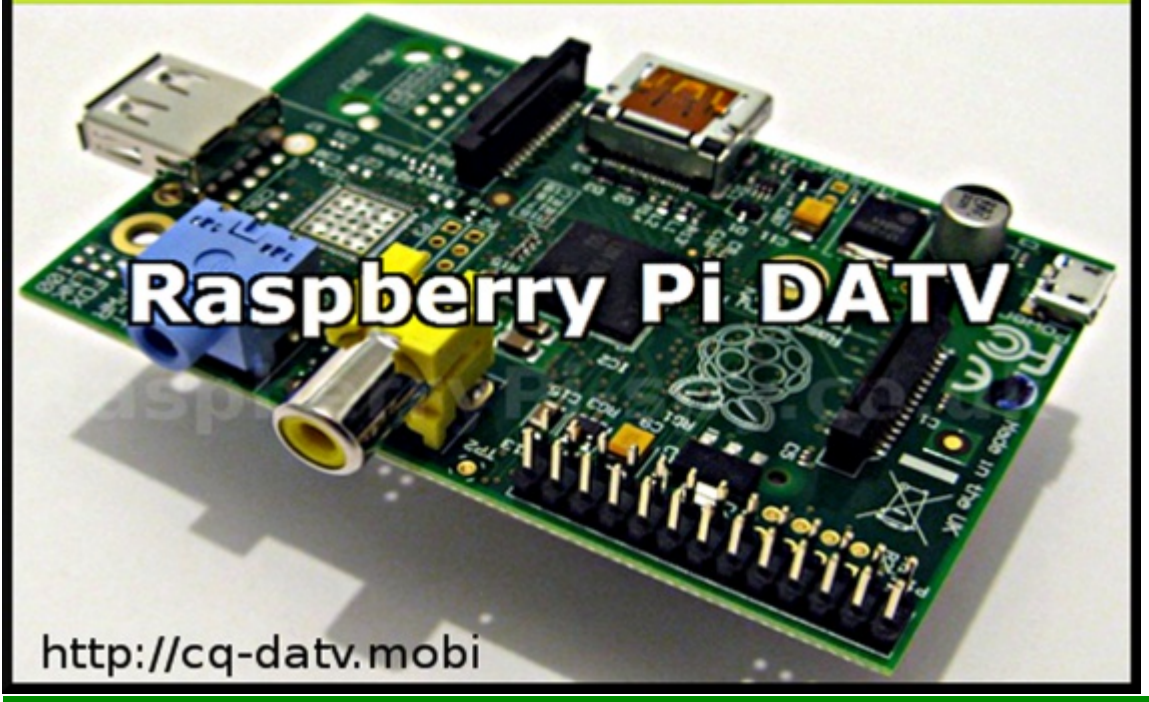
CQ-DATV

dotMOBI

Issue 10 - April 2014



In this issue

The team

- Ian Pawson - G8IQU
- Mike Berry - G1LWX
- John Hudson - G3RFL
- Ken Konechy - W6HHC
- Clive Reynolds G3GJA / G8EQZ
- Mike Stevens - G7GTN
- Paul Wade - W1GHZ
- Trevor Brown - G8CJS
- Richard Carden - VK4XRL
- Klaus Kramer - DL4KCK
- John Lukey - VK2ZUH
- Terry Mowles - VK5TM

The Wyong Field Day is held on the last Sunday in February at Wyong Racecourse. It is about 100 kms north of Sydney and is the major field day in Australia. There was quite a large crowd in attendance, but maybe not as many as other years. After having a look around the various tables and dealers stalls and not finding an awful lot to tempt me, I called into the ATV display, as usual put on by Vic VK2BTV and George VK2ZDC. Vic usually has some new project to show us but not this year. There was a good interest in his display and both Vic and George like to talk ATV. They are both involved in keeping the local ATV repeater running, VK2RTG. Part of the display was Laser Disc player, with a number of different discs.

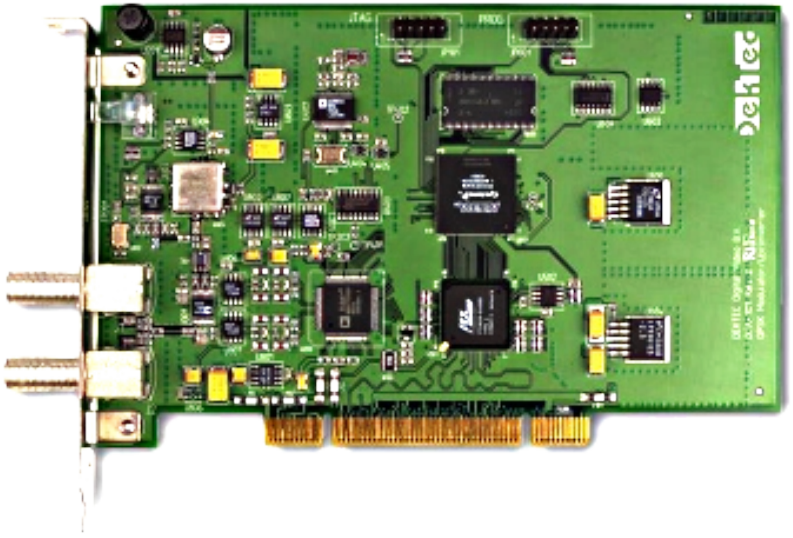
From the left George VK2ZDC, John VK2ZUH, Ray VK2ME, Gary VK2CRJ, Vic VK2BTV and Will VK2TRY.

George and Vic are local to Wyong and run the ATV repeater VK2RTG, Gary and Ray are involved with the Sydney ATV repeater VK2RFM.

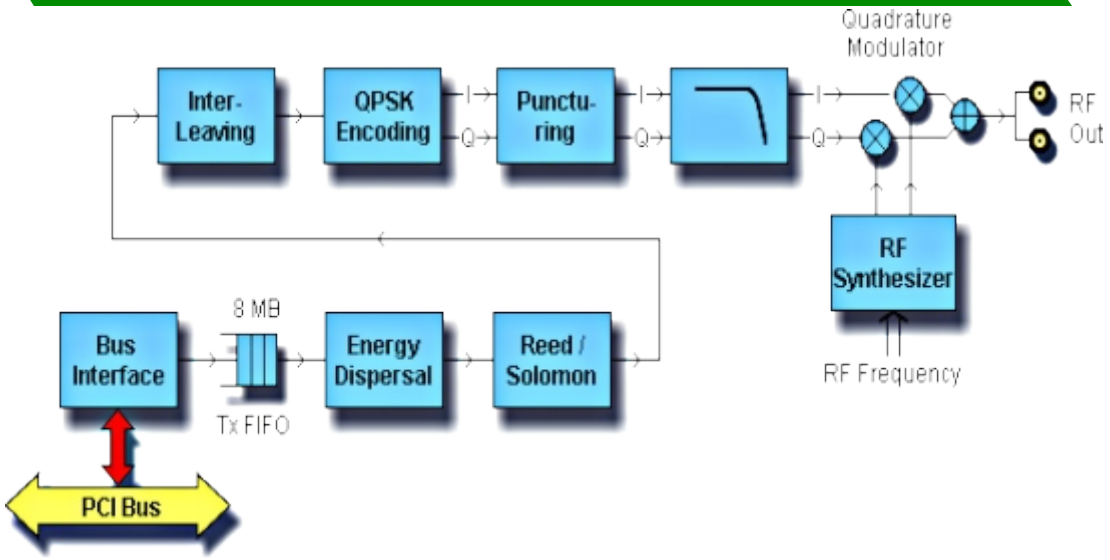
The 12 inch disc looked enormous after getting used to a DVD. The benefit to me of attending the field day is to catch up on every ones latest project and renew old acquaintances. I was very sorry that Richard VK4XRL couldn't manage to attend this year.

73 s John VK2ZUH.

Probably the most expensive contribution to the DATV world DecTek have produced a DVBS PCI card primarily designed for driving digital satellite receivers for demos, at shows, and electronics stores, but also with applications for Set-top-box development, repair, production testing and performance testing.



It is clearly not for the DATV enthusiast with a price tag of

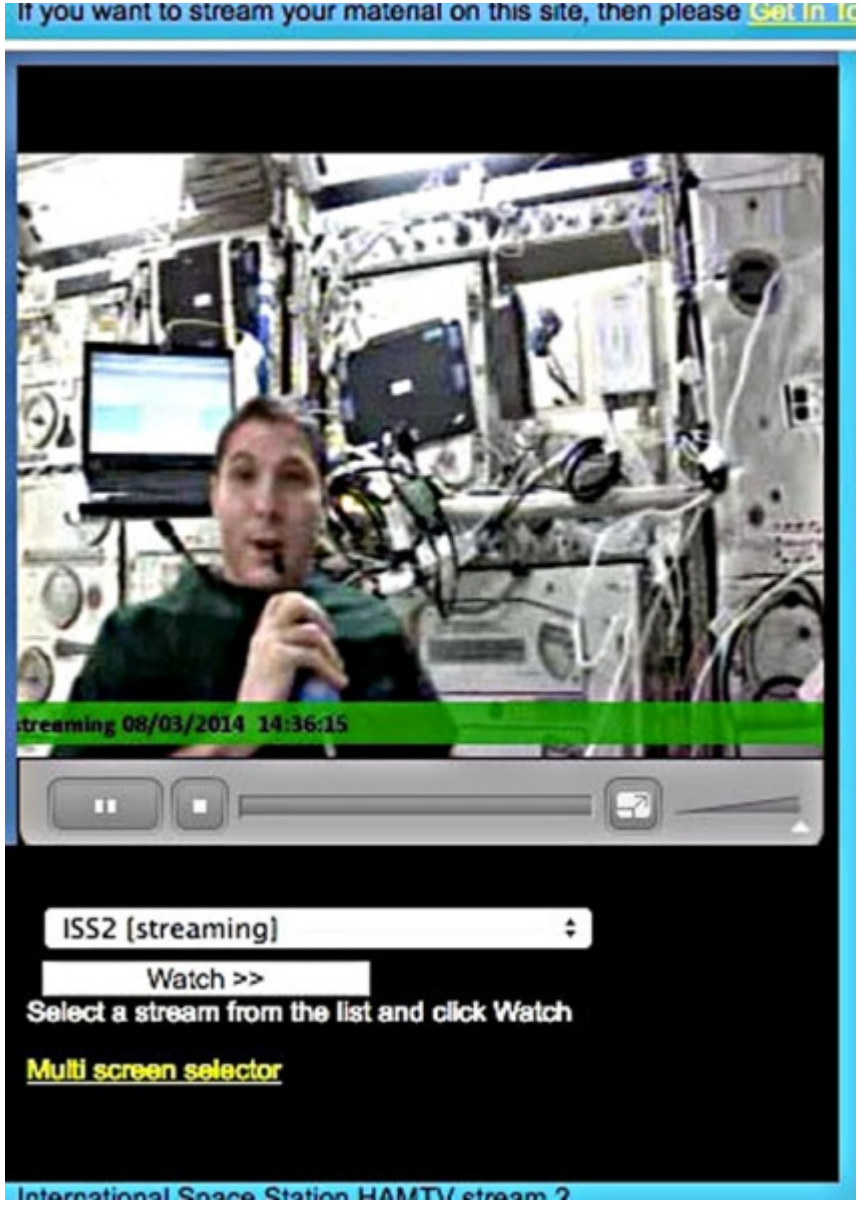


1,770 euro's.

More details at:
http://www.dektec.com/Products/PCI/DTA-107/

ISS HamTV success.

On Saturday, March 8 test transmissions were made on 2422.0 MHz using the HamTV equipment on the International Space Station (ISS).
The video was successfully received and was web streamed to a global audience via the Britsh Amateur Television Club (BATC) server at http://batc.tv/ch_live.php?ch=4
There were four live web streams each from different receivers.
The HamTV transmitter is the culmination of over ten years work by dedicated volunteers to establish an amateur radio TV transmitter on the ISS. It uses patch antennas fixed on the Meteorite Debris Panels (MDP) protecting the hull of the ISS Columbus module. These antennas were installed while the Columbus module was being constructed.



BATC Webstream of ISS HamTV by Stefan VE4NSA March 8,2014

A fund-raising campaign took place during 2005-7 to raise over 65,000 Euros for the antennas. Individual radio amateurs from around the world donated generously as did several organisations including AMSAT-UK and the RSGB.
The main mission of HamTV is to perform contacts between the astronauts on the ISS and school students, not only by voice as now, but also by unidirectional video from the ISS to the ground.

HamVideo is the name of the onboard DATV S-band transmitter. HamTV is the name of the complete system, comprising DATV downlink and VHF voice uplink. Kaiser Italia SRL was the prime-contractor for the design and development of the flight and ground segment.
http://www.kayser.it/index.php/exploration-2/ham-tv

Read the HamTV overview by Gaston Bertels ON4WF
http://tinyurl.com/HamTVoverview

Join the ISS HamTV Yahoo Group
http://groups.yahoo.com/group/HamTV

Webstream of the TV transmissions
http://batc.tv/ch_live.php?ch=4

ARISS-EU HamTV Bulletins
http://www.ariss-eu.org/

HamTV on Facebook
https://www.facebook.com/Hamtvproject

HAMTV System On ISS

VK4ZXI has just taken delivery of a Hides DC100 camera
This is an all-new camera which outputs the captured HD video (and optional audio) in digital TV signal. The core technology is based on open industrial standard EN 300-744 DVB-T, which can transmit compressed high-definition digital video over cable or air. The DC-100 uses a standard CCTV SDI camera, either 2 or 5 Megapixel, then converts the raw SDI stream to DVB-T with one of Hides modulators using the ITE chips.
The DC-100 can be program for channel by two rotary switches at the back and band-width (6,7,8 MHz; which only suits some countries, like Australia). It is possible to change firmware via a micro SD card and all TX properties via some extra hardware

through the return channel. (It is on its way). The camera uses CS mount lenses, so it is possible to use good quality lenses. All in all, the simplest and best quality way to do Full HD DVB-T DATV. Add some amplifiers and decent antenna and it makes a nice system.

More detail here - http://goo.gl/AdiQjO

CAT 14 • CAT14 September 6th / 7th in Basingstoke BATC - Forum by g8gtz

In the absence of any better venues being offered, we have decided to go back to the Everest Academy in Basingstoke for CAT14 which will be held over the weekend of September 6th and 7th 2014 with the BATC General Meeting 2014 will be held on the Sunday.

More details to follow, but put the date in your diary now and we look forward to seeing you all there.
73s Noel

33rd Annual 2014 ARRL/TAPR DCC (Digital Communications Conference)

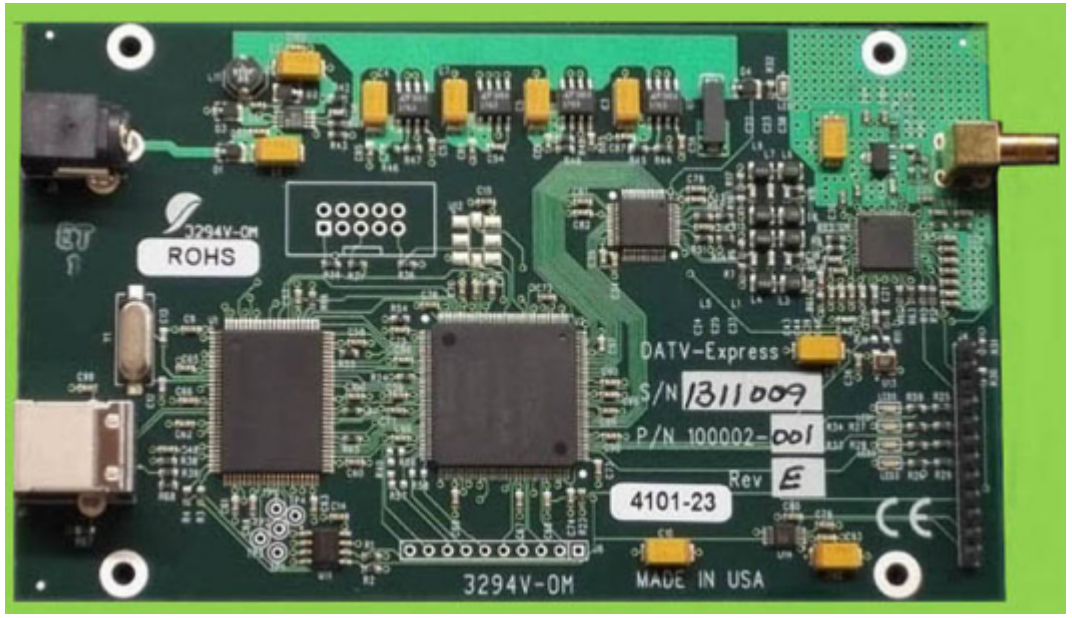
33rd Annual 2014 ARRL/TAPR DCC (Digital Communications Conference) is returning to Texas and this year will be held on September the 5th, 6th and 7th.

There are no plans at present to stream this conference live, it is rather a pity that it clashes with the BATC BGM, which is usually streamed.

I know recordings of both may eventually appear but, there is something about live television above and beyond the ability to ask questions back to the floor.

DATV-Express - available from BATC Shop!!

The DATV-Express project team reports that BATC announced on their BATC Forum http://goo.gl/rO6JDD that, as part of the BATC supporting this very exciting project, the PCBA is now available from the BATC shop.



Working in partnership with the DATV-Express team, BATC is stocking the PCBA to enable members in the UK and Europe to purchase it without the hassle of exchange rates / customs duty / VAT when importing it from the USA.

It is available ex-stock in the UK from the BATC shop for £215 including p&p to the UK and Europe. This price is directly comparable to the US price from the DATV-Express website after you have added VAT and customs / admin charges.

The fully-assembled and fully-tested board is available under the "Hardware and Kits" category in the BATC shop at http://www.batc.org.uk/

Sad to say that this transmitter is only available to BATC members via the online shop and not to all CQ-DATV readers.

For more details on the project web site, please see
http://www.DATV-Express.com
73....from DATV-Express project team

HD ATV Repeaters

The first german HD ATV repeater with DVB-S2 and H.264

output since 10.1.2014 is DB0KO near Cologne. On 1291 MHz the traditional DVB-S SD channel with a quad composition of inputs (SID1) is accompanied by a DVB-S2 HD channel in 720p/H.264 (SID2) with HD tower camera video showing the distant Cologne skyline and possibly more HD inputs in the future. To receive the second channel you need a DVB-S2 sat receiver (HD ready) which is able to decode the first channel as well. First HD test transmissions were performed already on the 3 cm DVB-T output end of 2013.

http://www.db0ko.de/dvb_s2.html

The first european HD ATV repeater ON0SNW near Antwerp (Belgium) was launched on 28.9.2013 with 10 W output on 10330 MHz, DVB-S2, SR 4500 ksymb/s, 8psk, FEC 3/4. One HD channel in Full-HD (1920x1080x50i) on TX, one HD channel on 23 cm with similar specs on RX. This way Arthur, ON4FIN, succeeded in transmitting the first european 3D HD ATV video on 18.11.2013, see the half-side-by-side 3D picture from the original m2ts video file (spatial view of leaves possible with a stereoscope).

web pages: http://www.on0snw.tv

DVB-T-News by OE7DBH (Darko Banko, OE7DBH)

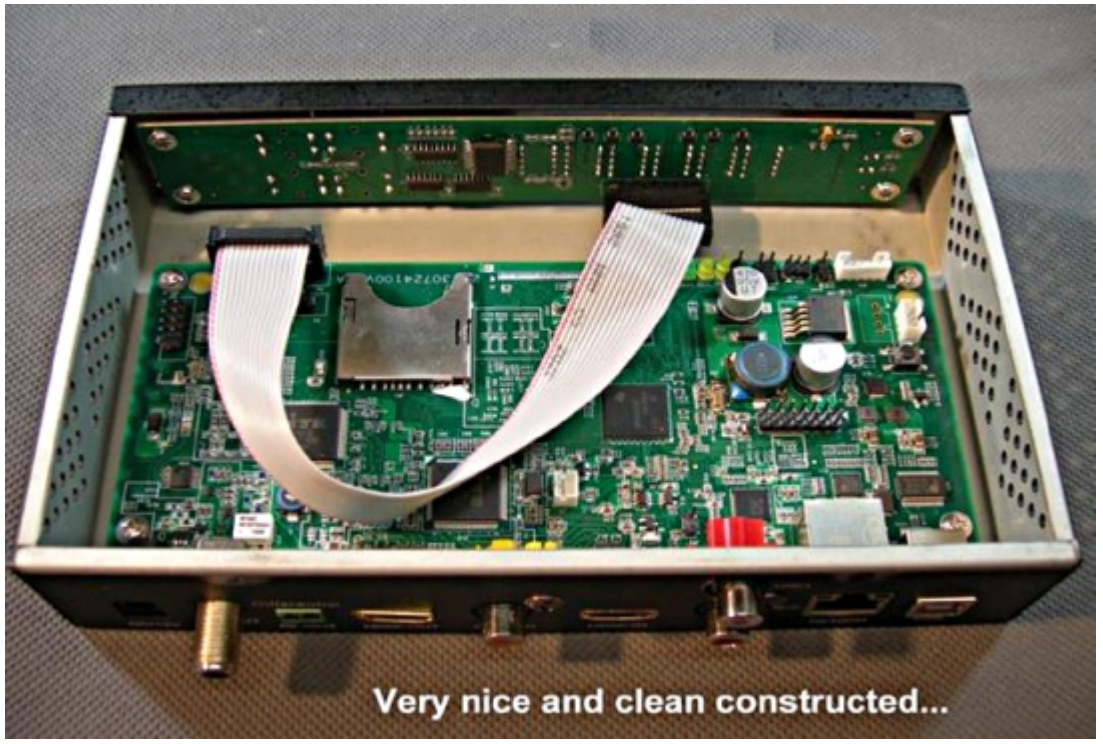
The Taiwan Company HiDes has launched the new HV-100 series Full-HD DVB-T modulator/exciter. Available for Europe: HV-100E with HDMI/CVBS in, DVB-T out – HV-101E: VGA/Component in, DVB-T out – HV-102E: 3G HD-SDI in, DVB-T out. Parameters see:

www.hides.com.tw/product_cg74468_Expandhv100e_eng.html

On-line shop at www.idealez.com/hides/product-gallery/en_US

For usage on the 23 cm band please add to your order a remark: "with Low Pass Filter 1350 MHz"!

For radio amateurs only the HV-100E is a proper choice, it is a stand-alone exciter with MPEG-2 or MPEG-4/H.264 coding,



DVB-T carriers 2k, 4k or 8k, QPSK-16QAM or -64QAM, rf bandwidth choosable between 1 and 8 MHz, PAL and NTSC video inputs for composite (CVBS) and HDMI up to 1080p, HDMI monitoring output and stereo audio level control. TX frequency range from 60 to 950 MHz and from 1200 to 1350 MHz (with proper filter as advised). Channel 1 to channel 80 are TV standard center frequencies with rf bandwidth from 6 to 8 MHz between 142 and 946 MHz. Channel 81 to 99 are freely programmable, also Ch 0, switching between by up/down keys and "ok". Exciter power output is flat over the chosen frequency range, power range from -2 dB to +6 dB on 23 cm and from -12 dB to +3 dB between 150 and 950 MHz.
Exactly measured power at +3 dB is 2,1 mW on 436 MHz and -17 dBm on 1260 MHz, spectrum shoulder below -45 dBc.
HD resolution is possible with H.264 coding from 3 MHz rf bandwidth up. The network connector is not yet supported, later on planned is 1. controlling function and 2. network video streaming! The HV-100 can detect an input video signal - without input a warning page is shown on the PC user interface. Supply voltage is 9 to 24 Volt DC, power consumption 0,52 A at 12 V.

Supporting web forum:
www.oe7forum.at/viewtopic.php?f=7&t=410&start=60#p1217

Translations from TVA 171 by Klaus, DL4KCK,
www.agaf.de

Missing flight search involves Amateur Radio Emergency Communicators

Written by G0DUB for VK3PC

The vanishing of the Malaysian Airline (MAS) Boeing 777-200ER jetliner with 239 passengers on board is a mystery that nine nations are trying to solve.

When flight MH370, ex-Kuala Lumpur bound for Beijing, disappeared from the air traffic control radar, the MAS Emergency Management Centre (EMC) at Kuala Lumpur Airport provided accommodation for all next-of-kin at the Everly Hotel at Putrajaya.

The Malaysian Amateur Radio Transmitters' Society President, Mohd Aris Bernawi 9M2IR, said MARTS was asked to provide a link between the airport and the hotel.

Mohd 9M2IR said at the hotel MARTS quickly set up a station, led by Zanirul Akhmal Zanirun 9M2PRO, and Azizi Samsuri 9W2ZZE was the MAS team leader.

NESRAC, a club from Negeri Sembilan, provided the volunteers for the station at the airport's Emergency Management Centre.

MARTS provided a cross-band VHF/UHF link to avoid any unnecessary interference from the public services. An HF link was later added.

During the call-out there were 11 volunteers at EMC and 23 volunteers at the hotel, on a shift roster for the link.

Mohd 9M2IR, who oversaw the entire process, said MARTS an IARU member society, was pleased to be able provide the link on the very tragic occasion. The search for MH370 continues.

Jim Linton VK3PC, Chairman IARU Region 3 Disaster Communications Committee.

Space the final frontier

Wow! ATV from the International space station. What a shot in the arm for all ATV enthusiasts, there has never been a time like this for ATV. The transmission used DATV, sorry for all you analogue lovers, but this was the only way we were ever going to get ATV from the space station.

I feel sorry for Grant ZL1WTT who reports that the interference from Wi Fi has just not made reception possible in New Zealand and Grant has pleaded for the transmissions to move lower in frequency. Sorry Grant, we are just a magazine. I wish we had the controls here to sort it for you.

While on the subject of only a magazine, one of our issues has now passed 4000 downloads. I hope we are providing a monthly umbrella for all ATV everywhere. I note the appearance of our magazine has been widely published in much of the ATV press, but there are one or two with their heads in the sand, clearly trying to believe we are not really here and delivering the support ATV badly needs.

My thanks also to those of you that have taken the time and trouble to email your thanks to my editorial email address. I am clearly pleasing some of you. I have not published the emails, but please let me assure you they are much appreciated.

Many of the emails have asked if we have thought of turning CQ-DATV into a club. This would not be a difficult step, and it is what the batc did after CQ-TV had been out for 12 months. They elected a committee and issued membership numbers and well, the rest is history. The late Grant Dixon G8CGK became the first Chairman, what a start to any club.

Meanwhile let me tell you what has been happening on the CQ-DATV production front. CQ-DATV was originally planned by me as a way of producing a magazine for eBooks. It was Trevor's G8CJS suggestion to go monthly and at first I thought it would end in disaster, but well, we started at the beginning of the year and this is the April edition and there is copy in the May folder. It's been hard work and on top of that Trevor pushed me into a PDF version too. The first one being DATV 7, which was auto generated from the ePub edition to see if there was any demand. CQ-DATV 8 and 9 were an improvement and were wide screen format, but time consuming to produce alongside the ePub edition.

Starting with DATV 10 we have a new member to the team, Terry VK5TM, who will be shadowing the ePub version and creating the PDF version. I am sure we all welcome Terry to the team, please expect changes. Terry has really got the bit between his teeth.

Nearer to home John G3RFL has now switched on GB3FY and the north of England now has a 10GHz ATV repeater working. Well done John. You can read all about it in this Issue.

Jan Panteltje has come up with a brilliant simple DATV transmitter that works with a Raspberry PI and transmits DATV. Jan's design has been put together on Vero Board. I never thought DATV would be possible on Vero Board!

Richard has produced another addition of his popular column 'digital world'.

Ken W6HHC has treated us to an article on using a spectrum analyser. Once the domain of the professional RF engineer, these devices are now becoming affordable and appearing in many shacks.

Trevor has his broadcast hat on again and is looking at the Cox 350 VTR clocks which often appear on eBay.

Enough from me, please sit back and enjoy reading CQ-DATV 10.

Ian Pawson - CQ-DATV Editor

From the PDF Editor.

Terry Mowles VK5TM

Hello and thankyou for the welcome Ian.

A little bit about myself by way of an introduction.
I was born in England, way back when and emigrated to New Zealand with my parents when I was 9 years old.

Having always had an interest in electronics and radio, I got my ham license in 1969. Then the usual happened, girls, cars and that other evil, a job, took over, so ham radio took a back seat.

I have had jobs in various companies involved with television in one way or another, from tea-boy to technician to producer / director, both in NZ and Australia.

Now, I am semi-retired with my wife of 13 years in the middle of nowhere, otherwise known as Tintinara in the Upper South East of South Australia, about a 2-hour drive from Adelaide.

If you are really bored or otherwise have nothing to do, this is where I live, population about 300:-

http://www.tintinara.com/index.php

To the pdf version of CQ-DATV:-

I have made some small changes to this edition.

The website URL's highlighted in blue are now clickable, so if you are connected to the 'net, you can access the web page directly from the PDF.

You will notice some of the link start with http://goo.gl/.....
It's not some form of baby talk, but a shortened version of the link (much like TinyURL some may be familiar with).

The content of the PDF edition is the same as all the other versions, but may not necessarily be in the same order. This is because of the different page layout and size.

We would like some from feedback from you, the readers, about the PDF version in particular.

Things like what you do or do not like about the the pdf edition.
Is the landscape format (the way it is now) Ok?
Do you want the paragraph headers in colour like the original (as shown on the last two pages of this edition)?
Is the font big enough for users of tablets and similar devices?

Picture quality is a trade off between the download size of the magazine and the ability to zoom the picture. So, in this edition, do you think they are of acceptable quality when zoomed?

Please send your comments, ideas and suggestions to pdf_editor@vk5tm.com.

They will all be considered, discussed and chewed over by the editorial team here at CQ-DATV, as our ultimate aim is to provide you, our readers, with the highest quality free magazine possible.

GB3FY on the air

GB3FY the Fleetwood 10Ghz FM ATV repeater is now on the air. For the regular readers of CQ-DATV we have been following the development of this ATV repeater from the drawing board, through every stage of development, construction and testing, since DATV1 first appeared last February.

There have been Eureka moments and setbacks, aerials have had to be constructed discarded and reconstructed, but on a clear March morning the team gathered at Farmers Parrs Heritage Museum to mount the repeater onto it pre prepared mast and to winch it into position

The 10m mast ready for the installation

The Mast with GB3FY aerials in place with myself John G3RFL left and Ted G4MXR picture Right looking almost pleased with their effort

Time to unveil the winch, draw lots for the winding team and the rest take cover

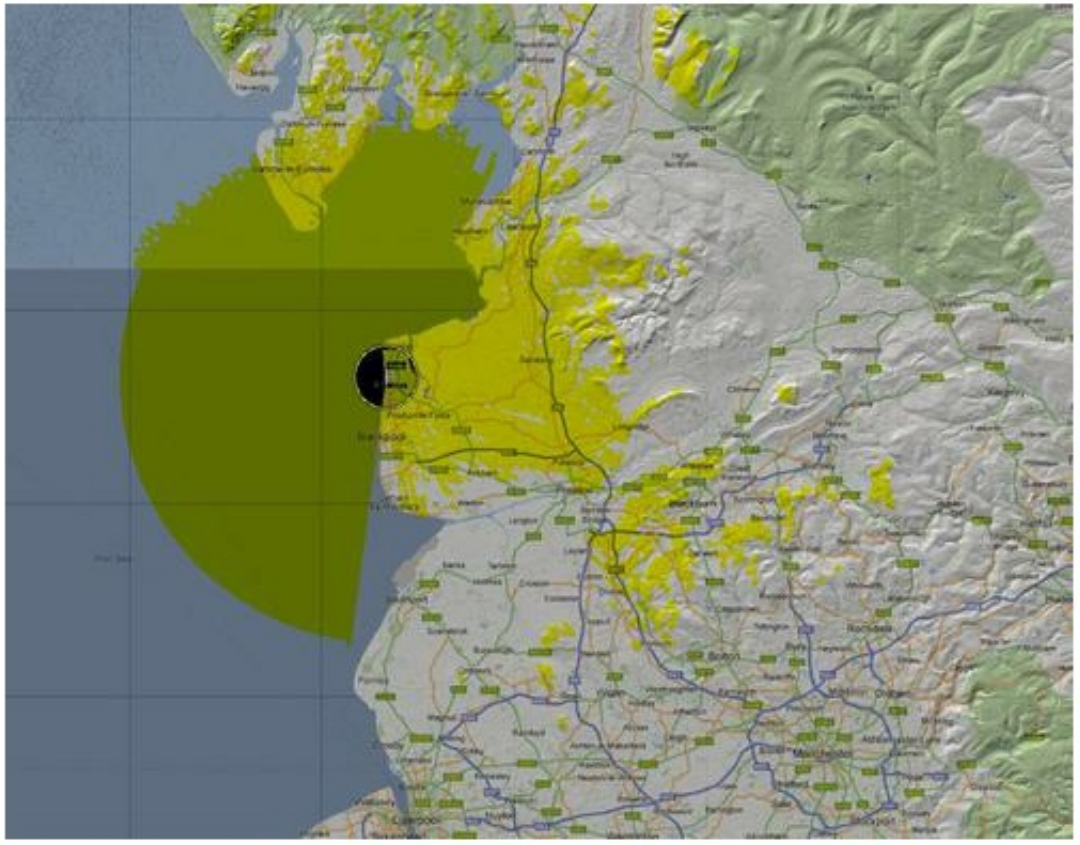
Despite the trepidation the mast soon assumed the vertical position and the team gathered for a group photograph

Left to right Brian (site Manager) Ted G4MXR Dave G3ZGZ John G3RFL

At this point non of us knew if it was working, we all had our fingers crossed, but we needed to get home and turn on the ATV kit for signal tests

Although we do not have a camera mounted on top of the mast Dave G3ZGZ was kind enough to bring his TV equipped Quadrocopter along and take this picture from a little above the mast, but it gives you some idea of the location and take off for GB3FY. This is the first ATV repeater to use a YIG in the transmitter, at the time they were plentiful on eBay but alas since the original CQ-DATV article on using them for ATV they supply seems to have dried up.

Back home and the reception exceeds all expectations with P5 pictures at G3RFL site



This is an early coverage prediction. As soon as the weather improves the team will be out collecting coverage data. In the meantime all reports to editor@cq-datv.mobi

DATV-Express Project. February update.

The initial sales of DATV-Express boards have gone well...and rather smoothly. The initial production batch of 24 boards are all gone. Art WA8RMC ordered the assembly of another batch of 50 production boards, and they came in during the last week of February. Art is currently testing each of these new boards. Boards can be ordered from the PURCHASE link on the web site.

Charles G4GUO made a number of tweaks and clean-up of little bugs in releasing v2.01 of the software during February. The v2.01 software is available on the www.DATV-Express.com web site under the DOWNLOADs link. Details of the actual changes are described in the README document, also located on the DOWNLOADs page.

Ken W6HHC made use of feedback from early owners of the DATV-Express board to improve and add missing details to the User Guide. Draft33 of the User Guide now contains 44 pages and can also be downloaded from the web site.

It is satisfying to see that there were a number of first-time linux/ubuntu users with the early board owners...and they have made their way through successful installation of the software and have their board running. The only area of difficulties has been with the old Hauppauge model PVR-150 PCI-based video-capture board.

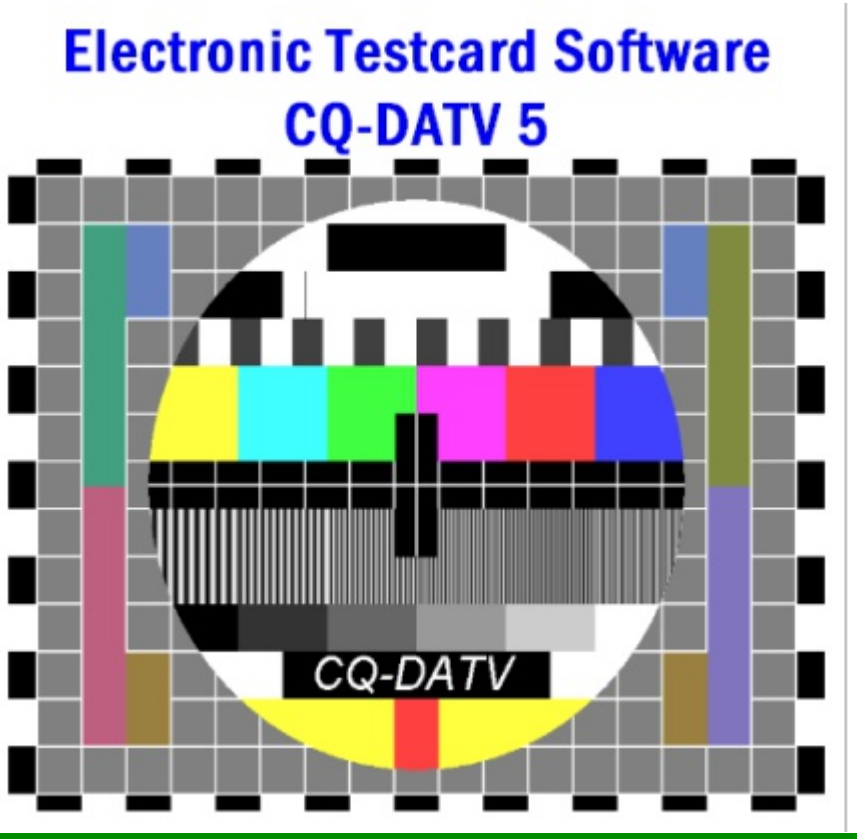
G4EWJ and G7OCD of the DigiLite team had explained on the BATC Forum and CAT2012 that the video bandwidth design of the PVR-150 was less than that of the model PVR-350. The PVR-150 resulted in somewhat poor colors, until it was configured to use the S-Video stream with the DATV-Express software (instead of the expected composite-video stream). The DATV-Express project team has been using mainly the Hauppauge model HVR-1900 USB2-based unit for PAL cameras, and the HVR-1950 for NTSC.

If you can't obtain a USB2-based Hauppauge unit, then the PVR-350 and PVR-550 seem to be better choices than PVR-150.

Charles G4GUO has now turned his software attention to porting more of the DVB-S functions into the board FPGA code to allow the DATV-Express board to be run by a Raspberry-Pi processor board. (Warning - the Raspberry-Pi effort is a much bigger effort than one or two months.)

Finally, if you have questions about capabilities of the board and software or are having questions setting up or using a board, please contact our support team by using support@DATV-Express.com

"full speed ahead" ...de Ken W6HHC



A Simple Digital ATV Transmitter for DVBS Using the Raspberry Pi

By Jan Panteltje

First of all I should explain I am not a radio amateur so the frequencies of this small digital transmitter have been chosen so I can feed it into my Satellite RX and secondly this is not all my own work, I must acknowledge the Pioneering work done by Jean-Francois Fourcadier, F4DAY http://goo.gl/AzHpo4

I also made use of simplifications made by F4AGC http://goo.gl/p1c9Vt . I simply simplified things some more.

The windows TS188ToIQ.exe software written by Evariste, F5OEO proved valuable to compare my ts2iq.c software output against.

The software running on the Raspberry Pi converts a MPEG2 stream to an 8 bit wide IQ stream made up of 4 pairs of 2 I and Q bits, that is then sent to a separate board. In this board the

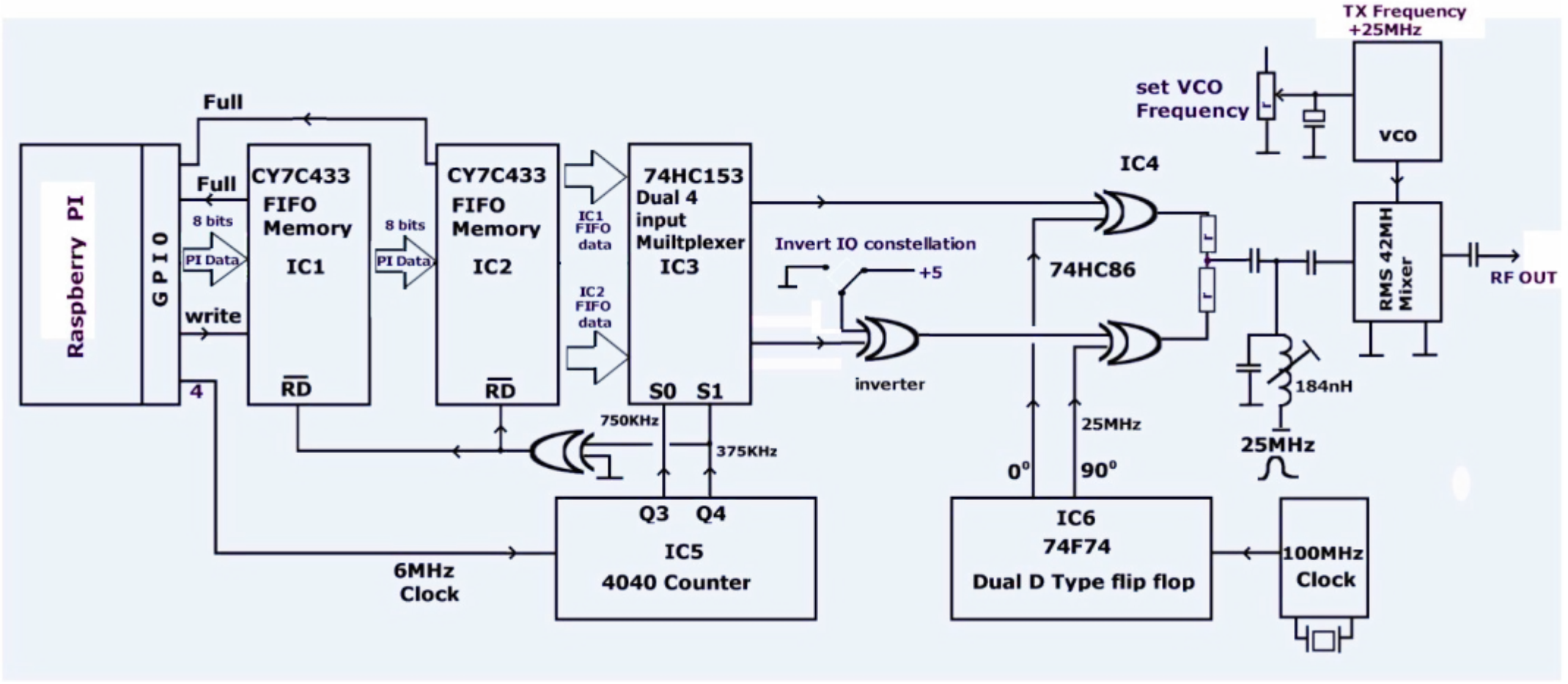
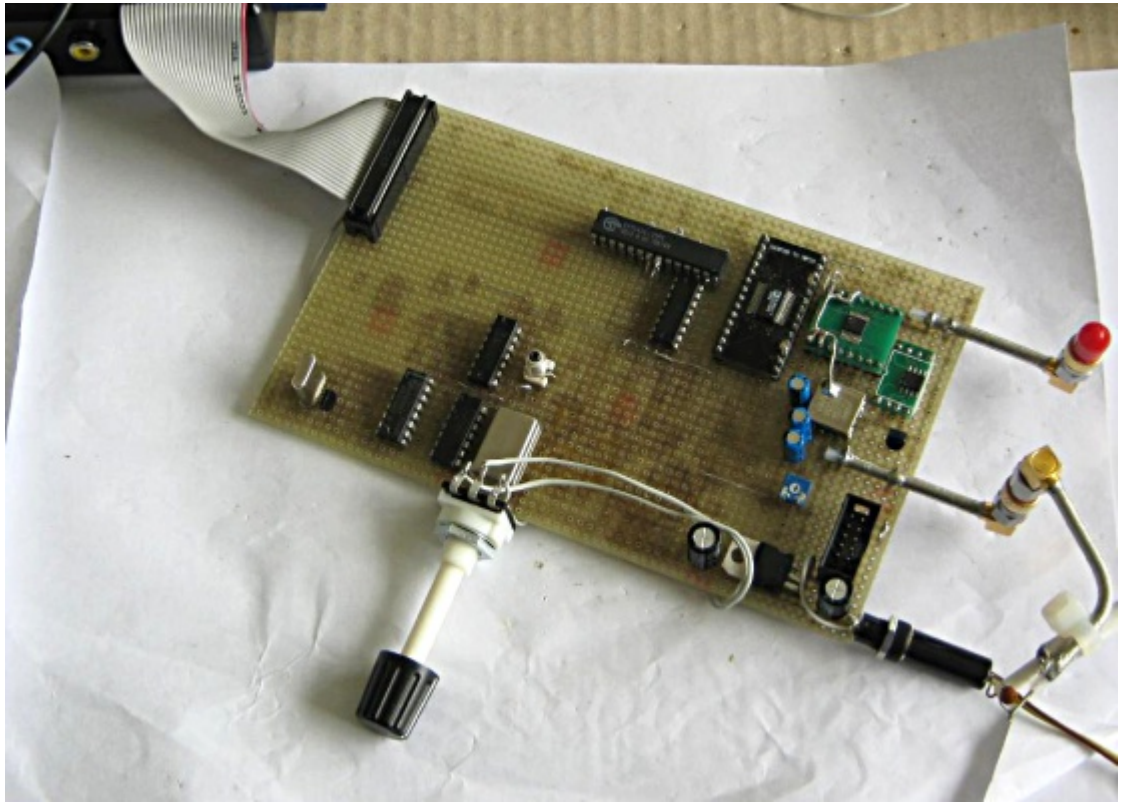


Figure 1 shows the bare bones of the unit

stream is buffered by a FIFO (first in First out memory) to make sure a constant regular signal is present for transmission. This regulation is done by sending a 'wait' signal to the Raspberry Pi any time this FIFO buffer is full. The Raspberry Pi also generates the clock frequency needed to split the 8 bit digital signal back into the 2 original I and Q signals, and present it at a very exact speed to the quadrature modulator.

That clock frequency determines the number of IQ pairs sent per second, the so called 'symbol rate', In this design this symbol rate can be set in the software.

The output of the quadrature modulator is filtered and mixed up with the help a local VCO and ring-diode mixer resulting in the required output frequency.



The original construction was on Veroboard

The 2 FIFOs are mounted on top of each other as all data lines are in parallel. Ignore the Analog devices DAC and QAM chip, they are not used for this project.

Only Pins 10,12 17, 19,9,11,16,23 should not be connected between IC1 and IC2, they can easily be bent out and with the exception of pin 23 all connect to IC3. There is also a little prescaler all the way to the right on the veroboard that again is not used. It provides 6 MHz out for use with a PLL that might be added later.

There are a lot of small electrolytics around the VCO for decoupling to reduce phase noise, do NOT use ceramic SMDs here, those are so microphonic that breathing on the board changes frequency already.

New in this version: the clock for the symbol rate is generated by the Raspberry Pi and output on GPIO_4 pin 7, fed into the 4040 counter, the 6 MHz crystal oscillator is no longer needed. This allows one to specify the symbol rate on the command line!

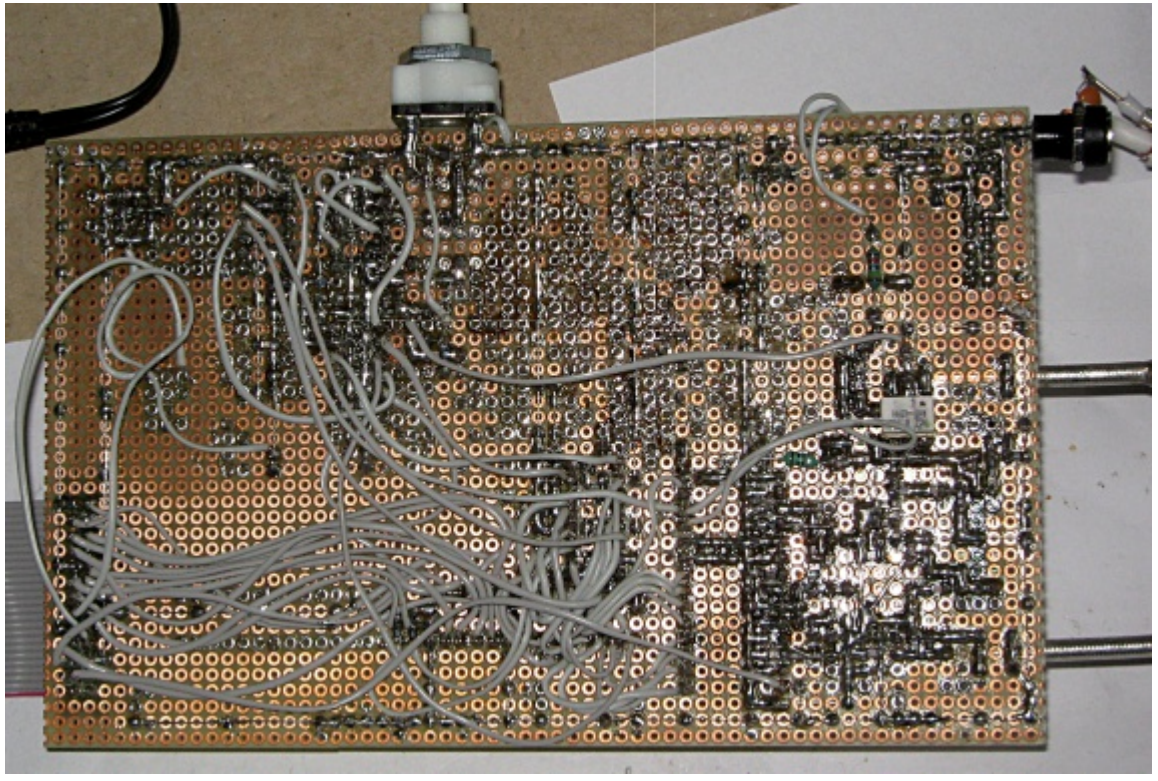
There is an XOR gate inserted in the Q line so it flips the constellation to what seems the normal way for a DVB-S receiver.

If you connect the other input to +5V the XOR inverts, that way there is no need for the software to invert I or Q (-i command line flag), and that saves processor cycles, we will need those for the camera.

As time goes by I come up with improvements.

The other XOR gate is used here as a buffer, I think it can be omitted, but maybe the gate delay is needed

(it drives the FIFO read pins), so why not leave it.....:-)



The underside of the board is a little scruffy, you can see the little white mixer on the right, RF wiring is very short with lots of SMDs (that you can see if you look close), those fit nicely on this type of board exactly between 2 isles, the 'low frequency' wiring is just wires stripped from a piece of flat cable.

Power required is about 9 V DC at <300 mA (with the AD chips), a lot less if you leave those out.

How to make a valid transport stream

A very simple way to make almost any format file into a .ts usable for transmission with this transmitter is this script:

```
ffmpeg -i $1 -f mpegts -acodec mp2 -ac 1 -ab 64000 -ar 48000
  -s 720x576 -deinterlace -r 25 -aspect 4:3 -vcodec
  mpeg2video -b 1200k -maxrate 1200k -minrate 1200k -bf 2
  -bufsize 1343488 -y my.ts
```

where $1 is your input file, it produces a transport stream with very close to 1500 kbps bitrate, mono audio, 720x576 progressive.

Adjust the 1200k so the total bitrate of the generated .ts is exactly 1500k, so no cache underflow or overflow on reception, needs a bit of experimenting.

This example uses different audio and video input files, this bitrate plays nice on my system with symbol rate 1500k:

```
ffmpeg -i b.mpv -i b.mp2 -f mpegts -acodec mp2 -ac 1 -ab
64000 -ar 48000 -s 720x576 -deinterlace -r 25 -aspect 4:3
-vcodec mpeg2video -b 1200k -maxrate 1200k -minrate
1200k -bf 2 -bufsize 1343488 -y my.ts
```

You can get flawless reception by sending the received stream to a file (use xdipo record function if you use xdipo for receiving), and then start xine (or mplayer) on that file a bit later, time shift :

```
cat /dev/dvb/adapter0/dvr0 > rx.ts
```

wait a few seconds, in another terminal: xine rx.ts

In fact it does not matter at all what is IN the transport stream, as long as there is a hex 0x47 byte each 188 bytes, not even the program stream pids are needed.

That makes it easy to write a program to transfer large files...send 0x47 send 187 bytes of data, send 0x47, send next 187 bytes of data, and on the receive side, wait for 0x47, skip

it, write 187 bytes to output, test if 0x47, skip it, write next 187 bytes...

But that would not conform to any standard that I know about, but who cares.

As to standards, you probably also need to add PAT, PMT, other things.

I have been trying things with opencaster , it is free open source, try downloading the manual, it gives more information than I can give here in a few lines of how to make a valid transport stream. http://goo.gl/YBWHjs

To check your media files there is the mediainfo program for Linux, I use it a lot, gives good info on transport streams you encode. http://goo.gl/PjrmU6

The math

We are sending 1500k symbols per second, that makes 3,000,000 data bits per second.
With a FEC of 1/2 that makes 1,500,000 real data bits per second, as for every data bit convolution has added a correction bit.

Because of Reed Solomon encoding we added 16 correction bytes to every 188 bytes, so that leaves us 1,500,000 * (188 / 204) = 1,382,350 usable data bits.

When we run the above generated my.ts through the mediainfo program we see (among many other things): mediainfo my.ts
Overall bit rate: 1392 Kbps

So we are very close to the required 1,382,350, that is why I wrote 'experiment with the 1200'.
Mediainfo also shows that the video bitrate is 1,231,000, and the audio bitrate is 64,000.
When we add audio and video bitrate we get 1,295,000, where is the rest?

The rest is in PAT (PID 0) and PMT (PID 4096) packets and packets containing the service ID (PID 17), generated by ffmpeg.

Media info does not show all pids, but I wrote a nice little utility - jpfilter-0.3.tgz - that can filter and show pids

http://goo.gl/d2tr8x

(try jpfilter -p < my.ts)

Filter out PID 17: jpfilter < my.ts -a 17 > q1

Use a hex editor to see what is in q1: hexedit q1 , or type: strings q1. AHA!!

FFmpeg Service01

So what should we do to be exactly at the right bitrate?
1,392,000 - 1,382,350 = 9650, subtract this from the 1200k as we are too fast, makes 1,190,350, change the 1200k to 1190350 in the script and re-encode.

Other FECs

With a FEC of 7/8 we need (7 / 8) * 3000000 * (188 / 204) = 2419117.647058823 bits per second (I use wcalc -c).

Experimenting gives 2150000 as a close value in the above script to make a ts that mediainfo reports as: Overall bit rate: 2415 Kbps.
Replace 7/8 with 2/3, 3/4, 5/6 for the required bitrates for the other FECs.

There is also the accuracy of the 6 MHz crystal oscillator (symbolrate), and on the receiving end the sound card crystal oscillator that has an effect.

When receiving such a file with xdipo -f 11350.42 -s 1500 -a 8192 -o | mplayer -cache 8192 - , look at the last % indicator on the command line, it is the cache fill, should be stable around 20%, if it increases or decreases a lot then you need to re-encode the ts with a different bitrate, that is how I test.

Transmitting a transport stream

Download ts2iq_pi.c, this allows you to send a transport stream format movie from the Raspberry Pi SDcard.

Current version is 10^-97.81_pi, also added the IQ file read function, and tested all FEC modes (see examples section below).

Full source in C, compile it on the Raspberry Pi (NOT on the PC, the Raspberry has an ARM processor!), compile instructions are in the source file: ts2iq_pi-10^-97.81.c

Making an IQ format file on the PC with ts2iq

This ts2iq program does the same as the TS188ToIQ.exe, but this one supports all allowed FEC modes, and in Unix you can pipe the stream through it!

The full source code, compile instructions are in the source file, current version is 10^-97.1: ts2iq.c

http://goo.gl/kXNJK9

Making an IQ file on the PC from a .ts file: ts2iq < my.ts > my.iq
It is no problem to for example do this on the Raspberry: netcat -l 1024 | ts2iq_pi -p

And on the PC then start this: ts2iq

This does the CPU intensive part on the PC, and the simple sending it to the hardware part on the Raspberry, allowing live 7/8 transmission!

Or like this on the PC:

ffmpeg -i almost_any.format -f mpegts -acodec mp2 -ac 1 -ab 64000 -ar 48000 -s 720x576 -deinterlace -r 25 -aspect 4:3 -vcodec mpeg2video -b 2150000 -maxrate 2150000 -minrate 2150000 -bf 2 -bufsize 1343488 -y - | ts2iq -f 7/8 | netcat 192.168.178.70 1024

Possibly you can have ffmpeg read from a /dev/videoX, some camera, webcam, whatever.

Receiving the transmitter

I can play this no problem with:

xdipo -f 11350.42 -s 1500 -a 8192 -o | mplayer -cache 8192 -

A modified version of my dish positioner program xdipo I made, with a control panel for the STV0299 chip.

Go here http://goo.gl/v3nlaJ to download xdipos.0.x

This should work on budget DVB-S cards with that chip, I use a Hauppauge wintvnova PCI card.

I wrote this code to be able to see a little better what was going on receiving the DVB-S signal from the Raspberry Pi.

This version is a modified old version that does not support HD.

The newer version is here, http://goo.gl/KfyH9d, and does support HD, but as my HD receiver has a different chipset, the STV0299 control panel is not provided.

You also need to recompile the kernel, and load a different kernel module so the program can read and write the chip registers.

Sort of a Linux clone to Tutioune, but hey it is not complete, I wrote this is a week, Tutioune has been at it for years...and this was all I needed for my tests.

Feel free to improve on - and add to it :-)

If xdipos does not work for you, then you are on your own, for me it is just a test program, it requires in depth knowledge of Linux, the STV0299 chip, and the kernel drivers.

Notes on receiving transmissions with a DVB-S receiver.

Using the DVB-S receiver without LNB, so sending the signal directly into the IF input (= LNB connection), we need to add a blocking capacitor for the 12 to 18 V DC on that line that is there to power and control the LNB.

At these high frequencies a few pF is already enough.
The receiver will assume an LNB, and subtract the selected local oscillator frequency from the requested frequency to get the correct IF frequency.

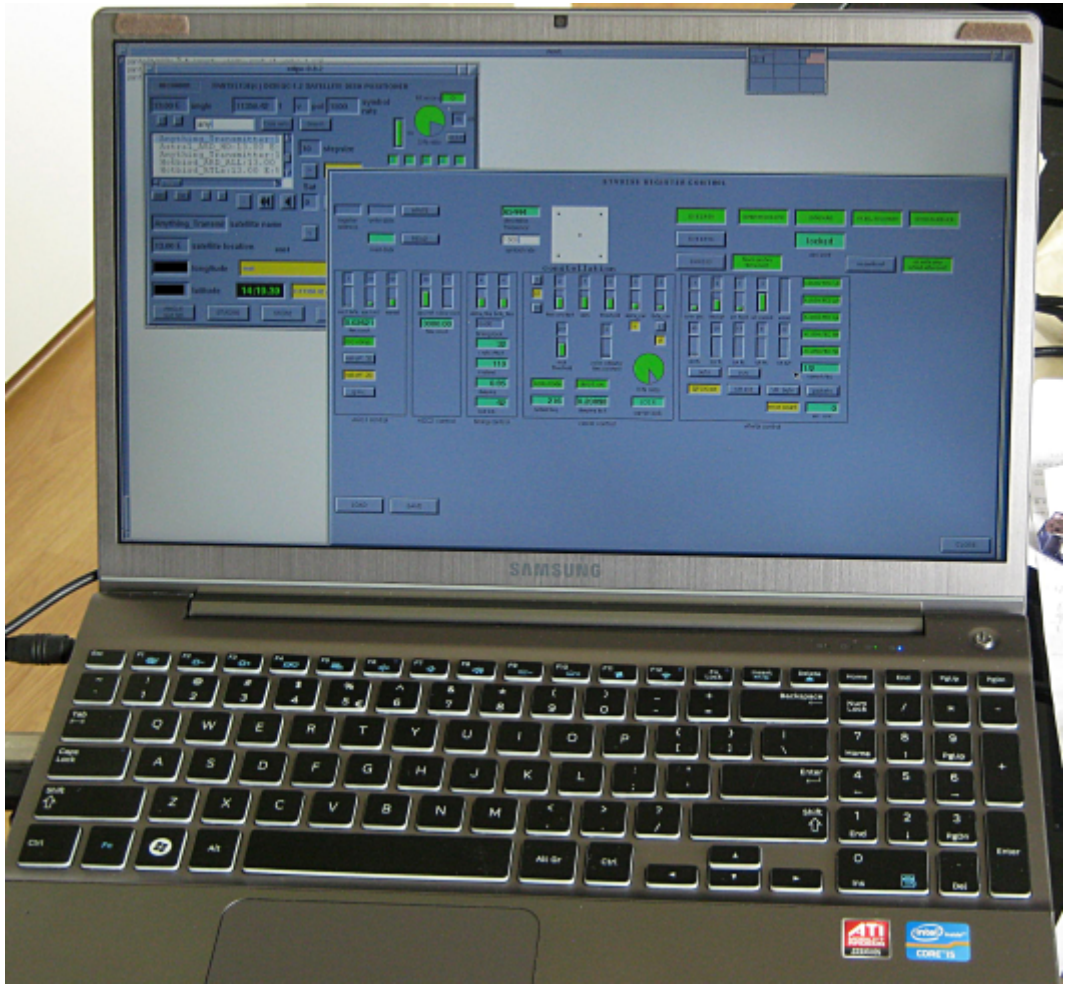
This means if your transmitter is at for example 1600.42 MHz, you will need to specify 1600.42 + 9750 = 11350.42 MHz.

The 9.750 GHz is for a normal European Universal LNB local oscillator, in other areas of the world things may be different, there is more info on LNBs at:-

http://en.wikipedia.org/wiki/Low-noise_block_downconverter

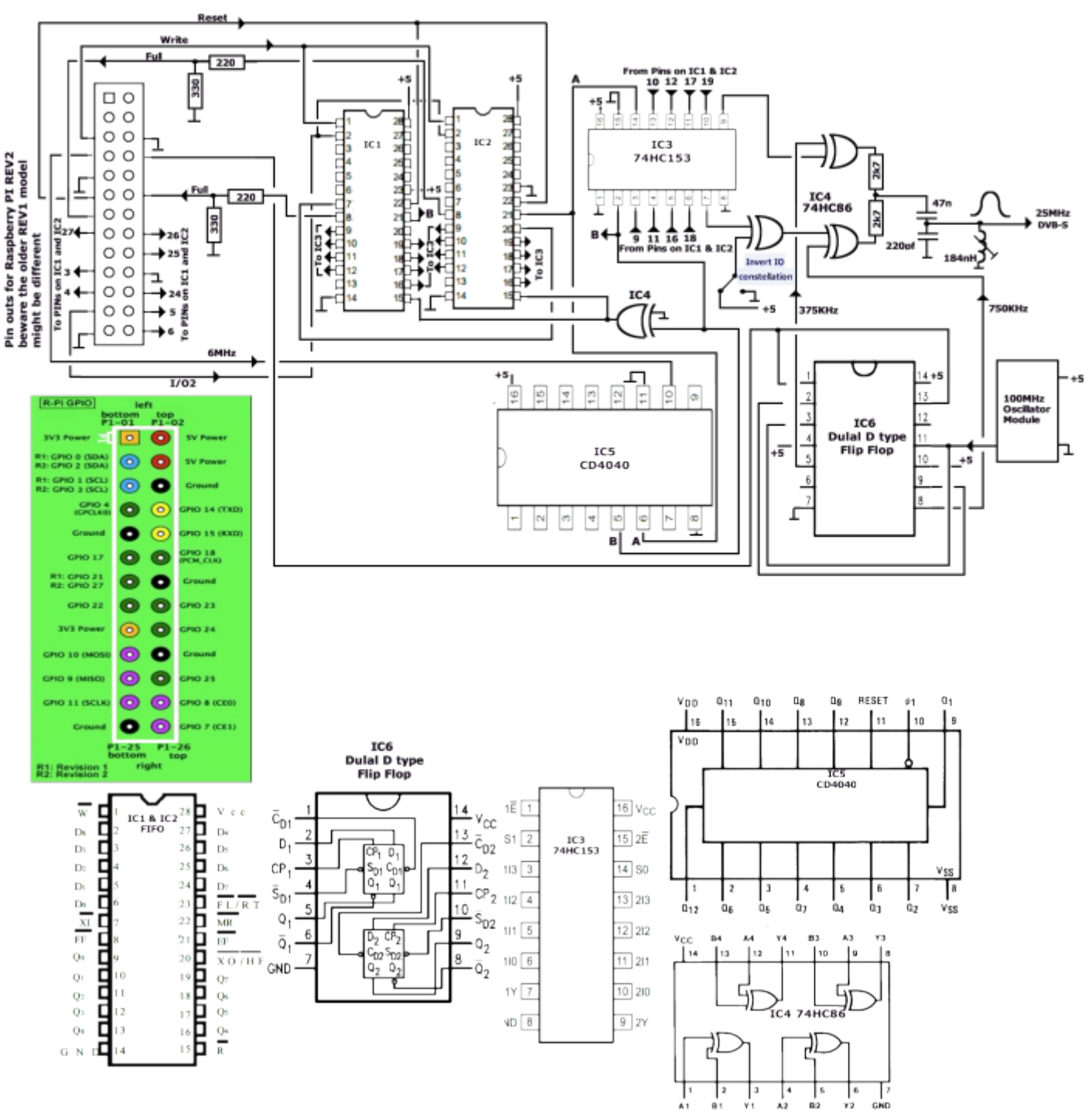
Project details available here:

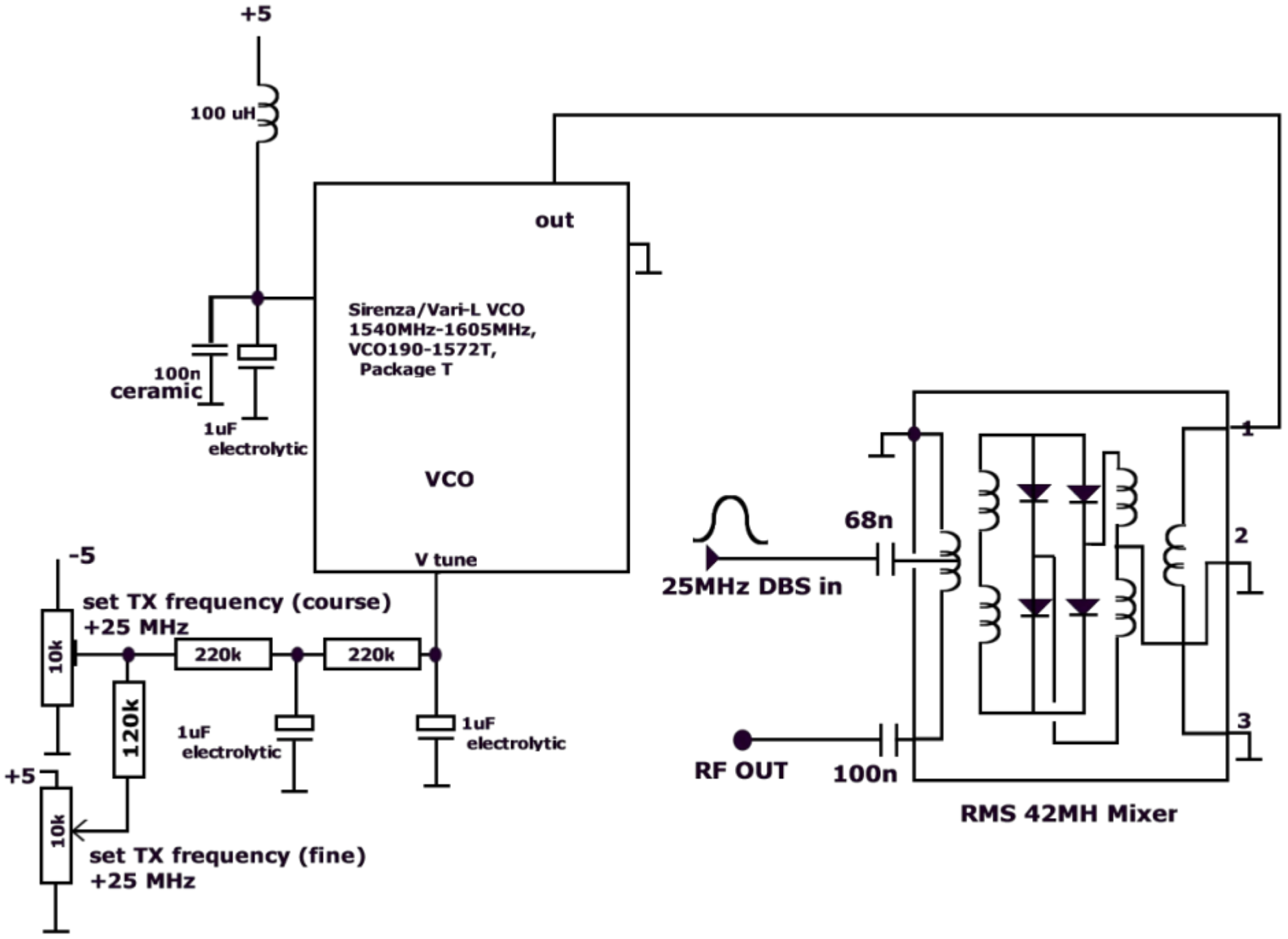
http://goo.gl/AvQUiR



Capturing a movie

The complete circuit diagram which I hope is sufficient to support a home construction. Continued next page

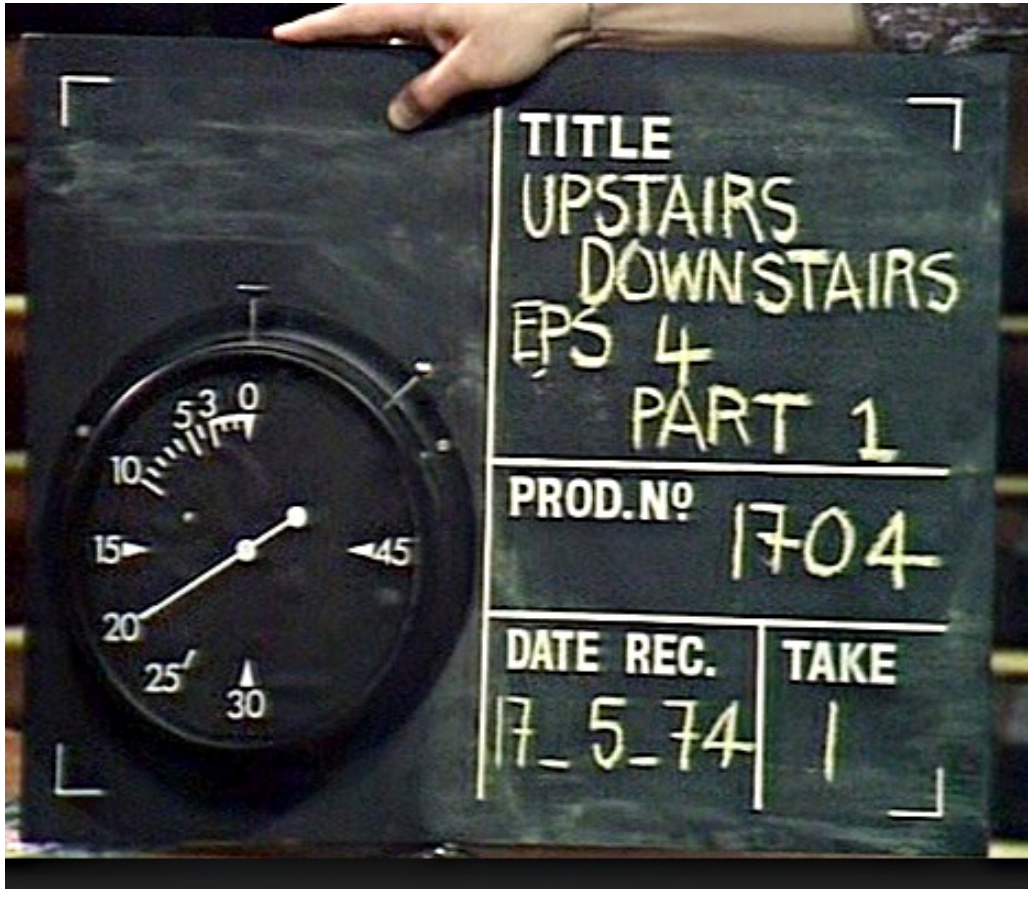



+5
100 uH
out
Sirenza/Vari-L VCO
1540MHz-1605MHz,
VCO190-1572T,
Package T
100n
ceramic
1uF
electrolytic
VCO
V tune
-5
set TX frequency (course)
+25 MHz
10k
220k
220k
120k
1uF
electrolytic
1uF
electrolytic
+5
10k
set TX frequency (fine)
+25 MHz
68n
25MHz DBS in
RF OUT
100n
1
2
3
RMS 42MH Mixer

Custom programming the COX 350 VTR Clock

By Trevor G8CJS

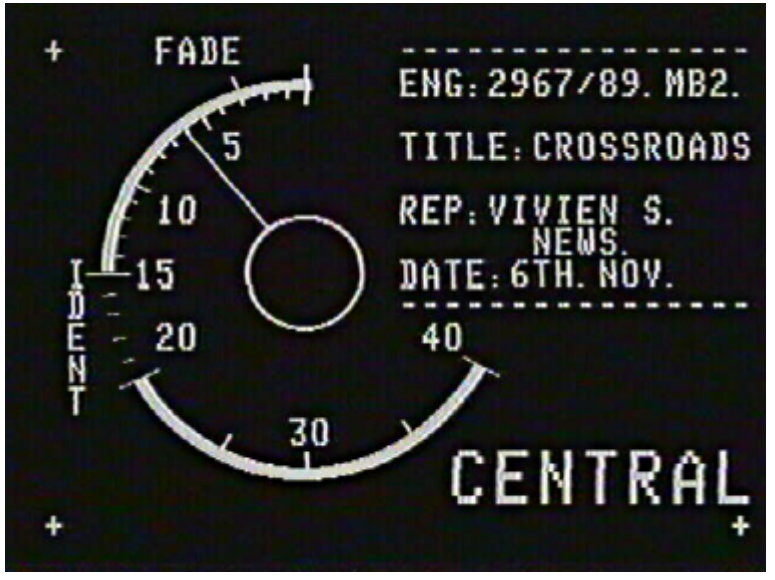
Every recorded TV programme has a VTR clock before it on the tape in order to cue it up and to identify it as the correct programme to be transmitted. Originally these were mechanical devices integrated with a slate, that could be held in front of a studio or OB camera.



They were often inaccurate and tied up a TV camera from framing up its first shot at the start of the production.

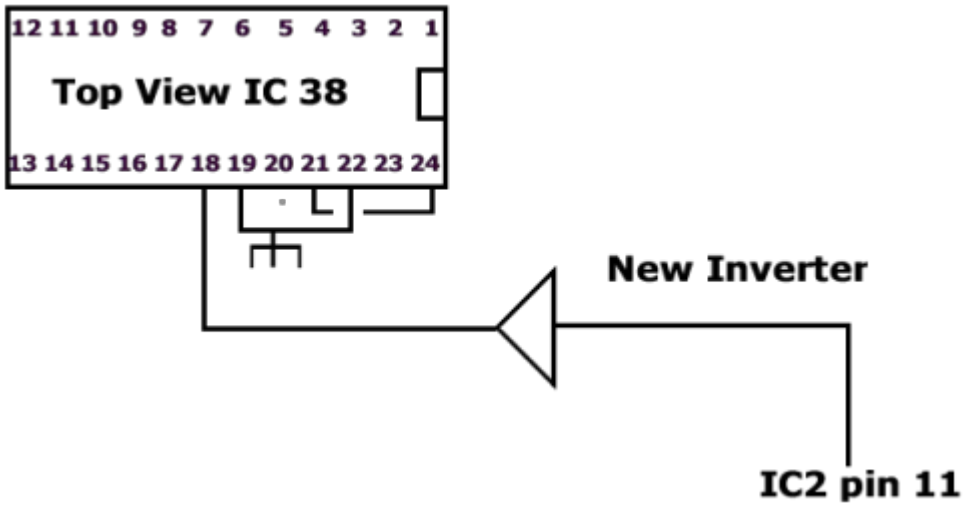
The answer came from Thames Television who developed the first electronic VTR clock, the prototype was then engineered by Cox Electronics into a 2U rack mounted case and marketed as the Cox 350 VTR clock. It appeared in the late 70's and soon replaced all mechanical clocks. The 350 was driven from an electronic keyboard, so the production details could be typed in. The keyboard was located in the production gallery, so Chinese whispers were no longer required to pass the details along to the studio floor for China graphing onto the blackboard area . There were rumours that the introduction of the gallery keyboard, caused industrial unrest in some quarters where the operation of QWERTY keyboards was monopolised by people outside the production gallery and in an attempt to quell this an alphabetical keyboard was introduced.

Many of these clocks turn up on the surplusmarket and can easily be pressed into service. They require a reference feed of mixed sync or colour black. They then produce a video output of the clock display, that can be started and have production details entered into the appropriate part of the screen from the keyboard.



The only downside to these very serviceable units is that they all come with the broadcasters details programmed into the bottom right of the screen. This information is in a programmed chip and cannot be changed from the keyboard.

This is fine if you are a collector of broadcast antiquity, but if you want to remove these details then the following may be of help: -The details are programmed into a PROM(IC38) on board two, unfortunately you cannot simply remove this chip



or the screen will be full of question marks.The PROM used for IC38 is also not re-programmable and is not pin compatible with a re-programmable EPROM. The 2716 is the nearest programmable chip, but some hardware modifications are necessary.

- *Pin 22, which is floating, needs grounding.*
- *Pin 19 needs separating from pin 18 and grounding.*
- *Pin 21 needs separating from pin 20 and routing to the +5V available on Pin24.*
- *Pin 18 is chip enable and on the old prom its active high and on the 2716 it is active low, so this feed needs an inverter in series with it.*

I could not find a spare inverter gate on the PCB or something that would adapt. I solved the problem by the addition of an SN7404, out of the junk box - a SN74LS04 would have done. This additional chip was placed on its back adjacent to IC2 and wired to the+5V and ground.

IC38s chip enable which goes to IC2 pin 11 is intercepted and routed via one of the inverters in this new package.

The PCB will now accept a 2716 EPROM. The EPROM needs programming with all the clock face details and the custom logo can be omitted or changed at this stage. If you go to the http://www.cq-datv.mobi/downloads.php you can download a file coxx.dat that has all the details of the clock face, but without a custom ident. If you want to add a custom ident of your own then this can be programmed in at location 01B0h and can be 16 characters or 8 large characters.

The EPROM is laid out so that bits 0 to5 carry the character code in ASCII. Bit 6 is unused and bit 7 controls the line and field clocks of the character generator, and thus switches in the large character mode. If we programme in 41h a large font A will result To understand this we need to change the hex digits to binary.

41 hex = 01000001 C1 hex = 11000001 i.e. the least significant bits are the same but bit 7 changes, when bit 7 is low a large font size is produced and when bit 7 is high a small font size is produced. The other characters follow on i.e. C2 = B and C3 = C and so on. The numbers start at F1 = 1 and F2 = 2 and so on, so yes you can programme in your call sign or telephone number.

Address:-

- *01b0 = 47*
- *01b1 = 38*
- *01b2 = 43*

- *01b3 = 4a*
- *01b4 = 53*

would put G8CJS in the programmed area of the screen.

Please do not confuse the Cox 350 with the later clock which I think was the 600, it is a completely different design and although the keyboards have the same connector they cannot be interchanges as damage will result.

Before you ask Ident between 15 and 20 is a verbal read of the production details, is that overkill well no, back in the 70's we had several batches of faulty video tape, with backing problems, which deposited white powder onto the VTR heads and the result was, several tapes that were difficult, if not impossible to replay, while the verbal ident might not restore the picture it did let you know you were holding the correct tape.

The details were also recorded on the paperwork in the tape box and on the label attached to the tape box. Ever seen the wrong programme transmitted well the answer is yes. The studio recording is often not the final product, some shows are recorded as live ie no VT editing, but often end up requiring an edit. The popular channel 4 series countdown springs to mind, I have often edited episodes where problems in the production, such as debates on rude words have taken place, but I am sure you have all seen the out-takes.

Other programmes have required sound dubbing, which changes the audio but not the sound, and there is little chance of changing the clock in an audio suite so again this requires sound dubbing and sound dub complete, may only be on the VTR paperwork, been there too.

- *A 10-GHz PA for all modes by H.-M. Fruits, DF9CR*
- *DVB-T News from OE7DBH by Darko Banko, OE7DBH*
- *A multi-band FM ATV transmitter 1.2 to 3.5 GHz by Roberto Zech, DG0VE*
- *Considerations for DVB-T at 70 cm by Hans-Karl Sturm, HB9CSU*
- *PGA103 + - a 50-mW broadband amplifier by G4DDK and WA5VJB*
- *Hamnet ATV relay for less than 50 euros by Frank, DL3DCW*

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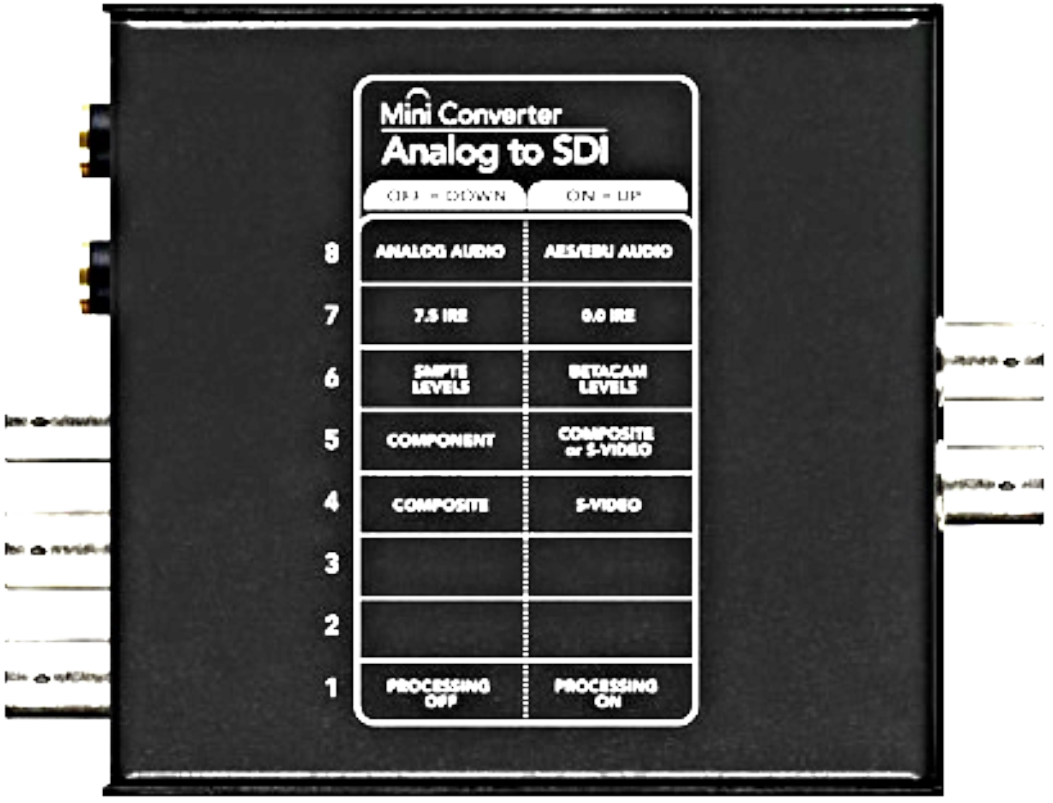
By Richard VK4XRL

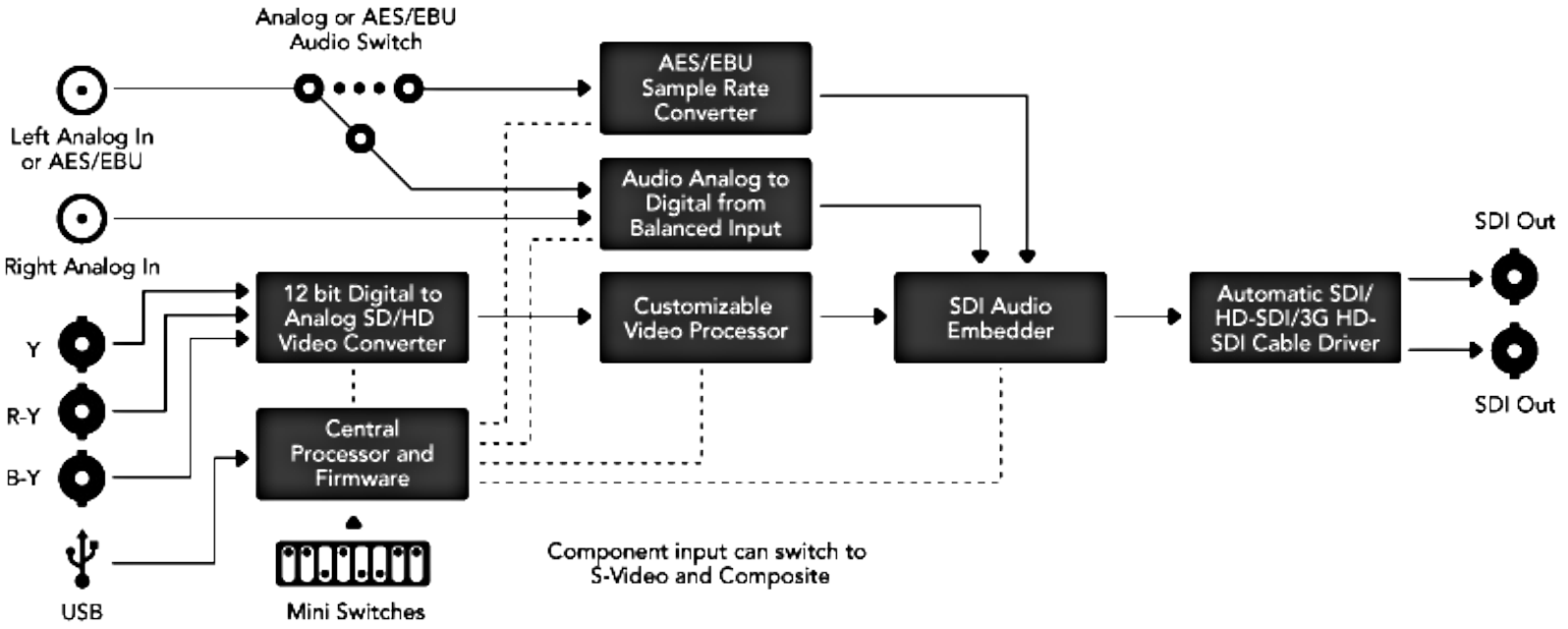
In the last issue of CQ-DATV No.8 we looked at ways to control camera lens that may come available via EBay or the like. This issue we are looking at some commercial equipment.

Just prior to Christmas 2013 we received a number of pieces of commercial equipment that was either from transmitter/Station upgrades or re-staking of channels due to the Government selling the UHF band 5 segment to mobile services etc.

The idea was to upgrade our own repeater system and have the added advantage of upgrading if required at a later date. So what did we receive in this first load of equipment?
The first Item was a Black Magic designed mini-converter that interfaced the composite PAL signal to SDI (www.blackmagicdesign.com/au).
The audio signal is embeddered within the SDI signal and settings can be changed as required quickly without reference to a manual.

The second piece of equipment was a Tandberg encoder model No. 5611.
Searching the net I found enough information as how to change it and was completed very quickly. The input to the encoder required SDI so the output from the mini-converter was feed into it and by selecting the input via the control buttons you could see the input signal and the diagnostics showed no errors.





Unfortunately I don't have any equipment to check that the connections and setup are working together. The Tandberg Encoder has two ASI outputs which would feed into the digital transmitter. It would also be possible via a mux unit and another encoder to provide two transport streams.

The next unit was in fact a Digital exciter fitted with a 2W driver power amplifier. The unit is a CTE-DL series as used for translator service and can driver a 250W digital power amplifier-which I hadn't received-as yet I hope? The unit can be setup using the Power supply and Metering Panel readout and associated buttons. The unit comprises six units being as follows;

1. *10MHz Reference (Optional)*
2. *Spare in our case*
3. *COFDM Modulator*
4. *IF Processor*
5. *Synthesized LO*
6. *Up-Converter*
7. *Power supply and Metering*

The next step was to check out the operation if possible on

446.5MHz being our repeater output frequency. Firstly the ASI output from the Tandberg encoder was connected to the one of the four inputs on the Modulator and then selected by the metering panel. From here I noticed that the Carrier Loss LED was 'on' indicating loss or very low level of the IF carrier.

Further investigation by removing the Modulator and housing it was seen that the +5 supply wasn't working and this also supplied inputs to the other two supplies being +3.3v and the +1.5v. On further inspection the +5v supply had a major problem as the board was very badly burnt. Checking with the operational manual that I had the layout and circuit weren't the same and there was no way of knowing what was faulty or missing.

I then substituted a +5v supply in its place using parallel 7805 regulators. This now had the other supplies working and the carrier loss light was now distinguished. We were still not out of the woods as you will see. The next problem was the LO, it was fitted with only the Australian digital frequencies, therefore the thought turned to providing a new separate LO tuned to 483MHZ (the IF was set to 36.5MHz). I had on hand a Mini-Circuit POS-535 VCO so that was pressed into operation as the LO.

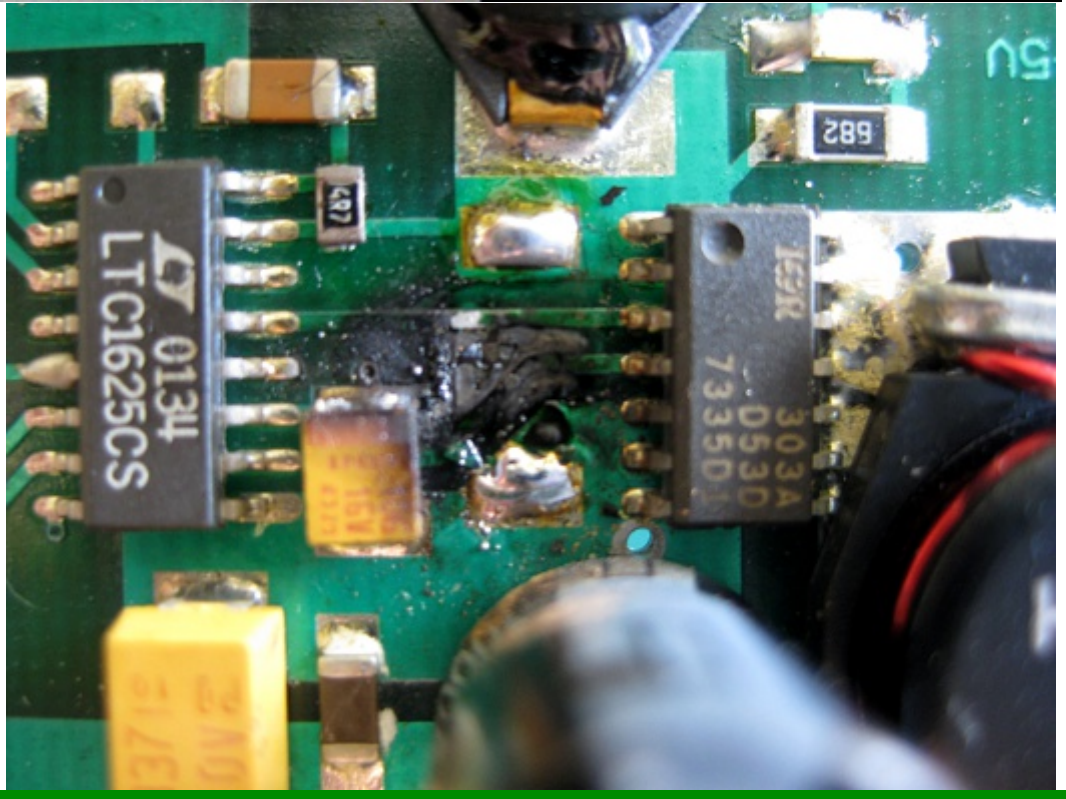
The next problem was the up-converter for it had a combine filter that needed retuning. Having accomplished the retuning

and with everything connected up I now had a reading on the STB tuned to our ATV repeater frequency. But alas it was only showing signal strength no quality setting was evident.

It looks like the modulator may have suffered more then was shown due to the possible faulty supply. There maybe some interconnection feedback from other modules missing when I used my separate LO. I am hoping that I can get my hands on another modulator to check that part of the operation before barking off on different tangents. It could also be the Tandberg encoder as I have no way of testing although the diagnostics say 'no errors'.

If anyone has had any experience with these units or have up to date circuits or information please let me know, that would be appreciated. I did email the company but had no reply.

To be continued.....



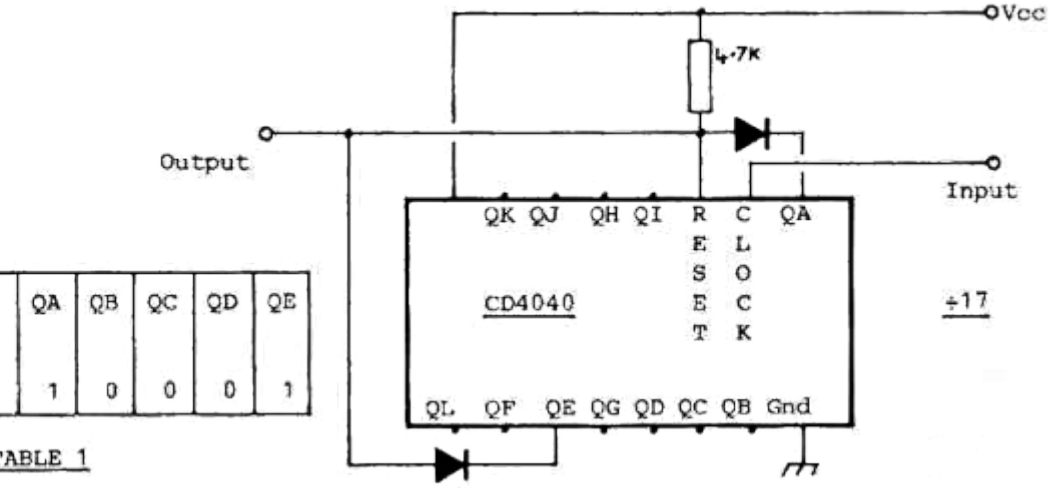
The badly burnt area on the board

Dividing by 'N ' with a CD4040

By Trevor Brown G8CJS

addition of simple diode array, may be programmed to divide by any desired number.

FIG 1



Diode Required	QA	QB	QC	QD	QE
Binary number LSB first	1	0	0	0	1

TABLE 1

First, choose the number by which you wish to divide and convert it into binary form; ie 17 = 10001. Each '1' corresponds to a diode being required in the array. The diodes are placed as shown in fig.1 of the LSB of the binary number, indicating a connection to QA.

The CD4040 reset is active 'high', so pulling it high with a 4.7k resistor will cause a reset - providing none of the diodes are conducting, a state which exists when the binary equation has been met by the counter.

A good use for this circuit would be a digital caption roller for use with electronic character generators.

If the circuit is driven with mixed sync pulses and set to count 320 then a pulse will appear at frame rate. If the count were 321 the frame pulse would appear progressively later and the captions would roll down the screen. (Fig.2).

If this application were implemented precautions would need to be taken to ensure that the characters do not roll into the sync period. This may be accomplished by processing the video with mixed blanking.

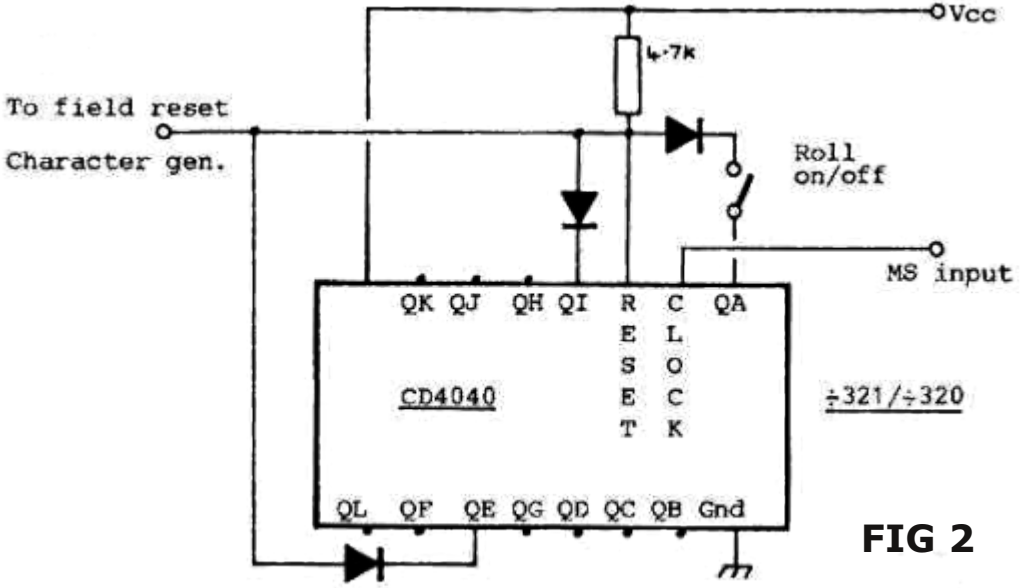


FIG 2

DIGITAL CAPTION ROLLER

DATVtalk07 - DigitalATV - Using a Spectrum Analyzer

by Ken Konechy W6HHC

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

[Please Note - This is the sixth article in a series of DATVtalk articles to introduce Digital-ATV to hams and to explain various aspects of this new area of ham radio. In the CQ-DATV5 issue, the DATVtalk02 article was the beginning of this series and presented an introduction article about Digital-ATV.]

I will venture to guess that most hams do not use a "stand-alone" Spectrum Analyzer instrument. Quite a few hams have a Spectrum Analyzer built into their HF rig (like the Icom IC-7000, the Icom IC-7600, Yaesu FT DX 3000, or even a Yaesu FTM-4000M VHF/UHF rig, etc.) to look for signals on the band. In my situation, I was introduced to a built-in Spectrum Analyzer (SA) when I purchased an Icom IC-756-Pro3 in 2007. Later, I was introduced to a stand-alone Spectrum Analyzer instrument that I purchased in 2013 because my involvement in digital-ATV.

Historically, 'stand-alone' Spectrum Analyzer instruments were built by companies like HP and Agilent for use in industry and had huge price tags of $20,000 to $40,000 new! A ham could only hope to find a used Spectrum Analyzer for sale that still worked and had an affordable price tag. At least one instrumentation company based-in-China is now producing good-quality Spectrum Analyzers at a much more reasonable price.

Spectrum Analyzer Uses

Rigol Technologies produces many types of instruments, including several families of Spectrum Analyzers. Charles

G4GUO pointed out to me that the Rigol Model DSA815 SA instrument is an en-try-level unit that can operate up to 1500

Figure 1 - Rigol Model DSA815 Spectrum Analyzer can operate from 9 KHz to 1500 MHz

MHz and has a base-price that is only US$1295.
The basic use of a Spectrum Analyzer is to analyze an RF signal over a range of frequencies. This is especially useful in DigitalATV (DATV) where you are interested in measuring band-width, looking for distortion, side-spurs and harmonics. These tasks of measuring band-width, looking for distortion, side-spurs and harmonics are very difficult to accomplish with only an oscilloscope.

Fig 2 (next page) shows a typical DVB-S/QPSK digital modulated signal on 1.290 GHz that is well-shaped and without distortion. The display is 10 MHz wide at 1 MHz per horizontal division.

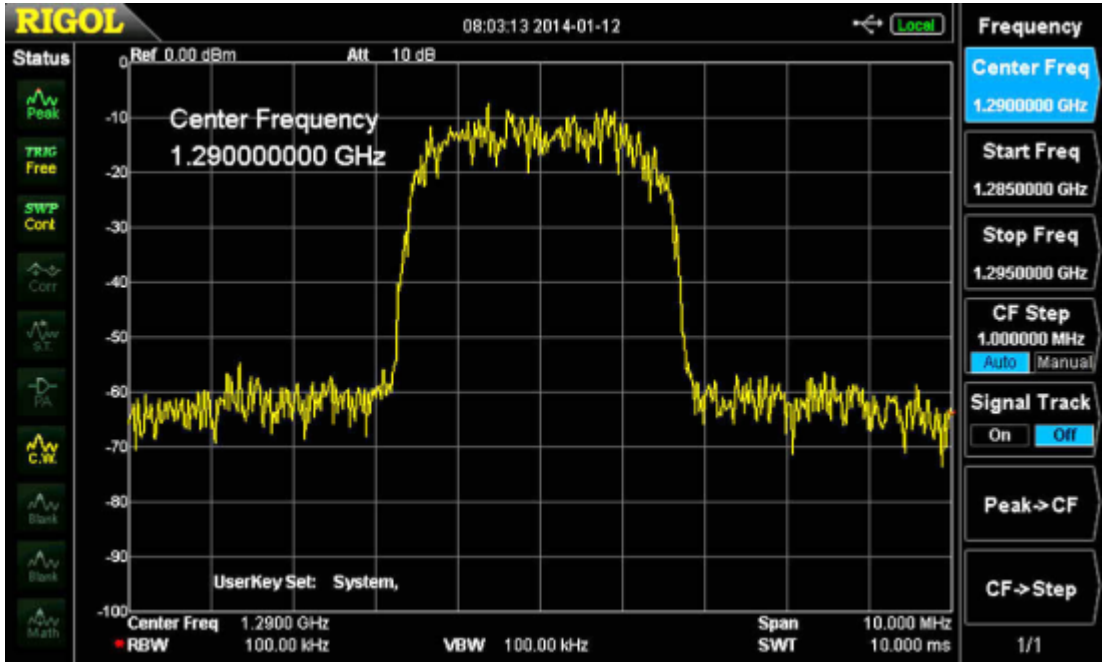


Figure 2 - Spectrum Analyzer display of QPSK digital modulation on 1290 MHz

The design of a good quality spectrum analyzer that is useable up to 1500 MHz requires immense attention to details like shielding to prevent introducing cross-talk. Fig 3 shows that the Rigol unit utilized a complex shielding-box milled from a solid block of aluminum to contain the RF radiations of one part of the design from unintentionally interfering with another part of the circuit design.

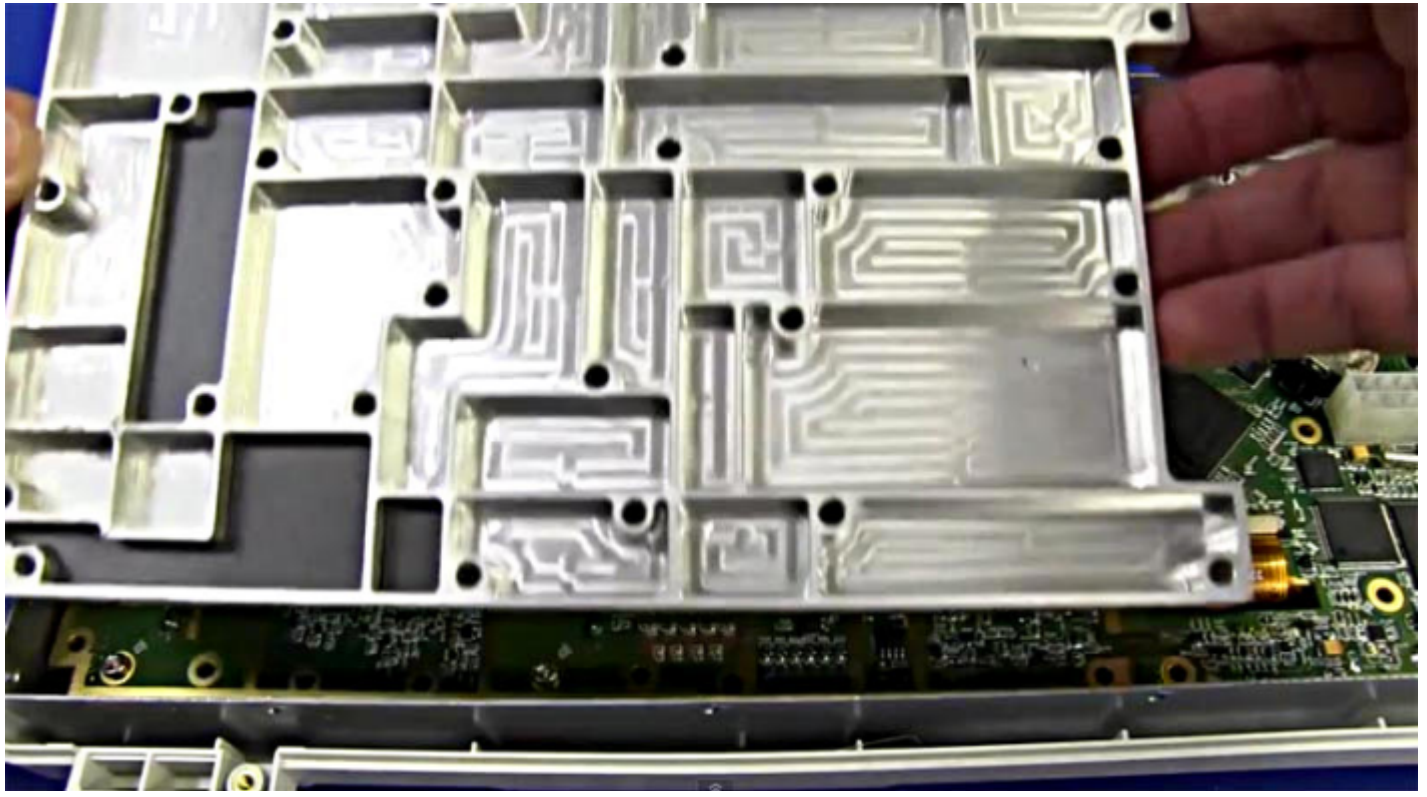
Figure 3 - Construction of the RF shielding-box milled from solid aluminum block (Courtesy of YouTube EEV #391)

There are quite few other functions that can be performed by a Spectrum Analyzer, such as:

- *Signal generation*
- *SWR measurements*
- *Power measurements*

Tracking Generator option

Rigol produces a variation of the base DSA815 SA unit that includes a "tracking generator" option. This model is called DSA815-TG. A tracking generator is a sweeping signal generator that tracks with the display span of the Spectrum Analyzer. Not only does the tracking generator help measure the performance of filters, but it makes a fine stand-alone RF signal generator that operates from 9 KHz up to 1500 MHz.



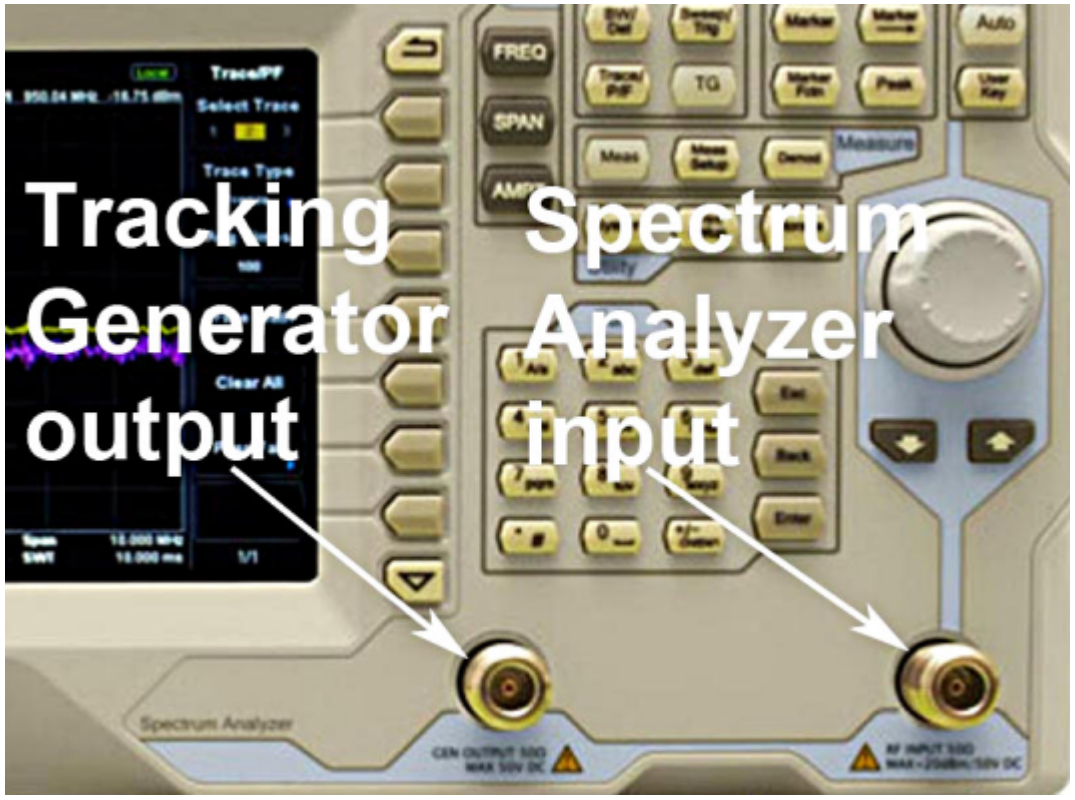


Figure 4 - Location of Tracking Generator output relative to the input connector of the SA

Do you want to calibrate a receiver....just place the tracking-generator output on the frequency of interest with a steady carrier and no sweeping.
As I mentioned earlier, one use of a tracking-generator option is to simplify the measurements of and displaying the performance of a filter. Fig 5 shows the measured performance a surplus tunable band-pass filter loaned to me for testing by Robbie KB6CJZ.

This tunable filter had the value of 1030 MHz hand-written on the unit. I think it is easy to envision using the Spectrum Analyzer to confirm re-tuning of this band-pass filter.

The Rigol Tracking-Generator option is priced at US$200, but must be ordered as a model DSA 815-TG Spectrum Analyzer, since it is not a plug-in option. The price of a DSA815-TG unit is US$1495, total.

SWR option

Another neat aspect of a tracking-generator is that it simplifies measurement and reports for documenting SWR of an antenna. The heart of making an SWR measurement with a Spectrum Analyzer is using a microwave directional-coupler to take a sample of the reflected RF and puts that sampled signal back into the input connector of the SA. Fig 6 shows a typical surplus microwave directional coupler.

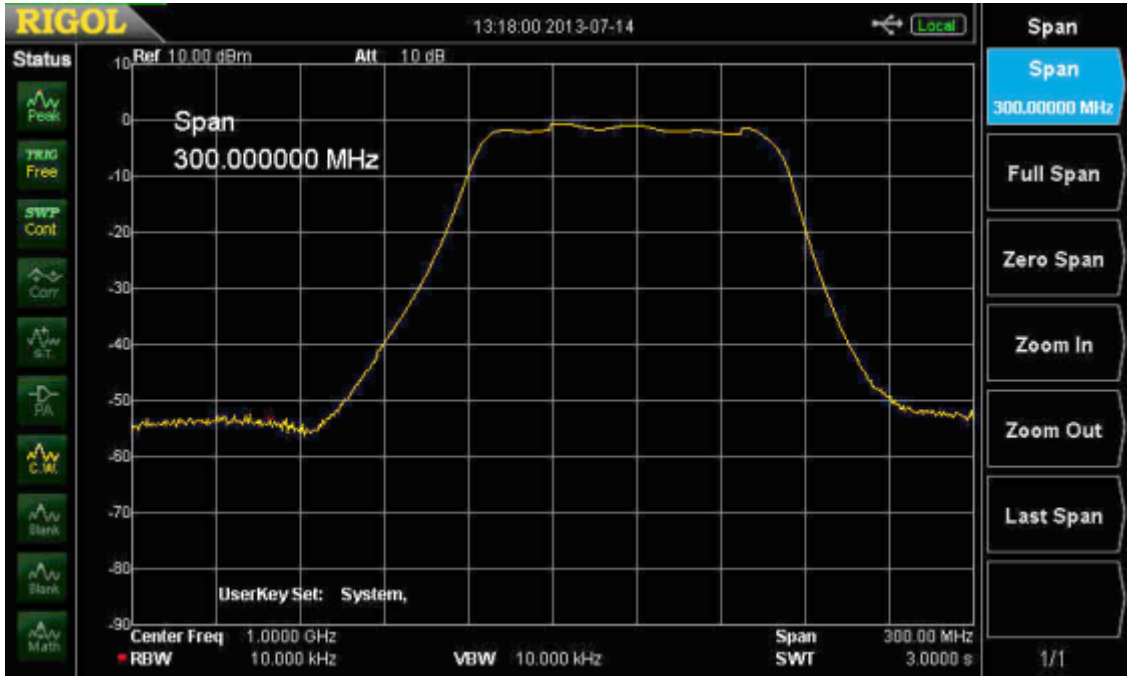


Figure 5 - Spectrum display (center frequency set to 1.0 GHz) of a surplus tunable band-pass filter

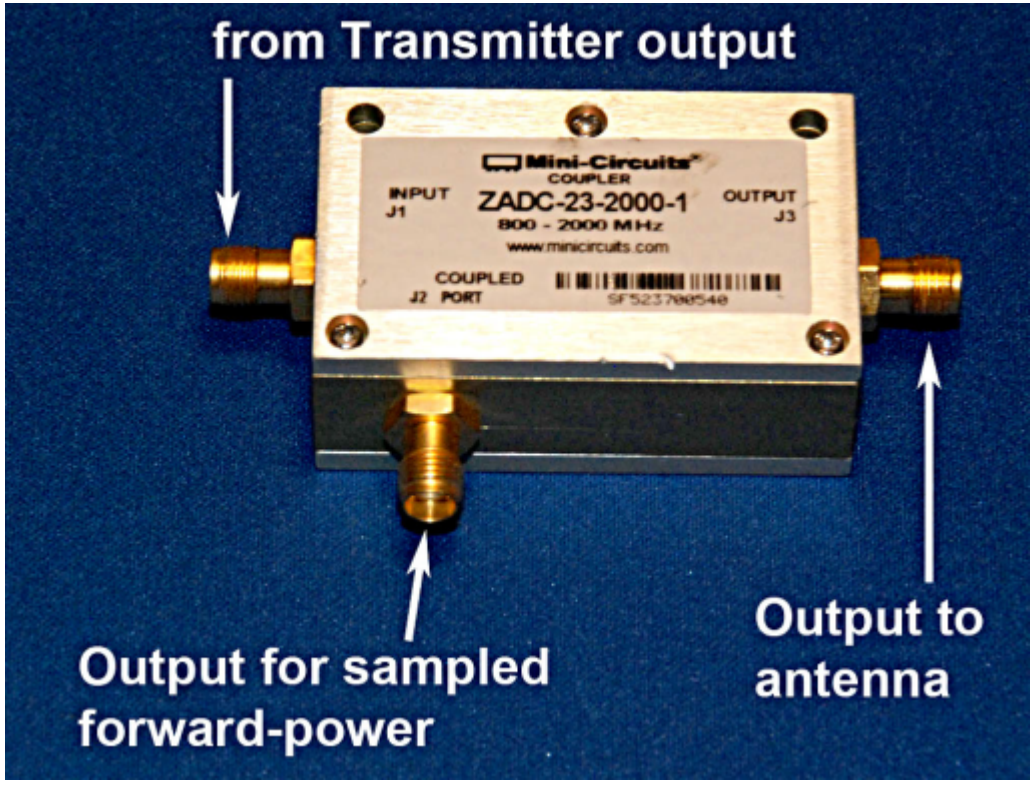


Figure 6 - Typical surplus directional-coupler with an output connector for sampled forward-power

Surplus directional-couplers are usually specified for a specific range of microwave frequencies. However for basic measurements of antenna SWR, you can use directional-couplers that are designed for a different frequency range. All that really changes is the gain of the sampled signal.
Art WA8RMC did point out to me that the "gain of the directivity" also changes when you operate in a different frequency range. Note - directional-couplers can be purchased with either SMA or N-connectors. Finally, these units are reversible...connect the transmitter to the J3 connector on the unit in Fig 6 and now the sampling connector delivers reflective-power as an output.

Fig 7 illustrates how a directional-coupler can be used with the Tracking-Generator output to find resonance on an antenna and help you tune it to the correct frequency. As a NOTE: No special Rigol optional-cost SWR software was used in Fig 7 to perform the test.

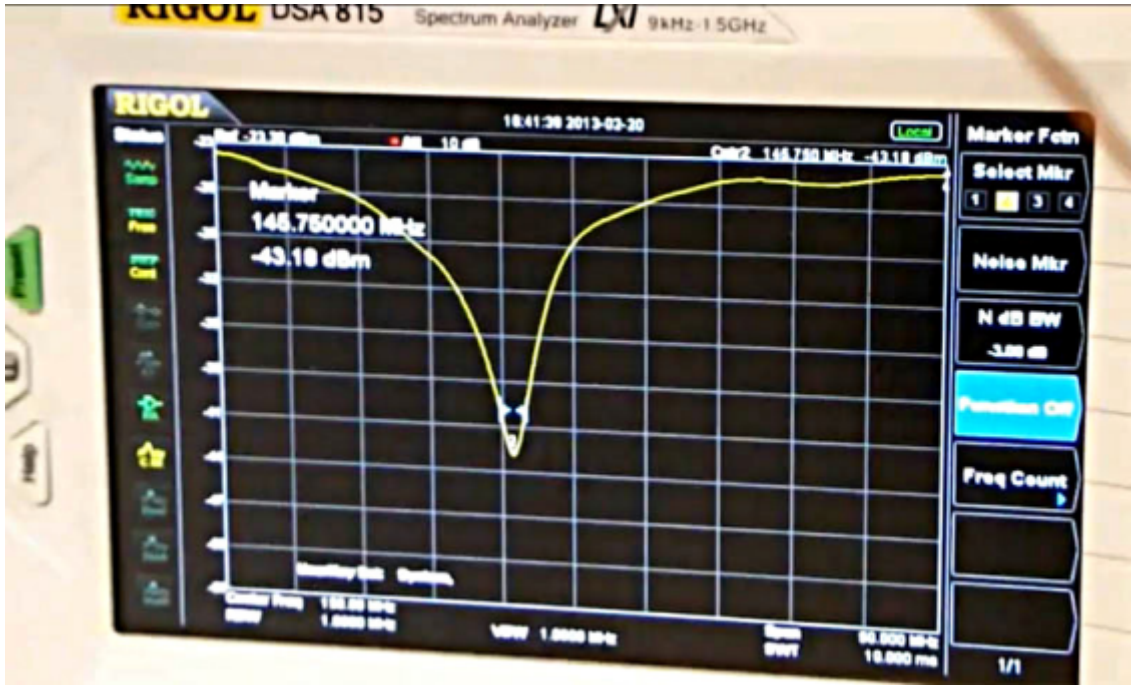


Figure 7 - Using a direction-coupler to tune an antenna (but, using no special SWR software)

Next, because modern Spectrum Analyzers contain microprocessors, a little software can be offered as an option to measure all the displayed SWR signal strength values...calculate a few values...and can provide you with a finished SWR report.

Rigol optionally sells two SWR accessories. The software-only measurements-calculations accessory Model DSA800-VSWR software kit sells for US$459 and provides professional reports

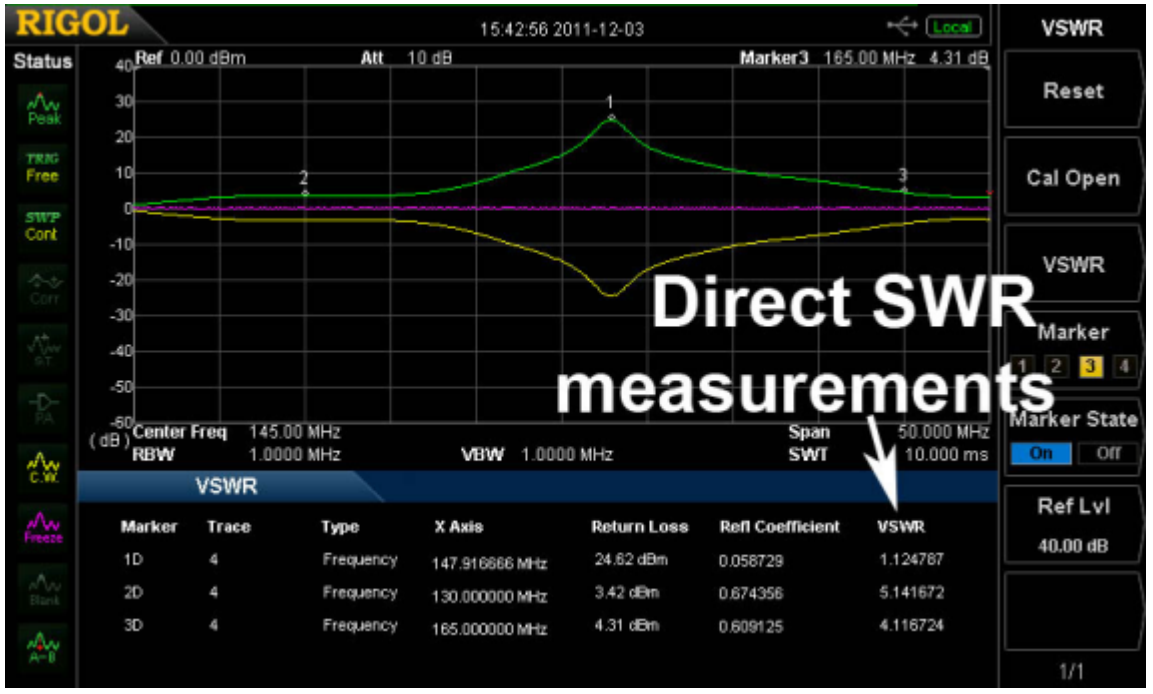


Figure 8 - The Rigol software DSA800-VSWR option measures values and displays SWR report

that perform all of the tedious calculations. Rigol also sells accessory Model VB1020 kit that includes:
(a) a specially designed directional-coupler hardware unit that has a frequency range from 1 MHz to 1500 MHz,
(b) the hardware unit screws directly onto the TG-output and the SA-input connectors, and
(c) the software measurements and SWR report code.
The cost of the optional Rigol Model VB1020 kit is US$599.

Power Measurement option

All Spectrum Analyzers can perform power measurements on simple carriers and even complex digital modulation without special software. Just put the SA into the dBm scale. However, for the complex digital-modulation signals, you need to compensate for the video-bandwidth setting of the SA, compared to the channel-bandwidth of the digital-modulation signal.

For a simple un-modulated carrier signals, because the bandwidth of the signal is so narrow (less than 1 KHz), the peak reading of the carrier is directly equal to the output power-level.

Mike WA6SVT (a commercial television station engineer) explained to me that for a more complicated RF signal such as a DVB-S/QPSK "hay-stack" (see Fig 2 as an example), the Video BandWidth (VBW) and Resolution BandWidth (RBW) setting on the Spectrum Analyzer has to be set to a value that is a little wider than the DATV signal you want to measure. If the RBW can be set correctly, then the DATV average power level is the value displayed at the top of the "hay stack".

On my entry-level Rigol DSA815, the largest VBW and RBW setting available is 300 KHz. This bandwidth is too small to directly measure power on a DATV signal that has 3 MHz or greater Occupied BandWidth. Fortunately there is a mathematical conversion that can compensate for a narrow VBW/RBW setting. Ron W6RZ and Rob M0DTS both suggested to me on the Yahoo DigitalATV Forum that the correction factor in dB for spectrum analyzers is:

10*log10 (channel bandwidth/resolution bandwidth)

Rigol optionally sells a software-add-on accessory to measure power directly called DSA800-AMK (Advanced Measurements Kit). The Channel Power mode of this kit uses the built SA microprocessor to integrate the power level measurements over an "integration BW" that you can select.

Fig 9 is a display of the optional Channel Power mode measuring the RF output of a bare-foot DATV-Express board signal running SR=2.2 MSymb/sec at 1292 MHz. The

integration BW was set to 4 MHz for this measurement of 13.81 dBm power output.

This Channel Power mode option certainly makes it simple to measure DATV power levels. No more worrying if the Bird power meter you are using is a bolometer/thermal type or not...and without digging out your scientific log calculator. The optional cost of the Rigol Model DSA800-AMK kit is US$499.

"Secret" Demo-Mode for Options

One complaint that I have is that NONE of the Rigol (or Rigol distributor) literature or web site materials explains that most of the extra-cost software options are available as a free demo mode to try out. The time-out period on the demo-modes is 200 hours of Rigol Spectrum Analyzer power-on. A phone conversation with technical support of Rigol (quite good at helping me use the instrument) hinted about the unpublicized demo-mode...but he did not have any real details of trial-period, etc. I finally discovered the "secret" demo-mode when I only had about 11 hours of use left to try them out.

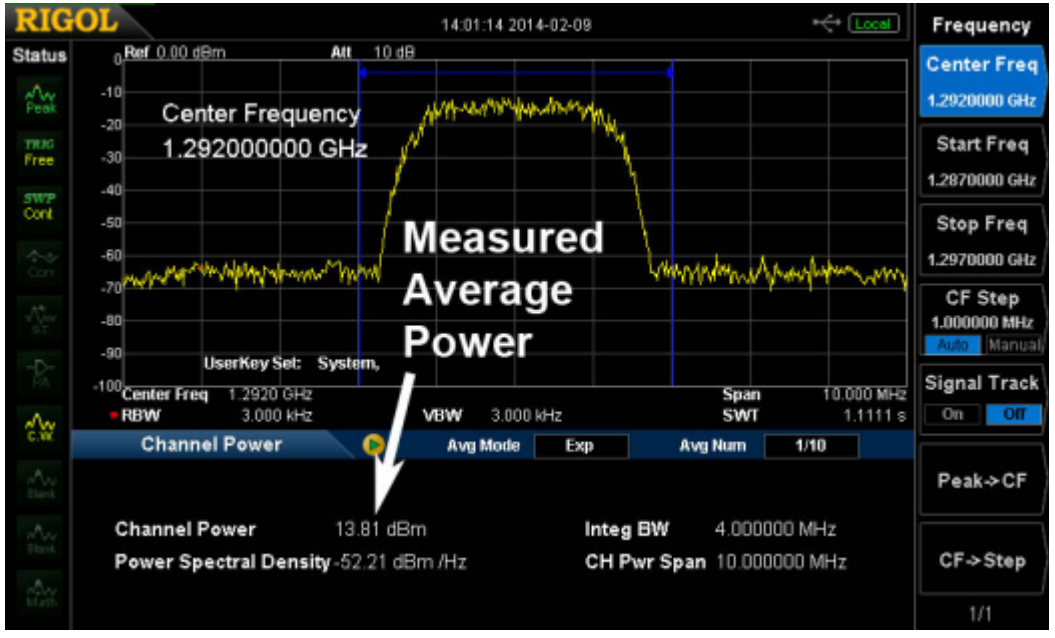


Figure 9 - Display of Channel Power option measuring 13.81 dBm average power (DVB-S at 2.2 MSymbols/sec)

Easy Screen-Capture Feature

A small feature on the Rigol SA that I really enjoy using is the one-button screen capture directly to an inserted USB-memory-stick. Just plug the USB-memory into the front-panel USB port...make sure the screen displays what you want to record...and press the PRINT button on the SA. Capturing the screen (just as displayed) could not be easier. I wish Windows would think about providing a setting for printing the screen directly to a USB-memory-stick.

Conclusion

While not essential, a Spectrum Analyzer is a very useful instrument to have available for looking at DATV signals. For normal DATV usage, viewing the SA is perfect for adjusting the drive into RF power amplifiers. An over-driven PA starts to exhibit spectral-regrowth distortion where the distortion creates a signal that grows wider and wider as the drive level is increased. The problem with spectral-regrowth is that the received video still looks good, but more and more RF interference is occurring on the sides of your intended signal. DATV uses include:

- *Adjusting RF power amplifier drive*
- *Inspecting quality of transmitted signal*
- *Confirming any spurs are low-level*

- *Checking for undesired harmonics*
- *Tuning band-pass filters*
- *Adjusting SWR on antennas*
- *Measuring power of digital-modulation*
- *Pointing antenna to weak DX signal (Spectrum Analyzer will see weak signal faster than STB can lock onto to the signal)*

Contact Info

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Useful URLs

Rigol Technologies (North America) - see www.Rigolna.com/

Rigol (United Kingdom) - see www.Rigol-UK.co.uk/

TEquipment USA Distributor for Rigol - see www.TEquipment.net/

YouTube "Tear-down" of Rigol DSA815-TG unit (EEVblog #391) - see www.youtube.com/watch?v=EY0acWrCYjw

BATC info site for DTX1 DVB-S exciter - see www.DTX1.info

British ATV Club - Digital/DigiLite/DTX1 forums - see www.BATC.org.UK/forum/

DATV-Express Project web site (SDR-based exciter) - see www.DATV-Express.com

British ATV Club - Digital Forum - see www.BATC.org.UK/forum/

Orange County ARC entire series of newsletter DATV articles - see www.W6ZE.org/DATV/

Yahoo Group for Digital ATV - see groups.yahoo.com/group/DigitalATV/

dBm to Watt power convertor - see www.rapidtables.com/convert/power/dBm_to_mW.htm

Just for fun....

Last issues picture is shown below.

"The last concert may have lacked base, but I think I have a fix" - Trevor

"Now .... just how do I get it up to the feed point?" - Mike G8CPF

And the winner is .....

Well, it's the last one, so we may as well let Trevor win!

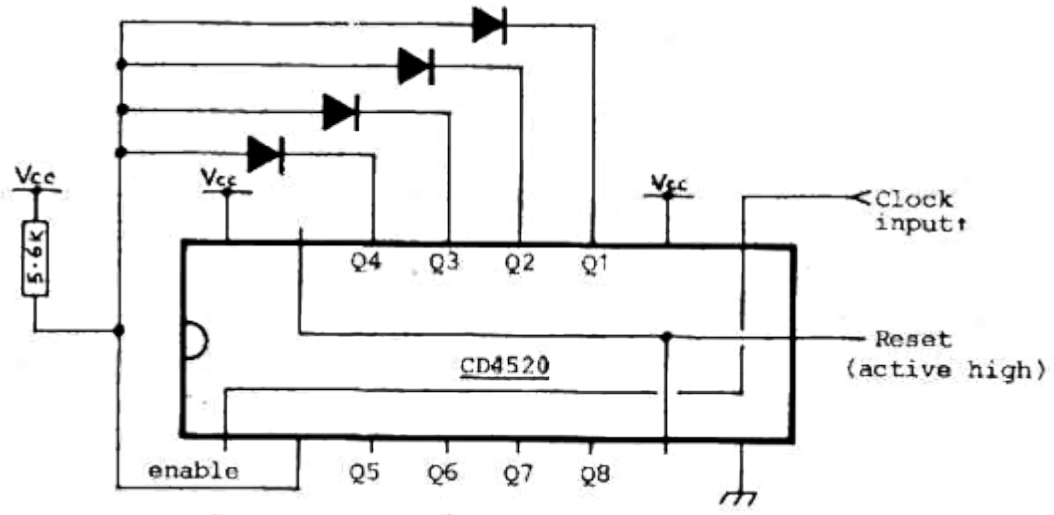
This issues picture would be shown below but.....

Due to lack of interest the competition has had to be dropped!!!!

Using the CD4520 as a single 8-bit synchronous counter
By Trevor Brown G8CJS

Synchronous counters such as 74193 (as opposed to ripple counters like 7493) have the advantage that all their 'changing' Q outputs change in unison when clocked. This is not the case with ripple counters however where momentary glitches and invalid counts often occur.

In C-MOS the CD4040 is a ripple counter but the CD4520 is synchronous. It is a dual 4-bit counter but to use it as a single 8-bit device it may be wired as follows: -



Both counters are clocked but the 'B' half is disabled by the four diodes. When the 'A' part is full it enables the 'B' half for one clock pulse, then it overflows to zero and removes the enable. In this way a "synchronous cascade" of both halves produces a single 8-bit counter.

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If you have an eBook reader that has WiFi then you will be able too providing you are in a WiFi zone.

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.

Smart phone reading apps are ok providing that you have a 3G data connection.

Note: These links will fire up your devices browser and if you are using 3G/4G then you will incur data usages charges.

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