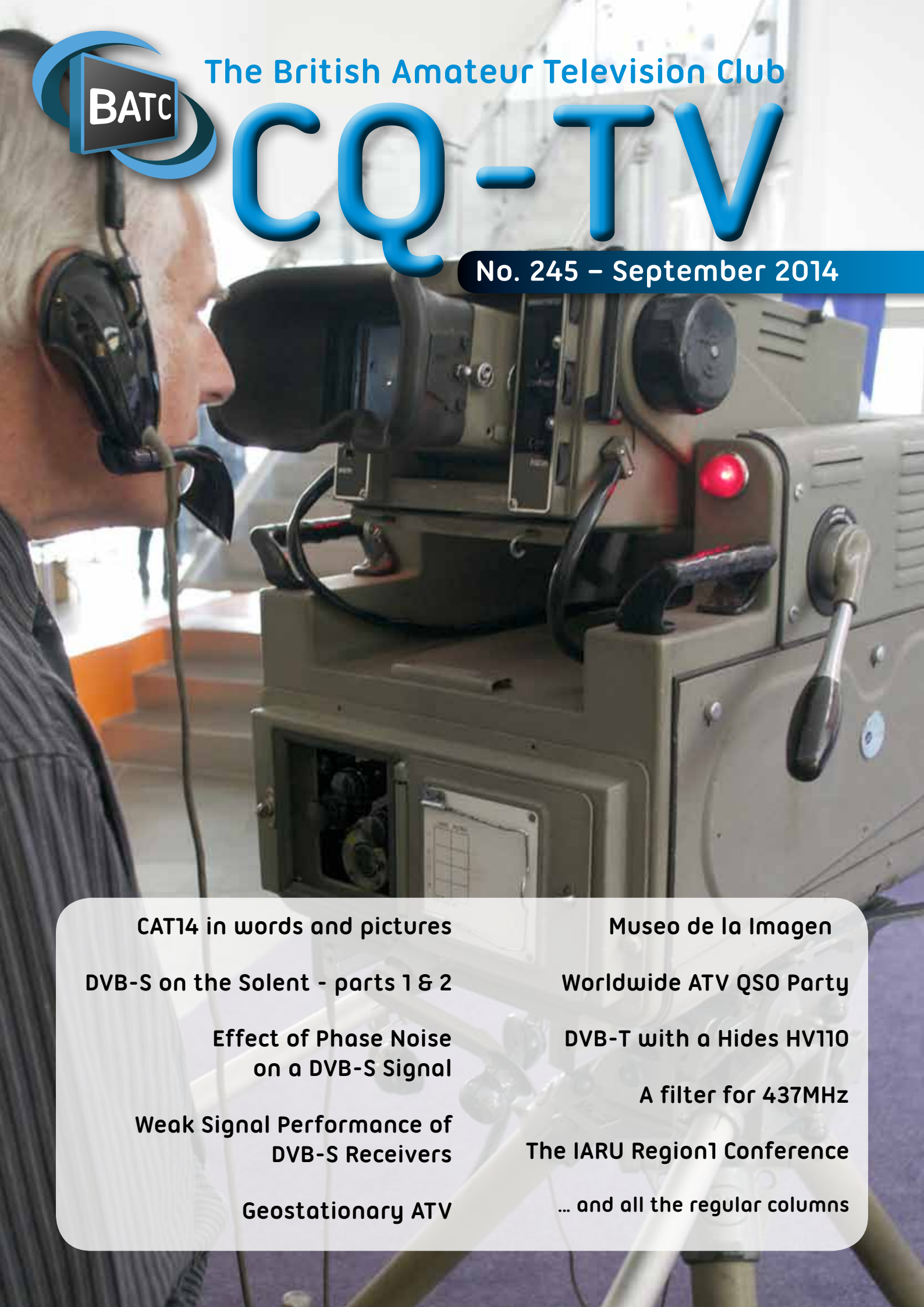

The British Amateur Television Club

CQ-TV

No. 245 – September 2014

CAT14 in words and pictures

DVB-S on the Solent - parts 1 & 2

Effect of Phase Noise on a DVB-S Signal

Weak Signal Performance of DVB-S Receivers

Geostationary ATV

Museo de la Imagen

Worldwide ATV QSO Party

DVB-T with a Hides HV110

A filter for 437MHz

The IARU Region1 Conference

... and all the regular columns

BATC DTX1
Digital TV Transmitter

MPEG-2 encoder and DVB-S modulator

- Self contained unit - computer not required.
- Composite and S-video input
- 2 audio channels
- Single PCB design
- Plug in option for 2nd video & audio channels
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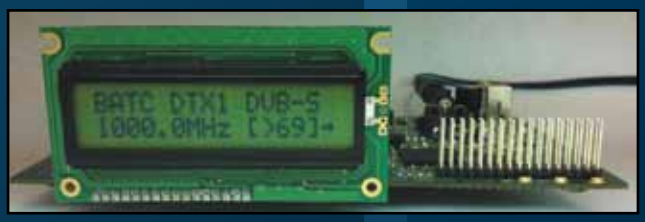
- Tunes the 70cm and 23cm bands. Tuning range from 150Mhz - 2Ghz
- -5 dBm output
- Power 500mA at 12 volts
- LCD front panel and keypad control
- RS232 control port



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  £465
  + Shipping
- 2nd encoder channel ***£199***
  + Shipping

Specification subject to change without notice

BATC

CQ-TV 245

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You can also telephone 01400 414 243 You will then hear a menu that will allow you to be connected to the correct person if they are available.

Alternatively you can write to us at: BATC, Silverwood, South View Road, Pinner, HA5 3YA, United Kingdom

We aim to publish CQ-TV quarterly in February, May, August and November.

The deadlines for each issue are:
March - Please submit by January 31st
June - Please submit by April 30th
September - Please submit by July 31st
December - Please submit October 31st

Please send your contributions in as soon as you can prior to this date. Don't wait for the deadline if you have something to publish as the longer we have your article, the easier it is for us to prepare the page layouts. If you have pictures that you want including in your article, please send them, in the highest possible quality, as separate files. Pictures already embedded in a page are difficult to extract at high quality but if you want to demonstrate your preferred layout, a sample of your finished work with pictures in place is welcomed. Please note the implications of submitting an article which are detailed on the contents page.

From the Chairman...

Noel Matthews - G8GTZ

The last three months have been very busy in the world of ATV. It started with the BATC SummerFun contest which attracted a record number of entries for several years and featured the special digital section which was won by WB8LGA. Unfortunately the IARU contest in September did not attract a similar level of activity and several stations failed to make any contacts!

A hot topic at the moment is the future of some of the bands we use for ATV – as I write this Graham, G3VZV, is keeping an eye on ATV interests at the IARU Region 1 conference in Bulgaria where the future of 437 MHz and the 23cms bands are hot topics. We do not believe there any specific threats to the bands in the UK but it is important that BATC is seen to be representing the UK ATV community at such conferences – see the BATC forum spectrum matters topic for the latest up to date information.

It was great to meet members at CAT14 – the talks program was covered a wide variety of topics with G3ZVZ talking about the exciting DVB-S satellite transponder project and Norman Green presenting a fascinating history of military CCTV in the 1930s – in case you missed any of the lectures they are available in the batc.tv archive. We had a number of fascinating demos from the Marconi camera featured on the front cover to G8ADM and G3PYB's experiments on 50 MHz DATV. If you haven't been to a CAT recently, they really are a great opportunity to meet other ATVers and get inspired by the talks and demos – we look forward to seeing you at Finningley in 2015!

The BATC GM and EGM took place on Sunday afternoon and I would like to personally thank all the members who attended and supported your committee at the meeting - I met one member who did a 350 mile round trip just to support us! We are pleased that you voted to overturn the vote of no confidence and to allow us to continue as your committee for the next 2 years - we will endeavour to drive the BATC forward to support all aspects of the ATV community. We are also very pleased to welcome Frank, M0AEU CQ-TV editor, and Clive, G3GJA to the team.

There was a strong feeling amongst members and the committee that we should all work together for the good of the ATV community and so we will be contacting the team at CQ-DATV to explore ways of co-operating.

Over the next couple of months the committee will be looking at how the BATC should develop over the next couple of years – if you have any ideas you like to be considered just let one of the team know.

On Sunday morning Peter, G3PYB, the BATC President presented the Grant Dixon award to Charles Brain on behalf of the DATVExpress team – the team have produced a ground breaking product with so much potential and really deserve the award. Don't forget that as well as awarding the Grant Dixon award every 2 years, we have the BATC grant which is given to individuals or groups in recognition of special work they have done to further the cause of ATV – if you know of anyone who you think deserves the award, just let a member of the committee know.

Finally, one the areas we are keen to improve is the BATC image, by updating our web presence online as well as on social media. We are trying to put together a team to develop the new website and streaming portal and in the meantime Dave M0SAT has taken on responsibility for the BATC Facebook and Twitter accounts and is looking for members to join in and post their latest news for all to see. ***https://www.facebook.com/groups/BATCOnline/***

Overseas News

Dave Crump – G8GKQ

The Netherlands

In the September issue of Electron, the Dutch Amateur Radio Magazine, Chris PA0CRX reports that a number of Dutch stations are experimenting with 9cm ATV. Initial experiments were analogue FM, but more recent tests have used DVB-S with SR4000, FEC ½. Receivers are based on C-Band LNBs with homebrew transmitters.

Chris had also found an article on the web describing a hand-held 2.4GHz Spectrum Analyser using an old mobile phone casing and display. The full details of the design by EA4EOZ can be found here: ***http://ea4eoz.blogspot.nl/2012/09/handheld-24-ghz-spectrum-analyzer.html.***

Australia

Grant, VK5GR reports that the new DATV Repeater VK5DRC was commissioned on 17 May 2014. Co-located with "Trax FM" 15 km east of Port Prie in South Australia (about 200km North of Adelaide), it receives on 1275MHz DVB-S (SR5000, FEC ¾) or analogue FM. The transmitter is broadcast standard DVB-T on 446.5MHz with an output power of 100 watts.

On top of the rack is the DTMF interface (in the separate box). Beneath that is the 23 cm FM receiver, the 23 cm Digital receiver, lower down in the rack is the DVB-T exciter, the 600 watt linear PA and then the power supply. The equipment at the bottom of the rack is the commercial Trax FM transmitter.

The antennas are currently on a temporary pole but will be installed on the tower (just visible on the ground behind) when proven reliable.

ACMA ATV shared 70cm spectrum news

The Australian Communications and Media Authority, as part of the re-planning activities for the 400 MHz band, has made 442.5 - 444 MHz and 446.5 - 448 MHz temporarily available to the Land Mobile Service.

To enable an orderly re-planning of that spectrum, it is anticipated that temporary spectrum allocations will be needed until the end of 2015. Any Land Mobile Service allocation will be on a secondary basis, and equal to the Amateur Service which is also secondary on that band. The ACMA wants frequency coordination to occur before any new user starts using a frequency.

All in all no one really knows what effect this may have on ATV repeater outputs. Given that there are only active installations in Hobart, Port Pirie, Brisbane and Melbourne there may be a work around with sensible frequency planning.

Members News

Dave Mann – G8ADM

DVB-T Success. Charles G4GUO reports:

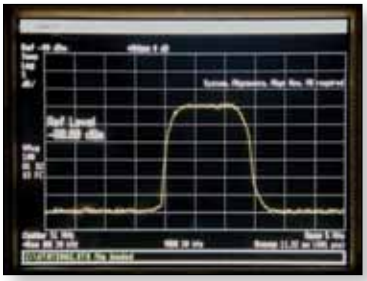
I had my first proper contact on DVB-T this weekend with Roy G4WTV. I was using DATV-Express in 2 MHz DVB-T mode with about 10 watts to a collinear on 70 cms. Roy was using a Hides HV110 also with a collinear.

The distance was only a couple of miles but it is a start. As the Hides UT100 series dongles now support 1 Mhz DVB-T I will add that to the Express code in the next couple of days. See: ***www.hides.com.tw*** *(See full article from Charles in this issue - Ed)*

70cm DATV from Cambridge

Ian, G3KKD from near Cambridge has recently replaced his Tandberg encoder and can now exchange pictures on 70cm digital with Arthur G4CPE near Luton running just 50W, he also received pictures from Steve M0SKM and Ted 2E0EAZ in the Dunstable area. Work continues to make these a two way contact. This is very good news as Ian has been very unhappy with the lack of ATV activity in the Cambridge area.

6m DATV



Peter, G3PYB and I have been testing DATV on the 6m band. By using a symbol rate of 1.133 MS/Sec, an FEC of $^{3}/_{4}$ and a frequency of 51.2MHz we can fit a DATV signal into the top 1.5 MHz of the band. This keeps the signal nicely away from the SSB part of the band. As the upper part of 6m is little used, our occasional use of DATV on the band should not cause a problem. By using these parameters regular encoders and receivers can be used. When fully operational we are hoping for some very long distance contacts occasionally when sporadic E or F layer propagation is about. If you are interested in operation on 6m please get in touch.

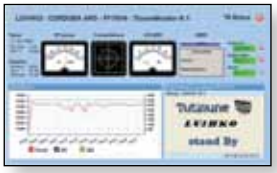
GB3GV Repeater

Peter, G8DKC who runs the GB3GV repeater in Markfield near Leicester reports that the repeater's 70cm DATV input is now working well. A new bandpass filter and SSB pre-amp have made a big improvement to the performance. Arthur G4CPE near Luton now regularly gets into GV.

The received performance on the repeater can also be measured on the web with a Tutioune monitor, see below.

The photo shows the very neat repeater shack, I wish my repeater looked so neat! GB3GV can also be seen on the BATC streaming service. See: ***http://www.batc.tv***

Tutioune DVB-S monitoring.



Many stations have a web page showing the results of their Tutioune monitor, developed by F6DZP, receiving DVB-S transmissions on various bands. There is now a web page, ***http://www.vivadatv.org/tutioune.php*** with a list of these stations around the world. Click on the nearest station to you and transmit. You will be able to see the performance of your transmission as well as look at the pictures. This is very useful when setting up a new PA or to check your transmission when nobody is about.

Surplus Equipment

Buying surplus broadcast equipment is often a good way to get on the air with a hi-tech system at relatively low prices. There are two main auction companies involved, the entire contents of the BBC Television Centre has recently been sold this way including 30m diameter dishes and control equipment. See: ***http://www.techbid.co.uk*** and ***http://mcdauctions.auctionevo.co.uk/***

Streaming Events

To keep you up to date with the latest broadcast technology, Studio Tech has a live show on Tuesday evenings. See: ***http://www.studiotech.tv/*** Some of the shows are direct from the International Broadcast Convention (IBC) and NAB. Previous shows can also be viewed on the site.

The TXFactor is a regular program that provides up-to-date news about Amateur Radio, well worth watching. See: ***http://www.txfilms.co.uk/txfactor/***

Please send your news for the next CQ-TV to:
secretary@batc.org.uk

Contest News

Dave Crump – G8GKQ

SummerFun Contest

The SummerFun contest with its special digital section attracted 13 entrants – the largest number that I have seen since I took over as Contest Manager 8 years ago. Here are the results:

Well done to Terry G1LPS and Rob M0DTS/P for activating all bands from 70cm to 3cm – a great effort, especially for Rob as a portable station! Terry just gained a few extra points with one additional contact on 70cm to win the contest.

Pos	Callsign	Locator	70cm	23cm	13cm	9cm	6cm	3cm	Total
1	G1LPS	IO94EQ	165	674	560	655	560	655	3269
2	M0DTS/P (1)	IO94DE	112	676	560	560	560	755	3223
3	GW3NWR/P	IO83JF	0	1178	0	0	0	325	1503
4	WB8LGA	EN80OK	1038	56	0	0	0	0	1094
5	G4CPE	IO91SW	308	150	270	0	0	130	858
6	G6OUA	IO91TV	127	86	355	0	0	0	568
7	G4KLB	IO90BR	144	348	0	0	0	0	492
8	G8GTZ	IO91KH	358	96	0	0	0	0	454
9	G0WFT	IO91RW	32	116	230	0	0	60	438
10	G8ADM	IO91TO	404	0	0	0	0	0	404
11	2E0TVL	IO91RV	66	38	255	0	0	0	359
12	M0SKM	IO91RV	61	48	115	0	0	35	259
13	M0DTS/P (2)	IO94LI	53	106	0	0	0	0	159
14	G0KTD	IO70OI	20	0	0	0	0	0	20

Digital Contest

The rules for the digital contest were specifically designed to encourage as much digital activity as possible and to level the playing field for those who had recently constructed or bought simple digital transmitters. The scoring was simply 1 point per kilometer for each one-way digital contact on 70cm or 23cm. As a prize was offered, entries were limited to BATC Members, but no geographic restrictions were imposed. Here are the results:

Pos	Callsign	Locator	70cm	23cm	Total
1	WB8LGA	EN80OK	1038	0	1038
2	GW3NWR/P	IO83JF	0	438	438
3	G8GTZ	IO91KH	358	48	406
4	G8ADM	IO91TO	404	0	404
5	G4CPE	IO91SW	308	75	383
6	G4KLB	IO90BR	144	87	231
7	M0DTS/P (1)	IO94DE	0	215	215
8	G6OUA	IO91TV	127	43	170
9	G0WFT	IO91RW	32	58	90
10	M0SKM	IO91RV	61	24	85
11	G1LPS	IO94EQ	0	83	83
12	2E0TVL	IO91RV	66	12	78
13	G0KTD	IO70OI	20	0	20

The contest was won by Charles WB8LGA from Marengo Ohio in the USA. Charles had 6 contacts with a best DX of 204 km to W8ZCF. He used a Hides UT-100B to drive an amplifier running 250 watts output of DVB-T on 70cm. He also had DVB-S available (generated by DigiLite) but did not use it during the contest. Three of his 6 contacts were with BATC Members.

In addition to the 7 in the USA, there were 28 UK Stations active during the contest.

Well done to Charles for winning and to the Wirral Amateur Radio Society (G4EWJ and G6NOI) for their top UK entry.

Charles was recently presented with the Nexus 7 prize, not by the President but by Amazon – it was cheaper! Here he is with the prize.

Contest news continued...

International ATV Contest

I am writing this article one week after the International ATV Contest and have yet to receive any logs. I know that, despite a good forecast, propagation conditions were poor. I saw a few UK contacts logged on DXSpot.tv, but most of the activity seemed to be in the Netherlands.

BATC Repeater Contest 6/7 December

Don't forget our next contest, which is the Repeater Contest on 6/7 December. This is really simple fun with the aim of getting more people on the air – please give it a try!

▶ *The contest aerial array of Terry, G1LPS*

Contest Calendar

1200 UTC 6 December 2014 – 1200 UTC 7 December 2014: *BATC Repeater Contest*
1200 UTC 21 March 2015 - 1200 UTC 22 March 2015: *BATC Repeater Contest*
1200 UTC 13 June 2015 - 1200 UTC 14 June 2015: *BATC Summer Fun Contest (or International Contest)*
1200 UTC 12 September 2015 - 1200 UTC 13 Sept 2015: *BATC Autumn ATV Contest (or International Contest)*

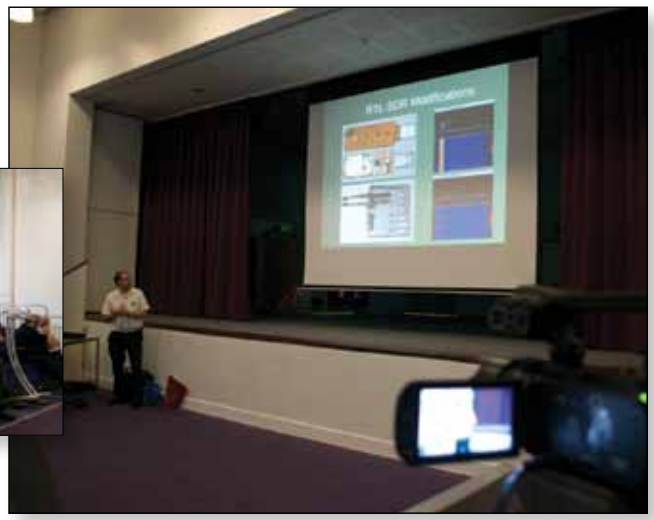
CAT14

Noel Matthews – G8GTZ

The BATC annual convention was held in Basingstoke over the weekend of September 6th and 7th 2014. Over 60 members attended the 2 days and heard talks on subjects as diverse as receiving the ISS HAMTV and the early days of military CCTV in the 1930s. There were a number of demonstrations and displays including Marconi cameras from the 1950s, a hands on SMD workshop run by Kevin G3AAF, 50 MHz and 3.4 GHz DATV, the latest from the DTX1 team and the UK microwave group were present with their chip bank which provides free SMD components to members.

The talks program started on Saturday afternoon with Colin, G4KLB, presenting his project to successfully receive ISS HAMTV along with video of the first test transmissions which he received. This was followed by Graham, G3VZV, giving the headlines on the ATV DVB-S transponder to be launched in 2016. After coffee Brian, G8GQS went back to the basics of the video waveform and was followed by Mike Cox who gave us an introduction to 4K or Super HD television. The day concluded with an excellent presentation by Norman Green on the early days of Military CCTV.

▶ *Martin, G8JNJ, explaining the finer details of WebSDR*



On Saturday night 21 members enjoyed a few beers and a meal at the Apollo Hotel – many new projects and old memories were talked about and a great evening was had by all.

Mike, G8LES, started bright and early on Sunday morning with a talk on how to make your ATV productions more exciting – something we could all do with taking on board! – and was followed by Noel, G8GTZ, giving an update on the work of the ETCC and the current state of ATV spectrum – see the very latest news from G3VZV in the this edition of CQ-TV. Martin, G8JNJ, then presented on the Farnham SDR project ***http://websdr.suws.org.uk/*** which uses multiple £5 DVB-T dongles to provide wideband coverage on VHF / UHF and microwave bands.

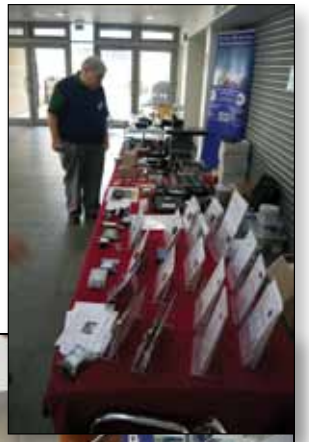
▶ *The members 'Bring & buy' tables offered some goodies.*

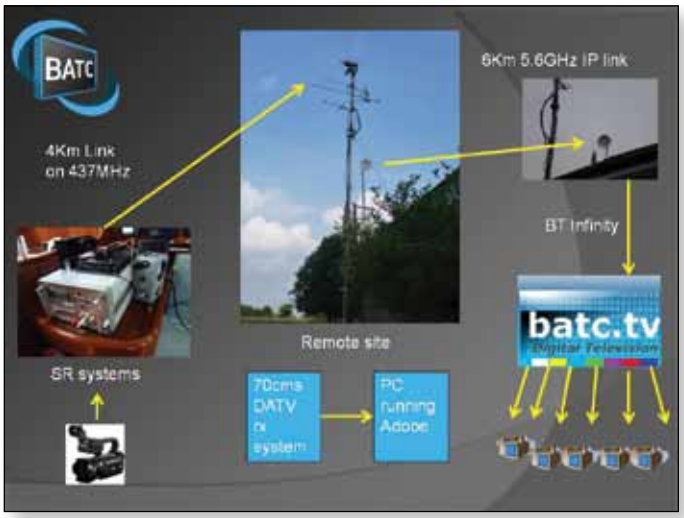
Brian, G4EWJ, then gave a very interesting talk on narrow band DATV including some video clips showing different resolutions and bit / frame rates and concluded with an introduction to the Digithin plug in modulator card for a RPI which he is working on. Charles G4GUO concluded the talks program with an update on the DATVExpress project before which he was presented with the BATC Grant Dixon award to recognise the projects significant contribution to amateur television.

The BATC EGM to adopt the new constitution and the 2014 GM were held on Sunday afternoon – documents relating to these meetings are available at ***http://www.batc.org.uk/club_stuff/geninfo.html***.

Although the local network would not support direct streaming, by using a combination of a 70cms DATV and 5.6 GHz IP link, CAT14 was streamed live on batc.tv and recordings of the talks are available in the archive section of batc.tv.

Everyone agreed it was a great event although it was felt by some that we tried to cram too many talks in to the weekend and did not leave enough time for networking and talking to fellow ATVers – something which we will take on board for next time. And finally Kevin G3AAF offered us the use of the Finningley AR Club house to hold CAT15 and so we look forward to seeing you all "up north" next year!





▶ *The route taken by the stream to ensure CAT14 reached as large an audience as possible*

DVB-S on the Solent - Part1

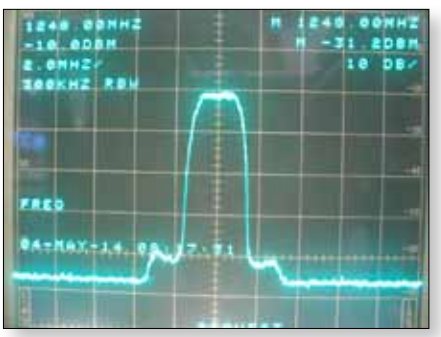
Mark - G4WVU

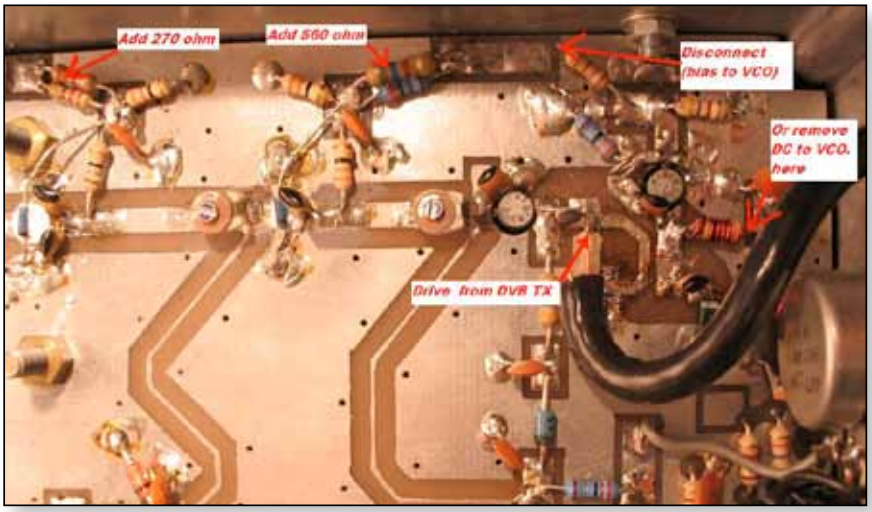
Well – not quite! Most of us have a WBFM transmitter languishing in the cupboard such as the "Solent" from the Worthing group. This article looks at the potential to use them as the first driver stage after a DTX1 to get enough power to drive a brick amplifier.

I don't know how many of these were sold, (perhaps someone can enlighten us!) but I suspect many hundreds, of which a high percentage are still about. These produced a watt or so on 23cm from a pot controlled VCO with 3 stages of amplification (an add on synth was also available for spot frequencies but rarely seen).

The world has since gone digital & increasingly WBFM is being consigned to history along with the Solent. Most current DATV transmitter kits, UK Antennair's Quadrant DVB-S / BATC DTX1; Germany's SR Systems; Minimod, Spectra NL's DVB12s etc - all have low output levels , typically +5dBm (SR Systems) & -4dBm (DTX1) requiring quite high gain linear amplification to get something more useful. It occurred to me the old Solent could still have a role as a quick & easy way to achieve this. Not owning a Solent myself a quick chat with Mark G0LGJ turned up several + some old M57762 'bricks' to play with. (these older 'bricks' need typically >100mW for ~10w out)

A look at the circuit seemed promising with all amplifier stages biased (not class C). I disabled the VCO by removing the DC feed & hooked up an SR Systems Tx to the first stage via mini coax to see what sort of output resulted. 200mW at full drive ('gain 15' on the SR) – a good start! A spectrum analyser was connected to see what the close in spectrum output looked like – not so nice! I suspected stages were quite lightly biased. With a bit of experimentation the driver & PA bias levels were upped. The PA original standing current of around 30mA was increased to 110mA & the driver also increased a bit. The 1st stage seemed OK with no improvement apparent from more bias. With the increases to the bias (probably near class A), the gain increased and >800mW was available, although around 400mW is probably the limit if reasonable spectrum regrowth performance is to be observed - important when driving subsequent amplifiers. At 400mW I measured the distortion shoulders at roughly -35dB which is reasonably good. If the mini coax is made an electrical half wave long (approx. 10cm depending on coax used) to a (BNC) bulkhead connector, the Digital drive can be simply unplugged, DC restored to the VCO and FM operation resumed if required. I tried cutting the coupling to the VCO and in reality little difference was apparent to DVB output so I decided to leave it as was without further modification (but I'm sure PIN diodes etc. might be employed at this point if folk have plenty of time on their hands!). It's a quick and simple modification that works OK without further complication.





The photo shows the mini-coax (not so mini RG58 here! – not great) and the two resistors (560r & 270r) requiring addition plus the DC VCO supply disconnection point I used. The existing bias resistors were simply paralleled for simplicity (& laziness), giving the option to remove them - back to original if required. (the PA and driver will dissipate more power with the increased bias so make sure they are well bolted/ heatsinked)

I also tested it using the DTX1 as drive (with its lower output) & about 150mW resulted which is ideal to kick an old M57762 brick to the 10w output level.

Recycle all that old FM gear!!

The Marconi at CAT14

Brian Summers – G8GQS

On display were two grand old Marconi cameras, a MkIII from 1953 and a MkVII from 1965. In the short 12 years between the design of these two cameras there were great leaps forward in the technology of broadcasting!

▶ *Marconi MkVII on the left with the MkIII on the right.*

From a 405 line black & white valve camera with an Image Orthicon tube to a 625 line colour solid state camera with 4 Plumbicon tubes.

Both represented the state of the art at the time, the MkIII camera channel had 91 valves and the camera head alone weighed some 70Kg. Additionally there was the camera control unit, picture & waveform monitor, main power supply, focus power supply, SPG, and much connecting cable. Marconi made 303 of them, 181 for the UK and the rest for export. The MkIII camera on display worked well for the event considering it is 60 years old. See ***http://www.tvcameramuseum.org/marconi/mk3/mk3-1.htm***

▶ *The picture & waveform monitor, camera control unit & power supply*

The colour MkVII was such a big advance, at the time it must have seemed like science fiction. The 4 tube camera could be compared to 4 cameras built into the single system to handle the Luminance, Red, Green & Blue signals, not only did you have the 4 signals that had to the same gain and processing but the tube scans all had to be accurately registered so that the pictures were without coloured edges.

All this made for a very complex set of controls, both mechanical and electronic. It also came with a new fangled zoom lens and power operated to boot!

▶ *Under test prior to display at CAT14*

Much has been written about the MkVII and it is interesting to note that it was described as "one of the smallest and lightest colour cameras in production in the world". Another successful camera with some 107 sold in the UK and 223 exported. Of note was the use of "Thick Film Modules", specially designed for the camera to help keep the size down and the stability up. The camera on display belongs to Paul Bicknell and is undergoing restoration. See ***http://www.tvcameramuseum.org/marconi/mk7/m_mkvii1.htm***

Another restoration project on display was a Pye portable 4 channel vision mixer, the cosmetics of this have been sorted just the electronics to attend to. Most of the larger electrolytics have been reformed to a reasonable standard, just all those pesky 0.1mfd papers to replace. This mixer is part of the Pye Mk3 range and works with the Pye Mk3 cameras as part of there outside broadcast installations.

▶ *Pye Mk3 mixer*

Repeater Roundup

Clive Reynolds - G3GJA

In the first of a new column, Clive Reynolds, G3GJA, looks at the latest news from the ATV repeaters. If you have any news or articles, please send them in to Clive for publication.

GB3TM in 2014 - new inputs

Report from GW3JGA, GW4KAZ & GW8PBX

A 70cms DATV input

Amateur TV repeater GB3TM, which is located at Amlwch on the Isle of Anglesey in North Wales, has been operating in analogue mode (FM) on 23cms since 1985. (Input 1249 MHz, output 1316MHz). The output was switched to Digital ATV in 2010, but retained the same frequencies.

An ATV Channel in the 70cm Band

The 70cm Band covers 430 – 440 MHz with 437 MHz being the centre of experimental Digital ATV activity. The recommended mode of transmission is Quadrature Phase Shift Keying (QPSK) with a maximum recommended rate of 2 megasymbols/second. This transmission occupies a channel width of 2 MHz. Following developments in DATV it is now possible to transmit a full colour picture within a channel width of 2 MHz including two audio channels for stereo or other purposes.

Two local amateurs John GW3JGA and Peter GW7BZY equipped themselves with 70cms DATV transmitters. GW3JGA using the German AGAF boards and GW7BZY using SR Systems equipment

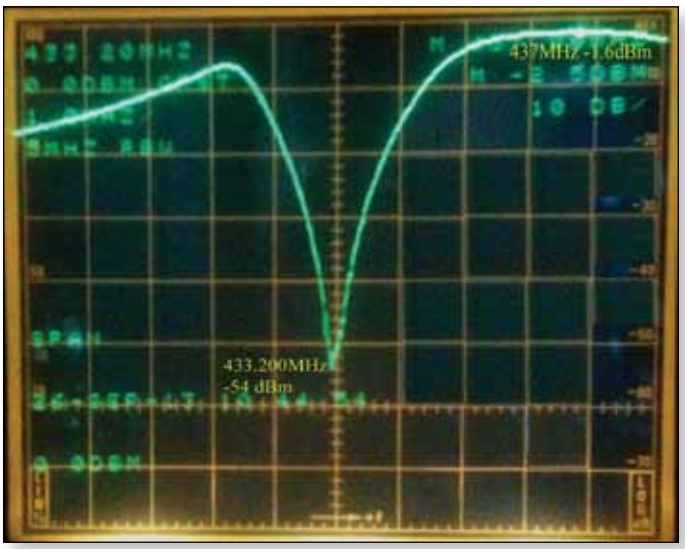
It was not possible to work each other directly so this resulted in the desire to provide a 70cms DATV input at GB3TM. Also, this would be of general use in the longer term

A horizontally polarised omni-directional antenna for 70cms DATV at GB3TM

The most suitable type of simple antenna for repeater use is a pair of crossed dipoles. A version built by Brian GW4KAZ is housed in a fully waterproofed plastic case and shown in Fig.1. This is mounted over the 23 cms Alford Slot antennas at height of 6m above ground as shown in the photograph opposite.

Building a 437MHz receiver for DATV repeater use

This is not without its difficulties. GB3TM is co-sited with the audio repeater GB3AN where the input is 434.800 MHz and the output is on 433.200 MHz running at 25 watts ERP. This required the use of a 437 MHz band-pass filter and a 433.2 MHz notch filter ahead of the receiver [3]. The filter response is shown in here:



The 437 MHz DATV receiver required good front-end selectivity to avoid de-sensing and breakthrough. The input front-end, taken from a PYE R412 PMR receiver, was used as this easily meets the selectivity requirements and gave about 12db of gain.

This was followed by a SatTV up-converter Type SUP2400,[4] shown in Fig.4. This module contains a mixer stage and a local oscillator on 2400 MHz. The SUP2400 converts the incoming 437 MHz signal to 1963 MHz (2400 – 437 = 1963MHz), which suits a low-cost Sat Receiver.

In the early experiments we found that the receiver did not have sufficient overall sensitivity, but increasing sensitivity with a pre-amp caused breakthrough from GB3AN. Fitting a 'satellite line amplifier' Fig.5, between the up-converter and the Sat Receiver gave a 10dB improvement in overall sensitivity without any breakthrough. Initial tests from GW3JGA using a Comag SL30/12 Sat receiver (from Maplin) proved encouraging

Problems with the PIDS

When using a low cost sat receiver, it initially requires a tuning sweep to be started to locate the incoming signal. When the signal has been received, the receiver sets up and stores the transmission Packet IDentification (PID) parameters to suit. When ever the same transmission is received again, the receiver uses the stored parameters and the signal is decoded and displayed.

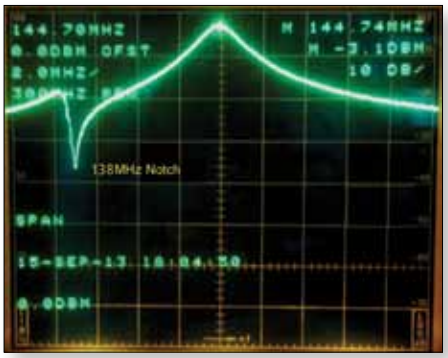
However, if a signal with different PID values is received, the receiver cannot decode the signal unless a fresh sweep is performed manually. The transmitters used by GW3JGA and GW7BZY had totally different PIDs which could not be reconciled. This made the Comag receiver unsuitable for unattended repeater use.

An alternative sat receiver, the 'Big Sat Golden 1CR Receiver' which follows changes in PID parameters was suggested by Peter G3PYB.[1] A receiver of this type was purchased and modified so that only a valid signal was output. Since its installation at GB3TM it has performed faultlessly.

The video and audio outputs from the receiver are taken to a switching matrix[2] en-route to the video input and mono audio input of the 23cms DATV transmitter

Talkback on 144.750

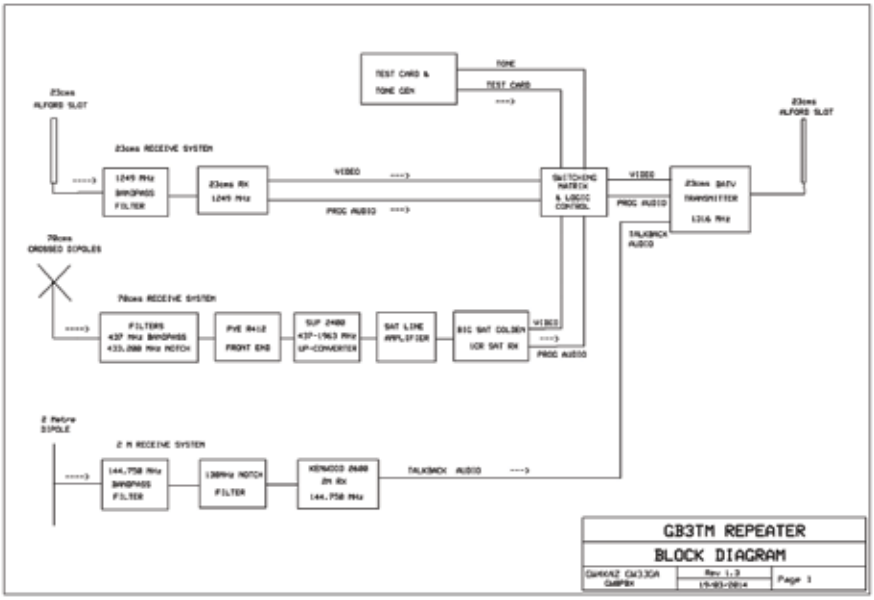
The FM channel of 144.750 MHz has long been used for ATV and Microwave talk-back purposes. A receiver for this purpose was built, incorporating the receive section of a Kenwood 2600 2M handheld transceiver. The input required a band-pass filter on 144.750 MHz and coaxial notch filter on 138 MHz to remove the very strong pager signals from a nearby site. The audio output from the receiver is taken to the alternative audio input on the 23cms DATV transmitter.



This allows talkback from 144.750 MHz to be monitored on the alternative audio channel of the 23cms DATV transmission, along with the normal programme audio.

General Testing

It is early days for the 70cms DATV input at GB3TM, but we hope that it will provide some interesting DX contacts in the future.



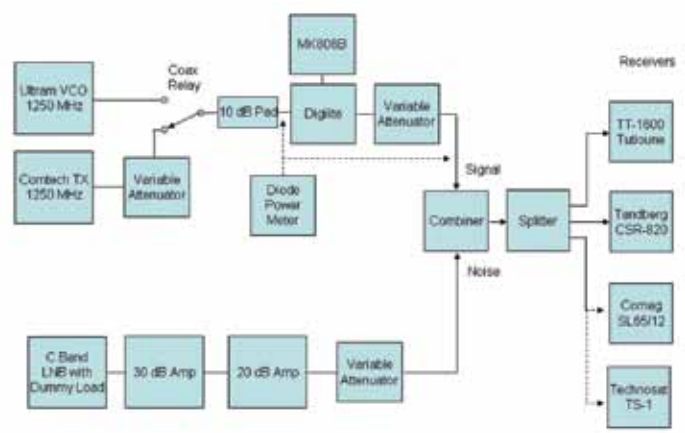
References.

1. Digital Integrated Receiver Decoder (IRD for use on repeaters) Peter Blakeborough G3PBY. CQ-TV No. 242. pages 37-38
2. GB3TM Control Box, GW3JGA & GW8PBX, CQ-TV 210. Circuit Notebook 86, pages 42-43
3. Filters by GW4KAZ, Garth RF Filters ***www.bvdavies.org.uk***
4. Modifying the Zinwell SUP-2400 for 70cm by G8GTZ & M0DTS. CQ-TV 239, pages 28-29

Effect of Phase Noise on a DVB-S Signal

Dave Crump – G8GKQ

This article was prompted by an idea that I could use an old COMTECH 23 Cm FM ATV transmitter as the local oscillator source for a Digilite-based DVB-S transmitter. I took some advice, and the experts advised against it, but I could not find any evidence so I set up the test rig shown below:



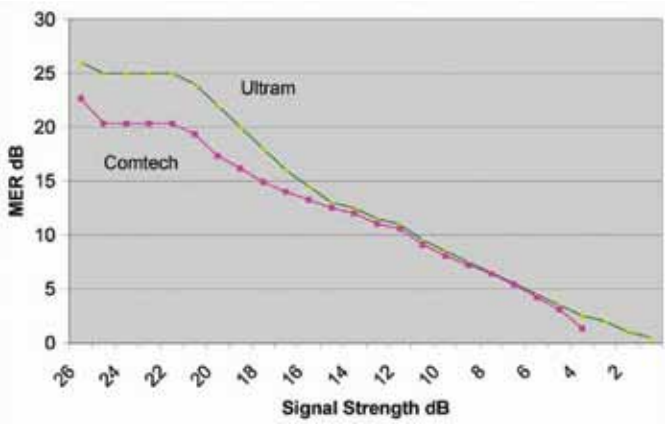
I compared the COMTECH VCO (which had the sound subcarriers disabled and the video decoupled) with an Ultram VCO, using a variable attenuator to achieve the same level on the input to the Digilite. The output of the Digilite was passed through a variable attenuator and then combined with a set level of wideband noise to simulate weak-signal conditions, and fed simultaneously to 3 satellite receivers (including a TT-1600 based Tutioune receiver) for comparison.

The tests were all conducted at 4MS and ½ FEC. I did not test at other symbol rates.

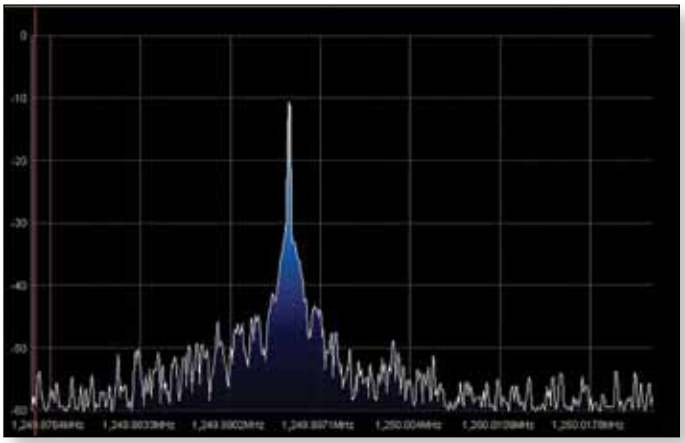
The difference in phase noise between the 2 oscillators can be seen in these screenshots from SDR Sharp. The scaling is the same for each photo.

The question that I wanted to answer was: "How much worse (in terms of signal strength required for a stable picture) would it be to use a COMTECH VCO compared to an Ultram VCO?"

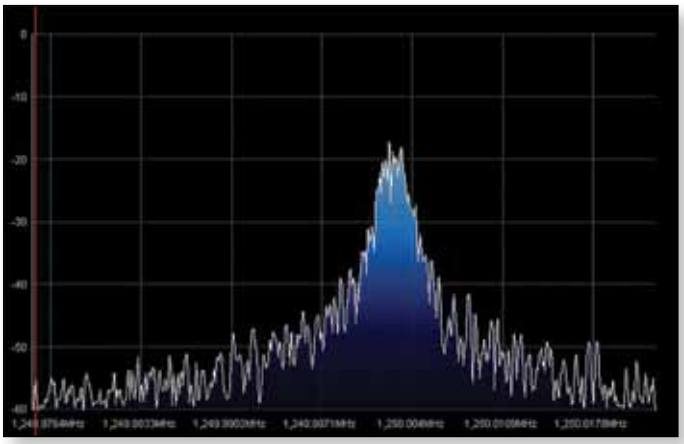
The graph below shows the received MER measured on the Tutioune receiver across a range of signal strengths. The injected noise level was constant throughout the tests. The graph is derived from the average of 3 separate tests. Recognising that these measurements are all noise-based, the figures were reproducible within +/- 1 dB.



As would be expected, the higher phase noise of the Comtech VCO caused a lower MER (by some 4dB) at high S/N ratios. However, as the injected noise masked the phase noise, this effect reduced down to less than one dB at an indicated MER of 8 dB. At this stage I thought that I would be able to use the Comtech oscillator with no problems. However, as I reduced the signal strength further, at about 3 dB indicated MER (on the Tutioune PC display), the Comtech-based signal started to lose lock on all the receivers every one or 2 seconds and soon



▶ *Ultram VCO*



▶ *Comtech VCO*

became unusable. The Ultram VCO remained in lock on the Tutioune receiver down to 1dB indicted MER.

Within a sensible range, these results were reproducible at lower and higher signal levels into the receivers.

Note that the older CSR-820 receiver suffered from regular picture jumps (although not loss of signal lock) as it did not like the inaccurate PCR in the datastream produced by the MK808B driving the Digilite.

So to answer the question that I asked: "A Digilite signal produced from a Comtech VCO needs to be about 3 or 4 dB stronger than a signal produced by an Ultram VCO to achieve a stable picture. For working at higher S/N levels the Comtech VCO is adequate."

I would recommend the use of the best oscillator possible for driving Digilite. A low-quality oscillator might be OK for across-the-shack tests, but could have a similar effect to halving your transmitter power!

In a second article, I will describe the differences that I observed between the 4 receivers.

DVB-S on the Solent - Part 2

Noel Matthews - G8GTZ

During 2013 I carried out a series of short tests transmitting DVB-S mobile back to a fixed station – these were done on 437 MHz at relatively low power and proved that given a true line of sight path with no reflections, proved that good results could be obtained.

Later in the year a short test was made on the way to CAT13 at Finningley by transmitting at 70 MPH on the M1 in to GB3GV with limited results, primarily due to interference at the GB3GV site.

Turnstile on towbar mount for original DATV mobile tests

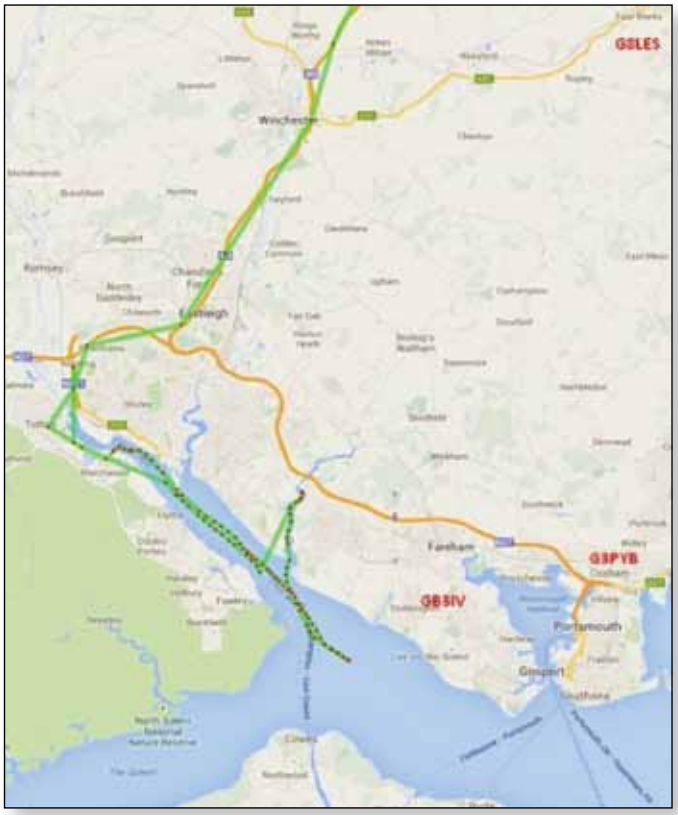
At a recent meeting of the Home Counties ATV group Bill, G4BID, and I discussed the possibility of some /MM tests from the Solent using his yacht Gnutcraker3 and so this summer, we carried out 2 days of tests.

For both days, we used an SR systems unit on 437 MHz running 2 Msymbols at ½ FEC driving a DG0VE PA running 30 watts in to the same turnstile used on the mobile test at approximately 6 mts ASL.

Mobile DATV on the M1 via GB3GV

SR systems installed in the cabin and turnstile at 6 mts

GB3IV, which is located at Fareham at the bottom of the Solent, is equipped with a rotatable 70cms beam controlled by the PSTrotator software. For the tests, the software was configured to auto track an APRS station and we ran the OpenAPRS iPhone app from the boat to update our location to the APRS servers.



APRS tracking of G8GTZ/MM

Unfortunately for the first day of tests the BigSat receiver at GB3IV had hung up and no pictures were received, however G8LES received good pictures over a 20 mile path for 80% of the tests. On the second of day tests, GB3IV with the APRS based tracking system working received pictures for 95% of the time. Unfortunately G4KLB did not receive any pictures due to the high ground in the New Forest between Bournemouth and Southampton.

What was significant was that both G8LES and GB3IV lost lock at times even with a high signal level – this is due to the destructive effect multi-path has on a single carrier system and is the reason why all professional wireless camera and mobile video systems use a multi-carrier modulation such as OFDM. This effect has been seen in all the mobile DATV tests to date and it is intended to carry out further mobile tests using some of the recently available 2MHz wide OFDM equipment to do a direct comparison between the OFDM and DVB-S modulation systems.

Mike, G8LES, Peter, G3PYB, and Colin, G4KLB, were also equipped to receive the signals and so a special web page was set up to show the streamed output from all stations plus our location and a dedicated IRC chat channel.

The mobile DATV web page set up for the tests

Weak Signal Performance of DVB-S Receivers

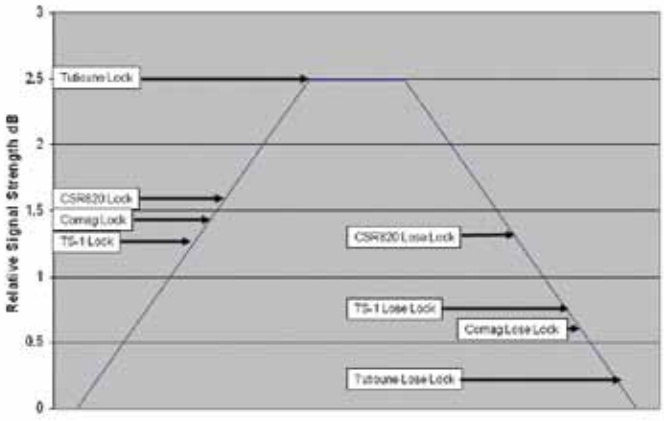
Dave Crump – G8GKQ

A number of articles have listed the sensitivity of various DVB-S receivers, but I had not seen any published figures for weak signal performance. I recently had the opportunity to test 4 receivers against each other. The test setup is shown here.

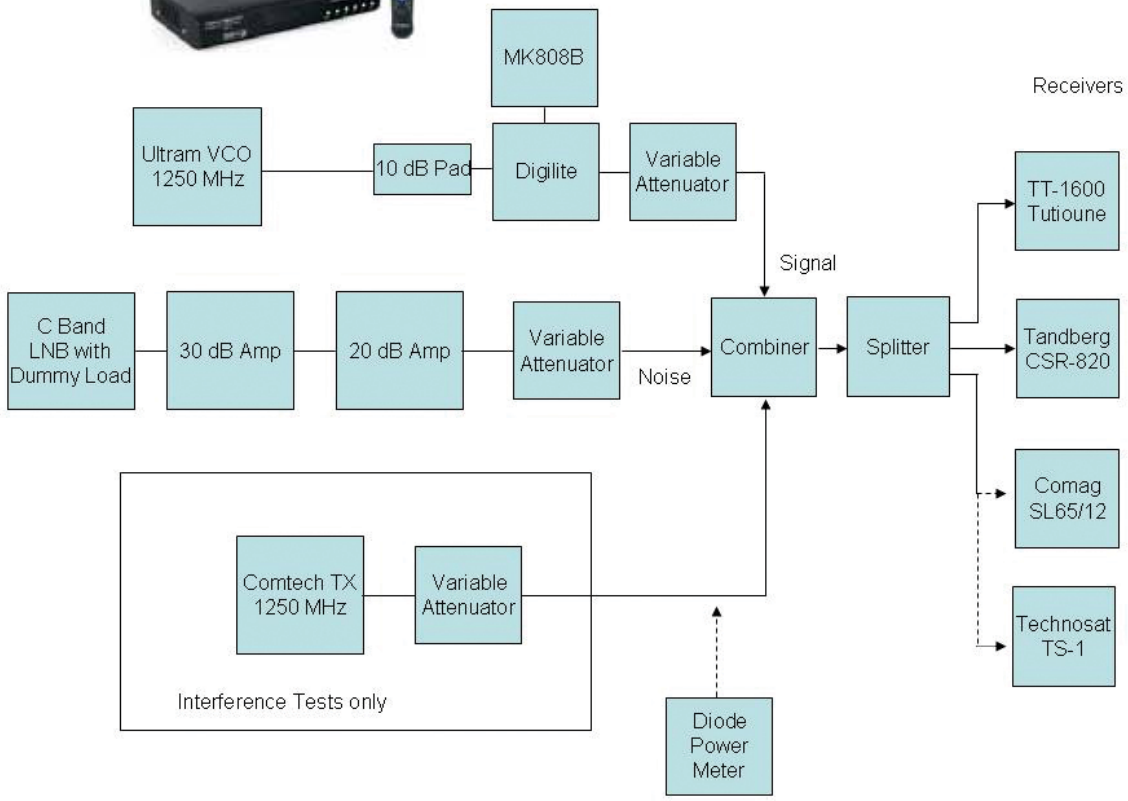
Two measurements were made for each receiver: the MER required for the receiver to acquire the signal, and then the MER that it would keep that signal acquired down to. The tests were all conducted at 4MS and ½ FEC. I did not test at other symbol rates. The receivers tested were:

- A **TT-1600 PC card** with Tutioune software running on a very old Windows XP computer.
- The **Tandberg CSR-820**, a venerable ex-broadcast receiver.
- The **Comag SL65/12**, as used to be supplied in the dish-in-a-suitcase kits from Lidl.
- The **Technosat (not Technisat) TS-1**, a budget receiver that I found being sold as end-of-line in my local supermarket in Abu Dhabi for £6.30 (needless to say, I bought the last 2!).

The diagram below shows how the receivers performed as the signal strength was slowly increased until all the receivers had locked and then decreased as they lost lock. As these measurements were noise-based, they were repeated many times to get average, reproducible, values.



The Technosat TS-1 was the first receiver to lock, followed very closely by the Comag SL65/12 and the Tandberg CSR-820. Tutioune TT-1600 would not lock until it had another 1 dB of signal to noise ratio. It indicated an MER of 2.0 when it locked.



As the signal was then decreased, the CSR-820 was the first to lose lock, followed by the TS-1 and the Comag. The Tutioune TT-1600 did not lose lock until an indicated MER of 0.5, over half a dB better than the other receivers.

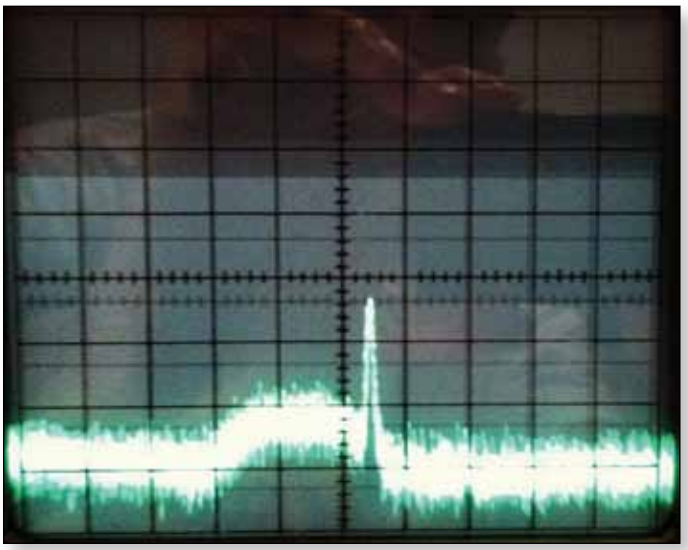
So, the TT-1600 with Tutioune was last to lock but retained lock down to a very low S/N. The CSR-820 did not perform as well as the 2 more modern receivers.

Effects of Interference

I used the same test set-up to measure the effects of a single interfering carrier, close to the digital signal. I injected the interfering carrier at a high level on a pre-determined frequency offset from the digital carrier, and then reduced the level of the interfering carrier until each receiver locked. The measurements were made at 4 MS FEC ½ with noise injected to set an MER of 8 dB and a signal level of -45 dBm (as indicated by Tutioune without the interfering carrier). The table below shows the results:

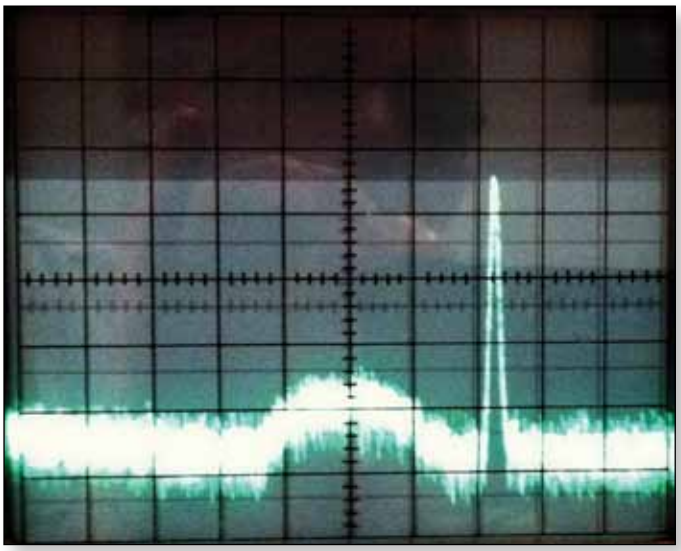
On out-of-bandwidth carriers, Tutioune performed the best, with the older CSR-820 being 15 – 20 dB worse. The lock condition for the Comag receiver with the 4 MHz offset carrier can be seen here on this spectrum analyser photo (2 MHz/div Horiz, 10 dB/div Vert):

For an in-bandwidth carrier, the Technosat TS-1 was the best with about 3 dB of margin over the older receivers. Here is the spectrum at the point that the Comag receiver had just locked:



This of course was a very simple test; I'm not sure how the receivers would have performed with multiple carriers or against broadband interference.

Interference Offset	Relative interference level for Receiver Lock (dB)			
	Tutioune	CSR-820	Comag	TS-1
4 MHz High	64.5	50.2	52.0	61.5
3 MHz High	65.0	41.7	51.2	58.2
2 MHz High	60.5	36.5	50.4	58.0
1.5 MHz High	35.5	35.0	37.0	38.5



Conclusion

The older CSR-820 was the worst performer overall. The Comag SL65/12 and the Technosat TS-1 were evenly matched in terms of weak signal performance, but the TS-1 could tolerate a much stronger interfering carrier and still acquire a signal. The TT-1600-based Tutioune receiver performed well except that it needed a stronger signal (by just over a dB) before it would acquire a weak transmission. However, once it had acquired it kept lock better than any of the other receivers.

On the basis of these tests, I have decided to use the Technosat TS-1 for portable and contest operation, and use the TT-1600 Tutioune-based receiver in the shack. I would be interested in hearing of the results of anybody else's tests.

Geostationary ATV could be on it's way!

Graham Shirville – G3VZV

The 2014 Region 1 Conference took place earlier this month in Bulgaria where it was hosted by BFRA the Bulgarian amateur radio organisation.

In addition to the usual "matters" that were discussed – these will be covered in a separate short report – the big news was the announcement of the new Geostationary Spacecraft called Es'HailSat-2.

This is of great interest to ATV operators because, as well as carrying a narrowband 250kHz wide transponder, this spacecraft will also include a transponder with an 8 MHz bandwidth. We made a short report on this project at the Convention but, at that time, the contract for the spacecraft had not been let so therefore there was little info generally available. Two days later, Es'Hailsat, the Qatari company responsible, announced that a contract for the construction of the spacecraft had been let to Mitsubishi Electric (Melco) from Japan.

▶ *A71AB presenting details of Es'hailSat-2*

At the Conference, during a meeting of the ARSPEX Working Group, Abdulrahim, A71AB, from the Qatar Amateur Radio Society, brought everyone up to date with all the details about the project.

The spacecraft is expected to be launched at the end of 2016 and, in addition to its usual Ku and Ka Band services, will also carry two amateur S Band up and X Band down transponders.

Details of the link budgets for both transponders are still being finalised but for the narrow band transponder little more than a Sky dish, a modern LNB and a SDR dongle should be sufficient for reception. The EIRP of each transponder is reported as 35dBW at the edge of coverage.

The wideband transponder is intended for Digital ATV and other experimental digital modes. We, together with other interested groups in IARU Region 1 will need to consider how best to plan the use of this opportunity. Possibly we need to consider using different modes on different days or perhaps conventional band planning by frequency.

The spacecraft will be located at 25.5 degrees East and its coverage is best described as "quite impressive". Rather than using any spot beam it will have antennas that have a gain of around 20dBi as these have the required 17 degree beamwidth.

▶ *View from 36,192km above 0°N 25°30'E*

TRANSPONDER	CENTRE FREQUENCIES	BANDWIDTH	ANTENNA POLARISATION
NB – Narrowband	Up 2400.175 MHz	250 kHz	Righthand - Circular
	Down 10489.675 MHz	250 kHz	Linear – Vertical
WB – Wideband	Up 2405.5 MHz	8 MHz	Righthand – Circular
	Down 10495 MHz	8 MHz	Linear - Horizontal

Museo de la Imagen – Santiago de Cuba, Cuba

Andy Thomas – G0SFJ

Well, there we were, my XYL and I, in a fortress outside Santiago de Cuba, and I was just photographing a Marconi telegraph key that testified to the fortress' military history, when our guide said:

"But I know another museum that has lots of things like that!"

And so, inevitably, we asked the taxi driver to take us to the "Museo de la Imagen" which was a small museum on the outskirts of the town.

Outside we saw with interest what we were told was a TV Outside Broadcast vehicle from 1940 – yes, they said 1940, although the number plate said 1950 – and a camera on a dolly above and next to the ticket lady.

There are four parts to the museum – stills photography, video and TV, a "Salon de Radio" and a small 16mm cinema. Let's concentrate on the TV part first.

The oldest TV item that I saw was labelled "Iconoscopo de Zworkin, 1926" and it was surrounded by blue studio cameras.

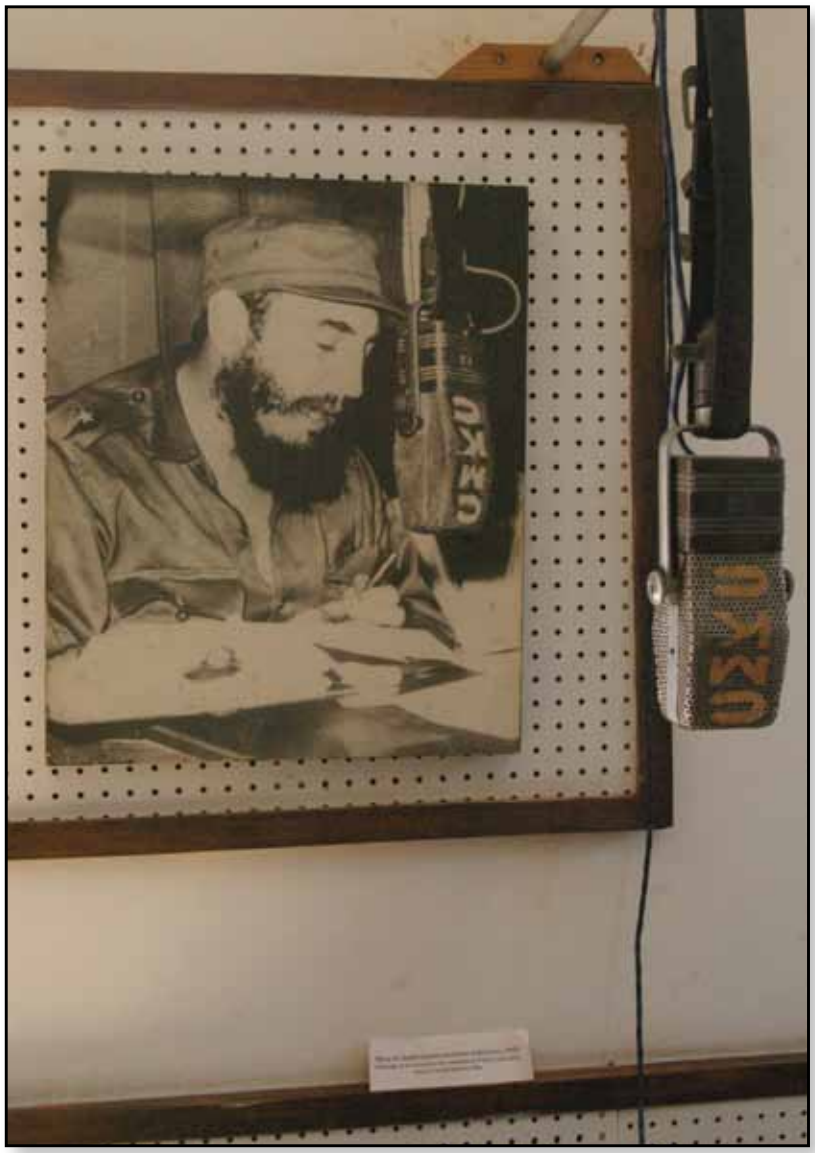
On dollies were an EMI camera said to be from 1941, a Russian (Soviet) KT-87 of 1970, and a large blue NEC.

Another, marked DuMont Television, and labelled "1944" was mounted mute on a dolly, in front of local off-screen pictures and near a black-and-white test card.

A yellow wall poster testified to their service for the "Patria" – Spanish readers will be able to give a better translation than I can.

There were also many portable shoulder cameras from more modern times in glass cases, and a stand-up video tape player.

Of interest in the Photography section was a tiny Japanese camera of World War II and 1,000 millimetre (isn't that a metre?) focal length lenses used in Angola and to spy on the American base in Guantanamo.



The radio salon contained a Juke Box, a Gramophone, a wind-up horn record player, and lots of broadcast awards, with a large photograph of Castro speaking into the microphone of CMCK and a ribbon mike in front of it.

Some microphones, old radio and telegraph kit and valves sat forlorn in glass cases, and a few revolutionary heroes smiled down like radio stars out of black-and-white framed photographs.

We were shown the cinema room, containing a 16 mm projector and voltage regulator, and it was explained to us how this equipment used to be taken to the countryside to educate the population.

Strangely, we saw a similar projector on display in a street festival in the town. Perhaps they are still getting good useage.

G0SFJ would like to thank the Museum for permission to take photographs and for the kindness of the staff in explaining the exhibits. And, of course, our guide.

If you ever go to Cuba, look out for the Museo de la Imagen. They like radio amateurs there!

Annual Worldwide Amateur Radio Television QSO Party 2014

Mick VK3CH

The party invitation

The fourth annual worldwide ATV QSO Party was held over the last weekend of August, Friday night and Saturday afternoon.

Friday night Melbourne time was for local stations to get on air, with Saturday afternoon for local and international stations linked up.

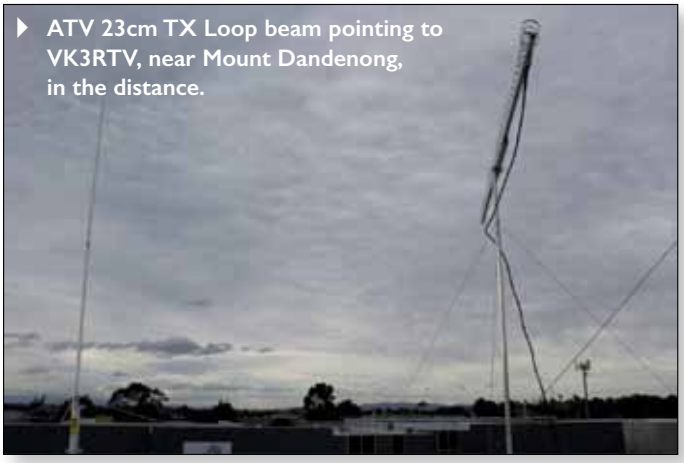
Man with a plan

Planning for the ATV QSO Party by Mick, VK3CH started two months prior, with a new work location to use.

At home Mick can either send ATV video from the shack, or from the back yard, via cabling running from the shack to the rear yard. All this was still in place from last year, so not much to do, other than prove that is was all still good, nothing eaten by the wildlife… Work however was a new blank canvas. Compared to our previous work location, we were now situated in a prime VHF-UHF area.

With line of sight to the commercial TV towers at Mount Dandenong, needing only a basic TV antenna to get both commercials and VK3RTV, the expectation that getting a reliable signal into VK3RTV was high. Google Earth gave a plot of the distance from work QTH to VK3RTV site as 34.3 km and reports our work as 110 meters above sea level. Add the building height of 8 meters and 2 meters of mast, the ATV antennae are 120 meters above sea level. At 137 metres above sea level, Mt Cooper in Bundoora Park is the highest point in the metropolitan area.

With a clear view to Mount Dandenong, working out the TX beam direction was no issue, knowing where VK3RTV is located. With a full voice station at work, on MF-HF-VHF-UHF already established, ATV was the last mode to add to the work "shack".



ATV 23cm TX Loop beam pointing to VK3RTV, near Mount Dandenong, in the distance.

Add another antenna to the collection… better make that two!

ATV receive had already been in place in March, with a perfect picture seen on VK3RTV, regardless of weather conditions. Late June the job of running coax to the roof and down the inside wall cavity to the office "shack" was done. A spare 33 element loop yagi was erected with 20 meters of 9913 coax down to the office ATV transmitter.

Initial tests into VK3RTV were excellent with only Level 3 power required to hold either VK3RTV1 or VK3RTV2 perfectly. A power level up to 15 is available with the SR Systems units. Given that the beam on VK3RTV2 is beaming towards the Yarra Valley area for input, this is a great result. On VK3RTV2, with just 1.45 watts, a perfectly locked picture was obtained, the transmitter drawing only 2.2 amps total current.

VSWR on the beam on either 1255MHz (VK3RTV1) or 1276MHz (VK3RTV2) was 1:1.1 for both, only about 1% loss, not bad. Also when talking on 2 meters at 50 watts, with the antenna close to the ATV beam, no adverse interference was noted on the picture.

Location, location, location…

With the ATV transmitter proven OK, it was time to decide what sort of material to TX on the day.

The office is not that interesting for ATV video, so video and audio cable was run from the office to downstairs near the roller door. As the voice amateur station is connected for remote internet access via Remote Rig, a cross-over CAT5 cable was also run downstairs, so that the IC-7100 radio control head could be used downstairs where the camera was situated, to allow voice liaison during the ATV linkup.

To power the radio via Remote Rig when downstairs, a DC cable was also run from the office so 13.8 volts was available, this saves mucking about with a separate 12 volt plug pack power supply downstairs.

In order to be able to watch other stations and to check our transmitted content 'live' a 75Ω TV coaxial lead was also run downstairs. At home a twin cable is also used to key the ATV transmitter or to power it down, without the need to run up and down the stairs. This facility was also wanted at work so a twin cable for this function was also run as well. All the cabling was put in ducts and then ran conduit down the warehouse wall to near the front roller door.

Spare ATV 23cm TX & 70cm RX antennae and masts hanging from the roof

Compared to the park, we now had mains power, shelter, all our tools, spare cables, etc, all at our disposal. Just turn up, open the door, site the camera, plug it in, go upstairs and switch it all on, too easy… makes future years easy!

Just a small domestic TV antenna required for to receive VK3RTV

The weather can do what it likes; just move the camera further inside if it gets nasty… But on good days the BBQ can go outside. The fridge, hot/cold water, microwave oven, kettle, landline telephone, work furniture and tables also add to the comfort factor. I wonder if it's justified calling ATV from work a "portable" station?

Bringing the home ATV TX unit to work meant messing up the shack. So it was time to make up a dedicated work ATV transmitter. A portable ATV unit was already used for the park, but required 24 volts. So it was converted to 12 volts. This was done by removing the exiting 24 volt PA and replacing it with a 12 volt PA. All this work was done in July.

This removed the need to use an inverter, only to feed a 24 volt switch mode supply, too much loss-converting voltages. Now everything is powered off 12 volts, just what you need for portable work.

Replacement 12 volt 23cm 20 watt PA, made by DG0VE from Germany, mounted on a heatsink

Mount Dandenong

It was good not being under pressure to have it finished in time, as the mains ATV unit could always be brought from home to use. So in future when portable, it can all be run off the battery without the additional current losses and QRM (on 40 meters) from an inverter.

But changing the PA was only part of it.

While doing that all, the extra features of the home unit were added. Adding a VU meter and driving amp unit for it; adding the relay enabling circuitry – to allow it to be remotely powered on or off; being a portable DC unit, reverse polarity relay protection was also added for safety, and a digital current meter. Seeing the current drawn is as good as having a PA power watt meter, as you can readily estimate the RF watts going to the antenna.

Just 1.45 Watts into VK3RTV2 for a steady picture, QRP ATV, with low VSWR, at work QTH. Note the range switch on 2W, thus 2 watts full scale deflection. VK3RTV1 (from work) can be held with just 100 milliwatt

'Murphy' decided I'm having too much fun!

An old camera gathering dust was found - a Canon MV530i - that uses tape to record, purchased back in 2003. To save swapping cameras between home and work, it was put into service for the home shack. It used to power off after 10 minutes. It is just used to capture video, not record it to tape. Removing the tape, the camera remains on without shutdown.

While testing this one day, no video was seen on VK3RTV. Nothing could bring up video or sound. The transmitter was taken to work, where it was confirmed, just a few weeks before the ATV Party, the final PA had died. This is one of the units that is notorious for copping final transistor failure.

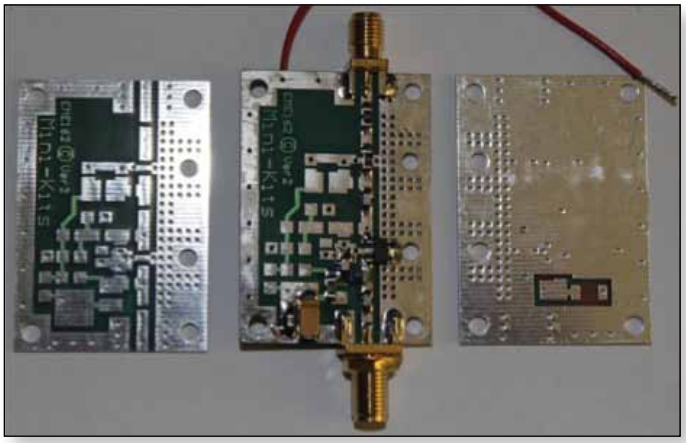
So it was swapped over from 24 volt to a 12 volt PA, like the portable 'work' transmitter that was upgraded with the Mitsubishi RA18H1213G 18 Watt RF MosFET amplifier module. This required the inbuilt 24 volt switch-mode supply to be replaced with a 12 volt version. After the "surgery" the transmitter was alive again. However the PA is designed for 8 mW drive, but the SR-System exciter outputs 2mW at full power. Currently the final maximum output power from the final PA was only 2.2 watts.

Just in case more power was needed in future a driver small current RF amplifier was added.

Minikits 'PHA1' driver

Minikits came to the rescue with a PHA1 which has a very high Third Order Intercept Point. This means that is a lot more linear and capable of higher output power before distortion. Just what is required for Digital Amateur Television. Not wanting to solder SMD parts so close to the ATV Party deadline, for a few dollars more a complete made up board was ordered, arrived in two days, very good service from Mark at Minikits in Adelaide. Check out ***http://www.minikits.com.au/*** it's updated a lot.

Once the PHA1 was installed an additional 3dB was added to obtain the correct drive levels to the final PA. Peter Cossins, VK3BFG, kindly offered to put it through his spectrum analyser and with current not exceeding 5 amps, the signal was clean and within specification.



Minikits PHA1 driver board in centre with spare general purpose boards, which are used as attenuators by placing resistors in a "T" pad circuit

After the PHA1 was added, 3dB of 'cut' was required, Peter Cossins took out a chart and suggested a shunt of two 300 Ω and an 18 Ω .

Attenuating about 8 milliwatt of power, no damage with bad VSWR likely, shunt calculator on web confirmed the values

On-screen display text

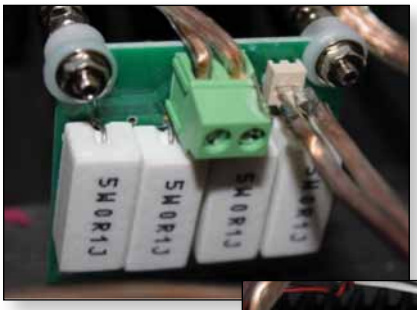
The home unit has a dedicated On Screen Display (OSD) unit that is programmed for text. This needs a PC to alter the text each time. The EMDRC have an OSD unit that has pre-programmed choices of text that can be selected on the fly.

On Screen Display Board, an EMDRC project by Ralph VK3LL and Damian VK3KQ

Also Morse sending for VK3RTV diagnostics and signal quality reports is built in, programmed with the VK3RTV touch tones. One of these units was also included and built into the portable unit at work. Many Melbourne ATV hams are using these now. It can output DTMF tones to control VK3RTV, display text, both static or timed in a loop, display temperature and power levels.

Mini attenuators were also found, on Minikits website, so the 3dB attenuation board was removed and a 2dB pad inserted instead.

Now the transmitter, at full power, on 1255MHz draws 4.5 amps and on 1276MHz, draws 5.4 amps, which is now considered safe. The house ATV transmitter was now "seniors' moment" proof!



Current sense board

Temperature sensor device in the glue

Finishing touches

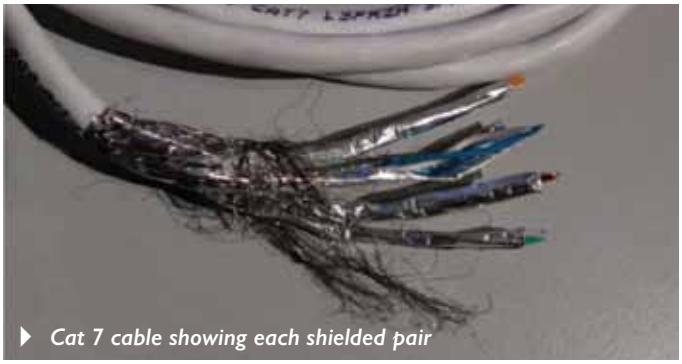
An IC-5100 Dstar/FM radio was put into service as well, so both the ATV liaison frequency and a second frequency could be monitored. Another VHF/UHF vertical was installed and coax run all the way downstairs and the IC-5100 mounted high up on the wall, with cables run down to a shelf for the microphone and controller front panel. Initial results were terrible, with QRM and radio stations breaking through on both receive and under my transmitted audio. Moving the control head (but more importantly) the unshielded cables to it , away from other mains cables near the ducting on the wall, sorted out all the problems completely.

With the IC-7100 head taken downstairs as required and plugged into the CAT7 network cable, both radios can be used, not just during the ATV QSO, but also on HF with the IC-7100 "watching" two spots on either VHF and/or UHF in real time. Perfect for cross-banding QSO's as well!

Category 7 networking cable - the ultimate in shielding - QRM killer

CAT7 network cable has each pair shielded then the four pairs all shielded. This cable is for 10 Gigabit networking.

Using CAT7 stops the ticking with the IC-7100 or IC-5100 in its tracks. Saves having to use the overkill solution of Remote Rig over 10 meters of coax, but a spare crossover cable was run anyway.



Cat 7 cable showing each shielded pair

The specs on CAT7 cable say:
Category 7 cable are backward compatible with Class D/ Category 5e and Class E/Category 6.

Class F features even stricter specifications for crosstalk and system noise than Class E. To achieve this, shielding has been added for individual wire pairs and the cable as a whole. Besides the shield, the twisting of the pairs and number of turns per unit length increases RF shielding and protects from crosstalk.

The Category 7 cable standard has been created to allow 10 Gigabit Ethernet over 100m of copper cabling. The cable contains four twisted copper wire pairs, just like the earlier standards. Category 7 cable can be terminated either with 8P8C compatible GG45 electrical connectors which incorporate the 8P8C standard or with TERA connectors. When combined with GG45 or TERA connectors, Category 7 cable is rated for transmission frequencies of up to 600 MHz

Last minute jobs

The last jobs were getting the BBQ gear ready, filling LPG gas bottles and tidying up.

The rear yard was looking a bit rough, as all can be seen on ATV, it was time to get it ready, not just for ATV, but summer as well.

New wood chips delivered

Job nearly done

Yard tidy and ready

The ATV weekend show - Friday Evening

One of the main objectives is for local and overseas amateurs to broadcast live video segments about their station setups and what they are currently working on. The ATV QSO party is broadcast via the Melbourne-Geelong VK3RTV digital ATV repeater, and can also be viewed on the British Amateur Television Club web site live video streamer at ***www.batc.tv*** and also ***www.vk3rtv.com***

On Friday night, only VK stations broadcast, this year there were internet links to the new digital TV repeater VK5RDC at Port Pirie, and VK4RKC in Brisbane. ATV hams not within repeater range or a repeater were able to linkup using Skype via the internet to master controller Peter VK3BFG. Skype is used for Interstate and International connections. However Skype is currently grandfathering out older versions and the new version does not support import video from USB Dongles such as EzCap. These are used to take the output video as received from the ATV Repeater and send it to the remote anchor station. Fortunately Peter VK3BFG found a temporary work around, but it depended on the administrators of Skype and their timetable.

Peter Cossins, VK3BFG, with the opening address for the Friday night ATV Party QSO

Pictures of the Friday evening stations that logged in, just photographed in front of the TV screen

Mick VK3CH, in the backyard, in front of the BBQ's and behind the camera

Mick's Friday night live telecast dinner, was smoked BBQ marinated honey/garlic/soy lamb ribs, washed down with Coopers Ale...

Friday night was a 'round robin' show and tell, like previous years. The topics and projects were incredibly diverse, with most undertaking either vast improvements or major new projects underway. EMDRC have a whole ATV studio and fantastic tower with all the beams on it. John VK3DQ has a huge tower under construction. Peter VK3BFG showed a 200 watt PA being built. Jack VK3WWW had a very amusing pre-produced video with his persona visiting him live on air, brilliant video indeed…

The usual BBQ teasing between Mick VK3CH and John VK3DQ was upheld, Mick's dinner looked better than what John displayed.

The main self criticism of the VK3CH setup is of course lighting. Better "white" lighting will need to be installed for next year.

The rear yard was not a big job, as the cables and radios were all installed in previous years, just switch it all on and away you go… The switching, both local and remote, works well. The biggest challenge is finding relevant content to show.

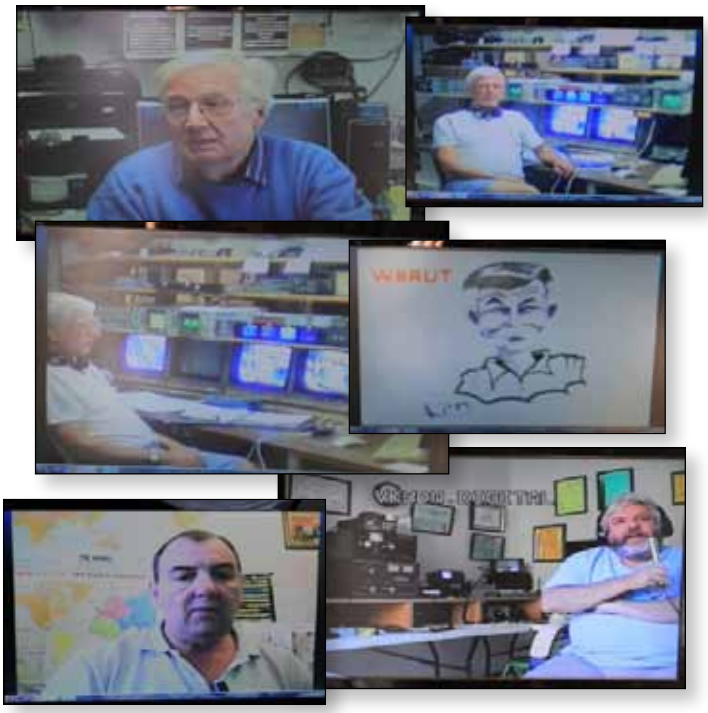
Those that pre-recorded video of their projects were well produced professional productions. It certainly shows the amateur radio does not have to mean "amateurish", certainly not on VK3RTV. The stations spoke for four rounds and then it was time to get some sleep for the next day. Stations in the USA watched and came up after 1am their local time, keen indeed…

Saturday morning

Saturday morning commenced with local stations before the USA came on. The weather was a perfect spring day.

On the Saturday, there were four international net controllers - Peter VK3BFG, Don KE6BXT, Art WR8DMC and Noel G8GTZ.

Overseas ATV repeaters linked to VK3RTV including W6ATN and WR8ATV in the USA and GB3HV, GB3SQ and GB3KM in England, as well as other international stations via Skype and the internet.



VK ATV station screen shots, taken with camera from the TV screen during the 10am session...

Saturday afternoon

The 1pm ATV session… Southern California, USA, was due to start, but Mick VK3CH, received a phone call summing him to not one, but two family medical emergencies, which cut the day short and unfortunately prevented recording the afternoon ATV sessions. Hopefully as in previous years the recordings will be put up to youtube. The only stations captured are shown here…

Saturday evening

Stations from England were patched in via Skype by Peter VK3BFG, screen shots below...

Putting on three sessions of ATV shows across different modes, time zones and local, interstate and international liaison - no lazy job. An incredible diverse range of discussions on ATV and amateur radio projects were seen, including stuff not to do with ham radio! As usual Peter VK3BFG managed to put up a professional run show under demanding conditions.

Despite this the promise of further improvements is always strived for, many stations have made great improvements involving much experimentation, patience, trial and error, and of course expenditure of money.

From experimental beginnings four years ago to now, the ATV Party is now a recognised annual event watched across VK, GB, W and Europe and anywhere anyone uses the BATV site or vk3rtv.com

In closing, it's only when you get on air, no matter what preparation you undertake, on the day of transmission, it's only then you discover either what is lacking, or improvements to be made.

For Mick VK3CH, it is better 'white' lighting; improved audio; a separate microphone on a lead or wireless to be researched. Pre-recorded content is also another option as the time gets tight on the actual day of going live to air.

It is impressive the time and trouble stations go to both getting on air, often in new locations and finding interesting content to put to air. It's getting to a point, how to top what you have done in previous years.

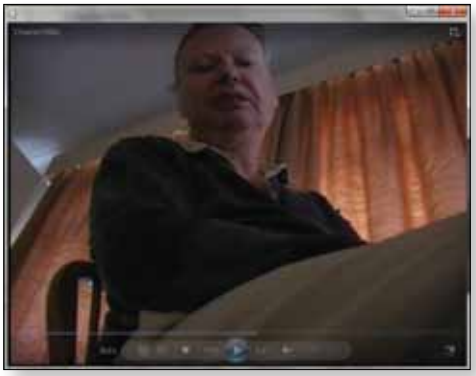
So that's always next year's project.

Many thanks to Peter Cossins, VK3BFG, for all his efforts and expertise in another excellent ATV QSO Party.

DVB-T with a Hides HV110

Charles Brain - G4GUO

Ten days after CAT14 I gave a talk at the Worthing and District Amateur Radio Club (WADARC) which meets at Lancing parish hall each Wednesday at 20:00 hrs on DATV-Express ably assisted by Roy G4WTV. The talk focused on ATV in general and the Worthing area in particular. The talk went well with an audience of about 20 people. The feedback I received was that a number of people in the audience would like to give DATV a go if it was possible to buy a single box transceiver solution i.e a non PC based solution.



There was also some discussion about the future of the Brighton ATV repeaters and suitable new sites. These along with the local FM repeaters are due to loose their site in about 2 years time.

Roy G4WTV came away from the talk in a euphoric mood, he along with some others, that were unable to attend the talk have plans to re-ignite ATV in the Worthing area. For those that remember the late 70s and early to mid 80s the Worthing group were very active on ATV.

Roy is a long time exponent of DVB-T having used it in his professional life. He mentioned that he had some DVB-T link gear and had also recently acquired a Hides HV110 stand alone DVB-T receiver but was having difficulty it getting the two to interoperate.

Being someone that permanently has their Amateur gear in bits lying around every flat surface in the house I was not immediately able to help. Roy suggested I emailed him when I was ready which I did the following weekend.

The equipment for the tests was a bit of a lash up. The exciter was a DATV-Express board housed inside a Hammond box which drove a PA module from GH Engineering. The PA fed a Comet Duplexer (so I could feed DATV and FM talkback up the same feeder). The antenna was a simple Watson Collinear, which I normally use for FM nattering. The transmit frequency was 437 MHz.

The PC was running Ubuntu 14.04 LTS and the capture device was a PVR150. I estimate the output power was around 5 watts, on DVB-T the Express board does not produce enough power to drive the PA very hard. The camera was a Cannon XM2 I bought used on eBay.

I started off using 2 MHz DVB-T 2K mode with FEC of 3/4 and QAM 16 modulation, as soon as I keyed up the HV110 was able to lock to my signal. During the tests we tried all the modulation modes QPSK, 16 QAM and 64 QAM as well as most of the FEC rates and guard intervals. Very good copy was received on all combinations. The screen shot was recorded at Roy's QTH, please excuse the lighting and camera angle, the video lead was not long enough to allow the camera to be placed anywhere else but the floor. Roy is located a couple of km from me so it was not a DX contact.

There was some breakup of the picture when Roy was transmitting on 144.750 FM and strangely when I was transmitting on the FM talkback frequency. In my case I suspect it was down to the fact I had the FM transceiver and the PA running on the same PSU. In Roy's case some form of filtering in front of the Hides box probably would have fixed the problem.

We also noticed some other unexplained breakups, these may have been either due to a software problem of just simply lack of signal strength. Roy's receiver was indicating around -83 dBm.

At the end of the day Roy was very happy his HV110 worked and I was pleased that someone other than me had received my transmissions.

DATV-Express was never designed to produce DVB-T and I was surprised it worked at all but then again I am surprised whenever anything I do works.

So it seems that using a simple setup like this the days of Amateur video phones are almost with us.

I am quite tempted to invest in an HV110 myself but I have been told a new receiver is coming out next year capable of 1 MHz DVB-T reception. I have already added 1 MHz DVB-T to the Express software in anticipation.

IARU Region 1 Conference

Graham Shirville – G3VZV

The IARU Region 1 General Conference took place at Albena in Bulgaria over the week of 21st to 26th September. These conferences, which are held every three years, discussed a vast variety of subjects and produced upwards of one hundred recommendations.

The VHF/UHF and microwave discussion are held under the auspices of Committee C5.

In relation to ATV operations, in addition to the announcement about the Es'HailSat-2 project which is reported elsewhere, the main matters related to the Region 1 ATV contest and the use of ATV on 70cms.

There was a proposal from the Dutch Society, VERON, to amend the rules and date of this annual contest. Before the conference, this matter was discussed on a Wiki between societies and interested parties and a final version was presented to the C5 committee. These new rules were adopted at the Plenary meeting and will apply from next year.

Therefore the 2015 IARU Region 1 ATV Contest will take place over the weekend 13/14th June. No doubt Dave, our contest manager, will provide a full update of the new rules in future CQ-TV editions but this is an early heads-up. You should perhaps especially note the new timing of the contest. It will now commence at 12:00 UTC on the Saturday and will end at 18:00 UTC on the Sunday.

In relation to 70cms, there were concerns about how ATV and in particular, DATV, could co-exist with Satellite activities which take place in their specific allocation in the amateur satellite service between 435-438 MHz.

The full details of the conclusions reached, which will be included in new information to be added to the IARU R1 VHF Managers Handbook and footnotes to the 435MHz R1 Bandplan, will be published later – in time for the next edition of CQ-TV. However in the meantime it can be stated that it is accepted that DATV should continue to use 70cms for simplex and repeater inputs, subject to such activity not causing interference to the amateur satellite service (as at present).

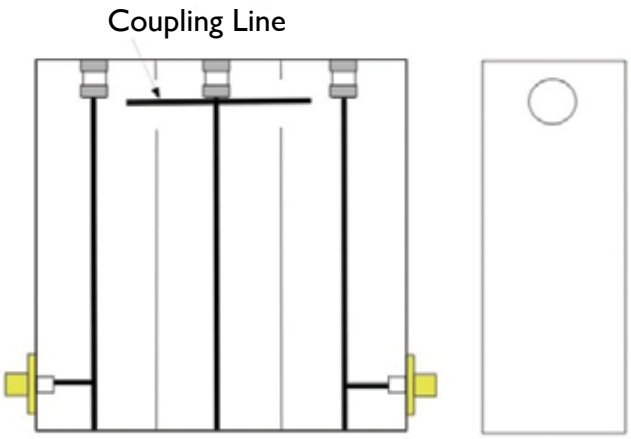
THE IARU R1 C5 Committee members during a coffee break

A Filter for 437MHz

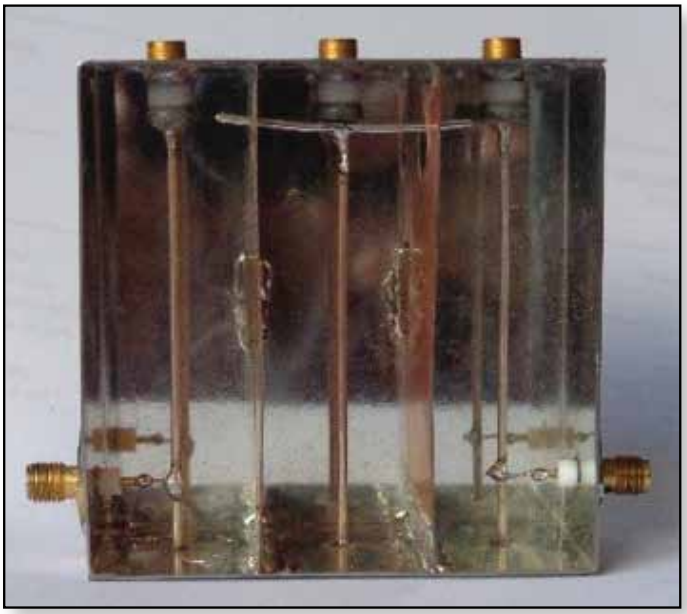
F1DJO & F6GQM

Here is a simple design for a filter for 437MHz built in a tinplate housing 72 x 72 x 28mm. The lines are 1.5mm silver plated copper (the diameter is not critical). The partitions are tin, copper or double-sided printed circuit. This filter eliminates all harmonics around the center frequency.

The measurements were performed in the laboratory of F6GQM with a DATV transmitter by F1DJO version 2, 20dBm output.



Line length: 63mm
Drilling diameter in walls for passage of the coupling line: 10mm
Soldered output lines with SMA 10mm from the ground.
Capacity Jonhanson 1 / 10pF (recovery).

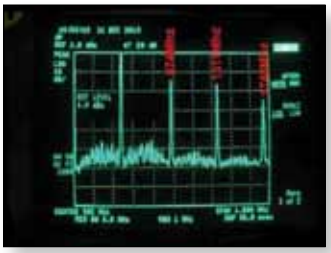


Findings:

Initially, we set the filter with a bandwidth of 2Mhz and we had an insertion loss of 6dB.

If you want to increase bandwidth, we must couple more. For 2Mhz, the coupling line length was 37mm. For 10Mhz bandwidth we have increased the line to 48mm long. You must then depart roughly every end for symmetrical flanks. Insertion loss is now -2,5dB.

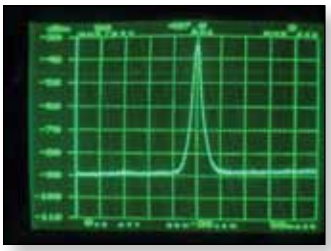
It is useless to try to look at too narrow a bandwidth, as with SR 1500, the image is cut every 5 seconds. This setting is a good compromise and lets out a clean signal:



Unfiltered

Filtered

5MHz per tile



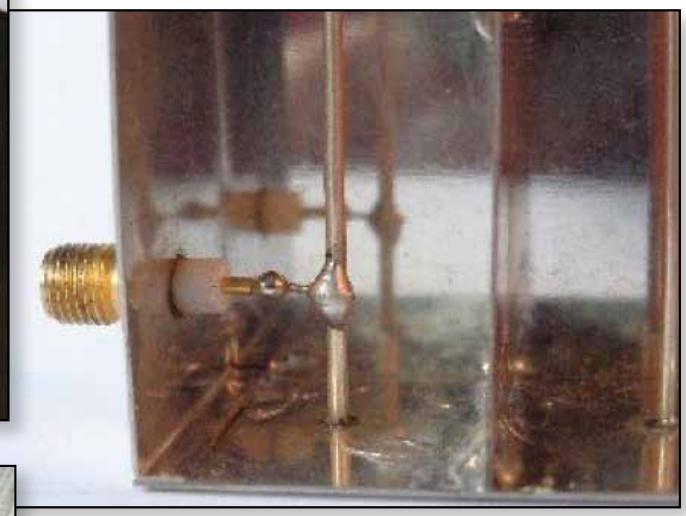
50MHz per tile

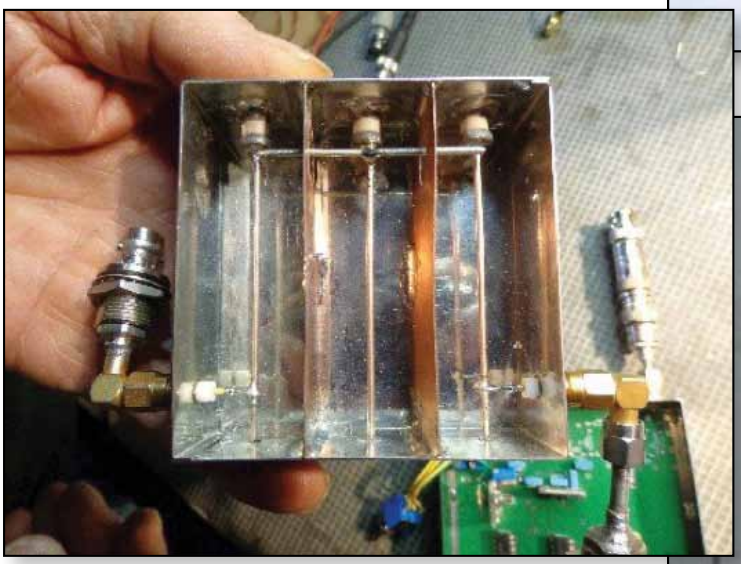
With this setting the loss was -4dB.

Discarding the ends of the line coupling of the input and output lines, we arrived at 2.5dB loss. Bandwidth has increased.

Photos of the production:

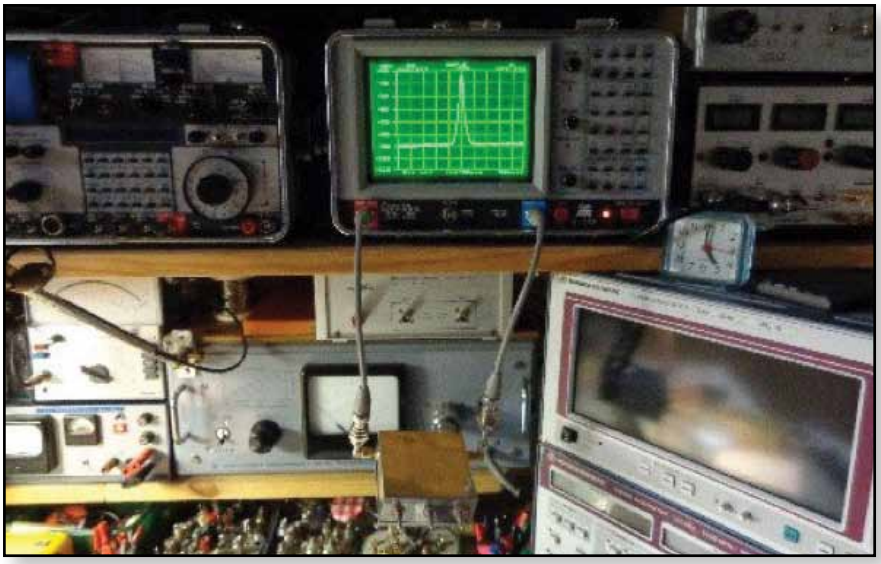
First coupling achieved with -6 dB insertion loss.





-4dB Coupling loss.

-2,5dB Coupling loss



Measurement of the filter bank

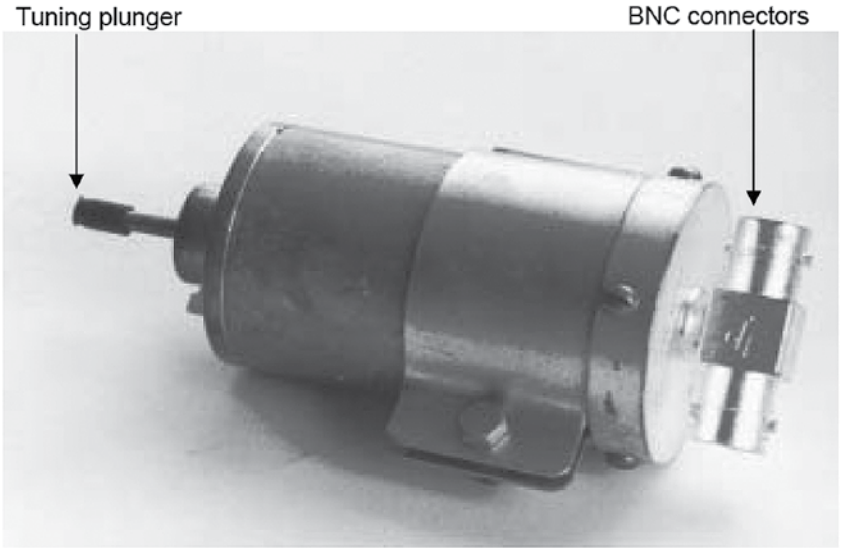
Classic circuits

Last time we had a filter for 70cms – this time it's a very simple look through filter for 23cms first published in CQ-TV 200 but the cavity resonators are still available at most rallys. Don't forget, let us have you own favourite CQ-TV ideas that you still use today and we'll reprint it so everyone can see it.

A Look-through Filter for 23cms

By John Douglas, G4DVG

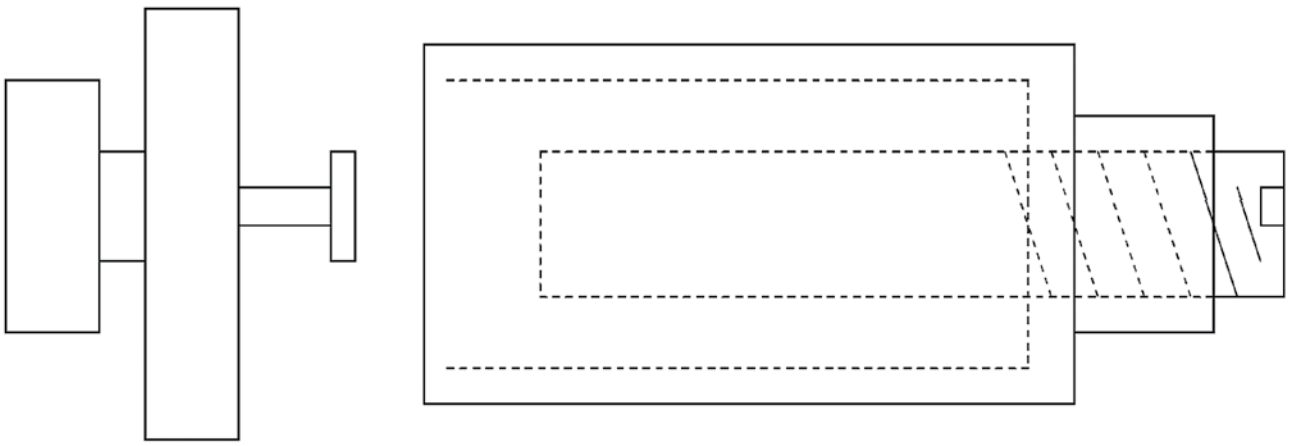
Cavity resonators made by Pye, presumably for use in PMR combiners, can be picked up cheaply at most rallies. They seem to be designed for use between 400-500MHz, but can easily be modified to make an effective look-through filter at 23cms. The unmodified resonator is shown below.



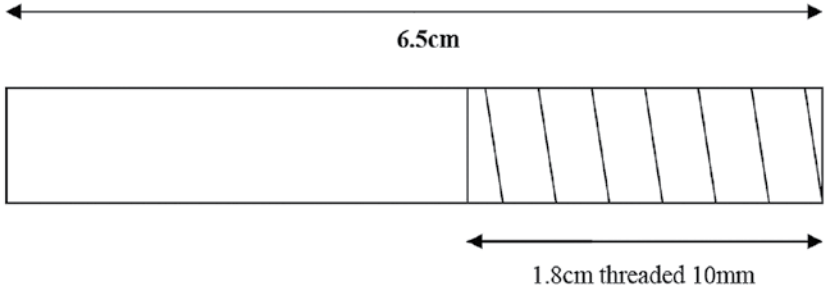
The modifications are as follows:

Open up the resonator by removing the four screws and remove the coil inside, the tuning plunger and the nylon lock screw.

Drill out the plunger hole at the bottom using a 9mm drill bit. Thread this enlarged hole with a 10mm tap (either 1.25 or 1.5 pitch will do). It is best to use a pillar drill for this work.



Take a 6.5 cm length of 9.6 mm brass rod (available at model shops) and cut a 10mm thread to suit the hole. Cut a screwdriver slot at the threaded end.



Insert the threaded rod and replace the cap with the BNC connectors. The nylon screw can be used as before to lock the rod in place after adjustment.

You should find that the cavity will resonate around 1250 MHz with the tuning rod pretty close to the end of the spill connected to the BNCs and will act as a very effective notch filter. A quick check indicated that the rejection at 1249 MHz was about 20dB with –3B points at +/- 6 MHz, ideal as a look–through filter.

ATV Streaming using a Mac

Frank Heritage - M0AEU

These days more and more people have access to an Apple Macintosh as their primary computer around the shack. Despite having been available since the Eighties, there is still comparatively little software available for the radio amateur. With the platform's history as a preferred machine in the graphics industry it would suggest it would make a good base for an ATV system. Indeed there are many applications available to provide all the tools you could want - the secret is getting them all talking to each other and providing the correct file format.

A requirement for a streaming solution for a Scouting event led me to look at the Mac platform to see if it could be achieved with my Mac laptop I was pleasantly surprised at the quality of the software available, without having to spend a fortune.

Source Material

As with any streaming solution have the battle is providing the source material. For my event I was working with 4 remote cameras (in this case re-purposed conference cameras) mixed in a Panasonic MX50 - but in reality any video source will do.

This provides a composite video source which is digitised into the Mac with a Hauppauge HD PVR. This versatile box will accept video as composite as well as component or S-Video and provides audio digitising at the same time. In order to preview the stream, the source is fed into VLC - a video player that will view a stream over UDP, even from the same machine. It should be pointed out that at this point it's not necessary to record the digitised video to disk - it can be fed straight through as a stream.

In addition to the video feed, graphics are prepared in Adobe Photoshop and animations in Flash for lower third titles, logos and images to be overlaid onto the video feed.

A lower third graphic ready for import

Television studio in a box

Once you have your source material then you need to be able to overlay your graphics and content the content to be streamed. There are several applications available for this, notably the commercial BoinxTV and the shareware CamTwist. ***http://camtwiststudio.com/*** The latter offers many of the features of the paid software and a few ricks that Boinx is not capable of doing.

All your source material is brought into the Studio and stacked according to it's position in the final output - so all your background is on the bottom, then your video, your graphics and any text and effects on top. Preview the next scene, then cut or dissolve to it. One of the nice features is the ability to use any application window as the video source - so if you're watching a stream in your browser, you can pop that stream into a (picture-in-picture) window and play it back out whilst perhaps commentating on it. There are also features to play an RSS feed as text over your video; provide a clock and other on-screen features and effects.

Streaming software

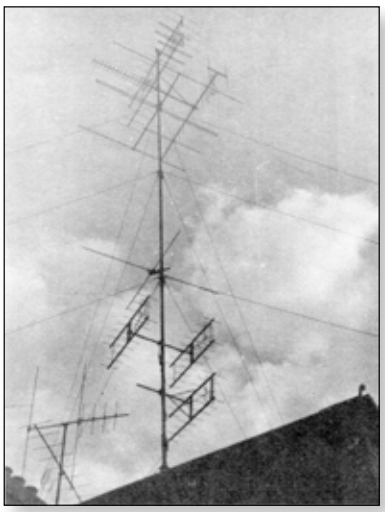
Your final output is fed into Flash Media Live Encoder for which there is a Mac version. This then streams to your BATC stream similar to Windows or Linux machines.

Overall the process on the Mac is very straightforward and provides a good solution for ATV content. There are more and more applications becoming available for the Mac and it's worth a Google to see what's out there.

Turning Back the Pages

A dip into the archives of CQ-TV, looking at the issue of 48 years ago. *Peter Delaney - G8KZG*

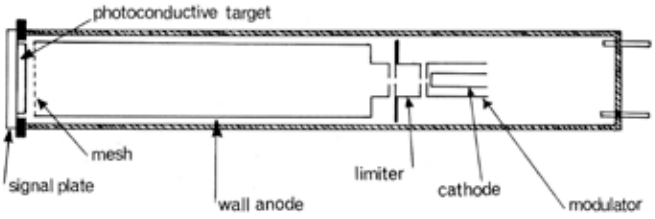
CQ-TV 58



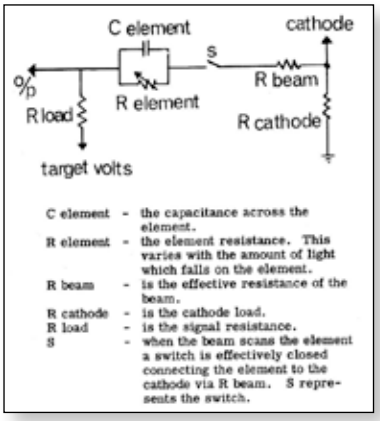
Members first sight on receiving this issue of CQTV will have been the splendid aerial array portrayed on the front cover. This belonged to Steve Birkill, G8AKQ and G6ABK/T of Barnsley, Yorkshire. (For 'more recent' members, the original G6 licence allocation was specifically for /T operation, and it was around 20 years later that the G6 series was used for general class B operation, following on from the G8 series.) The 60ft rotatable mast was located 400 ft above sea level, and this enabled 70cm pictures to be locked from G6ILD/T, 75 miles away, "under any conditions". The transmitter for ATV work had a QQVO3-20A producing 35 watts on 428MHz.

Activity reported from further afield was provided by Dick Ashton in South Australia. The group had a range of equipment available, including a 3" image orthicon camera (with a 4½" version under construction), a vidicon telecine for 35 mm and 16 mm film and 35 mm slides, extensive sound facilities, and an OB unit, housed in a caravan. "Emphasis (had) been placed on interchangeability of equipment owned by members; for example, the same types of plug are used throughout for the same purpose". One problem mentioned, though, was during a demonstration the mains started to fall - during the VIP speech (of course!). The supplies were already on a variac, but when the supply fell to 190V, the voltage stabilisers 'gave up the ghost', and so did the image orthicon camera. "Soon after someone tripped over the image orthicon camera dolly, and the camera ended up in a heap of broken glass, chopping a power cable in half on its way down! Believe it or not, the only casualty was part of the lens system on the slide attachment mounted on the lens turret."

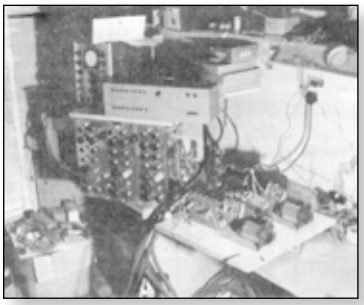
Most cameras used by members in those days were home-built. Although transistor circuitry was available, the imaging devices still used thermionic technology. The most common sort of sensor used for ATV cameras was the vidicon, but as this was rather different to ordinary triodes etc that constructors would be used to, the Club usefully included 'Some notes on the Vidicon Tube'. The tube, readers learnt, consisted of a glass envelope approximately one inch in diameter and six inches long. It had a flat window sealed to it at one end. This window had a transparent conductive coating, which acted as the signal plate. The signal plate was covered by a layer of photo-conductive material (generally amorphous antimony trisulphide) , and this formed the light sensitive target. The target was extremely thin and its resistance was considerably lower front to back than across the target face . Because of this, the target could be considered to be made of discrete elements. The resistance of these elements varied with the amount of light which fell on them. At the other end of the tube was an electron gun which produced the scanning beam. An ion



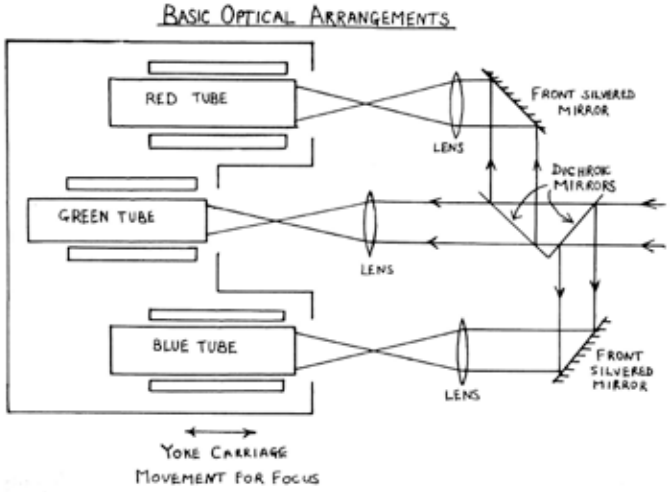
trap mesh was mounted on top of the last electrode (the wall anode), and the mesh produced a strong uniform decelerating field in front of the target. The equivalent circuit of a single element is shown. Assuming no light on the target - when the beam scanned the element (i.e., S closed) the beam charged C element to cathode potential. Thus, each element was brought to cathode potential until the whole target was at that potential. A positive voltage was applied to the signal plate, which gave the C element a charge. When light fell on the element. R element became more conductive and C element discharged, and this was repeated for each element of the image. When next the electron beam scanned the target, there was a pattern of charges corresponding to the image on the tube faceplate, and the beam restored each element to cathode potential.



A current therefore flowed in R load, corresponding to the light pattern of the image, and that formed the (very small) signal out of the device. The notes went on to discuss the effects of insufficient beam current (white crushing) or excessive beam current (defocussing), whilst increasing the target volts effectively increased the tube sensitivity, but at the risk of an increased dark current. One effect inherent in the vidicon (and similar) tubes was lag - a residual image being left if the picture changed suddenly (as when making a quick pan, for example) . The way to reduce this was to increase the scene illumination.

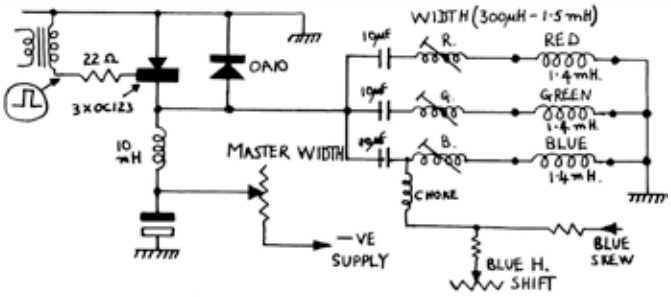


The longest article in the magazine was a report on progress being made by Mike Cox on a camera that used vidicon tubes. He wrote that "at various times, the idea of trying to build a simultaneous colour camera using three or four pick-up tubes was to be considered, only to be put firmly out of mind (and the worry that yours truly was slightly out of his as well!)". However, with the availability of a set of 3 vidicon scanning yokes at the end of 1964, he had embarked on the project. Apart from all the 'usual' difficulties in making a vidicon camera, the arrangement had to ensure that the red, blue and blue signals exactly coincided - optically and electronically. The optical arrangement is shown in the diagram, and the set of 3 yokes can be seen in the photograph. The vidicon tubes were placed so as to



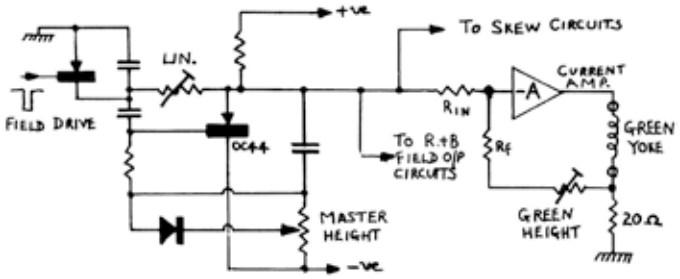
Basic Optical Arrangements

have optical paths of equal length, the dichroic mirrors reflecting the red or green components of the image to front silvered mirrors (so that refraction by the mirror glass did not affect the optical path). The 3 yokes were mounted on a substantial plate, so that they could be focussing together by racking the plate to and fro.



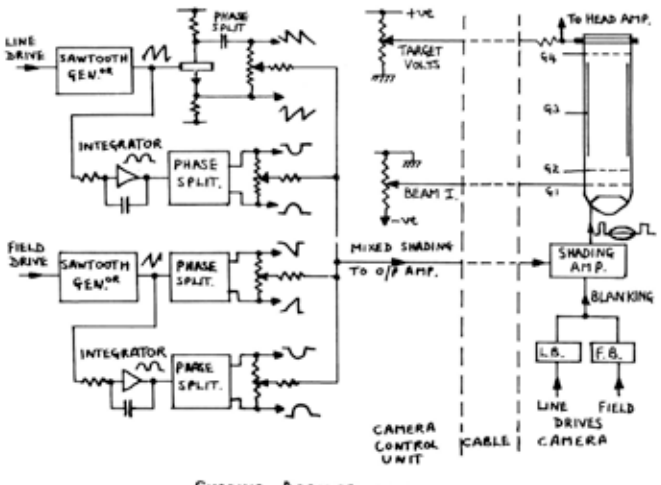
Basic Line Scan Circuit

On the electronics side, it was important that the focus current of each yoke tracked together. This was achieved by putting them in series, so the same current flowed through them all. As for proper focus, each coil dropped 7½ volts, there was only 1½ volts available for the current stabiliser circuit to work from the 'system' power supply of plus and - 12 volts - so a dedicated focus current supply had to be added. The line scan circuits were fairly



Basic Field Scan Circuit

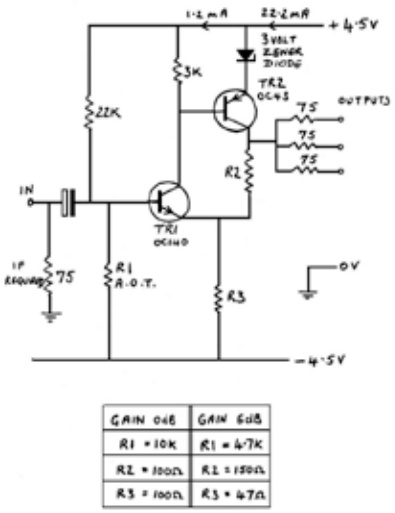
conventional, and used 3 OC123 germanium transistors in parallel to enable an adequate current in the 3 sets of scan coils, which were wired in parallel. Additional controls were added to adjust the position and skew of the different channels relative to each other. The field scan circuits were unusual. Ideally, the same current would flow through all 3 sets (as with the focus coils), but to generate a sawtooth waveform with sufficient voltage swing would create problems. A sawtooth generator circuit driven by field drive therefore drove three identical parallel output



Shading Arrangements.

stages. The field sawtooth signal also fed the 'skew' circuits driving the line scan. A difficulty with vidicon tubes was that the target sensitivity varied across the target. This was not generally a problem in a black and white camera, but for a 3 tube colour camera the effect would be colour shading that would be quite noticeable on the composite image. The solution was to develop the special 'shading arrangements' circuits to - in effect - vary the target supply voltage across the faceplate. In practice, by altering the cathode supply, the target - cathode voltage was varied (which was what controlled the sensitivity). Parabolic waveforms were derived from each of the line and field drives by integrating a sawtooth waveform in each case, and combining parts of the sawtooth and parabolic waves, for both horizontal and vertical directions, for each tube cathode. There were therefore 12 controls to adjust for just this aspect of the camera ! (the arrangement for a single channel is shown in the diagram). vidicon power supplies were stabilised by using neons (standard practice at the time -- 3 terminal semiconductor regulators were certainly not available then !) to provide the electrode voltages from +385 to -85 volts - with tens of microamps available per tube.

A rather simpler useful circuit by Martin Nutt was a transistorised distribution amplifier. The response was said to be 'satisfactory for 405 line working, and acceptable at 625 lines'. Layout was not critical. R1 was adjusted on test to give a zero output voltage when there was no input. The circuit was arranged to use a split + and - 4½ volt power supply, although a single 9 volt rail could be used if a capacitor of at least 100 µF was used in series with each output (the disadvantage being slight field shading).



GAIN 6dB	GAIN 6dB
R1 = 10K	R1 = 4·7K
R2 = 100Ω	R2 = 150Ω
R3 = 100Ω	R3 = 47Ω

(The diagram reproduced here incorporates the correction included in the following issue of CQTV)

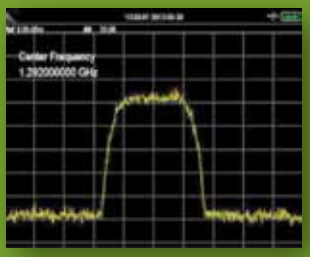
Do you have any news, ideas or circuits you would like to share with your fellow BATC members in CQ-TV?

Send any ideas, complete articles, circuits or photographs to **editor@batc.org.uk**

(Please contact the Editor before emailing large files!)

Digital Amateur TeleVision Exciter/Transmitter

now available from



DATV-Express

- A more affordable DATV exciter; fully-assembled & 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
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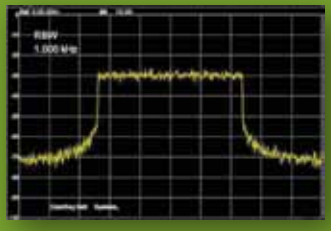
- Requires PC running Ubuntu Linux
- User Guide at ***www.DATV-Express.com***
- Price is £215.00 - includes shipping in Europe



For more details and ordering

https://BATC.org.uk/shop/

Register on the web site to be able to order on the HARDWARE and KITS page

Out and About

You will be able to see the BATC stand at the following forthcoming rallies and events. Come and say hello!

10-12 October - RSGB Convention - Milton Keynes

See: www.rsgb.org

9 November 2014 - West London Radio & Electronics Fair .

See: www.radiofairs.co.uk

If you would like BATC support at an event you are organising, please contact the membership secretary.