In this issue

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Editorial

Welcome to CQ-DATV issue 50.
It does seem we have reached a milestone and did not the time fly. It was a brave move to set up a free ATV publication and it could have only been done by making it an electronic only magazine.

There was some logic in that we needed a publication that was going to be worldwide because, even 50 issues back, copy was starting to decline. Most of the technical authors that have contributed to previous magazines now have their own websites to publish their designs and yes, this works, but it detracts from a single focus and an audience reading a single publication over perhaps the same time frame that we hope stimulates discussion rather than numerous distributed websites with arbitrary updates.

Secondly an electronic magazine can exploit HTTP links. They are less useful if they have to be copied into a browser address bar. Now we have launched Micro Corner and the cut and paste of text can be exploited for a quick movement of a programme from screen to micro.

So it would seem to have more advantages than disadvantages, particularly if you remember BASIC programmes back in the BBC home computer and Spectrum computer days and the hours spent copy typing programmes from paper magazines.

Why is it so important to reach worldwide audience? Well, the original concept was to write a few magazines, publish and people would download, read and the contributions would roll in so we could just select and print the ones we thought publication worthy. So we were effectively running a newspaper without journalists or feature writers. This failed and the CQ-DATV 49 issue was thin to the point where we wondered if there would be a CQ-DATV 50.

We appealed for copy and articles emerged and we are indebted to the people who took the time and effort to contribute, Their names are published alongside their articles.

The group we also call the staff writers (grand title almost makes you think they are paid a salary) also moved up a gear and so we are proud to produce CQ-DATV 50.

If we are going to continue and buck the trend that other ATV magazines are suffering, then we need to carry on this impetus. So please read CQ-DATV 50, but ask yourself 'could I contribute?' Do we have a local repeater people would like to read about, have I been anywhere that has ATV activity that I could share. It's not all about designing a complex circuit. We know people who can do this are perhaps a dying breed, but also we know some of you are still out there and we would love your input.

In this action packed edition we have:-

The full results of the IARU region 1 ATV contest

John G3FRL has sorted out what started as a Maplin Weather station

Richard VK4XRL has written another Digital World

Bob Dyer G1XIE has reported on his experiences building the Portsdown DATV Transmitter

Tim Forrester G4WIM has documented his DATV repeater GB3FT

Ken W6HCC has produced his June DATV-Express Project report

David PE1MUD has come up with the ultimate blue screen remover and video sync processor.

Trevor looks back on 50 years of Colour TV broadcasting.

Micro Corner, has a back to basics look at i2c, again from Trevor.

I wonder if any of you can remember i2c the first time around as a CQ-TV project when Chris Smith and Trevor engineered a Z80 machine code driven range of i2c projects.

Well it's BASIC this time again a blast from the past, but ESP 8266 BASIC is quite new. Mike G7GTN is now out of the wars and his audio module for repeater idents that we hung over form the last issue is now de-bugged and presented in this issue.

This has been a tough task for our two resident Editors, Terry VK5TM, without who we would have never had a PDF version of CQ-DATV and Ian G8IQU, the man behind the e-book concept.

Let’s hope we can keep producing magazines like this, but to do so we need your help, so please our thanks to everyone who has contributed not only to this issue but to all the previous issues.

So please, sit back and enjoy CQ-DATV 50.

CQ-DATV Production team

Production Team

Ian Pawson G8IQU Trevor Brown G8CJS

Terry Mowles VK5TM

Normal service restored

I have now repaired all of the missing files from the *DATV-Express.com* web site…after the big crash.

Our web host "had a huge power outage…the Web Server SAN Storage system had 3 drive failures at the same time during the power problem…".

The missing files (now restored) were mainly:

- *Windows download software releases*
- *User Guides*
- *TechTalk articles on DATV*
- *Open Source DATV-Express hardware files - like schematics, specs, and BOM*

The entire DATV-Express Project Team is sorry for any inconvenience that this crash may have caused.

73…de Ken W6HHC

ZERO ROBOTICS

Zero Robotics, led in Australia by the University of Sydney's Faculty of Engineering and Information Technologies, is one of the world's biggest computer programming competitions.

It is a robotics programming competition which challenges participants to test their coding skills on NASA robots known as SPHERES (Synchronized, Position, Hold, Engage, and Reorient Experimental Satellites) aboard the International Space Station. Teams from high schools around the world program the SPHERES to solve challenges.

In the 2016/17 competition five Australian high schools made it through to the Zero Robotics Championship Event and programmed robots in space. We had some incredible results, with our team coming second and equal third overall!

The Australia-only preliminary competition enables Australian high school students to gain valuable experience in coding. Students also learn the mathematics and physics behind the motion of the SPHERES robot and develop strategies for successful game play within the game premise. Students need to work as a team, delegate tasks, communicate effectively and be well organised.

These are valuable skills that students can apply to their schoolwork and that will be invaluable should they consider further studies beyond high school.

Zero Robotics is an international robotics programming challenge where Australian high school students have the chance to write code and complete tasks using NASA robots on board the International Space Station (ISS).

Created by MIT and the University of Sydney's former astronaut, Professor Greg Chamitoff, the competition involves over 170 teams worldwide.

In the 2016/17 competition 200 Australian students participated.

Our thanks to the University of Sydney in allowing us to use the information.

Friedrichshafen

Some pictures from the Friedrichshafen 2017 event kindly submitted by Robert Warner G1SAA.

Uwe Krause DJ8DW and his annual video link from The Pfänder mountain in Austria

The AGAF stand and actual printed magazines!

Stand of ATV Munich DB0QI with self built repeater devices shown

Stand of AGAF e.V. with beamer screen, membership data bureau and live DATV RX from Pfaender mountain (OE). Behind the desk is Evariste, F5OEO, talking to Uwe, DJ8DW, who is hidden behind the sys-op DG3KHS of ATV repeater Cologne, DB0KO

Above: Stand of ATV Munich DB0QI with self built repeater devices shown. The repeater site had to move last year to a small town near Munich called Vierkirchen

Left: Joerg, DF3EI, AGAF first chair, at his portable membership data bureau and HAMNET streaming station DA0TV, and latest TV-AMATEUR issues near by

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AMSAT-UK Colloquium

The AMSAT-UK Colloquium – 2017

The AMSAT-UK Colloquium will be held in conjunction with the RSGB Convention at the Kent Hills Conference Centre in Milton Keynes MK7 6BZ (Alternative postcode for Sat Nav: MK7 6TT) over the weekend 13/14/15 October.

Our Colloquium talks will take the form of a dedicated AMSAT/Space 'stream'. We shall also have a presence in the Special Interest Groups room, keep a look out for the AMSAT stand there, and use it as an AMSAT-UK rallying point.

Happy anniversary

AMSAT commemorated the 20th Anniversary of SSTV featuring SSTV images from the past and present, via a computer on the ISS Russian Segment, which stores images that are then transmitted to Earth using the ham radio, specifically the onboard Kenwood TM-D710 transceiver.

Those receiving the images can post them at *https://ariss-sstv.blogspot.com/* for viewing by the public.

Silent key - Dave Kenward, G8AJN

Dave G8AJN collecting the Grant Dixon award in 2012 from Colin G4KLB (over the air spoof)

Sadly on July the 9th Dave Kenward G8AJN passed away. Dave was a huge motivating force in the ATV world and without him we would not have had the benefit of the DigiLite project, the start of Digital ATV, which although this had been around sometime and was originally engineered by F1CJN.

Dave designed and engineered the DigiLite PCB's, and sorted out the programming of the USB modules, and all the other little bits and pieces that made this a home constructable project.

I first came into contact with Dave when I was re-starting the BATC shop and together we looked at the costs of stocking the full range of components for this project and the price break points on the various quantities of PCB's.

I was always weary about being attracted to large PCB runs and their attractive prices, only to be stuck as so many before me had been with stock that just never sold.

Dave inspired me to take a chance and risk BATC funds on the project, and he was never more right. DigiLite was a huge success and opened the digital gateway into ATV, other DATV projects have since come along but DigiLite was and will always be the first.

In 2012 the BATC awarded Dave the prestigious Grant Dixon award for services to ATV. No one deserved it more.

Colin G4KLB accepts the award on behalf of David G8AJN

Dave was also the Technical co-ordinator for the BATG (Bournemouth Amateur Television Group) that constructed and maintained GBSQ (The Digital ATV repeater)

The ATV world was the richer for all his contributions and he will sadly be missed by us all

Trevor G8CJS

Back in 2012-13 the DigiLite project was conceived by Dave. From his introduction to the project:

My contribution to the information contained in these notes has been to produce a single pcb with all the components for the serialiser and modulator. I claim no technical acumen, I am simply your guide to the system as it exists today. I aim to explain why you are doing something in terms that an analogue ATV-er can understand.

For those interested, the eBook containing all the DigiLite articles, in a single volume, is available from the *CQ-DATV* web site.

Dave was very helpful to me in the creation, proof reading and providing photographs on the various parts for this publication.

Ian G8IQU

Our thoughts are with his family.

50 Years of Colour Television

A personal reflection by Trevor G8CJS

Yes doesn't time fly when you are having fun. 50 years of UK colour TV broadcasting.

The BBC worked the initial cost out at between £1m and £2m per year, for four hours of television per week on BBC2, rising to 10 hours a week after 12 months.

The technology was cutting edge, so the corporation decided to trial it on BBC2, which in 1967 was run by David Attenborough. Where would his sort of broadcasting be without colour? Just imagine Paradise Birds and Life on Earth without colour, so perhaps the right person in the right place at the right time.

Attenborough also took advantage of other programming that would benefit from colour, Snooker, Percy Thrower's garden and then on July 1 1967 Wimbledon was broadcast in Colour, the first colour TV transmission in Europe.

Presumably the players still wore white kit, but the viewers would see green grass and before you ask Billie Jean King won the women's singles and John Newcombe won the men's singles.

The BBC also added to their press release that colour programmes would still be available on ordinary television sets in black and white, so they were on top of compatibility. Perhaps they might want to revisit the demand side, but to be fair it is really only an equipment cost and as that is replaced periodically anyway, perhaps an accelerated replacement budget and some training were the costs involved. But if you want to sell your programmes on, then colour would be the only way to go.

Philips PC60 Cameras, using 3 plumbicon tubes. Famous for using two camera cables

For me personally I remember taking an extended lunch break from college, along with several other students to go look at a demonstration by Pye, who were running a Colour TV road show for TV engineers and were in Leeds that day.

Most of the engineering speak went right over my head and seeing the engineers trying to converge the Red Green and Blue pictures on a delta gun shadow mask tube did make me wonder if I had chosen the right career, (Television Engineering), as it looked like colour was a real headache (note to self stay away from TV sets and monitors).

Remember BBC2 was 625 so the TV sets were dual standard and the convergence errors showed on Black and White pictures too, so it had to be right, otherwise viewers might stay with the Black and white TV with no such problems.

Late back to college and a telling off for the extended lunch break, in truth I think the lecturer was a little envious that we had seen colour TV before him and were full of all the technical buzz words from PAL through to dynamic and static convergence.

There were a number of references in the afternoons lectures to black and white television, that I suspected had not been in the original lesson plan.

By the 1970's I had my first job in a TV studio, it was an educational studio that was part of the University of Leeds. The newly appointed Chief engineer came from TWW and was a bit of a Dinosaur and had invested in black and white equipment and not left an easy door open into colour as the kit evolved.

The EMI image orthicons cameras were equipped with turret lenses. The VT machines were again only black and white capable, Ampex helical scan, that only used one head so there was a band of missing picture at the bottom of the screen.

University Television VTR department 1970 Ampex 7800 machines

I think I was there about two years honing my broadcast skills, before in February 1972 I made the jump to Yorkshire Television, Europe's first purpose-built colour studios, on Kirkstall Road in Leeds.

YTV started transmitting colour TV in November 1969 so it was settle down and learn colour TV engineering from the bottom, working with people who were already 2 years ahead of me on the learning curve. To be honest I was surprised I got the job which was in the engineering workshop, repairing Marconi VII Cameras and PAL coders (who was this Cox guy). We had EMI cameras (2001) but they never needed fixing, just as well the Marconi's made up that, so could colour be so difficult? well three of everything and in the case of the cameras 4 channels, did add to the engineering requirements, but on the plus side, did it create a job vacancy for me to fill,? I will never know.

Yorkshire Television as it was before the ITV branding of today

At that point I had just two years experience in the TV broadcast industry all of it on black and white kit, and most of that was spent on VTR engineering. The new job excluded Video Tape Engineering, apparently they had a specialist department that took care of that. This changed in 12 months when one of the specialist VTR engineering team left (there were only two people on the team, they kept that one quiet at the interview). I was successful at passing the interview for his replacement, which was a promotion too.

The problem was the VTR machines were Quadruplex (4 heads but a lot more than 4 times the complexity of the B/W Ampex I started with). The machines cost about £70k each and one of the accessories was a module called CAVEC (Chroma Amplitude and Velocity Error Corrector) and this was a £7k addition to improve head banding on the picture. We had just started to buy our first house, semi detached three bedroom costing £4k, does that put it in perspective. So for the other person he worked 12 hours 7 days a fortnight and I worked the other 7 so in short I was on my own (bugger).

TR70 VTR we had 6 and they were Germanium technology which as all engineers know has a finite life time. The top row of modules was the mostly FM and video processing, the bottom row was mostly servo, but the expensive CAVEC was also in this row

Ok the steep learning curve had just got steeper, YTV had 6 VTR machines and two crews driving them hard from 8am to beyond midnight, and if one was out of service for any length of time the balloon would go up, plus they had a TR50 in an outside Broadcast van which was also the responsibility of my new two man department. This older technology frequently went wrong in all sorts of exotic locations such as the Lincoln Drill Hall (Wrestling).

Colour added a lot to the VTR engineering, which all revolved around the coded signal, none of the RGB world of the cameras and a coder at the end of the chain.

PAL was probably the latest of the colour TV systems Perfection At Last we called it, as opposed to Never Twice the Same Colour or System Essentially Contradictory to the American Method.

The system we had chosen was engineered by a doctor Bruch (pronounced Brook) and was indeed the better of the systems available at the time, but it also had one or two abnormalities that lead us to believe that the good doctor was not ahead on the curve at the time.

The PAL system used a subcarrier as did NTSC and SECAM. This was not ideal and all three suffered patterning on the picture as a result, but for P.A.L and N.T.S.C. the patterning was proportional to colour saturation, so parts of the picture with little or no colour did not suffer (unlike SECAM). To minimise the patterning the good doctor added a subcarrier crawl on the grounds that the patterning was less objectionable if it moved up the screen, and he also removed some extra colour burst in the vertical interval, to help steer the monitors burst locked oscillator into lock quicker at the start of each field. (Bruch Blanking). There is much debate even today that this was necessary and the belief is that he had a faulty TV when he did the R&D, so this was a necessity for his TV only.

The bottom line was he thought the subcarrier to line lock, which was necessary to make VTR time base correctors work, produces a picture sequence that repeated every four fields (important to VTR editing) which always had problems until several years later when it was discovered that this was actually an 8 field repeat. That answered a lot of questions.

The funniest was yet to come. Bruch blanking which was unique to PAL and was engineered into the replay servo lock of all VTR's and that was it's only use, but remove it at your peril or VTR will be in trouble.

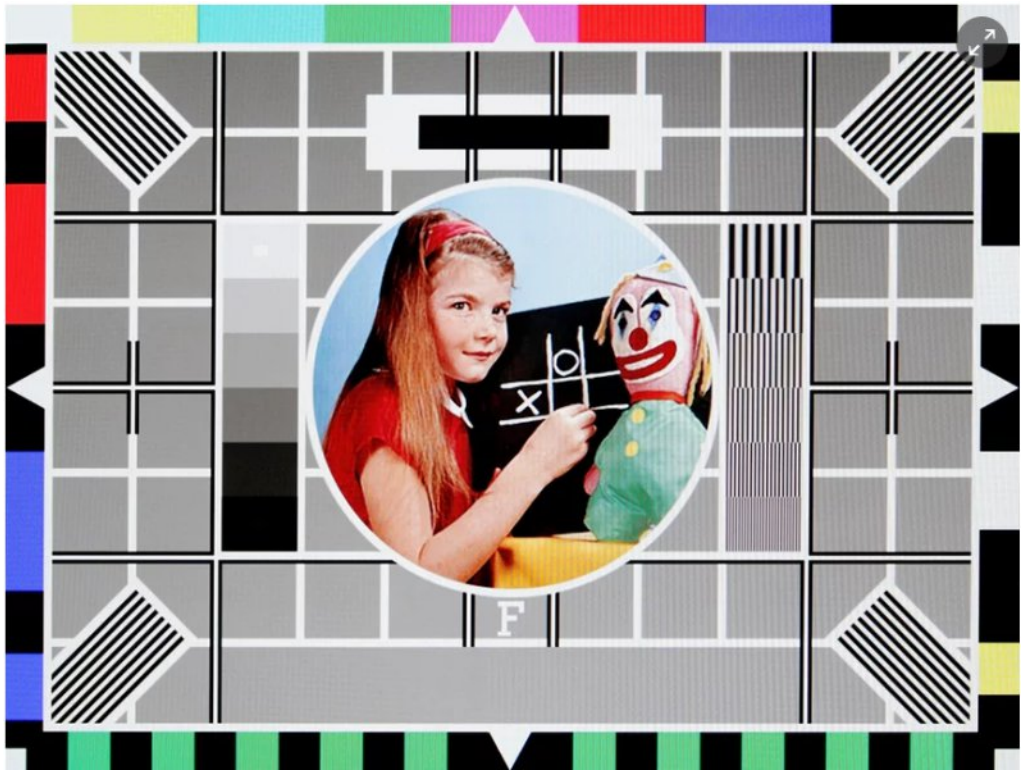
So enter RCA with the world's first portable TV camera The RCA TK-76, which weighed 19.8 pounds without lens or battery (yes bloody heavy) this featured the first single colour SPG chip, which really was a giant step in technology at the time except it was without Bruch Blanking.

I still remember the engineer flying in from the States to sort the problem and find out why VTR were unhappy and after an in-depth explanation on PAL asked "Who is this Brunch guy anyway?" at the top of his voice. You could hear a pin drop in what was normally an area that was anything but quiet.

The 70's still had test card transmissions in between broadcasting hours and of course that had to be redesigned for Colour.

Yes some of you will remember Carole Hersee, the most aired face in British TV history, the young lady in the middle of the Test Card who could be seen playing noughts and crosses.

Now 58, she says: "I got irritable, apparently. Because every time they wanted to take another photograph, I was eating!" Her Dad Bob Hersee would have none of it, he was pushing hard for his test card to be adopted and the centre picture had some vital elements, one being the delicate flesh colour of his daughters skin, which is very useful for colour



The first Colour Test Card, the centre picture of Carole was reversed so that she would not be recognised

saturation settings and the Noughts and Crosses board which was helpful for setting the static convergence of the original delta gun sets.

For both BBC1 and ITV, an agreed official joint launch of colour broadcasts was agreed for Saturday, November 15, 1969.

A concert by singer Petula Clark at the Royal Albert Hall was the first official colour programme on BBC1. It was aired at midnight, the exact time the colour broadcasting licence began. It is also rumoured that apparently the Comic Dick Emery, was so taken aback at his own yellow teeth after seeing them in colour, he had covered them with white plastic.

In the digital age, there must be some zeros! BBC CMCR (Colour Mobile Control Room)

The BBC mobile Outside Broadcast Control Rooms all had CMCR with sequential numbers as they evolved so presumably Wimbledon was televised with CMCR1.

They are all documented at
http://www.tvobhistory.co.uk/bbc-cmcrs---colour.html

What's left of these early days. Well there are still some early video tapes around, the oldest dates back to 1966 and is thought to be a test recording of ITV's London Palladium Show, hosted by Jimmy Tarbuck in 1966.

It was transmitted in Black and white, but ATV used it as a dry run for an American series , so two sets of cameras recorded the performance simultaneously one set recording it in 525 NTSC colour

In 50 years of colour we have seen a lot of changes, probably mostly to the flat panel screens we all now watch it on and the digital delivery. Well PAL stood us in good stead. It was never going to make it into wide screen and analogue as it was, was not ideal for video production and in particular multi generation VTR, but it got us started.

£2m well spent, thank you David Attenborough, the man at the helm of BBC 2 who pushed hard to get it started.

For those of you that remember his Zoo Quest series, which was first broadcast in 1954 and was previously thought to have been filmed in black and white, well it was filmed in 16mm colour and was transmitted that way on BBC4 on the 11 May. So again David Attenborough's a colour TV pioneer.

Want to be notified when issues of CQ-DATV are published? Then join our *mailing list*.

ATV Contest Results

Published 11th July 2017
Chris van den Berg PA3CRX, chairman VHF-and-above committee

Many stations joined the IARU ATV activity weekend/contest in June.

I especially call it 'activity weekend' since that is for the majority of the participants the most important reason to join. To have the highest score is for most of us not important. In fact, not everyone and every country have the same possibilities to reach the highest score:

- *different authorisation of band usage,*
- *different troposphere conditions,*
- *flat country or with mountains,*
- *path over sea,*
- *difference in antenna allowance,*
- *possibility to go portable,*

However, this activity is all about joining and having fun! This is understood by you, many send in their logs, some even with a very limited number of contacts.

The other purpose is to stimulate ATV activity, experimenting, showing our presence on the bands; 'use it or loose it'.

This is very well understood by countries that joined and send in their logs for this activity weekend for the first time (or since a log time): welcome!

Highlights:

- *band usage is very different in individual countries. While in one country almost all contact were made on 70 cm, in an other country almost all contact were made 23 cm's.*
- *ATV bands from 70 cm up to 1.2 cm are used, several stations operated on all seven bands,*
- *D-ATV as well as analogue,*
- *Enormous distances!*
- *Several portable stations,*
- *five stations operating from more then one location,*
- *limited number of contacts between countries.*

The number of stations that sent in their logs:

- *in 2014: 33,*
- *in 2015: 42,*
- *In 2016: 52,*
- *In 2017: 95! (operated from 100 locations).*

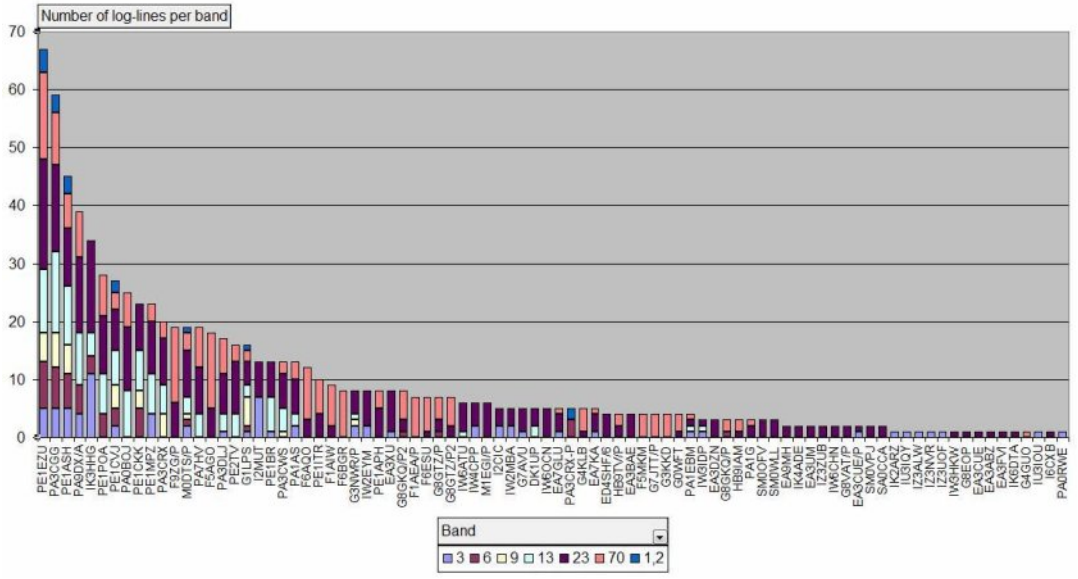
This increase could have been the result of active promoting to ATV by several countries. I asked the VHF-managers to publish this ATV activity in their local HAM magazines but unfortunately it was not always honoured despite all attention that is given to weak signal contests. A shame that some countries even made confusion with expired log sheets and rules on their website, even mentioning wrong date/duration of the activity.

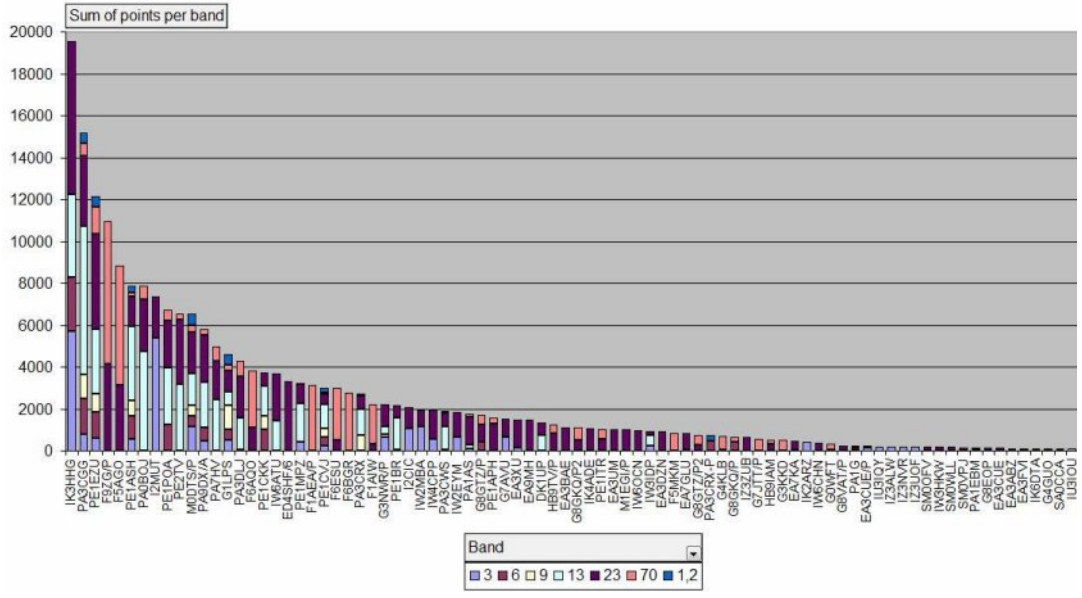
A total 719 lines in the logs shows a lot of band usage during this activity. (See graphs next page)

As you can see IK3HHG has the most overall points this year. Congratulations with this result!

Why not consider every ATV contact (especially with a new station) as a winning contact! So in fact, congratulations to everyone with your reached results.

In the tables you will find the details for every individual participant per band and the totals. Also included is the map with all participating ATV stations in the ATV contest of 2017.





The results could also be found at *https://vhf-uhf.veron.nl/wp-content/uploads/2015/08/IARU-ATV-results-2017.pdf* and likely soon on the IARU R1 website.

I will send certificates to some stations by email today. If you did not receive it and you would like to have one with your score on it, please do not hesitate to contact me and ask.

Check-out *www.dxspot.tv* especially during the contest (you can look back half a year). Handy to find each other, also on other days then the activity weekend. In several countries there are more ATV activity weekends, spread over the year.

Hopefully you all enjoyed this ATV activity weekend and spread it around so we have next year even more participants. To get others enthusiastic, you have to SHOW that ATV is interesting and fun!

Not only in HAM meetings or ATV magazine but you could send also a picture with your ATV activity and some additional text to your national HAM magazine.

It is obvious that ATV articles in most national HAM magazines are often hard to find, while there is a lot of ATV activity in their country. If you want to have more ATV interested stations, you need to bring ATV under attention by yourself!

Start with a (small) description of your station, experiment or experience (including picture) sending to the editor of your local HAM magazine.

Weak signal activities like contests are often in the picture while they use only limited periods a very small portion of the bands.

We should make them aware that ATV stations are the heavy band users that they need to protect the bands. (Besides that ATV is fun and it is easy and cheap to start with).

If you need the activity weekend/contest results in other format (Excel, Word) for publication, please let me know.

The IARU ATV results pdf is attached at the end of this issue of CQ-DATV.

Micro Corner - Node MCU BASIC and I2C control

By Trevor G8CJS

Node MCU Module and pin out

In CQ-DATV issue 43 we introduced the Node MCU micro controller and showed how to install a resident BASIC programming language that enables you to create simple programmes that can be edited in this high level language. The unit talks to your PC browser via WiFi, and can be powered from a USB socket.

Because this is an ATV magazine we based all the projects so far on ATV applications and two of the most popular have involved using the I2C bus and its built in instruction set for controlling the I2C bus - see CQ-DATV 46 and CQ-DATV 49 (both in the CQ-DATV library)

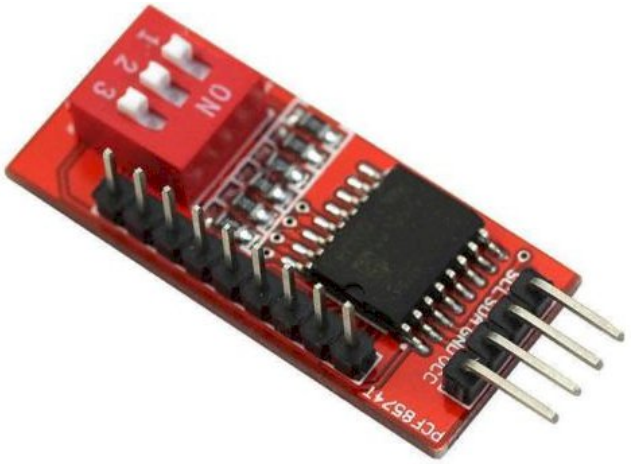
http://cq-datv.mobi/ebooks.php

The first project was simple internet control of a set of LED's that could be changed into drivers for an ATV repeater for video switching and all the housekeeping.

In CQ-DATV 49 we expanded this to rotating a RX aerial for a repeater which would greatly improve any ATV repeaters coverage area as opposed to the usually implemented Omni directional aerial.

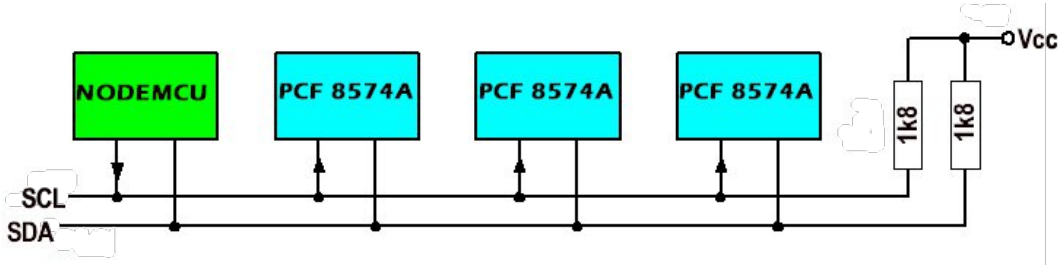
In CQ-DATV 51 we will be reading the I2C bus in order to look at a video detector to see if anyone requires access to a repeater.

All the projects use the I2C bus of the micro to drive a PCF 8547A I2C expander port, we may have skipped along a little too fast as there has been one or two questions, although I2C is heavily documented on the internet. So let's try and clear up one or two points on this port chip which is now available as a pre-wired module, (for those of you that have lost your soldering iron).



Pre-bought module with A0 A1 A2 switches to set the address

It connects to the NODE MCU module via the conventional two wire I2C bus. This is an open collector bus and can be daisy chained around many of these expander chips. It does require a pull-up resistor for both the SDL and SCL connection as the outputs are open collector, but only one on each leg regardless of how many port chips are daisy chained together on the I2C bus.



I2C bus interconnect

The expander chips have a unique address so that the bus can identify each chip. This is a 7bit address, four bits being locked into the chip, and three bits brought out to external pins on the chip so the I2C address can be externally selected.

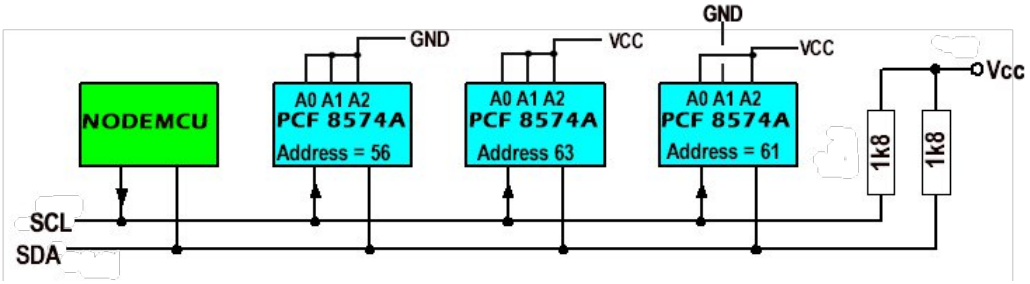
The four internal address connections are A7 to A4. For the PC8574 they are hard wired as follows
A7 Low,
A6 High,
A5 Low
A4 Low.

The PCF 8574A is different they are
A7 Low,
A6 High,
A5 High
A4 High,

Then for both chips A3 A2 A1 are wired to pins 1, 2, 3, so they can be set by the user as either high or low.

The chart documents the addresses for both the PCF 8574 and the PCF 8574A for all the available address locations.

A0	A1	A2	DECIMAL PCF 8574	HEX PCF8574	DECIMAL PCF 8574A	HEXPCF 8574A
0	0	0	32	0x20	56	0x38
1	0	0	33	0x21	57	0x39
0	1	0	34	0x21	58	0x3a
1	1	0	35	0x22	59	0x3b
0	0	1	36	0x24	60	0x3c
1	0	1	37	0x25	61	0x3d
0	1	1	38	0x26	62	0x3e
1	1	1	39	0x27	63	0x3f



Three PCF 8574A I2C port chips configured at three different addresses

A nice way to check the hardware is working and that you have the correct addresses for all the hardware is to ask the micro to check it for you and report back the address at which an I2C device is located. The following BASIC programme will do that for you.

```
 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
```

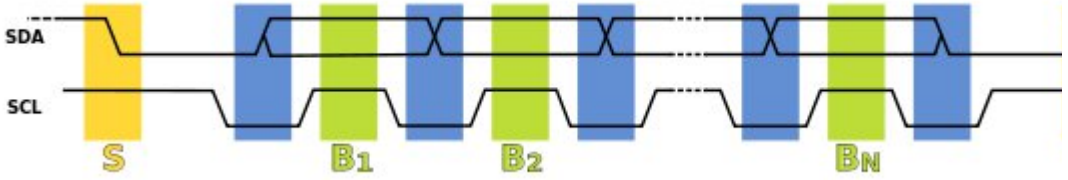
Just copy and paste this code into the edit page, save and run. This was the result for the above configuration.

```
Found I2C device at address: 0x38 - > 56
Found I2C device at address: 0x3d - > 61
Found I2C device at address: 0x3f - > 63
```

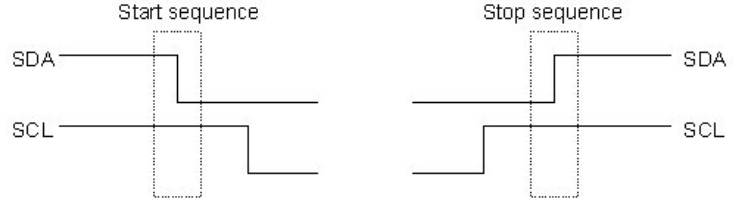
Nice to be proved right by software.

There are a couple of other complications to the I2C bus, that you would only need to know if you were programming in machine code, but is taken care of in EPS BASIC.

There is a unique timing sequence on the clock and data bus SCL SDA. The data line is always stable when the clock is in a high state indicating that the data on the bus is valid. The data only changes when the clock is low.



A start sequence is different and is one of two special sequences defined for the I2C bus, the other being the stop sequence. The start sequence and stop sequence are special in that these are the only places where the SDA (data line) is allowed to change while the SCL (clock line) is high.



This again is easy for the BASIC programmer
- i2c.begin(address) sends out the start sequence
- i2c.end() sends out the stop sequence

The last thing again is the direction of the data on the I2C bus which is a little more complex to grasp. The I2C address is seven bit, but converted to 8 by moving all the 1's and 0's one step towards the MSB so x 1 1 0 1 1 1 = 55 decimal would become 1 1 0 1 1 1 1 x =222 in decimal (BASIC uses Decimal not hex). This frees up the LSB x in which is placed 1 for a read direction of data and 0 for a write direction of data so read addresses are always odd numbers and read addresses are always even.

Again the address shift and the setting or resetting of the MSB is taken care of by simply using either I2C.write(address) and I2C.read () no address shifting is required, just use the address in the chart or the address delivered by the above code.

BASIC takes care of all these problems for you and produces a simple to understand set of instructions that can be changed by simple key strokes, saved and stored and will deliver you a programme with less brain pain than machine code programming of the I2C bus.

All you have to do is learn how to use the instruction set in the manual. Although difficult at first because of a lack of examples, this will soon become second nature. Should you mess up the syntax and create an error the line number of the problem or problems will be pointed out to you when you run the programme, return to the edit mode, correct the syntax and try again.

The manual is on-line at
https://docs.google.com/document/d/1EiYugfu12X2_pmfmu2O19CcLX0ALgLM4r2YxKYyJon8/pub#h.o9kamrmfwc3u

This is in Google documents and you might have to create a login to see it.

So what is holding you back the NODEMCU modules cost about the same as a PIC, they have built in Wi-FI, 4MB of non volatile memory and can be programmed in seconds, with the biggest plus of all, find a BASIC programme (lots on the net and more in CQ-DATV micro corner).

Copy and paste it into the edit page, save and run and if you have messed up it will point out rather diplomatically where the error is. Not bad for module costing under £3

Some entertaining and useful links

Flash Link
https://www.esp8266basic.com/download.html

Clock Software
https://www.esp8266basic.com/graphic-clock-example.html

BASIC Examples
https://www.esp8266basic.com/examples.html

TV TX 1 VHF TV
https://www.youtube.com/watch?v=SSiRkpgwVKY

TV TX 2 VHF TV
http://hackaday.com/2016/03/01/color-tv-broadcasts-are-esp8266s-newest-trick/

Forum Help
http://www.esp8266.com/viewtopic.php?f=40&t=6732

Driving an LED light strip
https://www.youtube.com/watch?v=7Dv70ci-MOw

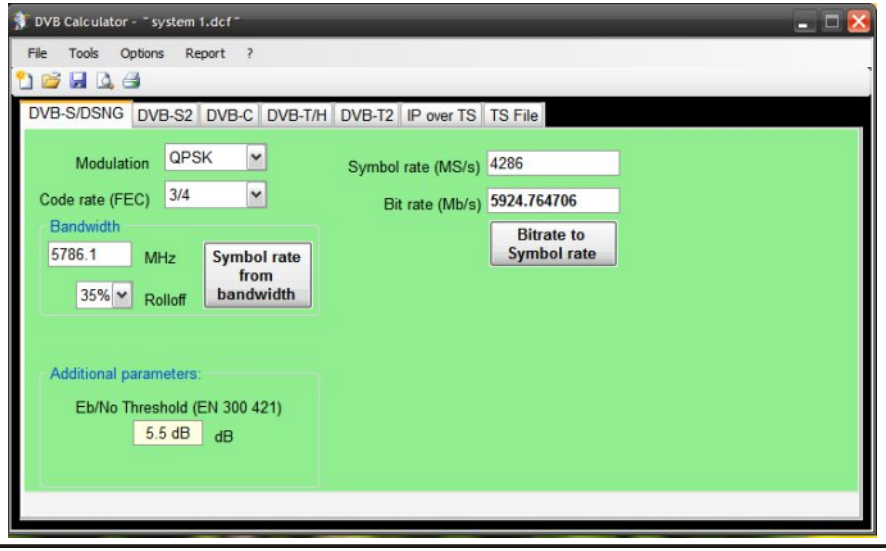
Nice demo
https://www.youtube.com/watch?v=fVpAN3adK9A

By Richard Carden - VK4XRL

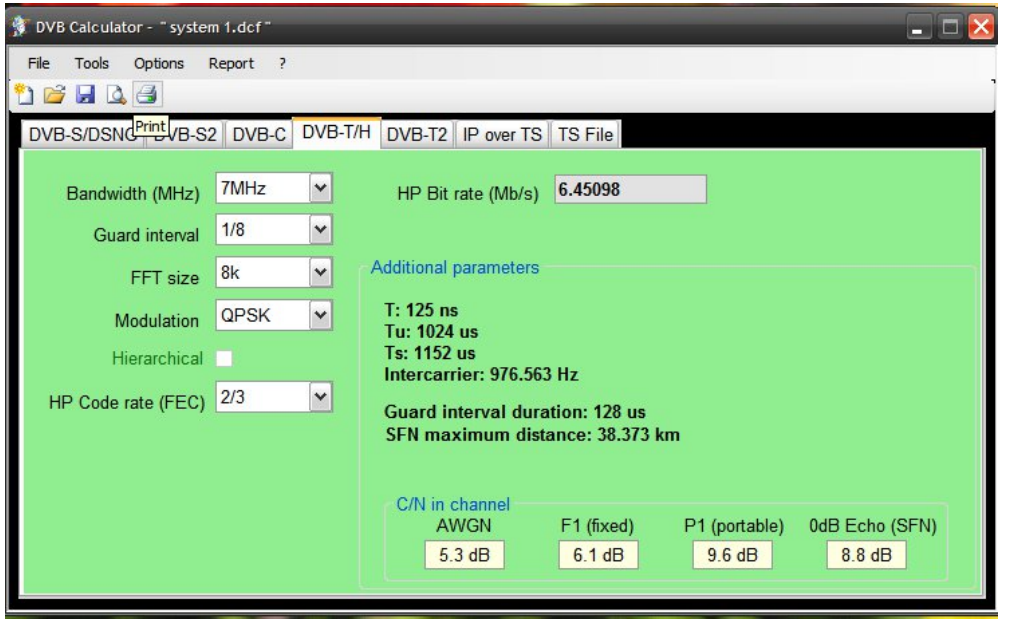
It has been some time since I last wrote as I have been busy building the DVS receiver and Ports Down transmitter more on those later. Also over the past few months we have seen many emails from people who want to get started in DATV or to build a repeater.

Having this information available via CQ-DATV is a great starting point where people can learn from the experience of others and that includes myself. I will try and give as much information as I can from our experiences here in Australia. I won't be going into the technical aspects as this has been covered by others like the technical talk articles at *http://www.datv-express.com/#Item4* and those of *http://kh6htv.com/application-notes/*.

We started to transmit digital going back to 2002 and brought some boards from SR-Systems for 23/13cm. These were the first digital transmissions here in Australia and looked very good. We just opted for 1250/1283 MHz and set the other parameters for a 10 MHz bandwidth.



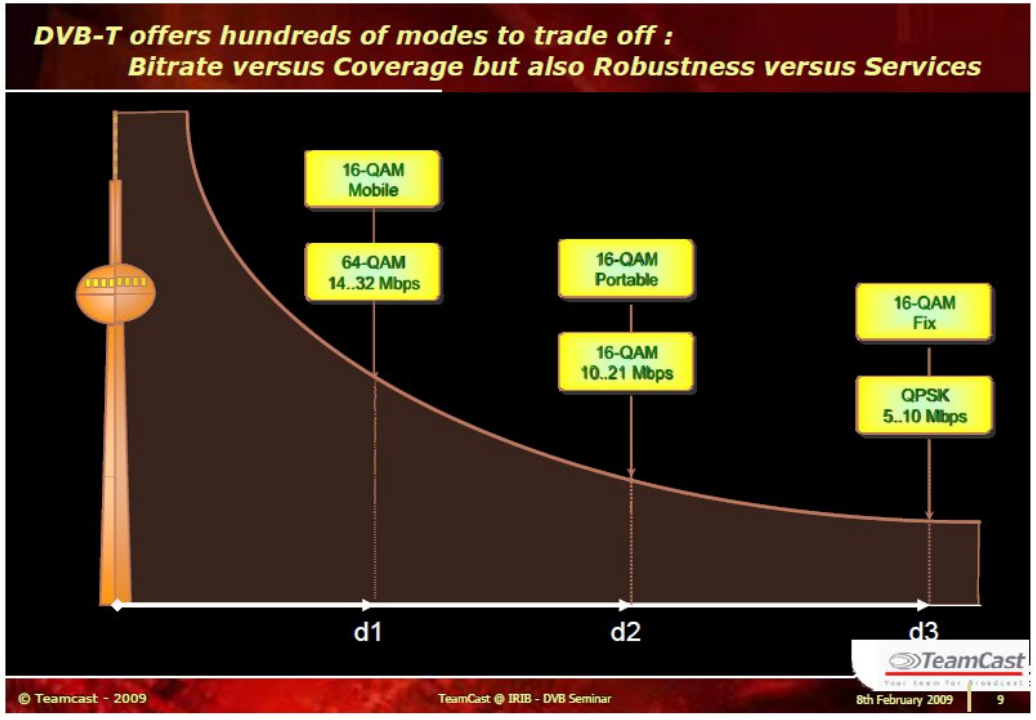
However better utilisation can be had by dividing the 23cm band into 3 sections and using a 6 MHz bandwidth (see picture). 23cm DATV using DVB-S is only used as far as I know in Australia for inputs to the repeaters. We used a Humax receiver modified with a video present indicator to trigger the repeater controller. It has been interesting while gathering information regarding DVB-S setting as used around Australia, USA, UK and Europe that a lot of different symbol rates, PID's have been used. One wonders why when most are using only one transport stream where a bandwidth of 5 MHz would do for SD.



However better receivers are now available and we have found the Strong brand to be very good. The STR 4950E *http://strong.com.au/hd-satellite-receivers/high-definition-mpeg4-dvbs-2-digital-satellite-receiver-with-record-function-via-usb* is an example that has the added advantage of a signal indicator so you only need a relay and transistor to apply an earth (our case) to the controller, also it has another advantage in that DVB-S2 can be received for those wanting to experiment further. Like using the BATC Portsdown DATV transmitter. More on that later.

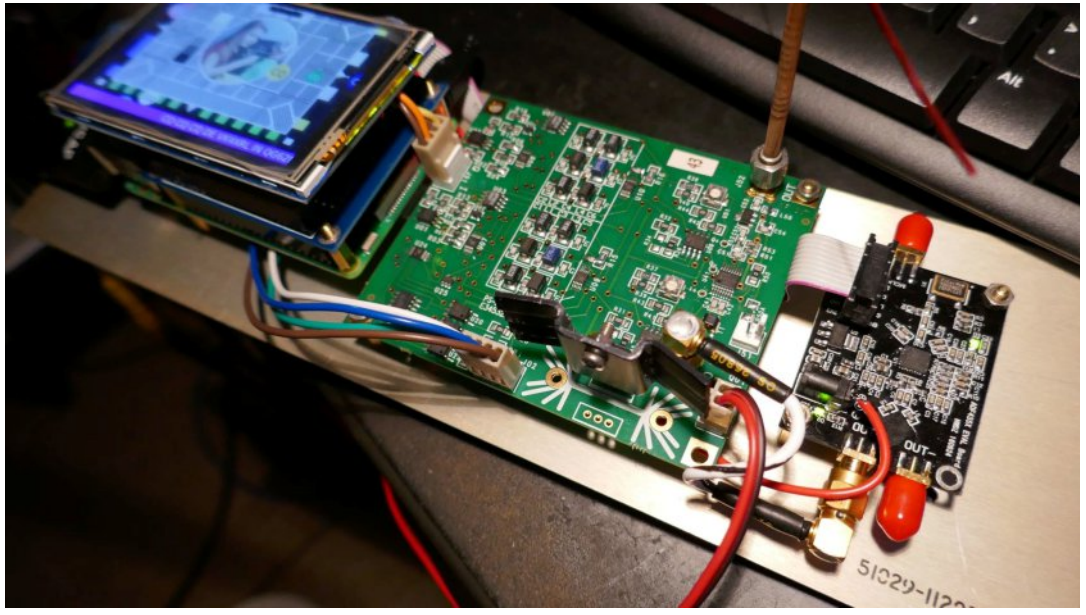
A newer receiver has come to light with the MiniTioune receiver project, developed by Jean-Pierre F6DZP, consisting of a home constructed hardware on a PCB which then interfaces via a standard USB 2.0 port to a Windows PC running the MiniTioune software. It is a good receiver but would like to see more information as to the regards of use in a repeater? And what computer interface is been used? Like what happens after a power drop out and resetting the receiver and computer?

The other down falling as I see it is no audio monitoring via bar graphs of levels from the dual channels and the setting of a reference level? On my part without the right equipment, I have used tone from our Optus satellite as a reference and adjust levels accordingly.



We have been transmitting digital for the past 6 years using DVB-T on 446.5 MHz were we decided to at a very early stage to go for the same standard as used by the FTA systems as used in this country.

The only difference was we went for QPSK which gives slightly better results and helps when running higher power amplifiers. A black chip will give you around 5 to 6 watts output (IE the 6db rule). So for my 100w power amplifier I would expect around 25 Watts output. To receive the repeater you'll need a STB or Digital Television that enables you to programme manually the required frequency. Again we have found that the Strong brand will cover our requirements and one of my choices is the STR 5432. *http://strong.com.au/set-top-boxes/hd-mpeg4-with-record-function-to-usb*. It also covers MPEG4 which is another added advantage (re use of PortsDown).



I know the problems in the UK and parts of Europe don't allow for wide bandwidths associated with DATV on 70cm so I apologise in that regard. Note that QAM 16 and QAM 64 are only needed to be used for where greater bitrates associated with multiple transport streams are required, however QPSK will allow for dual transports if and when required.

The subject of antennas for transmission will now arise and will be depended on where you situate your repeater in

relation to those going to use it. We use dual yagi antennas to cover most of the Brisbane area from our repeater situated some Km north west of the CBD area. I for one personally like the phased array which has a broader bandwith. Shown is my prototype see CQ-DATV 21.

If omi direction antennas are required then the phasing of a couple of the big wheel antennas or even the Alford slot maybe the answer.

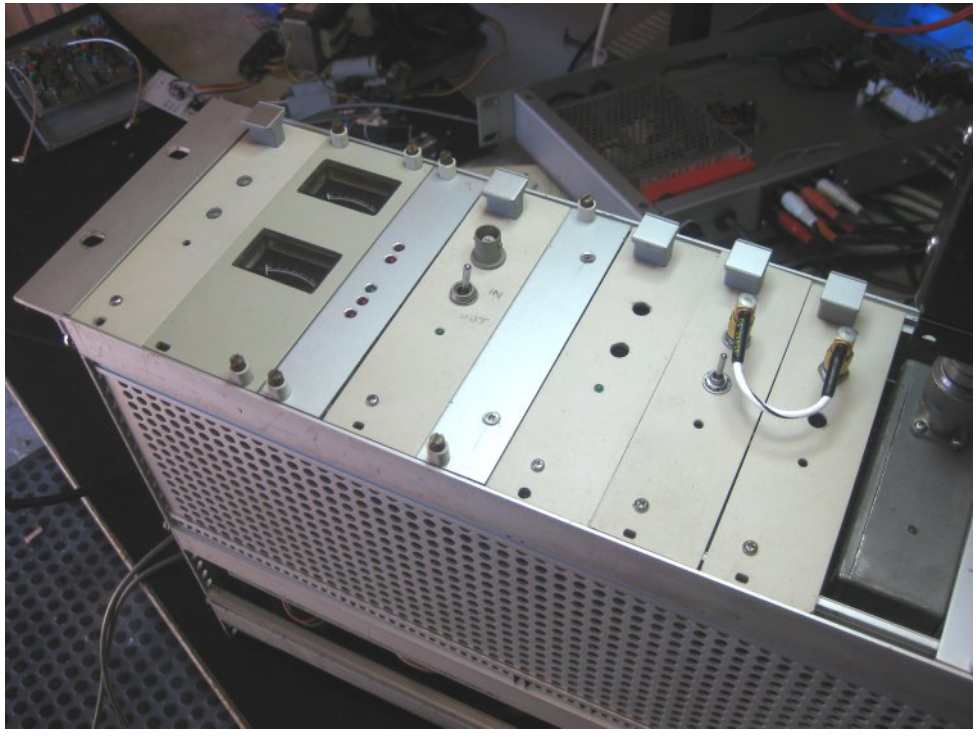
So where do you start, firstly you need to decide what digital platform you want to use. You will need to take into account what system is being used in your area to determine if DVB-T or DVB-S should be used.

My personal preference would be if it's a new repeater system would be to go with DVB-T.

The modulators are readily available for this system and there are not a lot for DVB-S, however commercial equipment is coming available from time to time that could be utilised. DVB-T digital modulators that I have used are:-

- *SR-System – check with Stefan on your requirements* *http://sr-systems.de/content.php?show=Produkte&lng=eng&style=std*
- *Clearview from Kristal* *https://www.kristalelectronics.com/digital-products/digital-modulators.html*
- *PV! – I have some problems with this unit in that it reboots on loss of signal and distortion on audio when feed from low impedance outputs from commercial SDA's.* *http://www.pvistore.com/hdmi-mod/*
- *Hide's*

http://www.hides.com.tw/index_eng.html



70 MHz IF 23cm FM Transmitter

The build of a repeater or home TX is a personal issue and will depend on individual skills. I personally like to build in module form in a rack format. I don't like to put all my eggs in one basket, however having said that there are occasions where space becomes the major consideration and a one rack repeater system excluding receivers maybe warranted.

Whatever the case I would make dual units for easy replacement as it's normally a long drive to most repeater sites. The test-cards and Idents can be happily provided for by WD media players. These units when setup properly will reset back to your setup after power glitches. Video and audio switchers can be roll your own or again commercial units as found on eBay.

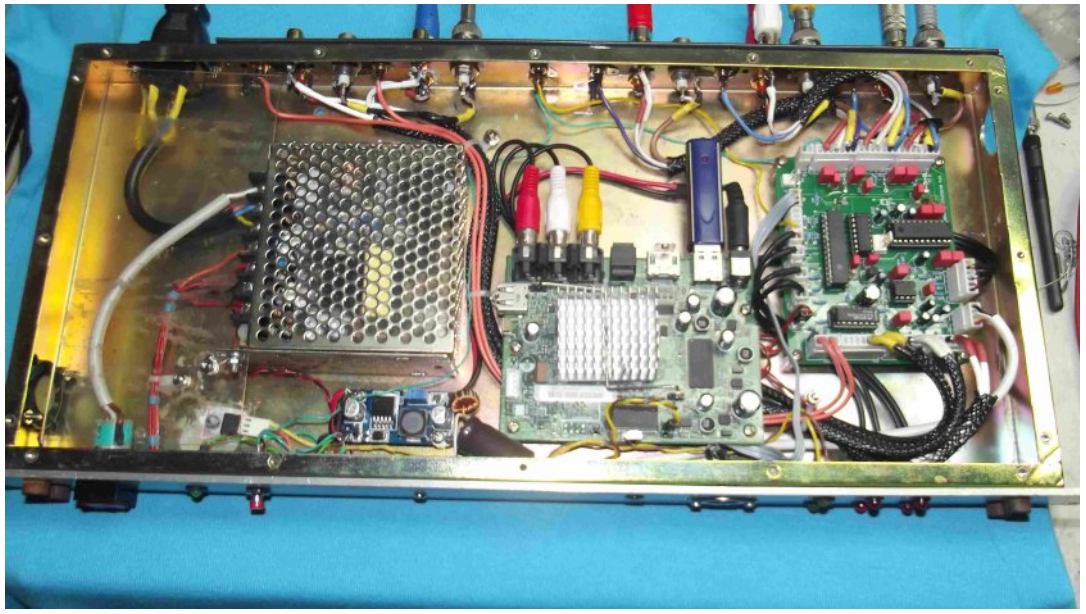
I like the idea of providing VDA's on the inputs if you have the space to do so, especially the FM receiver input as we are using only half the normal bandwidth of 18MHz and therefore the output would be around half a volt P/P so a VDA will reset that to one volt P/P.

Sometimes you may need to fit a video filter to the receivers output to reduce any indication of audio sub-carriers. This of cause depends on the FM receiver that you use. Also one thing that should be added is a way to monitor levels both audio and video, the aim should be to make the repeater as transparent as possible.

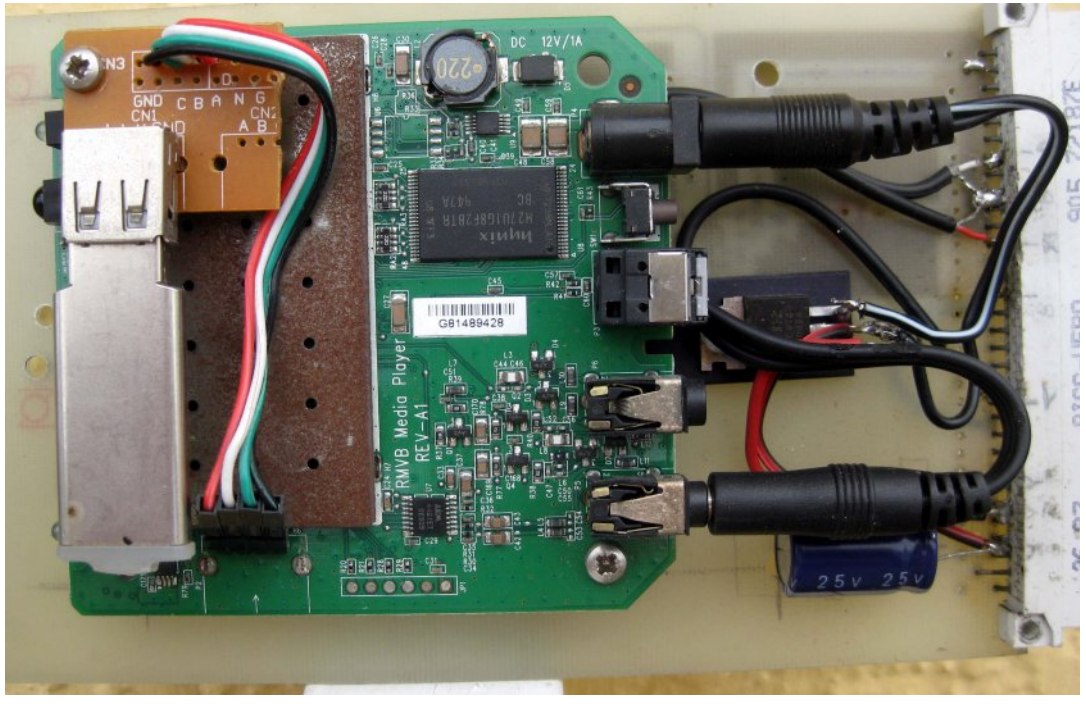
PortsDown DATV Transmitter experience

The overall project was a great idea, however it was made basically for the UK market and trying to get information wasn't initially available from Wiki.

This has improved somewhat which makes it a lot easier to follow. My interest in building it was just for a cheap DVB-S TX so that anyone could use it to go digital and as an exciter for 10Ghz.



One rack unit 4 x 1 Repeater Controller



WD Media Player wired as plug in Board

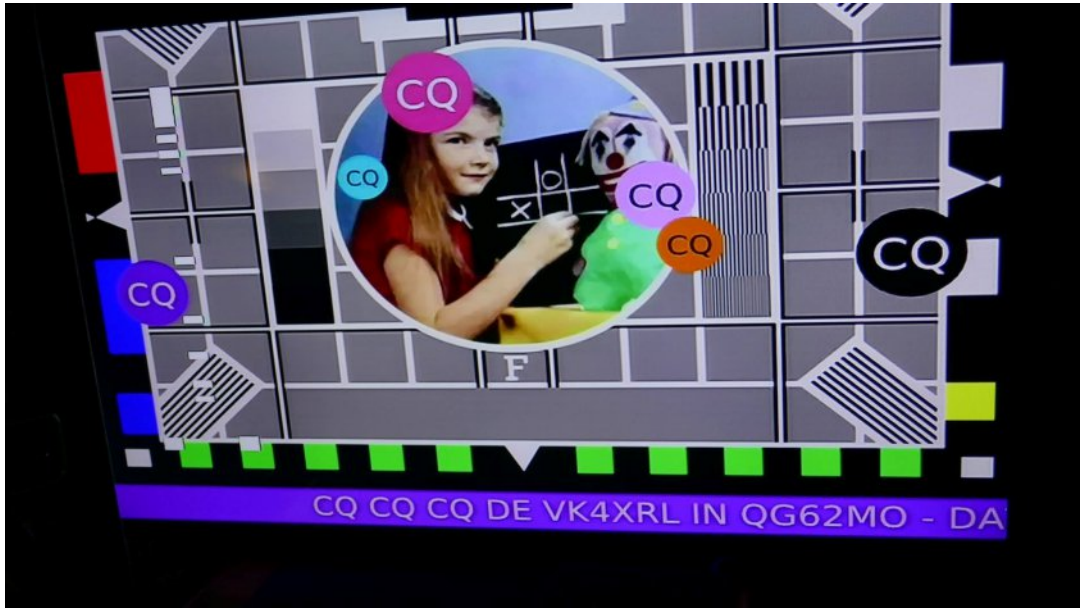
I did run into a problem where I had placed a space when resetting the frequency which stuffed the system, however Dave found the problem and re-coded the SD card.

Since then I have made a spare just in case. The biggest downfall I feel is that of the audio, as at the time of writing this no audio is available with the Easy-Cap input. Dave G8GKQ (*https://wiki.batc.tv/index.php?title=User:G8GKQ&action=edit&redlink=1*) is now working on this and other updates so you need to look here:-

https://wiki.batc.tv/Software_capabilities_and_issues.

As more people get to build and test the unit most bugs will disappear and other add-ons may surface.

Reference: *http://dvbcalculator.altervista.org/*



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

Building the Portsdown in the real world

By Bob Dyer - G1XIE

This is a summery of my personal experience with building the Portsdown digital ATV transmitter.

I would like to pass on my gratitude to everyone who designed this transmitter and let it onto the market for free. It looks like it was a LOT of work and many years of knowledge that went in to it all given away for everyone to use. This sort of selfless endeavour makes me regain faith in humanity.

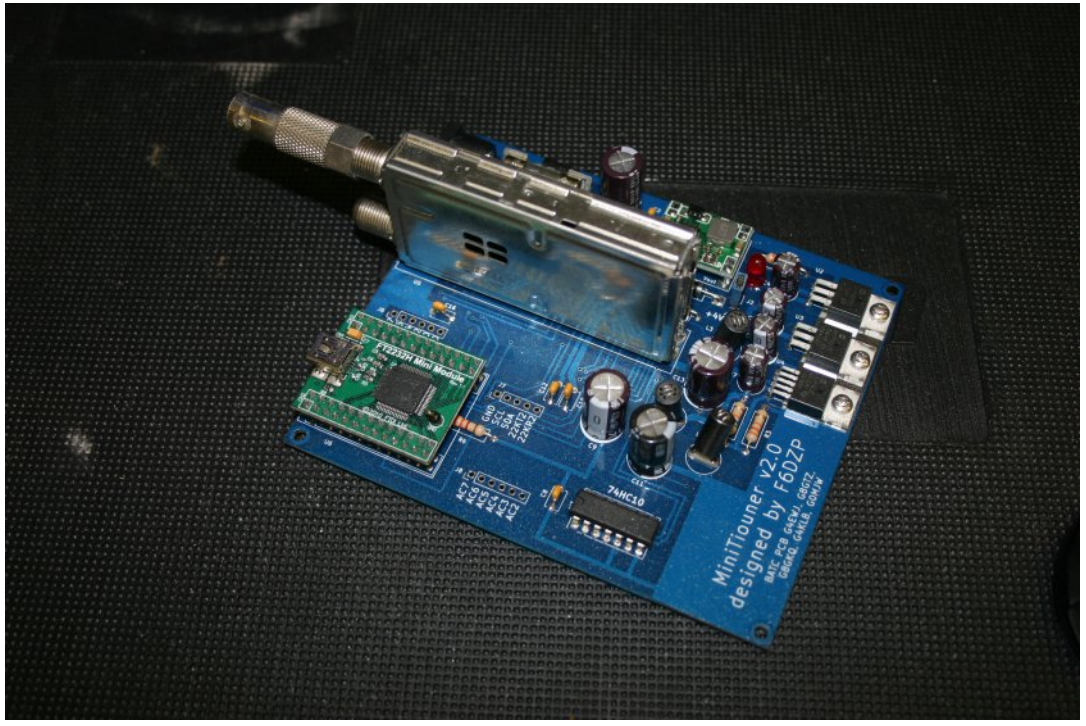
As for myself I'm a dedicated analogue man. I did try digital stuff for a while but when it progressed to 16 bits and more I stopped looking. Sadly it would seem that neither my home made Acorn atom or BBC micro were suitable for doing digital TV so I had to bite the bullet and embrace 64bit logic.

Getting given an Amazon voucher from work (they finally appreciated me!) I was wondering what to do with it when I realised that I could use it to buy a Raspberry Pi and screen so I could make an entire DATV transmitter for free! I now had all the kit I needed now so started the 'build'. It was then that I learnt I needed a memory card. No big deal, they are fairly cheep so I got one and a couple of weeks later I had a working digital transmitter!

The next 'issue' was I had nothing to receive it on. It wouldn't talk to my current digital satellite receiver. Some questions on the BATC forum later and I discovered it was only good for 'ugly' mode. Don't ask me, all I know is the name not what it really is. To receive it I'd need a special receiver like another raspberry Pi with a SDR dongle or a MiniTiouner. By chance I had an old raspberry Pi and a dongle so tried that. It did sort of work so I got the impression the TX was working but was all a bit slow and random so I spent the money and bought the bits for a MiniTiouner.

Of course, when I went to buy them the BATC were out of stock (no offence to BATC in any way, they are running hand to mouth with little if any profit so can't be expected to hold a warehouse of stock)

Eventually, with about another £35 gone from my bank account for a free project, I had a working MiniTiouner digital receiver.



The local computer recyclers happen to also host the GB3HV mast so I went to them to get a 19v PSU. They were very good and even though they weren't open when I went there, just cleaning up, the gave me an old monitor or laptop PSU for very little money. This was needed so I could connect the MiniTiouner to my LNB and test it using GB3HV.

I don't have a picture of it as I made a bit of an error in the end. Having got the system working I decided to disassemble the PSU for inserting into single unit with the MiniTiouner.

All went well until I accidentally brushed my hand on the de-cased PSU and found why it was covered in plastic, the internal metalwork was live. I decided then that it might be wise to get a replacement and leave the outer case on.

Now I have a known working Portsdown that I can use across the workshop, WooHoo. Now to talk to GB3HV! Errr… Nope.

OK, I really should do more research before beginning a project. "Every thing is in the Wiki" was something I'd heard several times. Sadly I'm a linear analogue person. I expect information to be set out like a book. An index page and a stack of consecutive pages there after. I can print it all out and read it cover to cover much like CQ-DATV. Wiki's don't seem to be like that. To my mind they are like a box of paper. You just need to know which bit of paper to search for and look at. I had no clue what I was looking for so had issues finding anything.

I'm already into this project with more time and cost that I'd planned so I bite the bullet, got to the BATC shop and order one of everything under the Portsdown heading. At least now I should be able to get something I can use properly and fully. I'll read the info for each board when it turns up and see where it is used.

Thankfully Noel, G8GTZ, who was dealing with my order could see what I'd done and removed at least one bit that I apparently had no use for and refunded the cost. So now I had all the boards and hard to get bits I could order all the other little bits.

Thankfully I had a few bits at work that nobody would miss so I started to work out what I need to buy and what I already had. The parts I could find around the lab came to a saving of around £0.75. I could go through all the parts lists, sort out the bits I already had which would take some considerable time or I could just post the parts list from the

Wiki (yes I did find that bit in there). I gave in and just ordered the pars and hoped the wife wouldn't see the additional £100+ bill on the card.

I'm in the lucky position that I work with surface mount components every day. Many of the parts on the boards are larger surface mount or even through hole so it was relatively easy for me to do the assembly.

If you've not done surface mount before DO watch the tutorial on how to solder surface mount chips (it's in the wiki :o)) or just search YouTube for tutorials on the subject. It's not too difficult when you get the hang of it. Just be sure to have plenty of solder wick and patience to hand.

When I was first shown the chap took no more than 2 seconds to solder down a 20 pin device. When I first tried it took me more like 5 minutes and plenty of de-soldering each poor attempt.

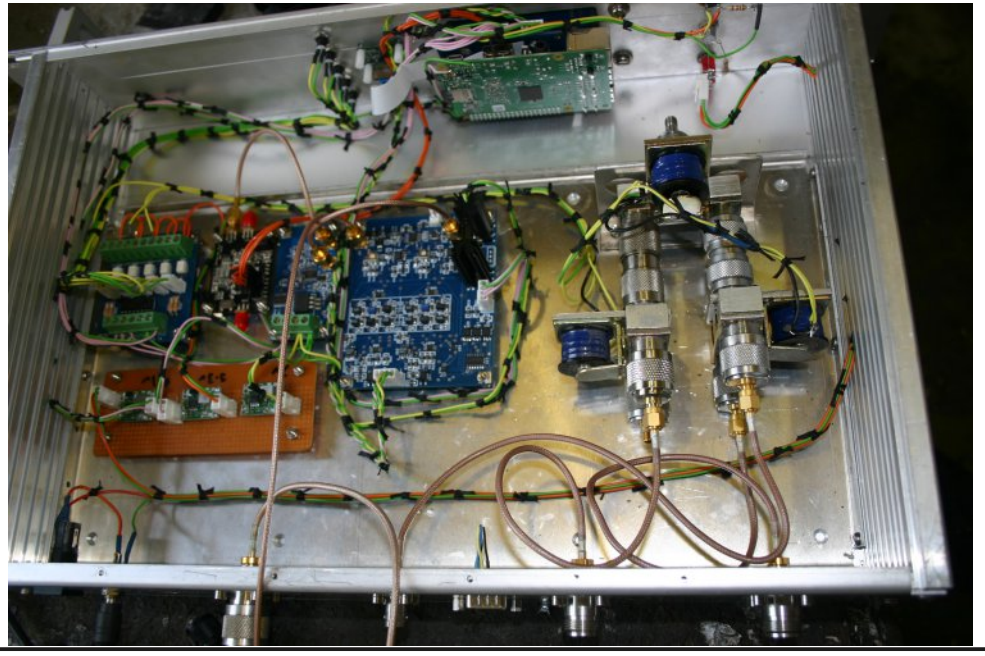
So now I have all the boards built, I've acquired a box, stripped out all the bits that were in the box (anyone want some RF down converter modules, S-band to 70cm. Custom made with no instructions) and started to bolt it all together. As I had a bunch of RF relays around I decided to use them for the RF switching. The switching and the 4 band decode aren't really needed. I'd bought and built the 4 band decode before I worked out what it does so added the relays just to be a bit posh.

For information, the Portsdown outputs at 4 different bands that you can select. The 4 band select and RF switching allows you to switch the output to different antennas. If you're agile or unlikely to change band then it's easy enough to do this manually. Just unplug one antenna and plug in a different one when you change band. No big deal really unless you get it wrong and are running high power when it could get messy.

Let's turn it on. What power do I need? Raspberry Pi 5.1v, well that's a bit tough but hey, get a nice big 5.1 PSU and I'm done, nope. Switch board, 3.3v , LO filter and modulator, around 7v, could be 12v but the linear regs might get a bit warm, relays 12v. Back to ebay and get 3 PSU's like the MiniTiouner uses for a couple of quid each. When they eventually turn up stick them on some Vero board I had and, all ready.

Test the relay switching, Hmm. It didn't work. The first relay didn't switch, check the 4 band board and the output doesn't work. Duff device from the get-go I guess, move the relay to a different output. That doesn't work either. Check the third output with a meter, seems OK, move the relay to that one. Nothing, the output is dead. Check relay, oops it has a protection diode on it and it's the wrong way around. OK, a new set of switches on order and do away with the switching for now.

So now I have a proper working transmitter that gives a very nice image on my MiniTiouner. I'm there! Errr… nope not yet.



10mW is never going to get to the repeater. OK, what RF amps do I have? -10mW in 4W out, that's not going to cut it I need to run at ½ max power at most to avoid non-linearities so 2W will not make it I'm sure and I'd be over twice the max input power.

100W amp, that will do the job well if it didn't need a 5W+ drive. My 10mw gives around ¼ output if that. It's difficult to read on a 5watt bird meter.

What the hell, try the 4Watt one as I know it pokes out some signal. Nope, can't get into the repeater. Try the 100W amp in case I was too distorted, nope not enough power. Try both together! Yea around 50W of power! I get in on 23cm at 15W so 50W at 70cm should get me there easily, nope. Repeater beeps at me but won't see any signal. Maybe too distorted, so I borrow a variable attenuator, tweak it so the 4W amp is outputting around 2w, the 100W amp now puts out about 20W so this should be good!

GB3HV says 'beep beep BEEEP' . OK, Lets see if anyone on BATC would like to buy a Portsdown. I'm obviously not able to get this working quite right. I can't justify £500 on a new amp so I guess it's time to give up after a year of building. It's Monday night and I'm off to bed.

Tuesday evening, I might as well stay up late for the weekly GB3HV natter. I'm normally in bed by 9pm which is when the natter starts. Tonight I might as well have a late night and see if anyone has any ideas.

A quick chat and Noel G8GTZ suggest I give it a go and they will see what seems to be happening. "Err, are you tx-ing Mpeg4? The repeater only takes Mpeg2?" Says Noel.

How would I know? I just built it I don't even know what the difference is. I've just set it to the test pattern.

Noel tweaks an online monitor and I see my picture at a distance for the first time ever! "yep, that's Mpeg4" say's Noel, "Lets get Dave, G8CKQ on line as he knows this stuff better than anyone".

Dave pops up, is told the problem and suggests I press the far left button as that's the only one that does Mpeg2 he says.

Within seconds I'm getting a perfect image into GB3HV with the Raspberry Pi camera.!

Finally, I'm there with a genuine working system.

Now, how do I connect a normal camera and audio? Ah, well, I just need another couple of dongles, one for video and one for audio. Back to Ebay and the BATC shop it is then.

Note, Dave is working on getting the video and audio from a single dongle as I type, 7/7/2017, so I'm going to wait a bit and see where that goes.

The morals of this tale

1. Always check how long an article is before starting to read it. If you've got this far then it's probably time for bed now.

2. RTFM before you start. It could save you more expense than you planned for and a lot of time placing multiple orders when you could have got it all at once.

3. Don't give up. I was right on the edge when it all fell into place with the kind assistance from a couple of knowledgeable people.

Gave a good Digital-ATV Presentation to JPL Ham Club in Pasadena

By Ken W6HHC and Robbie KB6CJZ

Reproduced from the Orange County Amateur Radio Club newsletter. *www.W6ZE.org*

On July 14, Robbie KB6CJZ and Ken W6HHC provided a one-hour slide show with a show-and-tell session about the current advances in Digital-ATV to the JPL ARC in Pasadena, CA. Can you imagine, these hams are all part of the "flight communications systems" section of JPL for space probes and Mars-landers, etc….so they really know communications.

So, I really had to "be on my toes" when talking about capabilities of RF communications used by DATV. For example: they completely understand that when the antenna gain gets impacted…you could narrow the RF bandwidth (slow down the data rate) to compensate for the loss of antenna gain. So, when I talked about improved DATV S/N reception using Reduced Bandwidth DATV (RB-DATV)…every head was nodding. Josh KB3UUS of JPL explained to us that some signals are as weak as around -160 dBm and JPL sometimes reduces the RF bandwidth down to 10 KHz to receive the incoming data stream from space. Josh went on to explain that the "closer" spacecraft at Mars and Jupiter are usually around -130 to -140 dBm.

They said they learned a lot about concepts of DVB-S and DVB-T protocols and the overview of DATV exciters (including the Portsdown Project) and MiniTioune analyzer and appreciated the list of URLs to get started in DATV. Hopefully, we stirred up some interest in DATV at JPL ARC. The presentation PowerPoint and PDF files are available for download at *www.W6ZE.org/DATV/*

The presentation covers DATV protocols, digital modulation technologies, current exciter equipment, MiniTiouner analyzer, and useful URLs

Robbie and I received a two-hour private tour of the Mission Control Center room and the JPL Museum which has models of all their space vehicles (some full size). Very cool…and we did not have to elbow through any overwhelming crowds of competing visitors that occurs during a JPL Open House event.

MORSE CODE LIVES ON MARS

An interesting artifact that we saw was: the tires of the Mars Rovers in the museum have an imbedded Morse-code pattern with the letters "J – P – L".

The full-size Mars Rover model exhibits Morse Code for J – P – L embedded on tires

The view from the visitors-gallery allows seeing all the displays at the Mission Control Center

The purpose of the embedded tire patterns is to allow JPL to visually inspect the tire marks in the Martian dust with the Rover cameras and look for a mal-functioning wheel…perhaps "dragging along" instead of correctly rotating.

MISSION CONTRL CENTER

The Mission Control Center at JPL allows the Center to collect data from all of their spacecraft simultaneously if required.

JPL gathers data and can send "control commands" to any of the spacecraft that are active, using radio telescopes at three locations on Earth. The clusters of radio-telescopes for the Deep Space Network are located at Goldstone, CA and Madrid, Spain and Canberra, Australia are all separated by 120 degrees of longitude so that they can be pointed to any spacecraft location at any time of the day. A NASA web URL to show the current activities of these radio telescopes can be found at: *https://eyes.nasa.gov/dsn/dsn.html*

Contact Info

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MP3 Sound Module Review & Application Notes

By Mike Stevens G7GTN

I was looking at simple options to allow adding either speech or simple sound clips to an ATV project and thought the £1.82 module I choose might be of some interest to others.

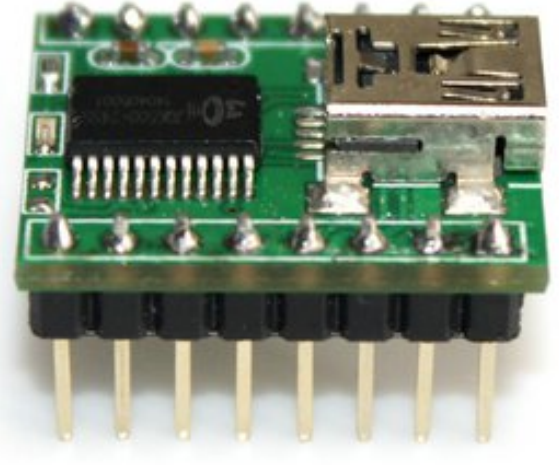
I guess many of us have seen the types where your clip to be played is stored on an SD memory card or indeed the types that flash memory is programmed using a dedicated external USB hardware device. The specific one I choose is different in that the module is connected by Micro USB to your Windows PC and a built in application then launches to allow you to upload your required sound clips. These are saved in the on-board flash memory with playback options being accessed via 9600 baud serial commands.

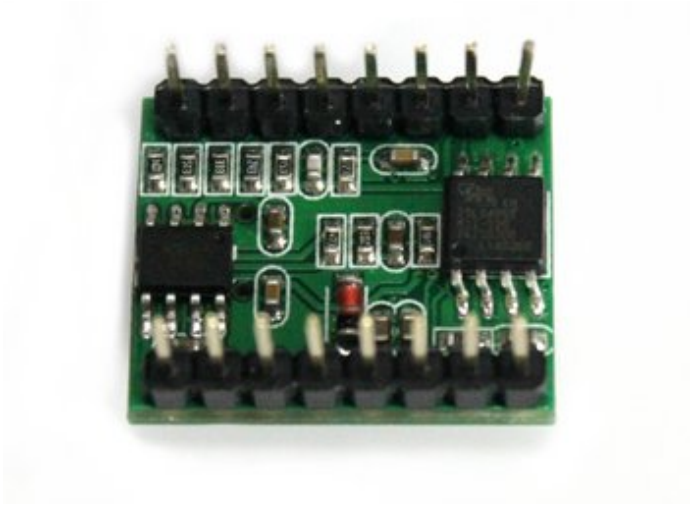
Module Hardware

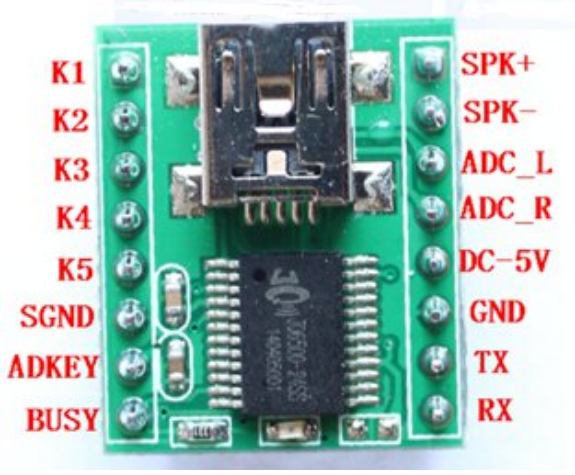
The module measures just 20mm X 17mm and is self-contained requiring just a +5V supply and a means of triggering the file to be played back (more on this later). Connections are made via male pin headers enabling this to fit very nicely on some stripboard. The heart of this module is the JQ6500 MP3 decoder chip alongside an SPI Flash memory (16Mbit Capacity) to store the actual clips to be played. The output is either an 8Ω speaker or via a pair of DAC pins for driving an external amplifier of your own choice. Power supply requirements are from 3.5V up to a maximum allowed voltage of 5V. A caution on the modules RX pin not being 5V tolerant and hence requiring a 1K series resistor if you wish to drive this from standard 5V micro controllers directly. Any 3V3 TTL logic level processor devices are totally safe and hence do not require the use of this additional protection resistor.

JQ6500 Module Basic Specifications

Support all the bit rate 11172-3 and ISO13813-3 layer3 audio decoding
Sampling rate support (KHZ) : 8/11.025/12/16/22.05/24/32/44.1/48
Support Normal、Jazz、Classic、Pop、Rock sound effect
16M device, UART interface, standard serial, TTL level
Input voltage: 3.2 - 5V
Rated current: 20MA
DIP16 packaging
Working temperature: -40~70°C
Humidity: 5%~95%

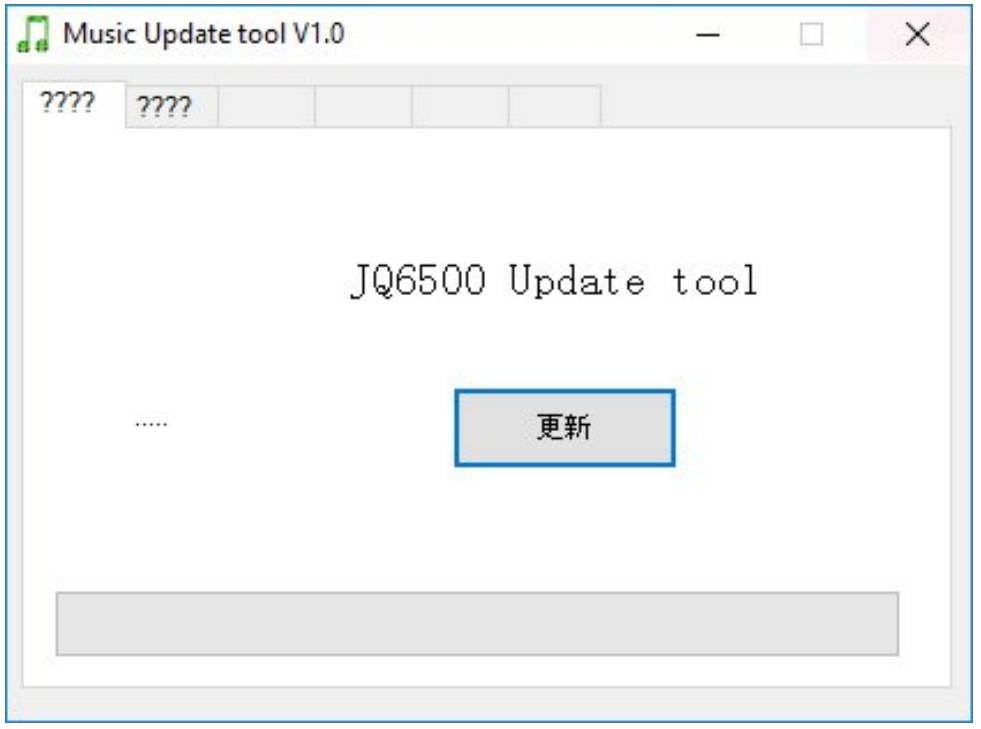


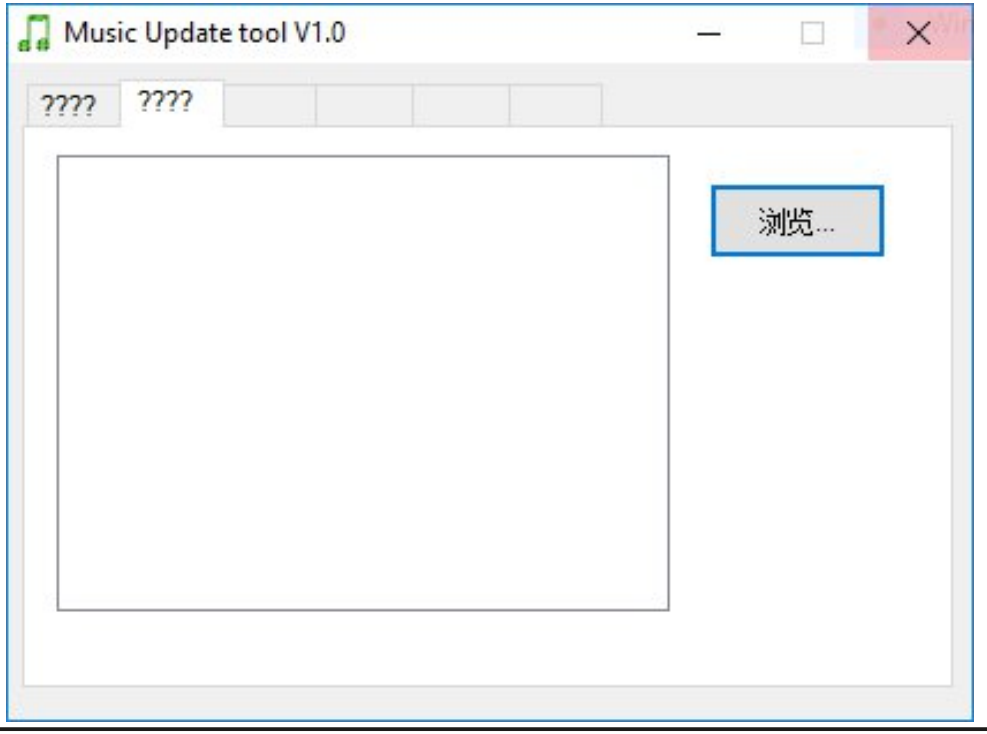




Uploading your own audio clips

To prepare the module with your required clips, once plugged in to your USB socket the device enumerates as a CD device. Once clicked you will be able to double click on the up-loader executable file to launch the software to allow uploading your required clips to the 16Mbit flash memory device. As depicted the software screens are all displayed in Chinese but selecting the second tab allows file uploads to be made. You can select multiple files or add them individually one at a time.





Control Methods

The playback and certain other limited functions of the module can be controlled via standard pushbuttons connected between pins K1 & K5 with the other end going to ground. This provides a somewhat limited control mechanism and we would probably prefer a more software controlled method using the RX and optionally the TX pin to communicate directly under our own control.

Ardunio Test Code

The commands are sent as a series of 3 hexadecimal bytes the most useful are summarised for reference in Table 1 an already written library makes control far easier as we can then just call functions where required in our own code. One such library is written by James Sleeman and can be downloaded from
https://github.com/sleemanj/JQ6500_Serial

Once installed in the IDE we are ready to do some quick tests with audio playback. A zip file called MP3TEST is available that contains the very simplest test code along with two MP3 Audio test tones of 1KHz and 440KHz. The IDE serial monitor is used to select which clip to play from a small displayed menu. The library talks to the MP3 module at 9600 baud-rate using software serial. The RX pin on the Ardunio remained unconnected as I was not interested in any status information coming back since this was only a quick test setup. However there are some commands that might prove of value for polling the module in your own custom applications.

ESP8266 Test Code

With our ESP8266 micro modules we can now also dispense with the serial resistor on the RX Pin since the logic levels are all driven at 3V3. Since we have the capacity to create web interfaces a simple page was implemented.

For this you need to enter your routers SSID & also Password in the top section of code, once uploaded your module will be at the IP address that you have specified. In your standard web browser enter this address pre-fixed by the normal HTTP header string to access the web control page.

Serial commands – Hexadecimal Format

As depicted in Table 1 (not all shown), the commands are sent as a series of hexadecimal control bytes.

Table 1 - JQ6500 Basic Command Summary

0x0D – Play, No Arguments
0x0E – Pause, No Arguments
0x01 – Next, No Arguments
0x02 – Prev, No Arguments
0x03 – Play file by index number, 2 Arguments. The index number being the index in the upload order.
0x04 – Vol Up, No Arguments
0x05 – Vol Dn, No Arguments
0x06 – Set Volume, 1 Argument. Argument 1 = byte value from 0 to 30
0x07 – Equalizer Mode, 1 Argument. Argument 1 = byte value 1/2/3/4/5 for Pop/Rock/Jazz/Classic/Bass
0x11 – Set Loop Mode, 1 Argument. Argument 1 = byte value 0/1/2/3/4 for All/Folder/One/Ram/One_Stop
0x09 – Set the source, 1 Argument. Argument 1 = 0x04 for flash memory.
0x0A – Sleep mode, No Arguments.
0x0C – Reset, No Arguments.

So we can quickly see that it is far easier for us to use more English like function names that the downloadable library provides us with such as :- mp3.setVolume(30)

Conclusion

If you require a simple and ultimately cheap investment for any sound playback solution this might be worth further exploring. Some project ideas could include Morse or even speech playback on your ATV Repeater system, or for home use TV Test tone generators – other applications are over to you.

A Simple Home Constructed Weather Station

By John Hudson - G3RFL

Until recently I was the proud owner of a simple electronic home weather station, that I admit was an impulse buy from Maplins, the home electronic store. I was rather attached to it and a little sad when it stopped working. Fortunately a visit to the store and some helpful advice from the manager, "bring it in doors when we have bad weather", I can now see how he got to be the manager.

OK time to put my engineering hat on and see what can be done about a weather station that can actually survive the weather that it indicates. The first thing was to research the outside parts and I was pleasantly surprised at the cost of the required sensors.

The N25 FR rainfall indicator for less than £5

This is a standalone rain gauge. Rain collects in a self-tipping tray that empties when it fills with 0.01 inch of water. Each time it empties, a sensor sends a signal to your motherboard, so if it tips 100 times, it's measured an inch of rain. The measured rainwater drains out of the bottom of the gauge and falls to the ground.

Bolt it to the pole opposite the housing and with an unobstructed view of the sky. Debris can catch loosely swinging wires and tear them down in bad weather. So run the cable along the rain gauge mount, along the opposite housing mount, into the housing, and all the way to the motherboard.

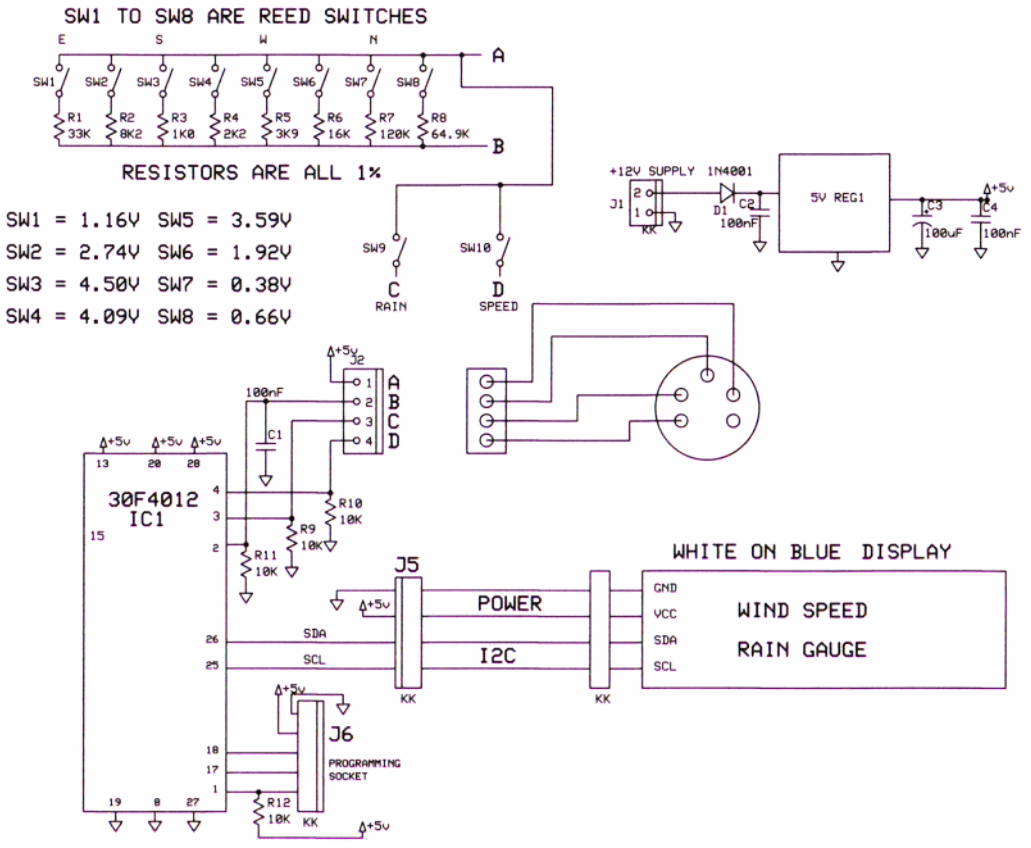
Wind Direction Sensor N96FY/N96GY for less than £10

This works by rotating a magnet over a circle of eight read switches. One or at best two can be made at once depending on the position of the magnet. The switches control a resistor ladder that creates an analogue voltage dependent on wind direction.

Anemometer for N25FR £2.49

There are three types of anemometer worth buying: three-cup, propeller, and sonic. Wind spins the cups or propeller to measure wind speed. The propeller anemometer is usually more precise than the cup anemometer. Sonic types are less likely to break or freeze because they have no moving parts, but most cost more.

Not the most difficult task to deploy this kit up the mast and deploy the cables back into the nice warm shack and think about how to interface them to a display screen.



The circuit diagram

SW1 to SW8 are located in the weather vane head and provide the wind direction. They are simple reed switches and are used to change the value of resistors in the top of a potential divider ladder network.

That together with R11 change the potential on the analogue input (pin2) of IC1, so a voltage proportional to the wind direction is delivered to pin 2, the analogue input of IC1. The software takes multiple samples and averages them out as the wind vane does tend to bob about.

SW9 is the micro switch in the rain detector head and every time the tray fills beyond its tipping point, the switch closes and the tray empties. This delivers pulses to the port pin 3 on ICI. The more frequent the pulses the heavier the rain fall. If you want to log monthly rainfall you can count the pulses over a 4 week period. The rocker had to have its reed switch placed on the other side of the PCB so it gave a pulse each time it rocked. In snow conditions this stops working, frozen up, but at least we know it's not raining!

SW10 is actually two switches in the anemometer head. These deliver pulses every time the wind cups revolve, so again the more frequent the pulses, the faster the wind is blowing.

IC1 is programmed to decode all this information and the code is on the *CQ-DATV website*. IC1 interprets all the data and communicates it via the I2C bus to the LCD readout. Simple really, all the sensitive stuff is indoors and the clever stuff is all done by software.

The business end of my weather station, indoors and out of the way of any weather problems

GB3FT - A 24cm Digital ATV Repeater for the Fylde Coast

By Tim Forrester - G4WIM

Background history

I've had an interest in ATV since the late 60's when a local amateur (Brian Seedle G3UIT) showed me his entirely home brew station for 70cm – he even built his own solid state camera (except for the vidicon tube), quite an achievement.

I was originally licensed as G8GIW in 1972 but it wasn't until the late 80's that my interest in ATV was rekindled. Ultimately resulting in the building of GB3MV during the early 90's. I understand it is still in operation in the Northampton area and using the original Sinclair Spectrum caption generator.

ATV has moved on in leaps and bounds since those early analogue days and now due to the availability of digital hardware and the efforts of the BATC group as a whole it is much easier to assemble a working ATV station.

The following pages offer a brief summary of the technical side of GB3FT and future plans.

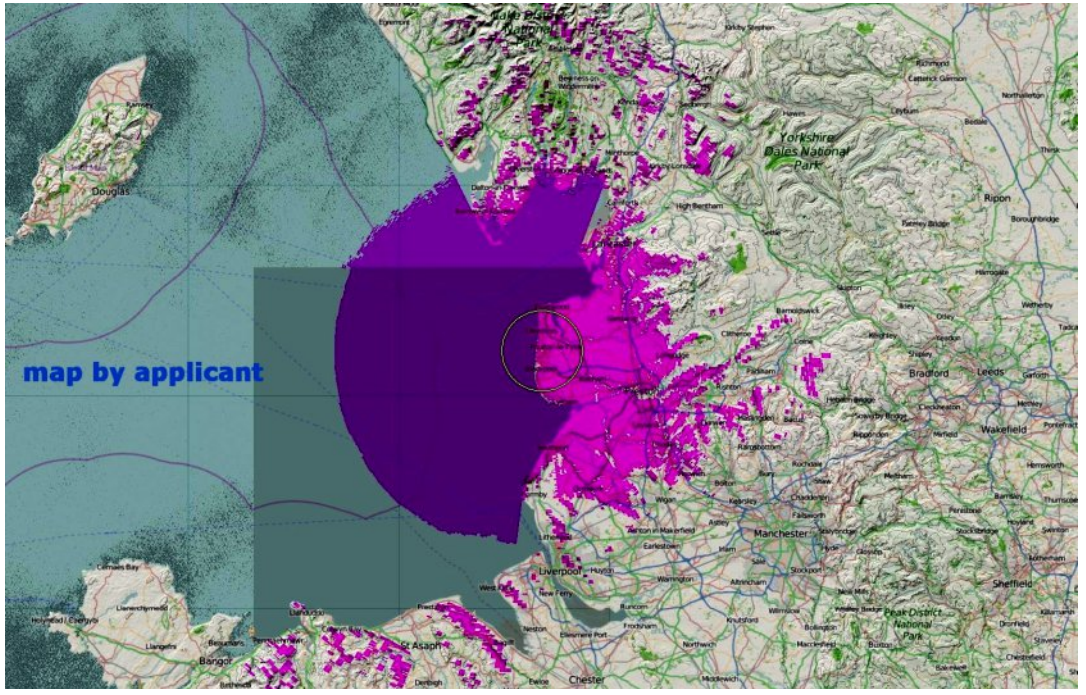
GB3FT Status and Coverage

The license approval for GB3FT is pending with no indication as to when it might be approved, however the hardware for GB3FT is being tested under clause 10 personal beacon at the location of G3WGU.

Steve G3WGU has kindly agreed to be repeater keeper and to have GB3FT installed at his QTH which happens to be one of the highest points on the relatively flat Fylde coast.

The repeater is located in his attic with a very short run of low loss coax to the chimney mounted Alford slot.
For license reasons, Steve has final manual override on transmitter operation.

Initial tests indicate coverage is very similar to that predicted, see coverage map below.



GB3FT Hardware

The front panel has various controls and indicators to aid operation and maintenance.

Given it's eventual location, keeping the PA cool is essential hence the over size heat sink and fan. The heat-sink is 300mm x 300mm x 35mm.

The following paragraphs go into some detail as to how the repeater was built. On page 40 is a simplified block diagram.

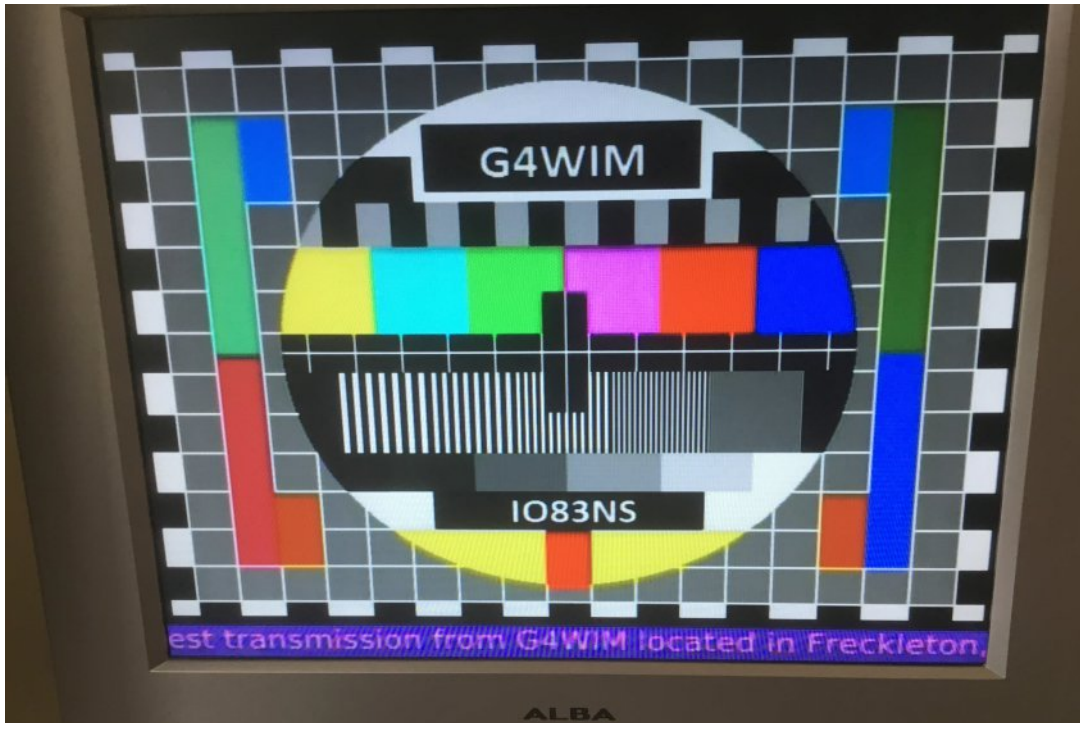
Left: The GB3FT transmitter sat on top of its receiver and command section

Below left: Another view from the top showing heat sink and cooling fan for the power amplifier.

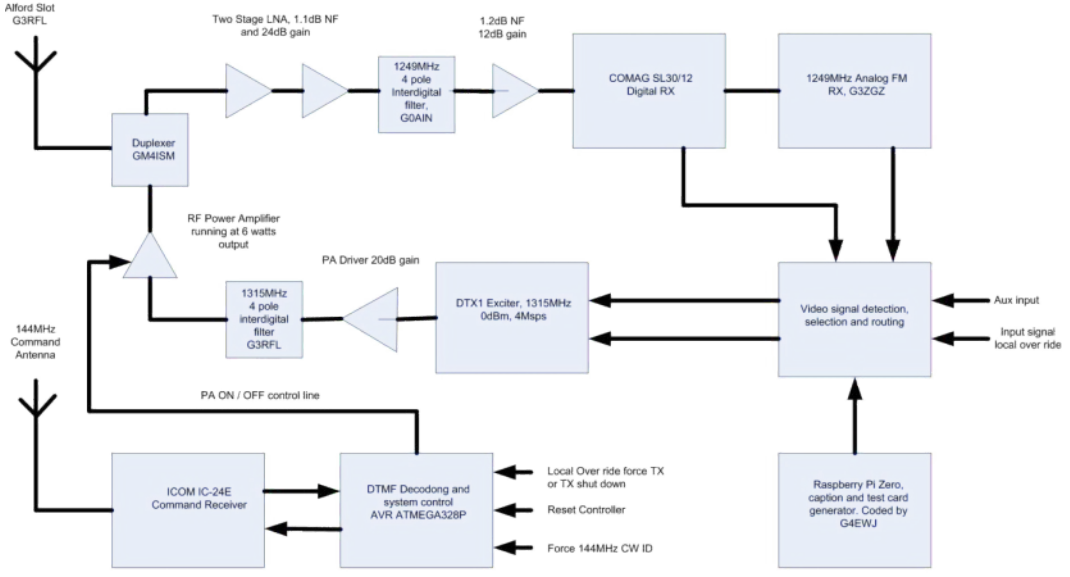
Below: Rear View – showing connections for the command receiver

The hardware is relatively straight forward with contributions from a number of local (and not so local) amateurs, as per the block diagram.

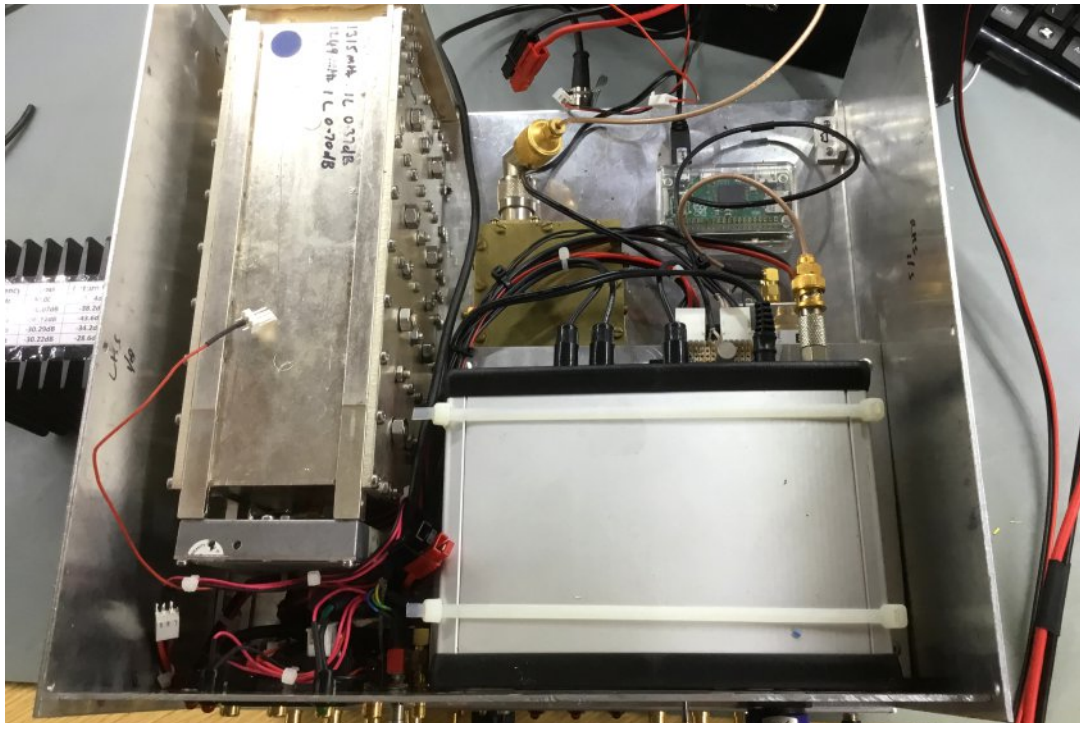
There is also a command receiver listening on 144.750MHz. See the GB3FT *qrz.com* page as to how this is used (enter GB3FT in the callsign search box).



GB3FT in operation showing my callsign signal being relayed



GB3FT Block Diagram



Transmitter Section

Above is a picture of the transmit section with the PA and heat sink removed.

It shows the internals of the transmitter. Lower right is the DTX1 with the 1315MHz filter just showing above it and the Raspberry Pi Zero next to it for test card generation.

The duplexer is on the left – it has an insertion loss of 0.37dB at 1315MHz and and 0.7dB at 1249MHz. Thanks Mark GM4ISM for providing this key item free of charge.

The transmitter runs at 5 watts output after duplexer loss and has a reasonably clean spectrum as show in the pic on the next page.

Receiver and Command Section

The picture (right) shows the internals of the receiver die cast box.

There is the PCB from a Comag SL30/12 digital rx on the right and analogue receiver from G3ZGZ on the left. In the middle is a small veroboard circuit containing the lock detection circuits and signal routing.

The 4 pole inter-digital filter and signal amplifier are attached to the lid of the box.

The signal from the LNA connects to the inter-digital filter at top right.

The rotary switch at bottom middle selects system off, automatic relay, force digital mode, force analogue mode or force auxiliary input. Normally it would be left in automatic relay mode.

A tight squeeze but everything fits – just!

The digital receiver produces a D5 picture down to -102dBm, whereas the analogue is a P3 at -100dBm.

These figures could be improved a little bit as could the antenna gain by moving from an Alford slot to a slotted wave guide – something to be considered for the future.

There is no detectable receiver de-sense when the transmitter is in operation.

Conclusion

The hope is that GB3FT will foster more ATV activity generally on Fylde coast and surrounding areas and ultimately provide a link to / from GB3FY which is on 10GHz but whose signal is blocked to the South by the higher ground where GB3FT will be located.

There is also a plan to stream GB3FT into the BATC website.

All we need now is formal license approval – but in the meantime clause 10 is a good second.

DATV-Express Project - June update report

By Ken W6HHC

Charles G4GUO has alpha-released v1.25 of the DATV-Express-for-Windows code. This new version cleans up a few problems:

- *Should work with non English versions of Windows (such as Japan, etc). This mainly applies to users of languages other than English and French. This change should now allow you to select video capture formats.*
- *Not all possible FEC rates are permitted for each type of modulation. The GUI had been trying to set illegal values (or no values at all).*

G4GUO has not tested this software so is looking for BETA testers to do some testing. When the Project Team gets some feedback from BETA testers we will THEN put the new v1.25 code on the normal *http://www.DATV-Express.com* DOWNLOADS page. In the meantime you can download the alpha code from:

https://www.dropbox.com/s/hjsbblik5gpgjhz/setup_datv_express_transmitter1.25.zip?dl=0

Finally, the NOTES file (aka README) for v1.25 is available on the normal *http://www.DATV-Express.com* DOWNLOADS page.

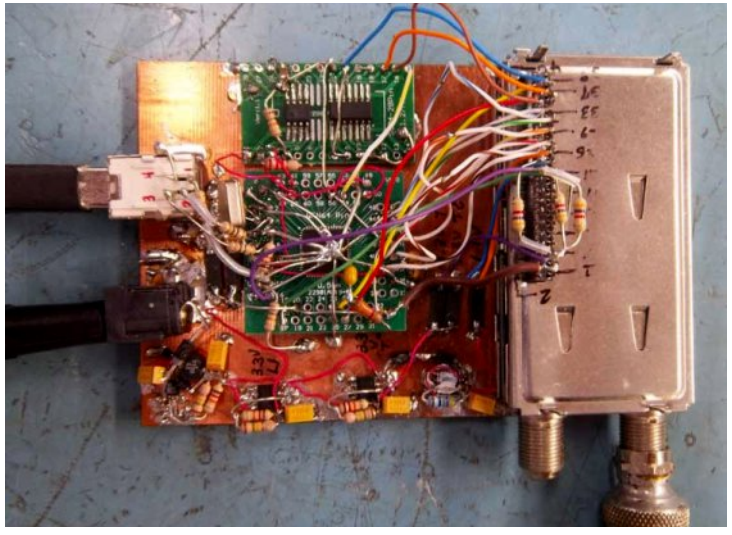
It is delightful to see "jiang wei aka @ jocover" start working with the DATV-Express-for-Windows software code and begin porting it to the LimeSDR hardware board. In June, Charles G4GUO had released the source code for the project Windows App on github at:

https://github.com/G4GUO/DatvExpressTransmitter

Charles has dubbed this DATV-Express and Lime Windows app as "LimeExpress". This software for the LimeSDR is early in the porting effort and only works currently in the DVB-S2 protocol. G4GUO explains that the good news is that jiang wei has created a framework in his LimeSDR software efforts to allow others to start filling in the missing functions code. You can learn more and download the LimeExpress code .exe at: *https://discourse.myriadrf.org/t/windows-based-dvb-s-s2-t-transmitter-for-limesdr/1348*

Even more good news is that Evariste F5OEO has started to look at the LimeExpress code and has made a few tweaks to the code for the LimeSDR hardware board. This software is unsupported by the DATV-Express team, but it was very nice to see other people taking an interest in the project.

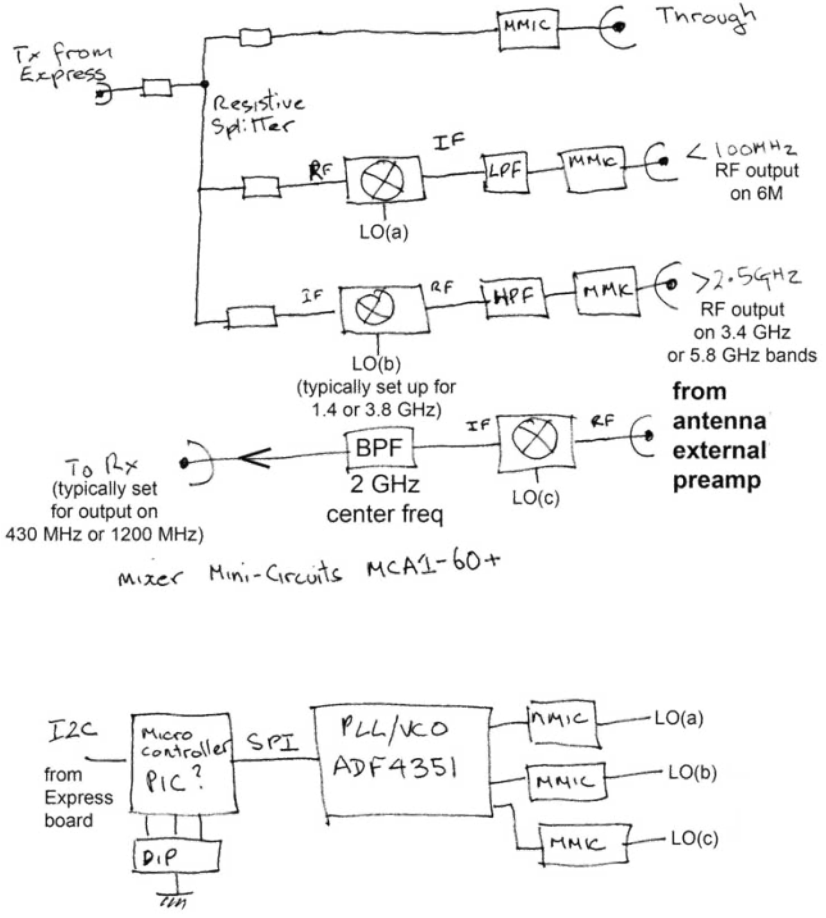
Art WA8RMC has been hacking away at cheaper/smaller version of the MiniTioune hardware board. Ken W6HHC calls this (with tongue-in-cheek) a "cheap American knockoff" of the current European MiniTiouner Serit-tuner board. Art has estimated that he can assemble-test-and-sell this design for less than US$100.



Only a "hardware hacker" could call this prototype beautiful...but, it WORKS!

Art also reports good inventory on the DATV-Express boards.

Charles G4GUO has been day-dreaming about a mini-project to extend the frequency range of the basic DATV-Express hardware. Currently this concept board (tentatively called the "Express-frequency-extender") would attach to the RF output of the DATV-Express to transmit on 50 MHz, 3.4 GHz, and 5.8 GHz ham bands. The concept would also provide a receiver frequency converter to take the output of your 3.4 GHz or 5.8 GHz antenna external preamp and down-convert to perhaps a 430 MHz or 1200 GHz receiver.



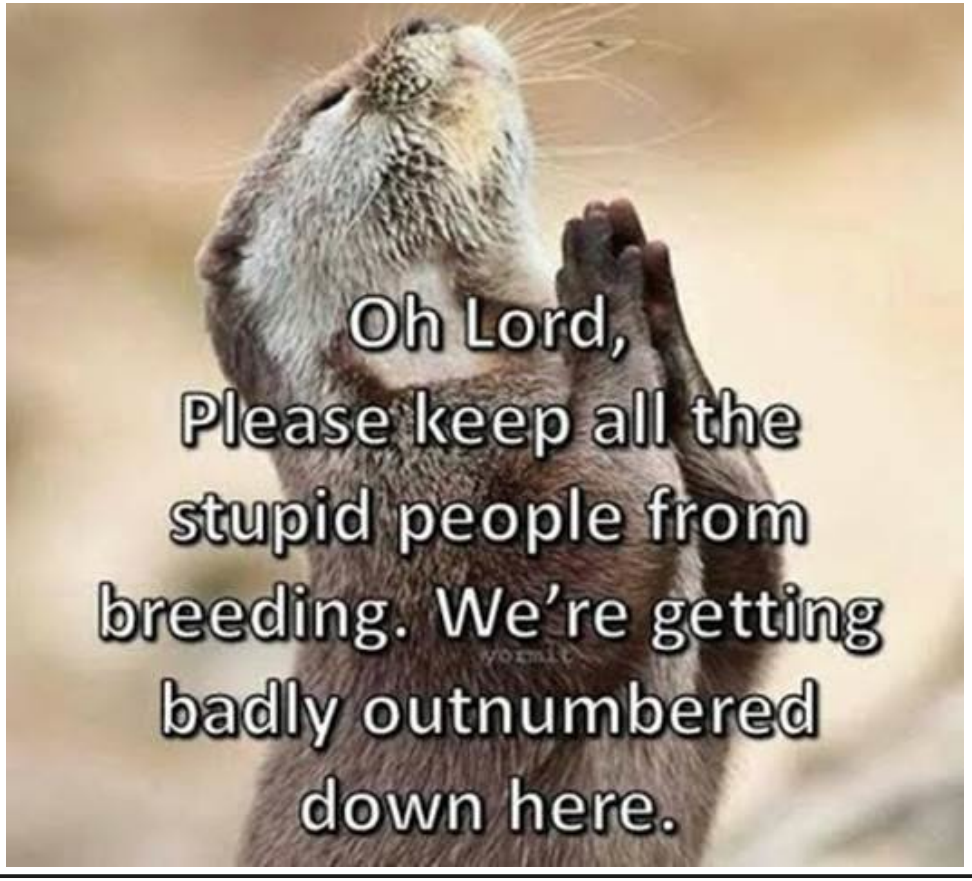
DATV-Express frequency-extender board (draft02)

The only real problem is determining if "there are enough interested hams to make this project worthwhile?" Please provide some feedback (via this forum or by e-mail) to Charles if you would be interested in this frequency-extender accessory for the DATV-Express board?

Future DATV-Express Project Reports are still expected to be quite short for the rest of 2017.

"Project speed set to back-burner" .... de Ken W6HHC

Left: A classic "back of envelope" sketch of possible Express-frequency-extender concept board Block Diagram



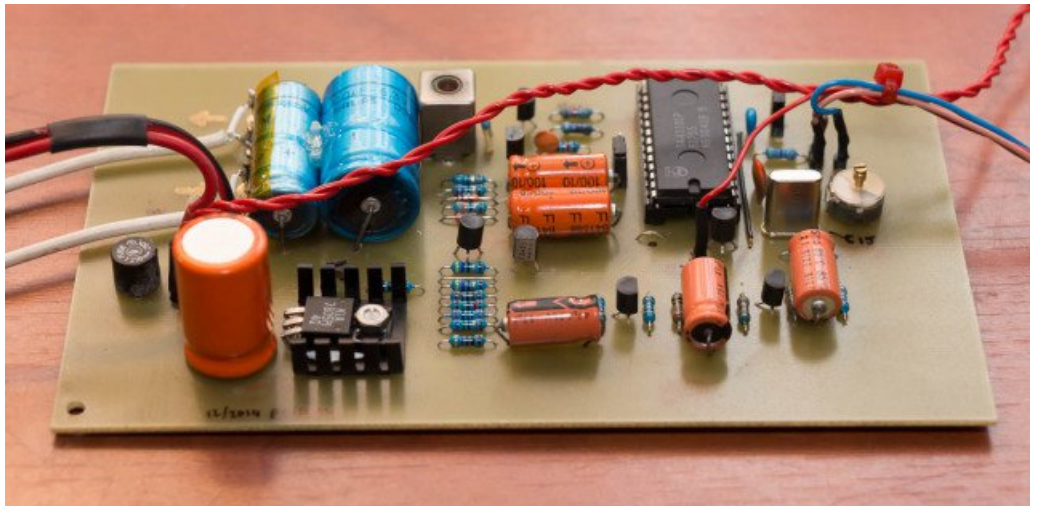
The popular Video sync generator; The new 'Syncsmurf'!

By David PE1MUD and Tjalling PE1RQM
Article updated: May 2, 2017
(*https://www.pe1rqm.nl/syncsmurf2/*)

Introduction

Since the end of 2011, a particular circuit has been very popular among Amateur Television (ATV) amateurs: the "video sync generator" designed by Hans PA0JBB, or the "video squelch killer" or the "video enhancer" etc. The circuit has in the Popularly quite a few names were received.

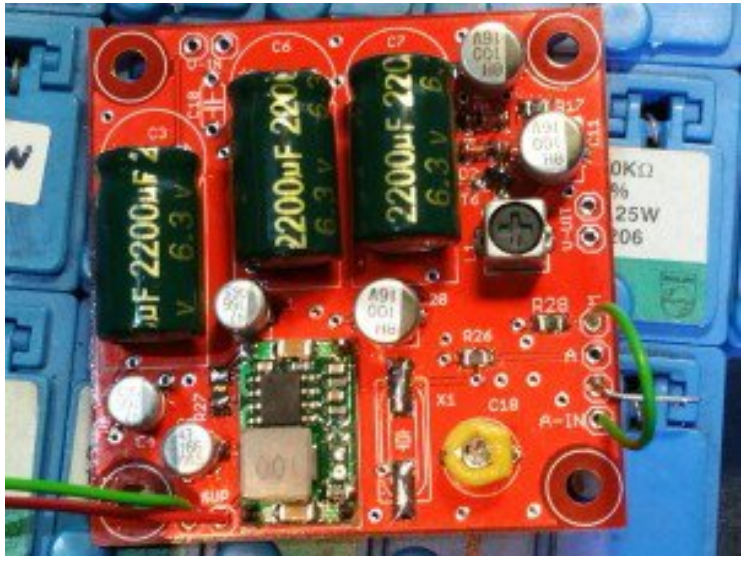
This was a circuit designed to bypass the annoying 'no-signal' notification and noise suppression on LCD monitors. Because for ATV amateurs it is especially important to be able to look deep into the noise even with weak signals. Old-fashioned CRT monitors (display tubes) do not suffer from this. But a particularly pleasant occurrence is also that the image of weak signals is more stable with the combination of Video sync generator and CRT monitor.



Video Sync Generator Version 1

So for those users, the circuit is useful (hence the name "video enhancer").

We are now almost 5 years old and the original design has undergone a lot of modifications. This became a nice collaboration between a number of people, including myself. They were extensively described on this page of this site.



Syncsmurf 1.0

SMD versions also appeared last year. David PE1MUD has also been busy with it and called his version the 'Syncsmurf 1.0'. This first version was not only smaller, but already had all available modifications on board and had a more efficient voltage regulator. The power consumption decreased from about 90mA (at 12V) to 50mA (at 7 to 15V) using a switched-mode voltage regulator. This was relevant for portable ATV use (batteries).

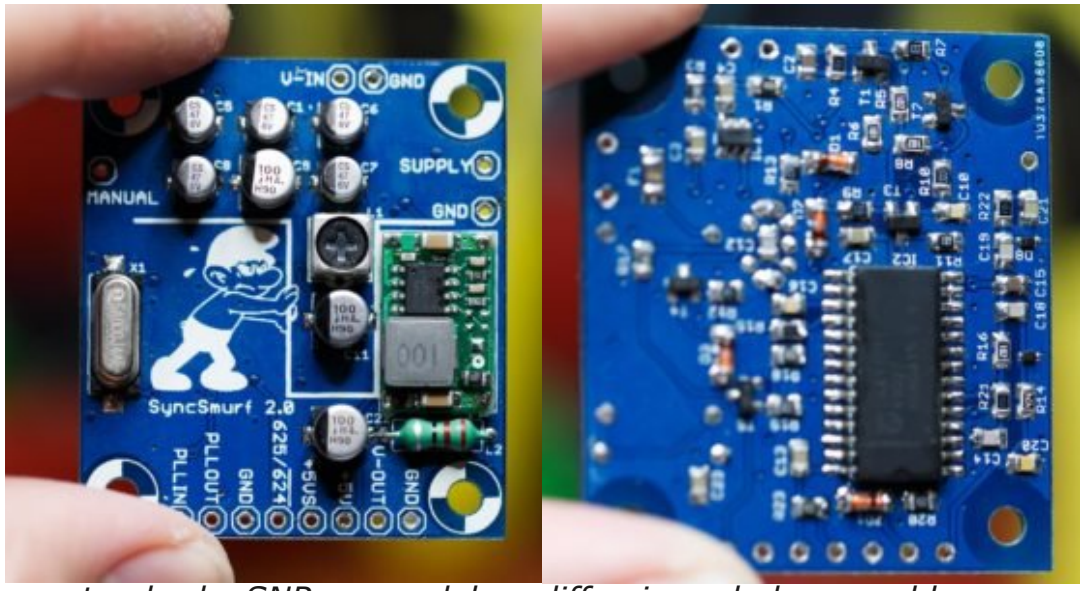
David and I have tested a lot and exchanged ideas. David is good at designing small electronics, so version 1 of the Syncsmurf had to be better! There was still something to be found on version 1. Something Hans PA0JBB himself had already described in his original article. We found the video amplifier "just good enough for normal use" (read: could be better), the thick electrics for the AC coupling were annoying, which also caused a slow start of the circuit. The control range of the 5MHz VCO for the PLL in the SAA1101 sync generator (to synchronize with the incoming video) was too limited. This could not cover all the different video equipment used by our amateurs. Therefore, it could happen that the video was still moving.

In September 2016, version 2 of Davids PE1MUD's SMD version was announced; Syncsmurf 2.0! And he is also offered for sale (on reservation). See bottom of this page.

Syncsmurf2

The Syncsmurf2 has been improved on many points:

- *PCB is even smaller than Syncsmurf 1.0, namely 41 x 46mm. This is even less than 1/8 of the original though-hole euro card version! And the circuit is also smaller platter by smaller elco's. The circuit could be built in size in many LCD monitors!*
- *The video amplifier has now been replaced for a MAX4090 IC. David told us: "This complies with frequency broadcasting standards, SNR, groupdelay, diff gain and phase and has 80dB suppression of common mode rejection." The latter seems to be quite bad at the original video amplifier.*
- *The new video amplifier does not require any major elecs. This makes the circuit smaller and platter. Another advantage is the faster start time of the new version, due to the smaller elco's.*
- *The "capture range" of the incoming video, to which the SAA1101 can synchronize, is no longer settled with a trimmer. This is now done with an additional varicap with external meter. This ensures that most available 'amateur' video sources will be covered by this new external arrangement. Yet there are sources that differ too strongly, not everything is catchable.*
- *The previous point is also immediately the manual function. Actually a kind of hybrid between car and manual. Put the video virtually still with the potmeter and the PLL then locks and quiet the video. It is still possible to disconnect the PLL output with a switch and connect the 0-5V output of the potentiometer to this second varicap. Then you have a full manual function and a slightly bigger catch range.*



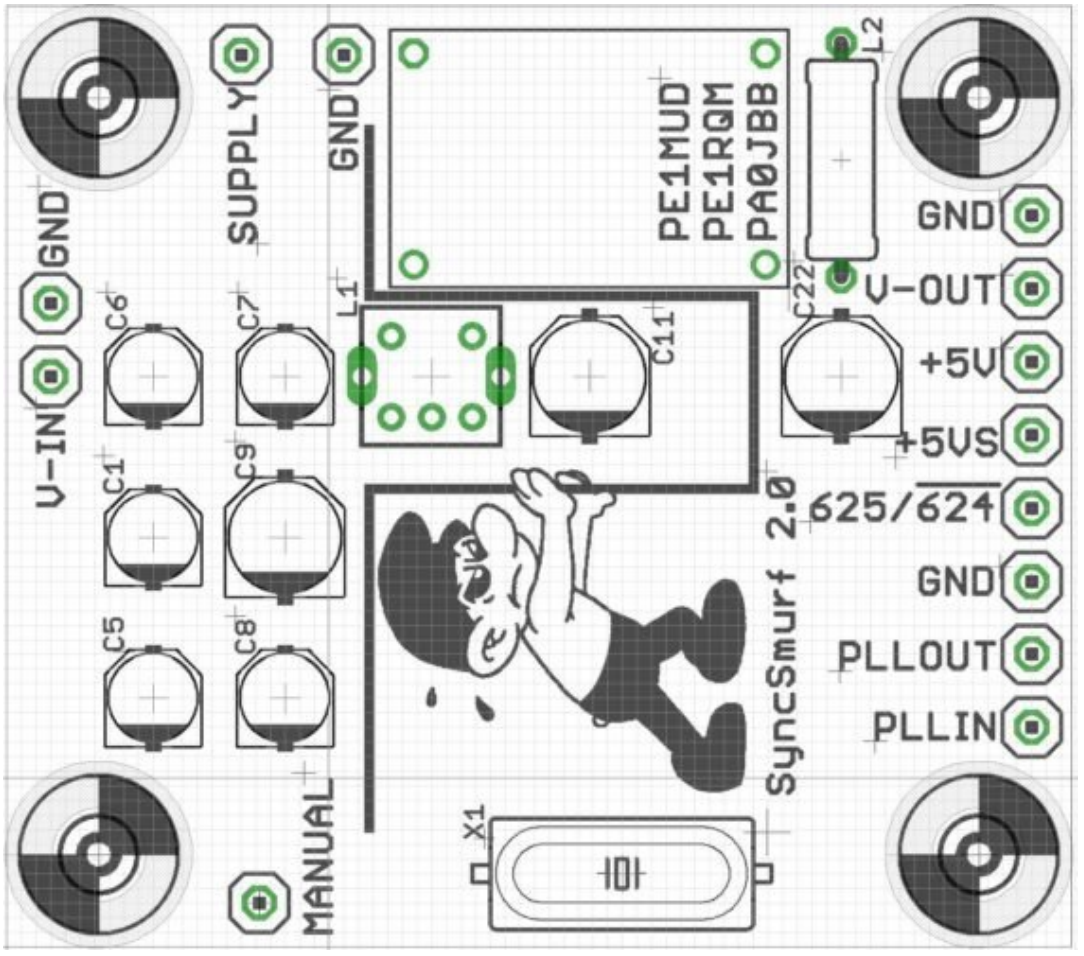
- *The video stays stable when a signal contains a lot of noise. Spikes in the Varicap control, caused by noise, are now cut off with a zener diode.*
- *The current version of version 2.0 has been reduced from 50 to 30 mA. With the through-hole version it was more than 80mA. So a big win, ideal for portable ATV!*
- *The sync generator is easy to switch off with a single switch. The video amplifier is then directly disconnected with the original sync pulses. This can be seen by you if it is in bypass of the circuit. The circuit is therefore in a low-power mode.*
- *The colour burst's kernel does not need to be sorted out.*
- *The 624/625 jumper is now easy to connect as an external switch. This prevents jumping of an image line during synchronization.*

Technical data

(Package owner owners, download the PDF under the partlist, including all comments on supplied items and other items. There is also a connection schedule available)

Partlist SyncSmurf 2.0

Qty	Value	Device	Package	Parts	Description
1	332PN-T1014Z	INDUCTOR	Toko4x4mm	L1	Inductor
1	100R	R-EU_R0805	R0805	R6	RESISTOR
6	100n	C-EUC0805	C0805	C3, C4, C13, C17, C21, C23	CAPACITOR
1	100p	C-EUC0805	C0805	C18	CAPACITOR
3	100u	CPOL-EUC	PANASONIC_C	C9, C11, C22	POLARIZED CAPACITOR
4	10k	R-EU_R0805	R0805	R4, R15, R21, R22	RESISTOR
1	10n	C-EUC0805	C0805	C20	CAPACITOR
2	10p	C-EUC0805	C0805	C2, C15	CAPACITOR
3	1k	R-EU_R0805	R0805	R5, R8, R16	RESISTOR
1	200mA	SRF	1206	F1	Self resettable fuse 200mA
1	220R	R-EU_R0805	R0805	R9	RESISTOR
1	22R	R-EU_R0805	R0805	R13	RESISTOR
1	22uH	Inductor	0309/10	L2	Inductor
1	2V7	ZENER-DIODESOD80C	SOD80C	ZD1	Z-Diode
1	330p	C-EUC0805	C0805	C19	CAPACITOR
1	33R	R-EU_R0805	R0805	R12	RESISTOR
2	33k	R-EU_R0805	R0805	R7, R10	RESISTOR
1	39p	C-EUC0805	C0805	C14	CAPACITOR
1	470R	R-EU_R0805	R0805	R1	RESISTOR
1	470k	R-EU_R0805	R0805	R14	RESISTOR
5	47u	CPOL-EUB	PANASONIC_B	C1, C5, C6, C7, C8	POLARIZED CAPACITOR
3	4k7	R-EU_R0805	R0805	R18, R20, R23	RESISTOR
2	4n7	C-EUC0805	C0805	C10, C16	CAPACITOR
1	52R	R-EU_R0805	R0805	R17	RESISTOR
1	5MHz	CRYSTALHC49UP	HC49UP	X1	CRYSTAL
1	680R	R-EU_R0805	R0805	R11	RESISTOR
1	75R	R-EU_R0805	R0805	R3	RESISTOR
1	820p	C-EUC0805	C0805	C12	CAPACITOR
1	8k2	R-EU_R0805	R0805	R19	RESISTOR
2	BB199	BB141	SOD523	D7, D8	VARACTOR
2	BC847	BC847B-NPN-SOT23-BEC	SOT23-BEC	T1, T2	NPN Transistor
1	BC857	BC857B-PNP-SOT23-BEC	SOT23-BEC	T3	PNP Transistor
2	BS170	NMOSSOT23	SOT-23	T4, T5	MOS FET
3	LL4148	DIODE-SOD80C	SOD80C	D1, D2, D3	DIODE
1	MAX4090	MAX4090	SOT23-6	IC1	VideoAmp
1	MINI-360	MINI-360	MINI-360	U$2	SMPS - Set it to 5V prior to assembly!
1	SAA1101T	SAA1101T	SO28W	IC2	Universal sync generator (USG)



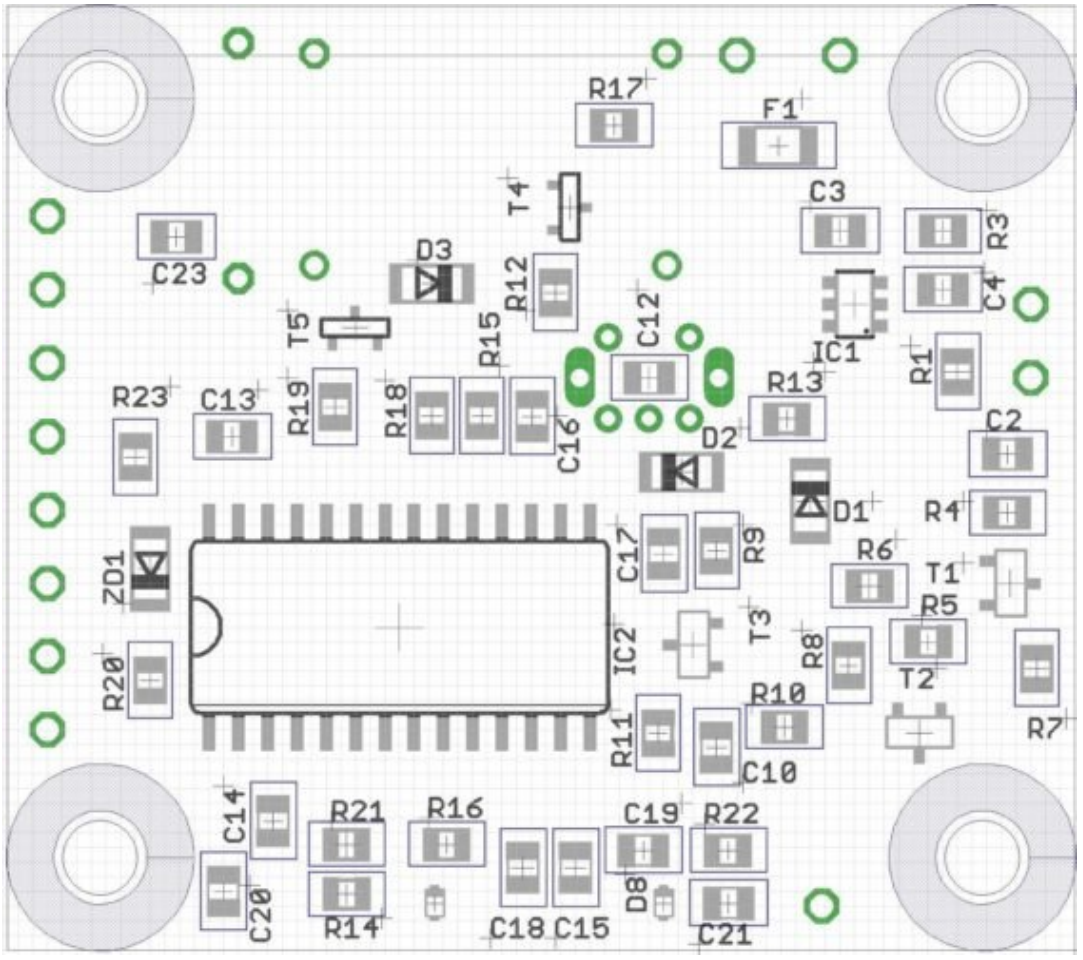
Syncsmurf 2.0 PCB top

This version is configured for the PAL standard.

Documentation for the builders

Note that PCBs 2.0 and 2.1 have R14 and R21 interchanged on the silkscreen. Stupid mistake, sorry. Please check the schedule and change these resistors. The circuit will work, but less well.

Left: Partlist - Note: Behind BB199 stands as device BB141. That's not true, it's just a BB199.



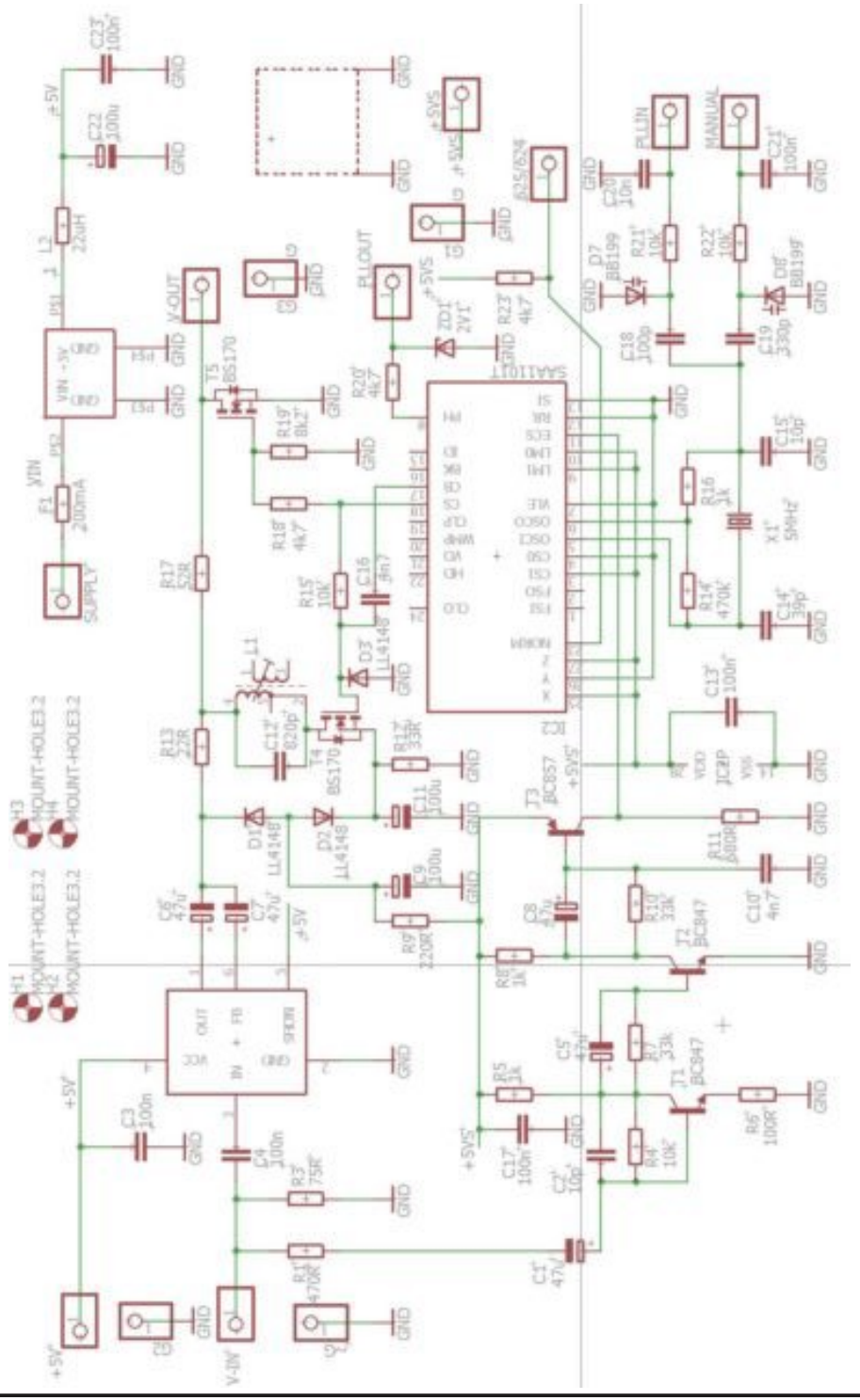
Syncsmurf PCB bottom

After my holiday, I will send an email containing this change.

Syncsmurf 2.0 package description - Syncsmurf-2.0-beschrijving-voor-bij-bouwpakket.pdf

(https://www.pe1rqm.nl/download/Syncsmurf-2.0-beschrijving-voor-bij-bouwpakket.pdf)

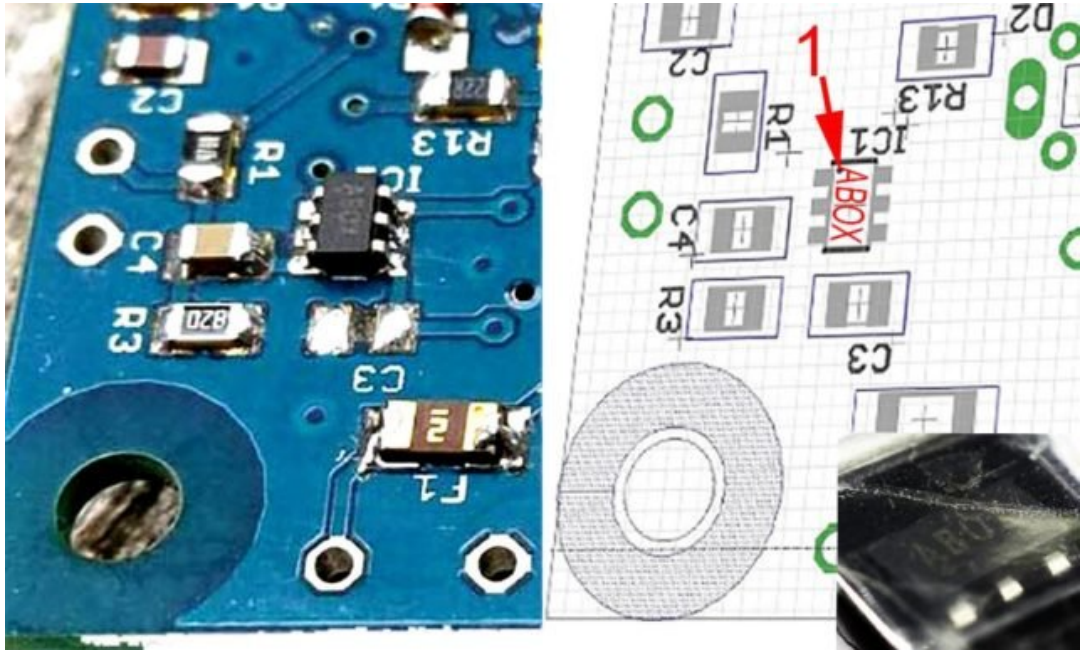
Please note that this file is in Dutch.



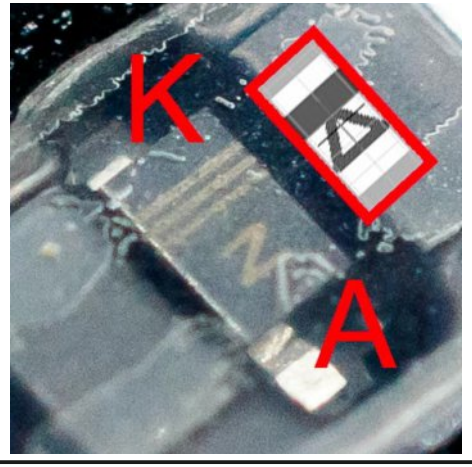
Right: Schematic Syncsmurf 2.0

Placement hard to read parts:

Pin 1 of the MAX4090-EUT-T may be somewhat unclear. If possible, make the impression more visible with side lights (sometimes works better than straight from above) and a peek. The text ABOX should be placed as follows:

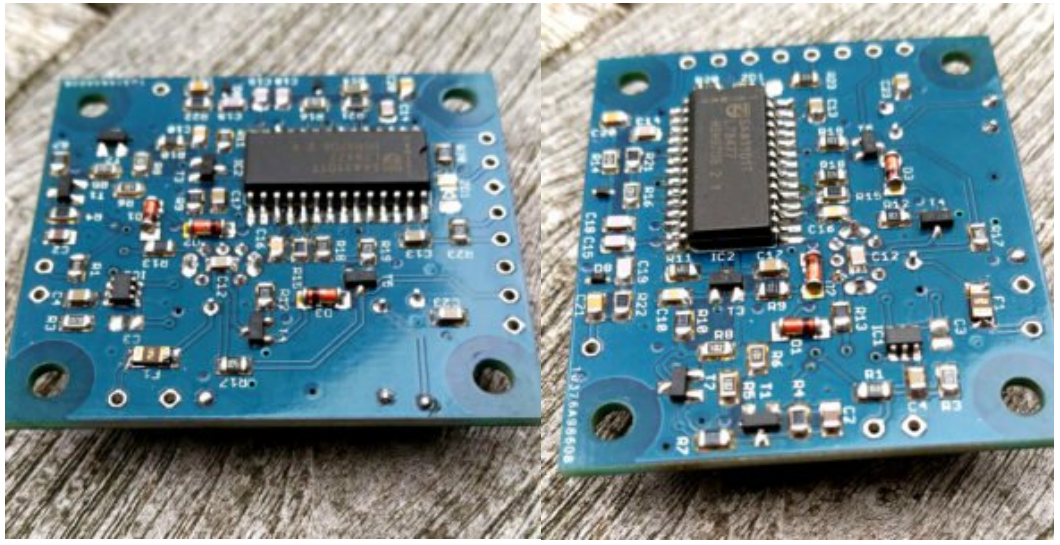


The BB199 is very small. This component looks like this after a big increase:



K = Cathode,
A = Anode

Two more pictures of built-in copies:



Interested?

We are going to offer this circuit for sale on this site. David PE1MUD takes care of the production and support and I (Tjalling PE1RQM) take care of the distribution.

The price for the PCB only amounts to €9.00 (excl. Shipping). The price for a building kit (excluding external potometers, switches, housing and shipping) will be €50, -. Completely built and tested costs €90, - and is available only on request (excluding external potometers, switches, housing and shipment).

Shipping costs €3.00 for PCBs and building kits, €5,00 for built-in copies. For shipments outside of the Netherlands we will have to calculate shipping costs.

Please note, there is a delay in delivery due to some errors in the delivery of the components. The building kits are available in a few weeks, the PCBs are a little earlier.
(img,, alt: smurf12 src: ../Images/smurf12.jpg)

Warning

Keep in mind that some components are difficult to find in small quantities. Therefore consider the building kit. Because we buy properly, we can not sell any items separately. The coil, the power supply and the video lamp are something specific. The SAA1101T, MAX4090, BB199 are obsolete, so we put out of NOS (New Old Stock) sources. That's once! The components are mainly in the small 0805 SMD format ! There is some experience and good eyes needed to solder it well.

The BB199 may be hard to get. We are investigating some alternatives. For example, the BB198 or the BB205. The results are not known yet, so if you've tried that, we'd love to hear! Our building kits will still have the BB199 for the first time.

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**

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But if you have a Kindle 3G then yes, but only to Amazon, and there is not a lot of ATV material on their site.
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Although a formatted article showing the layout can be sent, we prefer an unformatted text file of the script, along with annotations of where important images should be placed. All images should be identified as Fig 1 etc and sent seperately.

Images should be in PNG format if possible and the best quality available. Do not resize or compress images, we will do all the rework necessary to publish them.

If you are sending a construction project, please include the dimensions of any pcb's and make the pcb image black and white, not greyscale.

CQ-DATV reserves the right to redraw any schematics and pcb layouts to meet our standards.

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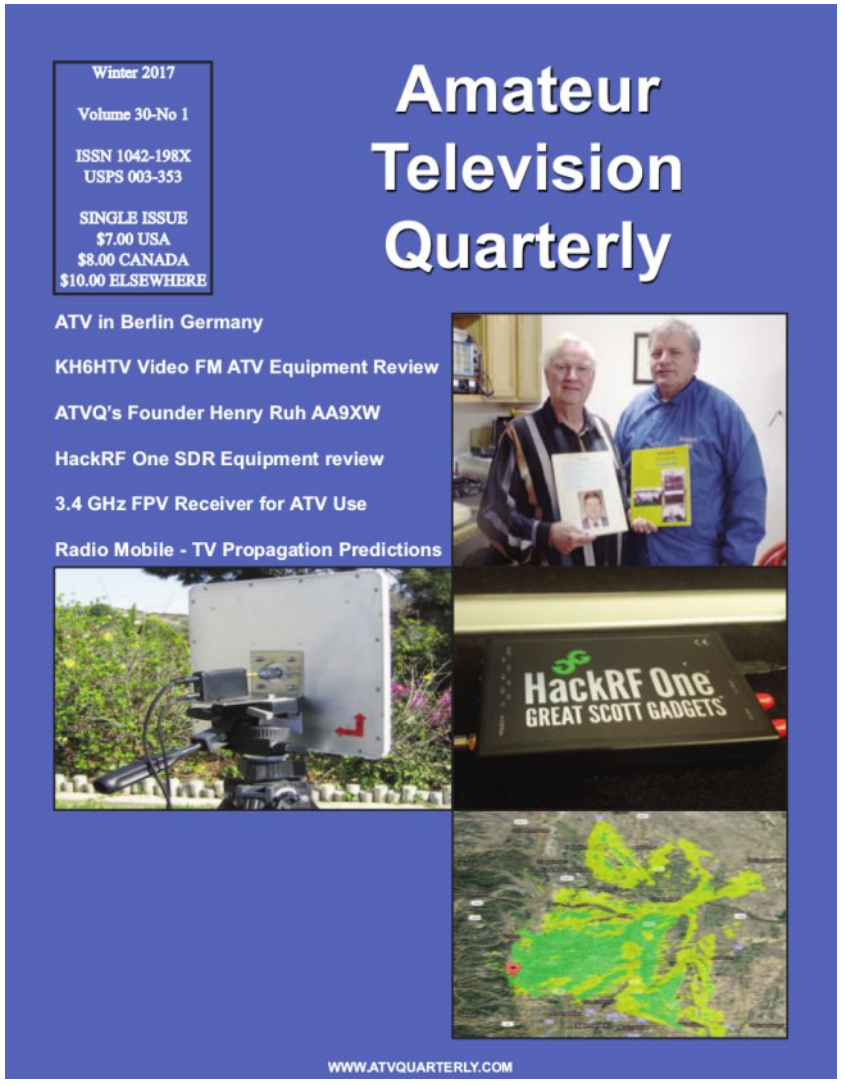

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IARU ATV contest results 2017

Published 11 July 2017

70 cm

No.	Call	Points	BestDX	QTH	Distance
1	F9ZG/P	6799	F1AHR	IN94VO	487
2	F5AGO	5683	F6BGR	JO00SC	395
3	F1AEA/P	3143	F9ZG/P	IN98JW	385
4	F6BGR	2758	F5AGO	JN06DP	395
5	F6AQO	2687	F9ZG/P	IN98JW	269
6	F6ESU	2509	F5AGO	JN06DP	393
7	F1AIW	1905	F1CSY	JN03SK	377
8	PE1EZU	1265	ON7ARQ	JO10VX	157
9	G8GTZ/P	938	F9ZG	IN98JW	201
10	F5MKM	845	F5AGO	JN06DP	187
11	G8GKQ/P	803	G3KKD	JO02CF	127
12	PA3DLJ	706	PE1EZU	JO22LE	150
13	PA7HV	688	PA3CGG	JO22ID14DS	102
14	G4KLB	660	F9ZG	IN98JW	205
15	PA0BOJ	628	PA3DLJ	JO20VW	83
16	PA3CGG	590	PE2TV	JO32GH	128
17	G7JTT/P	530	F9ZG	IN98JW	236
18	PE1POA	527	PA0BOJ	JO21ON17JV	75
19	G3KKD	493	G8GKQ/P	IO91IN	127
20	PE1ITR	459	PE1EZU	JO22LE	88
21	HB9TV/P	412	F5AJJ	JN27LH	130
22	M0DTS/P	331	G1LPS	IO94EQ	95
23	PE2TV	309	PA3CGG	JO22ID	126
24	G1LPS	292	M0DTS/P	IO93OX	95
25	PE1APH	292	PE1EZU	JO22LE93OW	100
26	PA9DX/A	291	PE1ITR	JO21QK	82
27	G0WFT	272	G8GKQ/P	IO91IN	66
28	HB9IAM	208	HB9TV/P	JN36GU44OK	77
29	PE1ASH	207	PE1POA	JO22RF82CP	42
30	PA1AS	154	PA7HV	JO21TK	60
31	PA3CWS	95	PA3CGG	JO22ID14DS	54
32	G4GUO	82	G8GKQ/P	IO90LU	41
33	PA3CRX	70	PE1ASH	JO22KF	34
34	PE1MPZ	57	PA3CGG	JO22ID14DS	30
35	PA1G	54	PE1EZU	JO22LE93OW	27
36	PE1CVJ	50	PA9DX/A	JO22MD14UR	19

No.	Call	Points	BestDX	QTH	Distance
37	EA7KA	10	EA7GLU	IM86SU	5
38	EA7GLU	10	EA7KA	IM86SU	5
39	PA1EBM	10	PA1AS	JO20XW	5

23 cm

No.	Call	Points	BestDX	QTH	Distance
1	IK3HHG	7340	IW6ATU	JN63QN	284
2	PE1EZU	4552	PA3DLJ	JO20VW	149
3	F9ZG/P	4144	F5AGO	JN06DP	278
4	PA3CGG	3388	PE1NKT	JO33EE	163
5	ED4SHF/6	3328	EA3UM	JN01XG	211
6	F5AGO	3146	F1DBZ	JN09DM	319
7	PE2TV	3052	PA3CGG	JO22ID	126
8	PA0BOJ	2482	PA1AS	JO20XW	89
9	PE1POA	2244	PE1NKT	JO33EE	123
10	IW6ATU	2244	IK3HHG	JN65AW	284
11	PA9DX/A	2222	PA1AS	JO20XW	149
12	PA3DLJ	2000	PE1EZU	JO22LE	150
13	M0DTS/P	1988	G3NWR/P	IO93AD	120
14	I2MUT	1988	IK3HHG	JN65AW	208
15	PA7HV	1880	PA3CGG	JO22ID14DS	102
16	EA9MH	1456	EA7GLU	IM86SU	182
17	PE1ASH	1420	PA3CGN	JO32MG	148
18	IW4CPP	1360	IK3HHG	JN65AW	205
19	PA1AS	1334	PA9DX/A	JO22MD	148
20	EA3XU	1312	ED4SHF/6	JN10WB63LT	210
21	PE1APH	1276	PE1EZU	JO22LE93OW	100
22	IW2EYM	1186	IK3HHG	JN65AW	144
23	G8GTZ/P	1124	F9ZG	IN98JW	201
24	F6AQO	1118	F9ZG/P	IN98JW	269
25	EA3BAE	1112	ED4SHF/6	JN10WB63LT	203
26	G3NWR/P	1064	M0DTS/P	IO93OX	120
27	IK4ADE	1044	IK3HHG	JN65AW	205
28	I2CIC	1036	IK3HHG	JN65AW	154
29	G1LPS	1012	M1EGI/P	IO93FL	134
30	EA3UM	1012	ED4SHF/6	JN10WB63LT	211
31	M1EGI/P	1002	G1LPS	IO94EQ	136
32	IW6OCN	946	IW6ATU	JN63QN	183
33	EA3DZN	912	ED4SHF/6	JN10WB63LT	208
34	PE1MPZ	904	PA0BOJ	JO21ON17JV	54
35	G7AVU	888	G3NWR/P	IO93AD	82
36	HB9TV/P	824	F5AJJ	JN27LH	130
37	IW2MBA	780	I2MUT	JN44XS	83
38	EA7GLU	768	EA9MH	IM85MG	182
39	PA3CRX	662	PA3CGG	JO22ID14DS	48
40	PA3CWS	632	PA3CGG	JO22ID14DS	54
41	PE1CKK	628	PA3CGG	JO22ID14DS	34

No.	Call	Points	BestDX	QTH	Distance
42	IZ3ZUB	622	IW6ATU	JN63QN	284
43	PE1BR	590	PE1EZU	JO22LE	131
44	DK1UP	580	DD4PQ	JN39TT	70
45	PE1ITR	568	PE1EZU	JO22LE	88
46	G8GKQ/P	528	G4CPE	IO91SW	71
47	PE1CVJ	508	PE1MPZ	JO22NB02NU	30
48	F6ESU	488	F1RJ	JN18AT	122
49	EA7KA	404	EA9MH	IM85MG	182
50	IW6CHN	372	IW6OCN	JN72DB	115
51	F1AIW	322	F1AHH	IN95QQ	139
52	HB9IAM	308	HB9TV/P	JN36GU44OK	77
53	G8VAT/P	228	M0DTS/P	IO93OX	39
54	IW3IDP	196	IK3HHG	JN65AW	49
55	EA3CUE/P	180	EA3XU	JN11CK02EI	30
56	IW3HKW	180	IK3HHG	JN65AW	45
57	SM0OFV	180	SM0VPJ	JO89VK33	16
58	SM0WLL	172	SM0VPJ	JO89VK33	21
59	PA1G	160	PE1EZU	JO22LE93OW	27
60	SM0VPJ	148	SM0WLL	JO89WF29	21
61	G8EOP	128	M0DTS/P	IO93OX	64
62	EA3FVI	100	EA3XU	JN11CK02EI	25
63	EA3ABZ	100	EA3XU	JN11CK02EI	25
64	IK6DTA	96	IW6OCN	JN72DB	48
65	SA0CCA	76	SM0OFV	JO99AI27	13
66	G4KLB	40	G8GTZ/P	IO80WP	20
67	G0WFT	36	G8GTZ/P	IO91RU	9
68	I6CXB	32	IW6ATU	JN63QN	8
69	PA1EBM	20	PA1AS	JO20XW	5

13 cm

No.	Call	Points	BestDX	QTH	Distance
1	PA3CGG	7080	PA3CGN	JO32MG	162
2	PA0BOJ	4755	PA3DLJ	JO20VW	83
3	IK3HHG	3940	IW6ATU	JN63QN	284
4	PE1ASH	3550	PA3CGN	JO32MG	148
5	PE2TV	3185	PA3CGG	JO22ID	126
6	PE1EZU	3105	PE2TV	JO32GH	106
7	PE1POA	2700	PA0BOJ	JO21ON17JV	75
8	PA7HV	2415	PA3CGG	JO22ID14DS	102
9	PA9DX/A	2160	PA0BOJ	JO21ON	66
10	PE1MPZ	1850	PA0BOJ	JO21ON17JV	54
11	M0DTS/P	1500	G8VDP	IO93GM	67
12	PE1BR	1500	PA3CGG	JO22ID	148
13	PA3DLJ	1490	PA0BOJ	JO21ON	80
14	IW6ATU	1420	IK3HHG	JN65AW	284
15	PE1CKK	1420	PA3CGG	JO22ID14	34
16	PA3CRX	1260	PA3CGG	JO22ID14DS	48

No.	Call	Points	BestDX	QTH	Distance
17	PE1CVJ	1140	PE1MPZ	JO22NB02NU	30
18	PA3CWS	1115	PA3CGG	JO22ID14DS	54
19	DK1UP	750	DC8UG	JO30UH	42
20	G1LPS	605	M0DTS/P	IO94DF	51
21	IW3IDP	490	IK3HHG	JN65AW	49
22	G3NWR/P	400	G3UVR	IO83KH	80
23	PA1AS	170	PA3DLJ	JO20VW	12
24	PA1EBM	50	PA1AS	JO20XW	5

9 cm

No.	Call	Points	BestDX	QTH	Distance
1	G1LPS	1160	M0DTS/P	IO94DF	51
2	PA3CGG	1140	PA3CRX	JO22QE51EF	48
3	PE1EZU	870	PA3CRX	JO22QE	26
4	PE1ASH	725	PA3CRX	JO22QE51EF	35
5	PA3CRX	720	PA3CGG	JO22ID14DS	48
6	PE1CKK	660	PE1CGG	JO22ID14	34
7	M0DTS/P	510	G1LPS	IO94EQ	51
8	PE1CVJ	420	PA3CGG	JO22ID14DS	19
9	G3NWR/P	120	G4CBW	IO83UB	24
10	PA3CWS	30	PA3CRX	JO22QE	6

6 cm

No.	Call	Points	BestDX	QTH	Distance
1	IK3HHG	2560	S58RU	JN65WM	150
2	PA3CGG	1700	PE1POA	JO22RF82CP	56
3	PE1POA	1250	PA3CGG	JO22ID14DS	56
4	PE1EZU	1240	PE1FOT	JO21MU05LT	36
5	PE1ASH	1090	PE1POA	JO22RF82CP	42
6	PE1CKK	1010	PE1CGG	JO22ID14DS	34
7	PA9DX/A	660	PA3CGG	JO22ID14DS	23
8	G1LPS	510	M0DTS/P	IO94DF	51
9	M0DTS/P	510	G1LPS	IO94EQ	51
10	PA3CRX	480	PA3CGG	JO22ID14DS	29
11	PE1CVJ	420	PA3CGG	JO22ID14DS	19
12	G8GKQ/P	400	G8GTZ/P	IO80WP	80
13	G8GTZ/P	400	G8GKQ/P	IO90LU	80

3 cm

No.	Call	Points	BestDX	QTH	Distance
1	IK3HHG	5715	I2MUT	JN44XS	208
2	I2MUT	5390	IK3HHG	JN65AW	208
3	IW2MBA	1160	I2MUT	JN44XS	83
4	M0DTS/P	1160	G7AVU	IO93OJ	65
5	I2CIC	1050	I2MUT	JN44XS	54
6	PA3CGG	775	PE1MPZ	JO22NB02NU	30
7	IW2EYM	660	IW2MBA	JN55GJ	33
8	G7AVU	650	M0DTS/P	IO93OX	65
9	G3NWR/P	640	G3UVR	IO83KH	80
10	PE1EZU	590	PA3CGG	JO22ID14DS	22
11	IW4CPP	560	I2CIC	JN55FC	51
12	PE1ASH	555	PE1MPZ	JO22NB02NU	23
13	G1LPS	510	M0DTS/P	IO94DF	51
14	PA9DX/A	455	PA3CGG	JO22ID14DS	23
15	IK2ARZ	420	I2MUT	JN44XS	42
16	PE1MPZ	400	PA3CGG	JO22ID14DS	30
17	IW3IDP	245	IK3HHG	JN65AW	49
18	PE1CVJ	230	PE1EZU	JO22LE93OW	15
19	IZ3UOF	205	IK3HHG	JN65AW	41
20	IU3IQY	205	IK3HHG	JN65AW	41
21	IZ3ALW	205	IK3HHG	JN65AW	41
22	IZ3NVR	205	IK3HHG	JN65AW	41
23	EA3CUE/P	150	EA3XU	JN11CK02EI	15
24	EA3XU	150	EA3CUE/P	JN11DM	15
25	PA1AS	110	PA3DLJ	JO20VW	12
26	IU3IOU	70	IK3HHG	JN65AW	14
27	PA3DLJ	60	PA1AS	JO20XW	12
28	PE1BR	50	PE1IWT	JO32KF	5
29	EA7KA	50	EA7GLU	IM86SU	5
30	PA1EBM	50	PA1AS	JO20XW	5
31	EA7GLU	50	EA7KA	IM86SU	5
32	PA0RWE	25	PA3CGG	JO22ID14DS	5

1.2 cm

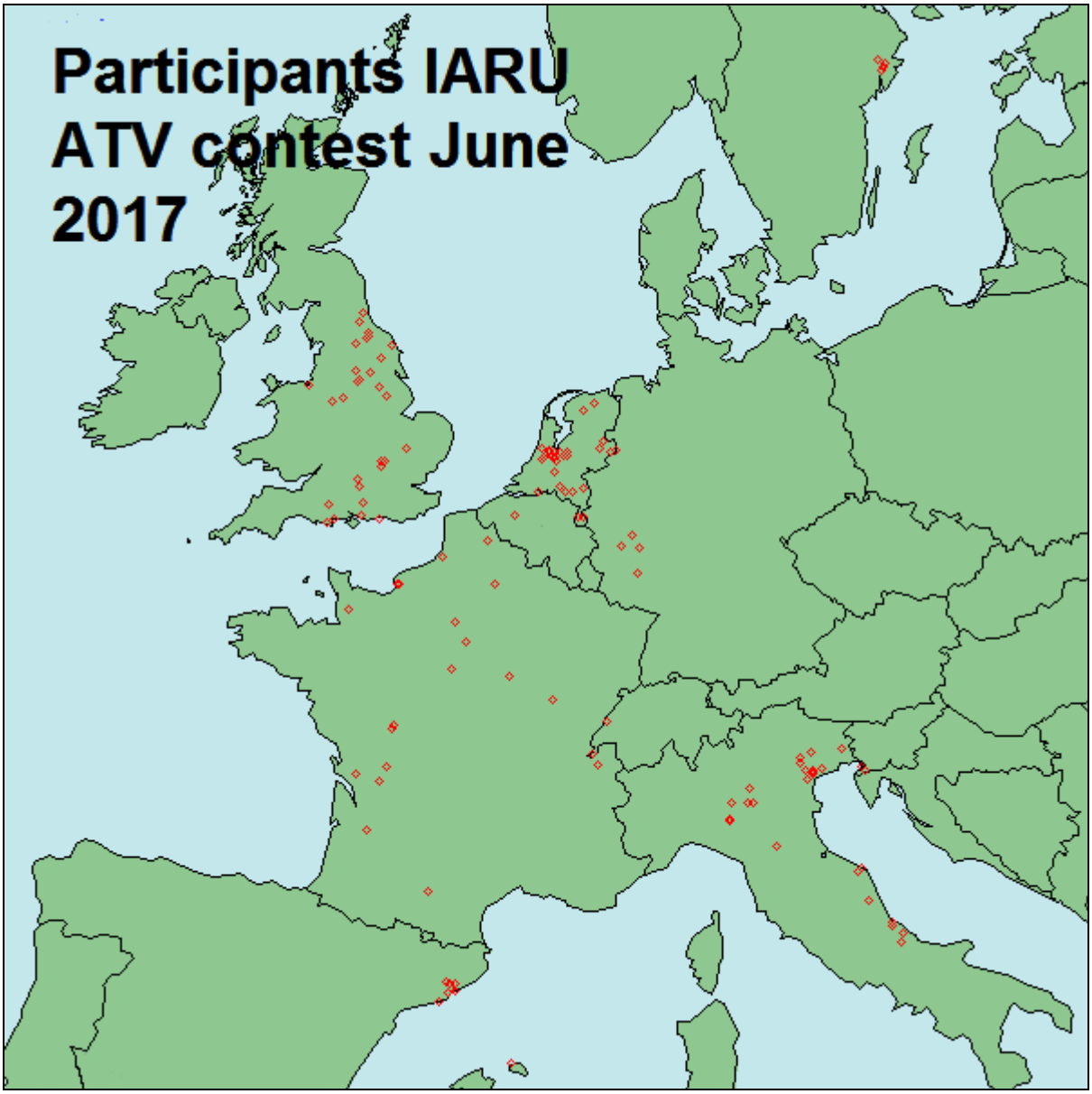
No.	Call	Points	BestDX	QTH	Distance
1	PE1EZU	530	PA3CGG	JO22ID14DS	22
2	PA3CGG	515	PA3CRX/P	JO22MF85MK	29
3	G1LPS	510	M0DTS/P	IO94DF	51
4	M0DTS/P	510	G1LPS	IO94EQ	51
5	PE1ASH	320	PA3CGG	JO22ID14DS	15
6	PA3CRX	235	PA3CGG	JO22ID14DS	29
7	PE1CVJ	230	PE1EZU	JO22LE93OW	15

Totals

No.	Call	IARU score
1	IK3HHG*	19555
2	PA3CGG*	15188
3	PE1EZU	12152
4	F9ZG/P*	10943
5	F5AGO	8829
6	PE1ASH	7867
7	PA0BOJ	7865
8	I2MUT*	7378
9	PE1POA	6721
10	PE2TV	6546
11	M0DTS/P*	6509
12	PA9DX/A	5788
13	PA7HV	4983
14	G1LPS	4599
15	PA3DLJ	4256
16	F6AQO	3805
17	PE1CKK	3718
18	IW6ATU	3664
19	PA3CRX	3427
20	ED4SHF/6*	3328
21	PE1MPZ	3211
22	F1AEA/P	3143
23	PE1CVJ	2998
24	F6ESU	2997
25	F6BGR	2758
26	G8GTZ/P	2462
27	F1AIW	2227
28	G3NWR/P	2224
29	PE1BR	2140
30	I2CIC	2086
31	IW2MBA	1940
32	IW4CPP	1920
33	PA3CWS	1872
34	IW2EYM	1846
35	PA1AS	1768
36	G8GKQ/P	1731
37	PE1APH	1568
38	G7AVU	1538
39	EA3XU	1462
40	EA9MH	1456
41	DK1UP*	1330

No.	Call	IARU score
42	HB9TV/P*	1236
43	EA3BAE	1112
44	IK4ADE	1044
45	PE1ITR	1027
46	EA3UM	1012
47	M1EGI/P	1002
48	IW6OCN	946
49	IW3IDP	931
50	EA3DZN	912
51	F5MKM	845
52	EA7GLU	828
53	G4KLB	700
54	IZ3ZUB	622
55	G7JTT/P	530
56	HB9IAM	516
57	G3KKD	493
58	EA7KA	464
59	IK2ARZ	420
60	IW6CHN	372
61	EA3CUE/P	330
62	G0WFT	308
63	G8VAT/P	228
64	PA1G	214
65	IZ3NVR	205
66	IZ3UOF	205
67	IU3IQY	205
68	IZ3ALW	205
69	IW3HKW	180
70	SM0OFV*	180
71	SM0WLL	172
72	SM0VPJ	148
73	PA1EBM	130
74	G8EOP	128
75	EA3ABZ	100
76	EA3FVI	100
77	IK6DTA	96
78	G4GUO	82
79	SA0CCA	76
80	IU3IOU	70
81	I6CXB	32
82	PA0RWE	25

* most points in their country.



This map contains all locations that are in the logs.
Five stations were active from two different locations.

Next IARU ATV contest date: **9 and 10 June 2018**
Starts Saturday **12:00 UTC**, ends Sunday **18:00 UTC**.

IARU rules:
http://www.iaru-r1.org/images/VHF/atv/IARU_ATV_contest_rules_version_2015.pdf
logsheet:
http://www.iaru-r1.org/images/VHF/atv/ATV_contest_log_-_ATV_yourcall_YYYYMMDD.xls

Chris van den Berg PA3CRX
VERON Chairman of VHF-and-above
IARU ATV contest manager