In this issue

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Contributing Authors

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Richard Carden - VK4XRL John Hudson - G3RFL
Ken Konechy - W6HHC Rovert Nworb

Photo: arnewsline.org

Bill Pasternak, the president and co-founder of Amateur Radio Newsline died June 11th, he was 73

Remembering Bill Pasternak https://youtu.be/zhTKbr2HveI

Arnewsline ran a weekly bulletin service since 1977

With much heavy heart my dear friend Bill Pasternak passed away tonight. He was so much more than a friend to me. He was a person I could talk to about anything. Helped me with my ham radio knowledge and working with electronics and tube radios. Bill will be missed by many but not forgotten. I know I will never forget the nicest person I have known in my life.

73 my dear friend Bill WA6ITF SK.

Bill Pasternak, a true gentleman and friend of many.

R I P

DATV date announced

The 5th World Digital Amateur TV Party is planned on Friday 21st and Saturday 22nd of August.

Anchor Peter Cossins VK3BFG is asking those taking part this year to prepare a one or two minute show and tell video to add a bit of interest. He will be assisted by Neil VK3BCU.

TV signals 'alternative to radar'

The BBC reports that existing TV signals could be used to track aircraft, providing a cheaper alternative to radar.

BBC News say:

Research carried out by the air traffic control provider Nats and its partners suggests that existing TV signals could be used to track aircraft, providing a cheaper alternative to radar.

TV signals use different parts of the radio spectrum to radar, but both bounce off solid objects.

Using special receivers, researchers said they were able to track up to 30 planes simultaneously flying at altitudes of up to 10,000ft (3km).

Read the BBC story at
http://www.bbc.co.uk/news/technology-33063353

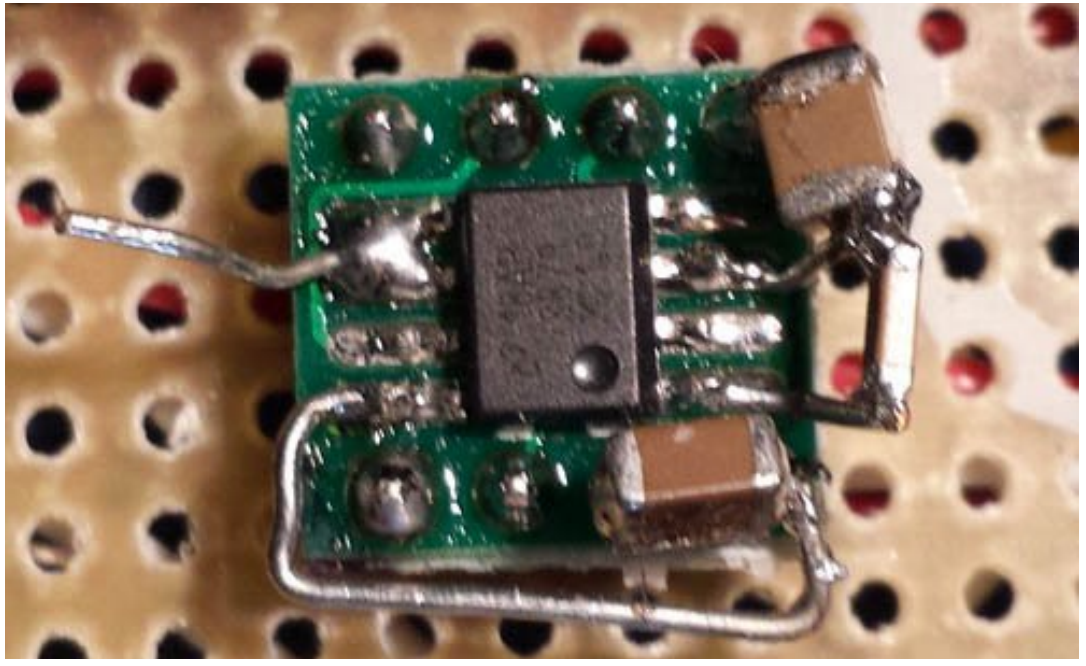
Southgate News

The test involved TV signals broadcast from a transmitter in Crystal Palace

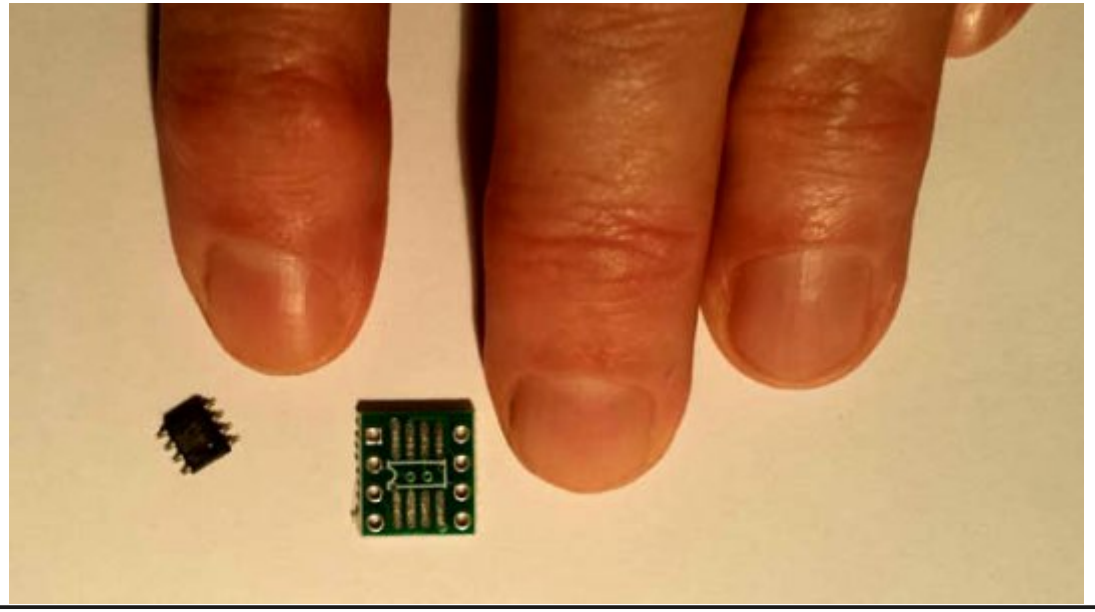
Breakthrough Narrow-bandwidth DATV

This MiniTiouner project by F6DZP is a breakthrough by
(1) creating a "hackable" DATV receiver that is capable of receiving down to SR=250K and
(2) creating a USB-based receiver that breaks away from the PCI interface used by the original Tutioune approach by F6DZP. The significance of migrating away from the PCI interface is that this interface is quickly becoming obsolete in computers. To learn the capabilities of the original Tutioune project by Jean-Pierre F6DZP, see the "Tutioune 3200 for TT S23200" article in CQ-DATV issue 11, page 11.

This project is a USB DATV receiver built by using a Samsung module (called NIM), two three-input Nand gates (74HCT10), a USB module and some voltage regulators to deliver DATV video and audio via the USB input to your PC or Laptop.



A close-up of the module and below the relative size of the module



Hamradio 2015

We are at the eve of Hamradio 2015. This year it comes as representative of Hides company that we (ATV - wireless operators) offer purchase DVB-T appliances (band close). http://www.hides.com.tw/hot_eng.html Calvin bring the different DVB-T transmitters and receivers. Visitors to the fair will have the option of purchasing prices for also other components such dual-band converters and amplifiers. On the stand will help OM OE7DBH.
Darko brings PLL LNB to receive future ATV signals geostationary satellite 26.° East.
http://www.oe7forum.at/viewtopic.php?f=7&t=40#p1371
We will be glad to see you in Hall 3 - Stand C21 C22.

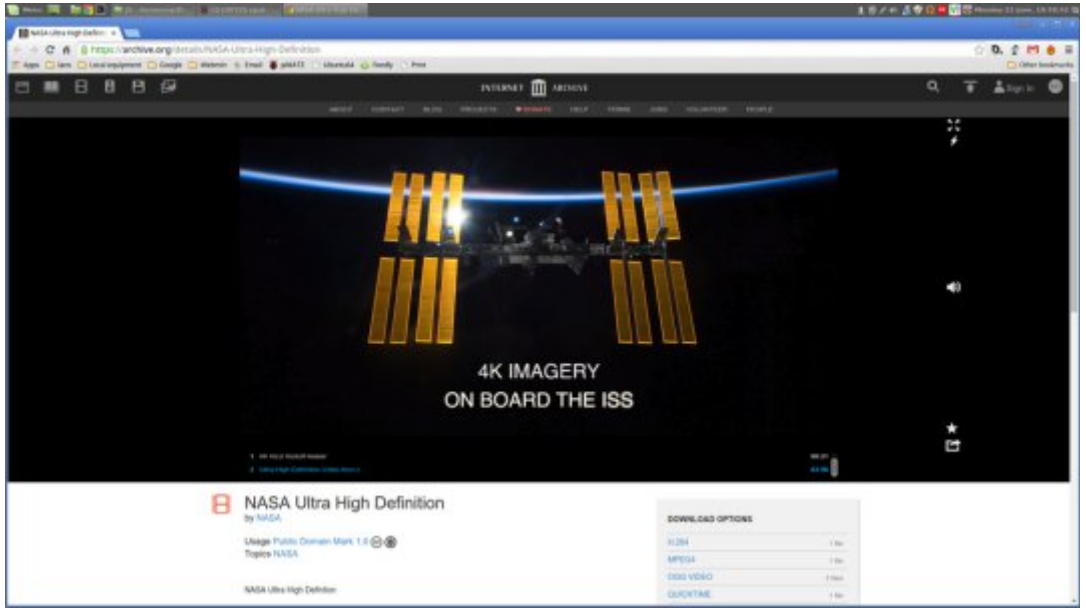
DB0KO output in HD only

After some time testing the 1291 MHz DATV output with two streams in SD and HD/720p the advanced Cologne ATV repeater will be switched to Full HD only on 1st August 2015.

For reception a DVB-S2 satellite TV receiver is needed, users will be rewarded with up-to-date video quality shown already in the online stream
http://atvstream.mooo.com:8200/live.nsv.m3u

Ultra HD coming from space

US space agency NASA is going to start a 4k TV channel on the internet. A first short clip with Ultra High Definition shots from the ISS can be found at YouTube under "ReelNASA", but an updated Google Chrome web browser is needed to get the stream in full resolution of 3840x2160 pixels. Another chance for downloads is given at:
https://archive.org/details/NASA-Ultra-High-Definition
Between different codec files, only the Quicktime (mov) version has real UHD resolution.



UHD demo from Moscow

On the Ultra HD demo transponder provided by "Eutelsat" on Hotbird 13 degr. east a nearly two hours military parade recorded at the Red Square in Moscow by "Channel One Russia" was shown in June. The week before during the AngaCom fair in Cologne new 4k trailers from "4K Fun Box UHD" and "Anixe UHD" were transmitted on that channel. The Red Square parade had been shown ten years ago already by "Euro1080" from Belgium, the pioneer HD channel for Europe, now extinct...
Translation: Klaus, DL4KCK - www.agaf.de

Editorial

Those of you that read the previous issue (24) will have noticed that we removed an article by F6DZP at his request and replaced it with an email from him as to why he wanted it removed. This was a mistake. It was an email sent personally to Trevor who then forwarded it on to the team as the quickest way of notifying everyone of his Jeans' displeasure. Apologies to Jean. The production team are only connected by email and as we reach publication date there are lots of frantic emails in all directions.

We realise the CQ-DATV magazine is the new kid on the block and that we are doing something for ATV that has never been done before and that is, produce a free ATV magazine every month. This requires an approach that has also never been tried before. It needs a proactive team to sort and shape the stories rather like any daily newspaper. It would not be possible to get a newspaper out on the streets if all that happened was the team sat around the office waiting for an in-tray to fill up with public contributions.

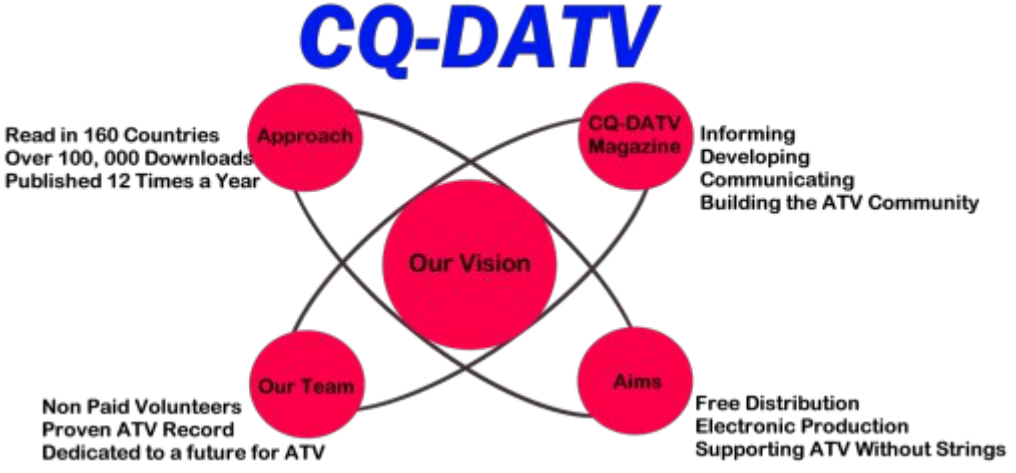
CQ-DATV has had to take a very proactive approach. The team are constantly scouring the Internet along with other ATV magazines and are also in contact with our regular contributors discussing the latest developments in ATV and shaping them into copy. All sourced copy needs work, such as correcting any Google translations, redrawing any necessary diagrams and most important of all, liaising with the source of the copy and checking acknowledgements.

We have never failed to publish a magazine. We have no financial motives, we do not charge or claim expenses and remember we publish 12 magazines per year in several downloadable formats. I hope the 100,000 downloads since we started two years ago and the 160 countries in which CQ-DATV is read is proof of all this labour.

It's now really up to the ATV community to either acknowledge that this is the future and the way to grow ATV with CQ-DATV as a common umbrella for all the ATV clubs and deliver the necessary support, or lose the initiative and live with a fragmented ATV.

An ATV umbrella is nothing new. The first one was launched by a Swiss ATVer in 1986 and called EATWG (European Amateur Television Working Group). This was a brilliant idea, but unfortunately it sank without trace because of the lack of support from the ATV community. Next year it will be 30 years since the launch of EATWG and the recognition by many of the European ATV organisations for this requirement, but sadly little has been done to restore this global requirement.

CQ-DATV is a different approach in a different time. With new options and horizons beyond Europe. Also CQ-DATV is driven by a dedicated team of ATV enthusiasts. EATWG had none of this and sadly we let a good idea sink without trace. So it's either get on board and make it work or let it sink as we did with EATWG back in 1986. To this end we have produced a mission graphic (next page) which we hope will promote a clear intention of what we are trying to do for ATV. All we ask for is your support to unite and drive ATV forward.



Enough of where we are coming from and how we work.

CQ-DATV 25, in this issue, Ken W6HHC has been looking at Digital-ATV DX records. Chris van den Berg PA3CRX has sent in a very interesting 24 GHz story. John G3RFL has been on eBay and purchased a 23cms YIG and now has it sending out ATV pictures. Richard Carden has been investigating a reference audio and video switcher. We have the answers to the CQ-DATV 24 skill test and this time we have set you a digital problem. Rovert Nworb has sent in an interesting view on what Codec's do and why there are so many. Trevor has been looking at an old Sony broadcast camera.

Next issue, CQ-DATV 26, Richard Russell G4BAU, the designer of the ATV handbook test card will be explaining his second generation programmable test card.
Please sit back and enjoy CQ-DATV 25

The CQ-DATV Production team

CQ-DATV dotMOBI

Like us on Facebook

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://www.agaf.de/

DATV DX records

During the recent BATC SummerFun ATV Contest, Rob MØDTS and Terry G1LPS again teamed-up, and also Noel G8GTZ and Arthur G4CPE teamed-up to add some new DX records on the UK temporary digital band allocation at 146.5 MHz.

Both of these two new records used narrow-band DVB-S modulation set to 333 KSymbols/sec to produce a bandwidth of about 0.5 MHz in the 2 M allocation. Both of these two new records also used H.264 video encoding to increase/improve the video frame-rate displayed at the receiving end.

Also, Daniel EI9FHB has suggested that the HamTV DATV one-way transmissions from onboard the International Space Station (ISS) on the 2.4 GHz ham band is a worthy addition to the Known DATV DX Records table (below).

I have added the first day of HamTV-live-video-transmissions that occurred on 2014-03-08 and were received by the Matera tracking station (IØKPT) and the Casale Monferrato tracking station (IK1SLD) in Italy as being typical when ISS is near the horizon.

One of the goals of one-way-video using HamTV onboard the ISS is to communicate with schools around the world. If you have not watched before, a historic video preserved from those first ISS DATV transmissions can be found at:-

https://www.youtube.com/watch?v=Xkodq_2TshI

Please let me know if you learn of any longer DATV QSOs.

73…de Ken W6HHC

Known Digital-ATV DX Records

updated 2015-06-20

by Ken W6HHC

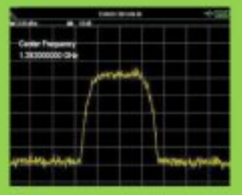
24 GHz			
124 KM	JA6DME & JA6EES	2011-11-12	Locations Mont Ten-Zan and Mont Ge-Zan
10 GHz			
450 KM	HØ8JBC & F4CXQ	2005-06-21	Locations JN40CT (Sardinia) and JN12OH (Spain)
5.7 GHz			
341 KM	JL1BLF & JH1GED	2011-08-06	Locations Mont Chokai-san and Mont Kashimayari-gatake)
2.4 GHz			
~ 1000 KM	OR4ISS to IØKPT (one-way)	2014-03-08	
~ 1000 KM	OR4ISS to IK1SLD (one-way)	2014-03-08	
Initial DVB-S protocol live video transmissions from HamTV in orbit aboard ISS			
SR = 1.34 MSymb/sec and 2.0 MSymb/s using SR-Systems exciter and MPEG2			
Locations Orbit to Matera, Italy and also Orbit to Casale Monferrato, Italy			
252 KM	JA6SPI & JA5MFY	2009-11-03	Locations ??
1.2 GHz			
440 KM	G4KLB to G1LPS	2010-10-11	Locations IO90BR and IO94EQ
(tropospheric ducting - one-way DATV)			
419 KM	G4KLB & MØDTS	2010-10-11	Locations Bournemouth, England and Yarm, England
(tropospheric ducting)			
379 KM	VK3RTV(RPTR) & VK7EM	2011-02-23	Locations Mount Dandenong, Victoria and Penguin, Tasmania
(operators VK3BFG, VK3DQ , VK3WWW and VK3TRX)			
252 KM	JA5GYU & JA6JNR	2009-11-03	
(1 Watt)			
70 CM			
696 KM	F1FY to G8GTZ	2013-09-24	
(DVB-S 2MS/sec FEC=1/2 - - one way reception)			
696 KM	G8GTZ to F1FY	2013-09-25	
(DVB-S 2MS/sec FEC=1/2 - - one way reception reported by FM)			
Locations IO91KH (near Basingstoke) and JN16VB (near Roanne, France)			
528 KM	G3PYB & F5AGO	2013-09-24	
(DVB-S 2MS/sec)			
Locations near W YORKSHIRE and JN06DP (near Poitiers, France)			

70 CM - continued			
501 KM	W4HTB & WB8LGA	2014-07-26	
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting			
Locations Bowling Green, KY and Marengo, OH			
373 KM	G8GTZ & F3YX	2013-09-25	
(DVB-S 2MS/sec FEC=1/2)			
Locations IO91KH (near Basingstoke) and JN18AP (near Limours, France)			
290 KM	W4HTB & W8ZCF	2014-04-12	
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting			
Locations Bowling Green, KY and Cincinnati, OH			
121 KM	KH6HTV to KØRZ	2011-11-21	
(video resolution HDTV 1080i - protocol ITU-T/J.83B QAM-64 - one-way DATV)			
Locations Cheyenne, Wyoming and Boulder, Colorado			
144 MHz			
237 KM	F3YX to F8ZG	2011-11-09	
DVB-S protocol at 1000 KSymb/s using modified SR-Sys MiniMOD (one-way)			
on 145.0 MHz experimental license 5-Minute max			
Locations JN18AP (near Limours, France) to IN99KC			
115 KM	MØDTS & G1LPS	2015-06-14	
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express			
with RaspberryPi camera and 1W avg PWR Output to antenna (10-15W ERP)			
on 146.5 MHz - UK temporary band allocation			
Locations North York Moors, England and high ground near Rothbury, England			
95 KM	G8GTZ to G4CPE	2015-06-14	
H.264 video - protocol DVB-S at 333 KSymb/s using DigiThin (one-way)			
on 146.5 MHz - UK temporary band allocation			
Locations IO91GI (Walbury Hill, England) and IO91SW (near Luton, England)			
50 KM	MØDTS & G1LPS	2015-02-21	
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express			
on 146.5 MHz - UK temporary band allocation			
Locations North York Moors, England and Spennymoor (County Durham), England			
28 KM	MØDTS & G1LPS	2015-01-11	
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express			
on 146.5 MHz - UK temporary band allocation			
Locations Yarm, England and Spennymoor (County Durham), England			
50 MHz			
64 KM	G8ADM to G8LES	2015-02-10	
DVB-S protocol at 1.133 MSymb/Sec with FEC=3/4 (one-way)			
on 51.2 MHz using 200W avg Pwr Out and BW approx 1.5 MHz			
Locations North of Harrow (IO91TO) to North of Alton in Hampshire			

See more details at:-
http://www.von-info.ch/hb9afo/records/recordse.htm

Download the above table as an Excel spreadsheet from:-
http://cq-datv.mobi/downloads.php#latest

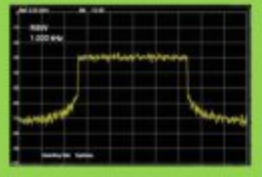
Digital Amateur TeleVision Exciter/Transmitter



now available from

DATV-Express

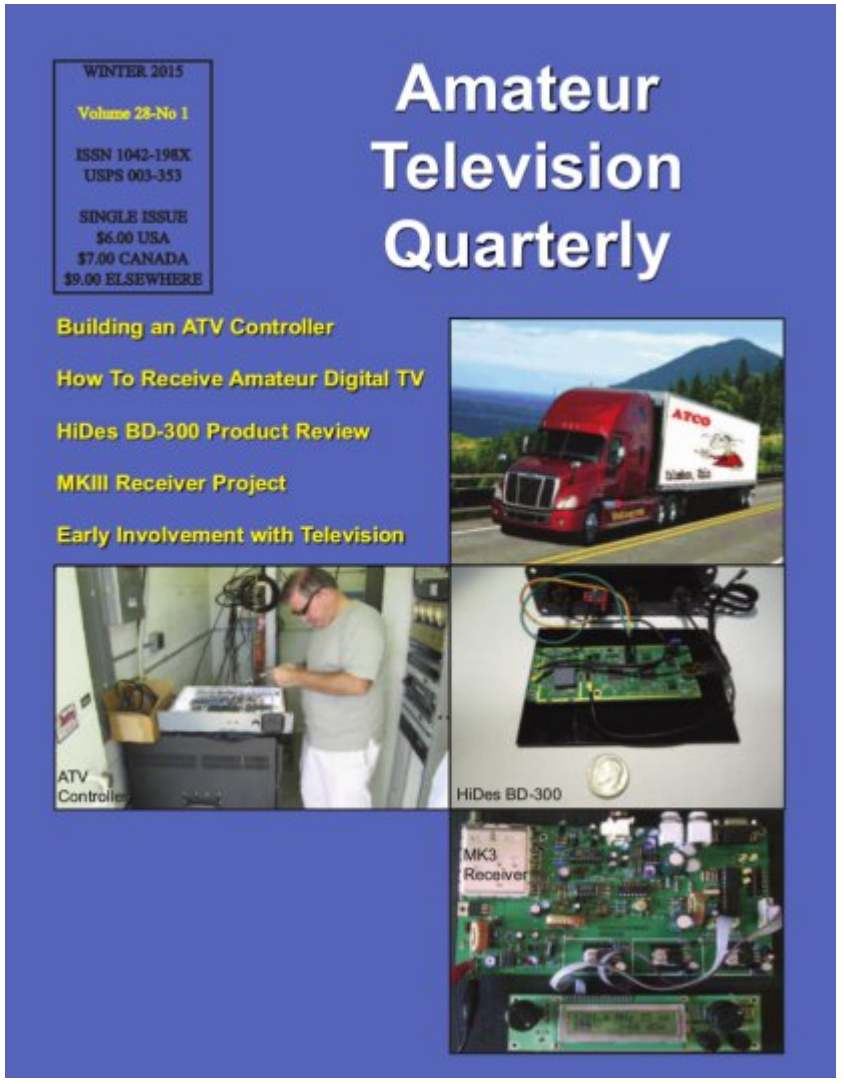
- A more affordable DATV exciter can now be ordered
- Fully-assembled and tested PCBA
- DVB-S protocol for DATV (using QPSK modulation)
- Can operate all ham bands from 70 MHz-to-2450 MHz
- RF output level up to 10 dBm (min) all bands (DVB-S)
- Software Defined Radio (SDR) architecture allows many variations of IQ modulations
- "Software-Defined" allows new features to be added over the next few years, without changing the hardware board
- As extra bonus, the team has been able to get the board to transmit DVB-T 2K mode, however we cannot guarantee the performance of that protocol. Caveat Emptor!
- Requires PC running Ubuntu linux (see User Guide)
- Price is US$300 + shipping – order using PayPal



For more details and ordering

www.DATV-Express.com

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



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24 GHz ATV, madness?

By Chris van den Berg, PA3CRX

Several years ago there was only very limited activity on the 23 cm band (at first even with AM), at that time we built PI6ATS (at that time called PI6ATV). The intention was to stimulate 23 cm and 13 cm ATV activity. On 13 cm we achieved regularly the first prize in the IARU ATV contest by making just a single one-way contact between Hoevelaken and Amersfoort. Many years later it was the turn of 6 cm to be activated by ATV. Standard modules were bought. Building a 6cm station was not much more involved than wiring of some components. PI6ATS was extended with a 6 cm input and meanwhile there are a good number of active stations on 6 cm ATV.

Heelweg 2012

At the Heelweg meeting in 2012 Roger (G8CUB) was present. He had "one last sample" 23GHz module (1) that was usable at 24 GHz, for sale. Books and documentation showed that it was actually usable in the 24GHz amateur band.

Unfortunately, Roger had only one sample and so it was impossible to build two stations to be able to make a contact.

Roger, however, appeared to have some 26GHz (2) samples arriving that also appeared perfectly usable at 24GHz. So we ordered two modules from England and in the mean time we could further delve into the specifications.

Eyal gal

The modules are manufactured by Eyal gal (6057-00), required signals are LO at half the frequency, IF in and IF out. The module has two waveguide ports for transmitting and receiving signals at 24 GHz.

The noise figure at 24GHz is about 4db and 1W output.

For narrow-band in England it is often used a synthesiser for IF LO signal, and as IF for a 70 cm transceiver.

We chose an IF in the 13 cm band (2450MHz), through the use of standard video links, such as those sold at hardware stores. It was very difficult to reduce the IF output low enough (-20 dBm) by ordinary resistors but we succeeded. The LO used was a DRO oscillator (10,8GHz), originally intended as a motion detector. Patch antenna removed and modified with an SMA connector which yielded just enough signal.

In this manner, the frequency of 24.050GHz is reached (= 2 times LO + IF).

Antenna connections

Since there are two separate waveguide connections for RX and TX, these have to be switched between transmission and receiving in case a single antenna is used. A waveguide switch is very expensive, as far as they can be found. We thought the solution was found by using circulators, where Jos (PA3ACJ) could help us. Despite the good damping, there would still be too much signal into the receiver. In addition, the circulator has the property that if the next port has a mismatch, the signal goes to the following port. That could mean that if (for whatever reason) while transmitting a mismatch should occur, full power would go into the receiver!

In time we dropped the idea for using the circulators. Waveguide / SMA transitions could be constructed by pieces of semi rigid cable that could be switched via a coaxial relay. But many transitions also means a high risk of signal loss. Creating a waveguide switch also requires the necessary machining...

It was decided to start testing first with two antennas side by side, one for transmitting, one for receiving. Given the wavelength (1.2 cm) such an antenna is not particularly large while still achieving the necessary gain.

Horn antennas

After being given with several pieces of waveguide and flanges, Peter (PA3CWS) added pieces of waveguide bringing the connections outside the enclosure, ultimately designed to mount 20 dBi horns.

Chris (PA3CRX) folded 14 dBi horns and soldered them directly to the flanges and built-in enclosure. The horns are made according to the method described on the PI6ATS (3) web site.

Horn antenna for 24 GHz

The possibility of using the horns later for a "sliding offset parabolic dish" is thus left open. Hopefully it can be made stable and the transmit and receive direction is identical.

Another possibility is the use of a lens antenna. This is then placed in front of the respective horn (like a magnifying glass), and the radiation direction does not change. If anyone has any experience with lens antennas at higher frequencies, we would be glad to hear from you.

Energy

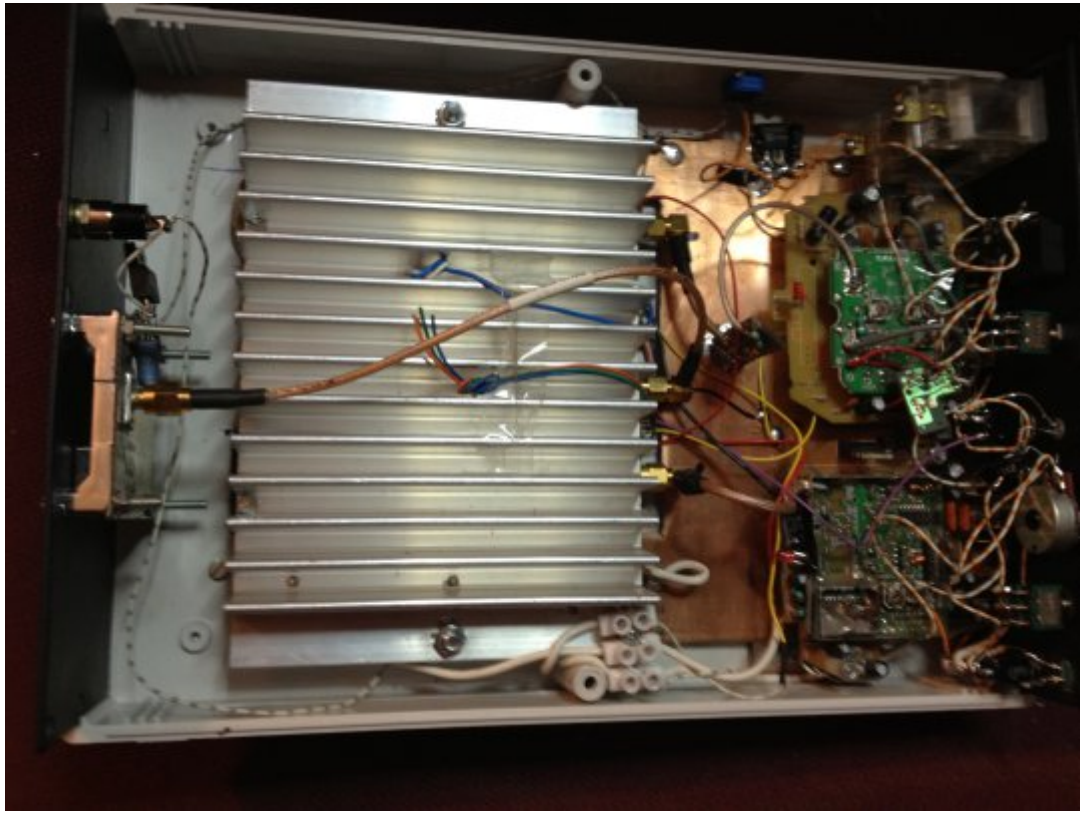
The modules must be provided with a number of voltages, including a negative. In order to be suitable for the whole /P use all voltages are derived from 12 volts. In order to make the negative voltage, a low-frequency amplifier IC has been used as an oscillator. A voltage multiplier, 7912, provides the stable negative voltage.

24 GHz station of PA3CRX during assembling

Built-in enclosure

We succeeded in finding a suitable enclosure that was not too big and could contain everything. In case the DRO frequencies of the two stations may be not exactly identical. It would be useful if one of the stations could adjust frequency (instead of the regular channels). Peter has enabled this with his station by adjustable IF.

After drilling and sawing, assembly could be tested.



24 GHz station of PA3CWS during assembling

Practise

The whole system consumes a lot of power (± 2.5A at TX), not just that the batteries will run out soon, also the amount of heat produced is pretty large. Test time should thus not be too long. Two /P stations were built up in the room, and a direct two-way contact was a made. By removing voltage of the 24 GHz module it could be confirmed that the contact did not take place on the IF frequency (13 cm).

After one station actually went for a walk, it could be determined that both video and audio went fine to the end of the street. Even if there were some obstacles between, the picture was still there.

After we chose a nice path the test was performed again in the meadows around Bunschoten. The talk-back contact at 2 meters worked very poorly and was suddenly gone, but at that time we still received a noise-free image and sound at 24 GHz! The distance was 5.7 km. Chris hereby used the 14dBi horns and Peter only open waveguides.

24 GHz reception of PA3CWS at PA3CRX

After placing an offset tray at the open waveguides (focus is not set correctly and exposure much too large), the signal had become so strong that (on which dips after) could be rotated 360 degrees while maintaining image and sound.

Increased distance

A greater distance was required. A previously used path at 6 cm was attempted. At the station with the open waveguides, an offset dish was mounted. The covering of the dish is not optimal and because the distance between the transmitting and receiving waveguide openings is even a distance of 80 mm it could even be called poor.

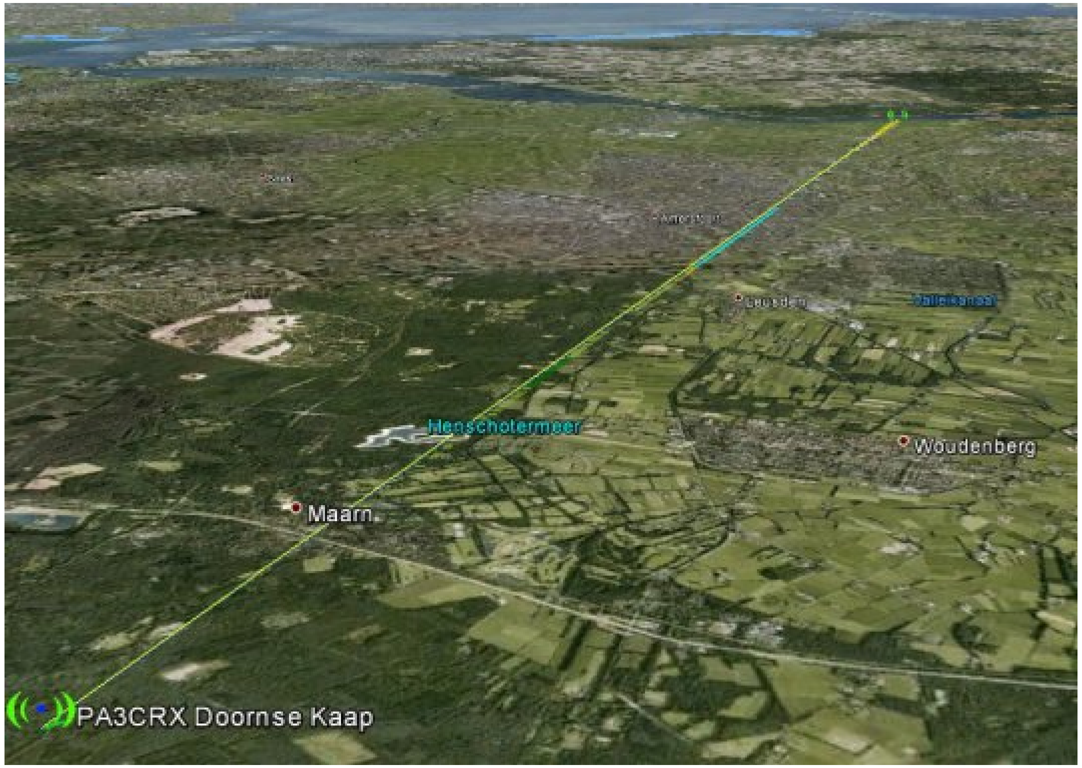
24 GHz station PA3CWS in use

Another disadvantage is that the direction of the signal during transmission and reception is not the same. Aligning the strongest signal and then switching to receive, means that direction needs readjusting...

The connection did not succeed. The contact, but a slightly different location did work and a two-way contact over 28km was made. After that we experimented with a dish that was illuminated by the 14 dBi horns, because both stations had to re align the dishes after switching between transmit and receive. Not very comfortable and difficult to find each other..

On the Sunday morning during the September 2012 ATV contest, it looked a bit foggy, which just might give enough attenuation to have the contact not succeeding. On the "Doorne Kaap", a tower on a hill, 80 mtrs above Sea Level running the station with the horns, transmitter switched on, ready. On the other site the station with the offset dish, receiver, rotating the antenna: P5!

Signal of PA3CRX received by PA3CWS



Paths 24 GHz PA3CWS - PA3CRX, short path is the first test, the long path the second

Thereafter, the contact reversed and also that succeeded (with considerable fluctuation in the signal strength). By using a little part of the prime focus dish (of the 6 cm station), acting as an offset dish the resulting signal was immediately stronger.

To get an idea of how it all went there a movie on youtube, search on “Doornse Kaap” (4).

Still madness?

Yes, maybe it's quite a lot of work to finally have a few minutes contact, with only one station. However, it was quite interesting and who knows how many ATV contacts will be made in five or ten years from now at 24 GHz. Probably not

Prime focus dish from 6 cm station used as offset dish for 24 GHz by PA3CRX

only /P but also from home. By that time it may be questioned as to whether building an ATV station at 245 GHz is madness!

2015

We are now a few years further on than the first tests. One year later, several Dutch stations where present on 24 GHz, only receiving, transmitting and receiving. Likely more then 15 stations are now active on 1.2 cm in the Netherlands. Not with the equipment we use but with Gunn diodes and other modules. Reasonable noise figures and from a few mW to a 1.5 Watt of output.

The station of PA3CWS is now equipped with waveguide to SMA adaptors with one feed horn in the correct position of the offset-dish do the job.

The station of PA3CRX is now equipped with the sliding dish construction, that makes it possible to have the same direction between transmitting and receiving by just sliding the dish. (5)

Sliding dish system by PA3CRX

Maximum distance reached between these stations is 43 km, while one is 80 mtr. above Sea level, the other about 7 mtr. Same path sometimes P5, with sound, other days no signal at all. Room here for a lot of experiments, done by many active ATV stations in the Netherlands.

1)
http://www.rfdesign.co.uk/microwave/Content/Eyal%20Gal%2023GHz2.pdf

2)
http://www.rfdesign.co.uk/microwave/Content/Eyal%20Gal%20Update-1.pdf

There are also other manufacturers (Terra satellite and Thales) and 26GHz 23Ghz possible at 24GHz obtain useful modules (see Internet and Ebay)

3) http://www.pi6ats.nl/6cm_horn_antenna.htm

4) http://www.youtube.com/watch?v=zc5nTVK34JE

5) https://www.youtube.com/watch?v=mrQaRYEsIpo
(at the end of the movie, the other stations equipment could be seen on the screen)

Reference Audio and Video Switcher

By Richard Carden - VK4XRL

In my last article I mentioned the requirement to provide reference setting up for both audio and video. One of my jobs while working in the television sphere was to provide line-up procedures for all installations within the plant. These line ups become crucial when we went colour so that colour phasing was within the required parameters.

We don't need to go quite that far unless you are using a video switcher where all inputs must be timed and phased so you can effect source flowing switching. That is why VMix is so good, it's all done for you in the digital domain. However it's nice to have all audio and video levels adjusted correctly within your station or repeater setup. I have always had a system where I used 100% colour bars and reference tone to check on my system and that of our local repeater.

To this end I have a unit that has a 4 x 1 audio and video switcher where inputs are arranged as follows – see Figure 1;

1. DVB-T STB (446.5Mhz in our case)
2. Station switcher
3. DVB-S STB (DATV 23cm)
4. FM receiver

With the station having been adjusted this is used as my reference where all inputs sources are matched. The video from the switcher is set to 1V p/p.

Items such as STB's should be near enough but if you need to, VDA's (Vision Distribution Amplifiers) can be added.

Audio is also set to reference level with some slight adjustment been done within the audio switcher. Next the internal and/or external monitoring should also be calibrated.

Figure 1 above and figure 2 below

I use an external monitoring OSD (On Screen Display – see figure 4) which combines the audio with the video in graph form and is therefore calibrated accordingly. The OSD unit also has an internal LED bar graph reader and is also calibrated at this time. This allows portable operation for repeater alignment if so required.
(Figures 2 and 3 show the output from VMix)

The DVB-T STB is set with reference to a known TV station (no testcard or tone these days) and I use the radio station and adjust the STB audio level for around 3db down on the reference level. It's not ideal but seems to work well.
The DVB-S STB used for 23cm DATV monitoring is calibrated from an 'off-air' signal with tone and colour bars, normally I use an interchange source.

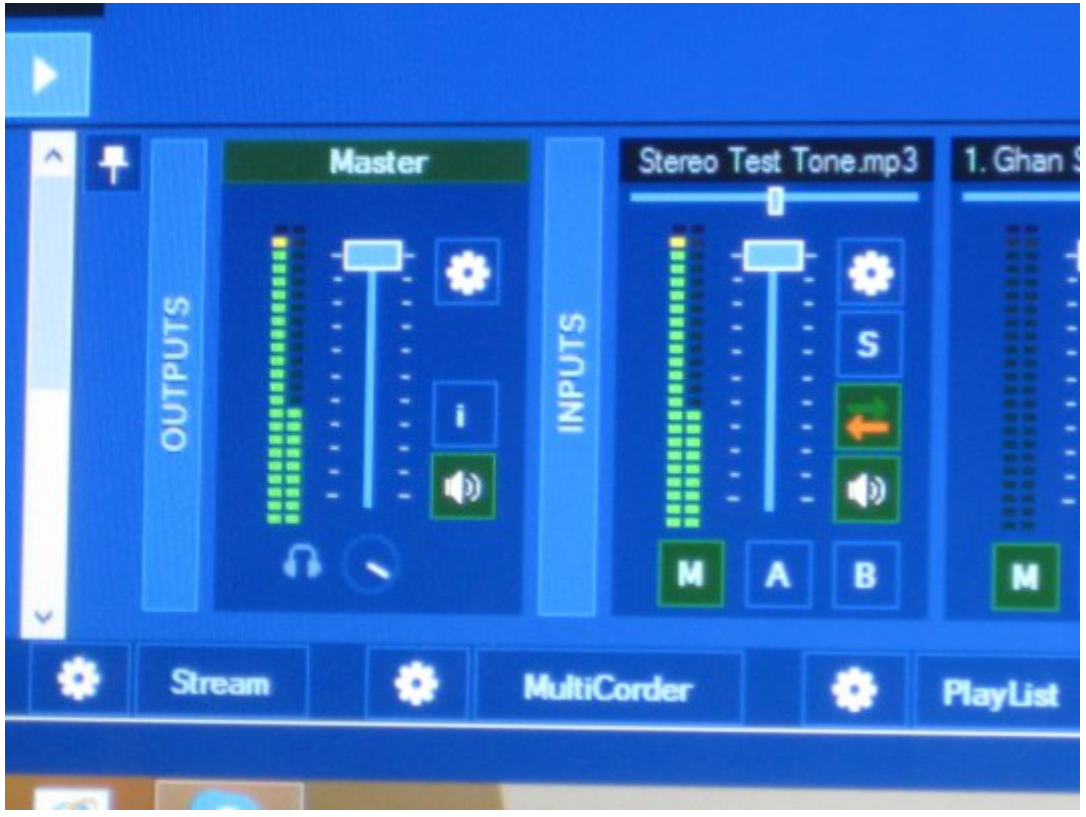
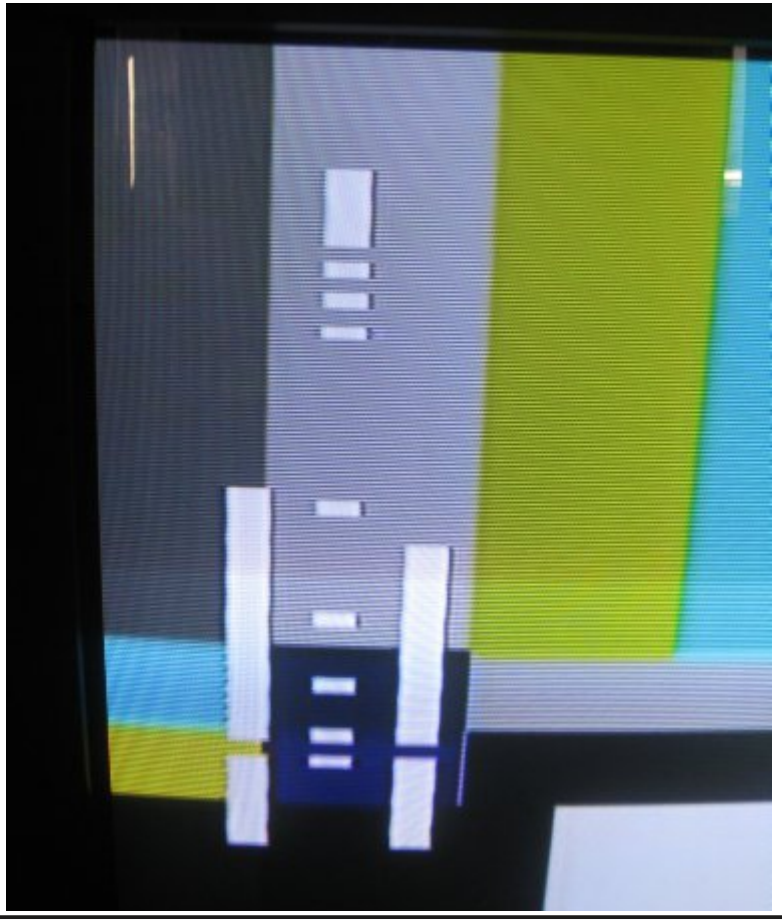


Figure 3 above and figure 4 right

Your own DATV transmitter can also then be adjusted to this reference level.

With the FM receiver it can therefore be adjusted for video levels and audio levels to match the same reference. Because we tend to operate with +/-9 MHz bandwidth we can only expect around 0.5V p/p and up to 0.7v p/p with some internal adjustment, however in these cases a VDA may be required to set the 1V p/p.

While this may not be ideal it is at least better than none at all and allows repeaters and other stations to reflect the same levels. It also allows you to set your our station via the repeater knowing that it originated at the correct levels.



Sourcing accessories for Sony BVP 7 broadcast CCD camera

Trevor G8CJS

I love working with professional video equipment. It is rewarding and provides opportunities to develop your operational skills, to what I like to think is a professional standard. I am not a kit collector or kit fondler, kit is there because I like using it. The Sony BVP 7 CCD camera I own, was mostly assembled from eBay as separate purchases, and there are pitfalls and choices, so I hope this article is of some help if you want to follow in my footsteps.

Sony BVP CCD Camera

I have a lot of time for Sony kit including their cameras as they are designed to please the operator and not necessarily the engineer. Engineers tend to go for the more robust battle ship style constructed cameras. In my view one of the yard sticks to judge any equipment by its user friendliness. Sony Camera kit is light weight and user friendly, viewfinders lenses and tripod plates are interchangeable across a large part of their broadcast range which is part of the attraction, although they now seem to have dropped this. Once you know your way around the kit you can often find items on eBay, its knowing which lens to go for, which back, tripod plate etc.

External Focus B4 Lens

Let's start with the lens. The BVP 7 has a removable lens, using a B4 bayonet mount, and this mount has been consistent through most of the Sony range of professional camera's, so if you upgrade to a higher spec camera then the lens could often be retained, for this reason you see Sony camera's advertised on eBay less lens. My lens is a Fujinon 9.5mm and zooms 150mm making it a 15:1 and will maintain a constant F1.8, there are lenses with built in range

extenders available. I have used longer lenses, but from a small 100mm ball tripod they are difficult to produce steady camera shot from. The B4 mount exists in two sizes 2/3 and 1/2 The BVP7 is a 2/3 mount, beware lenses from JVC camera's that are more likely a 1/2 mount.

B4 lenses use several different connectors for the electronic controls (zoom and iris control for automatic exposure). This connector is separate to the bayonet on a flying lead. The lead in most cases is equipped with a 6 pin or 12 pin round connector. The 6 pin is old and pre dates the BVP7 which requires a 12 pin connector. Lenses with 6 pin connectors can be found on eBay at reasonable prices and updated with a new connector.

If you want to use the camera hand held then a wide angle lens will improve your camera work, but I suspect unless you come across a bargain you will have to put up with a something around 9 or 10mm at it's wide end.

The older lenses were also designed for tube camera's not modern CCD camera's, what's the difference, something called achromatic, where focal point is dependent on the colour, not such a problem on tube camera's as the tubes can be positioned independently to cancel errors. This is not the case with CCD sensors. This error is minimised in most multi element lenses by constructing the lens from two different types of glass (Flint and Crown) which have different properties. By using Flint for the concave elements and crown for the convex elements, the theory is the errors cancel out. http://en.wikipedia.org/wiki/Achromatic_lens

I have to say I have now used numerous lenses designed for tube camera's on CCD cameras and have not yet seen any problems, when working at standard definition. I have seen lenses that won't make back focus that is more of a problem and they were designed for camera's where the CCD or tubes were located in a different position.

External focus lens

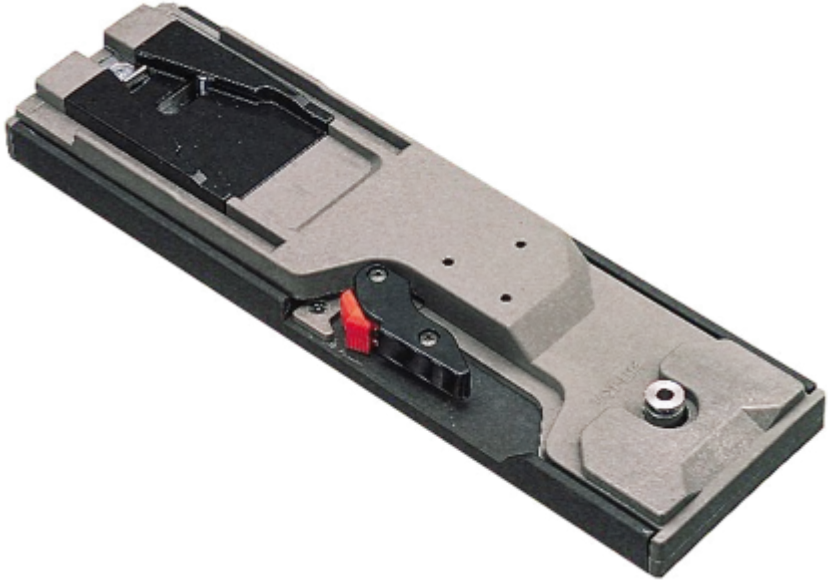
There are also two types of lenses, external and internal focus, this logic comes from what happens when you rotate the focus ring, on an external lens the front element rotates, on an internal focus lens the front element does not rotate.

So you can use square lens hoods and polarising filters, which can be set and will not change as you focus the camera, yes like most broadcast camera's it needs manually focusing (now there is a disappearing skill). I only have an externally focused lens, but one day I am sure an internal B4 2/3 lens that is 5mm at its widest, will turn up on eBay at a bargain price, it just has not happened yet.

These lenses are also very adaptable and are still finding uses on more modern cameras, admittedly with some adaptation. http://www.newsshooter.com/2014/11/20/inter-bee-2014-want-to-put-an-eng-lens-on-a-full-frame-a7s-or-5d-mkiii-technical-farms-new-b4-to-full-frame-adapter/
but that's another article

Adapted B4 Lens (above)

Tripod Mounting Plate (below)



The BVP 7 is equipped with a very pleasant shoulder mount that can be simply dropped onto a tripod, providing the tripod is equipped with the appropriate Sony plate, for this camera it's a VCT-U 14 plate, again they turn up on eBay. Once the tripod is equipped with this plate all the Sony professional camera's of this age will fit this same tripod plate.

Triax and Studio Backs

The camera body is designed to fit a number of interchangeable backs rather like the Hassleblad stills camera, so it can become a camcorder (Beta SP it's an old camera) or a cable fed studio camera (CA-50p back). Triax backs are also available, CA-55p for connection to a CCU 355/P these too have the 26pin VTR connector but not the 41 pin CCU connector.

Sony monocular view finder and Studio Viewfinder

The view finder can be a standard Sony monocular view finder (again can be found on eBay), or the larger studio view finders (BVF 55CE) both can be fitted to the same socket. The monocular viewfinder also takes a camera mic, this has a non standard connector (not XLR). This versatility is why Sony cameras are so popular.

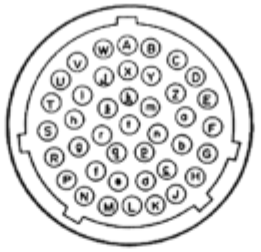
The CA-50P cable back has two multi pin connectors which enable it to interface to a Sony CCU for studio work, 26pin VTR and 41 pin CCU and the triax back has just the 26pin and triax connector. These connections are shown at the end so Component output is possible. It has a BNC connector which will accept black and burst for genlock operation, or it will simply free run for connection to any video recorder or other application via the other BNC connector which provides CVBS out.

Power requirements are +12v from a standard 12v bag battery, mounted on the rear or via the 4 pin XLR connector, in the case of the cable back, which in my case connects to a homemade mains PSU, although I do have a battery belt, when I need to use the camera on the move.

Battery mounting or Battery Belt options

Down side they are an old camera and need a lot of light, they are not widescreen, and as mentioned earlier they are manual focused, so you do need to keep this skill sharp, its not difficult, everyone can do it, but doing it quickly and going the right way every time, well that does take skill. Also from an engineering point the components are getting old, mostly it's capacitors that fail. On the plus side it's a modular camera so if you have two bodies you can locate the problem card by substitution. Once you have the problem card change the electrolytic capacitors (they are wire ended not surface mount).

Yes they are old cameras, yes part of a bygone age, but they are now very affordable, once they cost many thousands of pounds and were the domain of professional broadcasters, these days you can put one together for a few hundred pounds.



(EXT VIEW)

CCU (41 PIN)

PIN NAME	SIGNAL	REMARK FOR SIGNAL
A	POWER SENS (-) OUT	Between pin A and pin Y DC16V
B	(SPARE)	
C	(SPARE)	
D	VBS OUT (G)	GND for VBS VIDEO
E	(SPARE)	
F	PGM IN (G)	GND for PGM AUDIO
G	(SPARE)	
H	RETURN VIDEO IN (G)	GND for RETURN VIDEO
J	(SPARE)	
K	MIC OUT (Y)	-20dBs.Zo = 600 ohm
L	MIC OUT (G)	GND for MIC SIGNAL
M	H SPARE CONT IN	5.0Vp-p, Zi = 4700 ohm
N	SERIAL DATA OUT	2.5Vp-p, Zo = 470 ohm
P	SERIAL DATA (GND)	GND for SERIAL DATA
R	INCOM RECEIVE OUT (Y)	Between pin R and pin g -20dB
S	INCOM TALK/RECEIVE OUT(G)	GND for INCOM TALK/RECEIVE
T	G OUT (G)	GND for G/Y VIDEO
U	(SPARE)	
V	B OUT (G)	GND for B/B-Y VIDEO
W	SC PHASE CONT IN	
X	R OUT (G)	GND for R/R-Y VIDEO
Y	POWER SENS (+) OUT	Between pin Y and pin A DC 16V
Z	VBS OUT (X)	1.0Vp-p, Zo = 75 ohm

PIN NAME	SIGNAL	REMARK FOR SIGNAL
a	PGM IN (X)	-20dB
b	PGM IN (Y)	
c	RETURN VIDEO IN (X)	1.0Vp-p, Zo = 75 ohm
d	MIC OUT (X)	-20dBs, Zo = 600 ohm
e	SERIAL DATA IN	2.5Vp-p, Zi = 4700 ohm
f	INCOM TALK IN (X)	Between pin f and pin q, -20dB
g	INCOM RECEIVE OUT (X)	Between pin g and pin R, -20dB
h	(SPARE)	
i	Y OUT (X)	0.7Vp-p/1.0Vp-p.Zo = 75 ohm
j	B-Y OUT (X)	Zo = 75 ohm 700mVp-p(CA-50) 525mVp-p(CA-50P) (75% COLOR BARS)
k	R-Y OUT (X)	Zo = 75 ohm 700mVp-p(CA-50) 525mVp-p(CA-50P) (75% COLOR BARS)
m	(SPARE)	
n	POWER (+) IN	10.5 ~ 17V
p	(SPARE)	
q	INCOM TALK IN (Y)	Between pin q and pin f, -20dB
r	GND (POWER)	GND for POWER
s	(SPARE)	
t	(SPARE)	

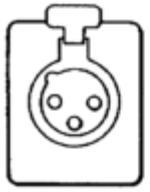
Connections for the sockets on the backs of the BVP7

VTR (26PIN)

(EXT VIEW)

PIN No.	VTR SIGNAL	VTR REMARK FOR SIGNAL
1	COMPOSITE VIDEO OUT (X)	1.0Vp-p,75 ohm
2	COMPOSITE VIDEO OUT (G)	
3	Y OUT (G)	1.0Vp-p,75 ohm
4	Y OUT (X)	
5	R-Y OUT (X)	75 ohm 700mVp-p(CA-50) 525mVp-p(CA-50P) (75% COLOR BARS)
6	R-Y OUT (G)	
7	B-Y OUT (X)	75 ohm 700mVp-p(CA-50) 525mVp-p(CA-50P) (75% COLOR BARS)
8	B-Y OUT (G)	
9	MIC OUT (X)	-60dBs, 600 ohm
10	MIC OUT (Y)	
11	MIC OUT (G)	
12	VTR START/STOP OUT	START : 4.5 ± 0.5Vdc STOP : 0 ± 0.5Vdc
13	BATTERY ALARM IN	(Note 1)
14	(SPARE)	
15	REC/ALARM IN	(Note 2)
16	(SPARE)	
17	SHIELD	
18	PB VIDEO IN (X)	1.0Vp-p,75 ohm
19	PB VIDEO IN (G)	
20	POWER SAVE OUT/ AUDIO MONITOR IN	SAVE: 4.5 ± 0.5Vdc (across 10k ohm) STANDBY: 9.0 ± 0.5Vdc (accross 10k ohm) MONITOR: -6dBs,750 ohm
21	(SPARE)	
22	COLOR FRAMING PULSE OUT	This signal is not used in VTR.
23	(SPARE)	
24	(SPARE)	
A	UNREG +12V IN	10.6 ~ 17.0V
B	UNREG GND	

MIC IN (3PIN)



(EXT VIEW)

PIN No.	SIGNAL	REMARK FOR SIGNAL
1	GND	600ohm, -60dB
2	MIC IN (Y)	
3	MIC IN (X)	

DC IN (4PIN)

(EXT VIEW)

PIN No.	SIGNAL	REMARK FOR SIGNAL
1	GND	GND for DC (+)
2	(SPARE)	
3	(SPARE)	
4	DC (+) IN	10.5 ~ 17.0V

DC OUT (4PIN)

(EXT VIEW)

PIN No.	SIGNAL	REMARK FOR SIGNAL
1	GND	GND for DC (+)
2	(SPARE)	
3	(SPARE)	
4	DC (+) OUT	10.5 ~ 17.0V

YIG FM transmitter for 23 CMS

By John Hudson G3RFL

It seems a long time since I designed GB3FY the 10GHz FM ATV repeater located in Fleetwood. I used a different approach to the transmitter, by using a YIG. Let me explain.

Yttrium **I**ron **G**arnet, YIG for short

These very small balls are about 10 to 30 thou in diameter. It's sliced from the grown garnet and then diced and tumbled to produce the finished ball. The value of the raw material on the open market is several million dollars per pound, don't worry you don't have to buy the whole pound, garnet balls are available on eBay at affordable prices as part of functioning surplus telecom equipment. These small self-contained devices can be powered up and modulated with video either analogue of digital and provide the bases for a transmitter.

YIG's are nothing new they have been around quite a few years and are to be found in expensive high end test equipment. What has changed is they are now appearing on eBay at prices affordable by amateurs. They are extremely stable, can produce typically 100Mw and now that GB3FY has been operating for 2 years using one as its transmit source, I can also report that they are very reliable and ideal for FM ATV.

The question I have been asking myself is are they suitable for other ATV bands in particular 23 cms, sometimes the only way to find out is to power one up and see.

For those of you not familiar with this technology, the key to controlling and modulating these devices is via a magnetic field. There is magic number to set the frequency of a YIG and this is 2.8 MHz per Gauss of an applied magnetic field. So if a 1000 Gauss field were applied to the YIG it will oscillate at 2.8GHz, similarly 2000 Gauss would move the frequency to 5.6GHz.

However the STELLEX devices I used in GB3FY have built in magnets so they just cover a small frequency range. My STELLEX 6755 728 covers 9.5 to10.43GHz, and without any power being applied to the coil it runs at 9.985GHz.

The control coils (yes there are two) can add or subtract from the frequency. The main coil is about 15 ohms and creates a lot of frequency change per m/A of applied current. The smaller is the FM modulation coil.

For my 23cms I used an Avantek YIG again purchased from eBay, in common with the Stellex unit it has two coils one that can add or subtract from the frequency. The large coil is about 15 ohms and creates a lot of frequency change per m/A of applied current.

The smaller coil is for FM modulation and is about is 1 ohm and has an inductance of 2uH. Driving this inductor was the first problem, not too difficult up to 500 KHz, but above that frequency we need some sort of EQ or current drive, to compensate for the inductance. So far I am still on a learning curve, but I have managed without any serious equipment to create a watchable modulation system good enough for ATV Fig 1 shows the circuit design that I have developed to evaluate the unit.

Both coils are driven with by IRF520 FETS which are in turn driven from one half of a CA3240 op amp (not too dissimilar to my original 10GHz design). The PIC is programmed with a look up table to match the displayed frequency to a given voltage that will adjust the YIG via the main coil to match. This can be stepped through with increment and decrement push buttons. The PIC also stores the last frequency used on power down as the frequency it powers up on.

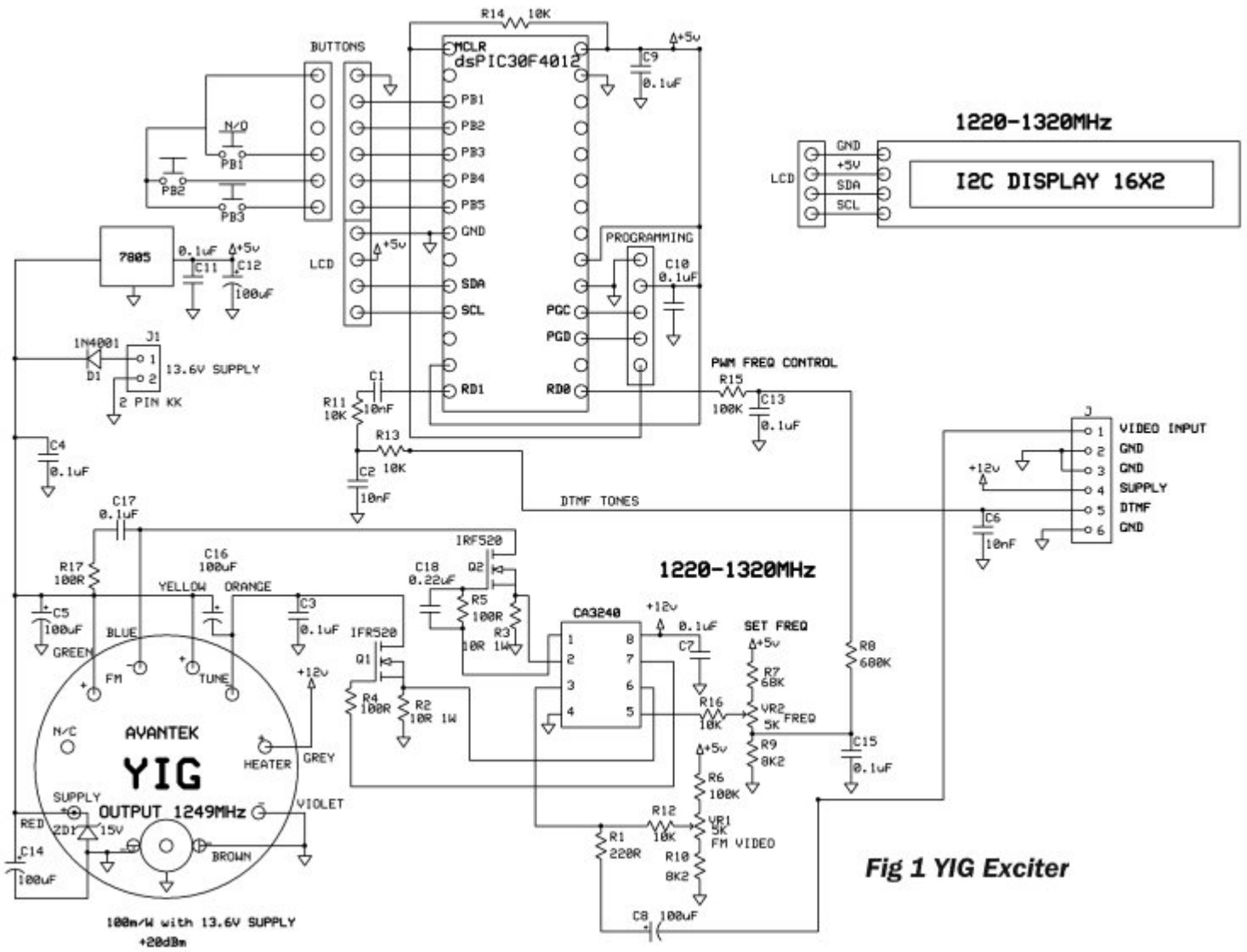


Fig 1 YIG Exciter

I did include VR2 for calibration purposes so that if the YIG was replaced the look up table would not need to be re written, but the stability and ability to change the YIG with very little adjustment bears testament to the stability and interchangeably of these units.

The smaller modulation coils is driven in a similar manner, but here we limit the current to 200mA just in case you have a fault to protect the coil. The modulation of this coil requires CCIR 405 Pre emphasis, in order to compensate for the poor spectral energy in the FM side bands, which reduces in power as the modulation frequency increases. All the FM ATV receivers have standard CCIR De emphasis, so there are no options, it must be part of the modulator.

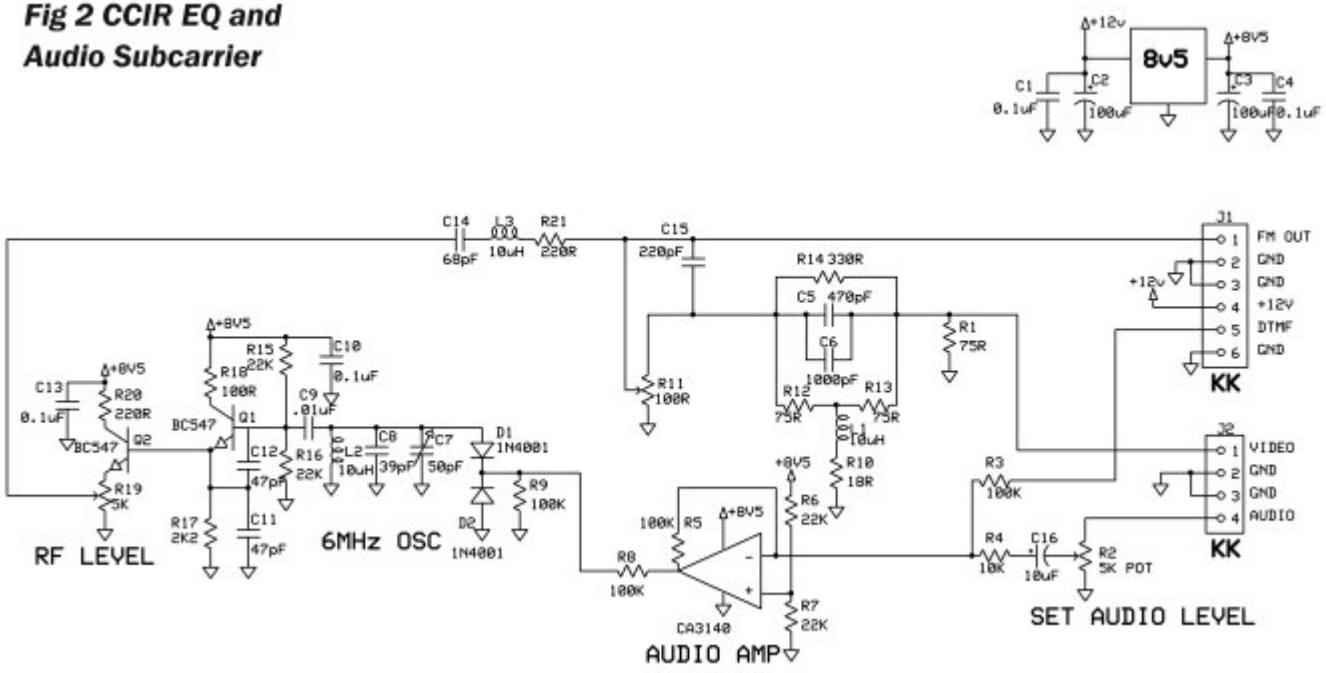
Figure 2 (NEXT PAGE) shows this video CCIR Pre-emphasis and the audio subcarrier generation.

The PIC driven display is via an I2C interface to a 16x2 LCD display. (the software is available on the CQ-DATV download site along with a DTMF version for use with GB3FY repeater which has two codes *1249# to switch the RX listening on 1249MHz and on power up the new 23cm YIG TX sends this automatically so to reverse this if you re-power the YIG TX it automatically sends in our case *9# to close the repeater or it times out after 10 mins).

The CCIR curve is very old and was designed as three curves to suit 525 (A), 625 (B) and 819 (C) line television. The network shown produces an approximation to curve B (625 and is common circuit across many FM ATV applications.)

The Audio path is via a CA 3140 op amp to produce gain so as to suit most audio levels. R2 enables level adjustment . The signal then goes on to drive two reverse biased 1n4001

Fig 2 CCIR EQ and Audio Subcarrier



Sorry the photograph does not do the display justice (see next page).

The assembler source code for this project can be downloaded from our web site.

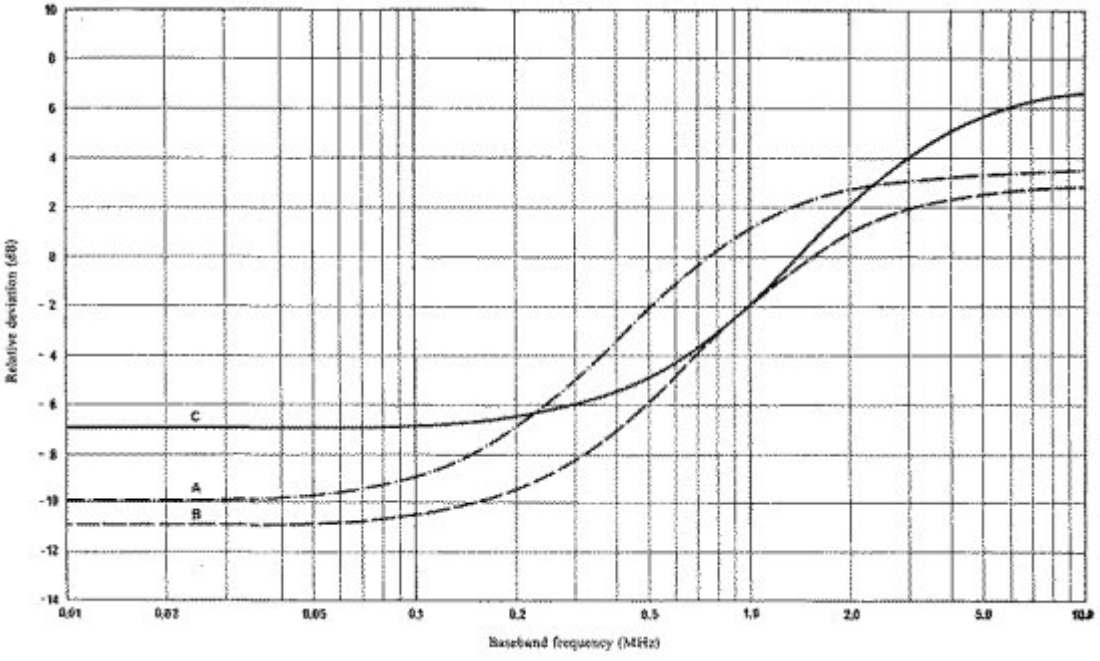
http://cq-datv.mobi/downloads.php#latest

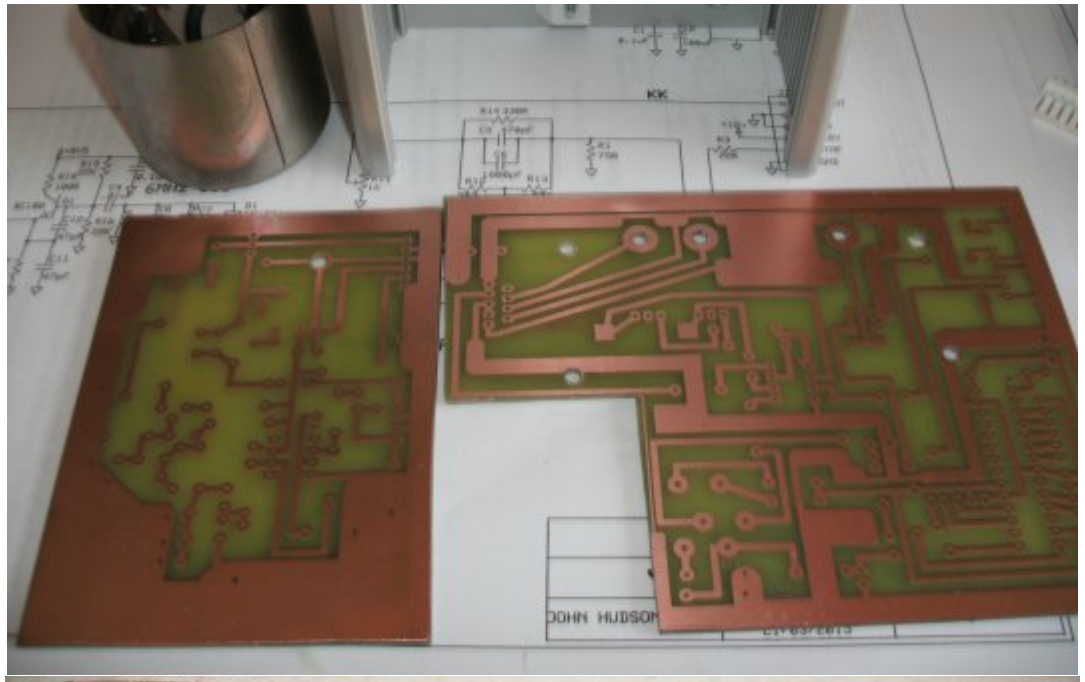
diodes that act as voltage dependent capacitors in this mode and will then frequency modulate the RC oscillator Q1, Q2 buffers this subcarrier and R19 sets the level of the audio subcarrier.

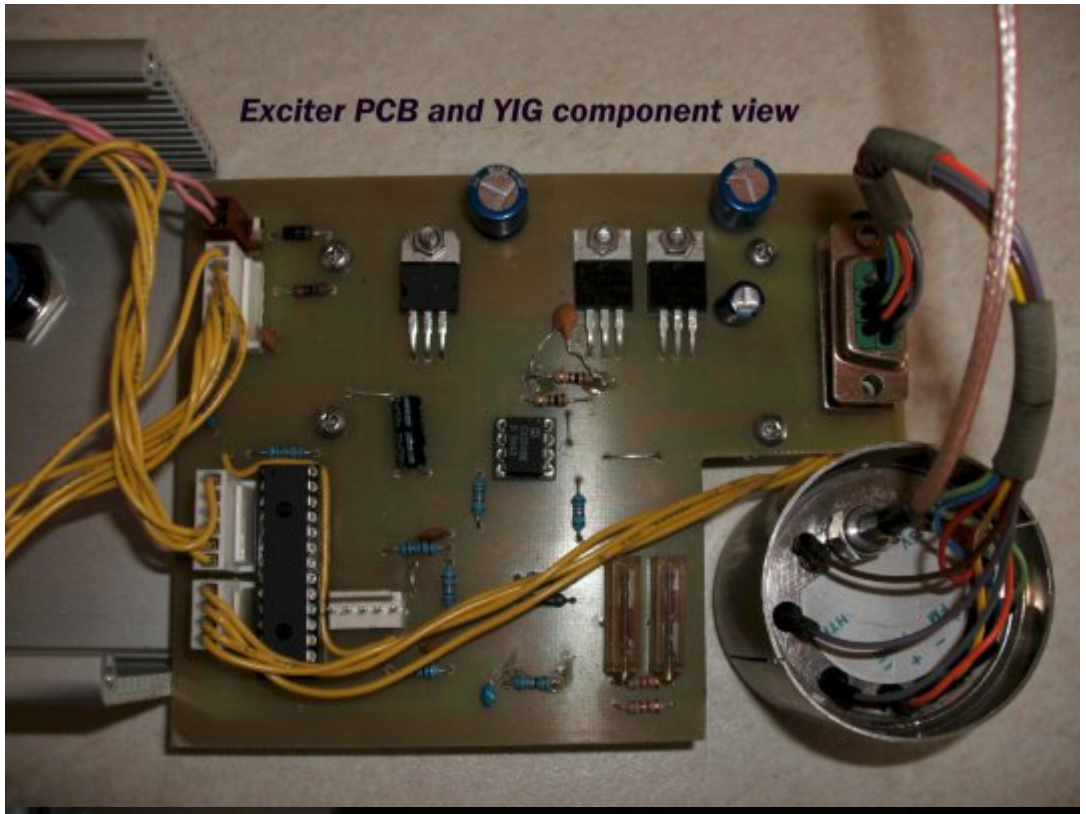
Construction was by using two home etched PCB's one for the exciter fig 1 and a separate board for the CCIR EQ and audio subcarrier fig2. The only reason for two pcbs is the audio and EQ board has become a standard module around the shack as it is used in a number of FM TV transmitter applications

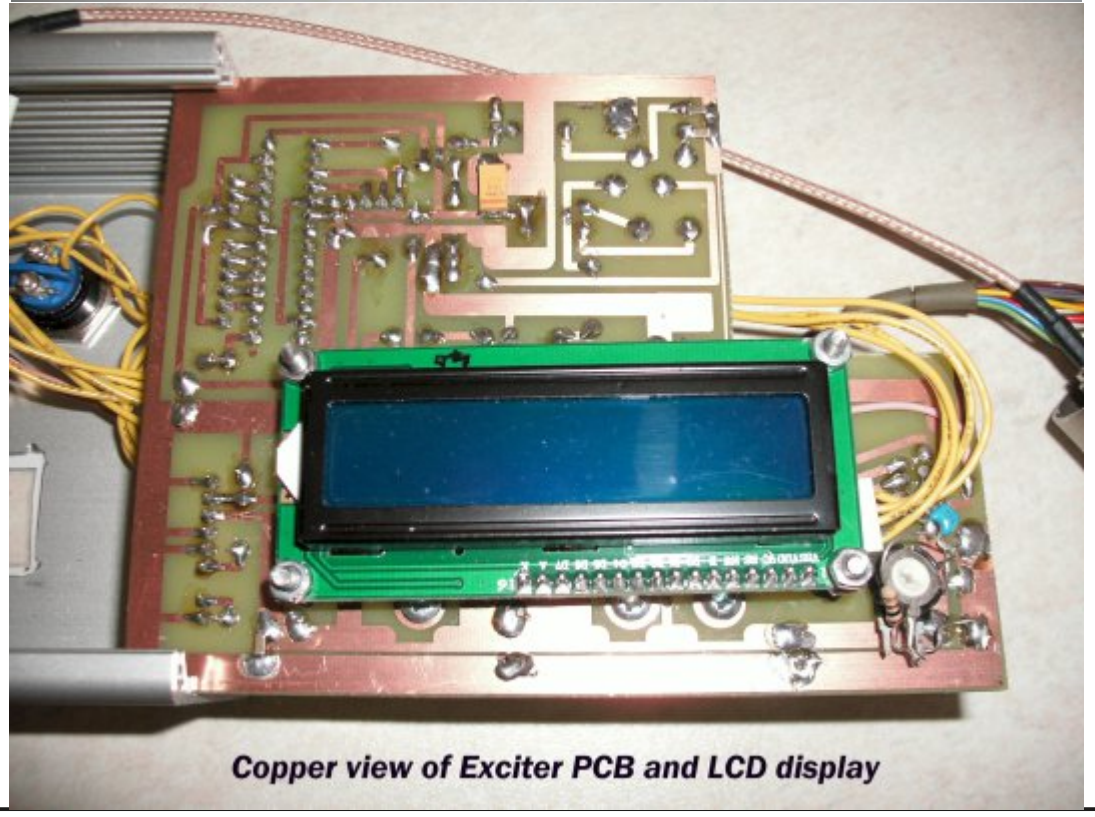
Just of finish off the project I invested in a rather eye catching box that in the photograph does not really do this elegant transmitter justice.

So there we have it my 23cms FM ATV transmitter, 100mw of output with an LCD display of the frequency.






Exciter PCB and YIG component view


Copper view of Exciter PCB and LCD display


YIG 23cm EXCITER
23cm YIG EXCITER
1249.000 MHz
FREQ MENU INC DEC

DATV-Express Project - May update report

Ken W6HHC continued to test the alpha-version of v2.04 deb file for the ODROID U3. (Although other household duties have eaten into his spare time for ham radio and DATV-Express project.)

A Hauppauge HD-PVR model 1212 was obtained on e-bay and successfully transmitted H.264 video (using an NTSC camera and an NTSC EMPREX "slide show generator" unit) to the AMIKO STB. Charles had discovered that the HD-PVR encoder typically requires a FW update (hdpvr_1.7.1.30059 available for free download from Hauppauge support page) to prevent instability, especially running on Linux. The Linux drivers for HD-PVR that were supplied with the ODROID Lubuntu v14.04 LTS distribution worked great.

This was the first time that Ken had been able to display DVB-S with H.264 video on the AMIKO STB that had been purchased for that purpose. Ken's only previous STB experience had been with a ViewSat VS2000 STB that did NOT require a STB scan to find and display the video. The new AMIKO STB would only display LOCK. 100% QUALITY, and a blank screen…until G4GUO suggested performing a SCAN on the AMIKO. The remaining tasks before releasing v2.04 for ODROID are:

1. *Start the UDP feature testing without using Express_Server*
2. *Then plan to test UDP testing using the Express_Server*
3. *Then plan to update User Guide for ODROID*

Ken's time will continue to be impacted by visiting relatives in June and also diversion by Field Day preparations, also in June.

Art was busy hosting an ATV Forum at the HamVention in Dayton during May. Art reported that attendance at the ATV Forum was about 55 people (up from only 22 people in 2014).

Art tested the beta-version of v2.04 for ODROID and confirmed that the extended PID range allowed receiving his DVB-T signal on the HiDes HV-11 receiver. But Art reported that the received DVB-T (using 2 MHz bandwidth) became unstable while transmitting. Ken is suspicious that one of the ARM cores may be saturating while trying to run at 2 MHz BW. This 2 MHz BW DVB-T instability on ODROID v2.04 beta is being investigated.

Charles G4GUO reported that his development work is starting to wind down on DATV-Express, although he continues to provide all of the support efforts necessary. Charles has started to look at (a) the Lime LMS6002D / Xilinx 7020 Zynq combo as a possible next generation DATV transceiver. (Charles reports a steep learning curve is encountered on Zynq FPGA) and (b) trying to finish off a load of projects that have been hanging around his lab for sometime…like an Arduino-based solder-reflow oven using a 'toaster oven'.

Testing on ODROID V2.04 beta-software will continue, including investigations described above concerning 2 MHz bandwidth DVB-T instability with the DATV-Express.

"project is set to slow speed"....de Ken W6HHC

Continued on page 30

Video Codec's and why so many

By Rovert Nworb

If ever there was a recurring question in Digital Television it's what is a Codec and why are there so many different kinds.

Let's start with the name Codec, it stands for **CO**mpressor **DEC**ompressor. That's the easy part. What do they do, well in our case they convert the TV signal into 1's & 0's. OK so it's an A to D and D to A, no its much more. If we take a 6MHz video signal and sample it at 3 times subcarrier (4.433 MHz in the UK we get over 13MHZ) and then convert it to 10 digital bits 130 MB/second that's for 625 PAL if we go for 1080p and 12 bits we are up at 155MB/Second, that's 560Gb to store for 1 hours worth of video, as for 4K Television well let's not go there. We are at a bit rate that hard disks struggle with, but what we wanted is to record video on an SD card.

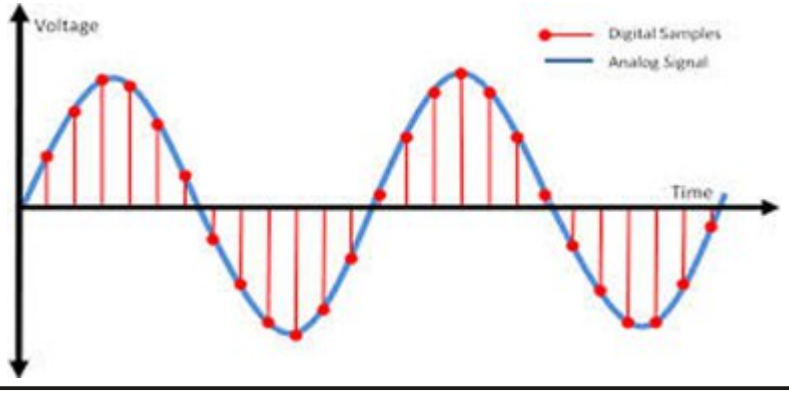
Television pictures are not the only medium, with digital problems, that are solved by Codecs.

Audio and still images, with the MP3 being the most familiar with AAC and AIF not far behind and JPG, PNG and TIFF for still images. Until fairly recently, the compression algorithm used in JPG files was copyrighted, whereas PNG is an open, public domain format.

These are digital files that have been compacted in different ways. The problem is each format has its short comings. JPEG is a single layer so it's not got an Alpha layer to define transparency, PNG does have a layer to define transparency, but the file size is larger (but is lossless!). JPEG degrades every time you edit/re-size. BMP and Tiff are better files but can be quite large.

Let's start with TV pictures from a camera and AVCHD compression. This compression will get the data rate down to about 7 to 10MB/second, so it can be stored on an SD card. But at what cost and how does it do it.

Let's go back to sampling, it's a little like those children's puzzles where we join up numbered dots to create a picture, the more detailed the picture the more dots you need. So for PAL think about the subcarrier and a single sine wave cycle sampled three times. Chose where you take the samples you are not going to draw a sine wave with three dots.



The dots carry binary amplitude information that indicate amplitude, so 8 binary bits would present 256 analogue levels. Still we are going to get a lumpy sine wave picture. Increase the samples and the analogue levels and the data will be coming so fast that we will have storage problems. Reduce it and we will see ether quantisation puddling or artefacts caused by low sample rates. Filtering is essential and nor something software does well.
Once over that hurdle we come to the next stage: removing the redundant part of the picture to save on space and reduce data rates.

Codec's

Moving images create too much data for the memory card to store

Video Codec's remove lots of the pictures

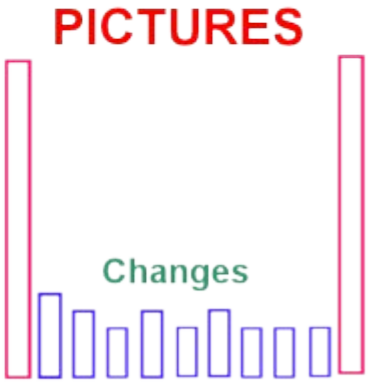
The Pictures are sent as data

Mpeg2 was the first Codec

Mpeg4 followed it

AVHCD

All these files are different



This is done by looking at a group of pictures, transmitting the first one and the last one and then the rest of the pictures in the group as the difference between the first and last picture.

Does it work well providing there is not too much movement in the picture? Yes, the more movement there is in the picture the more it is likely to not work.

In the early days all you had to do was put the camera into record and shake it to give maximum picture change for each frame and your Codec would be in trouble, but we have had considerable improvements and yes, they do now hold together. This is because there is prediction software built into the codec that guesses how the pictures are going to change throughout the GOP (Group of Pictures), but of course, it never guessed you were going to shake the camera.

Compression Codec's work best if you do not feed them with coded pictures. Otherwise you are PAL coding and then digital coding and you get the worst out of both worlds. But some DATV transmitters give you very little option as they have only PAL or SVHS inputs. Also we have moved into a wide screen world and PAL coding or NTSC for that matter was never designed for the wide screen world, so pictures are best sourced as component pictures. This is ok if you start today, but particularly in the broadcast world where they want to inflict programmes made in an older analogue world that were stored as 12 by 16 in PAL.

This can be aspect ratio converted by removing part of the picture and stretching other parts and the can be converted to component with high quality comb decoders, but they still suffer and can be found every day on some of the less well-off digital channels.

Codec's are very much horses for courses. They have specific uses, some are ideal for transmitting pictures and will cope with reduced bandwidth, such as Mpeg 4, little difficult to edit with as you do not have a group of pictures to scrub past and chose edit points, but software can create the illusion of the whole group of pictures being there, but this can be very demanding on your CPU.

Also, for equipment manufactures, there are copyright issues as Codec's might be in use everywhere but they were all

developed by somebody and that process might not be in the public domain which leads manufacturers to implement various versions of common Codec's.

There are also Transcoders, which will convert between the various codec formats but these are not necessarily lossless and can again lead to picture degradation.

Summing up, choosing the right horse for the course. Not that we always have much choice, avoiding sourcing a picture that will be in a digital domain from a coded source. The old computer adage of rubbish in rubbish out still holds and just because it is digital does not mean it is good.

Continued from page 27

Photo of first H.264 Video from HD-PVR that is being displayed by AMIKO STB. Obtaining the 4:3 aspect-ratio using AMIKO still needs to be sorted out

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Write for the CQ-DATV Magazine

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When you are ready to submit your article, please email it to:-
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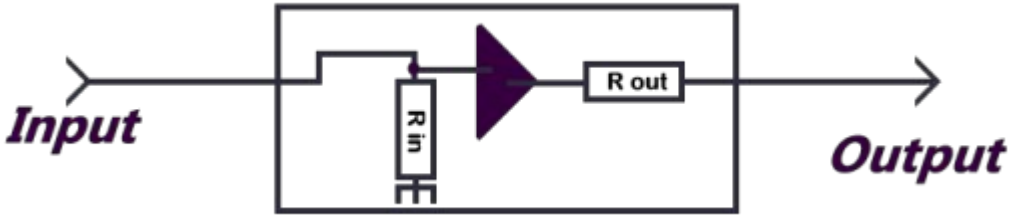
Skills test - puzzle

This was the skill test in the previous issue:-

This amplifier is producing a stage gain sufficient for the task, but does not deliver that gain when the input and outputs are loaded. Describe how you would measure the input and output impedances of the unit.

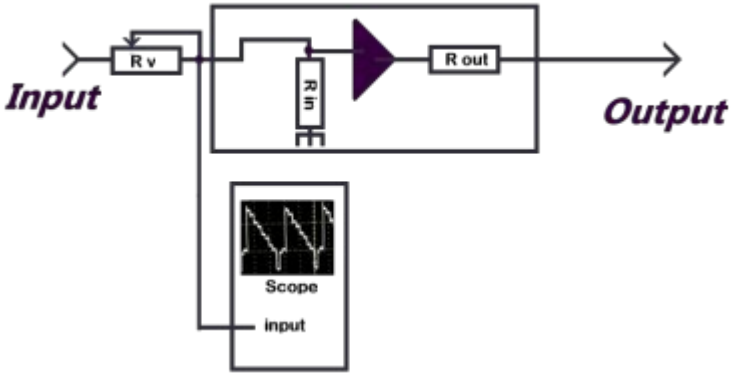
Let's start by adding a little more detail,



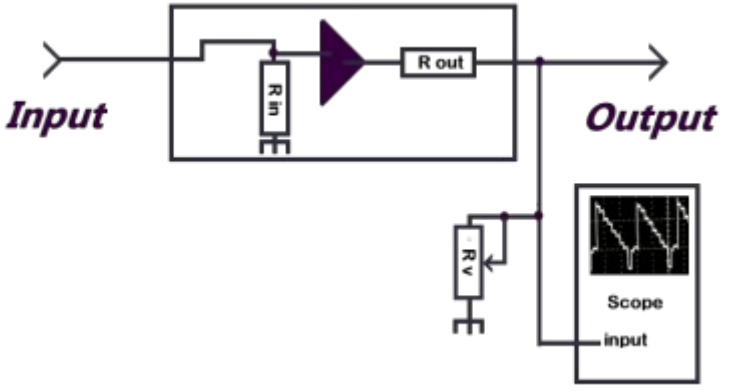
R in represents the input impedance Its not necessary a separate resistor it might be a single component or several components that comprise the input impedance of the circuit, but there effect is the same, it's a shunt across the input that needs measuring.

The output again is a resistor, but this time it is in series with the amplifier output and builds up the impedance. Again it might not be an actual resistor it could be a number of components that create this effect.

Easiest way to measure the input impedance is to put a pot in series and a oscilloscope or other measuring device across the input. Apply a signal and start with the pot set to short circuit and increase its value until the signal reduces to half the original, then we have a 6dB pad comprised by Rv and R in, remove the pot and measure it and we have the input impedance.

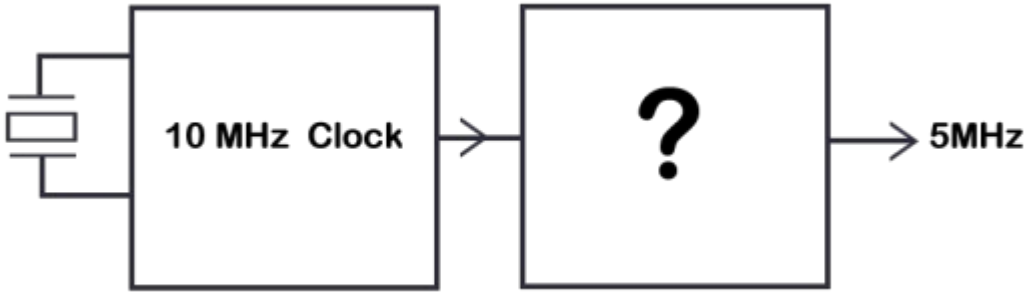


To measure the output impedance we follow a similar procedure



Start with the pot at the high resistance end, gradually reduce it until we find the level of our signal has dropped to half and we then have a 6db pad using two components R out and Rv, remove Rv and measure it and we have the output impedance. Remember if it is standard 1v CVBS video it should present 75 ohms.

For this issue lets have a digital problem to solve. You need a 5MHz xtal locked source and only have a 10MHz xtal in your junk box, how would you add a divide by 2 stage



(Cut the xtal in half? - ED)

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