The British Amateur Television Club

CQ-TV

No. 268 – Summer 2020

Dutch analogue ATV experiments in the 6 cm band

Using UDP for Sending Video over a Network

Cost-effective multiband dish feed

DATV Express 1.25LP14 in practice

Skype as a repeater input

An introduction to Video Editors

Ex broadcast 'LGT' amplifiers in 436MHz DVB-S service

Configuring a Router for the Jetson NanoBOX

Converting a TV repeater to widescreen on the cheap

Television History – Live

A 2.4GHz Interdigital Bandpass Filter

Lock Light Mod for the DVB-S2 Combo Receiver

... and much more inside!

CQ-TV 268

Contents:

Contributions

Contributions for publication or for constructive comment are welcome. The preferred method of communication is by email; all relevant committee email addresses are published in CQ-TV.

Alternatively you can write to us at:
BATC Secretary, 12 Petrel Croft, Kempshott, Basingstoke, Hampshire, RG22 5JY, UK

Contributing authors should note that we aim to publish CQ-TV quarterly in March, June, September and December.

The deadlines for each issue are:
Spring - Please submit by February 28th
Summer - Please submit by May 31st
Autumn - Please submit by August 31st
Winter - Please submit by November 30th

Please submit your contribution as soon as you can before the deadline date. Do not wait for the deadline if you have something to publish as it is easier to prepare page layouts where we have contributions in advance.

Contributions can be in almost any file format - except Microsoft Publisher! MS Word is preferred. Pictures should be submitted in high quality as separate files. Pictures embedded in a file are difficult to extract for publication however if you do wish to demonstrate your completed layout, a sample of your finalised work should be submitted at the same time.

Please note the implications of submitting an article detailed in the 'Legal Niceties'

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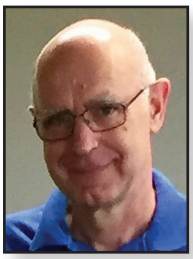

From the Chairman...

Dave Crump G8GKQ

After three months of lockdown, amateur tv as a hobby seems to be thriving. Activity on QO-100 and on the terrestrial bands has increased, and it's great to get some hard evidence of this with the number of contacts that have been recorded in the Activity Ladder.

I was pleased that activity levels were good during the IARU ATV Contest, despite the weather. I was involved in activity on all bands from 146 MHz to 24 GHz, although I did find all the band-switching time-consuming and apologise to all the stations that I missed while continually reconfiguring. Now that portable operation is practical again (at least in England) we are resuming activity days and adding some less ambitious contests that will give one and two-band stations a real chance of making a good number of contacts.

Looking ahead, we have made the decision to make CAT 20 an online and on-air event. Although we could have delayed making this choice, it means that we can plan the best possible programme and include all our members from around the world, not just those who would be able to travel to Coventry. So, please keep the weekend clear and join us for some fascinating talks, not just on RF, but on video production as well.

I would like to take a few words to thank, on your behalf, some of the busier, and less visible volunteers on the committee. Particularly Rob G8NXG the Membership Secretary, Phil M0DNY who runs our online infrastructure, Brian G8GQS the Treasurer and Noel G8GTZ the Secretary. You would not believe the hours this team put in to keep the BATC running smoothly.

We would normally have held a General Meeting at Coventry in October. However, as our Constitution allows us up to three years between general meetings, we have decided to postpone this until next year, when hopefully we can all meet in person.

We have a number of new construction projects lined up for the future; the Portsdown 4 will build on the success of the previous versions and bring improved capability, both for DATV transmit and receive. The simpler Ryde project should enable a self-build stand-alone set-top box for RB-TV reception. In the meantime, please make every effort to get on the air and provide support and advice to your fellow ATVers.

73
Dave, G8GKQ

▶ *David, M0YDH sheltering from the rain during his contest contact with Noel, G8GTZ*

The Listing

new and renewing members

Rob Burn G8NXG

Despite these strange and perhaps scary times that we find ourselves in, it is good to see that amateur radio is providing opportunities for enthusiasts with a little more available time to rekindle interest in main-stream amateur radio and niche areas of the hobby. I include ATV within this and it is good to see that the BATC continues to be well supported, now with upward of 1,400 members worldwide.

This list covers the period March, April and May 2020. If you joined or renewed your membership during the period you should expect to see your name, call and post town listed by country. As said in previous editions of CQ-TV, except for extracting the membership information the list itself is put together manually, so can be subject to errors creeping in! As the base information is extracted from sales data the incidence of error has reduced, however do write and let me know if you believe that you have been omitted. I can assure you that if you happen to have not made the list then this is likely the result of human error and not for any other reason! That said it is a straightforward task to check – although you do need to remember the month and year of joining or renewal before delving into back-copies of CQ-TV!

Although the number of our members continues to expand, we have to sadly say goodbye to between 10 and 20 ex-members each month. These are the members who have not renewed their membership subscription for over 12 months. In effect, this is a period of grace where members who did not renew before the due date can still do so. Once I have pressed the delete button renewal is no longer possible and as I send the final reminder about three weeks before ex-member records are deleted the only way back is to rejoin!

That said, we would obviously prefer you to stay on to remain as a member and to make renewing as easy as possible there are a number of options to subscribe and pay for your subscription. Just check the Membership Renewal tab on the website under 'Members'. For ways to pay just go to the Shop, then the 'How to Pay' tab where there are no less than four ways to pay including by cheque, for those who prefer not to make use of electronic banking.

Finally, a huge thank you to all those members who renew on time and continue to support the club; please continue to do so!

Australia		
Paul Hadlow	VK2PNH	Balranald
Charles Andrew Cutler	VK3CAC	Berwick
John Proctor	VK2AOJ	Corlette
Andrew Manning	VK3HDV	Koraligh
Gary Beech	VK2KYP	Lisarow
Peter Cossins	VK3BFG	Melbourne
Barry Finlay	VK2FIN	Merewether
Peter Jones	VK4YAC	Moorooka
Wayne Stringer	VK5BI	Seaton
Clinton Cann	VK6FCRC	Spencer Park
Anthony Bedelph	VK7AX	Ulverstone
Austria		
Reinhold Autengruber	OE5RNL	Linz
Heinz Meschnark	OE8MEQ	St Stefan
Gerhard Burian	OE3GBB	Wartmannstetten
Belgium		
Alex Verhoeven	ON5NV	Deurne
Frans Van de Velde	ON4VVV	Gent
Tim Schmitz	ON8TT	Herk-de-Stad
Patrick De Rocker	ON7ARQ	Merelbeke
John-Peter Martin	ON7ZO	Montigny Le Tilleul
Krist Perneel	ON6UB	Roeselare
Gert Peetermans	ON4GPE	Tessenderlo
Daniel Vanhoek	ON7RD	Torhout
Vandewalle Yves	ON4YV	Vilvoorde
Charles Verstappen	ON8YY	Waterloo
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Ole Nykjær	OZ2OE	Horsens
Finland		
Arno Martin	OH7XM	Espoo
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Auvray Michel	F1ETU	Izy
Dominique Metayer	F1EJP	Le Grand Quevilly
Roger Bouche	F1HCN	Le Havre
Keller Denis	F6GXI	Marseille

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Roland Etienne	F8CHK	Pabu
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Bricout Dany	F5IDK	Recquignies
Patrick Staszak	F4IJW	Ronchin
Pierre Marie Gayral	F5XG	Rurange Les Thionville
Jean-jacques Metay	F1HUS	Saint Herblain
Jean-Marie Vallet	F6HBW	Veretz
Jean claude Darge	F1HGJ	Veules les Roses
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Michael Vorbeck	DB1ID	Alzey
Sven Ziegenspeck	DH1HN	Bad Neuenahr-Ahrweiler
Siegfried Jackstien	DG9BFC	Barenburg
Walter Plaschke	DB2BG	Bremen
Rolf Gerhardt	DG8AR	Bruchsal
Kaspritzki Hans	DG1HTS	Dessau- Roßlau
Winfrid Flöter	DL3HQD	Dessau-Rosslau
Norbert Wetzel	DF6IY	Gaggenau
Tobias Janus	DO1KQ	Gelsenkirchen
Michael Rieger	DL4MAU	Hallbergmoos
Thomas Ehrhart	DF7PZ	Hoehr-Grenzhausen
Hans-Joachim Faber	DC7UG	Jever
Juergen Feldhoff	DK5KC	Langerwehe
Hans-Walter Peters	DC5EO	Mönchengladbch
Andres Justus	DK2ER	Niederkassel
Wolfgang Schreiner	DC2TH	Oberteuringen
Gert Weinhold	DG8EB	Oelsnitz
Erich Jankow	DL6ZEW	Oschersleben (Bode)
Achim Kruck	DL3SFQ	Pfedelbach
Peter Quidde	DG2AAO	Salzgitter
Ulrich Knobloch		Schwarme
Dietmar Barthel	DG0CPG	Stassfurt
Falko Troll	DG2TF	Staßfurt OT Rathmannsdorf
Gottfried Sacher	DG3MU	Sulzberg
Rainer Schuster	DG0RS	Syrau
Per Malmbak	DC3ZB	Taunusstein
Guenter Bauer	DK9CL	Waldmuenchen
Axel Bitsch	DG1DAV	Wesel
Roland Sobotta	DD0AO	Wolfenbuettel
Greece		
Grigorios Smiaris	SV2RR	Kilkis
India		
Peter Jacob	VU2PJP	Palakkad
Ireland		
Stephen Ormondroyd	EI4KM	New Ross
Italy		
Alessandro Salvatico	I2SVA	Brunate
Franco Milan	IU3ADL	Caneva
Renato Campo		Paceco
Alessandro Mattiuzzi	IZ3CTS	Vittorio Veneto
Japan		
Nobuo Katsuma	JF1WKX	Adachi-ku
Malta		
Dominic Azzopardi	9H1M	Birkirkara
Montenegro		
Dragan Milosevic	4O6DM	Podgorica
Netherlands		
Rob Engberts	PA0RWE	Alphen A/d Rijn
Herman Minke	PA2WFM	Barendrecht
Jack Hoogewerff	PA3AXO	Bosschenhoofd
Harry Paas	PA1AS	Brunssum
Jan Kok	PA3FRX	Bunnik
Martin Struijs	PE3MST	Burgum
Jeroen Bastemeijer	PE1RGE	Delft
Henri Van der heijden	PE1PYC	Den Bosch
Hans Baard	PE1NKP	Ede
Marco Geels	PE1BR	Enschede
Geert Klijnsma	PE1IWT	Enschede
OJM Baken	PE1PMD	Grou
Ramon Hoffman	PA3CX	Julianadorp
Harry Broersma	PA3GSI	Kootstertille
Dustin Snijders	PE1OZS	Pijnacker
Albert van Deursen	PA5OXW	Ulestraten
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Fred Marinus	PE1EXM	Veghel
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Jan Galuhn	SP5GDM	Serock
Piotr Slup	SP5MS	Warszawa
Portugal		
Carlos Abrunheiro	CT1XC	Coimbra
Manuel Cardoso	CT1PR	Coimbra
Antonio Pacheco	CT1ERW	Lisboa
Jorge Amarante	CT1XV	Parede
Jyrki Leppanen	CT1ALX	Perafita
South Africa		
Louis Haarhoff	ZS6BD	Vanderbijlpark
Geoffrey Levey	ZS6WR	Weltevreden Park

Spain		
Francisco Haro	EA7GLU	Almeria
Jaime Codina Jodar	EA3DZN	Barcelona
Alejandro Fernandez	EA4BFK	Las Rozas
Javier Sarmiento	EA4CMV	Madrid
Juan Garcia Dolz	EA3EDK	Sant Fost de Campsentelles
Francisco Garcia		Santa Cruz de Tenerife
Blas Cantero	EA7GIB	Sevilla
Jose Maria Gomez-Salazar	EA2AA	Urduliz
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Anders Klint	SA0BDK	Huddinge
Lars Pettersson	SM4IVE	Odensbacken
Jan-Olov Gråsten	SM0VPJ	Sollentuna
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Luca Rovelli	HB9OBD	Barbengo
Pierre Andre Gossweiler	HB9AKP	Bremblens
Christoph Joos	HB9HAL	Domat/Ems
Pierre Binggeli	HB9IAM	Le Grand-Saconnex
Peter Lueckert	HB9DAQ	Walzenhausen
Thailand		
Tanan Rangseeprom	HS1JAN	Bangkok
United Kingdom		
John Morris	G6PEP	Abingdon
Sonny Ward	M0SYW	Alpington
Chris Tanner	MW0LLK	Amlwch
Steve Haseldine	G8EBM	Ashbourne
Mike Berry	G1LWX	Ashton-in-Makerfield
Joe Bingham	GI4TAJ	Ballyclare
Alan Rishworth	G8UHN	Banstead
Gary Whittaker	M1EGI	Barnsley
Robert Head	M0HBA	Basingstoke
Tony Tyrwhitt-Drake	M0TDK	Beccles
Ian Gordon	G8IFT	Birmingham
Simon Macdonald-Smith	M0IVQ	Bognor Regis
John Morris	G3PHA	Bolton
Martin Newell	G8KOE	Bridgwater
Shaun Pratt	G8VHO	Bridgwater
Art Smyth	G3XNE	Bude
Roger Jones	G7RGR	Burnham On Crouch
Dominic Baines	M1KTA	Cambridge
R Beech	G1BXG	Chandlers Ford
Colin Keevil	G7COY	Chatham
John Houldridge	G6KYD	Chessington
Brian Corker	G8FBQ	Chester-le-Street
Jim Thompson	2E0FOA	Chesterfield
Robert Kerby	G0CHK	Chichester
John Nichols		Chislehurst
Peter Braidwood	M1TCP	Cirencester
Mike Crawshaw	G4BLH	Clitheroe
David Atkinson	G8DRE	Colchester
Philip Heron	MI0VIM	Cookstown
John Melton	G0ORX	Crawley
David Sadler-Lockwood	G3WRS	Dewsbury
Graham Bailey	G1ZTJ	Dideford
Phil Smith	GD1HIA	Douglas
Graham Jefferies	M1ASR	Driffield
Robert Harris	G4APV	Dronfield
David Harbour	G0EID	East Grinstead
Sandy Fraser	GM8NET	East Kilbride
James Harris	M0GUR	Eastbourne
Paul Goodhall	MM3JFM	Elgin
Graham Denton	G8VAT	Goole
John Spurgeon	G4LKD	Goole.
David Palmer (NARC)	G7URP	Great Ellingham
Anthony Parker	G4AXN	Great Yarmouth
Simon Hammond	M0SIH	Great Yarmouth
Anthony Parker	G4AXN	Great Yarmouth
Tony Wilson	G6ZAC	Guildford.
Colin Dalziel	SPARC	Hamilton
David Warwick	G4EEV	Harrogate
Mark David	G4MEM	Harrogate
Neale Davison	G3VFX	Harrow
Neil Douglas	G4SHJ	Hartlepool
Stuart Swain	G4FBS	Havant
Paul Bunnage	G8SVE	Havant
Peter Mullen	M0PMJ	Hemswell Cliff
Wynn Griffiths	MW0AQZ	Holyhead
Clive Andrews	G2DX	Hook
Alan Ball	G3TCR	Hook
Graham Leighton	G8FXB	Ingatestone
Donald Ilsley	G4ZVW	Ipswich
Nick Perry	G6DQZ	Kidderminster
Dunstable Downs RC		Kilmingon
Bill Ward	GM0ICF	Kilwinning
Peter Elms	G0IJU	Kings Lynn
Martyn Apperly	G6FSU	Kingston
Nigel Booth	M0CVO	Kirkby in Ashfield
Chris Smith	G1III	Leeds

Simon Clark	2E0DXE	Lincoln
Tony Krvszelnicai		Lincoln
Kelvin Law	G4WMZ	Little Downham
Paul Lister		London
Andrew Coulthurst		London
Peter Standley	G8RW	Longfield
Richard Ellis		Macclesfield
Patrick White	G6CJB	Maidenhead
David Robinson	G4FRE	Malvern
Colin Lowe	G4WVR	Market Harborough
Graham Turner	M1DHV	Market Rasen
Adrian Hope	G0ACZ	Matlock
Chris Dodds	G8LED	Milton Keynes
Trevor McKee	Mi0TBV	Mossley
Heather Lomond	M0HMO	Much Wenlock
Anthony Pearce	G0AZQ	Nafferton
Graeme Griffiths	G0KQS	Neston
Adrian Leggett	M0NWK	Newark
Jenny Bailey	G0VQH	Newmarket
Dale Robins	2W0ODS	Newport
Tars Torbay ARS	G3NJA	Newton Abbot
Ben Matthews	GB3XYZ	Norwich
Carl Bowen	M1BSI	Nottingham
Adrian Craig	M0GLJ	Nottingham
Steve Liptrott	G4EGY	Nottingham
Stephen Catlin	G8HLM	Oakham
Peter Burton	G3SRC	Old Coulsdon
Geoff Oliver	G0BJR	Oldham
Ian Marsh	G4EXD	Penrith
Norman Swann	G1TEX	Poole
Marcus Bowman	GM4LVW	Prestwick
Simon Watson	MX0AAA	Reading
David Blowers		Reigate
Martin Borer	G0NYM	Ripley
Laurence Cook	M0LDZ	Rochdale
Peter Martin	G0GIR	Rochester
Ray Hill	G6TSL	Ross On Wye
Ian Tickle	G4ZJH	Saxmundham
Nigel Smith	G4EQD	Scunthorpe
Matthew Dronfield	G6BNT	Sheffield
Chris Wilson	M0YZA	Sheffield
Stephen Webster	M1ERS	Sheffield
Gerald Edinburgh	G4CDD	Shelley
Alan Baker	G3WOR	Shoreham-By-Sea
Chris Bryant	G3CNO	Southampton
Graham Sunderland	G8UTH	Sowerby Bridge
Henry Neale	G3REH	Spalding
John Newman	G0VDU	St. Austell
Gary Stephens	2E0ONC	St. Austell
Alan Docherty	2E1HCG	Stoke on Trent
Drew Belcher	G7DMO	Stourbridge
Michael Meadows	G4GUG	Stroud
Mukti Kar		Sunbury-on-Thames
George Quarterman	G3NHX	Sutton
Tim Clark	MW0RUD	Swansea
David Hazell		Swindon
David Wright	G3XOU	Tavistock
Peter Wallace	G1OAR	Telford
Martyn Vincent	G3UKV	Telford
John Humphreys	G3ZME	Telford
Chris Pegrum	M0NAY	Tunbridge Wells
Tony Hill		Tunstall
Eddie Ashburner	G0EHV	Tyne and Wear
David Hall	G8CLI	Warwick
Chris Foote	G8IPN	Weybridge
Miles Ogden		Wigan
Ashley Booth	G8DPH	Windsor
Mark Coulthurst	M1AEC	Worcester
Peter Hampton	G4ADJ	Worcester
Roy Humphreys	G4WTV	Worthing
Andrew Hearn	G3UEQ	Worthing
United States		
William Frovik	N0MNB	Blaine
Thomas Taft	KA8ZNY	Columbus
Kevin Kimbro	NG4P	Cottondale
Mike Bagstad	KB0OZN	Coulmbia Heights
James Edelen	KA3KIU	Jamison
Bryan Herbert	KE6ZGP	Las Vegas
Barton Pearl	WC3PS	Ligonier
Rex Harper	W1REX	Limerick
Charles Yurek		Pennsauken
Michael Warren	W6MEW	Pittsburg
Ed Mellnik	WB2QHS	Portland
Bill Jones (SNARS)	W7TA	Reno
Kenneth Goldstein	KD5HEH	Rio Rancho
Karl Heinz Kremer	K5KHK	Rochester
Charles Morrison	N1RR	Seekonk
Kevin Hempson	KK6JPN	Sutter Creek
Bob Miller	WB6KWT	Tracy
Andrew Spencer	KA5BBC	Tulsa
John Ronan	K3ZJJ	Windsor

Activity and Contest News

Clive Reynolds, G3GJA

Activity and Contests

The Christmas Repeater Activity contest for the second year attracted only one entry. The Severnside ATV Repeater Group again picks up the £100 prize cheque. This contest will be run one more time to see if it can attract more than one repeater group entry; if not the Committee will consider an alternative. However, with most Groups struggling for funds I would have expected a lot more interest in this initiative!

Activity Weekends

The April activity weekend over the 11th & 12th didn't seem to generate any activity that was audible on 144.75MHz from my QTH located to the west of Hull. I left a receiver on the calling channel all weekend and nothing lifted the squelch. Obviously the Covid-19 restrictions precluded any portable activity which does seem to drive the Activity Weekends more than anything else. I suspect that satellite operation is still a major distraction reducing terrestrial activity.

However, please remember that the contest entries are the easiest to obtain, verifiable proof of our use of the spectrum that has been reserved for ATV use. Without proof of our use of the spectrum it is very difficult to justify the continued allocation of spectrum in the face of increasing commercial demand.

Lockdown Activity Contest

In an effort to promote terrestrial use of ATV and to help pass some time whilst in lockdown, the BATC ran a month-long Activity Contest from the 16th May, which was the start of the previously announced Activity Weekend, through to the end of the IARU R1 ATV contest on the 14th June 2020.

Points were awarded dependent on the type of contact; one point for a contact via QO-100, two points for a contact via a terrestrial repeater and three points for a home QTH to home QTH contact. Any mode could be used on any band from 50MHz up.

The Committee has offered substantial cash prizes of £100 for first place, £50 for second and £25 for third place. Congratulations to the winner Arthur G4CPE, who has won by a substantial margin.

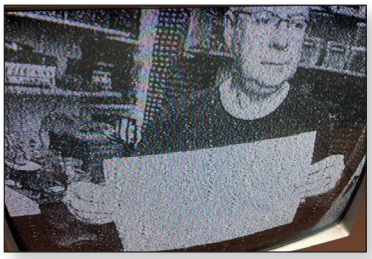
Here are the results.

Position	Callsign	Points
1	G4CPE	783
2	G8XTW	494
3	G7NTG	272

IARU International ATV Contest

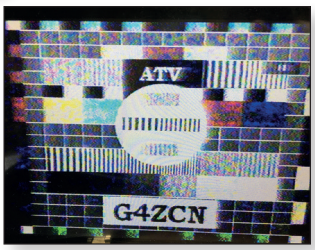
The main ATV contest of the year took place over the weekend of the 13th and 14th June. Although, some regions were still in lockdown because of the Covid-19 pandemic, it was an excellent opportunity to fire up the home station and get some ATV contacts in the virtual log book.

The preliminary results are in and it looks as though Rob M0DTS/P is in first place in the UK with 6197 points followed by Terry G1LPS with 4563. There is still time to get your log in; please email it to *contests@batc.tv*



There was a lot of non-digital activity including 70cm AM as seen in this screenshot of G4FVP as received by Terry G1LPS

And this transmission of 23cm FM ATV from G4ZCN was also seen by Terry



A full report, including the UK only VHF results, will appear in the next issue of CQ-TV.

Forthcoming Activity Weekends and Contests

After the July all-band activity weekend, the BATC is organising a pair of two-band contests. The intention is to make portable operation easier by reducing the equipment and preparation needed. Focusing on just two bands should make operation less arduous too. Dates are on the back cover of this issue.

Further details will appear on the BATC Forum under the Activity and Contests section.

Contest Activity Report, David M0YDH

My son Peter M6EMP and I went to Titterstone Clee Hill, Shropshire on both days. We tried the west facing lower car park on Saturday. My pictures on 2m and 70cm were received in Cheltenham by Graham G3VKV.
The weekend's only two way transmissions were with Shaun G8VPG at Bath Racecourse. In front of the hill's car park is the ridge of Magpie Hill - home to Random Farm and a phone base station. I wished we were there.

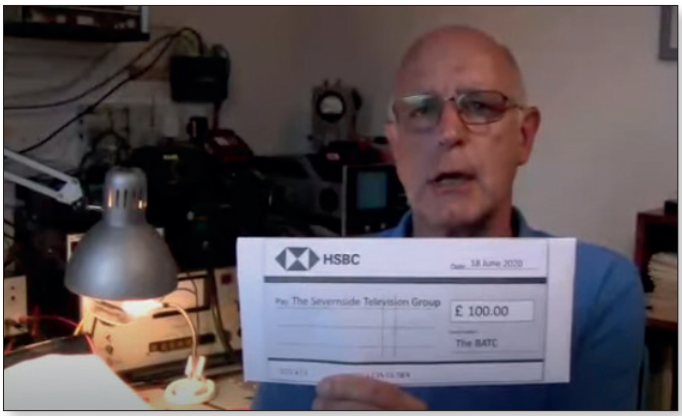
We spotted cars parked higher up and above the ex-quarry for the first time. On Sunday I decided to risk the proximity to NATS radar station in exchange for a 100 foot height gain. I made successful 437 MHz transmissions to Noel G8GTZ on Walbury Hill, Dave G8GKQ at Mere in Wiltshire, Arthur G4CPE and Steve M0SKM in Bedfordshire. All over 100 km. I didn't get a peep from them. Ok one second of the inside of Noel's luxury

vehicle was it. Never any carrier lock. Always some RF on the Minitioune meters. Arthur was using huge power. P0 all round there. Thanks to Ray M0DHP and Mike G0MJW for their attempts too. Dave remarked that perhaps this location is rather like being on Portsdown Hill near the government research establishment - great TX location but receivers hear nought. I've a super spot for you to test EMI and filters! My orange survival shelter from my SOTA kit was pressed into use to work Noel and protect the station rack from the downpour. (***Ed - see page 3!***)

It was a super weekend activity and a delight to get out. Peter saw further than the walls of his room too. Thanks to all for making my third go at the contest such fun.

David Holman M0YDH
Oxley
Wolver'ampton

Christmas Contest winners presented



▶ *BATC Chairman Dave, G8GKQ presents the cheque…*

Shaun, G8VPG, was virtually presented a cheque for £100 from BATC chair Dave, G8GKQ, on behalf of the Severnside TV group, for winning the club's Christmas contest.

The annual contest takes place over the festive period and is run to encourage the use of local repeaters.

It's the second year the group has won the award - mainly due to the efforts of veteran microwaver and DATV-er, Adrian Whatmore, G4UVZ, who is can get in to the repeater from his QTH near Taunton.

Speaking during the presentation which took part on the BATC QO-100 net, Shaun said the money will go towards the running of GB3ZZ in Bristol, and added the cash was "particularly welcome and useful" as the Frome rally - which normally funds the group - had to be cancelled this year because of the coronavirus pandemic.

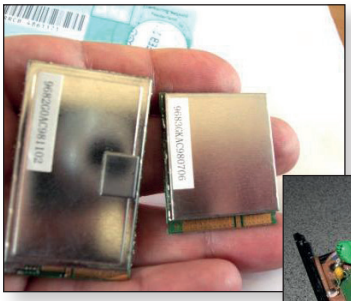
▶ *…and by the power of satellite, it's received in Bristol by Shaun, G8VPG!*

Dutch analogue ATV experiments in the 6 cm band

Chris van den Berg PA3CRX

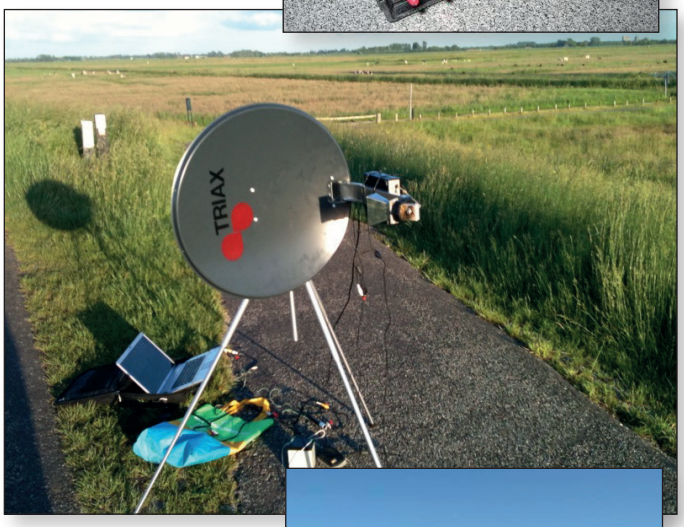
In 2010 Peter PA3CWS and I started with successful experiments in the 6 cm band. Before that, we did some unsuccessful experiments with multipliers. The successful results were with purchased standard modules from Airwave (long before such units were used for drones). Frequency channels could be chosen by making some connection points 'high' or 'low'. Several diodes and a rotary switch did the job, multideck to have the frequency of the receiver and transmitter synchronised. For the RF in and out we soldered SMA connectors. We also bought SMA coax relays on a rally so we did not have to switch over manually.

My station was housed in a very small box that was directly mounted on the back of a prime-focus dish with semi-rigid coax to the can-feed. The other station was equipped with an offset dish with horn feed.



▶ *The Airwave modules*

▶ *Typical way of building the units in a housing with a relay*



▶ *First station of PA3CWS in action*

▶ *First station of PA3CRX in action*

Some measurements on these modules taught us that the output of the 100 mW transmitter was about 70 mW and the receiver sensitivity was about -95 dBm for B2 report to -88 dBm for B5. However, receiving frequency was about 5 MHz lower then the corresponding transmitter. We found out that the PLL in the receiver moved to the correct frequency if the signal was strong enough. So in fact the problem of low frequency only showed up in the case of very weak signals.

Another poor point is the video frequency response, far from flat, lack of low frequencies but sufficient for amateur purposes.

We defined 5780 MHz as our standard test frequency. Our first experiments were portable over very short path, over a lake. Signals were strong, to our surprise even when the dishes were not pointed (or even assembled). A loop element (size of a small finger ring) was enough for an excellent picture!

▶ *This loop antenna was sufficient for several kilometres*

The next months we did several tests, extending the distance. Mainly over water, combined with viaducts and bridges to have at least some height. Behaviour of several passing car drivers was strange, pushing the brakes while sticking up their middle finger! Likely they were speeding and thought we did speed measurements.

You must keep in mind that the Netherlands is a very flat country, the few hills are a reminder of the ice age, shaped by glaciers. The highest hills are about 100 meters high. They are covered with forest so not really useful for portable stations.

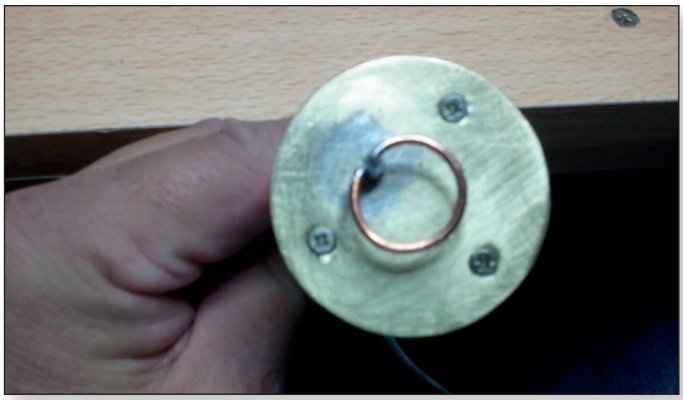
Nearby my home is such hill, with a 25-metre-high tower on it, resulting in a total height of about 85 meters above sea level. The line of sight is over the tops of the trees, ideal for portable stations. However, from the parking place to the tower it is about a quarter kilometre walk and all the stairs need to be taken with all carried equipment.

▶ *Tower 'De Kaap' with the platform 85 metres above sea level*

▶ *Station PA3CRX on the platform*

From this high location I tried contacts with portable station from locations we used before. We experienced that large distances still resulted in strong signals, even when the other station was on (or even below) sea level. With the software application 'Radio Mobile' we simulated possible paths to find new locations to try.

Ton PE1BQE joined our tests and made also a portable station with the same setup but with a single loop and reflector to feed the offset dish.



▶ *The feed of PE1BQE for an offset dish: a loop with a plate reflector mounted on a small piece of PVC tube that fits in the LNB holder*

We were very surprised that a contact over a city (so totally not line of sight) succeeded with the home station of Wim PE1EZU. This was promising because until now, we searched for line of sight locations to activate.

Unexpected was the problem with talkback on 2 mtr or 70 cm. It was difficult to make these contacts with portable equipment like a handheld even while the report on 6 cm was B5! Of course the ERP power on 6 cm is much more. I also tried my cell phone but it seems that to many base stations were reached resulting in a confused telephone system that closed the connection. So that did not work.

So, additional antennas needed to be taken with us and if talkback directly was still not possible we tried via FM repeaters.

We needed this talkback to point our antennas. We do this the following way; one transmitting while moving the dish fast in sweeping way in about the expected direction. At the same moment, the receiving station moves the dish slowly in a sweeping way in the expected direction. With common earphones connected instead of the monitor you could immediately hear the video signal of the transmitting station and point to the maximum signal direction. Then the receiving station starts transmitting and the other station (then receiving) only had to adjust the antenna direction. This sound could also be transmitted by the talkback channel.

When the contact was steady, the sound channel of the video link could be used (6 MHz).

Then we improved our output power by adding professional amplifiers. They needed so less power as input that we had to attenuate our signal by 40 dB to prevent overloading. At 12 VDC, we had about 1,2 Watt output, much more then the 70 mW we used before.

Did it make a big difference? We found out that most contacts that could be made the higher power could also be done with the lower power. Only when the contact was poor, the higher output gave a better result.

▶ *The inside of the new 6 cm station of PA3CRX with more power*

▶ *Stations with more power active, PA3CWS also changed his antenna from a dish to a mesh antenna*

An observation to mention is that even when the distance is 50 km and non-line-of-sight, it could make a big difference if one of the stations move the station half a metre or a metre sidewards, forwards or backwards. This is very strange to notice, the other station is at the horizon and such a small difference in position could make the difference between 'not seen at all' to have the contest characters seen.

Tjalling PE1RQM tried with his portable station a contact with Ton PE1BQE, several kilometres away. He did this in the street, between the buildings! Elevating his antenna and moving around he found a spot that finally resulted in a two way B5 report. This elevation issue was noticed before with nearby trees in the path: point to the top of the nearest tree.

▶ *Between the buildings searching for a location to make the B5 contact*

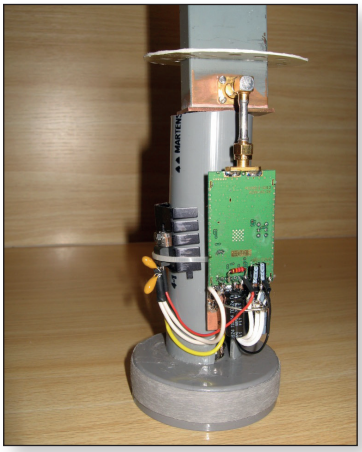
During time, more stations started to be active on 6 cm and especially from the high location several stations could be contacted during ATV activity weekends.

With the portable stations we have had and seen many problems with batteries (for the camera and/or for the station), forgotten cables, wrong connected cables, bad connections, non switching relays, wrong frequency and more. The best portable station seems to be the one that has a minimum of connectors and switches, always ensure all batteries are full and everything is stored together 'ready to go'.

6 cm via PI6ATS.

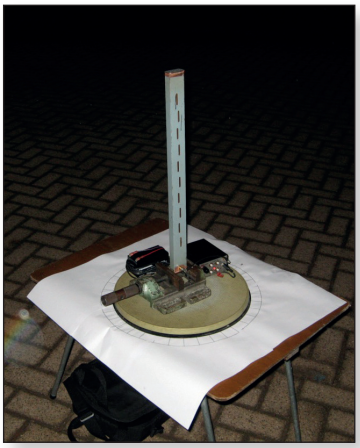
In June 2011 a 6 cm input frequency (5780 MHz) is added to ATV repeater PI6ATS. More (fixed) stations could do tests, not only during activity weekends or when a portable station is active.

The receiver is the same receiver as we use for our portable stations: Airwave AWI5822. This module is connected with a short semi rigid cable to an unidirectional slot antenna with 20 slots.



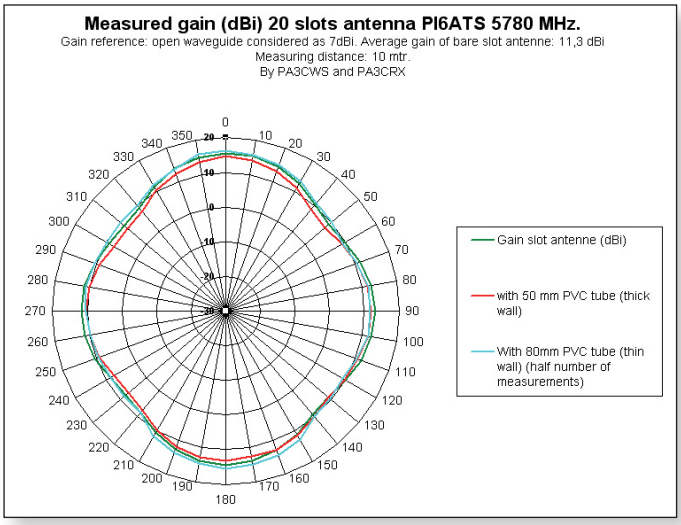
▶ *The airwave receiver on 5780 MHz ready for final assembly*

Calculation for this antenna was done by me, using the calculator of W1GHZ. It is machined from a piece of WG14 waveguide by PA7JB.



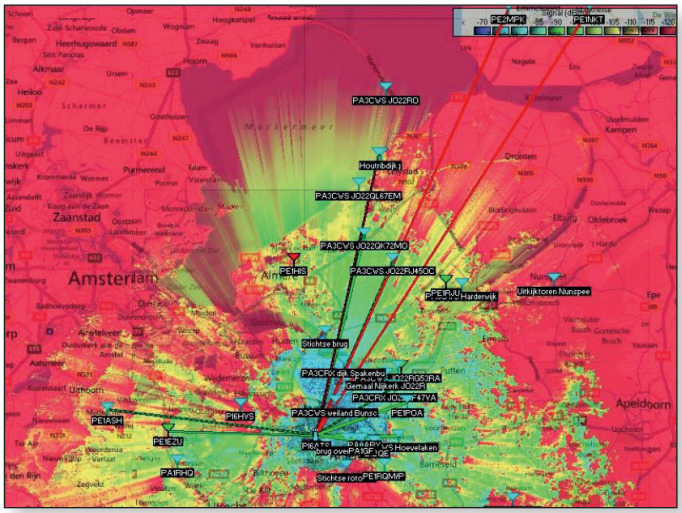
We did some tests with the influence of a PVC tube around the antenna by plotting (manually) the measured field of the bare slot antenna, covered with a (thick wall) 50 mm tube and with a (thin wall) 80 mm tube. Depending on the scale of the graph, it really looks very good.

▶ *The machined slot antenna under test*



▶ *The resulting plot*

We decided to use the 80 mm tube and mounted it parallel with the mast of PI6ATS. A multi cable passed the signals and DC. Several stations succeeded to be retransmitted on 1280 MHz by PI6ATS, even through cities.



▶ *Simulated plot by Radio Mobile*

During tropospheric lifts, stations that are far beyond the horizon are received by PI6ATS, like PE1NKT (134 Km) and PE2MPK (135 Km). PE2MPK was using five Watts and a 60 cm dish at a height of 16 meters. He was not even aware he was received so far away!

▶ *Receiving of Cees PE1NKT by PI6ATS*

▶ *Path between PE1NKT and PI6ATS; far behind horizon, simulated with Radio Mobile*

Because the location of PI6ATS is on an apartment building, interference occurs more and more because of strong local wifi signals. Besides ATV stations sometimes also other stations are received, mostly located on high cranes. Sometimes even a hobby drone.

At this moment, many stations in the Netherlands are active with 6 cm ATV. Most of them from home, with a multiband feed in the dish or a grid antenna and output powers of five to eight watts. Several also with adjustable frequency.

Some stations are still portable, in the field or from a balcony with one or two Watts. More ATV repeaters are equipped with 6 cm in- and/or output frequency. This band can be considered as an interesting, low entry band that could be used to do a lot of easy experiments for a low price.

Links:

Transmitter module: *https://pi6ats.nl/AWI5800transmitter.pdf*

Receiver module: *https://pi6ats.nl/AWI5822receiver.pdf*

Panorama view from The Doornse Kaap:
https://pi6ats.nl/panorama%20doornse%20kaap.htm

Showing the way contacts are made:
https://www.youtube.com/watch?v=N0BI-jM6zuQ
And
https://www.youtube.com/watch?v=zc5nTVK34JE&t=533s

Influence of trees: *https://pi6ats.nl/Trees%20and%20801_11.pdf*

Influence of rain: *https://pi6ats.nl/rain%20effect.pdf*

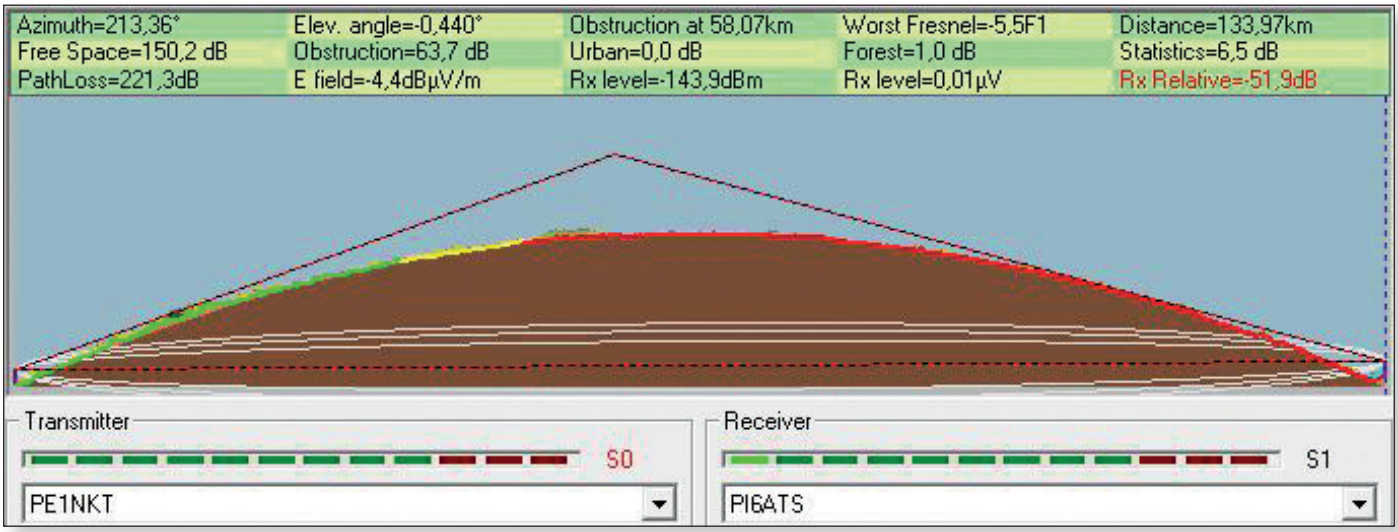
Influence of wind: *https://pi6ats.nl/wind%20speed%20effect.pdf*

Radio Mobile software: *http://www.ve2dbe.com/english1.html*

Radio Mobile on-line: *https://www.ve2dbe.com/rmonline_s.asp*

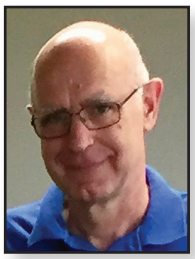
Slot antenna: *https://www.qsl.net/n1bwt/ch7_part1.pdf*

Slot antenna calculator: *https://pi6ats.nl/slotantenna.xls*



Using UDP for Sending Video over a Network

Dave Crump G8GKQ



Many of us are using UDP (User Datagram Protocol) to send video over our home networks (from MiniTiouner to VLC, or from a PC to a Portsdown), but it has always been a bit of a black art for me, so I did some research. This guide only applies to IPV4 networks, not the newer IPV6. Most home networks use IPV4, some will also support IPV6.

Introduction to UDP

Video sent by UDP is sent in packets. Sending a UDP packet is a bit like sending a postcard – it's fairly reliable, but you don't know whether it is going to get there or whether it gets there at all. There are two types of UDP that we use: unicast and multicast. Unicast is like sending a single postcard to a known address; multicast is like sending a batch of business flyers to the network switch or router and asking that they are delivered to anybody on the local network who asks for them.

Some network switches and routers will not deliver multicast UDP packets; some deliver them to all the devices on the network whether they want them or not (this of course causes congestion). In my experience, about 50% of domestic routers deliver multicast UDP correctly. What is required is for the switch or router to correctly implement IGMP (Internet Group Management Protocol) – this is how the delivery of multicast should be managed. Multicast UDP packets are not delivered outside the local network – so they do not get onto the internet; unicast UDP packets can go over the internet. Multicast can be problematic over wireless networks as it can cause congestion.

The best way to tell whether a router will handle UDP multicast is to test it. I know that the TP-Link WR841N works well; you would need to test other routers.

Unicast UDP is set up to deliver to a destination address that will look like 192.168.3.2, or 10.10.2.3. For multicast, the address is set in the range 224.0.0.0 through to 239.255.255.255. This tells the router that it is a multicast, but also allows each client to select a particular multicast. In the analogy above, this is like selecting which business flyer to read.

UDP packets are also addressed to a particular port at their destination; this can be thought of as the internal department number (within the destination computer) that the postcard should be sent to. We tend to use port 1234 for the transport stream being sent from the MiniTiouner receiver to video players, and port 10000 for any transport stream being sent to the Portsdown for transmission. The port number is indicated by a number after a colon after the IP address; for example (for port 10000) 192.168.2.214:10000.

Configuration for UDP

There are some general rules for configuring how to send and receive UDP packets, but the exact text required tends to vary from application to application.

I will describe how to configure some of the more common applications below.

Sending UDP from MiniTioune

The configuration file for MiniTioune allows you to set up a UDP stream that is sent when the UDP switch is set to on.

To configure MiniTioune to send a multicast UDP transport stream, the text in the MiniTioune config.ini file should look something like this:

```
[UDP]
;============================
; UDP address for TS transfer
;....................................
; UDP address for TS
TS_AddrUDP=230.0.0.10
TS_Port=1234
```

This sets it to send a multicast stream on the address 230.0.0.10 using port 1234.

For a unicast stream to be sent to the computer at 192.168.2.210 using port 1234, the text should look like this:

```
[UDP]
;============================
; UDP address for TS transfer
;....................................
; UDP address for TS
TS_AddrUDP=192.168.2.210
TS_Port=1234
```

Receiving UDP on VLC on a PC

To view a multicast MiniTioune UDP output using the VLC player on windows, select media, open network stream and use an address of the form:

```
udp://@230.0.0.10:1234
```

To use VLC to view a unicast UDP Stream being sent to the PC, use the address:

```
udp://@:1234
```

Receiving UDP on VLC on an iPhone/iPad

To view a unicast stream sent to the IP address of an iPhone or iPad, open the app and select Network, Open Network Stream, and enter

```
udp://@:1234
```

or for multicast:

```
udp://@230.0.0.10:1234
```

and then select Open Network stream.

Sending a UDP Transport Stream from ffmpeg

ffmpeg can be used to send video from a PC. It is usually called from a batch file with a very complex set of parameters to determine the video and audio sources and encoding parameters. The final statement is generally how the stream should be output. To send a unicast UDP stream it should be of the form:

```
-y udp://192.168.2.210:10000?pkt_size=1316
```

We use a packet size of 1316 bytes because this contains exactly 7 MPEG Transport Stream packets at the defined length of 188 bytes. This is the normal standard for internet protocol transport streams.

Sending a UDP Transport Stream from the Portsdown LongMynd Receiver

Just like MiniTioune, you can send a UDP stream to an external player from the LongMynd Receiver built into the Portsdown. You can set the destination IP address and destination port (default 1234) from the Receiver "Config" menu. Then, having set the desired receive frequency and SR, select "UDP Output".

Transmitting an IP Transport Stream sent to a Portsdown

You can transmit (as a DVB-S or DVB-S2 DATV signal) an IP transport stream sent to the Portsdown (for example from ffmpeg performing H265 encoding on a PC). All that is required is to send it as a unicast stream to the Portsdown's IP address on port 10000. Remember that you can look up the Portsdown's IP address on Menu 2, Info. Then select "IPTS in" from the Encoder menu, and select transmit. You will have had to calculate the correct bitrate for your selected Symbol Rate and FEC, but that is another article in itself!

Viewing an IP Transport Stream sent to a Portsdown

From Menu 2 of the Portsdown, you can select the "IPTS Monitor". This will display (and play audio from) a stream sent to the Portsdown's port 10000. This was primarily designed for pre-transmission testing of the IPTS input, but can also be used to view the output from a MiniTioune or LongMynd receiver if the TS is sent to port 10000. Currently it uses omxplayer, so is only H264 capable. The internal command used for this is:

```
omxplayer --video_queue 0.5 --timeout 5
udp://@:10000
```

I hope to use VLC in future to enable the replay of H265 streams:

```
cvlc -f --width 800 --height 480
udp://@:10000
```

or for multicast:

```
cvlc -f --width 800 --height 480
udp://@230.0.0.10:1234
```

Conclusion

Remember that not all network hardware will handle multicast UDP, so if you are having problems, try unicast first. For multicast it is a good idea to use an isolated network in the shack for your video.

Using UDP can be frustrating because the syntax has to be exactly right; however, I hope that this guide provides some help. The use of UDP can be really useful to add flexibility to your transmitting and receiving setup.

Portsdown Newsletter

Dave Crump, G8GKQ

Comparison of Portsdown to other DATV Transmitters

Many of you will have been watching the signals on QO-100 and seen the really good quality HD H265 signals. I have been asked the question: "is the Portsdown being left behind?".

- Certainly, the stand-alone Portsdown cannot generate pictures as good as these. The excellent quality of these signals is due to the use of powerful PCs to encode the graphics. Evariste F5OEO's custom DATV firmware for the Pluto enables these graphics to be easily transmitted from the PC. However, these transmit setups are not available as a single piece of software – it all needs to be individually configured for each PC.
- The aim of the Portsdown is to provide a simple, easily built, DATV transmit exciter in a single box to get people on the air. Initially the aim was for terrestrial transmissions, but it does a creditable job on QO-100.
- If you want the amazing H265 pictures, you can configure your PC to send the H265 IP transport Stream to the Portsdown and it will transmit it.

So, the Portsdown on its own is not a highly-tuned Jaguar, more a Ford Fiesta that just works. It can be made to transmit amazing H265 pictures, but needs a bit of external help.

The Portsdown Roadmap

There had been some concern that, with all the developments going on around the Jetson Nano and the Raspberry Pi 4, there was no clear way ahead for the Portsdown. There was some truth in that, as I was evaluating the best way to take the project. I had been pushed off course by the fact that the Raspberry Pi 4 did not support the graphics used by the Raspberry Pi 3, and initially the Raspberry Pi 4 seemed very difficult to configure for H265 decoding.

After some experiments (and some dead-ends), the way ahead is now clear. The next version of the Portsdown (to be known as the Portsdown 4) will use a Raspberry Pi 4, a 7 inch touchscreen and a LimeSDR. It will also receive DATV when connected to a MiniTiouner. There is a good chance that it will have some (limited) capability to transmit DATV using a Pluto SDR loaded with F5OEO's custom DATV firmware. It should also be compatible with Colin G4EML's Langstone transceiver using the same hardware.

If you want really high quality pictures (as discussed above), the Jetson Nano can be used as a network-connected video encoder (for H264 and H265) working with the Portsdown in more complex networked home-station setups.

Portsdown Versions

There are now four distinct Portsdown versions:

1. Portsdown Classic was the initial version. It was based on the Raspbian Jessie operating system running on a Raspberry Pi 3 with a 3.5 inch touchscreen. It used the BATC-supplied Filter-Modulator board and could take video from the Raspberry Pi Camera or the EasyCap. It would transmit DVB-S MPEG-2 with audio, or H264 without audio. This version is no longer supported, although it will continue to work as built.
2. Portsdown "Stretch" was the second version, using the Raspbian Stretch Operating System. Support for the seven-inch touchscreen was added and some WebCams could also be used as a video source. Audio capability was added for H264 encoding, and early support was provided for the LimeSDR Mini. Later versions also supported the LongMynd receive software enabling good DATV reception using a MiniTiouner. Again, this version is no longer supported, although it will continue to work as built.
3. The current in-use version of the Portsdown is Buster 2020. This introduces support for the LimeDVB firmware on the LimeSDR Mini and also supports the use of standard firmware on the LimeSDR USB and the LimeNET Micro. The LongMynd receive capability has been improved with the addition of a player that will display some H265 signals. It will also control an external Jetson Nano with an HDMI capture device to allow the transmission of high definition H265 signals. This version will continue to be actively supported while the Buster operating system is current for the Raspberry Pi. No date has yet been set for release of the next operating system version (Bullseye).
4. The next version of the Portsdown will be the Portsdown 4. This will use the Buster operating system on a Raspberry Pi 4 with a seven-inch screen and a LimeSDR. Unlike the previous version changes it will not maintain hardware compatibility with the

classic (filter-modulator) Portsdown. You may have seen mention of the Portsdown A27 – this version was the stepping stone from the Portsdown Buster 2020 to the Portsdown 4, and will not be continued with that name. I hope to issue the first production release of the Portsdown 4 during July or August 2020.

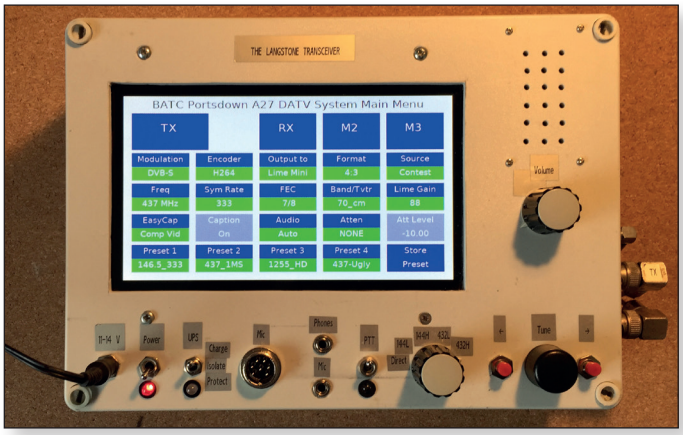
There is always a worry that progress, as described above, makes your previous investments worthless. This is definitely not the case for Portsdown. You can still buy the latest SD Card from the BATC shop (for £10 – a price that has not increased for a number of years) and put it in the first Portsdown you built and it will make all the features that your hardware supports available. I have a personal interest in this with 4 Portsdown transmitters of this standard in my shack!

However, we are reaching the limits of what a Raspberry Pi 3B (or 3B+) can do, so to provide more capability we need to move to the Raspberry Pi 4. With this switch to the Raspberry Pi 4 I have taken a careful look at the hardware that should be supported in future by the Portsdown 4. My initial plans are that the following items (without variation – just these!) will be supported:

- Raspberry Pi 4
- Official Raspberry Pi seven-inch touchscreen (connected through the DSI ribbon cable)
- Official Raspberry Pi Camera Version 1, 2 or HQ (optional)
- White eBay USB audio dongle (optional)
- "BATC" EasyCap Video Capture device (optional)
- C920 WebCam (optional)
- LimeSDR Mini (if transmit capability required)
- BATC Serit MiniTiouner (if receive capability required)
- RTL-SDR (if Panadapter capability required)
- BATC four-way and eight-way RF Switch systems

I am aware that there are supply problems with the C920 WebCam and would welcome suggestions for an affordable alternative that has guaranteed supply for a few years.

My intention is that the Portsdown 4 should be compatible with the same hardware as (and be able to co-exist with) the "Langstone" microwave transceiver, which uses a Pluto SDR to provide SSB, NBFM and CW transceive capability from 70 MHz to 6 GHz. I know that there is demand for the Portsdown to drive the Pluto to generate DATV; I have recently achieved this for the first time, so there is hope. However, I anticipate some limitations so am not making any promises as to the capability that will be provided.

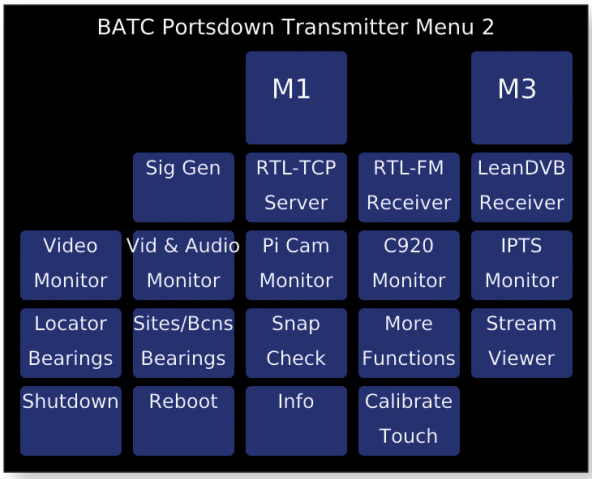


▶ *Portsdown 4 and Langstone Prototype*

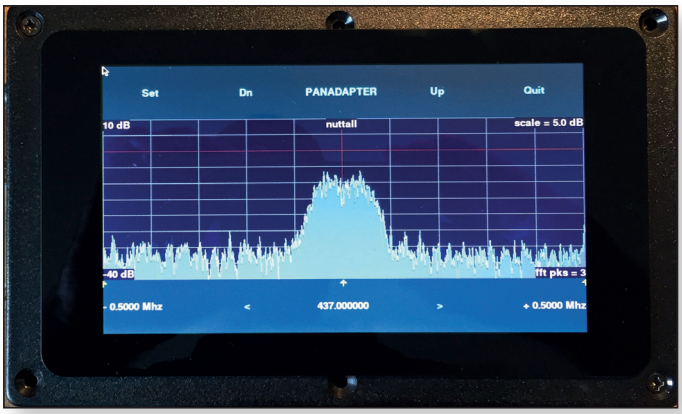
The move to the Raspberry Pi 4 significantly improves the H265 receive capability of the LongMynd receiver on Portsdown, and provides a very good DATV receiver for general use. I used it for all my contacts during the recent contest; so did not even need to boot up my laptop.

Recent Updates

There have been some recent updates to the in-use Portsdown Buster system. The main change has been to consolidate the input monitor functions on Menu 2. There is now a "Video Monitor" Function to display the composite video input to the EasyCap; the sync recovery on this seems good enough to allow its use as a monitor for 5.6 GHz FM receivers – it displays noise without a blue screen. The "Vid and Audio Monitor" also replays the audio through whatever output device (RPi jack or USB Dongle) is selected on Menu 3. However, the image size is reduced to keep the processor load low enough for smooth replay. The Pi Cam Monitor and C920 monitors do what they say on the button. Screen capture (to the "Snaps" folder) is available on all these functions, by touching the bottom left of the screen.



John G7JTT has recently managed to get WQ7T's Panadapter software to work with the Portsdown Buster system; I hope to incorporate that in the next update.



H264 Audio

During 2018, Evariste F5OEO added the capability to include audio with H264-encoded video. This was implemented in the Portsdown and generally proved adequate for short-duration terrestrial contacts. However, it is not perfect and can be troublesome on QO-100. Some video players handle it better than others – VLC is particularly good, the default Windows players used by MiniTioune are particularly bad. I have spent hours trying to improve it (by adjusting sample rates, encoding rates and other parameters) but have only been able to make marginal improvements. I would welcome someone else taking a look at the problem. The sample rate and encoding rate is defined in the file **`~/rpidatv/scripts/a.sh`**. The code that does the audio coding and insertion is in **`~/avc2ts/avc2ts.cpp`**. Someone out there must have the expertise?

Conclusion

If you are wanting to start building a Portsdown transmitter now, I would suggest starting with a Raspberry Pi 4 and the seven-inch screen. The software should be available in the next few months, and you will be building for the future rather than limiting yourself with older technology.

I will be supporting two Portsdown versions for the foreseeable future: Portsdown Buster 2020 and Portsdown 4. This will mean that updates will take longer and the rate of progress may not be as fast as you might like. However, you can short-circuit the process by developing your own updates (as John G7JTT has). It's a win-win: you get the functionality you want, and I can copy it and distribute it to the rest of the community.

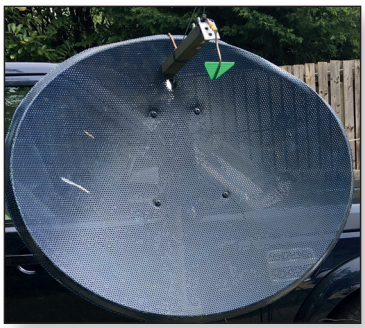
So please don't be shy, give it a try!

Cost-effective multiband dish feed

Noel Matthews G8GTZ

The enforced lock down for the last three months has meant no going out portable for activity days or contests. While the home QTH is at 400 feet it is also at the bottom of a chalk chasm with poor take off in most directions except the North East.

Not wanting to make life easy for myself, I could have gone on HF or VHF, I decided to see what could be done on narrow band microwaves from home. I had previously run a small 10GHz transverter on the 10m Tennamast Adaptamast and had some success with rain scatter but I had just completed a 5.6 GHz transverter and wanted to see what could be achieved on that band – plus I was slightly concerned with overloading the Tennamast, particularly when pulling up on a single wire rope with transverers at masthead.



I had an old 80cms offset dish, donated by Matt Cosby, which I had used successfully on 3.4GHz with an old DRO LNB hacked to become a waveguide feed, and I wondered if this could be used with a multiband feed. I also had a couple of the very versatile WA5VJB wideband log periodic antennas which I used around the shack for testing and had heard these could also be used as dish feeds.

I set up my low tech antenna test range in the garden and tried it out on 3.4GHz. The test source was the Langstone Microwave SDR driving a Pluto in to a variable attenuator. At the receive end, I used my narrowband transverter connected to a flat plate antennae and ran the IF cable back to the equipment table at the source end.

I was fortunate enough to pick up a calibrated 3.4GHz 20dB horn at a rally (remember those?!) and used this to get a relative level across the range. I then replaced the horn with the dish and the single band 3.4 GHz feed which showed a gain of 13 dB above the horn. This is a gain of ~33dB which was within the expected ball park at 3.4GHz.

I replaced the waveguide feed with the WA5VJB antenna and saw a gain of 12 dB or 32dB – just 1dB down on the single band feed. That sounded good enough, but did it work on other bands? The way to find out was to try it out.

It was impractical to put three heavy transverters at the top of the mast so the only alternative is transverters at the bottom and low loss feeder up the mast. I dragged out some of the big FHJ450 co-ax I had been hoarding for years only to discover when I tested it, that it was all high loss at 5.7GHz, probably due to damp ingress over the years!

So I took a look at what was available at a reasonable price and discovered that Ecoflex 10, as well as being much more flexible than LDF450, had reasonable attenuation even at 5.7GHz so I ordered 10 metres from Dxshop who delivered it promptly.

Typ. attenuation (dB/100 m @ 20°C)

5 MHz	0,8	1000 MHz	14,2
10 MHz	1,2	1296 MHz	16,5
50 MHz	2,8	1500 MHz	17,9
100 MHz	4,0	1800 MHz	19,9
144 MHz	4,9	2000 MHz	21,2
200 MHz	5,8	2400 MHz	23,6
300 MHz	7,3	3000 MHz	27,0
432 MHz	8,9	4000 MHz	32,2
500 MHz	9,6	5000 MHz	37,0
800 MHz	12,5	6000 MHz	41,5

I put the dish on the mast and the feeder ran neatly in to the water softener cabinet at the base where the transverters were located, all in time to test during the UKmicrowave Group May 2.3 and 3.4 contests. And I was pleasantly surprised by the results working several stations on each band including G4ODA on 3.4GHz at 180km!

Since then I have done further tests which showed it worked well on 5.7 and 10GHz bands and so I decided to use it on 2.3, 3.4 and 5.7GHz for the ATV contest last weekend. Not only did it save having to take hardware for each band but it performed really well on all bands with a best Dx of 64km on 5.7GHz.

The WA5VJB feeds make a very good multiband antenna solution and are good compliment to the wide band coverage offered by the modern SDR hardware such as Pluto and Lime Mini, although I would be cautious to run more than 10 watts in to a PCB antenna. The full range of WA5VJB antennas are available at reasonable cost from Sam G4DDK including an interesting PCB Vivaldi covering 1 to 15GHz.

http://www.wa5vjb.com/index.html
http://www.g4ddk.com

Our History in Eight Badges

Brian Summers - G8GQS

Our club, the BATC, has a long history. The first CQ-TV No. 1 was published in October 1949 and had a full eight pages! In 1950 we had some 55+ members and the first sighting of the BATC diamond appeared in CQ-TV.

In this article we will explore some of the BATC badges over the years. By CQ-TV No. 9 a lapel badge was offered to members at 3/6 post paid. Amazingly by 1968 they were still the same price, but you could order a special with your callsign on it for the princely sum of a crown, five shillings or 25p for those who don't have grey hair!.

This picture of the black & gold badge is thought to be the early style with the traditional fixing to go through the badge hole in your lapel of your jacket. The callsign version had a crescent at the bottom point.

By CQ-TV 73 windscreen stickers and adhesive BATC "emblems" could be purchased and applied to your camera. This picture of the emblem was extracted from a photo of a home built vidicon camera.

This is a blue version of the club's badge, it's a clutch-pin version. Not sure when it was introduced but it had a long life and was still available as late as CQ-TV 220. Blue has long been a club colour.

By the autumn of 1979 in CQ-TV 108 a new version of the BATC logo was introduced in blue and gold. The badge attached with a folding pin, like a safety pin. This logo was also available on a key fob and an updated equipment sticker. You could also have a tie with the logo on it for the princely sum of £1.80. This roundel design was popular and featured on the cover of the 150th Issue of CQ-TV

This is a blue and gold adhesive equipment sticker, modelled on the roundel. It is 25mm. in diameter and came on a sheet of six.

This is a cloth version of the club's logo introduced in August 1993 for CQ-TV 163. it was 12 cm tall and cost £3.77 inc post. At this time we had a confusion of badges, Diamond Lapel, Clutch-pin, Round, Cloth and the equipment sticker.

A completely new style of badge was introduced in May 2011, CQ-TV 233. This was a break away from the traditional diamond amateur radio style. It was reasonably priced at £2.99 post paid and available till May of 2013.

During 2013 the BATC chose a new logo to represent the wide range of "TV" activities of the clubs members. This first appeared in CQ-TV 241 and is our current logo. Clutch-pin badges with the new logo are available in the BATC on-line shop.

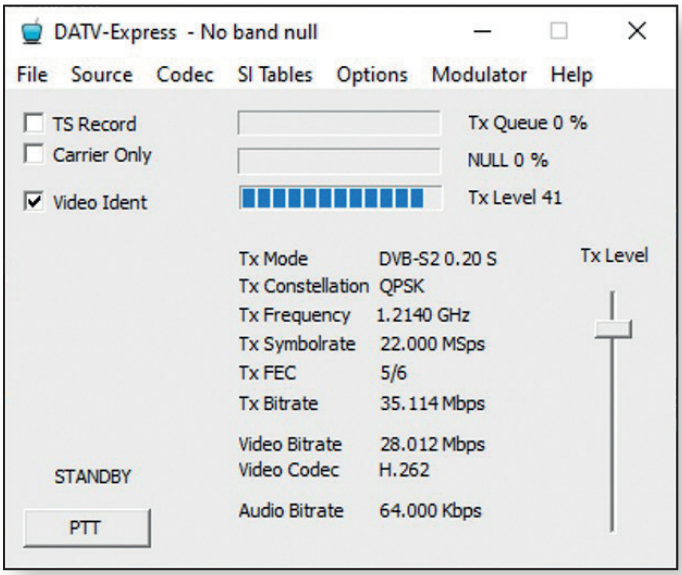
DATV Express 1.25LP14 in practice

Mike G8LES

The User Interface (picture one) is a bit of a tweaker's paradise with so many parameters that are adjustable; however I would like to offer some settings that I find to work well later in this article.

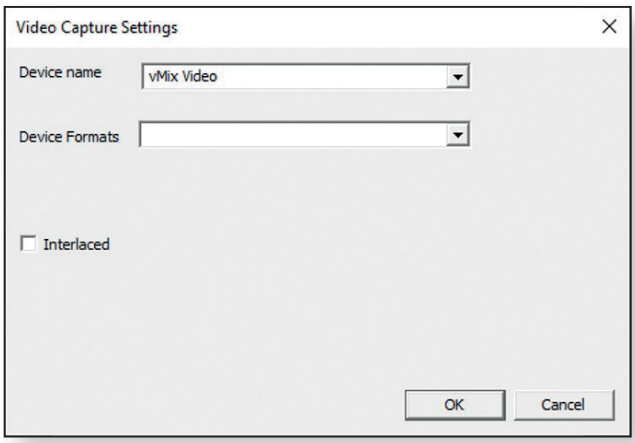
On Windows 10, sadly all is not perfect, and that is normal with any software-driven device. There are a number of instances where the User Interface (UI) will disappear off the desktop with no warning at all and the app may re-start, or you may have to manually restart it. You may also find it opens with settings inappropriate to the band you wish to operate on and you will need to reset those. Preferably this would be from a saved configuration (config) file, but you may find sometimes that if it crashes, it overwrites your saved config file which is very annoying, and I can only report this behaviour as I find on my PC.

More than three visits to change the settings in the modulator tab or the codec tab will cause this to happen for no real reason at all that I can make out and sometimes clicking the PTT button after making changes will result in the orb going round for ever; so it has to be force-closed.



▶ *Picture one*

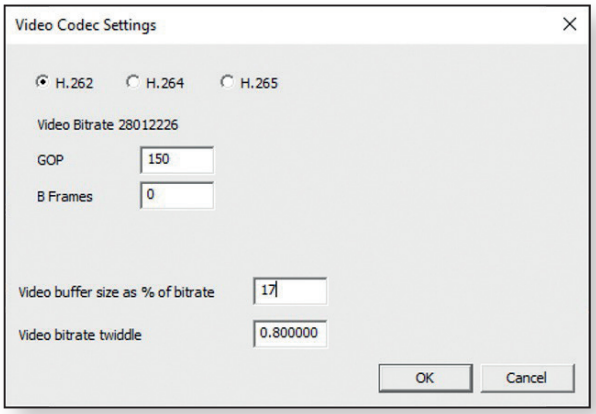
One thing to avoid is not having an entry in the Video capture settings "Device formats" (picture two) which can happen if you alter the settings of vMix or any other source input to DATV Express (DATVE); leaving it blank is certain to make it disappear a few seconds after the PTT button is pressed. The Tx queue should be below 20% and stable, if it is increasing you may need to lower the bit rate twiddle figure as once it reaches 60% or over encoding will stop.



▶ *Picture two*

Generally speaking DVBS-2 is preferred as it gives a +3dB advantage over DVB-S

Version 1.25LP14 will not give a decodable output on H262 if any B frames are set in the Codec settings but all other versions will, except for v1.23 but that only in DVB-S mode. H264 and H265 require at least a value of 1 in the B frames box (picture three).



▶ *Picture three*

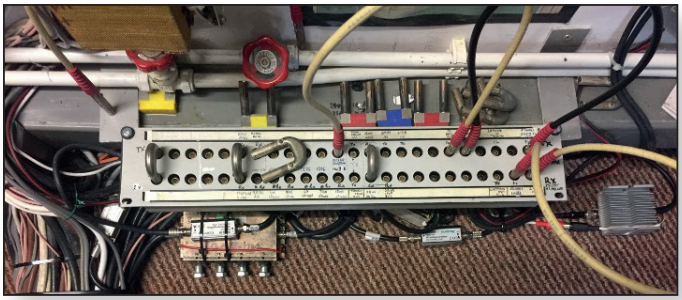
The above settings of GOP and buffer sizes gave the smoothest output in MiniTioune (MT) testing at 1M/s on QO100 using vMix as the video source; this was running an HD test video 1920 x 1080 50i with smooth movement camera scenes.

I do have v1.26.1 DATV Express which is an unofficial tweaked version, and that does seem more stable when dipping in and out changing the settings, but its output power is -6dB down on any other version.

You will not be able to set your video standard to 50i for H265 encoding as the H265 spec does not include the interlaced video format, it is progressive only, so set to 25i or severe cogging on vertical edges will be the result.

On board control ports ABCD and PTT

As the PC I use for MT and DATVE is in the rear shack (a dual six-core Xeon HP Z800 workstation) I have wired up the DATVE ports to remotely control the main shack Tx/Rx in conjunction with a video Musa patch panel. This is where I patch converter outputs to MT and DATV Express outputs to various bands or transverters. Everything is connected on the converter output or low power RF drive side via foam insulation satellite cable and BNC male to female F adaptors are used for the underside of the Musa panel as shown in picture four.



▶ *Picture four*

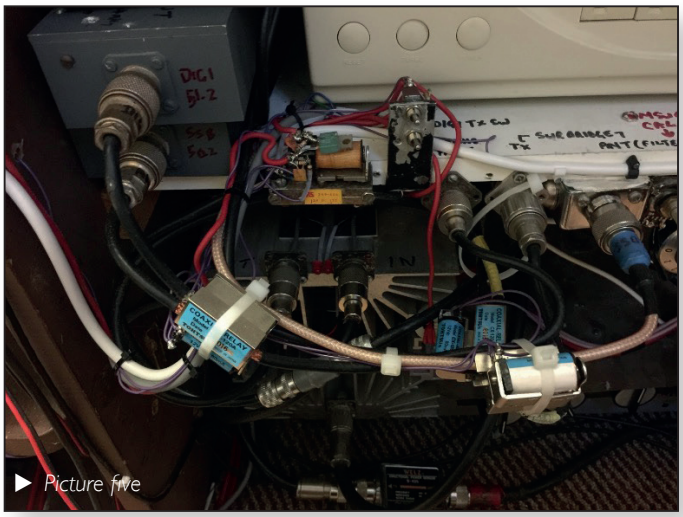
The filter on the left is the 3.4GHz LNB IF filter; there is a sat booster amp for the 23cm masthead preamp output and the small heat sink on the right is a three stage driver amp for the QO100 uplink amplifier. This is in the garden with three off MMG2024HT1 Mimics (Farnell 243-3049). The Musa patch lead with the black coax cable on the right was upgraded to foam sat cable to reduce losses at 2.4GHz as it is the drive to the heat sink amplifier.

So back to the DATVE ports where Hi level is active.

Firstly we have to recognise that when DATV Express powers up, all four ports are on, as is the PTT line. By detecting the software alive LED it is possible to inhibit the Tx line by means of additional logic on a daughter board on DATVE, which inhibits PTT until the app is loaded. In my system A.B.C.D 'all on' represents no band on which gives a "safe" power on condition.

Each band (50MHz, 70MHz, 146.5MHz, 437MHz, 1249MHz and 2340/2400) is in dual use for voice (FM/SSB) and DATV, so as you can imagine quite a few relays are needed and of course some bands have masthead pre-amps. Accordingly a Tx/Rx timing sequencer is required to be built-in in order to control those bands and thus protect the masthead pre-amps.

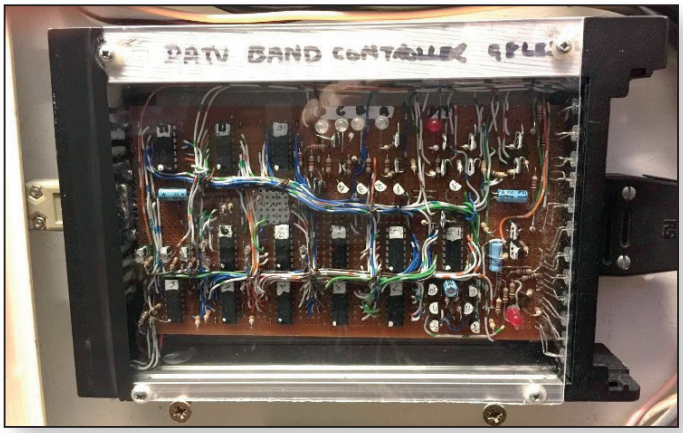
As shown in picture five there are two low pass filters, one for 51-51.2 DATV and the other for 50MHz SSB. The top large heat sink at the back has the 200Watt FET HF amplifier for 50MHz (ex mobile rig where the 70cm and 2m PA transistor had gone and no replacement is available) and the bottom one has the driver amplifier for 70cm to



▶ *Picture five*

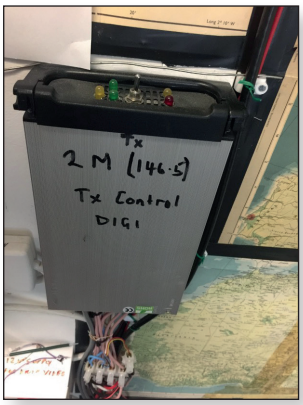
drive a pair of 4CX250Bs in a K2RIW amplifier design in the workshop. A note on that: the cooling needs to be uprated considerably for DATV and the transformers need to be over-rated. I am using 415 volt to 240volt 1000VA transformers where the two 415 volt windings are the secondaries wired in series, and then voltage doubled which gives nearly 2.4kV! The smoothing caps are 1000uf 450V in two series sets of 6 with balancing resistors providing about 330uF total at 2.4kV. Keep wandering hands well clear if the lid is off!

Moving back to the band controller shown in picture six the nine-pin connector on the left in the picture below comes from the DATVE via 74LS07 open collector buffers added to the DATVE as a daughter board; the 25-way connector on the right goes to the band relays and PTT lines in the rest of the shack. The LEDs on the right in the front panel indicate band on, PTT on, and sequencer complete and it has a clear plastic lid. Power transistors do the switching.



▶ *Picture six*

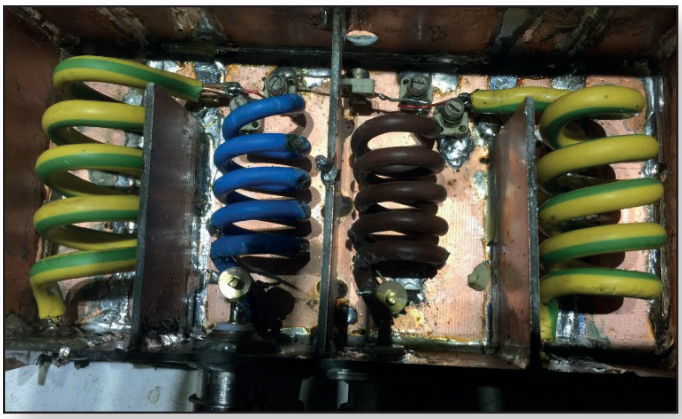
146.5MHz is one of the trickiest bands. There is a crossed 10 element Yagi with vertical and horizontal polarisation on the main mast as well as a co-linear antenna (white stick) on the side gable end. I had this controller already in the picture above which dealt with the 2m antenna switch-over and the Tx control so the band controller had to



▶ *Picture seven*

just interface with this box (it's another hard disk drive caddy) - picture seven.

So for DATV the horizontal beam is selected and the radio is switched to the white stick antenna, so local 2m voice communication is still available, or so you would think. But it requires a filter in line with the DATV Tx signal with a High-Q band-pass and two High-Q notches on 144.750, which are either side of the band-pass, or the 2m radio will just hear a load of noise. The finished filter is shown in picture eight.



▶ *Picture eight*

The box size is 100mm by 180 by 40 high. The bottom and the top are 10mm bigger and the bottom has to support the uprights or box sides and screens; they are soldered on both sides of the PCB material.

The two coils in the middle are wound with 40 amp twin and earth "cooker cable" conductors and the notches are wound with heavier duty earth cable. The filter started with just the band-pass section but while that reduced the noise on 144.750 it wasn't enough on its own.

I seem to remember a 10mm drill bit was used as the mandrel. It is important to get the coils adjusted in position first so that the pre-prepared and tinned end lies nicely next to the trimmer cap as the wire will just break the trimmer if it has to be adjusted.

The trimmer caps are PTFE multi-turn and the centre trimmer has no adjuster inside as it is just the body capacitance for the coupling on the band-pass. As a guess they may be 1-6pF in value, a standard polythene cap will not do in this application as it may even flash over.

A 2-25pF cap is used for loading (SWR match) between the input socket and the first turn tapping point (a standard polythene trimmer is OK here). All coils start from the side wall of the box (ground). The notch coupling is made by a piece of 26SWG self-fluxing winding wire 20mm long from the tuning cap which is moved near to or further away from the band-pass tuning cap as very small capacitance is needed. The notches are sufficiently High-Q not to affect 146.5MHz.

The N sockets are soldered both to the outside and the inside of the box to ensure the inside and the outside of the box have common RF ground continuity.

So from terrestrial back to operational tests on QO100

Feeding DATVE with HD and running 2M/s 2/3 FEC, gives some really nice pictures, with no obvious artefacts and smooth camera movement. I have found that H265 is the way to go for the minimum of blocky look to the picture; DATVE is not so good at H264. 1M/s H265 is not quite as fluid with some noticeable frame drops on camera pans.

What I couldn't get much performance for was 333K/s. It is a great pity that there is no AAC audio as this would be more efficient than MPA at lower symbol rates and takes up less of the video bit rate space.

I found I could increase the video bit rate twiddle from 0.8 to 0.95 to give some more space for video and the encoding speed was set to faster. (It needs slowing down when running narrower bandwidths)

Anyway with 64kbits minimum set for the audio I found that the earlier GOP and buffer settings worked well but I couldn't get rid of the blocky effect on movement - that was until I selected 8PSK which made a world of difference in output quality but as a snag it requires more output power. I did just try 16 APSK and the end result looked very good with little to fault the only 333K/s for, using the same test video throughout but only a D0-D1 with quite a big signal.

Even the dual six-core Xeon struggles to decode H265 in MT at the same time encoding H265 and running vMix as well; turning off MT gives about 25% headroom on CPU grunt. It depends how much movement there is in the outgoing video as to how much CPU effort is required.

I have drawn up the DATV Express band controller with the sequencer circuit, and shack interface without the use of a ruler so if anyone is interested I will re-draw them and scan them in which will be another article.

I have designed a transverter for 50MHz (as that is below the DATV Express minimum output frequency) and up-converters for 50MHz and 70MHz. I use commercial up-converters for 146.5, 70cms and a down-converter for 13cms to L band so they can all be used with a standard sat receiver.

Now the other issue we need to consider is A/V sync which is quite variable according to your video encoding settings and may be as much as 400mSec out where the audio is in advance of the video. It can be checked by watching your transmission on MT and clapping your hands to see how the lip-sync timing is doing.

I use an app called Equaliser APO - the UI is shown in picture nine.

In order to patch it in series with the audio between say vMix and DATVE you need another app which is going to allow you to do this separately from the available inputs on the sound card. That is Virtual Audio Cable. So vMix is set to output to Virtual Audio Cable Line 1, the Equaliser is acting on Line 1 so that DATV Express gets delayed audio by looking for Virtual Audio Cable Line 1 as its input, so that the sound aligns with the video. The Equaliser app works live so you can keep clapping your hands until you adjust the sound delay until the sound matches the viewed action.

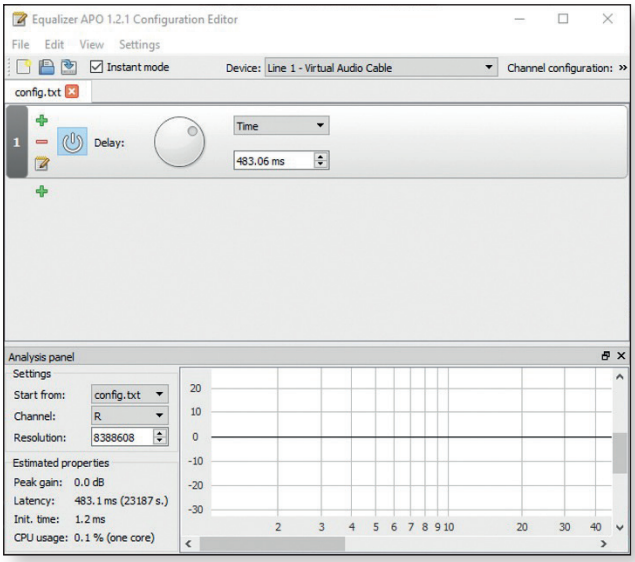
A quick receive note before I finish:

You may find it is important if you have not externally locked your PLL LNB to ensure you have the hot and cold offset frequencies recorded as that will make a big difference to receiving stations running 125kS and below; it will make all the difference between getting nothing and success using MT.

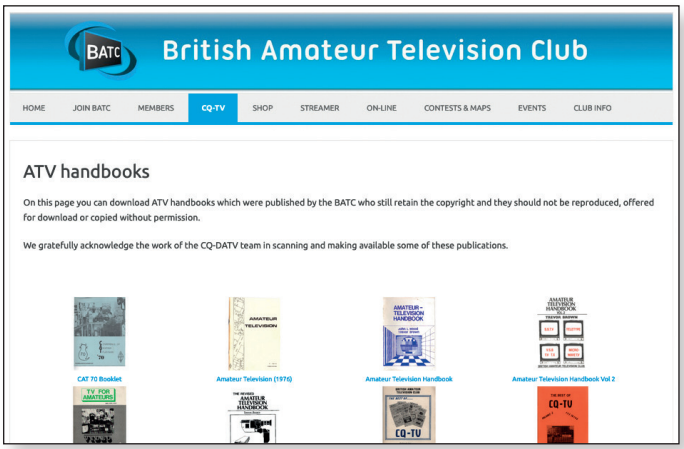
Happy DATV'ing
Mike G8LES

EsHail Uplink frequencies for DATV Express

Channel	DATV Express frequency	End result
Beacon		10.491530
1M/s #1	2.403800	10.493287
1M/s #2	2.405300	10.494785
1M/s #3	2.406800	10.496283
333K/s #1	2.407820	10.497284
333K/s #2	2.408280	10.497768
333K/s #3	2.408800	10.498285
333K/s #4	2.409250	10.498733
333K/s #5	2.409800	10.499280
125K/s #1	2.407760	10.497137
125K/s #2	2.407890	10.497631
125K/s #3	2.408156	10.497691
125K/s #4	2.408404	10.497885
125K/s #5	2.408652	10.498139
125K/s #6	2.408900	10.498382
125K/s #7	2.409127	10.498606
125K/s #8	2.409375	10.498600
125K/s #9	2.409650	10.499134
125K/s #10	2.409870	10.499358



▶ *Picture nine*



The BATC Library

An archive of all the past CQ-TVs are on our website together with the ATV handbooks. There are 16 handbooks and whist some of these are of historical interest, like the "Amateur Television" published in 1976 some are still relevant today.

In particular I would draw your attention to the book written by Peter Johnson about "Lighting for Television and Film", 160 pages with many photographs of studios and lighting. *https://batc.org.uk/atv-handbooks/*

The main CQ-TV archive section is here *https://batc.org.uk/cq-tv/cq-tv-archive/* going all the way back to issue number one in 1949! There is also an index on our wiki.

We have recently been given a folder of documents and manuscripts written by Grant Dixon about slow scan television. These were probably for the "Slow Scan Companion" edited by John Wood and published by Mike Wooding for the BATC. Now added to the BATC paper archive.

I would urge you to spend some time browsing in the Archives – enjoy!

Brian Summers G8GQS

Skype as a repeater input

Jason Haywood G7KPM

Skype has been around for many years and is well established as a multi-platform video communication application allowing two-way video communication which could be used as a repeater input to allow access to ATV repeaters from anywhere in the world. The 'Skype for desktop' application can be set to automatically answer calls and can be restricted to access by users within the Skype contact list which can prevent un-authorised persons from using the system.

Skype used to have a very comprehensive API which could be used to interface the Skype application with other software and allow third party applications to control Skype functionality and interact with it. Sadly, since Microsoft purchased Skype, the API appears to have been largely dropped and as a result, it has become more difficult to interface Skype for desktop with repeater hardware for automatic operation at software level.

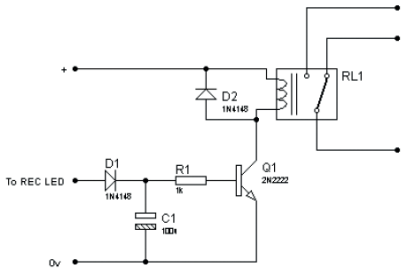
While building GB3CT, we decided to look into the feasibility of adding a couple of Skype inputs and taking the above into consideration, looked into hardware based options to automatically open the repeater upon the activation of a Skype video call.

We decided that the most straight forward method to do this was to convert the PC desktop (with Skype video window) to composite video and use video motion detection with a cheap Chinese DVR which is available on eBay for about £15 to £25 including postage plus the cost of an SD card.

The above DVR is set to video motion recording mode and the red LED flashes when recording after video motion is detected and is steadily lit when in standby. The SC DVR has a fixed motion detection timeout of 60 seconds and the C-DVR has a 30 second timeout from the cessation of motion. GB3CT has 60 seconds on Skype input one and 30 seconds on Skype input two.

A simple modification can be performed using junk box components to provide a switched output when video motion is detected.

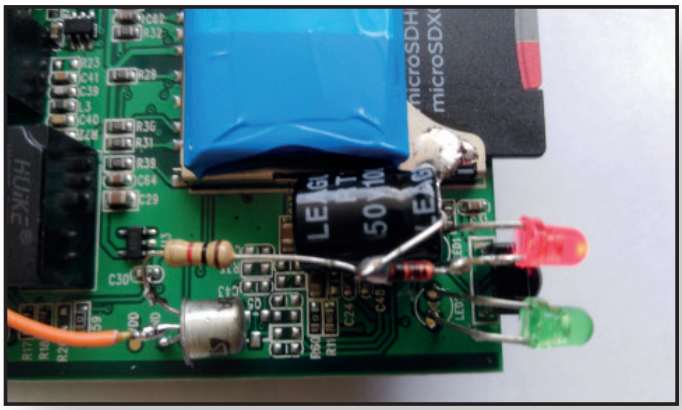
The DVR records for between 30 - 60 seconds when motion is detected and remains active until motion ceases. There is then an additional timeout depending upon the value of the capacitor in the circuit. The components are not critical but the capacitor should be sufficient in value to prevent the relay from dropping out when the record LED pulsates.



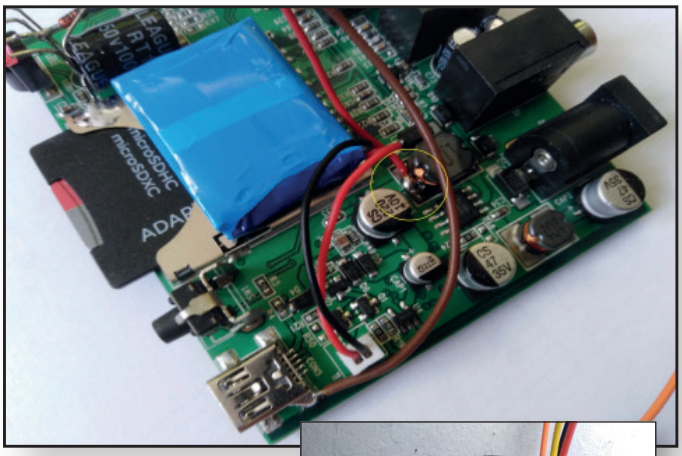
(Any DVR with video motion detection and a switched contact output can be used. The above examples were the cheapest available purchased new to provide this functionality).

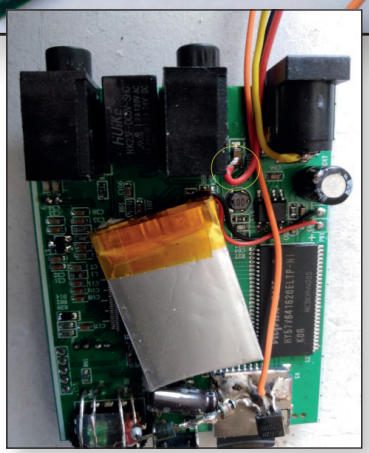
Please note, the more expensive SC - DVR has alarm outputs but this only loops the wired alarm input and does not provide a closing contact output on motion detection. As such, the cheaper C-DVR is better value at £15 unless you require the remote control which the SC-DVR offers.

A relay module can be purchased from eBay for about £2 including postage. Connect VCC to a 5v supply in the DVR and the IN to the collector of Q1 in the above circuit omitting RL1 and D2



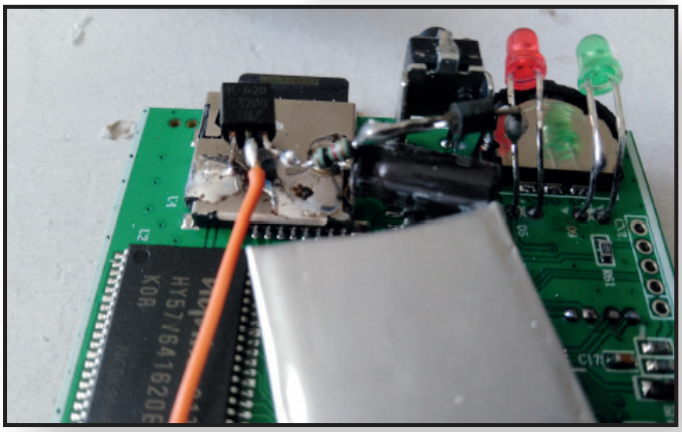
▶ *Modification shown above (SC-DVR Model)*





▶ *A 5v supply is available at the point shown above if you have purchased the 5V relay module (SC – DVR).*

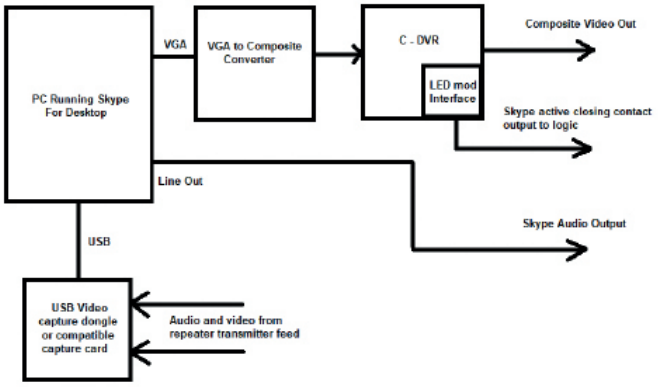
▶ *Below shows the LED modification for the C-DVR model and to the right is the 5V connection point (circled yellow RED wire), Orange wire is switched output to relay.*



If your PC motherboard does not have composite video output, then a VGA to composite video adapter can be used. It is best to obtain one which enables the output size and position to be altered to suit the video window allowing for a tidy output display. The unit shown below is about £10 including postage from eBay.

Be sure to obtain the correct type for the video standard for your country. Some are PAL/NTSC switchable, some are fixed to one standard!

Block Diagram



Setting up the system

Skype is only available for Linux as a 64bit application, so our two systems use a mini ATX motherboard based upon the Intel Atom D525 processor with 3 to 4GB of RAM. These can be purchased second hand from eBay for about £20 plus about £10 for the memory. We use Ubuntu and Real VNC (free version) for remote access system administration.

Skype for desktop can be downloaded for Windows and Linux from
https://www.skype.com/en/get-skype/download-skype-for-desktop/

It is advisable to disable any operating system automatic updates to prevent nuisance pop ups appearing on the computer desktop which will interfere with the video and cause unwanted system reboots!

The above will provide a fully automatic Skype interface for your repeater which will allow international participation of your ATV activity. It is also very handy to check your RF access into the repeater as your transmission can be monitored live with minimal latency if your repeater provides multiple user access.

Remember to terminate your Skype call when done!

An introduction to Video Editors

Rob Burn G8NXG

This overview continues the theme of producing video content introduced in previous issues of CQ-TV

Assembling and editing video on a computer has been possible for many years and these days there are many applications to choose to use with your favourite operating system. In fact many are cross-platform providing flexibility for file sharing and so forth.

This short introduction focuses on 'non-linear' video editors, that is the type which can import a video file and make non-destructive changes to it to create an individual presentation.

There are many video editors available, particularly for the Windows OS. Just check Google or Wikipedia for a mind-boggling list; the problem is what do you choose?

There are a number of points to consider. If you have never played with such a program then you might need something that is not too involved without facing a time-consuming and steep learning curve. If you consider yourself to be a budding video producer then you could tackle something more involved – however would you want to do so for ATV? In fact why would you invest the time in using a video editor anyway?

Well, a couple of instances come to mind – maybe three. You could use a two or three minute piece of video content to send for test while on site or at the home QTH – perhaps consisting of a short presentation of your set-up and equipment. Perhaps an extended version for longer QSOs or indeed a presentation via the BATC streamer. Finally perhaps a 15-20 minute masterpiece to stream via your personal member streaming channel! It all adds another dimension to the ATV hobby.

For straight forward video content you are hardly likely to need motion tracking, multi-cam or 3D editing or indeed 4k support and although some of these features can be found within current software applications, for our purposes I have focused on a straightforward entry-level application. Whittling down what is available I found OpenShot and selected this as a good proposition, mainly because it is open-source and is also cross-platform; there are downloads available for Linux, Windows (7, 8 or 10) and Mac OS X. The project files that it produces are also cross-platform thus enabling easy file exchanges between systems, should you need it. In fact, far from being 'entry-level', OpenShot is a multi-featured video editor but provides a very easy method to create good video presentations.

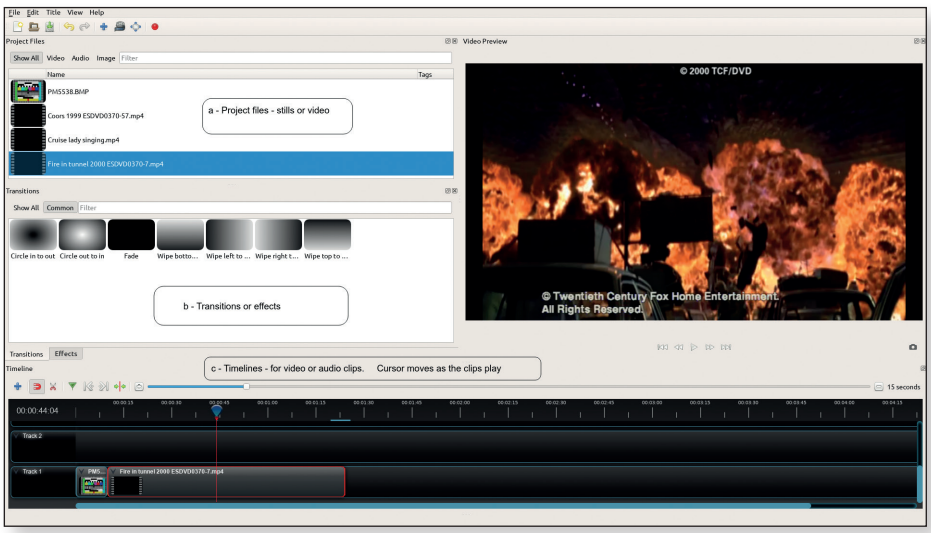
Before you do anything I'd suggest that you gather together all of the content that you plan to use in one folder. I am guilty of accumulating many clips, images, test patterns and other resources over some time and it would not make sense to try to find them while attempting to put a small video presentation together! Using the one resource folder means that your main source of clips etc. is in the one folder thus easy to get to as your video production progresses. In practice, I also have a number of different sub-folders for video clips, stills and audio clips among others. OpenShot will accept an extensive range of types of file for stills, audio and video files.

Most video editors follow similar layouts and provide similar features. There will be a number of tracks or timelines which tend to be at the bottom of the your screen and this is the area where you would begin to compile your video. You would need easy access to the resources that you will use and it is here is where your resource folder comes into its own.

Putting it all together

Although it is common practice for commercial film studios to put together a story board of the presentation before going down the path of production, for our purposes an orderly list of stills, titles and clips would suffice for a short test transmission video, or it can be

▶ *Figure 1 - Assembling your content, transitions and timeline.*

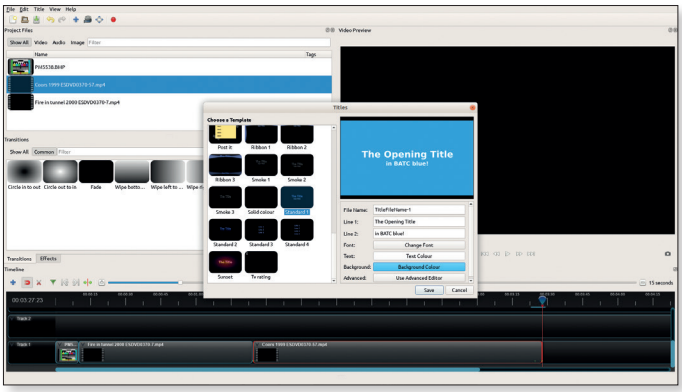


created 'as you go' as you would probably already have some thoughts as to what you would like to present.

Once the various parts of your video have been pre-imported to the Project Files section (as in Fig 1 - a) getting your video under way is straightforward. All you need to do is to 'drag and drop' the item that you wish to use in the order that you wish it to play onto one of the timelines. Your results are checked by 'playing' your selections via the video preview screen using the controls underneath it. During playback, you will note a cursor moving along the track. This cursor can be moved along the line just by using your computer mouse which saves time when editing.

Introducing titles

In line with this straightforward way of constructing the video there is an easy way of creating captions or titles. Selecting Title from the tool bar starts up the Titles menu (Fig 2) from which you can select a number of different title styles, all of which can be edited for content, text and background colour. Saving the title with a name will add it to the Project Files list, from where you can drag and drop to the timeline.



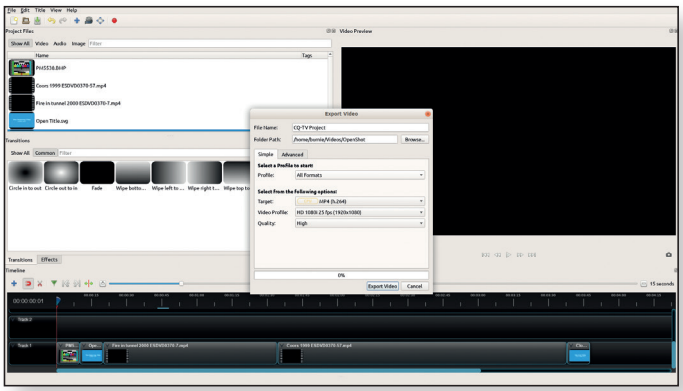
▶ *Figure 2 - Adding titles.*

As it stands, this simple video track will play however the transition from one clip to the next is instant, which can be visually jarring. Although there are many transitions which can be applied from the transitions and effects area (Fig 1 - b) there is in fact an easier and quick method of applying a number of changes to a clip, including applying probably the most useful, fade in and out.

At the start of every clip or still there is a small easily overlooked 'v' at the top left corner. This is yet another menu and amongst other items there is an item to enable a short or long fade at the start or end of the clip. Click on the 'v' or alternatively, right-click anywhere in the clip and select what you need, then replay your video again. This time, assuming that you have selected fade ins and outs for every clip, you will find that the transitions between the items on the timeline are much more visually acceptable.

Exporting the video file

Once you are satisfied with your presentation you will need to 'export' the combination of stills and clips on the timeline to a readable video file and the software caters for this too. A click on the red Export button on the tool bar will take you to an Export Video menu where you will be offered a myriad of choices for the profile of your video (Fig 3). For general purpose use I'd suggest to keep it simple and select the defaults of MP4 with a video resolution of 1080i/25fps. Don't be surprised at the length of time that it will take to convert everything to a single video file as this is the most computer intensive part of the process – even a short video will take some time to compile and the fans in your computer are likely to let you know that your computer is working hard!



▶ *Figure 3 - Outputting your finished video.*

Finale

While this short introduction highlights a quick way of making a short movie presentation, we have not even scratched the surface of what this very capable video editor can do. It is possible to export video to lots of formats, including those suitable for Vimeo and YouTube through to HDTV. The video clips that I use normally include a sound track; OpenShot can add audio tracks and comes with lots of effects and transitions. If you like the idea of being creative then you have an excellent software tool to experiment with and make use of.

Video production places considerable demands on a computer which means that a fast multi-core CPU with lots of RAM (8GB upwards) is mandatory. Fortunately, many computers made in recent years will fit the bill and for initial experimental purposes you could get away with 4GB. Visit the OpenShot website for lots of advice and information about its features.

https://www.openshot.org

Ex broadcast 'LGT' amplifiers in 436MHz DVB-S service

D J Long G3PTU

From time to time at rallies, amplifier modules can be found that where made by Laboratories Generale Telecomunications, St Cloud, Paris; now part of Thompson CSF.. These where used in I.B.A. (mostly) early ITV transposer stations. During their working life they where not pushed to work hard, so the printed boards etc are usually mint. They are all linear amplifiers. Quite a family of these where made, some are wideband i.e covering all Bands IV & V, but mainly they are segregated in to two dynasties, those for the lower Band IV and those for the upper Band V. As the UK does not have the American 900MHz allocation only the lower band ones are of interest. They are characterised by being affixed to hefty heat sinks. The five-Watt versions are considerably bigger than the others. All are +28Volt and are moderately hungry for current and get warm. They by virtue of this are very linear, as well as by reason of the output being such a small ratio of the DC input Watts, together with the circuit configuration they are tolerant of mismatch and load disconnecting. For all intents they are just lumps of gain – DC and RF in, bigger RF out.

The lower Band IV units cover "as they are" 436MHz and some of the wideband units also have a very considerable gain (20db) at 145MHz. In fact, most of them have rising gain below TV Channel 21

The connectors are SMC except the five-Watt 'slabs', which are BNC. All the amplifiers are from the same design stable, characterised by push pull configuration, 'with couplers'. Bias is stabilised and adjustable. The power connections are split between the two halves, presumably for an original arrangement of A & B supplies. An analogue output present detector is also provided on each module, as are sockets to check the current through each transistor.

Basically the Band IV amplifiers fall into 3 types:-

1. Type 428/485: 16db (Nominal) gain, 0.5 Watt (Tv standard) output: 0.6A
2. Type 401/485: 7db (Nominal) gain, 1.0 Watt (Tv standard) output: 1.2A
3. Type 421/485: 8db (Nominal) gain, 5 Watts (Tv standard) output : 1.7A

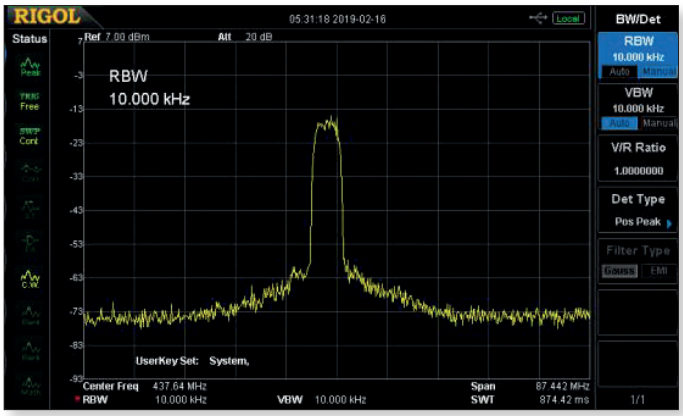
Type numbers may vary; there are some later versions with different numbers. I also have one 7db Band I amplifier (bought at Friedrichshafen) so other visions for the lower TV bands must therefore have existed, as I also suspect a VHF-FM radio version. These units were also used in French TV 'system L' transposers albeit with inevitable complications because of the AM sound.

When used for DVB-S the possible output seems to exceed what is stated in the information above. A 1 Watt unit delivered 2 Watts (+33dbm) with very reasonable shoulders, see the screen grab. From this it would appear that they are very conservatively rated.

However in practice I found that 2x 18db units (with an aim to get 36db) would not live in cascade without instability, but with a sacrifice of 6db in an attenuator between them, stability returned and the combined gain was then 18+ 18 -6db, still very worthwhile. In their original life I do not think they where ever used in this configuration and in its self may be a problem with inter unit matching. Apart from this I have found them totally stable. Some later versions had a 2000ufd capacitor installed Manhattan-style to decouple the bias, this was after Nicam sound arrived. An attempt at modifying my set up made the shoulders worse.

I am intending to investigate the five-Watt version as soon as time permits

These are well worth looking out for although as it is some years since the demise of these stations, most regrettably have found their way to the scrap. Remember some will be Band V units.



► *2 Watts (on HP 'true power' meter) from 2x 428/485 >-6db > 401/485:*

Configuring a Router for the Jetson NanoBOX

Dave, G8GKQ

In CQ-TV 265 I described the Jetson NanoBox, a single box solution for High Definition H264 and H265 video encoding with HDMI input. The unit included a dedicated network router so that the broadcast UDP traffic generated by the LKV373A HDMI encoder could be kept separate from other networks.

I have been asked to describe the configuration of the router; the procedure here applies to the recommended TP-Link TL-WR841N "300Mbps Wireless N Router", but should help with other routers. Note that not all routers will handle the broadcast UDP traffic, so please test before committing!

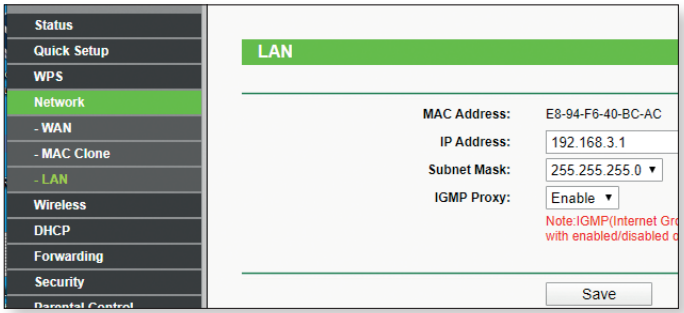
Factory Reset

The first step is to clear any old settings out of the router by performing a factory reset. On the WR841N this is performed by turning on the unit and then pressing the WPS/Reset button for more than 10 seconds. Release the button and the router should reboot.

Log in and Set the Password and LAN Address

After the reboot, use a network cable to connect a stand-alone computer to one of the (yellow) LAN ports on the router. The computer must have DHCP enabled (the normal setting). Open your favourite web browser and type 192.168.0.1. You should see the router login screen. The username and password are both "admin" (no quotes). Next, set the router password by selecting "System Tools", "Password".

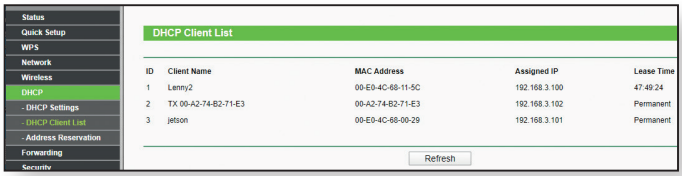
Then set the router LAN address to something that does not conflict with your home network. I used 192.168.3.1, as my other networks are on 192.168.0.1 and 192.168.2.1; if you are not sure use 192.168.3.1. Set by selecting "Network" and "LAN" as seen here:



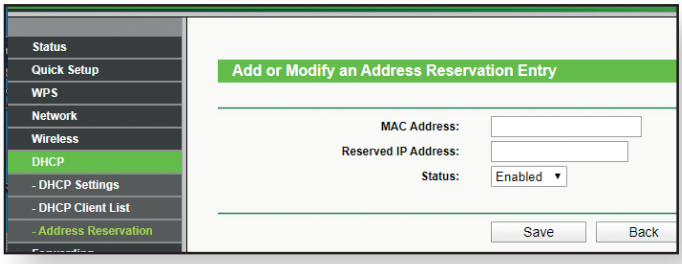
Save and reboot. Disconnect your PC network cable then reconnect it, and type in the new LAN address (192.168.3.1) into the browser and log in with your new password.

Set Static IP Addresses for the Jetson Nano and the LKV373A

Connect the Jetson Nano and boot it up (you can delay this step if your Jetson Nano is not working yet). Now go to the "DHCP", "DHCP Client List" page. You should see a list with your PC at the top and the Jetson Nano second. It will look like the list below, except that there will be a time against the Jetson, not "Permanent".



Copy the MAC address from the Jetson line, note its IP address, and click on "Address Reservation"

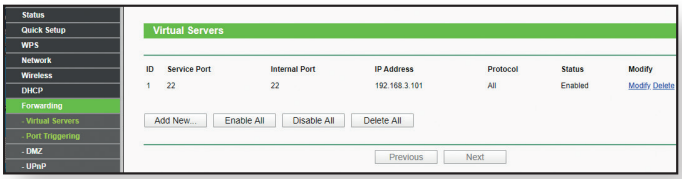


Now paste the MAC address in the top field and type the IP address in the second field and click "Save".

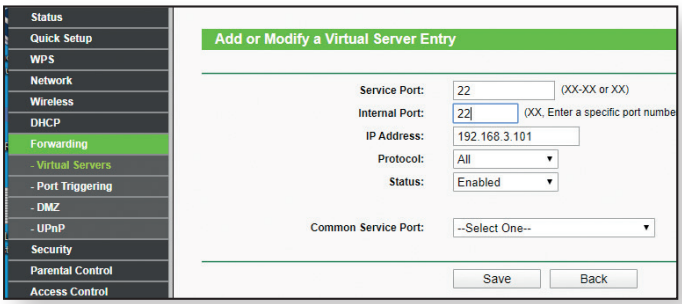
Connect the LKV373A, go back to the client list and then repeat the process of reserving an IP address for the LKV373A. At the end of the process, you should have permanent IP addresses for the Jetson and LKV373A.

Set Up Port Forwarding for ssh

To control the Jetson from outside the network (through the Blue WAN port) you need to set up port forwarding for ssh.



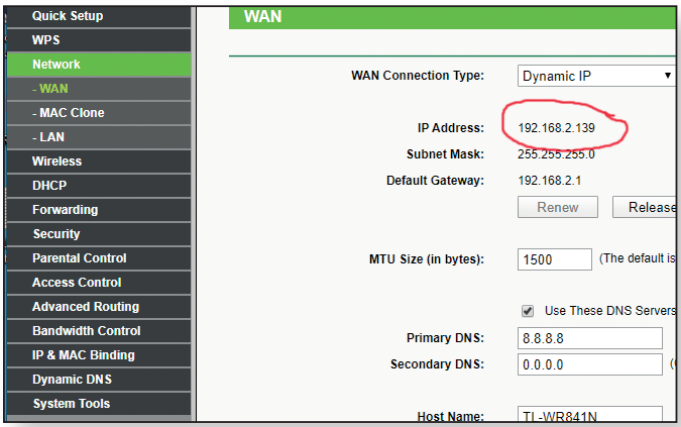
Go to "Forwarding", Virtual Servers", and click "Add New.."



Set the Service Port and Internal Port to 22 (the port used for ssh), and enter the permanent IP address of your Jetson. Other settings as shown above and then press "Save". You should see an entry for Port 22 on the Virtual Servers tab.

Check the WAN Address

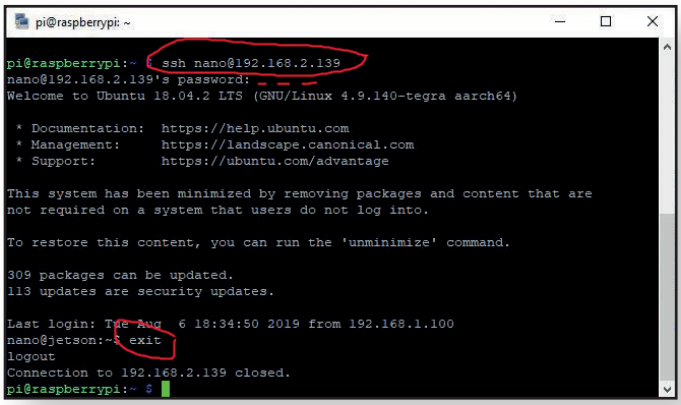
If you are going to control the Jetson from a computer or Portsdown on your shack LAN, you should now connect the WAN port of the router (the blue one) to your shack LAN by a cable. You can then check what IP address it is allocated by checking the Network, WAN tab as shown below.



The address circled is the one that you will need to enter in the Jetson Config screen on the Portsdown.

First Connection From a Portsdown

The first time that you connect to the Jetson from your Portsdown, you will need to go to the command line and manually connect. So log on to your Portsdown using Putty, and then from the menu select "Shutdown", and then "Exit to Linux". You should then get to a command prompt. The key commands are circled here – you will need to substitute the correct IP address and enter the password that you set on your Nano. It may additionally ask you to confirm that you are happy with the Security Certificate (this is the reason for doing this manual connection).



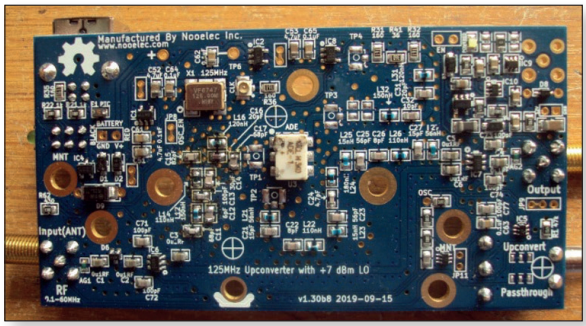
That completes the configuration of the router; I will describe the configuration of the Jetson Nano in a separate article.

Experiments on 4 metres

Jim, G7NTG

Just done some 4 metre testing both ways DVB-S2 71MHz 125s/r between myself and Arthur G4CPE from both our home QTH, with Arthur receiving my 28 Watts D4 on a dipole and myself receiving Arthur's 8 Watts D1 on a 5 element beam using the Nooelec modified upconverter. *(Full article in the next CQ-TV - Ed)*

About 60km I think.
We are both very pleased with this result!



Converting a TV repeater to widescreen on the cheap

Ian, G8XZD

It is possible to convert most TV repeaters to pass widescreen (as well as 4:3) quite easily, and without having to spend any money.

Although the BATC streamer is capable of 16:9 most repeaters are still operating in 4:3.

We also want to make sure everything is backwardly compatible so someone sending 4:3 doesn't end up getting stretched.

For this exercise we are not looking to convert the repeater to HD – that is somewhat more involved – as at the moment there is no off the shelf transmitter DVB-S2 transmitter with a HDMI input.

However, much of what I'll describe would allow this upgrade to happen in the future.

TV repeaters normally consist of a test card generator (or media streamer), one or more receivers, a transmitter, and the control logic.

Let's start with the receiver(s):

In the video output menu we need to make sure that the receiver is set to output 16:9 – or widescreen – this would be equivalent to being connected to a widescreen TV.

The receiver now needs to be told how to auto switch between the formats, and most receivers will have auto switching – once it is enabled.

In the settings menu look in the video output department.

There should be something along the lines of 'Display 4:3 content as', set it to pillar box.

This will then display a 4:3 picture in the centre of a 16:9 raster.

If a 16:9 signal comes along (with a widescreen flag set), the receiver will pass this as is.

Make sure you set all the receivers in your repeater this way.

For the transmitter:

Make sure this is set to a widescreen (16:9) output.

For example in the DTX-1, it's menu – Input – AV input 1 – then under Aspect radio, set this to 16:9.

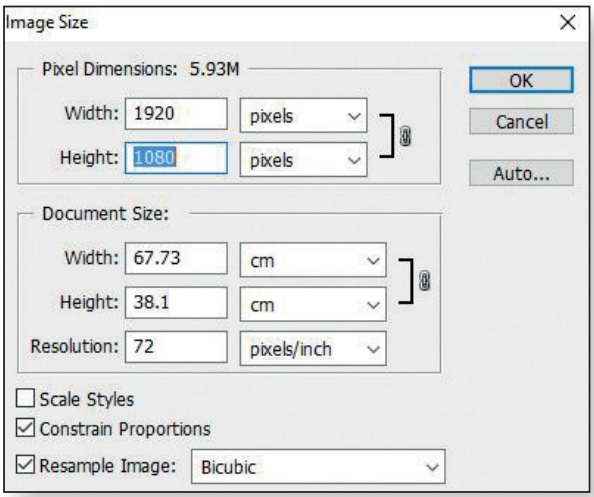
This will cause the transmitter to set the automatic format descriptor (AFD) to wide – so the receiver/monitor combination you are watching it on will know to display the aspect ratio correctly.

The media player:

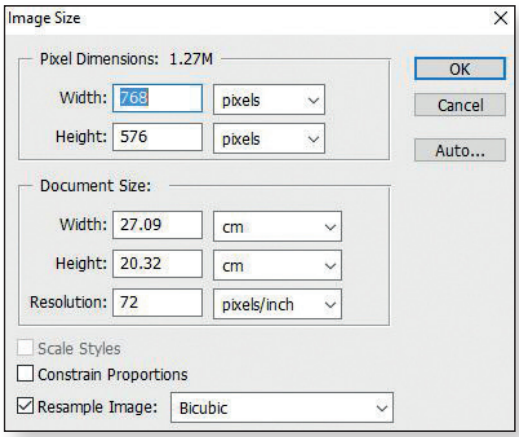
Start with a widescreen test card 1920x1080px.

Open this up in Photoshop (other image manipulating programmes are available).

Menu - image – image size - this will show as 1920x1080px

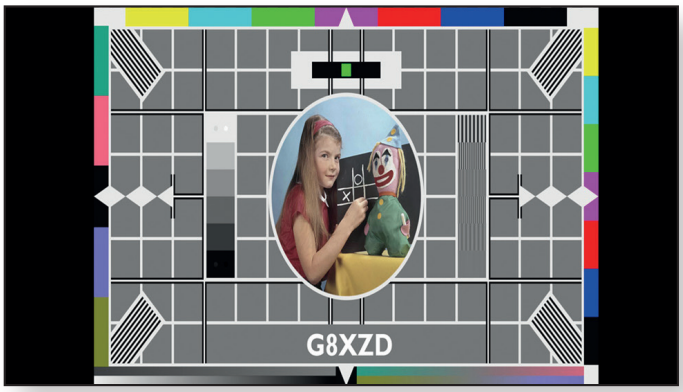


Untick constrain proportions and change to 768x576



Apply the scaling to all your slides.

What you'll end up with is the resized image fitting the 4:3 raster, but circles will look egg-shaped – now the picture is anamorphic.



At the receiving end:

If you are using a 16:9 monitor, make sure your satellite receiver is set to 16:9 output.

If you are using a 4:3 monitor, make sure you set your receiver to a 4:3 output and set it to display 16:9 as letterboxed.

This way round all users are happy and there are no excuses for stretched or squashed pictures any more.

CAT 20 Will Happen, But Online

We had planned to hold CAT 20 and the Biennial General Meeting at the Midland Air Museum, Coventry on the 24/25 October. Given the current situation, we have made the decision that the event will go ahead on the same dates, but online and on-air only.

This is an early decision so that we can put the best possible package of lectures, discussion and activity together. We will not be holding a Biennial General Meeting during the weekend as the Constitution allows us three years from the date of the last meeting (16 September 2018) to hold the next one.

We plan to host the interactive parts of the meeting using Zoom, and also stream all the lectures on the BATC Streamer. Selected highlights will be transmitted as contacts on QO-100. The draft programme is shown in the side panel

I am pleased that David G4NRT has agreed to be our first speaker to talk about "Producing Professional Internet Streaming" – very appropriate for this year's event! I would welcome other volunteers to speak on any ATV-related subject.

So, please make sure that your diary remains clear for the weekend of 24/25 October. If you get a chance to use Zoom, take the time to get to know it – we will publish full instructions as well. And the BATC Streamer will also carry all the content.

It would be good to get the maximum number of members onto the QO-100 net on the Saturday evening. The format will be similar to the regular Thursday night nets, but only one over each, with a maximum of three minutes. Light-hearted but appropriate content please!

We will try to arrange a real meeting as early as possible in 2021.

Saturday 24 October

1000	Zoom online for testing connections. Breakout Rooms open for specific discussions (trading?)
1330	Introduction – Dave G8GKQ, BATC Chairman
1340	First Lecture
1700	End of Lectures for Saturday
2000	Special QO-100 Net for CAT 20 (to be streamed as well) (Bring your favourite beverage – as for the CAT 20 Dinner)

Sunday 25 October

1000	Start of Lectures
1300	Closing Comments – Dave, G8GKQ BATC Chairman

Television History – Live

The Broadcast Engineering Conservation Group - *Jeffrey Borinsky*

It's Friday 15th November 2019 at Birmingham City University and Southern TV is live on ITV News. The occasion was the 50th anniversary of colour on BBC1 and ITV, and this was no fantasy. A 1968 vintage outside broadcast truck and cameras were live on air for the first time in over 25 years.

Martin was camera operator, Richard vision mixing and Paul on racks. Phil, Dave and I had fingers firmly crossed, hoping that nothing would go wrong.

The six of us are the founders of the Broadcast Engineering Conversation Group (BECG), a newly formed charity dedicated to restoring TV's past for the future. The event celebrating the 50th anniversary was organised by Kaleidoscope, an organisation that preserves historic TV programmes. We were invited to take part because we own preserved historic TV equipment in working order. This is part of our mission to present television history to the public.

The ITV reports from the event are on Youtube:

https://youtu.be/9o-3L3qbypo

https://youtu.be/U4QSnVo2rel

▶ *Southern and Marconi Mk VII camera with ITV satellite news truck*

The BECG is a registered charity, 1189469. The founders are also the trustees. The BECG is financed entirely by the founders and by private donations.

Founders

Dr Paul Marshall G8MJW (Chairman)

Dave Hill G8MGP (Secretary & Webmaster)

Jeffrey Borinsky (Treasurer)

Richard Harris M0TUW

Martin Pritchard

Phil Nott

▶ *Part of a display of vintage cameras and TVs at Birmingham City University*

For many years, amateur TV enthusiasts used all kinds of old broadcast cameras and other equipment, simply because it was all they could afford. Gradually this equipment went from necessity to interesting vintage. A few people have specialised in this sort of vintage kit, and six of us have formed the BECG. Our large collection of equipment includes several outside broadcast trucks.

I'll look at two of them in this article; others will be in part two.

Southern Television OOW 999G

▶ *Southern interior*

▶ *Southern with cameras*

Many BATC members will have seen ***Big Bertha***, as she's affectionately known, at BATC events. We rescued her from Meridian TV's car park in 1995. At that time the truck was just a shell with few original fitments and was painted in TVS silver. After a five-year programme of repair and refitting, she made her debut at the Newark Vehicle show in 2000 and was featured in Bus and Coach magazine.

Southern TV bought OOW 999G in 1968 as a bare chassis Bedford VAL 70. The outer coachwork is all fibreglass; this was a requirement as a lot of work would be done next to the sea. The electronics fit was done in-house by Southern TV engineers with help from the Marconi Company. This gives the unit a uniquely home-made feel in comparison to others in their fleet.

Originally fitted out with monochrome cameras, she was quickly converted to colour operation using four Marconi Mk VII cameras and was used at the Investiture of Prince Charles at Caernarfon Castle in 1969, as was every other colour OB truck at the time.

When Southern TV lost its franchise in the 1982 ITV re-organisation, the truck passed to TVS which continued to use the truck throughout its reign, refitting it several times.

After the ITV franchise changed again, this time from TVS to Meridian, the truck was abandoned in a car park at Northam Studios. After a little loving care, and some new diesel, lubricants and coolant, we drove it away to start its new life in preservation.

IN PRESERVATION

Southern has been shown in public many times. Before it went live on air in Birmingham, other events included 10 years at the Lincoln Steam and Vintage Show, several BATC conventions and an appearance at the Sandtoft Trolleybus Museum. In 2008 we drove ***Big Bertha*** all the way back to Southampton and parked her outside the Rose Bowl for the celebration of 50 years of ITV in the south.

EQUIPMENT

We have tried to restore her to the original colour fit-out using equipment of the original type where possible. Some original fitments have survived, including power, some woodwork, air conditioning, racks and audio patching.

The colour cameras can be up to four Marconi Mk VII. Monochrome monitors are Pye. The Barco colour monitors are not 100% authentic but are much more reliable than the originals. Most of the other equipment is by Marconi.

CAMERAS

One of the hardest engineering problems in TV is the camera. From the dawn of electronic TV in the 1930s, the camera was often the limiting factor in what was possible.

In the UK we had four major broadcast TV camera manufacturers: EMI, Marconi, Pye and Link. BECG members have a wide range of historic cameras from all these companies, many in working order. Alas no broadcast cameras have been made in the UK for many years. We also have vintage cameras from other makers, such as Ikegami and Sony.

We have an almost complete set of Marconi cameras, from Mk II to Mk VI, the last monochrome camera. Then all the colour cameras from the ground breaking Mk VII right up to the Mk X. No less important are lenses, most of which were made specially for TV cameras. Great names include Taylor Hobson (later Rank Taylor Hobson) and Angenieux. We have a good selection, both fixed focal length and zoom.

MARCONI MONOCHROME CAMERAS

In the UK, the pre-war Emitron cameras were made by EMI. Camera tube design advanced rapidly, culminating in the orthicon and image orthicon (IO) tubes. The 4.5" IO tube, a rather large piece of glassware, was a British

design and represented the pinnacle of camera tube design until the mid 1960s.

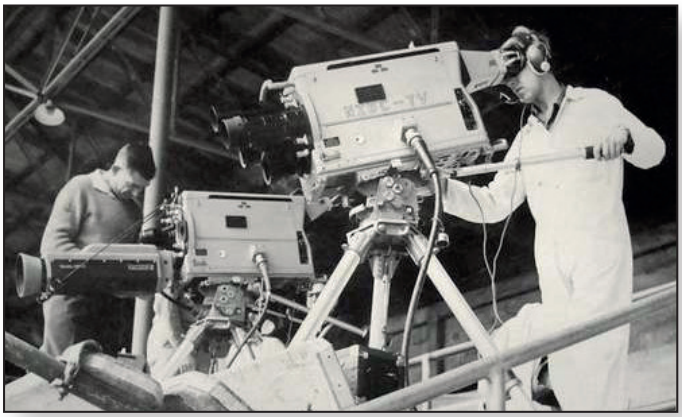
In the late 1940s Marconi built on an RCA 3" IO design and subsequently developed its own camera, the Mk II. These were used at the Queen's coronation in 1953. More about that in Part 2 of this article.

▶ *Paul Marshall with a Mk II that was used at the Coronation. This was part of an exhibition at Broadcasting House for the Diamond Jubilee*

The Mk III was launched in 1954. It could use either 3" or 4.5" IO tubes. A classic 1950s camera.

▶ *Mk III fitted with zoom lens rather than the usual turret*

The Mk IV from the late 1950s was a very successful design with almost 1,000 made, most of them exported. A true classic.



▶ *Pair of Mk IV cameras used by New Zealand TV. One has a turret, the other a zoom lens*

Marconi's last IO camera was the Mk V in the mid 1960s. It was transistorised and looked rather like the Mk VII colour camera. Finally, the Mk VI was the last of a truly great series of monochrome cameras spanning almost two decades. It used the new 30mm Plumbicon tube with a 25mm vidicon alternative for telecine applications.

I'll look at colour cameras in part two.

ABC-Thames GNF 951E

Our latest acquisition has a long and interesting history, taking it from ABC to Thames to Sony. It finally became a mobile home before we acquired it.

▶ *ABC-Thames as found*

▶ *ABC- Thames in service with Thames TV*

HISTORY

After the Football World Cup was awarded to the UK in 1966, ABC Television ordered three new Outside Broadcast trucks. These trucks were state of the art, incorporating a number of firsts:

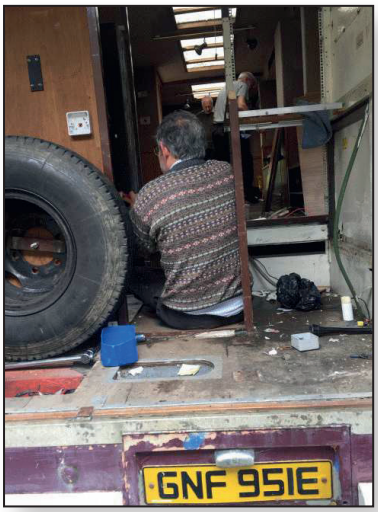
- All-transistor equipment
- Longitudinal layout (the operators face sideways, not forwards)
- Separate operational compartments for sound, production and engineering.

The trucks were built on Bedford VAL-14 chassis, fitted out by Marconi and supplied to operate with up to six Marconi Mk V image orthicon monochrome cameras.

Following the ITV franchise changes in 1968, these trucks were transferred to Thames Television which kept GNF951E and converted it to colour, using Marconi Mk VII cameras. The unit remained in service for more than 10 years before being sold to Sony, which used it as an HDTV (High Definition in the modern sense of 1,000+ lines) demonstration unit. During this period the truck spent some time in Italy making pioneering HD programmes.

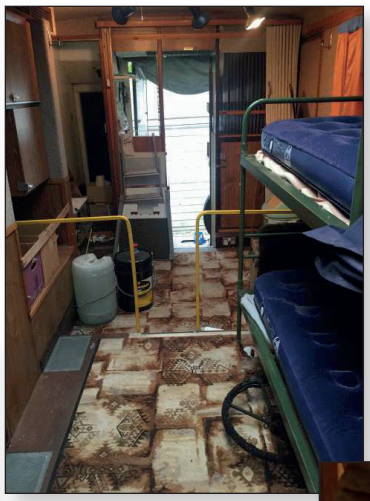
A new owner in 1992 used it for several purposes including as a mobile home, an art gallery and a costume store. BECG acquired the unit in 2018, with a view to restoring it as an outside broadcast unit. The vehicle is in good running order and the bodywork has little rust. Apart from the air conditioners and some 19" rackmounts, very few original fitments survive. We plan to equip the truck with Marconi Mk V image orthicon and Marconi Mk VII Plumbicon cameras, giving the unit both monochrome and colour capability.

So far, we have stripped out the mobile-home interior. Further restoration will have to wait for money and effort to become available.



▶ *Jeffrey working on stripping out ABC-Thames*

▶ *ABC-Thames interior as found*



▶ *Paul and Dave: We've found this false floor. What do we do now?*

▶ *Martin has the answer! Use the angle grinder.*

Broadcast Engineering Conservation Group

We are a small group of qualified and experienced professionals dedicated to the survival and interpretation of television history. Our main purpose is to promote and demonstrate vintage TV. We have achieved many successes in this field.

The BECG will bring together much equipment, currently owned by the founders. We have many cameras, monitors, video tape recorders and all the less visible paraphernalia that are needed to make TV programmes. The biggest parts of our equipment are several outside broadcast trucks; they are the main feature of these articles

Acknowledgements

The author thanks fellow founders for their contributions.

Kaleidoscope: *www.tvbrain.info*

Photos: BECG members, Kaleidoscope, Ruth Slavid

Contact

To learn more about us, or help us in any way please email at: *contactus@becg.org.uk*

More information on the trucks, cameras, monitors etc and other BECG activities can be found at: *www.becg.org.uk*

Much of the equipment shown in this article is available to hire for film and TV production.

A 2.4GHz Interdigital Bandpass Filter

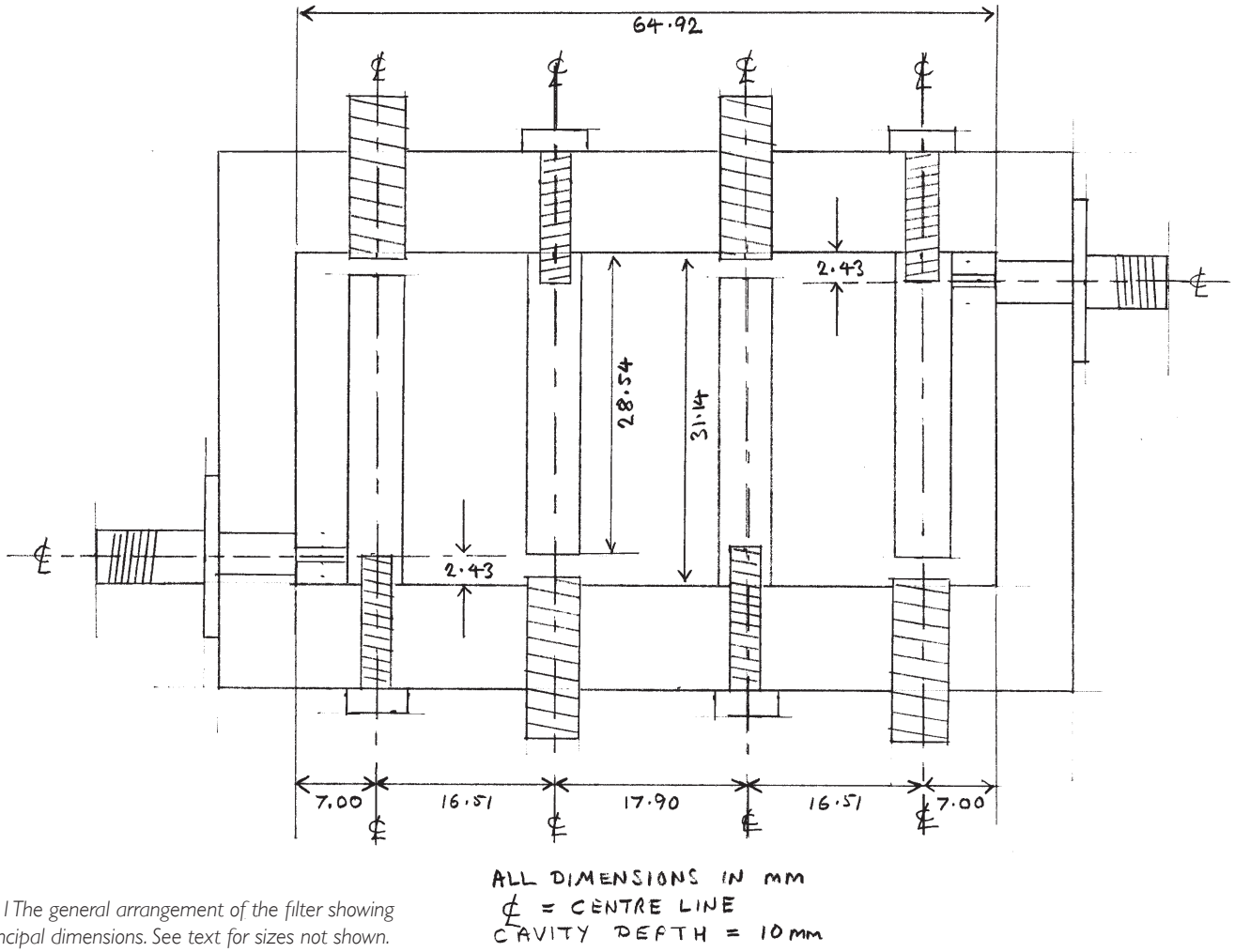
Shaun O'Sullivan G8VPG

As I completed my DATV satellite uplink system for QO100, I was concerned that there was no bandpass filter in the system. The SDR transmitters that we all use (DATV Express, Lime, Pluto etc.) are wideband devices with no output filtering. They do produce a variety of spurious outputs. When used on lower frequency bands, I have always used bandpass or low pass filters to reduce these to acceptable levels. However, I have seen very little discussion about such filters for 2.4GHz and an internet search did not produce any designs. I decided to see what I could produce myself.

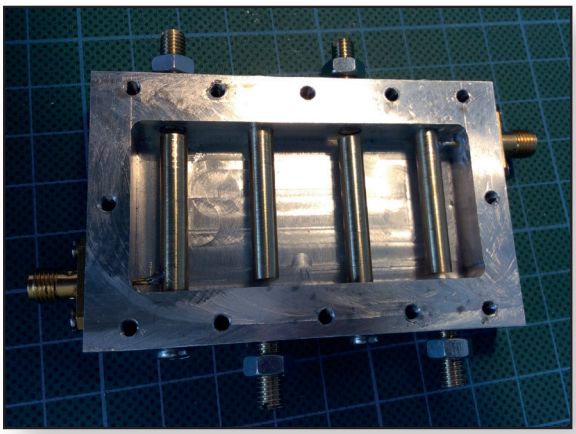
I have a programme by VK5UM which produces designs for four pole interdigital bandpass filters. My friend G4BVK has used this programme to make filters for 437 & 1249MHz with great success. The question was; would the algorithm hold true for 2.4GHz? After playing around with the variables (cavity depth, rod diameter, bandwidth) I arrived at the design shown in Fig.1.

The filter is constructed in a cavity 64.92mm long, 31.14mm wide by 10mm deep. I formed this in one piece from a two by half inch bar of aluminium. After squaring off all faces, I milled out the cavity in the centre of the bar. This left me with side walls 9.5mm thick on the long side and 7mm thick on the short side. They do not need to be this thick; it just saved me from turning good metal into more swarf! An alternative approach to constructing this would be to use four pieces of aluminium (or brass) bar 10mm thick, with two pieces of sheet material to form the top and bottom. I used a piece of aluminium sheet to form the top, with a screw fixing in between each rod.

The four poles are formed from 5mm diameter brass rod. I used my lathe to turn down some larger stock I had, but you can buy brass rod from model engineering suppliers. The base of the rods was centre drilled 2.5mm diameter and tapped M3. M3 screws were used to fix the rods in position. Be certain to face off the base of the rods square otherwise they will not sit perpendicular to the cavity walls.



▶ *Fig.1 The general arrangement of the filter showing principal dimensions. See text for sizes not shown.*



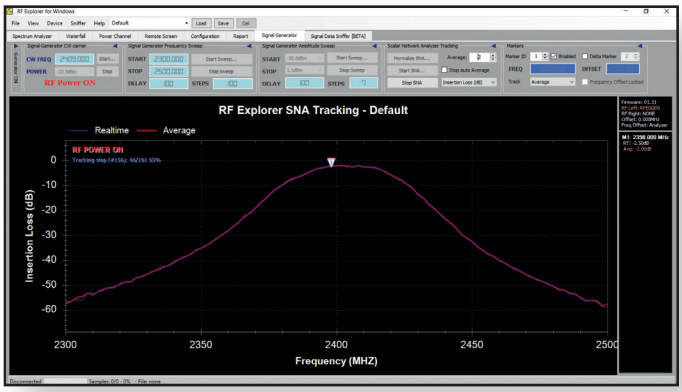
▶ *Fig.2 A picture of the completed filter before alignment and final shortening of the pole lengths.*

The adjuster screws are M5 brass screws. I passed a die over the 5mm brass rod used for the poles to cut the thread, but you could buy ready made brass screws, length to suit the side wall thickness you produce. Drill a hole 4.2mm diameter opposite the top end of the poles and tap M5. An M5 nut is used to lock the screws in position once adjusted.

The input and output connectors are two hole flanged SMA sockets of the long-reach variety. The tapping position of the input and output poles is 2.43mm from the base, this being the centre line position of the SMA centre pin. The centre pin is about 1.2mm diameter, so I drilled a hole 1.3mm diameter in the pole, 2.43mm from the base for this to fit into. I then drilled a hole in the end walls 4.1mm diameter on the same centre line for the dielectric of the SMA connector to fit into. The dielectric is trimmed off flush with inner wall. If you've measured and drilled it all correctly, the centre pin should slide into the hole in the pole and can be soldered. The SMA socket flanges were secured with M2.5 screws in blind holes 2mm diameter.

I found that the easiest way to position all the various holes was to designate the lower left hand corner as the origin, 0,0. Taking into account the wall thickness that you have produced, everything is measured out from there. Digital Calipers or height gauge that measure to 0.01mm are needed, although I used the DRO system on my machines.

The filter is now complete and ready for testing. You will need a spectrum analyser and a tracking generator or wideband noise source to see the bandpass filter shape. The dimensions given by the VK5UM programme resulted in the filter resonating 150MHz low. This was good, because the frequency can be raised by shortening the poles. The pole length that I give, 28.54mm, centred the filter on 2405MHz. However, I only needed to remove 1mm of length to shift the frequency 150MHz. I suggest that you make the poles a few tenths of a mm long to start with. Measure the resonant frequency and it will hopefully be a few tens of MHz low.



▶ *Fig.3 The final passband of the filter centred on the satellite uplink band 2400-2410MHz.*

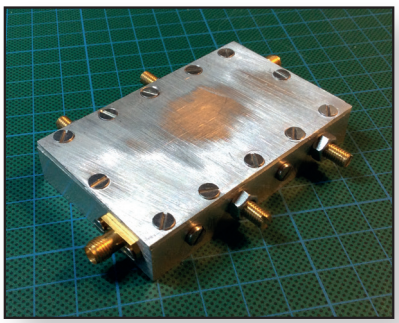
Remove 0.1mm and see what difference this makes. This will give you a shortening rate, MHz per mm, to guide the next length reduction. I reduced the length by 1mm in four increments, the last being just 0.06mm to get the length shown and centre it on 2405MHz. You will need digital calipers or a micrometer to measure to a hundreth of a mm.

I found that it was not possible to pull the frequency of this filter with the adjustment screws. The two centre poles finished with their screws fully withdrawn. The input and output screws just optimised the passband shape and hence the frequency is wholly governed by the pole length. Dimensions shown to a hundreth of a mm are there for this reason!

The result has been most satisfactory and the measured performance is shown in Table 1.

Centre frequency	2405MHz
Insertion loss	2.5dB
-3dB bandwidth	30MHz
-30dB bandwidth	90MHz

The passband shape over the central section, 2400-2410MHz is completely flat and works very well with DATV signals. This project does require some painstaking and accurate work. It took me a week of work to get it finished. I am fortunate to have a small, table top model makers milling machine and lathe, both equipped with digital read out(DRO)/measurement systems with a resolution of 0.005mm, but it would be possible to produce this with simpler tools if you take your time and work in a careful and methodical manner.



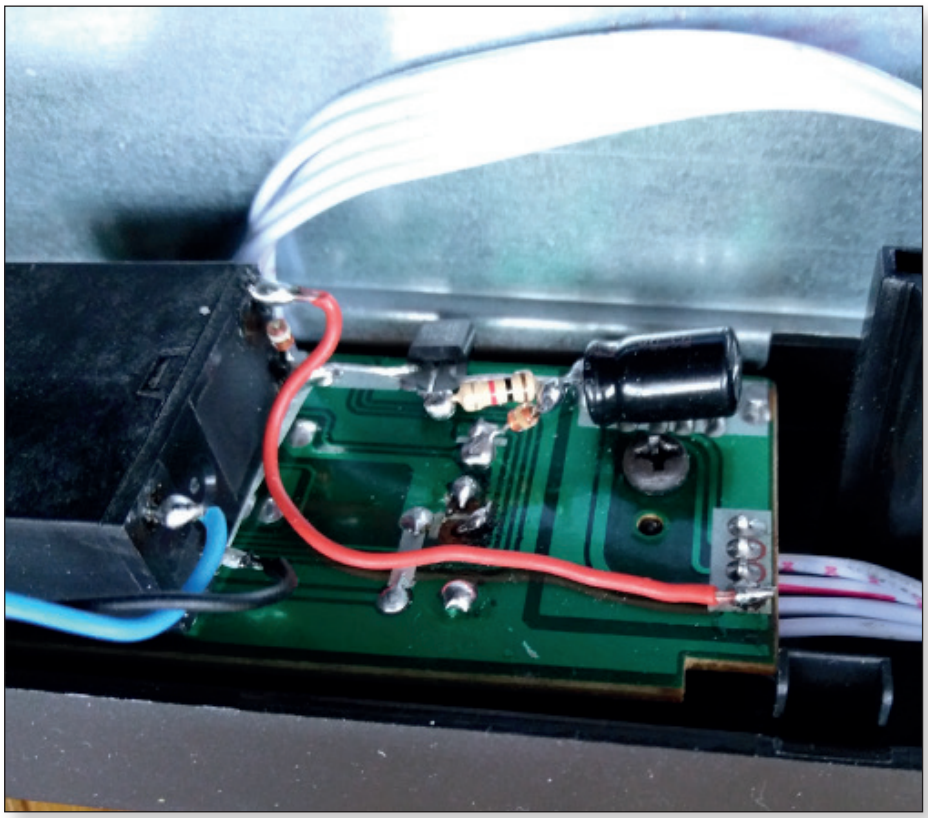
▶ *Fig.4 The completed filter. The lid is held down by 12 M3 screws. Drill 12 blind holes 2.5mm diameter and tap M3.*

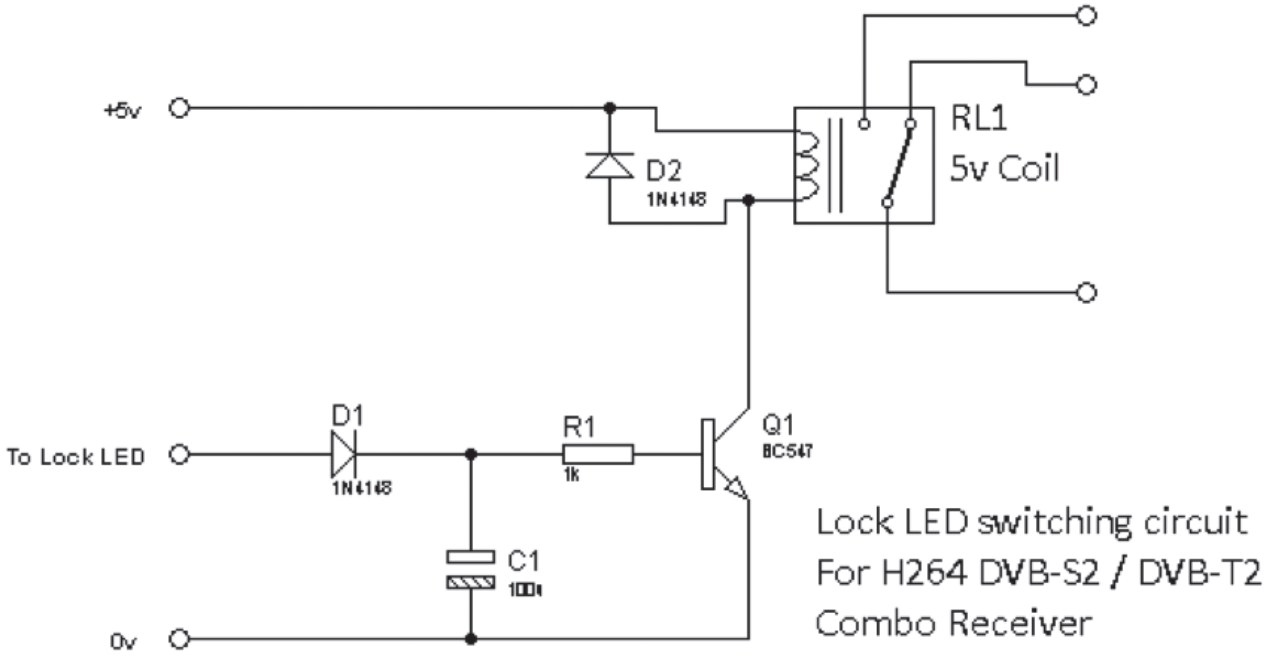
Lock Light Mod for the DVB-S2 Combo Receiver

Jason Haywood G7KPM

I ordered a DVB-S2 / DVB-T2 combo receiver as featured in the last edition of CQ-TV and looked at the lock LED indicator to make a simple interface to switch upon valid RX. One side of the LED is switched and measures about 0.5v when lit. After further investigation, the LED appears to be strobed at about 200Hz (according to the frequency measurement of my multimeter logic probe) and measures around 2v with my multimeter on A.C.

The circuit below can be made from junk box components and will reliably switch when the LED lights. The photo shows a point on the ribbon cable where 5v is available on my receiver version, with ground connection made at the USB socket frame. The whole circuit can be easily built 'piggy backed' on the front PCB. Be careful when soldering to the PCB as the tracks can lift very easily when heat is applied!





Lock LED switching circuit
For H264 DVB-S2 / DVB-T2
Combo Receiver

Turning Back the Pages

A dip into the archives of CQ-TV, looking at the issue of 47½ years ago

Peter Delaney - G8KZG

CQTV 79 appeared in August 1972, with an opening comment from the editor to apologise for the late arrival of the magazine - the previous one had been delayed due to a squashed finger in the printing machine, whilst a spell in hospital as result of the editor's appendicitis had held up issue 79. He promised that his excuse for the late appearance of the next issue would be "bigger and better"!

On opening the envelope, BATC members would have found a picture on the cover taken by the club chairman, Malcolm Sparrow, in Wolverhampton of a transmission received from Brian Kennedy in Stourbridge. Brian's callsign identifier card is adorned with the (then) BATC diamond shaped badge on the left hand side.

An aspect of amateur television that was growing at the time was working with colour signals. Nigel Walker, G6ADK/T, wrote a series of articles explaining some of the problems - should the sources to a vision mixer be processed as encoded video, for example, or as separate R, G and B channels to then be fed to a single colour coder. The difficulty with the latter process was in getting all 3 colour channels to track each other sufficiently accurately. Nigel went on to describe how an A/B mixer could be made capable of handling colour signals (although most amateurs at the time would have only had monochrome cameras, they could mix those with colour bars for example). The block diagram showed the principles. The sources - 1 to 4 in this case - were fed to two identical banks - A and B - of electronic switches.

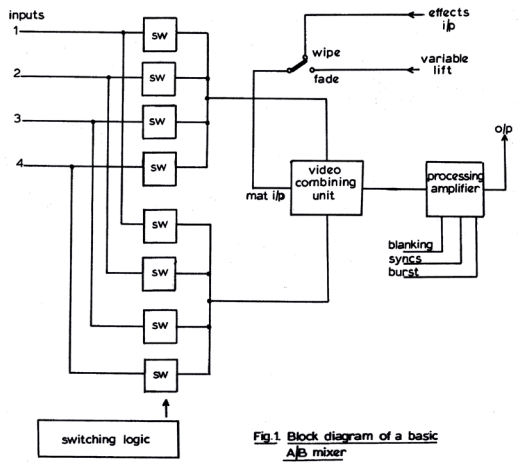


Fig.1 Block diagram of a basic A/B mixer

These were arranged so that only one input could be fed to the output of the each bank of switches at a time. The two selected sources were then passed to a video combining unit, where they would be mixed together under the control of the mat input signal.

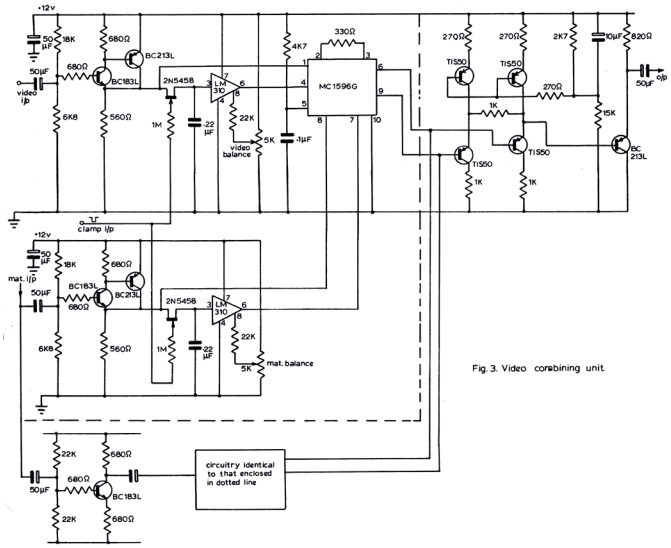


Fig. 3. Video combining unit

The circuit diagram shows that each video channel was first clamped to black level before being sent to one input of an MC1596 balanced modulator. The other input of each modulator was derived from the mat signal, the controlling signal at one modulator being the inverse of the other. Each modulator output is the video input multiplied by the mat signal, so, as in the multiplier waveform diagram, if input 1 is a sawtooth wave and input 2 is a grille pattern, the resulting output from the modulator is a grille pattern that has the lines ranging from very black to white across the screen. The balanced modulator outputs were then processed together by the 5 transistor output stage, and sent to a processing amplifier for clean timing pulses and colour burst to be re-inserted.

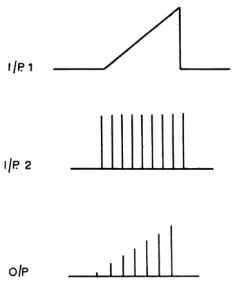
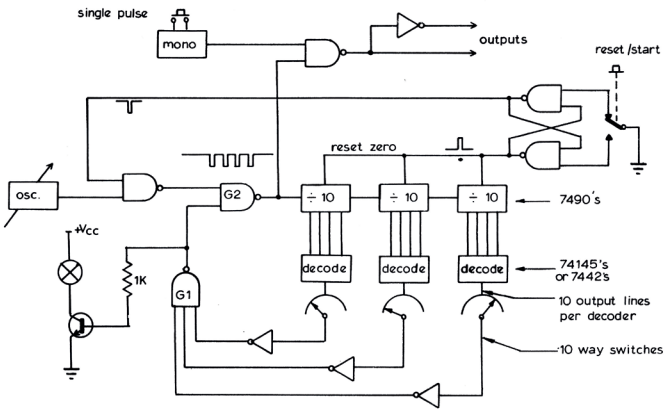


Fig.4. Multiplier waveforms

The use of digital logic circuits was also becoming much more common - especially in sync pulse generators (spg). Dave Bridgen had designed a novel pulse counting generator to help in the setting up of such circuits. Instead of driving the spg with its normal oscillator, the generator could produce a preset number of pulses, and then remain in that state, so that the conditions in the circuit under test could be examined. It worked by gating together the

appropriate selected decoded counter outputs in G1, which would then inhibit the clock pulses into the counter chain when the desired number of pulses had been reached.



A vision fader circuit formed the subject of John Lawrence's regular "Circuit Notebook" series.

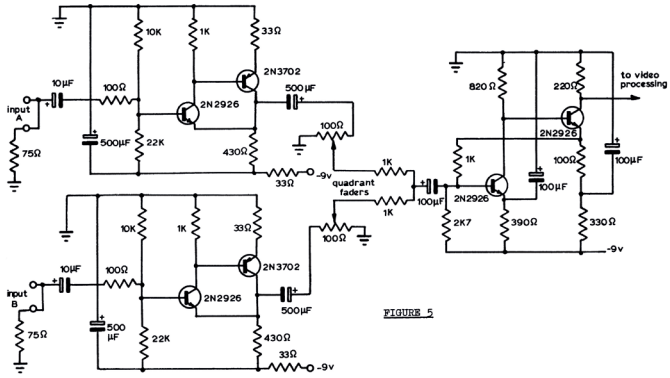


FIGURE 5

The circuit consisted of an input stage on each of two channels leading to a 100 Ω fader, and the combined signal from amplified by the 2 transistor output stage. The more unusual part of the article was a description of how the 100 Ω potentiometers could be made to work like the standard studio quadrant faders. The design used standard Meccano gears and bushes, as set out in the diagram.

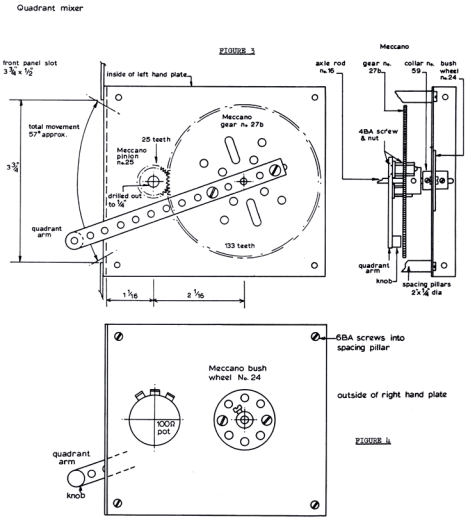
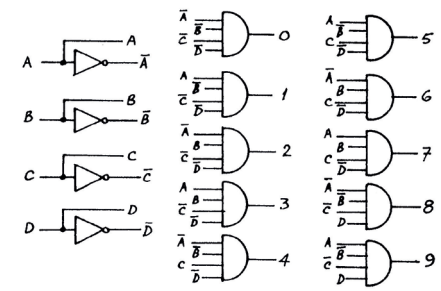


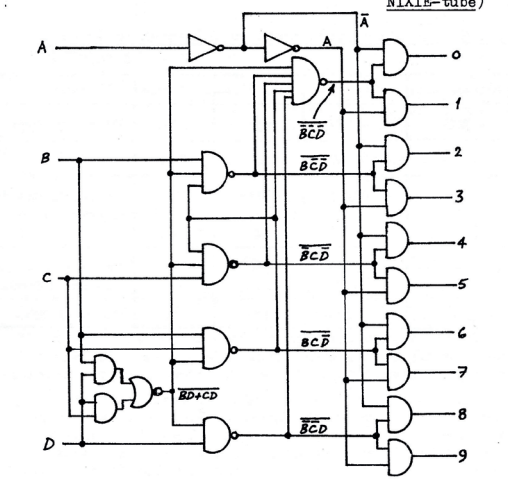
Fig. 3 Binary-to-Decimal Decoding (7442)



Boolean Algebra terms are shown, A = A at 1
$\overline{A}$ = A at 0

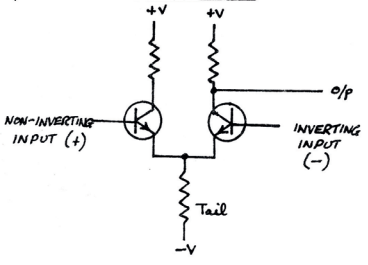
Arthur Critchley's latest instalment in his series on integrated circuits began by looking at digital encoders and decoders. To decode from 0 to 9 as decimal into binary was (relatively) straightforward, but to return the binary code to a decimal output was more complex. It could be achieved with 4 inverters, to produce the inverse of each binary input, and then a set of 4 input AND gates - one for each decimal output. If, however, the input ABCD code is for a number other than 0 to 9, it would produce an incorrect output.

Fig. 5 Binary-to-Decimal Decoder (System for driving a NIXIE-tube)



An alternative logic was shown that could drive 'nixie' tubes, in which each input was connected to a cathode shaped as the corresponding digit that 'glowed' orange when activated.

Fig. 15 Long-tailed Pair



The second part of Arthur's article began to explore the 'new' linear integrated circuits. The basis of these was a long-tailed pair, in which there are inverting and non-inverting inputs fed to the output. The long tailed nature of the device has the advantage that any changes in behaviour of

the transistors due to temperature variations will be balanced on the two inputs. By cascading the input long tailed pair with another as the output stage, the dc conditions at the output match those at the input. These circuits were able to perform linear 'operations' on the input signals that depended (within limits) only on the external feedback components used. The advantage was that, for normal use, these 'operational amplifiers' - op-amps for short - could be used without any detailed knowledge of its internal workings. In normal use, therefore, the device was represented by a symbol that just showed the inputs and outputs, and by feeding back a portion of the output to the appropriate input, a definite relationship could be set between the input and output - other calculations, such as the bias at each stage, were not needed - it was a 'black box' that would do what was determined by the feedback loop.

Fig. 16 Cascaded Long-tailed Pairs.

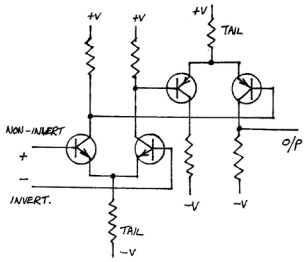
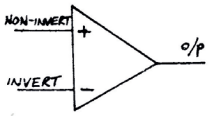


Fig. 18 Op. Amp Symbol



CQTV also included a prediction by Walter Bruch at the (then) recent Schoenberg Memorial Lecture, regarding colour television tubes, when he said that 'nothing significant will happen before 1980 - but with engineers working hard on the flat picture screen something should be available by 1990 or 2000'. Professor Bruch thought that 'the flat screen would be made from semiconductor laser elements, would be self luminescent, and current magnetic deflection techniques would be replaced by a sort of shift register system'. CQTV's editor added "If only this could happen today…".

Footnote: *The word 'mat' used by the G6ADK/T is more commonly written 'matte'.*

DATV activity contest report

Saturday

Left home at 0800 and drove the 84 miles from home to Walbury Hill IO91GI (thanks to Noel for the opportunity). Worked G8GKQ/P on all bands 432 to 24GHz at 54km.

Worked G8LES at 40km on 23cm and 13cm and he received my signal on 9cm. Worked G8GTZ/P at 51km 432 to 24GHZ except 13cm. Got my signals to G4LDR at 30km on 24GHz to 9cm during some huge rain storms. Could lock to his carrier but got no further than Carrier and FS lock. Did have a two way on 13cm with him.

Drove back home arriving at 2240

Sunday

Up early. Arrived at Cleeve Common car park IO81XW at 0800. As a new location I needed new contest numbers in the Portsdown 2020. No problem, I have previously saved a suitable new set to USB drive. Imported them but subsequently not even the Portsdown touchscreen would respond. After much searching found ethernet cable and did a factory reset via SSH. Manually set all parameters.

Lost two hours so no time for expedition to trig point for LOS 24GHz path. Worked G8GTZ/P at Walbury at 76km 13cm to (surprisingly) 10GHz, Just not enough signal for 24GHz. Location getting overrun with visitors so left at 1200

Drove the 29 miles to Notgrove, IO91BV, a site that should have a good path to Walbury (and would not be crowded!). Decided to change the contests numbers manually and avoid risk. Worked Noel at 67km 23cm to 24GHz. Signals were not too loud on DATV but huge on 24GHz NBFM. Worked G0MJW with big signals both ways on 70cm and 23cms. Saw signals from G4CPE on 70cm but couldn't attract his attention with my 5W. Tried getting signals on 70cm to G3VKV but path too blocked locally. Good signals on microwave bands from GB3ZME 3 and 5 GHz but too late to work the M0YDH/P in that area

An interesting, but tiring weekend (had to be at work 0600 Monday!).

Dave, G4FRE/P

The British Amateur Television Club

Out and About

Rallies and events with a BATC stand: (subject to change)

2020

All amateur radio rallies have been cancelled until at least the autumn.

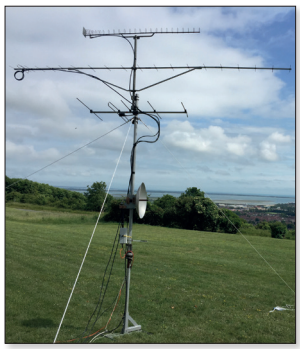
We will show any that will be running in the next issue.

The most up to date status can be found on this RSGB web page:

https://rsgb.org/main/news/rallies/

If you are able to help on the BATC Rally stands, please contact the BATC secretary.

Activity Weekends & Contests



Activity Calendar

Activity weekends and the contests will go ahead as single operator and stay-at-home events.

July 11th / 12th - Any band activity weekend

August 8th and 9th – 146 and 437 MHz contest

Sept 19th / 20th – 50 and 70 MHz contest

BATC Online

Website:	http://www.batc.org.uk
BATC Wiki:	https://wiki.batc.org.uk/
Forum:	https://forum.batc.org.uk/
Stream:	https://batc.org.uk/live/
Dxspot:	https://dxspot.batc.org.uk/
YouTube:	https://tinyurl.com/BATCYouTube