://lea.hamradio.si/~s51kq/*), which is online all the time. The ATV news with nice graphic editing are published in form of an e-magazine. These news items were a learning source for ATV activity in S5, in the past.

At that time we kept the regular technical meetings in Trojane, where the awards from ATV competitions were handed out. Since 1993. when the first ATV Repeater in Celje (S55TVA) was built up to 2010, there were up to 11 ATV repeaters active in S5. Later on, the interest for the ATV activity decreased and most of repeaters were shut down.





Mr. Darko (OE7DBH) built excellent ATV repeater, which covered the whole Istria, part of Slovenia and the North of Italy from the Učka summit. Because of the landscape configuration, the signal was not seen at the coastal area, so Mr. Mauro (IV3WSJ) and Mr. Elizej (S57AZW) built the repeater S55TVJ on Malija just above Izola, which later was moved by Mr. Maks (S53KP) to the more suitable location on Elerji.

The latest upgrades include the digital 23cm and 3cm repeater. At the moment only the following repeaters are active in Slovenia: S55TVJ (QTH Elerji , sysops IV3WSJ and S58RU), S55TVG (QTH Trnovo sysop S57MSL), S55TVX (QTH Korada sysop S52DS) and S55TVL (QTH Globoka sysop S51L).

Since 2003. the DVB-S repeater on Pohorje is active. The following year Mr. Mijo (S51KQ) activated repeater S5TVA using the laso DVB-S mode.

By the development of the digital TV, we recognized the advantage of the DVB-T transmitting. Accompanied by Mr. Alessandro (IW3RMR), who began to use this mode in Italy and with Mr. Mauro (IV3WSJ) we began to build the DVB-T converters.

At the moment in Slovenia there are two DVB-T repeaters. The first one on Elerji and the second one is a transponder S55TVG.

Mr. Mauro (IV3WSJ) uploaded the web site *www.atv-europe.net*. This web site includes the published projects, tests and events about ATV activity in county Friuli Venezia Giulia and Slovenia.

Each year we have friendly meetings and contacts between the radio amateurs from the two countries.

S5 ATV team


S55TVJ

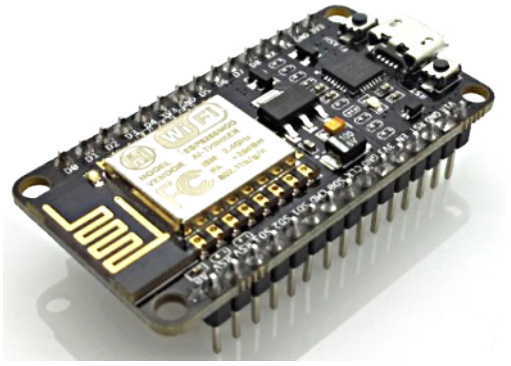

DVB-T RPT 23cm-3cm


S55TVX

Micro Corner - ESP BASIC

By Trevor Brown

"I can sit in my local coffee shop with my smart phone and control a repeater anywhere in the world, using this logic!"

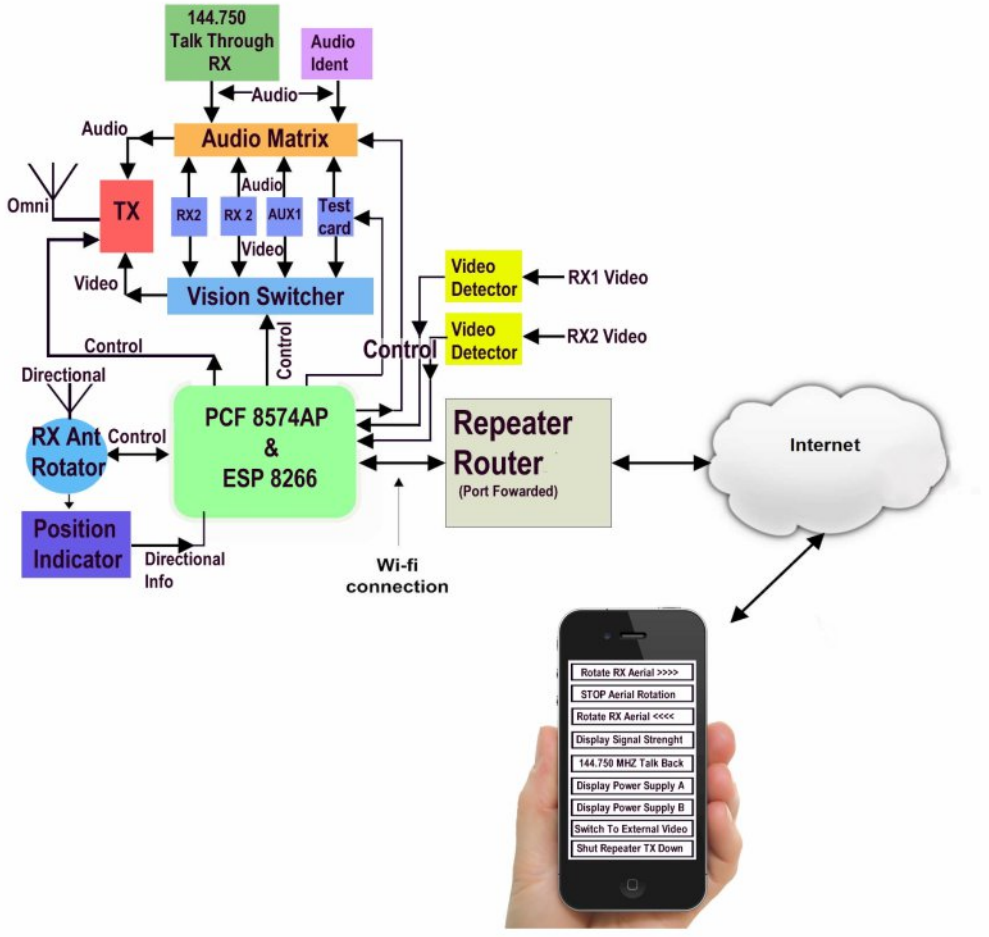


In CQ-DATV 43 we introduced the low cost ESP 8266 module that can be flash programmed to run a resident ESP BASIC programming language and promised you some TV applications.

Continuing on the ATV repeater then, let's have a look at using this rather clever module to provide I2C control for an ATV repeater via the internet.

With this module installed at the repeater end. I can sit in my local coffee shop with my smartphone and control that repeater. My coffee shop can be located anywhere in the world providing it has an internet connection. All I need on my smartphone is a browser.

I have used the word control because we are in Micro Corner and I think that this is the place to explore control. I am sure some of you would like Smartphone repeater access and those days are not too far off, because they already exist for voice repeaters.

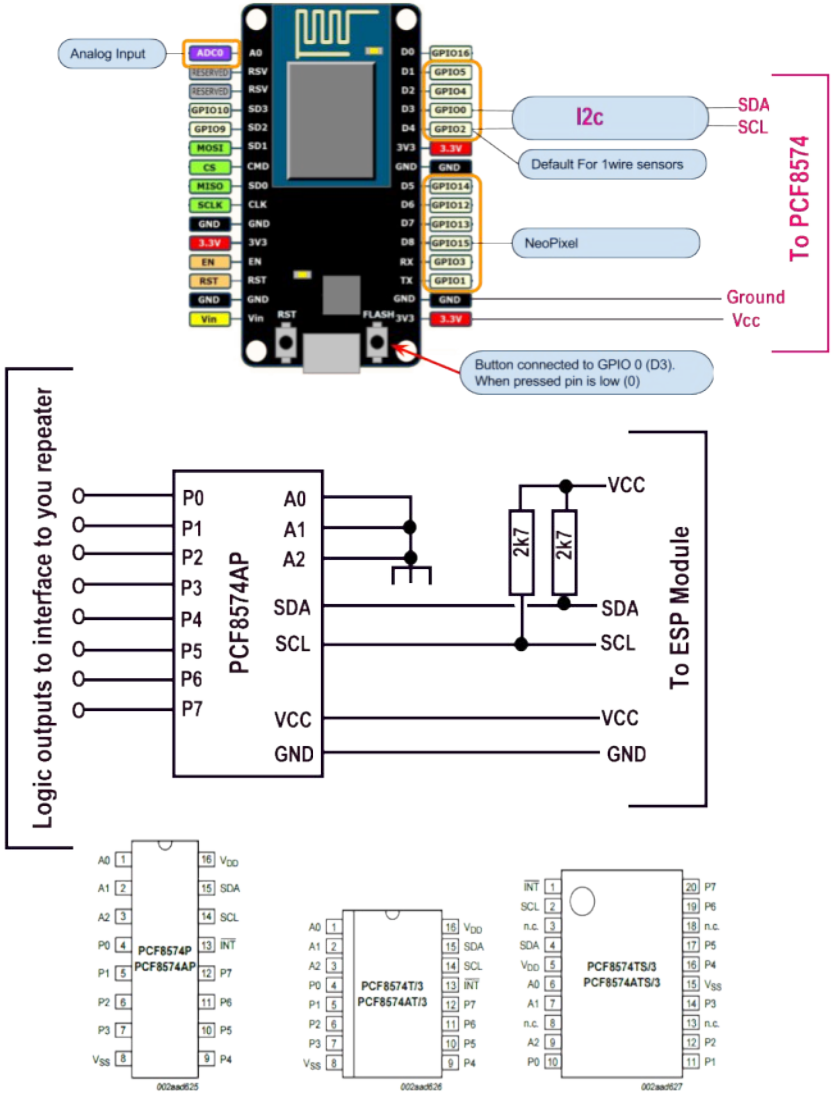


Operation overview

But for now can we focus in using the internet to control an ATV repeater, rather like we use DTMF tones, which are now a little long in the tooth and are a one way communication, which has limitations, both as a diagnostic tool or a way of say controling an aerial, which might be pointing the wrong way and stopping acces that is required to use DTMF tones to move it.

Let's start this issue by adding some I2C hardware to the ESP module, in the form of an I/O port.

Yes the ESP module already has port pins, but once you start developing a repeater logic you will be surprised how much I/O you consume, not just to send out commands, but also as inputs to the ESP module to verify that the commands have been implemented.



The Hardware Connect between the PCF 8574AP and the ESP Module

If you are using relays it is not enough to power the coil, you need verification that the contacts have closed or opened. This is not always the case when you power or depower the coil of a relay, but I am sure we have all been there.

The ESP module can then send this information back to the Smartphone as we have a two way connection. If this is input information to the ESP module, that the command has been implemented and not just the module acknowledging it has received a command, it has much higher value.

The rotating aerial for instance needs to send positional information and indicate if it reaches an end stop. Should we have a mechanical problem we don't just want command received coming back, we need to know the aerial is responding or a site visit might be on the cards.

Let leave the EPS modules own I/O ports and how you control them for a later article and start by adding a simple I2c port chip. This will use two of the ESP Modules I/O pins D3 and D4, but will in return deliver 8 port pins, which can be inputs or outputs.

This port chip connects via the ESP modules I2C bus. This two wire bus (SDA & SCL) a +3v3 power rail and ground are all the connections that are required between the ESP module and the PCF 8574AP which is happy running on a 3v3 rail.

So all we require is a 4 wire interconnect and two pull up resistors that can be anything from the 2k7's I found in my junk box up to 4k7 - they are not critical.

The port chip has an I2C address and this can be modified by three external address lines, A0, A1, A2, so that different addresses can be set for multiple chips on the same bus. I grounded all three and then set out to discover the I2C address of my chip.

This seemed to be a little non standard from the data sheets, but then my PCF 8574AP again came out of my junk box and is quite old, but still in current production.

Using an I2C scanner programme that returns the address of all the connected devices, is the most elegant solution to detecting I2C addresses.

ESP BASIC I2C Scanner Programme

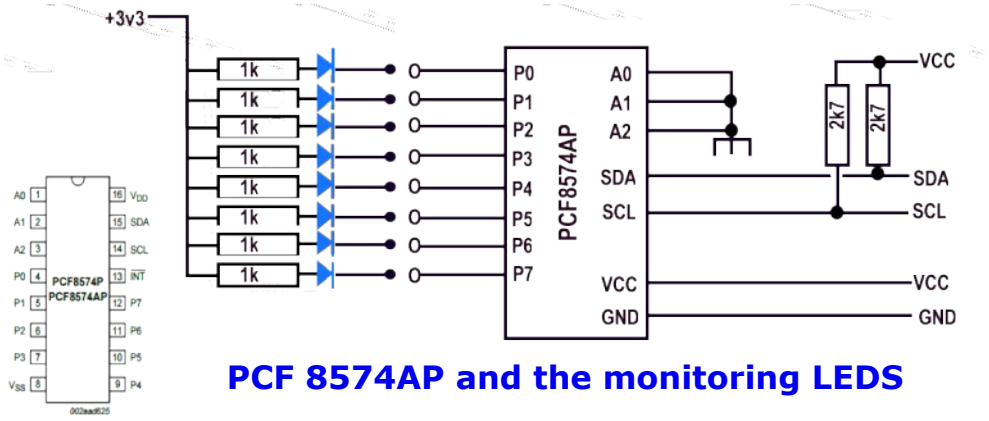
```
 for address = 1 to 127
   i2c.begin(address)
   stat = i2c.end()

   if stat  <  1 then
     ' print stat
      wprint "Found I2C device at address: 0x"  &
hex(address)
      wprint " -  >  "  &  address
      wprint "  <br>"
 endif
next
wait
```

Connect your browser to its 192.168.x.x address, you will see the ESP menu. Select edit, cut and paste in the I2C scanner code above. Save and press the run tab and it will return the address of all the connected I2C devices. In my case just the single port chip.

Found I2C device at address: 0x38 - > 56

The 0x38 is the hex address and the 56 is the decimal address.

ESP Basic is an interpreted language which uses humanly understood instructions (well almost) and it also uses decimal.



PCF 8574AP and the monitoring LEDS

This should mean we have a way of talking to the ESP module and quickly changing the code, without having to compile it into a less understandable computer code.

That is all taken care of when the programme is run and is transparent to the programmer.

Using the hardware address found by the I2C scanner BASIC programme.

```
 let address=56 'PCF8574 I2C Address set by hardware
```

Let's give our new port a workout. First connect 8 monitoring LED's to the port pins of the PCF 8574AP. I used the power rails of the ESP module and very small LED's with 1k series resistors to keep the load on the ESP module as light as possible.

The following BASIC programme can again be cut and pasted into the ESP module under the edit tab, again saved and run.

ESP module screen menu

ESP BASIC Programme

```
let address=56     'PCF8574 I2C Address set by hardware

button "Rotate RX Aerial  >>>>    " ,[1]    'Button to latch
clockwise rotation

wprint "<br />"                    'remove all the wprint lines
for a horizontal menu
wprint "<br />"
button " STOP Aerial Rotation..." ,[9]    'Button for turning
OFF all
wprint "<br />"
wprint "<br />"
button "Rotate RX Aerial  <<<<    " ,[2]    'Button to latch
anti clockwise rotation
wprint "<br />"
wprint "<br />"
button "Display Signal Strength " ,[3]    'Button to check a
power rail'
wprint "<br />"
wprint "<br />"
button " 144.750 MHz Talk Back  " ,[4]    'Button to allow talk
back to TX
wprint "<br />"
wprint "<br />"
button "Display Power Supply A  " ,[5]    'Button to call a
display power rail routine
wprint "<br />"
wprint "<br />"
button "Display Power Supply B  " ,[6]    'Button to call a
display power rail routine
wprint "<br />"
wprint "<br />"
button "Switch to External Video" ,[7]    'Button to switch
external video to RX
wprint "<br />"
wprint "<br />"
button "Shut Repeater TX Down    " ,[8]    'Button to shut
down the repeater remotely
wait

[9]
i2c.begin(address)    'Routines to Start I2C communication
with PCF 8574 devices at set 'address'
i2c.write(255)        'write the corresponding I/O pin value to
register
i2c.end()             'end I2C communication
wait                  'CPU sleeps until button press

[1]
i2c.begin(address)
i2c.write(254)
i2c.end()
wait

[2]
i2c.begin(address)
i2c.write(253)
i2c.end()
wait

[3]
i2c.begin(address)
i2c.write(251)
i2c.end()
wait

[4]
i2c.begin(address)
i2c.write(247)
i2c.end()
wait

[5]
i2c.begin(address)
```

i2c.write(239)
i2c.end()
wait

[6]
i2c.begin(address)
i2c.write(223)
i2c.end()
wait

[7]
i2c.begin(address)
i2c.write(191)
i2c.end()
wait

[8]
i2c.begin(address)
i2c.write(127)
i2c.end()
wait

This will produce the on screen menu in the browser.

If you would prefer horizontal buttons, remove all the wprint "
" statements from the programme.

Note the 'let address=56 statement' which is the address of my PCF 8574AP as detected by the I2C scanner. Yours might be different depending on the package, or if you have connected the A0, A1, A2 lines differently.

I have given the pushbuttons labels that can easily be changed in the BASIC programme to suit you repeater requirements. The LED's can of course be relays or other suitable interfaces, dependent on your requirements. Click on the boxes in your browser and you will have control over the LED's. The Selection will be latched and each LED selection will clear the previous selection.

On Screen Menu

The stop will clear them all so this simple setup will only allow one function at a time.

This one function at a time is not a hardware limitation, only a limitation of the simple BASIC control programme. It is possible to read the port status and add an additional 0 into the binary equation and resend the data, but not with this simple programme. This would enable the aerial to be rotated and the 144.750 talkback to be maintained. It all depends on what function you assign the buttons to. Let's just walk before we run.

By looking at the programme you will see each button calls a routine [1] to [9] which sends a decimal number via I2C bus to address 56 (PCF 8574AP location). The decimal numbers make more sense if you covert them to binary. Remember we humans might prefer decimal, but computers think binary.

Decimal	Binary	P7	P6	P5	P4	P3	P2	P1	P0
255	1 1 1 1 1 1 1 1	1	1	1	1	1	1	1	1
254	1 1 1 1 1 1 1 0	1	1	1	1	1	1	1	0
253	1 1 1 1 1 1 0 1	1	1	1	1	1	1	0	1
251	1 1 1 1 1 0 1 1	1	1	1	1	1	0	1	1
247	1 1 1 1 0 1 1 1	1	1	1	1	0	1	1	1
239	1 1 1 0 1 1 1 1	1	1	1	0	1	1	1	1
223	1 1 0 1 1 1 1 1	1	1	0	1	1	1	1	1
191	1 0 1 1 1 1 1 1	1	0	1	1	1	1	1	1
127	0 1 1 1 1 1 1 1	0	1	1	1	1	1	1	1

Button Data sent to the port via the I2C Bus

The stop button [9] sends or writes 255 which in binary is 11111111 a binary number devoid of 0's. 0's set the port bits, so 255 will just clear the port bits.

Button one calls routine [1] (Aerial Clockwise) and is sent 254 which in binary is 11111110 so the left digit sets port bit 0.

Button 2 (Aerial Counter Clockwise) calls routine [3] which sends 11111101. So port bit 0 is cleared and port bit 1 latches. Remember the 1's clear and the 0's set and you count from the left. Remember to convert the binary number to decimal for BASIC.

So all we do is chose the port bit 0 to 8, put a zero in the correct column, fill with 1's and send the 8 bit number to the PCF 8574AP down the I2C bus in decimal.

These LED's can be controlled by any device connected to your router. Remember I am using the ESP module in Station mode, not in the AP mode it is shipped in (see the last issue to change this).

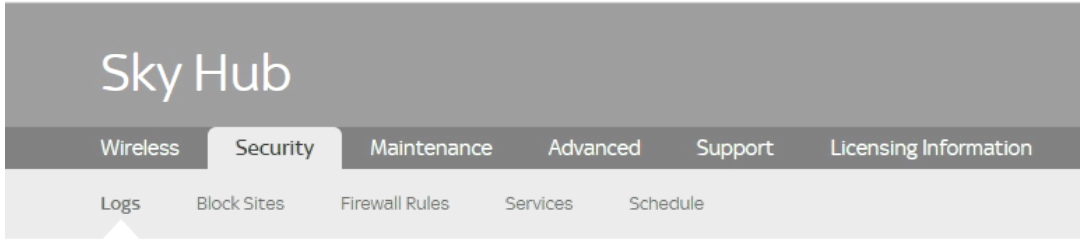
At this point you have local control only, not from a smartphone in your coffee shop as promised. To do that we need to carry out an exercise in the router that the ESP module is using, called port forwarding.

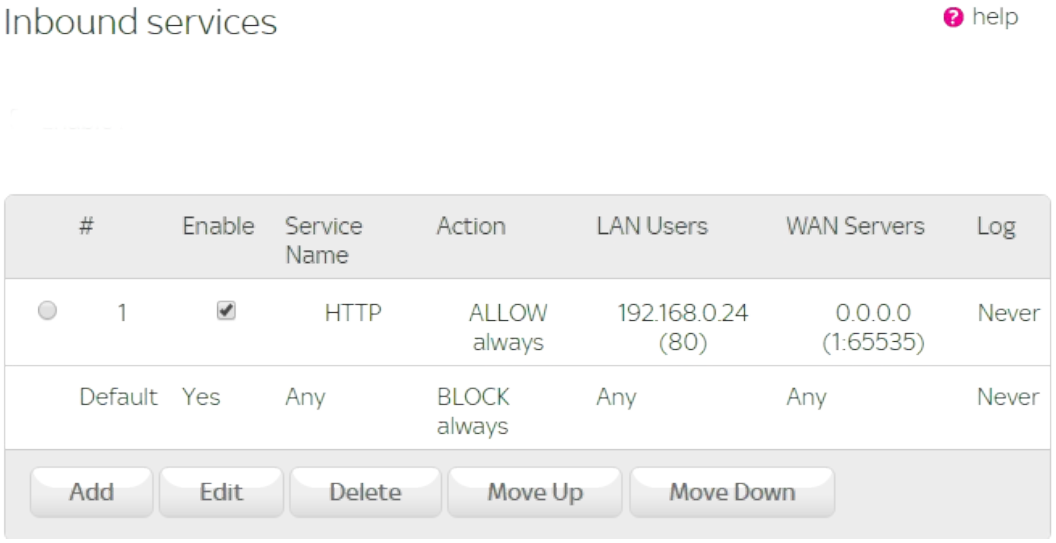
Every router has an IP address assigned by your ISP. If you are unsure of yours then point your browser at *http://www.cq-datv.mobi/myip.php* and you will see your current IP address and that will enable communication from any other device on the internet. Alas it will not be possible at this stage to see your ESP module which will have a local address starting with 192.168. x. x. These addresses are only reachable from within the same network. To make this a global connection, so it can be reached from any Internet connection, it requires an operation called Port Forwarding. This is an enabling process that must be carried out in the router that the ESP module is connected to.

All routers are different! Mine is a Sky router and it is located at 192.168.0.1 so we need to put that in the browser and we should see:-

Summary Status

Select the security tab and you should get





Select the 'Firewall Rules' tab and then the 'Add' button to add a new rule.

Complete the IPv4 inbound service settings using the IP address that you gave to the module in the steps above. Your ESP module is now available to the world on port 80. So put your IP address (found from above) and put it into your browser to try it.

Beware your IPv4 address will change, not every day but frequently (depending on your ISP) unless you use a dymanic DNS (*noip.com*) service or have paid for a fixed IP address.

The ESP module connects to the router via WiFi so no physical connection is required. It just needs to be located in a hot spot so it can chat down the WiFi. (no PC required).

So from a unit that is smaller than a box of matches, costs only a few pounds and is a simple interconnect, I can sit in my local coffee shop with my smart phone and control an ATV repeater anywhere in the world, using this logic.

I have assigned the push buttons in the BASIC programme, they can easily be changed and interfaced differently to control, monitor or even close down the repeater. There will be different arrangements depending on your requirements or even local regulations. This is a very adaptable solution and is I hope a step on from DTFM tones and let's face it a lot more elegant.

Can I thank all the people who have worked on this module providing endless support via the internet.

Michael Molinari who wrote ESP BASIC.

https://docs.google.com/document/d/1EiYugfu12X2_pmfmu2O19CcLX0ALgLM4r2YxKYyJon8/pub

Tracker J who came up with the button programme

http://www.esp8266-projects.com/2016/08/esp-basic-1-pcf8574-i2c-io-expander.html

Other links you might find useful

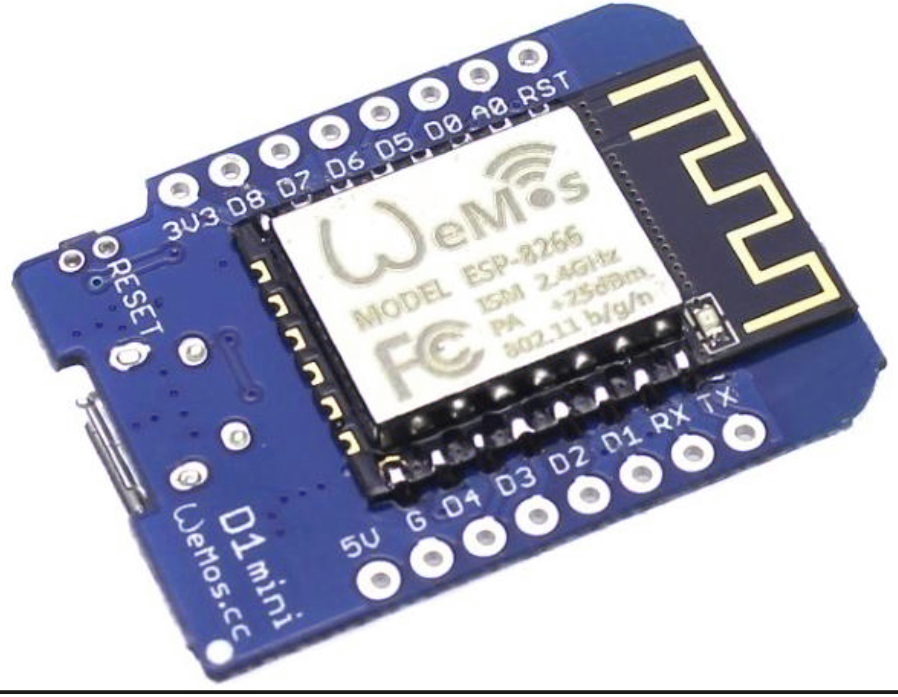
https://www.nxp.com/documents/data_sheet/PCF8574.pdf

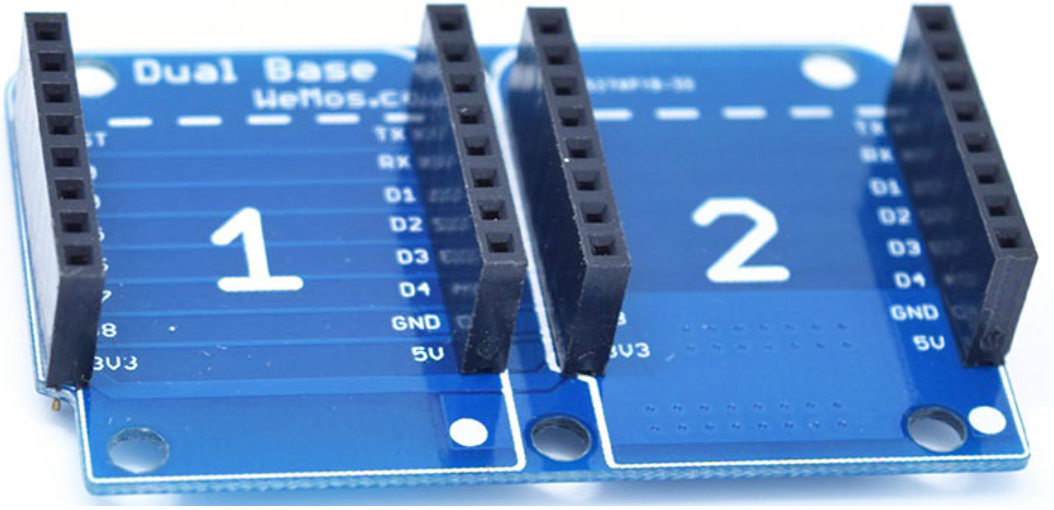
http://www.gammon.com.au/i2c

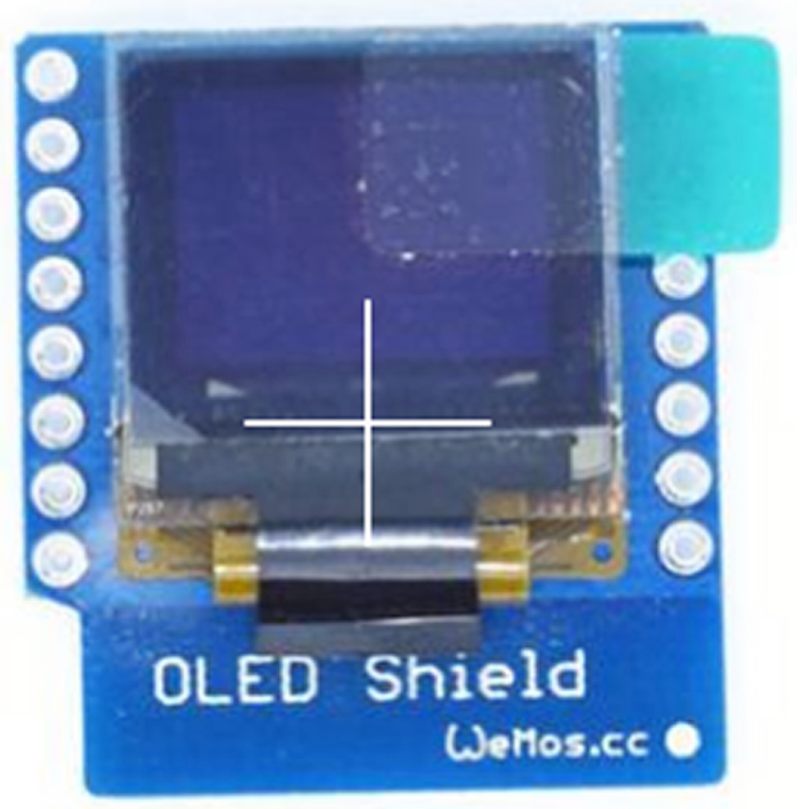
WeMos D1 mini ESP8266 Stackable Development System

Mike Stevens G7GTN

Following the introduction by Trevor G8CJS on the interesting ESP8266 modules, I quickly searched the internet and found the WeMos D1 module and a range of additional small plug in boards (shields) that looked like would make development of projects easier if a breadboard was not really required. We have a nice range of boards available from simple push buttons through to very neat OLED displays. We have 11 digital I/O Pins available for us to interface to, remembering that the pins are only 3V3 tolerant as external inputs. If you fit female headers on to the main D1 module we can now stack these additional modules on top as a sandwich. This seemed like a very good and actually quite neat solution for simple projects where only a few additional parts are potentially going to be required.







D1 Module and a simple dual Motherboard. Options exist to stack further modules.

All lines are paralleled between connector 1 and 2 on the small double sided PCB motherboard. We can navigate around the lack of available I/O to an extent by making use of I2C to control some of our own additional external circuitry.

These are designated on the D1 as being pins D1 for SCL & D2 for SDA. But at present the ESP8266 can only be the Master on the Bus and not a dumb slave type connected device.

We have to remember to fit the I2C pullup resistors a value of 4K7 has worked well for me. This lack of pins will disappear as we start to see the new ESP32 range commonly available for purchase.

Logic Levels – are now becoming far more important

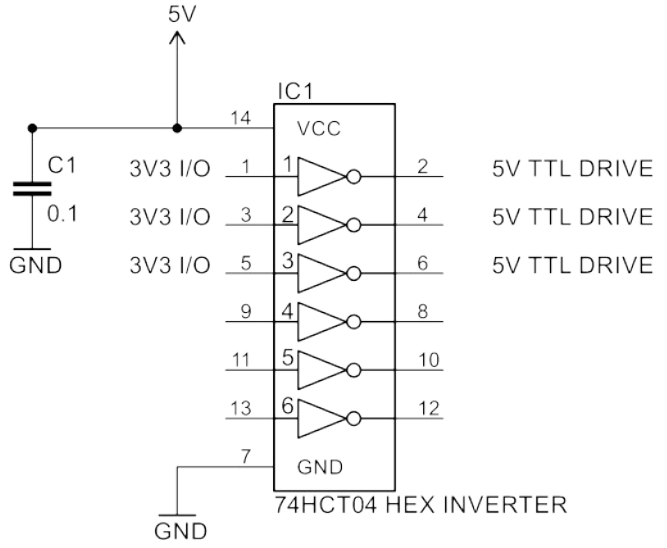
Often when we think of logic and associated levels 5V quickly comes to mind, is what we have been generally used to since the TTL device days.

Now many more modern processors require a 3V3 or even lower core maximum input from our sensors or other connected devices.

We can use a couple of resistors to create a basic voltage divider; this may in fact work fine for slower signals but can become troublesome for many devices.

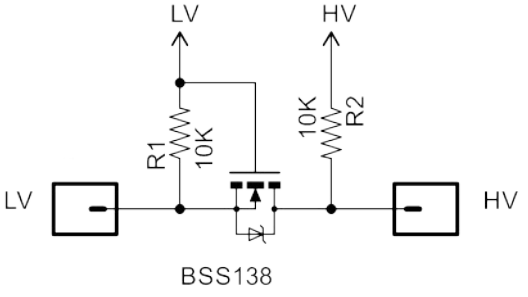
Hence this is not a good solution. We can also use several of the available gates from a 74HCT04 if we need to further drive other older TTL chips at +5V levels from 3V3 tolerant I/O pins in our designs as depicted in the circuit diagram.

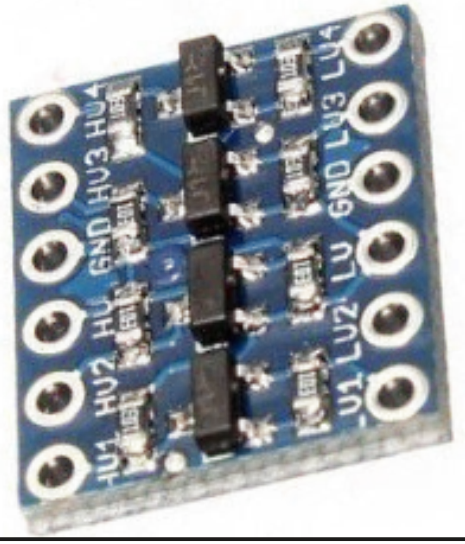
As noted we should tie all the unused inputs to either VCC or ground as good practice.



ALL UNUSED GATES ARE PULLED TO EITHER +5V OR GND

To make our designs easier or at least convenient in construction terms we can also purchase from eBay ready-made small modules that handle this voltage level conversion for us in a bi-directional fashion. These are based on a BSS138 Mosfet transistor with a pair of 10K resistors. This is depicted in the circuit diagram for just one channel (these being duplicated four times generally) on the small 0.1” pin pitch compatible breakout boards.





Of now available programming languages

Whilst we can programme these devices in an actually very comprehensive version of Basic, we can also leverage the power and creative forces of the many Ardunio library creators.

So we can code for these ESP8266 based devices today, if we wish to make the transition from the Basic environment towards "C" type coding. Micro python is also a good and totally viable option for all the snake lovers that exist amongst us.

We are sat on the ground floor, but understand the next generation design is already moving incredibly fast from the silicon developers Espressif to provide us with much more on every level.

If you are able to view YouTube videos then I certainly recommend looking at some of the projects that David Bird G6EJD has been doing using these small ESP8266 D1 modules in various different configurations *https://www.youtube.com/user/G6EJD* he has done some very nice technical walk through type tutorials with freely downloadable code from GitHub for the Ardunio IDE he prefers to programme in.

Conclusion

The WeMos D1 main processor boards are available from eBay for under £3 (4M flash size) with the plug in modules ranging in cost from real pocket money prices up to the most expensive at £5.50 for the small OLED SSD1306 (64X48) pixel resolution display.

So we can afford to use these if the slightly limited available I/O fits in with the design plans at hand.

Helpful Internet Links

https://espressif.com/en/products/hardware/esp8266ex/overview

https://www.wemos.cc/

https://www.esp8266basic.com/

https://www.b4x.com/b4r.html

https://docs.micropython.org/en/latest/esp8266/esp8266/tutorial/intro.html

https://www.youtube.com/user/G6EJD

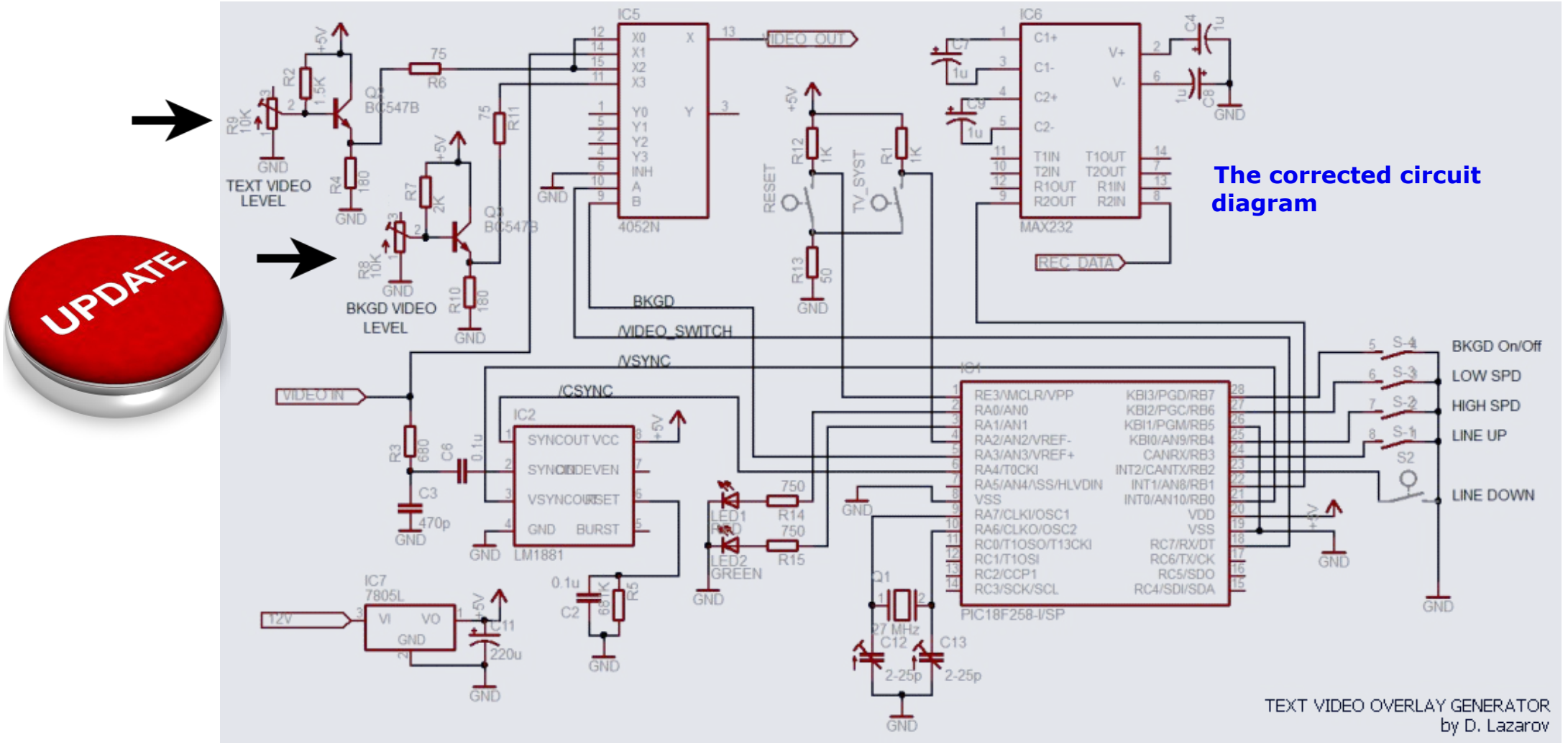
Update - Video overlay project

Back in issue 9 (March 2014) we published an article by Deian Lazarov entitled 'Video overlay project'.

Deian has now advised us that there is a mistake in the main schematic in the magazine - pin2 of R8 and R9 are connected to the base of the transistors and not pin3!

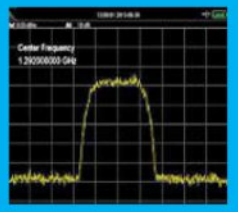
Please also note that the authors website has been shut down.

The *tvo_v3.zip* package available from our web site contains the corrected diagram, source code and other files for this project.



Digital Amateur TeleVision Exciter/Transmitter

Now available from

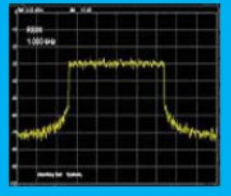


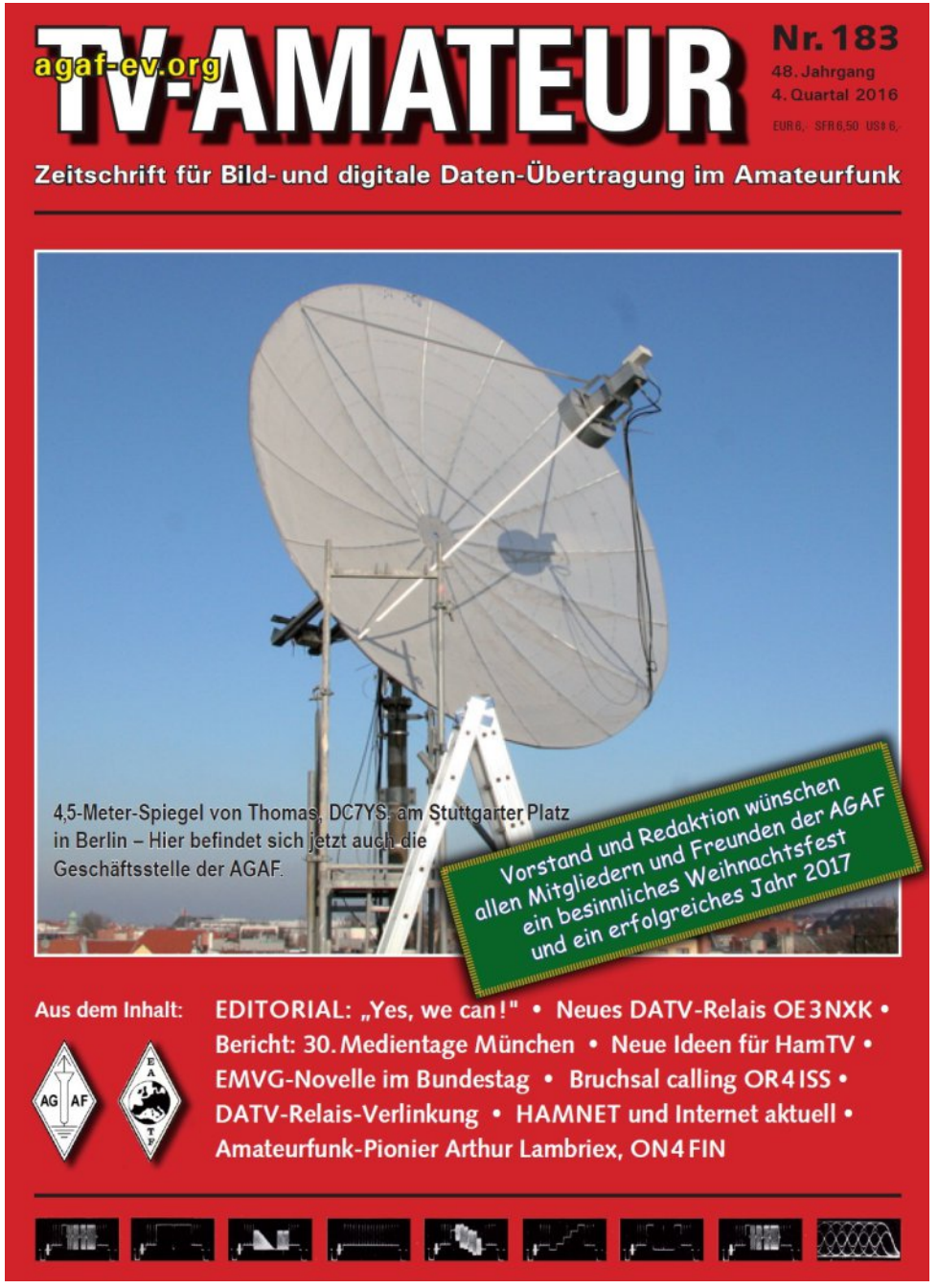
DATV-Express

- A more affordable DATV exciter can now be ordered
- Fully assembled and tested PCBA
- DVB-S protocol and DVB-S2 protocol for DATV tramsmissions
- Can operate all ham bands from 70 MHz-to-2450 MHz
- RF output level up to 10 dBm (min) all bands (DVB-S)
- Software Defined Radio (SDR) architecture allows many variations of IQ modulations
- "Software-Defined" allows new features to be added over the next few years, without changing the hardware board
- Symbol Rates from 100K to 8000K Symb/sec allows RB-DATV
- Requires PC running Windows or Ubuntu Linux (see User Guide)
- Price is US$300 + shipping – order using PayPal

For more details and ordering
www.DATV-Express.com

Register on the web site to be able to see the PURCHASE page





TV Amateur is a German Language ATV Magazine It is published 4 times a year and if you would like to subscribe go to *http://agaf-ev.org/* NOTE new URL

DATV-Express, a high performance TX DVB-S, DVB-S2, DVB-T !

By Pierre HB9IAM

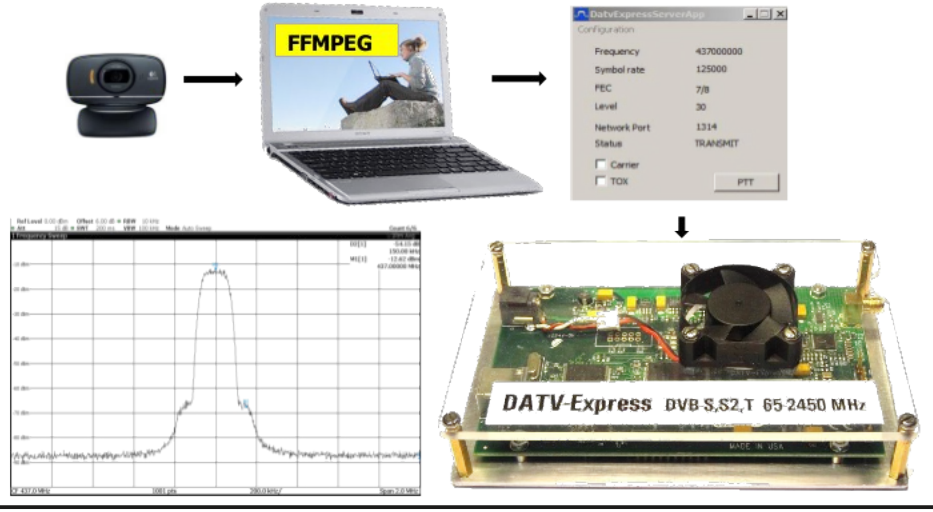
The DATV-Express team of Art WA8RMC, Charles G4GUO, Tom WB6P and Ken W6HHC, have realized a digital TX modulator of remarkable quality and very high performance.

It generates DVB-S high and low bandwidth standards, DVB-S2 and DVB-T between 65 - 2450 MHz, the output is adjustable between -39 and 13 dBm depending on frequency and mode, all on an 8x13 cm card connected to the PC in USB-2, and powered with 12 V <0.5 A!

https://datv-express.com/

For DVB-S Low SR, use the DATV-Express SERVER soft:

Low SR DVB-S between 125 and 500 kSymb/s, constellation QPSK, FEC 1/2 to 7/8.
The video encoding H264 or MPEG2 is real-time on the PC by the software FFMPEG, The signal is then streamed via the USB-2 port to the DATV-Express board.



Note the quality of the spectrum with the lower shoulders of > 53dB!

Measurements Spectrum FSW, power probe NRP-Z21 Rohde & Schwarz, MER with Minitioner

DVB-S Fec 5/6 Level	145 MHz dBm	Shoulder SR 125 dB	437 MHz dBm	Shoulder SR 125 dB	MER dB	1200 MHz dBm	Shoulder SR 125 dB	MER dB	2350 MHz dBm	Shoulder SR 125 dB	MER dB
0	-27.55	-62	-28.90	-52	31	-31.89	-43	31	-38.10	-36	30
10	-23.85		-24.90			-28.02			-33.60		
20	-18.95		-19.80			-22.98			-27.76		
30	-14.00		-14.90			-18.25			-23.00		
40	-11.15	-62	-11.00	-54	31	-14.26	-45	31	-18.90	-36	31
50	-6.46		-6.05			-9.16			-13.78		
60	-1.65		-1.12			-4.29			-8.77		
70	1.36	-64	2.29	-54	31	-0.70	-45	31	-5.00	-39	31
80	5.83		7.25			4.32			0.24		
90	10.54		12.00	-48		9.06			4.96		
92	11.57	-58	13.04	-48	31	10.22	-45	31	6.11	-40	
100	Maximum before 2nd shoulders								10.06	-38	30

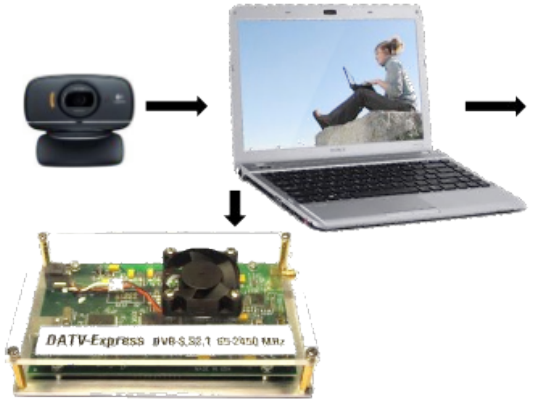
For DVB-S / S2 SR 125-8000, use the DATV-Express TRANSMITTER soft:

a) DVB-S modulation, SR between 125 and 8000 kSymb/s, constellation QPSK, FEC 1/4 to 7/8.

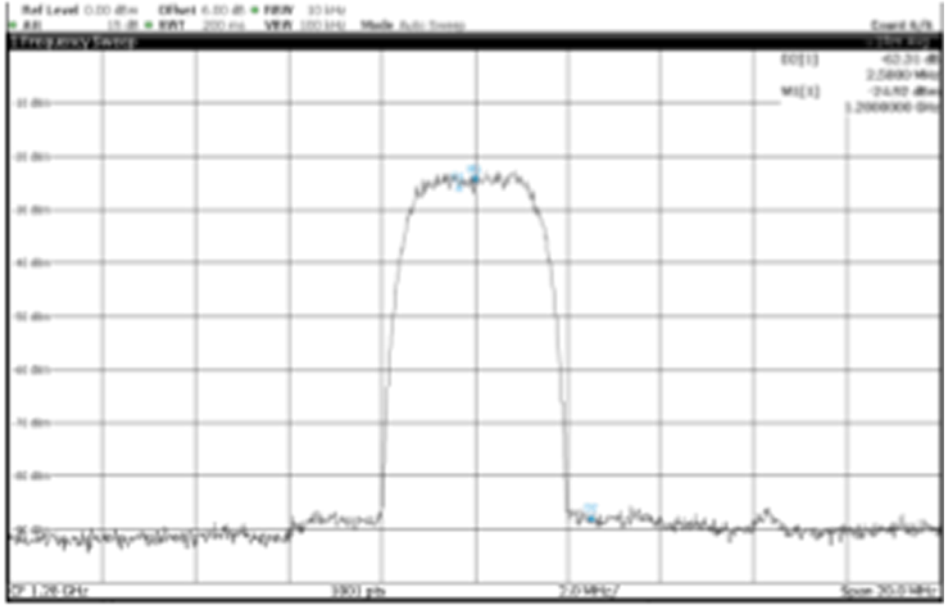
b) DVB-S2 modulation SR between 125 and 8000 kSymb/s, constellation QPSK, 8PSK, 16APSK, 32APSK FEC 3/5 à 9/10, RF shape filter Roll Off: 0.35, (0.20 and 0.25 currently not available), Pilot ON/OFF.

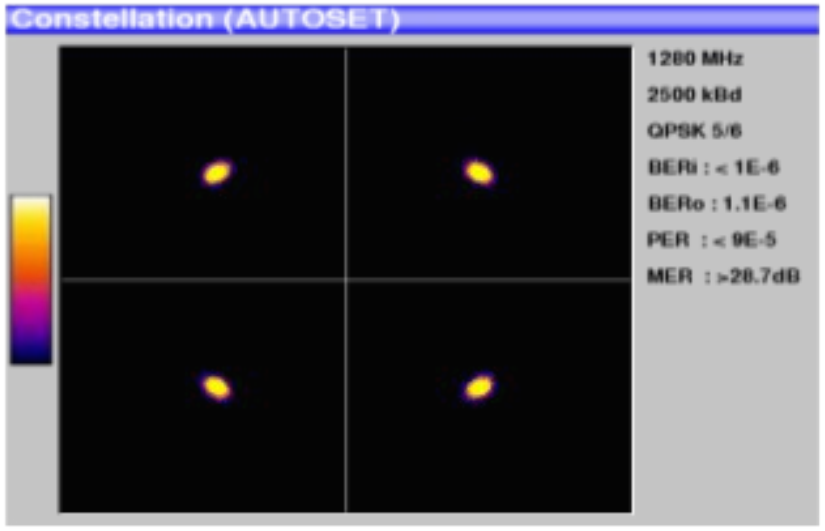
In both modes the H264 - MPEG2 encoding is performed using the Express -Transmitter soft

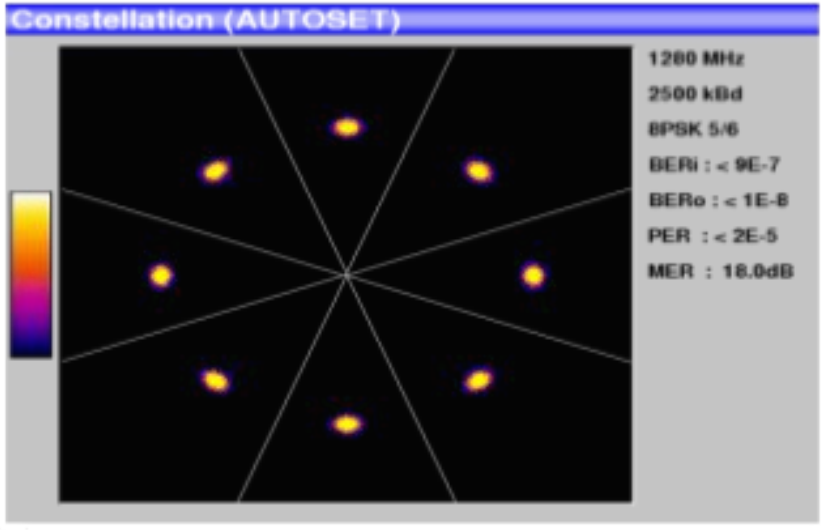
Note the quality of the spectrum with the shoulders lower than 53dB !
Measurements: Spectrum FSW Rohde & Schwarz
Power: sensor NRP-Z21 Rhode & Schwarz
Constellation and MER: SEFRAM 7875



DVB-S FEC 5/6	145 MHz	Shoulder SR 2500	437 MHz	Shoulder SR 2500	MER	1200 MHz	Shoulder SR 2500	MER	2350 MHz	Shoulder SR 2500	MER
Level	**dBm**	**dB**	**dBm**	**dB**	**dB**	**dBm**	**dB**	**dB**	**dBm**	**dB**	**dB**
0	-27.40	-50	-30.27	-34	-26	-33.25	-39	-31	-37.80	-35	-27
5	-22.92		25.38			-28.50			-32.86		
10	-18.12	-60	-20.49	-40	-26	-23.77	-51	-31	-27.83	-48	-31
15	-13.03		-15.41			-18.82			-22.71		
20	-9.47	-67	-10.69	-54	-26	-13.93	-57	-31	-17.88	-58	-31
25	-4.66		-5.65			-8.82			-12.47		
30	0.21	60	-0.72	-62	-26	-4.09	-64	-31	-7.84	-63	-31
35			3.61						-2.82		
39			7.63	Maximum before 2nd shoulders					1.25	-62	
40			8.50	-59	-26						







MER measurement is quite difficult, Mintioune is optimistic, Kathrein MSK-200 does not rise >15 dB, Promax Explorer II+ >25 dB, SEFRAM 7875 >28 dB

Finally for a more realistic value I compare with the Rohde & Schwarz SFU generator output …

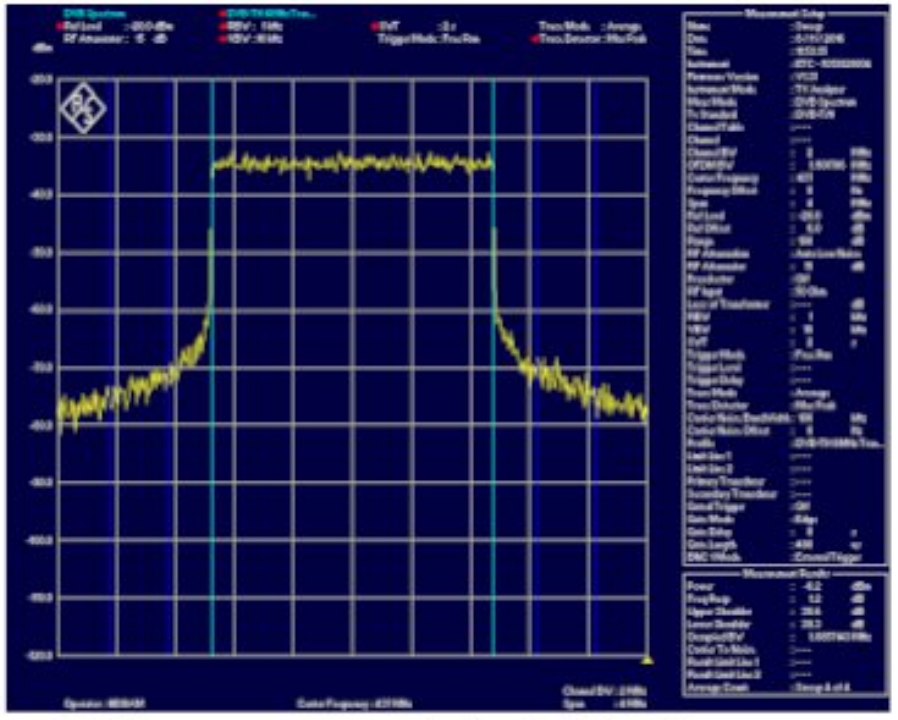
The MER of the DVB-S2 constellation corresponds to >25 dB !

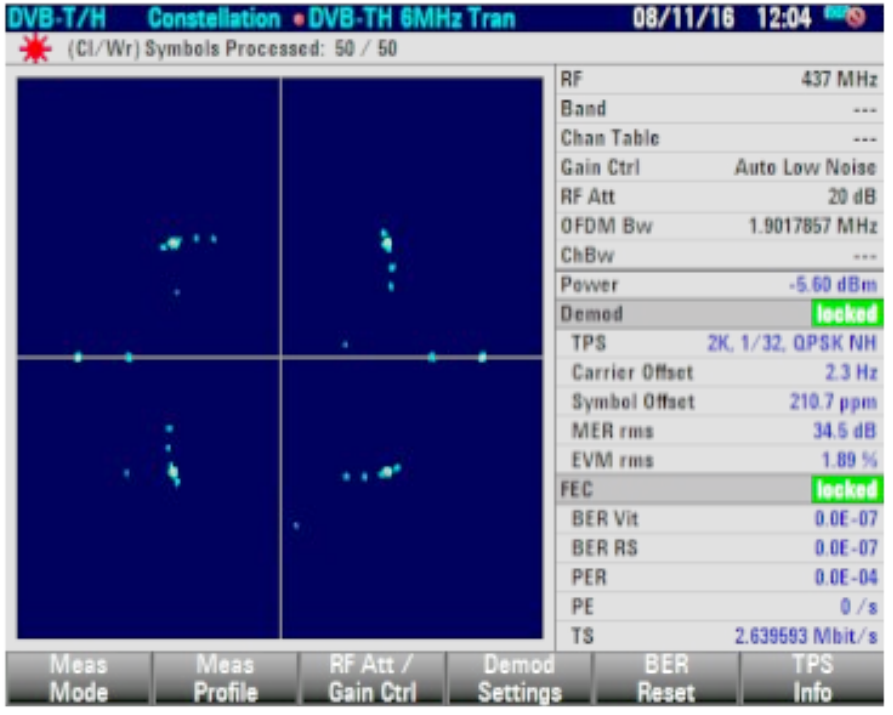
For DVB-T, use the DATV-Express TRANSMITTER soft:

This mode is experimental and limited by the speed of the USB-2 and the processor, a PC I5 @2.5 GHz already works in 2 K, 1 and 2 MHz of BW, QPSK modulation. For the 2 MHz, generally the flow must be reduced to 15 ips and the FEC and Guard intervall adapted to the available space in the TS.

The H264 or MPEG2 encoding is performed using the Express-Transmitter soft.

DVB-T 2 FEC 7/8 Level	145 MHz dBm	Shoulder BW 2MHz dB	MER dB	437 MHz dBm	Shoulder BW 2MHz dB	MER dB	1200 MHz dBm	Shoulder BW 2MHz dB	MER dB	2350 MHz dBm	Shoulder BW 2MHz dB	MER dB
0	-38.02	-38	-32	-39.90	-32	-28	-40.80	-28	-22	-41.80	-25	-19
5	-34.80	-40		-37.15			-38.80			-40.80		
10	-30.50	-39	-33	-33.35	-39	-33	-35.60	-36	-31	-38.90	-34	-24
15	-25.60	41		-28.70			-31.30			-35.50		
20	-22.20	40	-34	-24.30	-39	-34	-26.70	-39	-37	-31.35	-38	-25
25	-17.80	40		-19.30			-21.70			-26.25		
30	-13.10	40	-34	-14.40	-40	-35	-17.20	-40	-37	-21.70	-39	-25
35	-9.33	40		-10.00			-12.50			-16.80		
40	-4.83	41	-34	-5.30	-39	-35	-7.65	-41	-37	-11.90	-40	-24
45	0.00	40		-0.25			-2.80			-6.70		
47	1.82	40	-34	1.73	-39	-35	-0.90	-39	-37	-4.95	-40	-24





Upper right - Maximum power output before 2nd shoulders

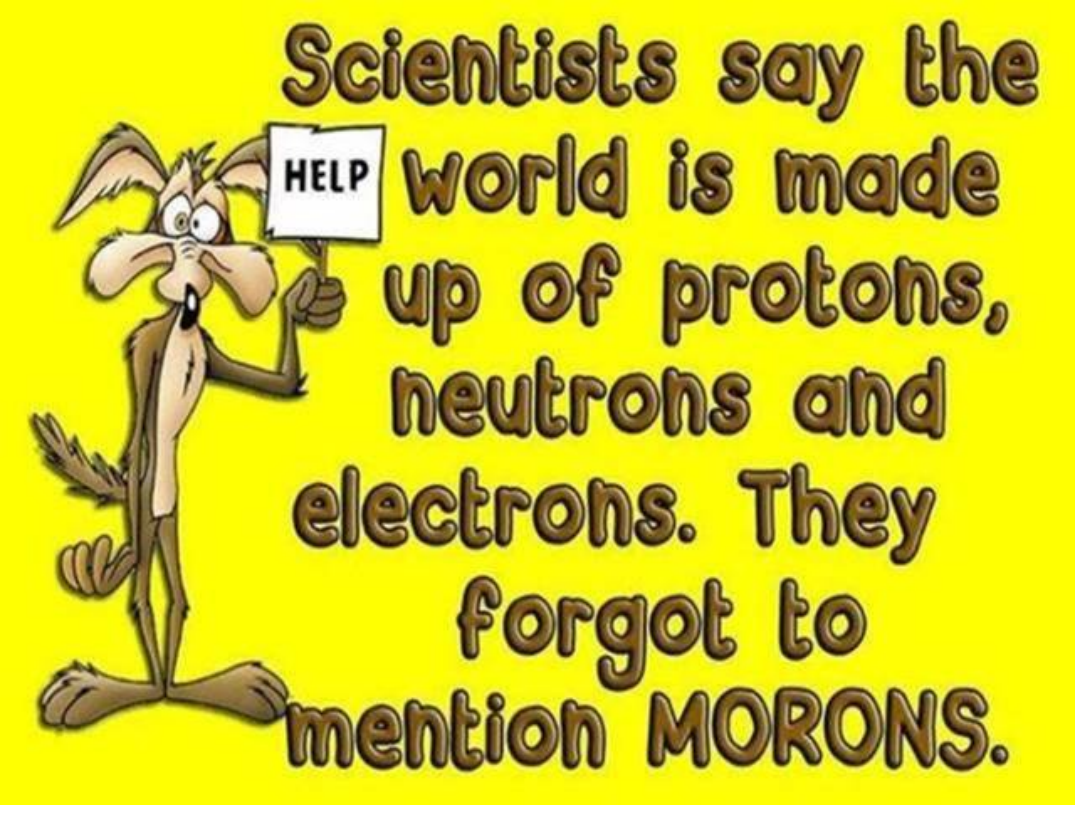
Lower right - QPSK constellation with Pilots

Note the quality of the spectrum with the lower shoulders of> 38dB and the constellation MER> 34dB!

Spectrum Measurements, Constellation & MER: ETC Rohde & Schwarz, Power:NRP-Z21 Rohde & Schwarz

VMix: Mixing of sources for DATV-Express TRANSMITTER

Using the VMix video selection and effects application with the DATV-Express card create a 100% digital system performing in SD and HD, with a wide choice of sources of almost all formats, camera, DVD, video files, images, photos, graphics, Power Points, Audio CD, MP3, subtitle etc.



DATV-Express Project - December update report

By Ken W6HHC

Charles G4GUO is trying to get his LimeSDR TX/RX board running correctly. After resolving the earlier Windows driver issues…he has the LimeSDR "sort of" running.

He inadvertently had loaded a tool needed by GNUradio that is statically-linked, not dynamically-linked. Now he can not seem to remove the statically-linked tool??

Not much customer support from LimeSDR project yet for early adopters. LimeSDR is currently expecting to begin shipping production units of their board in early January.

Charles G4GUO is now officially taking a rest from DATV-Express project for a few months.

Can you believe that he has been working constantly on the DATV-Express project since he first sent an e-mail to the TAPR organization (digital communications group) in July of 2010 asking if there was any interest in designing a "low-cost SDR-based DATV transmitter".

December turned out to be a bit of "chaos" for the project's Manufacturing/Testing manager, Art WA8RMC.

The team had found enough interest from hams to build another lot with 50 boards…officially we had standby-orders for 42 boards. The 50 assembled boards were delivered for testing in mid-December…BUT…

- *Initially none of the boards would work. There were two values of capacitors that had been interchanged on the board. They were all fixed within a couple of days.*
- *Then we ran into a second unexpected testing problem on 16 boards. The problem turned out to be the modulator chip was soldered in with a rotation of 90 degrees. These 16 boards should be repaired by the first week in January.*
- *We have ENOUGH good boards to send to everyone on our standby list a good board, if they order NOW.*
- *New hams (NOT on the standby list) have discovered that PayPal is working again to order boards and are paying for new boards. The project team does NOT want to ship these orders from new hams until more non-working boards are fixed.*

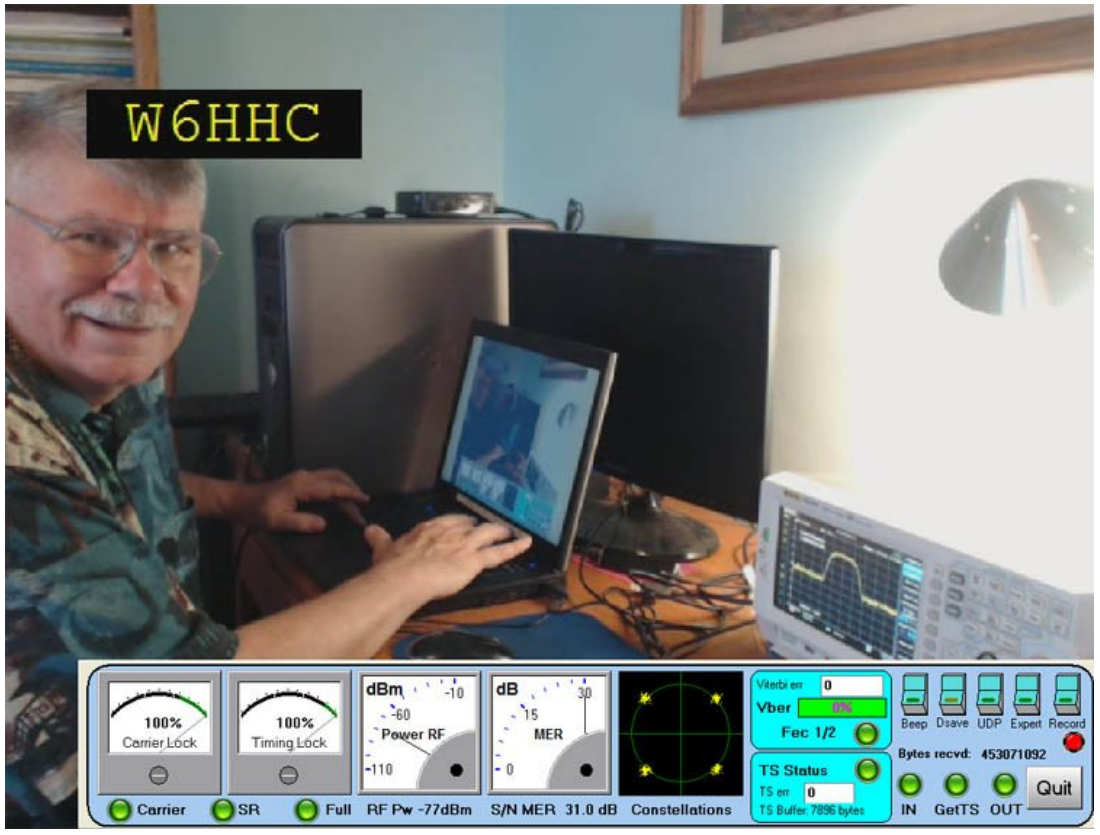
Ken W6HHC has sent out e-mails to everyone on the official "stand-by orders list" asking them to help the project team by following through on PayPal ordering their reservation by January 10.

This will help Art sort out his chaos. Ken reported that in the last week of December (since PayPal became active again), the project team had received additional new orders for 10 additional boards from seven different countries. It seems the DATV-Express board has really become a world-class product!

Ken W6HHC had enough time to install his MiniTiouner USB-based receiver/analyzer board for DVB-S protocol on Windows10.

Two of the most important advantages of the MiniTiouner (currently v0.4c software) design are:

- *The MiniTiouner is a ham-radio analyzer tool for DVB-S. As Jean-Pierre F6DZP clearly explains: "On commercial receivers the DATV video is either good or missing…perhaps only with a signal strength reading to guide you. With MiniTiouner, Digital transmissions are not really 'all or nothing', in between there are many things that can happen; it's important to be able to observe and define the various stages."*

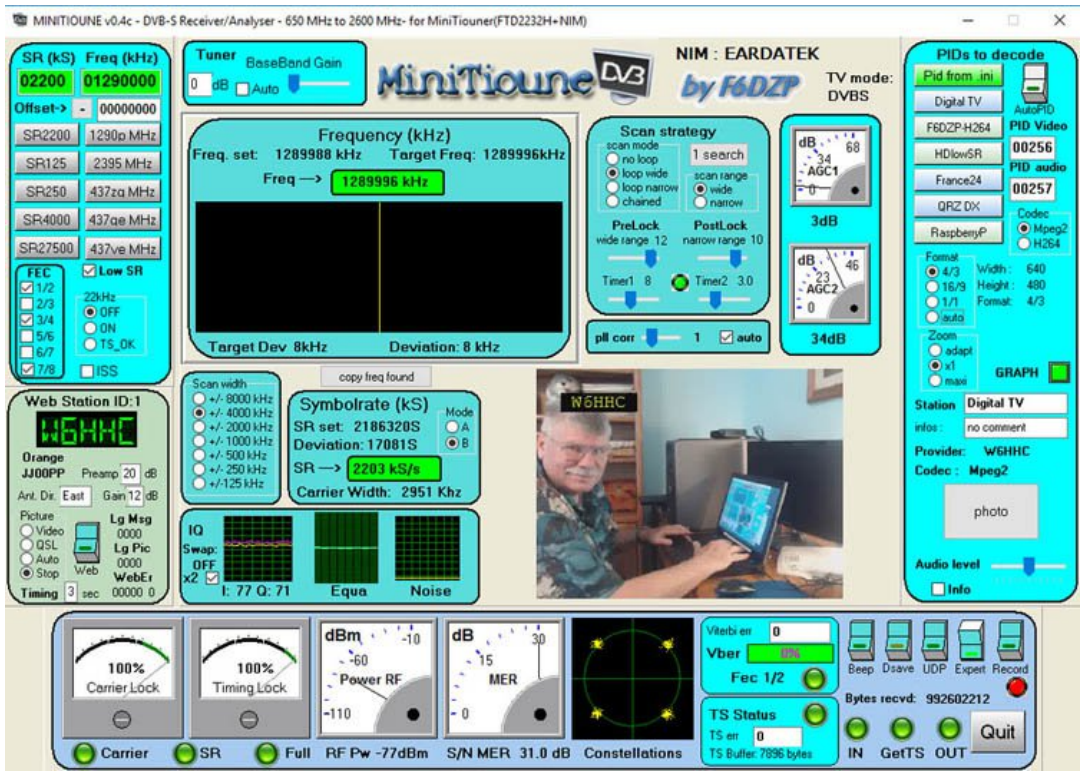


The MiniTiouner shown in receiver-mode for DVB-S. The toolbar at bottom can also be removed.

- *The only DATV receiver around that can receive RB-DATV (Reduced Bandwidth) signals with SymbolRates less than 500 kSymbols/sec*

The MiniTiouner receiver will now allow Ken to test RB-DATV transmissions signals being produced by the DATV-Express board and software.

"Project speed set to chaos" …de Ken W6HHC



The MiniTiouner design by F6DZP is an excellent analyzer and receiver for DVB-S. Shown in analyzer-mode (AKA "Expert" mode).

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