The British Amateur Television Club

CQ-TV

No. 269 – Autumn 2020

The Hardware Edition!

CQ-TV 269

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:
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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

It's great to see so much happening in the Amateur Television Community. At least some of the credit for this must go to the AMSAT-DL team who have enabled our access to the QO-100 wideband transponder. This has enabled and encouraged many innovative technical projects. However, I would also urge you to use the transponder for normal one-to-one ATV contacts; such usage is far more welcoming to beginners than seeing the Big Buck Bunny test video again!

Terrestrial activity is also increasing and the BATC will continue to organise contests and activity weekends to promote the use of the bands. Let's not forget the repeaters; we will be holding another Christmas repeater activity contest and I look forward to seeing competition between repeater groups for the cash prize. Congratulations to Clive G3GJA and the team who recently put GB3EY on the air.

This issue of CQ-TV sees the publication of 3 projects with differing levels of complexity. The Ryde DATV Receiver is a very capable digital ATV receiver that can be built by beginners, but would not be out of place in even the most advanced shack. The Portsdown 4 is slightly more complex and provides a simple route towards generating ATV transmissions for QO-100 or terrestrial use. Lastly, the "Nanobox" is an advanced project capable of generating stunning HD TV signals primarily for fixed station transmissions through QO-100.

I would like to acknowledge all the volunteers who have written the software components that enable us to put these projects together. I must mention Evariste F5OEO, Heather M0HMO, Tim MW0RUD and Phil M0DNY. There are many more and an army of beta testers; thanks to them all.

You will be able to hear more about the Ryde Receiver and the Portsdown 4 during CAT 20, which will be held online on Saturday 24 October. Please also make the effort to join us on that Saturday evening for the BATC QO-100 Net. This will hopefully be a bigger and better version of the net that we run every week on Thursday evenings at 8pm. If you want to see what it is all about, and you are not yet equipped to receive QO-100, you can watch the net being relayed almost live on the BATC Streamer.

73
Dave, G8GKQ

The Listing

new and renewing members

Rob Burn G8NXG

Coronavirus or not, life does go on and its effects have seemed to have speeded up the passage of time instead of what might be expected – some sort of slow-down. Which is why I find myself surprised at writing the introduction to the quarterly members listing so soon after the previous one!

I suspect that in line with many members I have been closely following the developments of the Portsdown 4, the Ryde STB plus the Langstone and I guess that these projects have kept many members gainfully occupied either planing to build or constructing and testing.

So, without further ado here is the Member Listing of those members who have joined the Club or renewed their membership subscription during June, July and August. As is the norm, your details will only appear here at this time to be repeated only when you renew again. As has been said before, any mistakes are due to human error (usually mine!) and if you have spotted an error or expected to see your details in this edition of CQ-TV then please get in touch.

A special mention of thanks should be made to those members who join or renew and are then faced with some kind of glitch in the payment system. These do not occur very often, (thank goodness!) however when they do I am grateful for the perseverance and stoicism of those affected. I am never quite sure if the reasons that we experience these admittedly rare instances are due to the choice of browser, or hardware such as tablet, desktop or laptop computer and I am thankful that in most cases a workaround is made by the member concerned.

Finally, although the word 'British' appears in the title of the Club, in practice anyone who has an interest in TV is welcome to become a member, wherever you are. Thanks again to all members, UK and overseas, who continue to support the Club.

Argentina		
Fernando Costarelli	LU1HKO	Cordoba
Australia		
Denis Pittaway	VK3YLH	Belgrave Heights
Bob Reid	VK3BVR	Box Hill North
Mark Stephenson	VK3PI	Bundoora
Tony Falla	VK3KKP	Castlemaine
Alfred Edwards	VK2YAC	Colyton
Wayne Gooda	VK4YWG	Cranbrook
Michael Brockway	VK2EK	Dawesville
Keith Bainbridge	VK6KB	Eden Hill
Richard Searles	VK3VRS	Fountain Gate
Hilary Bridel	VK2AZ	Glenmore Park
Rod Preston	VK4VU	McDowall
Graeme Parr		Melbourne
Clint Jeffrey	VK3CSJ	Melbourne
Alan Wills	VK4NA	Petrie
David Carwana	VK5DMC	Port Pirie
Robert Williams		St Albans
Wayne Bruce	VK3VCL	St Albans
Simon Judge	VK3ZSJ	Tooradin
Austria		
Philipp Jeschofnik	OE8JPQ	Klagenfurt
Peter Stiassny	OE1PYW	Wien
Hans Schmid	OE1SSB	Wien
Hans Alberer	OE1HAW	Wien
Belgium		
Patrick Hernaelsteen	ON5AV	Brussels
Freddy Vanoppen	ON1AVO	Heusden-zolder
Baudouin Jean	ON2BJ	Jurbise
Corne Van der Kloot	ON7MOR	Kalmthout
Ronald Supply	ON7FLY	Leper
Francois Dubois	ON5JU	Liege
Gabriel Libeer	ON5FH	Oostakker
Rudy Pycke	ON6PY	Oudenaarde
Lucien Brouckaert	ON7TU	Pittem
Luc van Achte	ON4AOL	Stekene
Vandewalle Yves	ON4YV	Vilvoorde
Jean Paul Mertens	ON7AMI	Zevergem
Finland		
Juha Kiili	OH2LKV	Perttula
France		
Saitner Gerard	F5GQ	Roquevaire
Eric Vacassoulis	F6FLQ	Beaumont Les Valence
Francis Sarot	F6AWS	Carvin
Philippe Cappelle	F5AOD	Chatillon-le-Duc
Stephane Kraida	F4DVK	Fargniers

Jouan Francois	F1CHF	Franconville
Bricout Dany	F5IDK	Recquignies
Rolf Collette	F9ZG	Saint Gilles
Jean-pierre Jacquot	F4AGC	Septfonds
Germany		
Wolfgang Pöschel	DH6AL	Barchfeld-Immelborn
Hans Haller	DD5KP	Berlin
Guenther Krauss	DC9VD	Berlin
Thomas Bäker	DB0OV	Brake
Oliver Amend	DG6BCE	Bremen
Dietmar Austermuhl	DL1ZAX	Lohfelden
Mennicken Claus	DK1UP	Neresheim
Thomas Ruhmann	DG6UAX	Pforzheim
Hans-Peter Neuber	DD1IA	Pirmasens
Dirk Wessel	DG5OBX	Porta Westfalica
Wilfried Ornowski	DL9YDC	Raesfeld
Andreas Foellmer	DL1AF	Roedinghausen
Frank Spiegel	DG2FSP	Roehrsdorf
Rolf Lehmann	DJ7TH	Schwanau
Martin Blanz	DL9SAD	Schwieberdingen
Andreas Lock	DG8AL	Wannweil
Ireland		
Michael Goss	EI2JM	Arklow
Don Kelly	EI8DJ	Crosshaven
John Good		Dublin
Dermot Flanagan	EI6FZ	Dublin
Japan		
Hideyuki Sato	JJ1RUF	Ichikawa
Luxembourg		
Georges Mathgen	LX1BB	Heisdorf
Netherlands		
Anne Westra	PE1GTA	Alkmaar
Joop van Schaik	PE1BIA	Bergen Op Zoom
Alle de Jong	PE0AJF	Den Hoorn
Ad Valkenburg	PE1DGW	Eindhoven
Barry Polderman	PA1ZKH	Gravenhage
Bert Harms	PA3AOD	Hooghalen
Randall Tamminga	PE1SDE	Lelystad
Hans Holtkamp	PA3CGN	Losser
F.C.Trevor Gale	PA2TG	Rijnsburg
Paul Theunissen	PA5PT	Son en Breugel
Poll van der Wouw	PA3BYV	Vlagtwedde
New Zealand		
Mark Atherton	ZL3JVX	Christchurch
Keith McRoberts	ZL2TKM	Nelson

Norway		
Hans-Petter Falao	LA9UI	Tromsø
Portugal		
Sérgio Silva	CT2GHB	Figueira Da Foz
Jacinto Rebelo	CU2ED	Ponta Delgada - Sao Miguel
Slovenia		
Stefan Lebar	S51L	Ljutomer
South Africa		
Johannes Enslin	ZS6JDE	Lynnwood Ridge
Spain		
Jabi Aguirre	EA2ARU	Abadiano
Jaime Codina Jodar	EA3DZN	Barcelona
Antonio Navarro	EA3CNO	Barcelona
Lorenzo Manso	EB3CKD	El Vendrell
Manuel Anonio Páez Pérez	EA9MH	Melilla
Juan Piqueras	EA3TA	Sabadell
Gonzalo Giron Castillo	EA7AYB	Sevilla
Sweden		
Jörgen Overgaard	SM4WWG	Fjugesta
Gert Carlsson	SM5LWC	Linkoeping
Ulf Jordan	SM0WSA	Upplands Vasby
United Kingdom		
Pawel Markiewicz	M7TSA	Abram ,Wigan
Mike Sanders	G8LES	Alton
Graham Felton	GW0FEM	Amlwch
David Shaw	M5TXJ	Appleby-in-Westmorland
Pip Price	G8NOP	Ashbourne
Ralph Moyle	G0UWB	Banbury
John Manley	M1CNJ	Banbury.
Ken Roberts	G8VDP	Barnsley
Barrie Ford	G0EYF	Barnstaple
Tammy Palmer	RSGB@8	Bedford
Michael Senior	G4EFO	Billingshurst
David Philip	M1ALX	Bodmin
Chris Simpson	G7LCW	Boston
Viv Green	G1IXE	Bristol
John Witchell	G4OTJ	Bristol
William Woodward		Bristol
Chris Watts	G7PVL	Bristol
Adrian Lambert	G8TNU	Broadstone
Geoffrey Pike	GI0GDP	Carrickfergus
James Colwill	G0DQH	Chandlers Ford
Roderick Warner	G0KJF	Chard
Mike Browne	G3DIH	Chelmsford

Peter Townrow	G6LTB	Cheltenham
James Fletcher	2E0KVS	Cheltenham
Roger Killick	G8KWR	Congleton
James Welsh	G4YLB	Darwen
Kenneth Aspden		Darwen
Steve Cooper	G3YTI	Darwen
David Lucas	G0BIE	Derby
Mike Willis	G0MJW	Didcot
Peter Lewis		East Cowes
Andrew Hood	GM7GDE	East Kilbride
Kevin Wheatley	M0KHZ	Egremont
John Bailey	M0MTW	Ely
Jacob Saunders	2E0DQX	Ferndown
Keith Parker	G8SYA	Gillingham
Steve Barrett	G4HTZ	Great Wakering
David Rudderham	M0YAA	Grimsby
David Pykett	G0IIQ	Grimsby
Chris Dadd	G1HZN	Grimsby
Peter Kozlowski	M6LFP	Grimsby
Simon Kennedy	G0FCU	Guildford
Michael Scott	G3LYP	High Wycombe
Robert Connett	G0WSC	Horton Ilminster
John Corlett	GD6RVA	Isle of Man
Ian Wilson	GM4UPX	Jedburgh
David Richards	2E0KSF	Kings Lynn
Stephen Craig	GI8WHP	Larne
Paul Elliott	G4MQS	Leicester
Steve Greaves	2E0XAY	Leicester
Mike Harriman	G4SJX	Leicester
Robin Ayers	G4ZWB	Leiston
Dave Davy	G6EWP	Lincoln
Andy Webster	G7UHN	Liss
Philip Fahey		London
Paul Entwistle	G8AFC	Manchester
Frank Beesley	G8CZE	Manchester
Ron Satterthwaite	G6BMY	Manchester
Dennis Anderson	G6YBC	Manchester
Nigel Walker	G8AYC	Newbury
Peter Grannell	G4TQB	Newcastle-under-Lyme
Paul Bowen	M0PNN	Newport
Steve Sorockyj	G0LCG	Nottingham
Robin Carter	G4NDM	Nottingham
Philip Hosey	MI0MSO	Omagh
Andy Brooker	G4WGZ	Orpington
Darren Rainer	G4VTQ	Ottery St. Mary
Christopher James	G1JXS	Oxford
Allan Copland	GM1SXX	Paisley
Ron Harrison	G8DVR	Partington
Philip Pavelin	G4WWH	Portland
Christopher Tidwell	G0DAE	Portsmouth
Tom Fanning	M0LTE	Reading
Simon Watson	M0ZSU	Reading
Tom Grady	G6IGA	Reading
Phil Hayes	M0PIT	Roade
Geoff Boyce	M1AHN	Ross-on-Wye
Peter Johnson	G4LXC	Royal Tunbridge Wells
Ralph Bird	G4ALY	Saltash
Oscar Acton	M7OJA	Seaham
Paul Archer	M0PJA	Sheffield
John Mccarthy	G7JTT	Southampton
Mark Johnson	G4ZRT	Southampton
Barry Shane	G1JOL	Spalding
Keith Bonney	G0KTD	St Austell
Kevin Pye	G4EER	Stoke On Trent
Mark Longson	G0NMY	Stoke On Trent.
Alan Mayhew	G8TQK	Sutton
Dennis Fitch	G8IMN	Sutton Coldfield
John Smith	G3JZF	Sutton Coldfield
Derek Blight	G0PGL	Taunton
John Alexander	M6JAX	Telford
Ray Benitez	M0DHP	Thames Ditton
Stuart Le Poer Trench-Brown	G7DTG	Warminster
Glen Turner	G7MNP	Warrington
Gary Heald	G0VLJ	Weymouth
John Grandshaw	G8IKP	Weymouth
Anthony Hornby	G1HBD	Wokingham
Ray Davis	M0DTM	Wolverhampton
Gavin Nesbitt	M1BXF	Woodditton
Gwilym Jones	GW6PVK	Wrexham
United States		
Roger Paskvan	WA0IUJ	Bemidji
Chester Jaffee	KM6AVE	Berkeley
William Eberle	AB0MY	Boulder
James Andrews	KH6HTV	Boulder
Gary Grivna	K0GX	Brooklyn Park
John Heinrich	ND6H	Concord
Charlie Short	K9BIF	Goshen
Thomas Matthews	K5SAF	Houston
John Nobile	N6ZP	Humble
Ronald Fredricks	K8DMR	Jenison
Don Coker	KM6TRZ	Ladera Ranch

Lawrence K Nelson	KC0PYX	Longmont
Lou McFadin	W5DID	Orlando
Norman Thorn	K6UU	Redondo Beach
Zygmunt Skrobanski	G3XDZ	Roswell
Richard Hoover	AB0CV	Saint Louis
Richard Diehl	KJ6RNL	San Jose

Joe Barcelona	WB6RIY	San Jose
Ben Carlucci	W2NYC	San Jose
Stanley Salek	NJ6E	Sonoma
John Del Ponte	KC1IDN	Tewksbury
Jim Nagle	KF4OD	West Palm Beach

Activity and Contests

Clive Reynolds G3GJA

IARU International ATV Contest

The finalised UK results changed from the preliminary results published in the last CQ-TV as there were a several late logs submitted. In the Section 1 contest for home stations Terry G1LPS came first in the UK with 4563 points and 12th overall.

In Section 2 for portable stations Noel G8GTZ/P came 1st in the UK and 2nd overall with 20386 points. Dave G4FRE/P came 2nd in the UK's Section 2 with 13898 points and 3rd in Europe overall. Congratulations to Terry, Dave and Noel. It's great to see UK stations displacing some of the usual stations running portable from mountain tops in Italy! UK band leaders were:

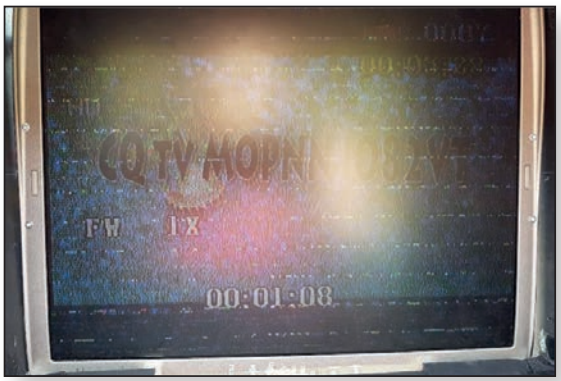
- 70cm M0YDH/P
- 23cm G1LPS
- 13cm to 12mm G8GTZ/P
- 4mm shared between G4LDR/P and G8GTZ/P

The full results can be seen in this edition of CQ-TV and also here: *https://wiki.batc.org.uk/images/7/7c/IARU_Region_1_ATV_Contest_Results_Final.pdf*

The UK only VHF portable section was won by Shaun G8VPG/P with 435 points on 2m. Mike M0MJW bagged 1st place for fixed stations on 2m with 290 points. There were no entries for 4m.

All band Activity Weekend July 11th/12th

A few stations headed for the hills and were rewarded with contacts on 10GHz down to 437MHz. Despite the fine weather with a little tropo enhancement, activity was low with many stations remarking that it was difficult to get any response on the calling channel. Highlights were John G7JTT/P near Beaulieu in the New Forest receiving G8GKQ/P one-way (27 km) on 23cm, David M0DYH/P on Long Mynd getting pictures over a 50km path from M0PNN/P and Terry G1LPS taking video from Clive G4FVP/P on 3cm and 6cm FMATV.



▶ *M0PNN/P as seen by M0DYH/P on 6cms*

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

Eight stations entered this year, which is 33% up on last year. All eight operated on 2m and there were six stations active on 70cm. Conditions in Yorkshire were not anything special and signals were characterised by deep QSB that affected 2m and 70cm which even made talkback on .75 difficult.

▶ *M0DTS/P as seen by G3GJA*

Despite the QSB, I was able to make a 79km two-way over the top of the Yorkshire Wolds via a very obstructed path on 2m with Rob M0DTS/P. All of Rob's 70cms QSOs had to be one way because of the Fylingdales EWR that pretty much obliterates 70cm at his portable location.

Rob got the best DX of the day at 271km on 70cm but found contacts hard to come by. The leader of the 2m section and overall winner of the contest was Dave G4FRE/P who managed to work all of his contacts on both 2m and 70cm. Dave will be presented with the trophy when pandemic precautions allow.

August 2020 2m & 70cm Contest full results table

2m

Nr	Call	QTH	Qs	BestDX	Locator	Dx
1	G4FRE/P	IO82LB	5	G4CBW/P	IO93AD	141
2	M0DTS/P	IO94LI	4	G8VDP	IO93GM	97
3	M0YDH/P	IO82QL84	4	G4CBW/P	IO93AD60	84
4	G8GKQ/P	IO81UC	3	G4FRE/P	IO82LB	118
5	G4CBW/P	IO93AD60	2	G4FRE/P	IO82LB	139
6	G3GJA	IO93TR09KO	2	M0DTS/P	IO94LI	79
7	G4XAT/P	IO91XH	1	G8LES	IO91LC66BS	72
8	G0AZQ	IO94TA	1	M0DTS	IO94LI	57

70cm

Nr	Call	QTH	Qs	BestDX	Locator	Dx
1	G8GKQ/P	IO81UC	4	M0YDH/P	IO82QL	154
2	G4CBW/P	IO93AD60	4	G4CPE	IO91SW	166
3	G4FRE/P	IO82LB	5	G4CBW/P	IO93AD	141
4	M0DTS/P	IO94LI	4	G4CPE	IO91SW	271
5	M0YDH/P	IO82QL84	5	G8GKQ/P	IO81UC	154
6	G3GJA	IO93TR09KO	1	M0DTS/P	IO94LI	79
7	G4XAT/P	IO91XH	0	–	–	0
8	G0AZQ	IO94TA	0	–	–	0

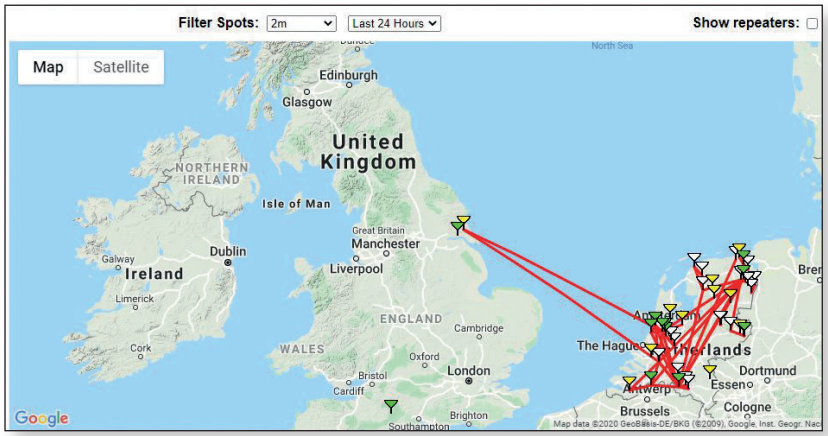
Combined Scores

Nr	Call	Points	Nr	Call	Points
1	G4FRE/P	1520	5	M0YDH/P	932
2	G8GKQ/P	1192	6	G3GJA	251
3	G4CBW/P	1153	7	G4XAT/P	72
4	M0DTS/P	966	8	G0AZQ	57

Veron 2m DATV experiment

In July, the Dutch IARU member society Veron, decided to organise a 2m DATV experiment for Saturday the 22nd of August 2020. Clubs and individual stations were encouraged to get on the air with DATV with the aim of seeing what the possibilities were, having been encouraged by our results on 2m in the UK.

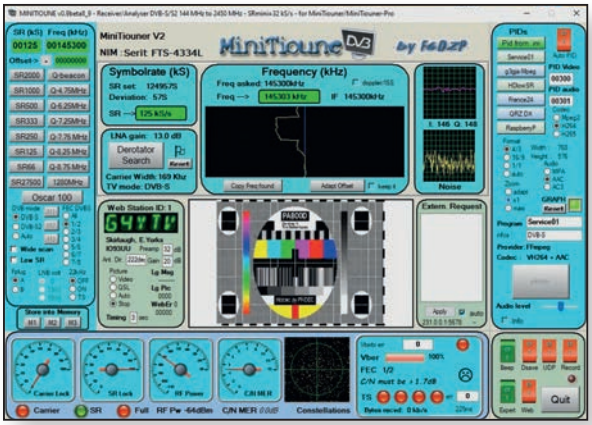
The operating period was to be restricted to 4 hours to avoid interference to other users of 2m band around the chosen frequencies of 144.600MHz and 145.300MHz. The parameters to be used were DVB-S or DVBS2 with symbol rate 125kS/s. Most stations used DVB-S, H264 and FEC1/2. Talkback was not feasible on 2m, so good use was made of the DxSpot chat facility. In all, 27 participants entered into the fun and were joined by stations in Belgium and the UK.



▶ *dxspot.batc.org.uk screenshot during the experiment*

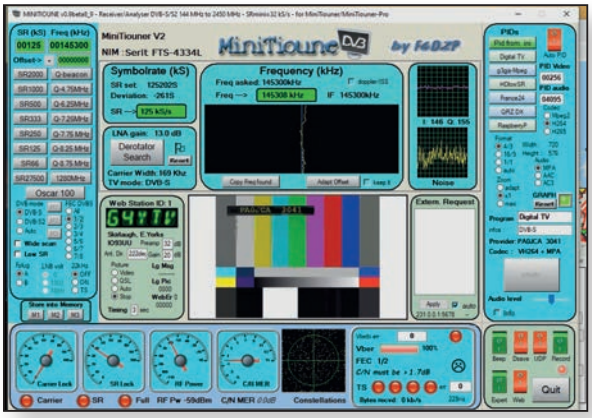
As you can see from the screenshot, Richard G4YTV, received two of the Dutch stations at his QTH north-east of Hull for the first QSOs with a country outside of the UK using 2m DATV. Unfortunately, Richard hadn't completed his amplifier, so wasn't able to make it a

two-way. Although not quite the DX world record, which Rob M0DTS holds at 407km, the contact from the Dordte Electronica Club PI4DEC was close at 403.5km. PA0JCA was received at 380km.



▶ *PI4DEC received at G4YTV (PA800D is a special event callsign and PI4D is the club's contest callsign)*

Richard was using an M2 9 element beam at 20m with an MVV144VOX masthead preamp into a Minitioune v2. PI4D at the Dordrecht club house was using a Lime SDR at about 13dBm followed by a modified NWD2 PA taking the power to around 33 dBm followed by a Dressler D200S (4cx350) PA with an output 100-150 Watts. That was fed to a pair of beams at 40m AGL.



▶ *PA0JCA received by G4YTV on 2m at 380km.*

The frequency used for both contacts was 145.300MHz. The other channel did not work in the UK, possibly due to local mixing from out of band transmissions. Both signals were subject of QSB and long periods of no signal at all. There was no tropo shown on either the F5LEN or Hepburn forecasts so it looks as though these contacts were the result of aircraft scatter. Later analysis using AirScout shows that the path used crosses the routes that many planes take out of Schiphol Airport as they head towards Manchester or the more northerly Great Circle route across the Atlantic.

Upcoming Contest and Activity Weekends

Sept 19th - 20th: 50 and 71MHz contest

When: between 1pm and 7pm on Saturday, 19th September 2020

Where: above 50.5MHz and 71MHz

Why: there's another coveted BATC trophy on offer to the winner!

Please send logs using the usual Excel spread sheet to *contest@batc.tv*. Note that 50MHz contacts should be entered into the 2m section please.

25th October – 70cm and 23cm Activity Day

Focusing on the two most popular bands for ATV, hopefully this activity day will tap into one of the autumnal lifts that used to be more frequent years ago. It's not restricted to these two bands so if you want to try another then go ahead. Focusing on a couple of bands makes it easier for portable stations.

19th & 20th December –13cm and up Activity Weekend

This weekend is centred around the microwave bands. There's a double chance of enhanced propagation with tropo or rain scatter depending on the weather. Has anyone claimed an ATV contact via rain scatter? Give it a try. Again, if you want to use lower bands, please do!

Christmas Cumulative and Repeater Challenge

We are holding a Christmas Repeater Challenge again this year with the aim of increasing ATV repeater use and on offer is a £100 prize for the repeater group with the most contacts recorded. In parallel, we will run a cumulative contest for terrestrial, satellite and repeater contacts. The same on-line entry and ladder system as used for the this year's Lockdown Competition will be used for both contests. The competition will run from 24th December 2020 through to Sunday 3rd January 2021 inclusive. Last year's repeater prize went to the Severnside Group who were grateful for the cash support. Like many repeater groups, their income has been slashed by the pandemic precautions, so here's a chance to help your local repeater group. There will not be a cash prize for the cumulative contest - just bragging rights!

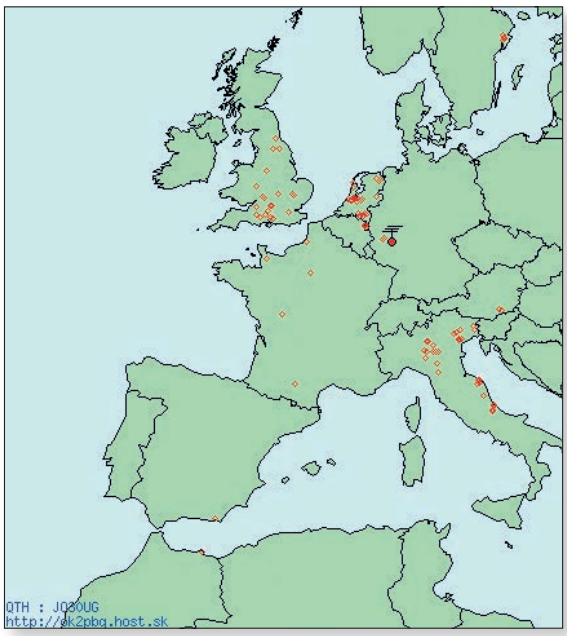
IARU Region 1 ATV Contest 2020

Dave, G8GKQ

The IARU Region 1 ATV Contest was held on 13/14 June 2020. Due to travel restrictions in some countries caused by the COVID 19 Pandemic, the main scoring tables were split into 2 sections. Section 1 was for entrants who only operated from their home station address, whereas those operating from alternative addresses or portable locations entered Section 2. There were 92 entrants from 8 countries competing, using all bands from 432 MHz to 76 GHz.

The overall winner of Section 1 for fixed stations was Wim PE1EZU while Francesco IK3HHG won Section 2 and had the highest overall score. Propagation conditions appeared to be good across Southern Europe with a number of contacts (even on 3 cm) at over 200 km. The best DX was a 70 cm ATV Contact between F5AGO and F1CSY at 370 km.

Participation was much increased from last year (55 to 92), which is a very welcome sign. There were 15 UK participants, and Noel G8GTZ placed second in the portable section with an amazing 20386 points. Terry G1LPS was the highest paced UK fixed station with 4156 points. Noel also achieved the highest score on 4 of the 9 bands used in the contest, sharing this honour with Neil G4LDR on 76 GHz.



IARU Plaques will be presented to the Section winners and Band winners.

Please put next year's contest in your diaries: 12/13 June 2021.

Overall Rankings – Section 1

Pos	Call	Score	Locator
1	PE1EZU	16566	JO22LE
2	PE1POA	13388	JO22RF
3	PA0BOJ	12614	JO21ON
4	PA3CGG	11473	JO22ID
5	PE1ASH	11422	JO22KF
6	IW6ATU	9556	JN63QN
7	PA0T	8141	JO33JB
8	PE2TV	7497	JO32GH
9	IW4CPP	5919	JN44XT
10	F3YX	5776	JN18AP
11	PE1MPZ	5419	JO22NB
12	G1LPS	4563	IO94EQ
13	PA3DLJ	3645	JO20VW
14	PA2TG	3605	JO22FE
15	PA7HV	3566	JO21TK
16	PE1APH	3362	JO21XM
17	F5AGO	3074	JN06DP
18	PE1RQM	2790	JO22RD
19	IZ3ALW	2469	JN65EP
20	PA0JCA	2022	JO22JG
21	I2MUT	1842	JN55FJ
22	PA1AS	1578	JO20XW
23	PA3CRX	1572	JO22NG
24	PA3FXB	1260	JO33KC
25	G0MJW	1222	IO91IO
26	I2CIC	1162	JN55FC
27=	PE1CRW	1138	JO22JW
27=	IW3RMR	1138	JN66PA
29	DC8UG	1128	JO30UG
30	IQ4SC	1126	JN54IN
31	F6BGR	1072	JO00SC
32	PE1OLR	880	JO21UN
33	EA7GLU	828	IM86SU
34	F1CSY	740	JN03SK
35	EA9MH	728	IM85MG
36	PA0RWE	695	JO22HC
37	IW3HYS	675	JN66EB
38	PA3GNZ	638	JO22NB
39	IK6DTA	444	JN72BL
40	IU2JXD	356	JN55BO
41	PE1ITR	353	JO21QK
42	IK2AXV	352	JN55AO
43	G3KKD	322	JO02CF
44	IZ6MVK	268	JN72BJ
45	IW6CVN	216	JN63QP
46	IW3GNC	192	JN65CP
47	IK2DFW	168	JN45WE
48	PA0ASW	164	JO22JR
49	IK2ARZ	152	JN55AD
50	SM0WLL	136	JO89WF
51	SA0CCA	120	JO89XG
52=	IZ3NVT	116	JN66EB
52=	IU3KKY	116	JN66EB
54	PE1JXI	108	JO20VX
55	PA1EBM	105	JO20XW
56	EA7KA	100	IM86SU
57	M0PIT	74	IO92ND
58	PA3CFI	70	JO21TK
59	IZ6PNK	56	JN63OM
60	PE1BBI	44	JO33GE
61	EA7CU	40	IM86SU
62	G4HJW	28	JO02DE
63	G4XAT	24	JO01AI

Overall Rankings – Section 2

Pos	Call	Score	Locator
1	IK3HHG	27630	JN65AW
2	G8GTZ/P	20386	IO91GI IO90LX
3	G4FRE/P	13898	IO91BV IO91GI IO81XW
4	G8GKQ/P	12211	IO90AX IO81UC
5	IW5ECB	8326	JN54JD
6	F4BNF/P	6652	IN99KC
7	G4LDR/P	6425	IO91EC IO91GI IO91JA
8	M0DTS/P	6197	IO94JF IO94DF
9	PE1CVJ	4020	JO22KG JO22JF
10	IQ3QR	3358	JN55WV
11	OE6RKE/P	2753	JN76MU JN76OT
12	DK7UP/P	2262	JO30NI JO30OJ
13	I3NGL	1710	JN66EB
14	IV3CVN	1564	JN66OF
15	IW2MBA	1548	JN55JC
6	IQ3ZB	1284	JN65CN
17	M0YDH/P	1151	IO82QJ
18	IW2EYM	1112	JN55HC
19	IW6CHN	994	JN62SW
20	IW6OCN	774	JN72AE
21	G8VPG/P	736	IO81TK
22	M0DHP/P	456	IO91IN
23	IZ6BMP	305	JN72AF
24	G4CBW/P	264	IO93AD
25	SM0OFV	256	JO99AI
26	SM0VPJ	232	JO89XK
27=	IQ6SE	30	JN63PQ
27=	IK6ZDE	30	JN63PQ
29	IW6DCN	16	JN63RO

Band Winners:

Band	Entries	Winner	Score
70 cm	46	F5AGO	2558
23 cm	83	PA0T	6962
13 cm	45	IK3HHG	10085
9 cm	15	G8GTZ/P	4150
6 cm	24	G8GTZ/P	4135
3 cm	26	IK3HHG	7475
1.2 cm	9	G8GTZ/P	3190
0.6 cm	3	PE1ASH	100
0.4 cm	4	G4LDR/ G8GTZ/P	115

Country Winners:

Nation	Entries	Winner	Score
Netherlands	28	PE1EZU	16566
UK	15	G8GTZ/P	20386
France	5	F4BNF/P	6652
Germany	2	DK7UP/P	2262
Italy	33	IK6HHG	27630
Austria	1	OE6RKE/P	2753
Sweden	4	SM0OFV	256
Spain	4	EA7GLU	826

Best DX:

Band	Best DX	From-To	Dist
70 cm	F5AGO	F1CSY	370
23 cm	IW6ATU	IV3CVN	297
13 cm	IK3HHG	IW6ATU	284
9 cm	G8GTZ/P	G4FRE/P	76
6 cm	IK3HHG	IW5ECB	222
3 cm	IK3HHG	IW6ATU	284
1.2 cm	G8GTZ/P	G4FRE/P	67
0.6 cm	PE1ASH	PA3GGG	15
0.4 cm	G4LDR	G8GTZ/P	13

BATC Convention for Amateur Television 2020 (CAT 20)

CAT 20 will be held as an online event on Saturday 24 October. There will be an varied program of talks in the morning and afternoon, and a QO-100 net in the evening.

Members will be able to sign up to attend the meeting by Zoom, but the talks will also be streamed on the BATC Streamer, and some of the presentations will involve transmissions on QO-100.

The evening net will also be streamed on the BATC Streamer.

More details will be e-mailed to members and posted on the Forum nearer the date.

The outline program

Time (BST)	Title	Speaker
1000	Opening and Introduction	Dave, G8GKQ
1010	Video Production for Online Streaming	David, G4NRT
1050	BATC Low-latency Streaming after Flash end-of-life	Phil, M0DNY
1120	The Ryde DATV Receiver	Tim, MW0RUD
1200	Lunch	
1300	BATC Bursary Update	Noel, G8GTZ
1315	Using the Ampleon Pallet PAs for 2.4 GHz	Michel, HB9DUG
1400	Contest Prizegiving	Clive G3GJA
1415	Portsdown 4 with Pluto and HDMI	Dave, G8GKQ
1500	DVB-T Receiver for Amateur use	Charles, G4GUO
1545	Chairman's Summary and Questions	Dave, G8GKQ
1600	Close	
2000	BATC QO-100 Net – All welcome, call in on chat 10499.25 MHz, DVB-S2, 333Ks, FEC 2/3 H264	Dave G8GKQ

Treasurer's Report for 2018 & 2019

Brian Summers, Hon.Treasurer BATC

Financial strategy

At the club's 2014 general meeting, it was agreed by the membership that our capital reserves were too high and that the club should use those funds for the good of ATV and we are continuing with that policy.

Despite our efforts we have not managed to reduce our reserves, indeed the surplus for 2019 was larger than we would have liked. We are perusing several strategies and projects to use these surpluses to support ATV operation.

The balance Sheet

It has been the practice, for many years, to publish a simple condensed set of figures derived from a more detailed analysis of income and expenditure.

As this year would have been a General Meeting year, figures for 2018 and 2019 are presented with 2017 as a comparison. I normally get an established member to examine the accounts, but due to the difficulties of Covid 19 and shielding, this has not been possible. Full details are available for any member who may wish to examine the accounts.

General outlook

One line in the accounts that is worth a mention is the "subscriptions in advance" figure of £14,095 for 2019.

This is an increase over previous years and is due, in part, to the large increase in membership during 2018-9. I view this as a mark of the confidence that our members have in the club.

The shop (1)

The BATC continues to make a significant investment in digital ATV with the continuing development of Portsdown and other equipments.

It is the policy of the BATC to make items available to members at the lowest cost. We run the shop to promote activity for the mutual benefit of our members and any surplus is used to help fund the BATC. Our shop is operated by volunteers in their spare time.

PayPal (3)

Most of the club's income comes in via PayPal. They charge a percentage plus a fixed fee of 20p. Over a number of transactions this mounts up to the substantial figure as shown in the accounts. The only realistic way to deal with this is to total the fees and put it as a charge against income as it is deducted at source before we receive the income.

Web services (4)

This is the cost of our web presence and includes; software upgrades & purchases, domain charges, hosting, bandwidth charges, new equipment purchases and website development. Our new Wordpress-based website was launched in May 2018 and the cost has stabilised. The higher 2017 figure was for the development cost. The BATC has an extensive online presence, with some six sites.

Membership support, awards and prizes

Using our reserves, the BATC has offered prizes and awards to promote activity. We launched an offer of Bursary funds, to support ATV related projects, a free student membership option and during the Covid lockdown access to our streamer for radio clubs. During 2019 we supported 3 "mini CATs" in Bristol, Finningley and Didcot.

Membership

As treasurer, over the years, I have seen membership numbers increase and decrease. Today I am able to state with some satisfaction that our current membership is at a high point of some 1,400+ members. These members of "Our BATC" are spread around the world, truly an international club. (but there are no plans to remove "British" from our name)

Subscriptions

Once again we have decided not to increase the cost of membership. It remains very good value for money at £20 (paper) and £8 (cyber). This is due to the increased membership numbers allowing economies of scale in printing CQ-TV. The cost of postage remains a concern.

Please see next page for the Income & Expenditure Account

British Amateur Television Club

Income & expenditure account, year ending 31 December 2019

Income account	2017	2018	2019
Subscriptions	£9,737.17	£11,470.90	£14,650.78
Shop surplus (1)	£14,027.28	£5,945.04	£10,431.88
Publications surplus	£32.00	£0.00	£0.00
Interest received	£246.29	£271.09	£311.90
Donations received (2)	£588.19	£134.52	£455.03
Miscellaneous Items	£36.00	£375.00	£28.00
Convention & BGM	£0.00	£540.00	£0.00
Less PayPal fees (3)	-£2,044.72	-£1,322.42	-£2,649.11
	£22,622.21	£17,414.13	£23,228.48

Expend account	2017	2018	2019
CQ-TV Printing	£4,498.00	£5,170.00	£4,813.00
CQ-TV Postage	£2,045.21	£2,627.55	£3,600.78
Office expenses	£114.40	£269.90	£116.56
Committee meetings	£0.00	£36.10	£0.00
Members services	£1,672.65	£3,006.99	£3,243.46
RSGB affiliation fee	£47.00	£47.00	£47.00
Conventions & BGM	£25.00	£561.50	£42.97
Web services (4)	£6,306.92	£3,927.47	£3,387.12
Awards & Prizes	£169.98	£0.00	£100.00
	£14,879.16	£15,646.51	£15,350.89

Balance sheet at 31 December 2019

Assets	2017	2018	2019
Stock, BATC shop	£8,060.39	£3,881.15	£6,730.40
HSBC account	£14,218.39	£21,910.41	£16,861.29
PayPal account	£4,196.38	£2,524.99	£5,869.05
Teachers Building Society	£32,525.94	£32,797.03	£43,109.93
Paid in advance	£0.00	£562.50	£562.50
Less Current liabilities			
Subscriptions RX in advance	-£9,607.97	-£10,515.33	-£14,094.83
	£49,393.13	£51,160.75	£59,038.34
Represented by Accumulated fund			
Balance brought forward	£41,650.08	£49,393.13	£51,160.75
Surplus or Deficit	£7,743.05	£1,767.62	£7,877.59
Balance carried forward	£49,393.13	£51,160.75	£59,038.34

Equipment was purchased in 2018 to the value of £282
Equipment was purchased in 2019 to the value of £906

Notes to the accounts

(1) This is the shop surplus before PayPal fees. Shop turnover in 2019 was £56K.
(2) The donations figures includes some members payments & subscription “Top Ups” where there was a shortfall in payment.
(3) The PayPal commission is included in income as a deduction as it is deducted at source.
(4) The 2017 figure includes an advance payment for the new website template.

Report from PI9CAM during the Dutch ATV Contest on September 13

Jaap PA0T

A few months ago we conceived the plan to participate in an ATV contest once from the 25mtr radio telescope in Dwingeloo. Unfortunately Covid 19 turned out to be our biggest opponent, we were only allowed to use the dish for four hours with a maximum of four people. We decided to do this on Sunday morning and have spread the news of our presence in the ATV-world.

At 06.00 UTC time we entered the dish and we were qrv at 6.15 UTC. We were Jan PA3FXB, myself Jaap PA0T, Erik PA1ET and Gerard PE1BBI. We were able to work under the call PI9CAM on three bands, 70cm, 23cm and 13cm. Sending was not included, because that is prohibited there, only above 10 degrees elevation can be sent for EME. Jaap was behind the three laptops with which the images were captured with dongles and a HackRFOne and the SDR Sharp program, and also a laptop with SDRAngel for datv. Jan did the communication, mainly on the DXSpot chat box, but sometimes also on Whatsapp,. Appointments at 2 meters for skeds were not possible. Erik controlled the dish and Gerard provided the coffee, videos and photos.

▶ *De Dwingeloo telescope dish on September 13, 2020 (photo: PE1BBI)*

Technically everything worked perfectly, the biggest problem was the slowness of the dish. Obviously, such a thing cannot rotate at the speed of a normal rotor and starting and stopping takes a lot of time. Due to the enormous sharpness of the dish you could just stand next to the signal and then you really saw nothing. For 13cm, the opening angle is less than half a degree. The six digit locator system is too inaccurate at distances up to 150 km, so the dish had to be carefully adjusted regularly. And that took a lot of time.

As soon as the dish was set correctly, the connection was a fact. Usually B4 or B5, it went great. We also had agreements with Noel, G8KTZ /p (IO91GI) and Rob, M0DTS /p (IO94RJ) for DATV. It must be said, partly thanks to the tropo conditions, these were very loud signals at 70cm, even Rob's only 25 Watts. DX was therefore 558 km. The BATC had been so kind to donate a Minitouner to PI9CAM in the week before the contest, unfortunately we didn't get it up and running without risk in time. But it will certainly be used next time. Thank you gentlemen!

▶ *The digital image of G8GTZ / p with SDRAngel (photo: PE1BBI)*

It ran smoothly, connecting once every 7 minutes on average. It took most of the time to arrange and often also wait for a response in the chat. The picture itself was never a problem. We regularly saw Rob PE1ITR on 2330 MHz, who send beautiful ATV signals over the Netherlands from the PE1CKK plane. At 10:45 UTC we disconnected the whole system and the result was 39 connections from all parts of the country and beyond.

It was a wonderful four hours.

The Ryde set top box receiver for DATV

Noel Matthews G8GTZ

Since the early release of MiniTiouner in 2016 most DATV stations have been using the USB tuner hardware and PC software by F6DZP to decode Amateur DATV signals. The MiniTiouner system is a fantastic tool for receiving DATV signals and we simply would not have been able to move DATV forward with developments such as RB-TV without it.

However, having to use a PC to receive DATV signals is an inconvenience a lot of stations would like to do away with. Plus the need for a PC has discouraged a lot of repeater groups from installing RB-TV and DATV on a remote site.

To solve these issues, the ATV community has continually tried to find a suitable consumer Set Top Box (STB) that will reliably decode signals below 1Ms. One or two models have been found but the user interface, with the need to set up satellites and bouquets and then scan for signals, is not suited to DATV where we just need to enter frequency and symbol rate and wait for a lock. Plus a recent eBay purchase of quantity 3 of one model delivered 3 major variants of hardware!

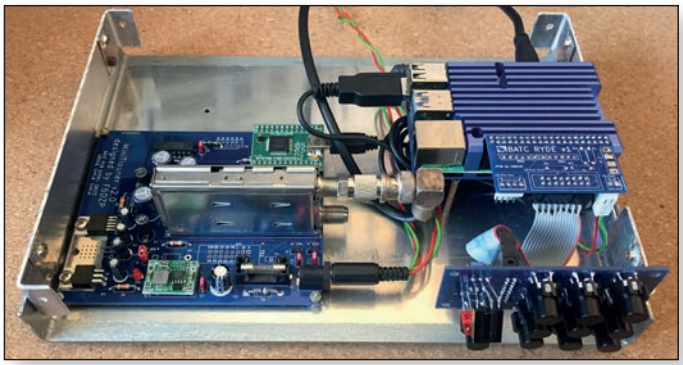
To overcome these problems BATC believed there was a need for the community to develop a reproducible DVB-S and DVB-S2 DATV receiver and so in April we generated a specification for the Ryde STB DATV receiver.

The Ryde receiver

The BATC Ryde receiver is a stand-alone receiver designed specifically for Digital Amateur TV which is controlled by IR remote or front panel switches and requires no additional PC or other hardware,

The Ryde has a "point and shoot" interface – by using the IR remote or front panel switches and on screen display you can simply enter frequency and SR and the Ryde will look for DATV signals without the need to enter bouquets, transponders or scan across a range of frequencies.

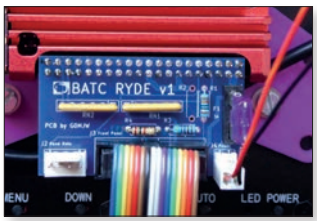
The received video and audio is available either as an HDMI signal or analogue audio and composite video making it ideal for monitoring in the shack on an HDMI or analogue input monitor.



Building a Ryde receiver

The Ryde receiver currently uses the existing MiniTiouner version 2 PCB connected to a Raspberry Pi4 via a USB cable. To build a Ryde you will need the following:

- Raspberry Pi 4 and heatsink / fan
- 5 volt 3 amp PSU
- Sandisk Ultra 8GB+ SD card - Pre-programmed cards will be available from the BATC shop
- Rpi 4 pole AV lead or micro to standard HDMI adapter
- Remote control and IR receiver – Ryde can be programmed to use any surplus remote
- A standard MiniTiouner V2 hardware PCB
- A case of your choosing



The BATC shop sells a small breakout board to save connecting directly to the RPi GPIO port and a front panel PCB to mount the front panel switches.

The components can be mounted in any suitable case– some people are using repurposed STB cases – and the MiniTiouner PCB is connected to the Rpi via the standard USB connector. Video and audio is taken out of the Rpi via the HDMI or Analogue connectors.

Using the Ryde on air

To use the Ryde on air, simply select menu and enter the frequency and symbol rate required using the IR remote or front panel buttons.

The receive performance is a good as a MiniTiouner system and the video decoder has shown to be more reliable than the standard Windows decoders. Testing on the weekly BATC net on QO100 has shown that the Ryde can reliably decode all signals without the need for any reconfiguration.

A number of pre-sets are available and these plus more advanced configurations can be set using the console menu on a PC connected over the network to the Rpi.

The Ryde as a repeater receiver

As well providing a DATV shack monitor receiver, the Ryde has been designed for use at repeater sites. A reliable lock detect signal is available to switch repeater logic when a signal is received plus the Ryde has the ability to scan up to 4 symbol rates and 4 frequencies. For example it is now possible to have a single receiver that will receive 2Ms, 1Ms, 500ks and 333ks on 437MHz and provide a reliable lock signal when a signal is received on any SR.

The Ryde receiver is simple to build and simple to control, it requires no additional hardware such as a PC and has been designed to provide a flexible DATV receive solution at repeater sites. It is a really great achievement by the development team Tim MW0RUD, Phil M0DNY, Dave G8GKQ and Mike G0MJW.

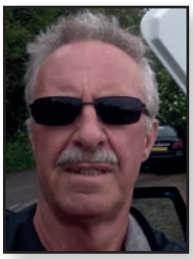
For more details see: *https://wiki.batc.org.uk/Ryde_Receiver*

Congratulations!

The BATC would like to wish a belated Happy 92nd Birthday to John Lawrence GW3JGA last August. John is one of our longest standing members and he is still active on ATV, usually on the GB3TM repeater in Anglesey on Tuesday nights. His name regularly appears in the '*Turning Back the Pages*' feature for his many technical articles for CQ-TV over the years.

John is in good health and we look forward to greeting him on his 93rd

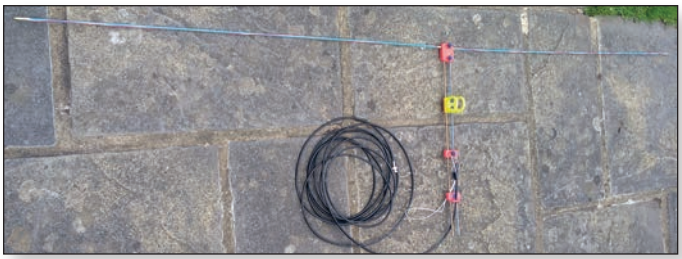
▶ *John, GW3JGA seen here at the BATC General Meeting in 2010*



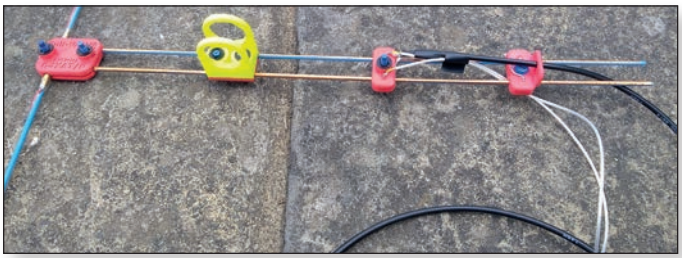
In search of maximum talk-back

Gareth G4XAT

As a relative newcomer to DATV getting the right 'gear' sorted for going portable is one way of ensuring success. I'm also an avid builder/designer and adapter of ideas to fit my agenda. This is the story of how I developed a full wave dipole for 2m, 'the most gain you can get without a co-linear or beam'.



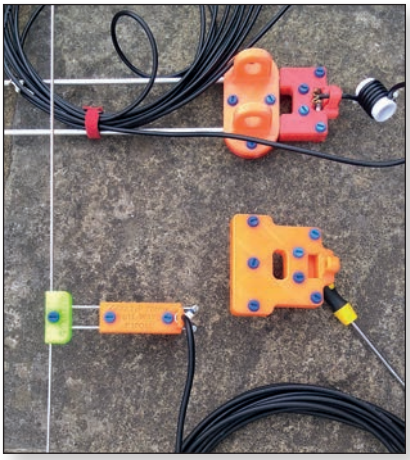
You may have happened across the amazing 'Technical Bulletins' produced by John, G8MNY over the years. *https://www.theskywaves.net/technical.html* If you can bear with the ascii diagrams, there is a wealth of info buried in them. Going back to 2006-ish I had quite a few foundation license holders (school pupils, all trained wonderfully by *https://bdars.wordpress.com/*) in need of something cheap and effective to get them on the air. John (fellow club member of the Surrey Radio Contact Club) suggested his full wave dipole. It worked well and was ideal for 'loft installations' where most were installed, allowing for matching in every situation. It wasn't without problems though, needing the feeder keeping away from the bottom element to prevent field distortion and being a 'bit of a palaver' to match and VSWR in-situ, plus a 4:1 balun needed making.



Driven by a need I started thinking about ways of making one that could be used portable, generally atop a fishing pole secured to my vehicle in some way. Photo shows my first development model (based on Aldi electricians fibreglass rod sets) which after due adjustment worked well, out-performing a $^{7}/_{8}$th mobile whip used for comparison purposes. On the weekly club net I mentioned my experiments and a desire to model it in MMANA-GAL. At this point Pat, G4FDN beat me to it and not only drew the model but investigated alternative matching arrangements, based on his university lectures about transmission lines from 50+ years ago. He shared his models with me and I delved further into the wonders of software simulation to see what made it all work. The breakthrough comes from adjusting the 'trombone' lines spacing (Pat's idea, not mine) to achieve impedance matching and available material diameters (hardware constraints). It didn't take long to come up with a model based on 3.2mm diameter elements and 6.25mm diameter trombone sections. It was then on with some CAD to design the 3-D printed parts to mount everything in the required manner. These were printed in PETG for strength and UV resistance. The 3.2mm aluminium welding rods (5%Mg) were turned down to 3mm and threaded M3 and the 6.25 (1/4") were bent using a brake pipe bending tool. Coax attachments points were drilled freehand and tapped M3 and the 3-to-6.25 joints were drilled using the final fixing as a jig. My favoured fixings of number plate nuts and bolts were used to assemble the parts.

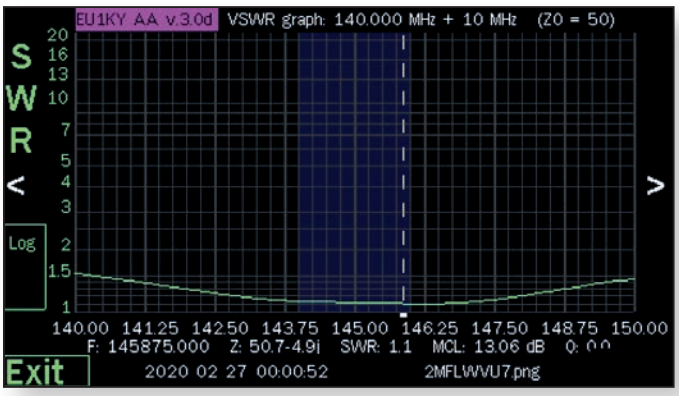
The first prototype resonated a bit low, so some trimming of elements and trombone was undertaken after using the software to model the effects (resonance and/or impedance). The end result produced the VSWR plot shown. Tests in the garden show a barely noticeable drop (-1dB, as predicted by the software when a feeder was modeled) in an essentially omnidirectional radiation pattern, all aimed at the horizon.

In use it was apparent the central mounting was not really needed so the CAD was modified to produce a combined 'end mount'. A coax choke former was designed and printed to help prevent feeder radiation. This sits atop a fibreglass fishing pole (5-7m AGL depending on pole) and works as expected.



Spurred on by this success, I scaled the model to 70cms and 3.2mm rod. With trimming this too produced a very good match and being so much smaller, can easily be mounted above the 2m version on the same pole.

Bit of the trend developing here… I currently use a Slim Jim made of ladder line for 4m, so I scaled the design again, going up in material size. This also worked as designed, although it did require a balanced mounting to stop the pole leaning. Understandable really – it's quite a lot of aluminium with attendant windage. STL files are available if anyone wants to replicate the design. It certainly helped me learn MMANA-GAL, especially the graphical entry method which works for my brain and shows the power of software simulation. Plus I get good coverage on 144.750 MHz!



Eight Band contact with G3VKV

Dave G4FRE

Over the last few months I have been trying to get signals from the indoor antennas at the G4FRE location (IO82UC) to G3VKV (IO81XV35) and G4NZV (IO82WA)

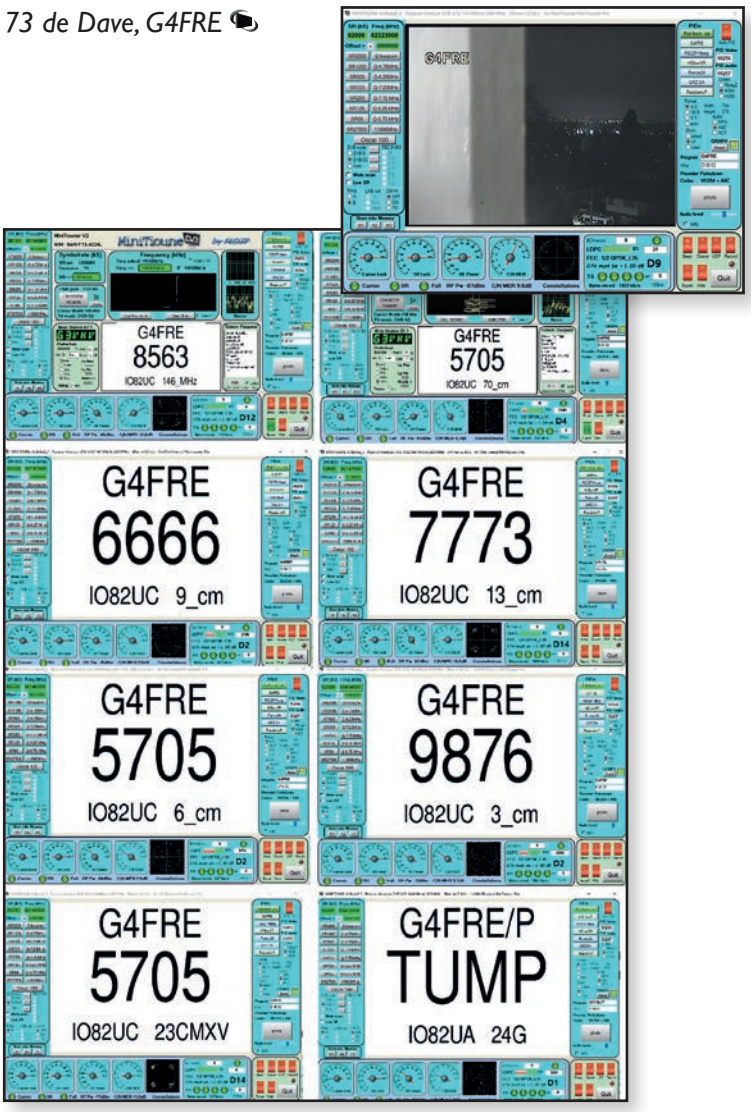
Have now got signals to G3VKV on all bands 144MHz to 10GHz (Update: 24GHz added to the bands - Sept 2020)

Also been received by G4NZV on all bands except 6cm. The other view is my of Worcester as received by G4NZV

My Equipment:

2m/70cm	2W	dualband colinear in loft
23cm	5W	23 ele yagi (fixed east in loft)
13cm	5W	23 ele yagi (fixed east in loft)
9cm	5W	15db horn
6 cm	5W	20db horn
3cm	5W	18" PW dish
1.2cm	1.7W	16" dish

73 de Dave, G4FRE

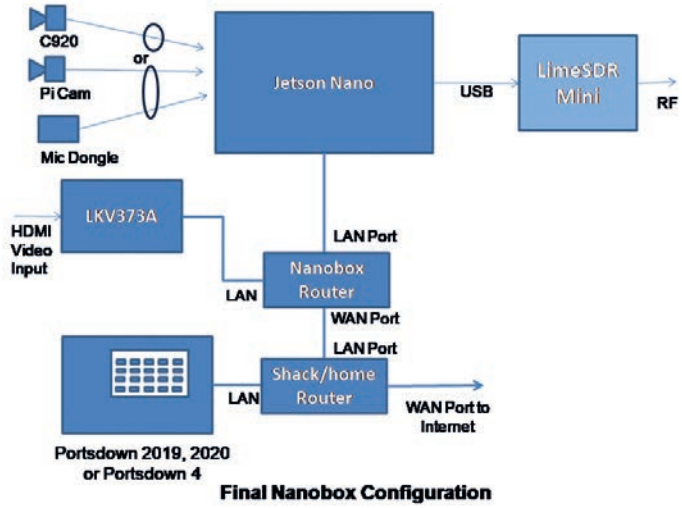


Setting up the Jetson Nanobox Software

Dave, G8GKQ

The Jetson Nanobox H264/H265 encoder was first described in CQ-TV 265 (pp 20-21), but only brief details of the software required to make it work with the Portsdown were given on the BATC Wiki. The router configuration was described in CQ-TV 268 (pp 30-31)). Please note that this project is not as simple as the basic Portsdown – you need to be prepared to learn some new computer/networking skills if it does not all go according to plan.

This article describes an updated procedure to set up the Jetson Nano so that it can be controlled from the Portsdown (any recent version – Portsdown 2019, Portsdown 2020 or Portsdown 4) to transmit stunning H265 (and H264) DATV pictures using a LimeSDR Mini. The target equipment is shown here.

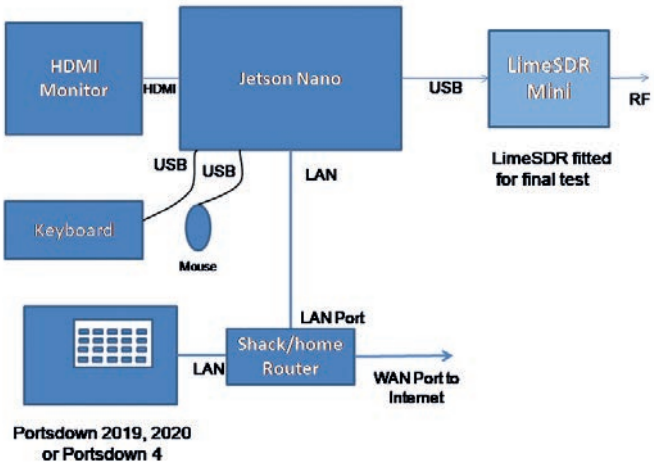


Final Nanobox Configuration

Software Build – Basic System

Unlike the Portsdown, to start the software build, you will need to connect an HDMI monitor, keyboard and mouse to the Jetson Nano. It also needs to be connected to the internet. So, for now, forget the diagram above and set it up like a normal PC on your main LAN as shown below. So, not the network that you will set up later for the NanoBox. Note that you will also need to connect your Portsdown to this network as well.

The first step is to download the operating system and utilities from the NVIDIA website. It is called "The Jetpack 4.4". To download the software, copy and paste this link into your browser: *https://developer.nvidia.com/jetson-nano-sd-card-image* . In future it might be found in the archive here: *https://developer.nvidia.com/embedded/jetpack-archive* .



Jetson Configuration for Setup

The download is about 5 GB, and you then need to unzip it. You will end up with a 13 GB file called **`sd-blob-b01.img`**. You should use Win32DiskImager (or etcher) to write this image to a 32GB UHS-1 Micro-SD Card (preferably a Sandisk one similar to those sold by the BATC Shop). Once the image is on the card, you can insert it straight into the Nano – there is no need to add an ssh file or anything like that. Note that the SD Card may no longer be visible to Windows after writing the image to the card; this is normal, but does make it difficult to re-write the card if required later. (See side box)

Make sure that you have the keyboard, mouse, HDMI display and wired network connected to your Nano and switch it on.

- After a minute or so the HDMI display will come to life and you will be asked to accept the terms of the licences. Accept and continue.
- Select the language and continue.
- Select the keyboard layout and continue.
- Set your time zone and continue
- Enter your name, and then EXACTLY these responses:
  - Your computer's name: jetson-nano
  - Username: nano
  - Password: jetson
  - Confirm: jetson
  - Tick "Log in Automatically" and press continue.

  It is important that you use these settings to make it easier for you later.

- Accept the default APP partition size (probably 30422) and continue.

Let it build the system and reboot itself. When it has rebooted, close any windows that are open and, if it asks you, tick **No** to sending system info.

Click the cogwheel "System Settings" in the left hand bar. Then click "Network" in the middle section of the Window. Click on each of the wired network options looking for your IP address and make a note of it.

Now you should connect your Portsdown to the same network as your Jetson Nano. First log in to the Portsdown by ssh (using PuTTY or KiTTY with the username pi and the password raspberry). If the console menu comes up, select "Shutdown" and then "Exit to Linux". At the prompt, type:

```
ssh nano@<ip address>
```

where **<ip address>** is the IP address of your Jetson Nano that you noted earlier. This command asks the Jetson to open a user session for the user "nano" which you created earlier. It should respond with something like this:

```
ssh nano@192.168.2.113
The authenticity of host '192.168.2.113
(192.168.2.113)' can't be established.
ECDSA key fingerprint is SHA256:JYXO5w3LRs
Ml9hE+i8+ggNKWcKJI35w/7H6Hvwm4MFM.
Are you sure you want to continue
connecting (yes/no)?
```

Type yes, and it will then ask for the password (jetson). This procedure needs to be done for each new Portsdown build that you will control the Jetson Nano from in future.

You can now disconnect the HDMI screen, keyboard and mouse from your Nano. Hopefully you won't need them again.

Software Build – DATV Components

From your Portsdown or a PC, make sure that you are logged into your Jetson Nano by SSH. If a PC, you can use PuTTY or KiTTY, to log in to the IP address that you noted earlier with the username nano and the password Jetson. Next, download and run the install file with these commands:

```
wget https://raw.githubusercontent.com/
BritishAmateurTelevisionClub/portsdown4/
master/install_for_nano.sh
chmod +x install_for_nano.sh
./install_for_nano.sh
```

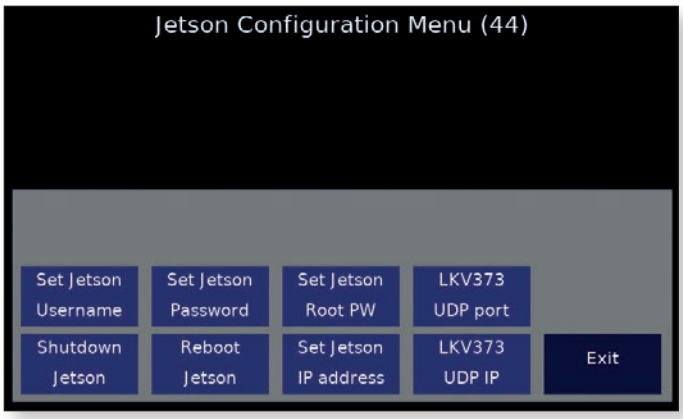
At the end of running this script (which takes 5 to 10 minutes) your Nano should reboot. Connect a LimeSDR Mini (with stock firmware loaded, not the LimeDVB firmware) by USB, and then log in by ssh again.

```
Enter
test
```

at the command prompt; you should see some error messages to begin with, but after 15 seconds or so, you should find that your LimeSDR Mini is transmitting a test card on 437 MHz 333 kS, DVB-S2. If all is well, you can press ctrl-c to stop it and then move on to setting it up with your Portsdown.

Setting Up with Portsdown

You should now shutdown (sudo shutdown now, and then enter the password 'jetson') and then connect a video source to the Jetson Nano – either a Raspberry Pi Camera or a C920. Not both at the same time, as the software gets confused. If you connect a Raspberry Pi Camera, you MUST also connect a USB audio dongle (even if you don't plug a microphone into it). If you don't have either of these cameras to hand, simply select Test Card as the video source when you come to test.



Then, after the router has booted up, start the Jetson Nano, and go to Menu 3, Jetson Config on your Portsdown. You will need to set the Jetson IP address. Once you have done this, you will see that "Shutdown Jetson" and "Reboot Jetson" buttons are no longer greyed out. If you have connected an LKV373A HDMI sender to the network, you can also check its IP address and port on this menu. The defaults are normally correct.

Now, on Menu 1, you can select "Output To" "Jetson Lime" and then select a video source, set your transmit settings and try selecting transmit.

If you have built a full "Nanobox" with a router, you can now reconfigure to connect everything to the Nanobox router and only connect its WAN port to the shack network. If your Portsdown is on the shack network, make sure that you have port forwarding set up on the

router (see the article in CQ-TV 268 pp 30-31) and that you then set the Jetson IP address in the Portsdown (Jetson Config) Menu to the router WAN address, not the actual Jetson IP address on the Nanobox network. If, having done this, you find that the "Shutdown Jetson" and "Reboot Jetson" are still greyed-out, you may need to go to the "Security, Advanced Security" page of your router configuration and untick the "Forbid Ping Packet from WAN Port" box.

You should now be able to shutdown or reboot your Jetson from the "Jetson Config" Menu of your Portsdown.

Troubleshooting

If you have difficulty with transmissions, the first thing to check is that the "test" transmission works (see above). Then check that you only have one camera connected, and if it is a Raspberry Pi Camera, that you also have a USB microphone dongle connected.

Note that, because only the minimum of commands are sent from the Portsdown to the Jetson, the LimeSDR may continue to flash a Green LED after transmission ceases. It does not go back to Red flashing like it would if connected to a Portsdown.

If using the LKV373A for HDMI capture, make sure that you have a valid HDMI source with audio connected to the LKV373A.

Many problems are caused by network configuration or authentication issues. So if the Jetson does not respond to the Portsdown commands, try logging into the Portsdown from a PC and then opening an ssh session from the Portsdown to the Jetson (**`ssh nano@<jetson_ip>`**). You may see a message asking you to run a command to re-authorise ssh access; this often cures the problem. If the "Shutdown Jetson" button in the Jetson Config menu is greyed out, it means that the Jetson is not responding to ping requests from the Portsdown.

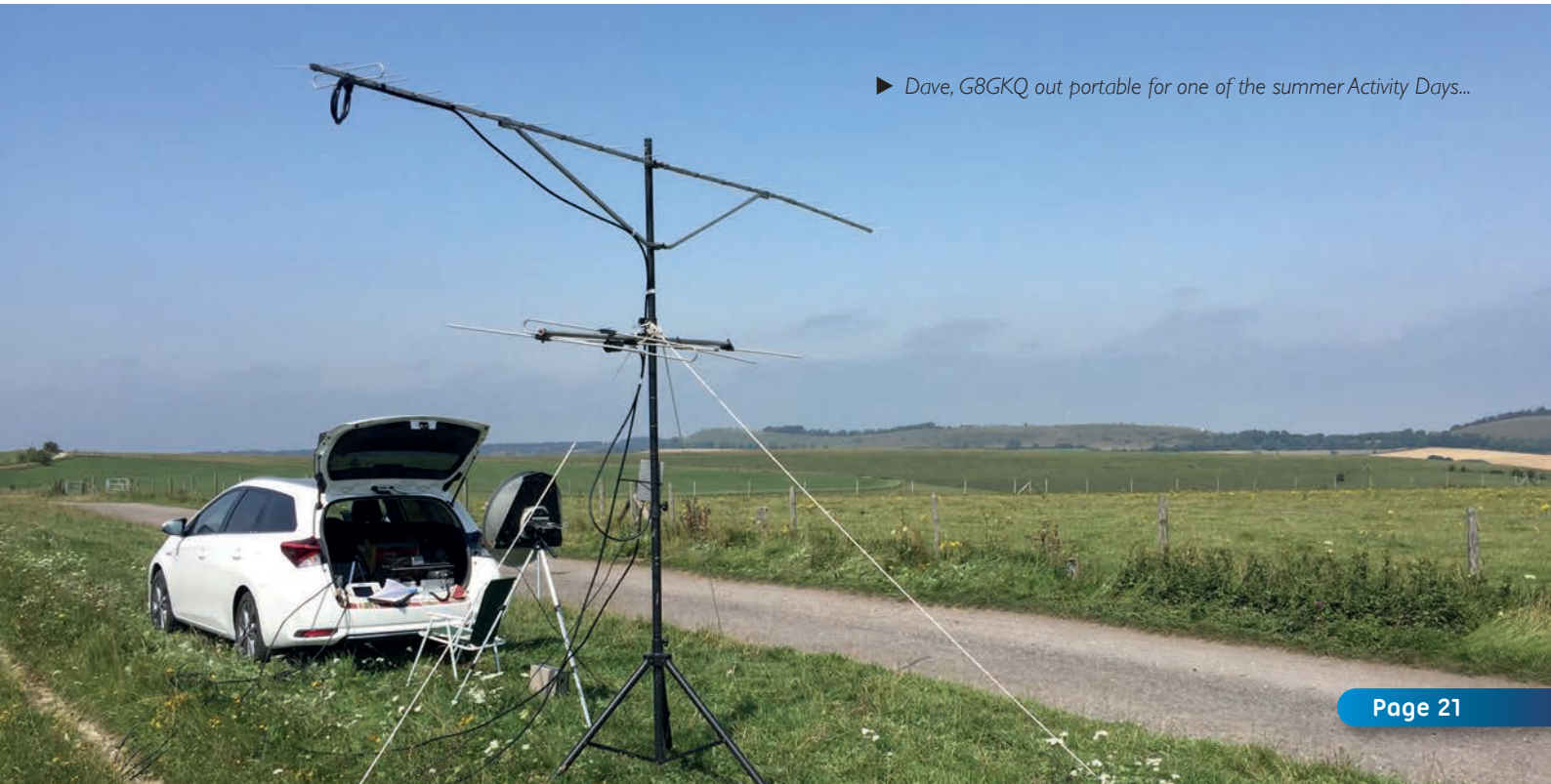
Remember that you can post on the BATC Forum for further help. Please try to give as much information as possible with your question.

Re-Writing the Jetson Nano SD Card when it won't appear in Windows Explorer

If you have written the Jetson software to an SD Card it will no longer be visible in Windows Explorer on a Windows PC. This is because the card has a valid file system on it, but Windows cannot understand the file system format (ext4).

The way to reformat the card so that it can be re-written is to use a utility such as "EaseUS Partition Master Free Edition". After downloading and installing this free software, select the SD Card. Be very careful to select the correct disk – it should have a capacity of about 29.72 GB, and a mistake here could wipe your computer's main disk. Then right click on the correct disk and select "Rebuild MBR". Then, in the ribbon at the top of the window, execute this action.

At the end of this action, the SD Card should be visible in Windows Explorer so that you can re-image the card.



▶ *Dave, G8GKQ out portable for one of the summer Activity Days...*

Jetson NanoBox Part 2

The LKV373A HDMI Interface

Dave G8GKQ

Good quality HDMI computer interfaces can be expensive or difficult to use (needing specialist applications and USB3). However, there is a reasonable alternative that I have used in the "Jetson Nanobox".

The LKV373A

The LKV373A HDMI "TX" and "RX" started appearing on eBay as HDMI range extenders about 4 years ago. They are still available and the "TX" costs about £29 including delivery from UK-based sellers. The description is something like *"LKV373A V3.0 HDMI 1080P Extender Sender & Receiver Up to 120m Over Lan Cat5/5e/6 [Sender]"* The important thing is that it is a V3.0 device. Earlier versions are not suitable for our use.

The "TX" can be modified to accept full HD HDMI and send it over a LAN (by broadcast UDP) with very little loss of quality. The HDMI video and audio can then be used as an input to ffmpeg or gstreamer linux software applications and transmitted (as DVB-S or DVB-S2) or streamed (to the BATC Streamer or other streaming servers). The video and audio can also be viewed using VLC on a Windows 10 PC.

This article describes how to set up and use the LKV373A for the "Jetson NanoBox" transmitter (see *CQ-TV 265 pp 20-21*), and also how to use it to stream HDMI video and audio to the BATC streamer. Note that the device uses "broadcast UDP", so you may wish to set it up on an isolated LAN as discussed in my previous article about UDP (*CQ-TV 268 pp 14-15*).

Setting Up the LKV373A

Soon after the devices were released "danman" wrote on his blog *https://blog.danman.eu/* about how useful they were. Additionally, Yodeck *https://www.yodeck.com/* documented how to use them with their video walls, and published some updated firmware.

Firmware Update

The first step is to download the firmware. This can be found at *http://repo.yodeck.com/Lenkeng_LKV373A_Alternative_Firmware.zip* . Unzip the files to a new (named) folder on your computer and look for the TX folder. Again, unzip the file "IPTV_TX_PKG_v4_0_0_0_20160427.zip" and you should get 2 files. The one that you will want is IPTV_TX_PKG_v4_0_0_0_20160427.PKG.

Next, you will need to find the IP address of your LKV373A. It does not identify itself on the LAN with a name, so I find that the easiest thing to do is to log into the router DHCP management page and look at what devices are there. Then connect and power-on the LKV373A (you don't need any HDMI input at this stage), and look for the new device. Alternatively, you can use IP Scanner or "fing" on an iPhone. Once you have the IP address, type it into your browser's address bar.

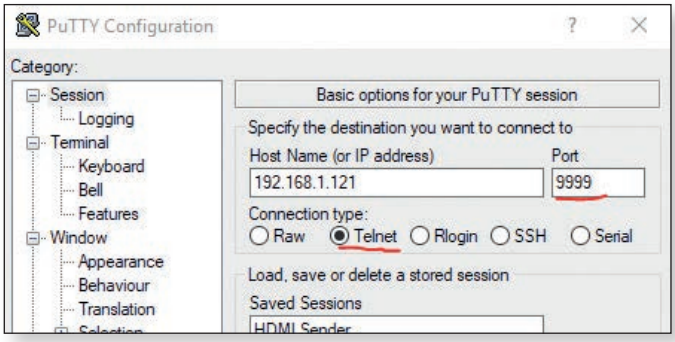
The IP address takes you to simple (and insecure) web page from the LKV373A. This gives you 4 options. To load encoder software and update, or to load firmware and update (which is what is required). Where it says "File to Upgrade Firmware(*.PKG):", click choose file. Then browse to the file IPTV_TX_PKG_v4_0_0_0_20160427.PKG that you downloaded earlier and select it. Then click the "Upgrade!" button.

You should see a message saying "Firmware upgrading, please wait..." After about a minute, a message will appear saying "Please reboot the device". Do not reboot the device – it will already have done it.

The LKV373A should now work in its default mode, but it is worth restoring the factory settings so that you can access the management interface.

Restoring Factory Settings

Use PuTTY or KiTTY to access the device by Telnet (NOT ssh) on its IP address and port 9999.



Once connected, you should see it announce itself as an IPTV TX Server. You simply need to enter one command: factory_reset. It should look like this:

```
Escape character is '^]'.
==============================
========IPTV TX Server========
==============================
input> factory_reset
Processing factory reset!
System will reboot after few seconds!
```

Once the device reboots, go back to your web browser and go to the IP address again. Log in with the username admin, and the password 123456.

Configuring the device for Use

The IPTV Server management page is mostly self-explanatory. The fields that you might want to change are:

Video Output Resolution. The Full HD (FHD) output resolution is 1728x1080, so not quite Full HD. However, it does resample, so shows the entire 1920x1080 input image. For some applications you might want square pixels, so you can select the FHD output resolution to be HD, which will give you a 1280x720 output image. This is a good compromise for streaming to the BATC Streamer.

Stream Settings. If you have more than one LKV373A, you may want to change the multicast IP address to a different address. I have not found the need to change any of the other settings.

Testing the LKV373A

You can check that the LKV373A is working by opening VLC on a Windows 10 PC, selecting "Open Network Stream...." and entering udp://@239.255.42.42:5004 as the address. Even without an HDMI input, you should see a "Please check the TX input Signal!" message. Note that there is no audio associated with the stream. You can also use the network-based "HDMI Monitor" included in the latest Portsdown 4 software build.

Using the LKV373A

Note that you MUST have input valid HDMI signal with an audio channel to stream or transmit from the LKV373A. The "Please check the TX input Signal!" message does not have valid audio and will fail to stream or transmit using some software builds.

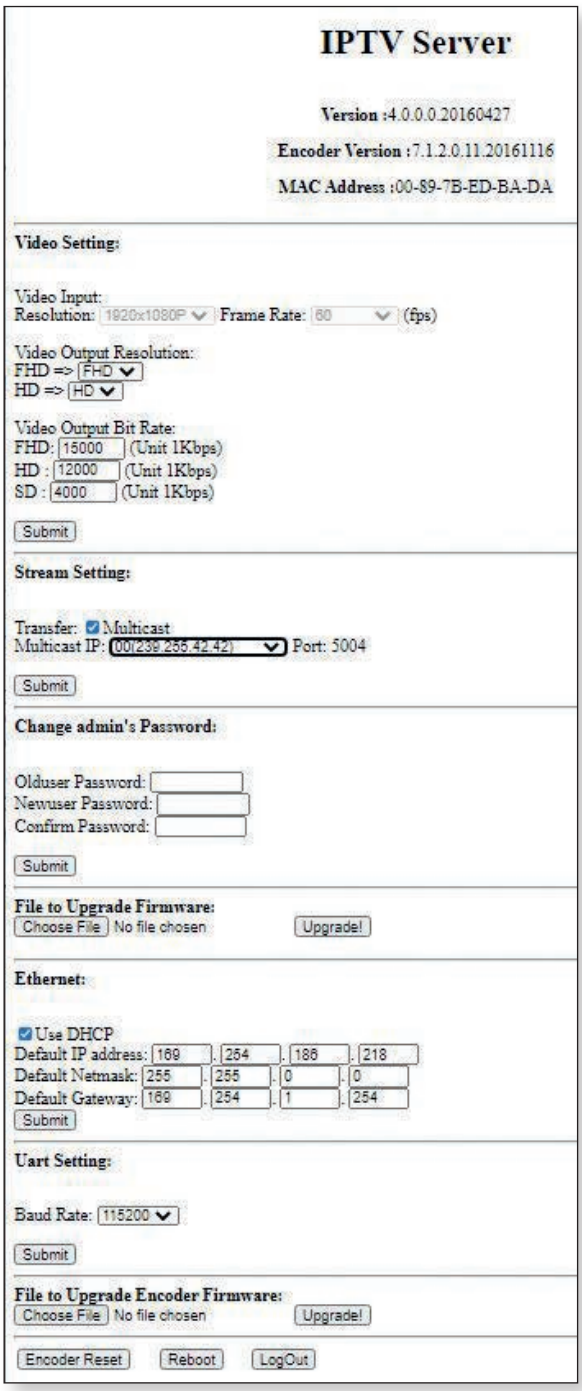
To use the LKV373A with the Jetson Nanobox, the IP address (default 239.255.42.42) and port (5004) will need to be entered in the software that you are using.

To stream to the BATC streamer, you can use a Portsdown-configured Raspberry Pi 4. Log in by ssh and enter this command (one long line):

```
pi@raspberrypi:~ $ rpidatv/bin/ffmpeg
-thread_queue_size 2048 -fifo_size 229376
-i udp://239.255.42.42:5004 -c:v h264_
omx -b:v 1024k -c:a aac -b:a 128k -f flv
rtmp://rtmp.batc.org.uk/live/streamname-
keykey
```

Conclusion

Although there are alternative devices available, I have found the LKV373A to be a reliable device to import HDMI into computer systems, and use it for nearly all my QO-100 transmissions.



The BMD ATEM range of video switchers

Frank Heritage M0AEU

If you have a requirement for switching between several cameras or other video sources such as VT or graphics during a 'live' production environment – ie an ATV contact through your local repeater, or the Thursday night BATC net on QO100 – and you don't want to use a traditional vision switcher like a Grass Valley Mixer, then you might want to consider the Blackmagic Design ATEM range of production switchers..

There are a variety of switchers available now, from the basic TV Studio (out of production now, but often available secondhand on a popular auction site), right through to the latest ATEM Constellation 8K, for those requiring UltraHD and with very deep pockets! The range includes::

- ATEM TV Studio
- ATEM TV Studio HD
- ATEM 1M/E
- ATEM 2 M/E
- ATEM Mini/Mini Pro/Mini Pro ISO
- ATEM Constellation 8k

As my requirements are fairly minimal, and my pockets aren't that deep, this article will focus on my experience with the ATEM TV Studio and the model I subsequently upgraded to - the 1M/E. We'll also have a quick look at the new model, the ATEM Mini. However those of you who have more complex requirements, and have won the lottery, might wish to explore the other models here: *https://www.blackmagicdesign.com/uk/products* .

Whether you need just the basic model, or one of the more advanced switchers, they all utilise the BMD control software which runs over IP and can be controlled from multiple instances simultaneously. This can help on a larger shoot, where one operator might be controlling the switching, whilst someone else might be doing an audio mix; another operator can be controlling the graphics - all on the same switcher, but with their own control screen.

The ATEM Television Studio

This switcher is an affordable, broadcast-quality, production switcher for creating live SD or HD television programs, aimed at the more 'amateur' market (schools, weddings, houses of worship… etc). With six-channel vision mixing, chroma keying, a multiviewer and H.264 encoder, it offers live, multi-camera production and encoding files for the internet, all in one unit. Any HDMI or SDI camera,

including low-cost, consumer HDMI HD cameras, can be used, and all video inputs feature automatic frame re-synchronizers. The switcher consists of a 1U rack-mounting panel which is controlled by a software control panel. It should be pointed out, that although the TV Studio will support SD or HD up to 1080i, all the inputs have to be the same format and resolution.

This is a fully 10-bit digital design, providing high quality from cameras, servers and character generators, with true, 10-bit video quality maintained throughout the entire signal path. All transitions are instantly available and include the same cut, mix and wipe functions as found on traditional mixers. Graphics can be loaded into the two media-player frame-stores, for custom titles and logos. When using green-screen shoots, the ATEM keyer includes full chroma keying. Two downstream keyers are also included to add graphics such as your callsign or logo. The upstream keyer allows for chroma, pattern, shaped and linear keying. The multi-view output shows up to ten channels of video on a single HDMI television or SDI monitor. An audio mixer is sourced from audio embedded on all SDI/HDMI inputs and the AES/EBU input.

The ATEM Software works for Mac or Windows and has the facilities to switch video sources on the fly, load the media pool with graphics, use transitions and keys and remotely control and color balance Blackmagic Studio Cameras. The interface has separate tabs to make finding controls simpler. A 'switcher' tab offers the tools to make live cuts, adjust keys, apply transitions, overlay graphics and more. The 'media' tab is for working with and managing graphic files. A dedicated tab for the audio mixer includes faders and meters for every input, along with a master level control. When working with Blackmagic Studio

Cameras, the 'camera control' tab can be used to remotely control focus, iris, and full colour correction for each camera.

Up to twenty broadcast-quality, RGBA graphic files can be stored in the media pool. The two media players appear as input sources to the switcher. The user can transition to graphics as full-frame video or feed them to the keyers for overlaying video. Popular image formats such as PNG, TGA, BMP, GIF, JPEG, and TIFF are supported. The included Photoshop plug-in can be used to create broadcast graphics and add them to the media pool.

The hardware panel is extremely shallow, less than 25mm deep, so is easily portable. On the rear there are connectors for a total of six video inputs. HDMI connectors are provided for inputs one and two. Inputs three and four have the choice of HDMI or SDI connectors. Inputs five and six are SDI only. All are 10-bit capable and switchable between SD and HD. A reference input is provided for trisync or black-burst. A BNC connector provides an input for AES/EBU audio.

BNC output connectors are provided for two 10-bit SD/HD SDI switchable outputs, SDI one, SDI two, and the multi-view SDI output. HDMI connectors are used for HDMI Multiview output and Programme output. A USB 2.0 connection is provided for USB programme output, H.264 encoded, from the program output. An RJ45 connector provides an Ethernet port for control.

The ATEM 1M/E

The ATEM 1 M/E Switcher is the bigger brother to the TV Studio with four SDI and four HDMI inputs in a 2U rackmount size with the same software control panel. There are more SDI, HDMI and analog outputs including down converted SDI output and USB 3.0 - there are also some AUX out sockets, allowing individual clean feeds to be output, as well as the program or preview. You also get more professional features such as a stinger and digital-video-effects transitions; 6 keyers; and the same multi view and built in media players as the TV Studio

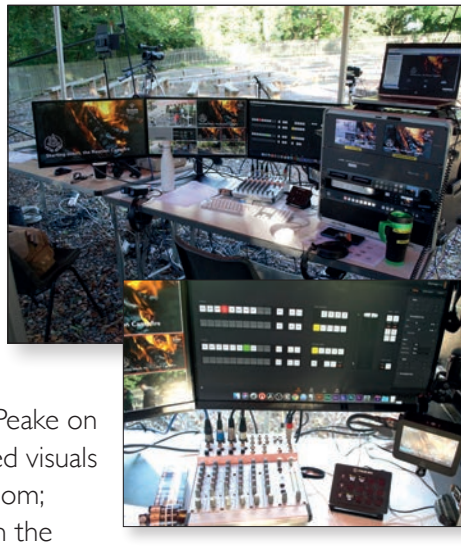
ATEM Mini

It's worth mentioning the new ATEM Mini - starting at only £245... An affordable live switcher with 4 standards converted HDMI inputs, USB webcam out, audio mixer with EQ and dynamics, 2D DVE, transitions, green screen chroma key, and a 20 stills media player for titles.

ATEM Mini Pro also includes recording to USB disks in H.264 format, a built in hardware streaming engine for YouTube Live, Facebook, Twitch and more, plus multiview to see all cameras on a single monitor. Plus with the ATEM Mini Pro ISO model you also get recording of 5 streams including all inputs as clean feeds for editing, plus a DaVinci project file for fast edit turnaround and Blackmagic RAW file relinking for finishing in Ultra HD.

In use...

My first experience with the ATEM mixers was helping BATC to stream the AMSAT-UK Colloquium, and with my work with the Scouts I could immediately see an application. I managed to acquire one second hand from eBay - however this has led to me upgrading all my cameras to HD. Beware of the upgrade path required! We have recently streamed the Gilwell Reunion Campfire - an event that would usually have 2,000 Scout leaders in attendance, but due to current restrictions had to be done online! By the following morning, we'd had over 11,000 views of the event!



▶ *The ATEM control screen and a StreamDeck for external control. See the 'Companion' article on the next pages.*

The ATEM setup was also used for the ARISS schools contacts with Tim Peake on the ISS, where we combined visuals from the cameras in the room; visuals from the HamTV on the ISS via Goonhilly; and the graphics and satellite tracking maps from the computers in the room.

A very versatile piece of kit!

Every ATEM Needs a Companion

Sam Raby

Introduction

There is no denying that in recent years the Blackmagic Design ATEM video switchers have exploded into the consumer market.

Their recent addition of the ATEM Mini have made it quick and easy to setup multiple input recordings and live streams.

But just because there is new hardware around it doesn't mean we need to be so quick to ditch the old stuff.

With the addition of a single device and application we can make controlling our ATEM, and a whole host of other devices, that much easier. IP cameras, OBS, Kramer switches, remote keypress, macros, the list goes on.

So you are running a live stream – how do you switch an input on the ATEM; enable audio on an input channel; transition the logo on screen; switch over to a new scene in OBS; and start your Hyperdeck SSD recorder – all from a single button press?

Companion is the answer.

Companion

Companion is an open source app that has the ability to interact with more than 100 different devices and systems and it's free.

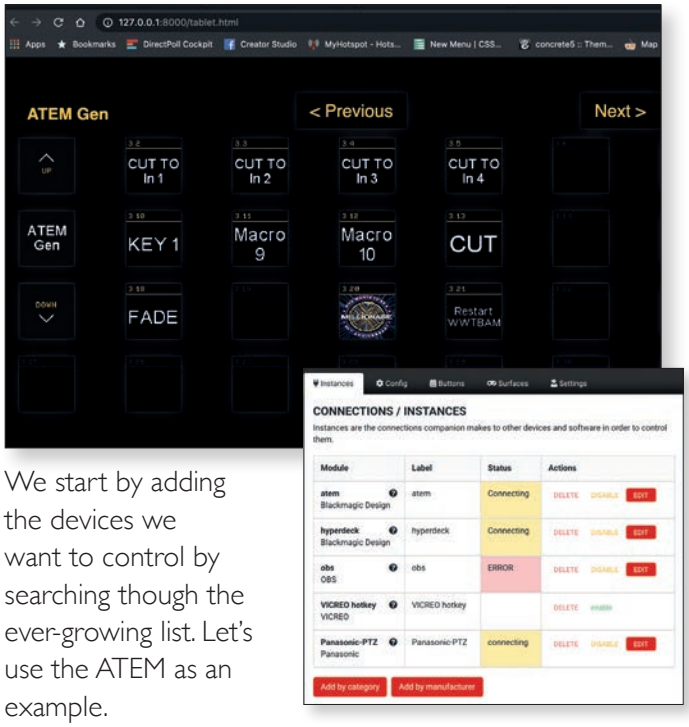
The team over at *BitFocus.io* have been developing Companion for a number of years and its community has grown rapidly.

It is a lightweight application that you can run from a PC, a Mac, Linux or even a Raspberry Pi, allowing you to easily implement it into your setup.

It has the ability to interact with a number of software platforms as well as hardware. OBS, Vmix, VLC, Vicero HotKey to name just a few, allowing you to control applications and content as well as physical hardware all from the same system.

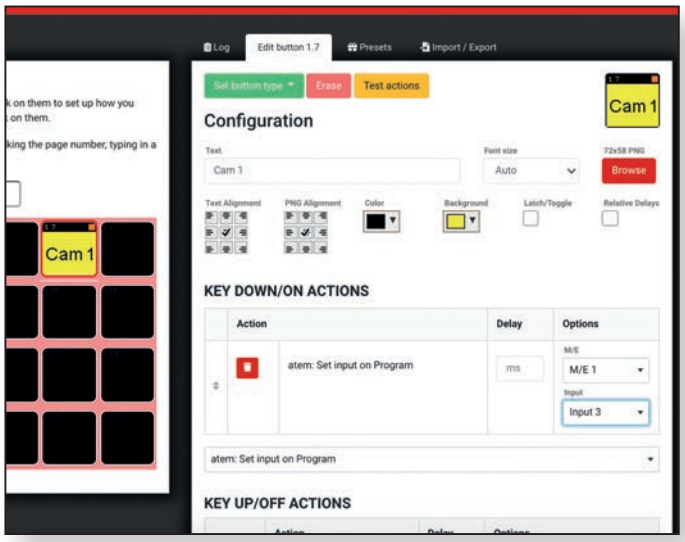
Companion runs as a background app, and is in effect a completely customisable button panel. Whether you use the built-in virtual button page or a StreamDeck, you will wonder why you didn't use this before.

One button could do a single action - "switch an input"; or it could do a whole host of complex actions.

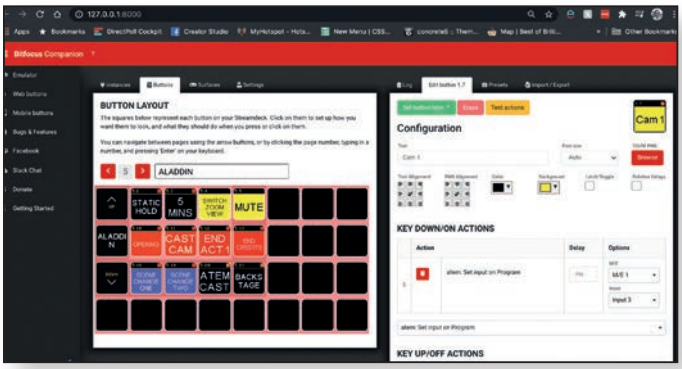


We start by adding the devices we want to control by searching though the ever-growing list. Let's use the ATEM as an example.

We tell Companion the IP address of our switcher. Once a connection has been established we can then setup our buttons. Pick the button you want to setup, give it a label, a colour, or even a background image. Select the type of button, either a single press or a toggle on off. Then setup the key press / key release actions. Simply pick the option from the drop down. It couldn't be simpler.



You can stagger the actions by setting the delay. As an example if you are presenting to camera, you may want to add a small delay before switching back to a camera facing you so that your audience don't see you pressing the button.



With up to 99 pages of buttons there is a massive amount of space to setup buttons for specific tasks.

We can set labels, colours, or even small images to be the button background making them simple to identify. We can also make use of "instance feedback". As an example, the ATEM could tell companion that one of its inputs has switched to preview and thus change the background colour of the button.

If you haven't got the time to setup your own buttons and make them look nice and pretty, Companion incorporates some pre-set buttons with some modules so that you can just drag and drop the button you want without having to setup labels, or actions.

StreamDeck

Now that we have our buttons set up how about a way of interacting with them. Companion was built around the Elgato StreamDeck. A small affordable USB button panel with customizable LCD buttons which is available in 6, 15 and 32-button models.

▶ *The Streamdeck USB button panel*

Attach one to the system running Companion and all of your buttons become available as physical buttons. Want more physical buttons without switching pages? Add another StreamDeck and set it to another page.

ATEM & macros

While Companion will give you a good amount of controllable options on the ATEM, there are some options that are just not supported. This is by no fault of Companion, it's simply a limitation of the Blackmagic API.

So how can we work around this? Well for years the Blackmagic ATEM control software has had the ability to store and recall macros. For the programmers, you will be glad to know that they are all stored in an XML format and thus are a doddle to edit within notepad.

I could go into a very long segment about how to create macros but there are a number of great tutorials on YouTube already. My only comments would be to get used to the XML format. It will make tweaking macros so much easier later on.

Once you have your macros stored, recalling them via Companion is a simple as selecting them from the drop down when you setup your buttons.

Flexibility

Because Companion runs as a service we can access it via its web interface on multiple devices. If you don't feel like splashing out on a StreamDeck you could open the Companion URL on a mobile device or a tablet and use the virtual on-screen buttons instead.

With a small amount of network knowledge and some port forwarding you could very easily allow remote access to the management and virtual button interface, allowing team members working remotely to be able to trigger Companion buttons to control kit hosted hundreds – even thousands – of miles away.

If you are trying to incorporate a device that is not currently supported then you will find a wealth of knowledge in the BitFocus forums. I personally had two different Kramer switchers that were not supported.

However, with help from the forums and developers, I was able to create and submit my own modules, which are now part of the main release. The modules themselves are Java-based, so developing your own is rather straight forward.

Conclusion

Companion has streamlined a huge amount for me in various setups. My ATEM rack houses a Mac Mini which always has Companion running.

The ability to quickly create a button for multiple actions or even simple ones means that during live streams or recordings I feel safe in knowing that I'm not going to click the wrong thing.

Whenever my ATEM is out, my StreamDeck is not far behind. It has greatly simplified my work flow and allows for combinations of actions that normally come from fully automated TV studios.

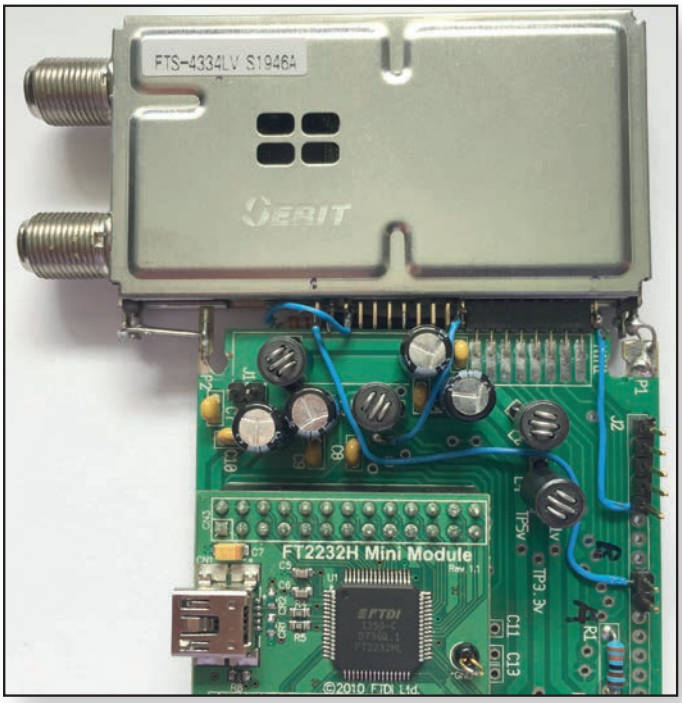
Replacing a Sharp Tuner with a Serit

Dave G8GKQ

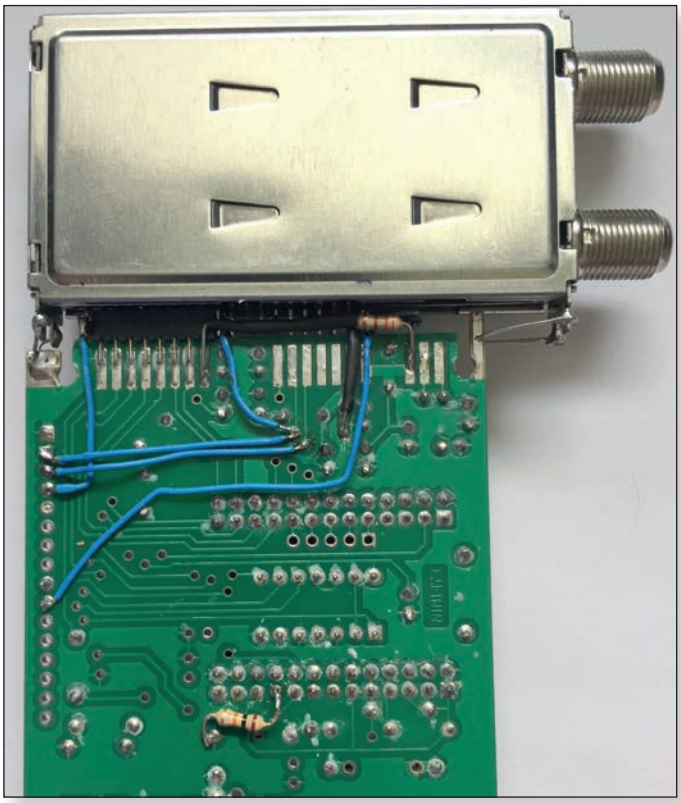
I recently lent my old MiniTiouner unit, with a Sharp NIM fitted, to a friend for use for receiving QO-100. We were very disappointed with the results, and it was not until I did some comparative tests with a Serit tuner that I realised what the problem was. The Sharp tuner had very poor adjacent channel rejection of other DVB-S2 signals. This shortcoming of the Sharp Tuner was not apparent when I used it for terrestrial contacts, nor in the early days of QO-100 when the transponder was less congested.

So, I decided to replace the Sharp tuner in the unit with a Serit tuner, but faced 2 problems. The adapter cards designed for the purpose were no longer stocked by the BATC Shop, and even if I found one, it would not fit in the box. I had heard that John G7JTT had previously managed to replace his tuner without an adapter card so asked him for some advice. In the event, the modification was quite straightforward as I had used sockets to connect the Sharp tuner; it would be a lot more difficult if I had not. Here is how I did it:

1. Print off the adapter card circuit to use as a reference. It can be found on the BATC Wiki, just search for "Serit Adapter Card" on the BATC Wiki. You can also use these photos to see my modifications.



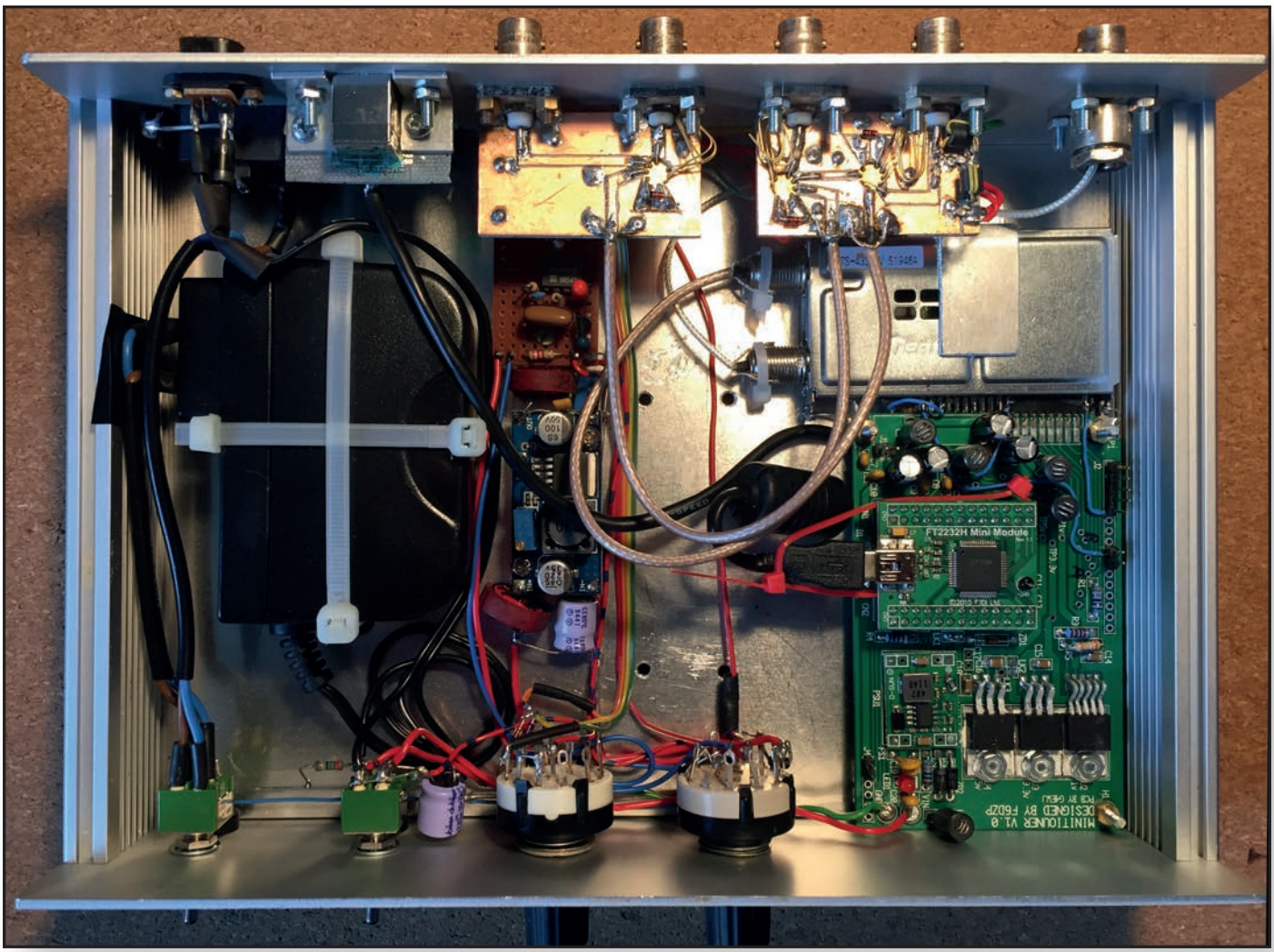
2. Remove the Sharp tuner from the tuner PCB, and put it to one side for reference. Note that the pin numbers on the Sharp tuner were in 2 rows, the odd numbers on top (PCB Component side) and the even numbers underneath. If all the pins had been present the numbers would run from 1 to 47 (odds) and 2 to 48 (evens) with the lower numbers at the input socket ends.



3. Using solder wick, or a solder sucker, remove the socket that connected the single row of low-numbered pins. Then remove (cut away with wire cutters) any parts of the socket that used to shield (or mate with) pins 29 – 32. This should leave you with 16 pins in a socket on old pin numbers 33 – 48.
4. Inspect the Serit tuner. Again, the low numbered pins are nearest the input sockets, and the odd pins are on top (component side) with the even pins underneath. The pins are numbered 1 to 39 (odds) and 2 to 40 (evens).
5. Plug the Serit tuner into the socket so that pins 23 – 38 go into the slots where pins 33 – 48 of the Sharp used to go. This should leave you 2 pins (39 and 40) exposed at the end furthest from the F connectors.
6. Use thick (at least 24 gauge) tinned copper wire to connect the tuner end tags to the end lugs on the PCB. This provides some mechanical stability in addition to the electrical connection.

7. You can connect wires to pins 39 and 40 of the tuner to connect to a 22 kHz bias board. I fitted a 5-pin header on the spare holes at the side of the PCB (with pin 1 in the ground connection nearest the tuner) and connected them to pins 5 and 4 respectively (the same pinout as used on the full-size Serit board).
8. Take a wire from Pin 1 of the tuner to another pin header on the spare holes. This is the connection for the LNB power for input B. Do the same from pin 2 of the tuner, this is for LNB power for input A.
9. Connect pins 3 and 4 to ground. I scraped off some PCB varnish to get a good connection close to the tuner.
10. Connect pin 5 to the 3v3 supply. This is available on the underside of the board on the pad for the old pin 6.
11. Take a wire from the tuner pin 21 to the SDA line, which was the old pin 20. You can trace it from the old pin pad to a thru-hole, which will allow you to make the connection from the top of the board.
12. Take a wire from the tuner pin 22 to the SCL line which was the old pin 22. I used the through-hole adjacent to the one used for SDA.
13. If you want a future capability to use a 22 kHz switch board, connect the SDA and SCL lines to pins 3 and 2 respectively of the 5-pin header fitted in the old J1.
14. Fit a 3K3 resistor between tuner pin 24 and the 3v3 rail (I used the old pin 6 pad).
15. Fit a 10K resistor between pin 19 of the FT223H header and ground to allow recent versions of MiniTioune to work correctly.
16. Lastly, fit a 390K resistor across R5 adjacent to the 1v regulator to increase that supply line to 1.1v.

I refitted the PCB to my tuner box (which has front panel controlled input switching and LNB supply), and redesigned the clamp holding the tuner in place. I was able to remove the old SUP-2400 up-converter that I used to use, leaving space for the possible future addition of a 71 MHz up-converter.



Power & Outside Broadcast Vans

Brian Summers G8GQS

Power has always been a bit of a problem and apart from the smallest vehicles still is even today. The very first BBC outside broadcast vans travelled like a circus in a convoy and one of the vans specialised as the power source with engine and alternator. The use of your own supply freed you from the need to find a good and reliable supply. You would not want a power cut halfway though the match. As television became more common place venues would install a suitable supply, but even then if the programme was of importance a back-up generator would arrive.

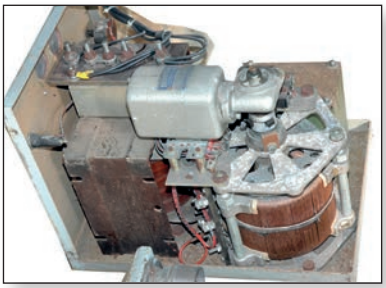
A small digression, this reminds me of a programme I worked on a few years ago. We were doing the Draw for the National Lottery, a moment of great interest to many. For the rehearsal we had a single hired generator and for the transmission a second generator arrived and the generator crew attempted to connect them together. Now when doing this it is quite important to get the phasing correct. Well it did not go well, there was a BIG bang, a column of black smoke leapt into the air and it all went very, very quiet. Now the venue we were at had not allowed us to connect to their internal supply, although they did have an adequate supply, after all it was the BBC's Television Centre in Wood Lane. At this point it suddenly became possible to connect up, I suspect it was a matter of money and all was well. At that point in time the BBC had instituted a scheme of "business units" to improve efficiency and it was probably cheaper to hire two generators than pay the fee to connect to the TVC supply. Many will appreciate the large corporation lunacy that business units created.

Back to the subject. To give some idea of the power needed a big BBC truck might need six 63Amp inputs. At say 40A load on each a modest 58Kw. About half of this was for the equipment and the other half for the air-con to take the heat out.

Now our van, BBC MCR21 is much more modest in its power needs. It had a single BICC 80amp connector with a second one as a spare input, possibly from another source or generator. It was not possible to parallel them just switch between in a break before make mode.

The total load would be about 2/3rds of the rating i.e. 40-50A including the single air conditioning unit.

When MCR21 was built in 1963 the voltage regulation of the mains, and generators for that matter, was not wonderful and three AVRs (Automatic Voltage Regulators) were installed. These were to our modern eyes quite crude being a motor driven variac and a buck-boost transformer. They were effective to hold the voltage supplied to equipment within the range that could be smoothed out by the equipments internal regulator. The input voltage range is 170 to 260V for 240V output ± 0.5% @ 17.5A.



These were made by Claude Lyons type TS-3. The servo amplifier, with just 3 transistors, is in the box behind the variac. The Handbook is on the MCR21 website for download. There are 3 of these AVRs to refurbish.

A typical device might need a 12v rail and the regulator upstream of this might be fed with a raw DC supply of 15volts plus ripple . Those 3 volts have to be lost in the equipments linear regulator as heat (VxA) and it all adds up so without the AVR you would need more headroom for the regulator and more losses and heat. The AVR being a transformer has a much lower inherent loss so power and heat are saved. When the AVRs are working and as they correct for some change in the voltage they go "squeak squeak" as the variac moves. Even in a modest van, like MCR21, heat is a problem.

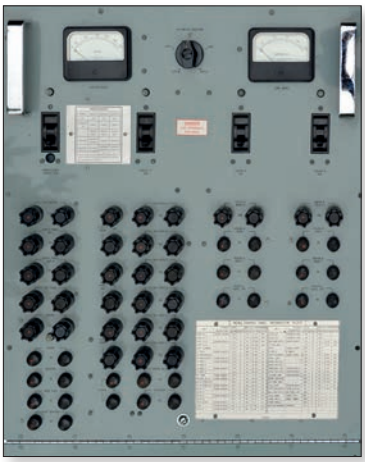
There is a main circuit breaker and bypass switch for each AVR, if they are not needed or faulty. The three AVR outputs are passed to the main internal power distribution panel and they feed; Vision A, Vision B and Sound. The video circuits are arranged so that if you loose A or B there is still a video route out of the vehicle. Sound has only the single AVR but is fully battery backed and can continue even in a total loss of power. A fourth circuit supplies the fans, heating, external circuits and air conditioning. An additional 15A input called a Night Supply can be switched to supply lighting, heating and battery charging overnight.

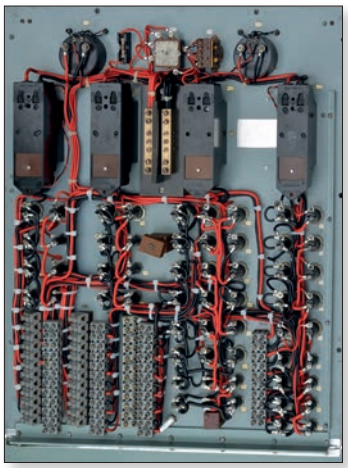
All this heavy engineering dealt with the changes in supply voltage back in the 1960s but today's switching power supply units will accept a wide range of input voltages. Indeed some will go between 117V 60Hz and 245V 50Hz

without any attention needed by the user. However all is not perfect and the mains input circuits and the switching can lead to harmonic currents in the supply and with a very large number of units connected in 3 phase circuits these harmonic currents can seriously overload the neutral connector. This effect is sometimes referred to as a poor power factor, but this is not really the same as a "traditional" poor power factor where the voltage & current are merely out of phase with little or no harmonic content.

These two pictures show the front and rear of the internal mains panel after restoration with the voltmeter and ammeter at the top. The 4 main breakers and the distribution fuses below. In 1963 it was the practice to fuse both the live and neutral wires, although we have kept the neutral fuses in place for historical accuracy but we have linked them out. The circuit diagrams for this panel are on our documentation page.

A separate strand to the restoration work is recording the history of the people who worked on BBC MCR21 and the programs they made. A list of programs can be found at *www.mcr21.org.uk/programs/* Can you can help to fill in the gaps?





About us

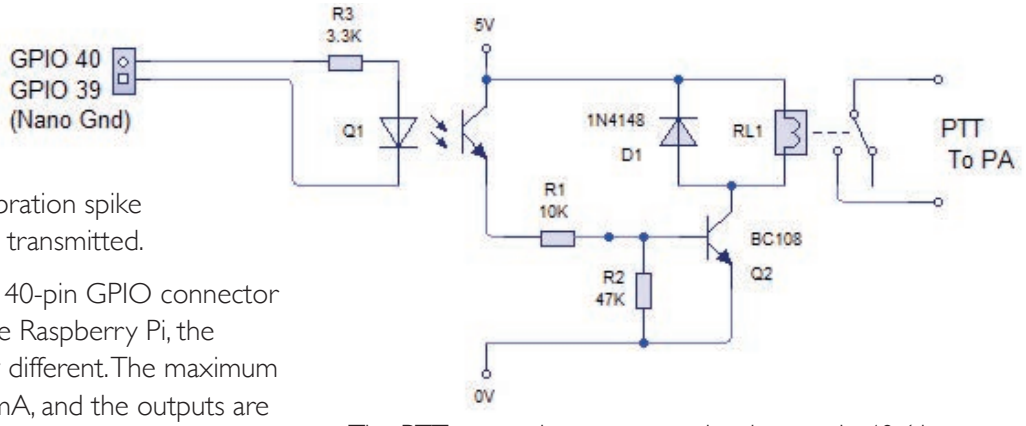
Ex BBC Outside Broadcast Van, MCR21 is owned by our Trust, the Broadcast Television Technology Trust and it is a registered charity. Our outlook is an open one for all benefit from and to contribute to.

For more information about MCR21, please visit: http://www.mcr21.org.uk/

Jetson Nano PTT switching

Dave, G8GKQ

It is useful to be able to switch a power amplifier on and off directly from the Jetson Nano when using it with a LimeSDR, so that the calibration spike from the LimeSDR does not get transmitted.



Although the Jetson Nano has a 40-pin GPIO connector with a pinout almost identical the Raspberry Pi, the electrical characteristics are very different. The maximum output source/sink current is 1 mA, and the outputs are very susceptible to electrical noise. So, if they are set low, and pick up a noise spike (say from a thermostatic soldering iron), they sometimes latch high for a while. Using an opto-isolator on the GPIO output reduces the possibility of this happening.

The PTT output is programmed to be on pin 40 (the same as the Portsdown RPi) and there is a ground pin at pin 39, so the opto-isolator can be connected with a 3k3 resistor directly between these pins. The opto-isolator was an unidentified item from the junk box similar to a 4N35.

VK3RTV Melbourne Australia July 2020

Peter Cossins VK3BFG

The Victorian Education Department site at Olinda was decommissioned and the tower disassembled in January 2018. VK3RTV had been operational continuously from there for 40 years.

After an extensive search, no site could be located on Mount Dandenong that did not incur a significant annual cost.

All antennas and rack equipment were removed and transported for storage in my garage and garden shed.

In mid-June 2018, a week long test was made from Telstra's historic site at Surrey Hills, a high point in the eastern metropolitan suburbs of Melbourne. Most of the equipment there had been long decommissioned and co-axial cables and rack space was available.

As there was a need for an omni-directional service, it was decided to switch to vertical polarisation for the output and use one of the dipole arrays salvaged from the Olinda site. Three small panels horizontally polarised were used for a single 1255 MHz DVB-S input.

▶ *Surrey Hills Single Channel Test Rack (Note the hole in the monitor display)*

Interference problems with co-sited equipment were identified during a first test and a two-level approach was taken to solve the problem.

The centre frequency for the down link originally was 446.5 MHz, based on the Wireless Institute of Australia Band Plan frequency for the old analogue channel.

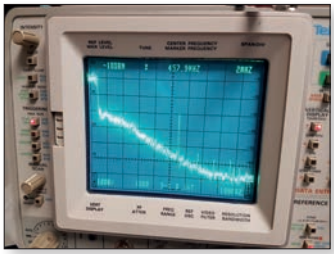
This placed the sound carrier at 449.5 MHz, a quite satisfactory arrangement for that technology with a band edge at 450 MHz. The centre of the old analogue band was therefore 446.5 MHz and this was adopted for DVB-T. This meant that a perfect 7 MHz DVB-T signal would terminate at the band edge 3.5 MHz higher at 450 MHz.

Due to non–linearities in the power amplifier stages, intermodulation products always result in a spread of spectrum well outside of band edge and these were at objectionable levels given the proximity of adjacent services.

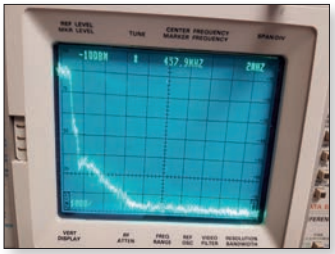
The first component of the solution was to create a guard band by moving the centre frequency down to 445.5 MHz. This then leaves 1MHz between 449 and 450 MHz which can be allocated to point-to-point repeater links which were originally located in the lower section of the new ATV band. This arrangement has been accepted and is now a part of the Wireless Institute of Australia Band Plan for 23 cm.

The second component was to source a commercial DVB-T filter. This was problematic as the amateur bands are usually not catered for by commercial companies in this area.

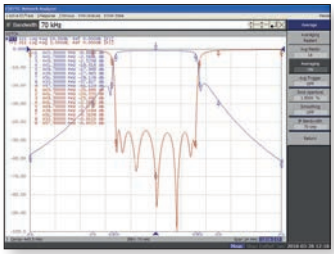
Comm Tech in Italy was found by Phil Gardner VK3GMZ who was prepared to re-tune one of their filters to the required centre frequency. I suspect there were sympathetic engineers who viewed it as a challenge to their design.



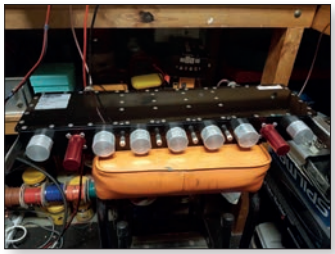
▶ *PA spectrum before filter*



▶ *PA spectrum with filter*



▶ *Filter specification*



▶ *Filter on test*

The cost of the filter was shared by the Eastern and Mountain Districts Radio Club and Amateur Radio Victoria.. Subsequent testing revealed a positive result with no interference to adjacent services. The test at Surrey Hills also provided data on coverage from a good metropolitan site and also receive pre-amplifier requirements.

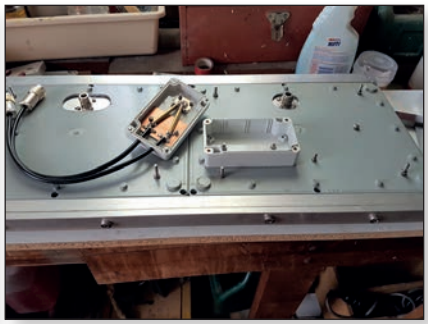
Amateur Radio Victoria had recently acquired the lease on a site at Mount View in the eastern metropolitan area and prime tower locations and cables would be available

for VK3RTV. The site is high security and requires that all Occupational Health and Safety rules be strictly observed.

To maximise receive coverage. It was decided to install three antennas on three separate cables. These antennas were to be dual quads sealed in switchboard boxes.

The frequencies selected were 1278 MHz, 291° magnetic, 1255 MHz, 020° magnetic and 1246 MHz, 140° magnetic providing optimum input coverage.

▶ *Panel front view*



▶ *Panel matching*

A number of field experimental measurements were made in developing the antenna, these being, bandwidth and beamwidth and gain, referenced to a dipole.

John VK3ATV, one of the Melbourne ATV Group, organised the services of Ian Curry who offered to install the antennas. Ian is a fully licenced professional rigger and provided his services free of charge.

Ian worked all day up the tower organising and testing and re-routing cables and installing the three panels. This was a significant contribution in practical and financial terms to the project.

▶ *1246 MHz Panel performance and outlook*

▶ *Mount View tower*

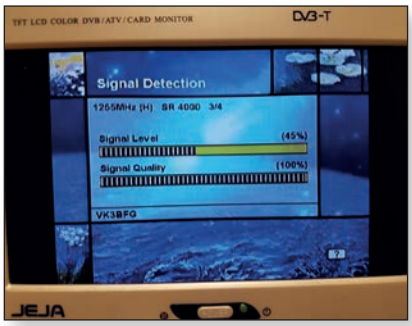
The Melbourne ATV Group and WANSARC, a western suburbs radio club, funded the purchase and installation of a binary array to serve as the 445.5 MHz DVB-T output.

The transmit exciter provides a multiplexed DVB-T signal on a centre frequency of 445.5 MHz DVB-T, QPSK modulation. The two channels are designated VK3RTV1 and VK3RTV2.

VK3RTV1 is served by two inputs, CHA is a remote access function which can be used for access for special visitors or remote 23 cm DVB-S nodes and CHB 1255 MHz DVB-S.

VK3RTV2 CHA is 1246 MHz DVB-S and CHB 1278 MHz DVB-S. These inputs are on a first in best-dressed option. Users are urged to monitor 147.4 MHz FM as the 2 metre liaison frequency.

There are various DTMF functions including 0 VU and colour bars for both right and left hand audio channels and the ability to bring up the internal satellite receiver signal report.



▶ *DTMF code request signal report*

▶ *Rack*

From the top of the rack there are two Raspberry Pi serving as the streamers to the BATC and also the remote input function. Then three Humax 5400 Satellite Receivers with remote IR control and a Minikits 23cm pre-amplifier coupled to band pass filters in each case. (Replacement by more modern DVB-S/S2 receivers is being planned.)

Below that are the VK3RTV1 and VK3RTV2 local monitors, VK3RTV1 Controller, Remote IR controlled Media Box, VK3RTV2 Controller, Multiplexed DVB-T Exciter, PA Controller, 500 Watt PA (running light), PA tangential fans, 12V and 50V power supplies.

A significant proportion of the equipment in the rack is either totally home brew, assembled from kits or partial kits and in the case of the DVB-T Exciter, PCBs mounted into a case with power supply and protection circuits.

The tangential fans were sourced from disposed telecom equipment, remounted with a speed controller to reduce the hurricane-level air supply they normally produce.

To date, the performance has been beyond expectations with most stations being able to see and access the system. Reports from viewers re-enforce this.

Stations seen so far include VK3XKA, VK3BCU, VK3GE, VK3WWW, VK3KQ, VK3CH, VK3BFG, VK3ATV, VK3WV , VK3ZSJ and VK3GMZ. The most noteable stations were Simon VK3ZSJ at 37.2 km , Geoff VK3GE at 60.9km, and Phil VK3GMZ at 33.5km.

The most noterable of the 'noteables' was Phil, VK3GMZ on 25 July 2020.

Phil is about the same distance from Mount Dandenong as the repeater site at Mount View. He has been able to access the repeater a number of times when the weather is fine. This is most likely a case of knife-edge diffraction.

▶ *Homebrew VK3RTV1 controller*

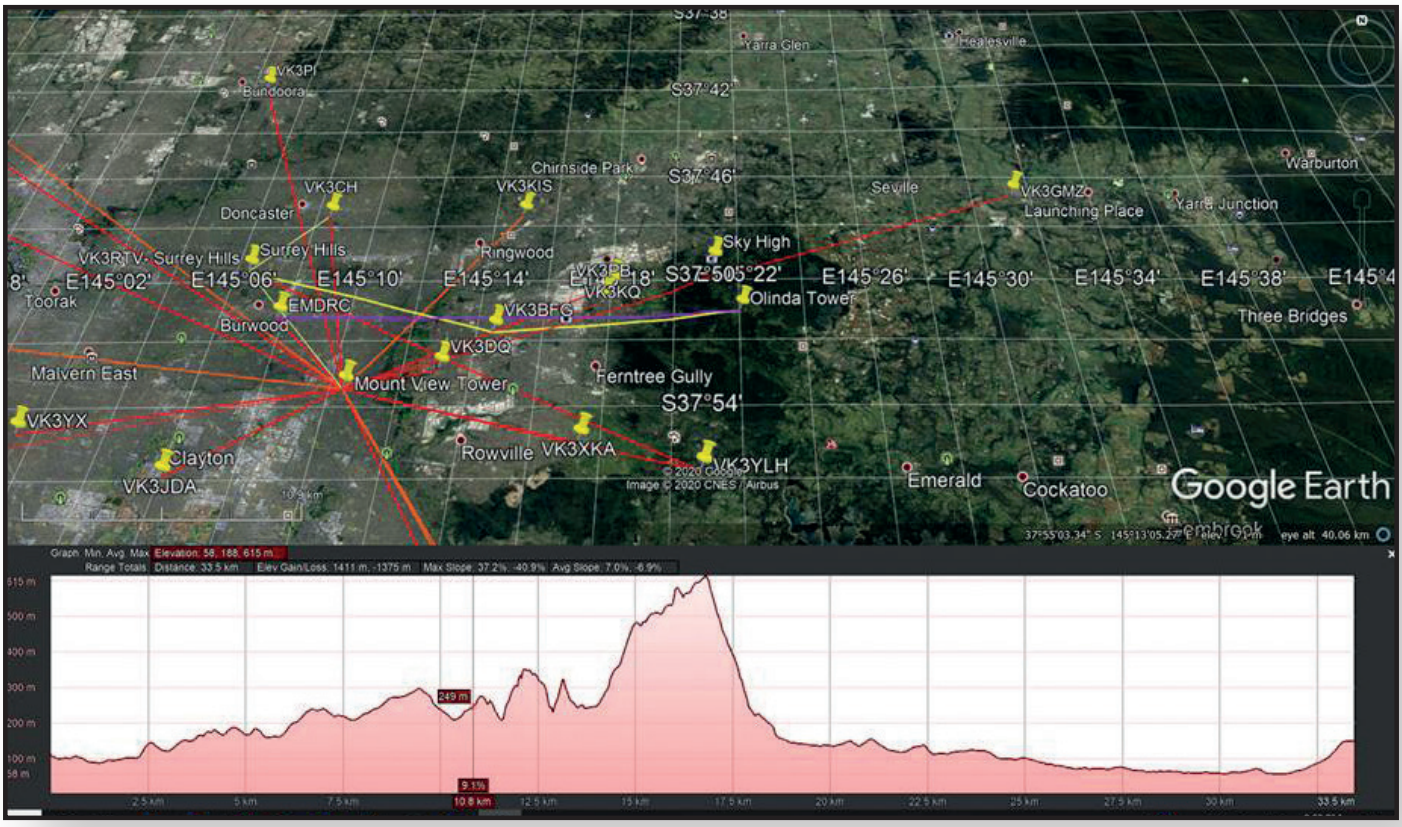
▶ *Phil's son Lochlan TV Star*

▶ *No Pixelisation for periods of time*

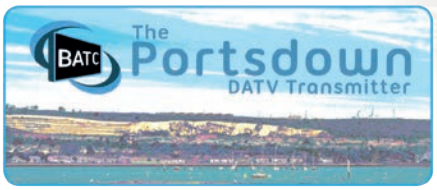
The new site has been professionally re-furbished by Amateur Radio Victoria. The tower has had a engineering inspection and with the lease arrangements that Amateur Radio Victoria has on the site, operations should now continue well into the future.

VK3RTV is again operational for the long haul and no doubt will exist in different forms as time goes by and as it has done in the past. At this time it is SD based on composite video and stereo Audio.

Possibilities for the future is a move to HD. As early adopters we use DVB-S for the uplinks and this is not likely to change in the near future as all current stations have an investment in this mode.



▶ *Path between VK3RTV and VK3GMZ*



The Portsdown 4

Dave Crump, G8GKQ

The Raspberry Pi 4 was launched more than a year ago but early investigations found that support for the graphics system which had been used for all the menus on the Portsdown system (OpenVG) had been dropped.

Following some pioneering work by Colin G4EML, and some refinements from Phil M0DNY, it proved possible to rewrite the graphics to make Portsdown on the Raspberry Pi 4 a possibility.

Colin had used the Raspberry Pi 4 as the basis for a microwave transceiver using a Pluto SDR and it seemed sensible to make the two systems compatible; the time was also right to drop support for some older hardware to make future maintenance easier.

And so the Portsdown 4 was conceived.

Project philosophy

The Portsdown is intended to provide an entry-level system for digital ATV, and the emphasis during the design process continues to be on simplicity, portability and affordability.

There are other transmission systems (particularly using the Pluto in association with high-end PCs) that will produce higher-definition pictures, but the configuration of these systems is not a task for beginners.

The Portsdown 4 is very similar to previous iterations of Portsdown, building on the lessons that have been learnt during their development.

Newcomers to DATV should start with the Portsdown 4.

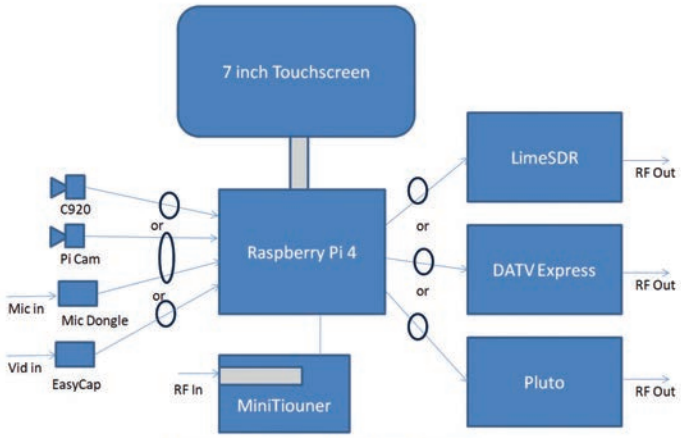
Initial capabilities

The Portsdown 4 has two core components:
The Raspberry Pi 4 and the official (foundation) Raspberry Pi 7 inch touchscreen.

No other touchscreens are supported, and although the ssh console menu is still available, it will only be maintained for basic functions – the primary control interface is the touchscreen.

Four transmit devices are initially supported:

- The LimeSDR Mini
- The LimeSDR USB
- The DATV Express board (DVB-S only)
- The Pluto SDR (H264 encoding only)



Portsdown 4 – Simplified Block Diagram

The supported video sources include:

- All of the official Raspberry Pi cameras (V1, V2 and HQ)
- Composite video input from a BATC EasyCap dongle
- Old and new Logitech C920, C910, B910 and C170 webcams
- Test cards in 4:3 and 16:9 formats

The LongMynd receiver has been included, and with a BATC version two MiniTiouner, the unit will receive and display DVB-S and DVB-S2 MPEG-2, H264 and H265 received signals with SRs from 66 kS to more than 4 MS.

The unit will stream to the BATC streamer and display streams "received" from the streamer. It will also control a Jetson Nano to transmit using a Lime SDR.

What it doesn't do

The Portsdown 4 does not:

- Transmit in Ugly mode
- Work with a Portsdown filter-modulator board
- Work with a DTX-1
- Output Composite video
- Support the Waveshare touchscreen
- Transmit the animated (bouncing balls) test card
- Include a signal generator

The Portsdown 2020 (using a Raspberry Pi 3B) will continue to be supported to provide these features.

What it does better than Portsdown 2020

- Act as a composite video monitor
- Display an incoming IP transport stream
- Transmit H264-encoded images in 16:9 format.

New features – Transmit DATV from a Pluto SDR

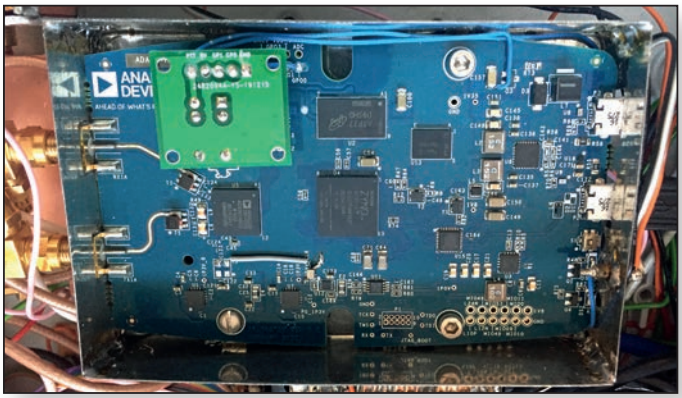
The Portsdown 4 will transmit using a USB-connected Pluto SDR.

The Pluto must first have been modified for extended frequency range, and then Evariste F5OEO's custom firmware "FIRM2101RC" of 5 February 2020 must be loaded.

Then you can simply connect the Pluto to the Raspberry Pi 4 and select Pluto as the output device.

It is limited to H264 modes and a maximum frequency of 4.2 GHz. You can set the power output for each band on a scale of -71 to 0 (VERY approximately dBm).

The prototype Portsdown 4 includes a Pluto in a homemade tinplate screening box. The TCXO has been replaced with a high-stability version and the Pluto-operated PTT relay mounted inside the box.



▶ *Pluto SDR mounted inside a tinplate screening box.*

The Pluto and Raspberry Pi PTT signals are both activated during transmission. Note that in Test Card mode (or Contest mode) the Pluto continues to generate a drive signal and activate its PTT for 10 – 20 seconds after transmit is deselected, although the Raspberry Pi PTT line has been de-activated.

You can use a suitably-modified LKV 373A to capture HDMI video and transmit it using the Pluto. You can also stream to the BATC streamer from the HDMI input, and display the HDMI input using the "HDMI Monitor" (on Menu 2). The HDMI input is not available for the LimeSDR or DATV Express.

▶ *Portsdown 4 Prototype with HDMI adapter. Note the redesigned Menu 2*

New Features – Langstone Compatibility

From the Pluto config menu (reached from Menu 3) you can load Colin G4EML's excellent Langstone SDR software for the Pluto.

Once that is loaded, you can switch (from the Portsdown Menu 2) to the Langstone software, and back again from the Langstone "settings" menu.

What about Portsdown 2020 on the Raspberry Pi 3?

The Portsdown 2020 is quite stable and continues to be popular. I will continue to maintain its existing capability (which occasionally gets broken by other people's software updates), and try to back-port some of the new features of the Portsdown 4 to it.

However, many of the Portsdown 4's new features are only possible because of its increased processing power, so the potential for improvements on the Portsdown 2020 is limited.

Choices

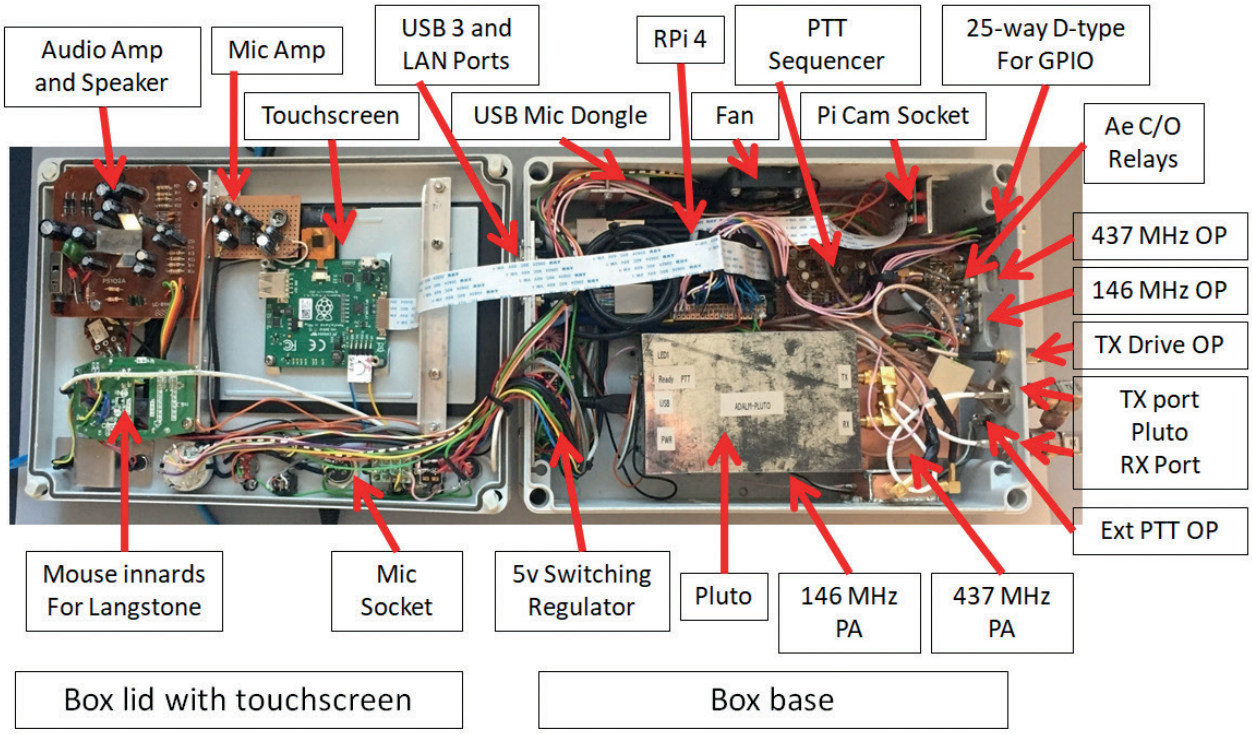
If you are building a new Portsdown system, my recommendation is that you start with a Raspberry Pi 4 and a 7 inch touchscreen and build a Portsdown 4, then add either a LimeSDR Mini or a Pluto SDR.

For simplicity, use a Raspberry Pi camera and a USB audio dongle, and then you have a very capable DATV transmitter. Plug in your BATC MiniTiouner for receive and it becomes a DATV transceiver.

My prototype system is intended for portable use as a Portsdown and Langstone, and includes a Pluto, an audio amplifier, a loudspeaker and (3 Watt) PAs for 146 MHz and 437 MHz.

It does look far more complex than it needs to be, but it does show just how much capability you can fit in a single unit.

Portsdown/Langstone Example Build

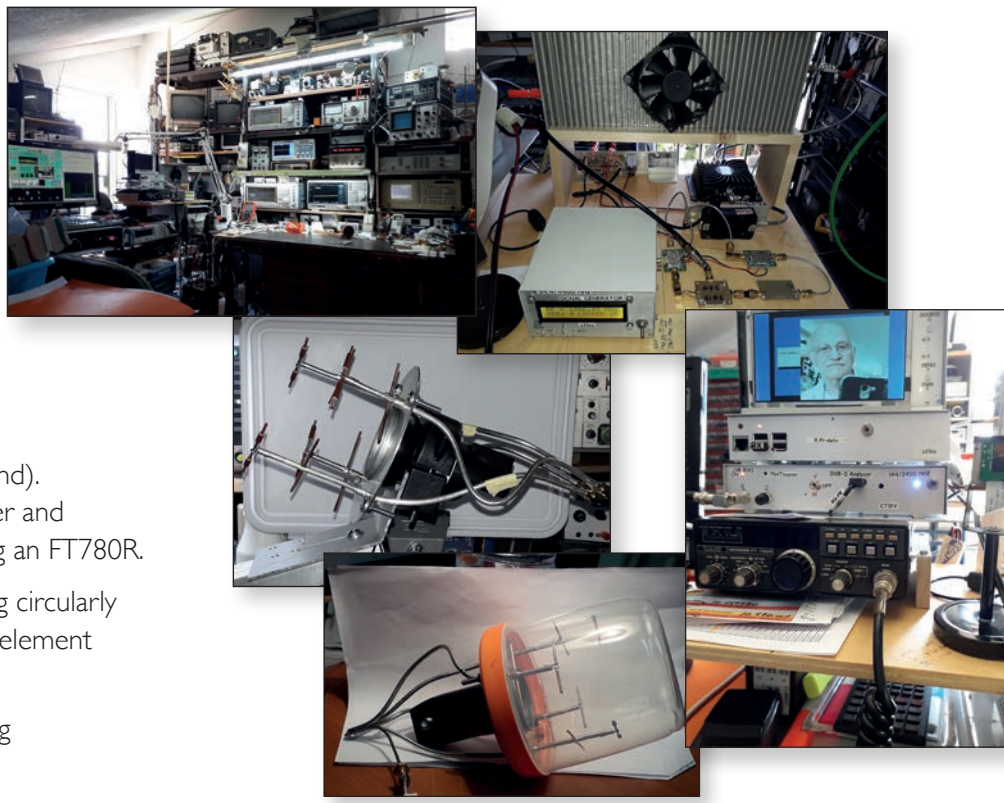


The only reason that you might consider a Portsdown 2020 would be if you also want composite video output from your Portsdown system. However, you could consider simply using a cheap Raspberry Pi Zero as a video source instead.

Now that I am confident of the Portsdown 4's capabilities, I will start selling Portsdown 4 SD Cards in the BATC shop (in addition to the existing Portsdown 2020 cards), so please make sure that you select the right one.

Featuring: Georges CT1XV

Dave, G8GKQ



Georges, CT1XV sent us these pictures of his impressive shack and equipment.

He is located at Cascais (IM58HQ) near Lisbon in Portugal and has been active on ATV since the 1980s. He tells us that he is QRV for anyone passing nearby.

For QO-100 wideband he is using a Raspberry Pi-based transmitter on 437 MHz and an up-converter with an ADF4351 local oscillator.

This drives a UMTS PA (bought from Poland). For DATV receive he is using a MiniTiouner and a 110 cm dish. On narrowband he is using an FT780R.

He is experimenting with a very interesting circularly polarised dish feed using four-phased two-element yagis with an LNB in the centre.

This design, first seen with LZ1JH, is waiting for more power before DATV testing.

Reduced bandwidth analogue ATV, the easy (lazy?) way

Chris van den Berg PA3CRX

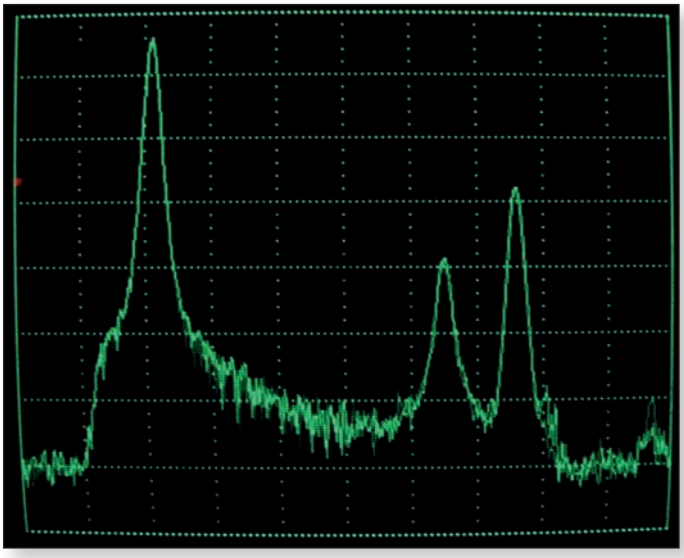
Not everyone is willing to spend effort and money in a digital ATV system. However, it is possible to use a smaller portion of the spectrum with some benefits in an easy way.

The 70 cm band and the 9 cm band are two bands that have (in the Netherlands) 10 MHz bandwidth and therefore very attractive to reduce the bandwidth in these bands.

70 cm band.

In this band, suppressed sideband AM is often used. The spectrum is covering almost the whole band and the carrier frequency (434.250) is in the ISM band. This results in interference of the received (wanted) ATV signal but transmitted signal will also interfere with the other band users and ISM users. Therefore only short transmissions are normally done, for example during an activity weekend.

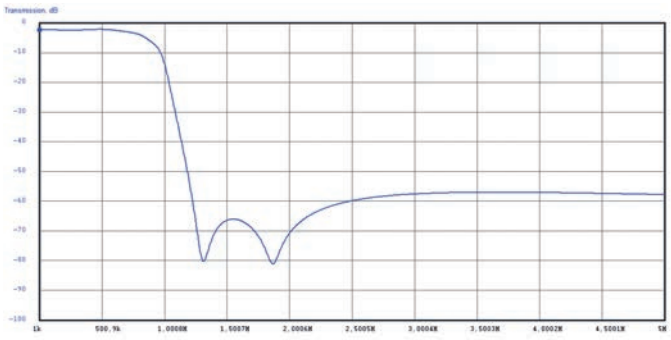
With an AM signal the highest modulated (video) frequency multiplied by two will be the resulting bandwidth. With a color burst of 4,43 MHz this will at least be 9 MHz. If one sideband is suppressed, the result will be less, see the picture of the measured spectrum.



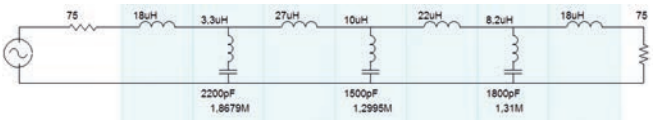
▶ *Measured spectrum of AM signal with suppressed sideband, modulated with color bars. Also the added 5,5 MHz sound carrier is present.*

Back in 1983, the German ATV society published in their magazine SATV with 1 MHz of bandwidth. The way to do this is just prevent the higher frequencies of the video signal to enter the modulator.

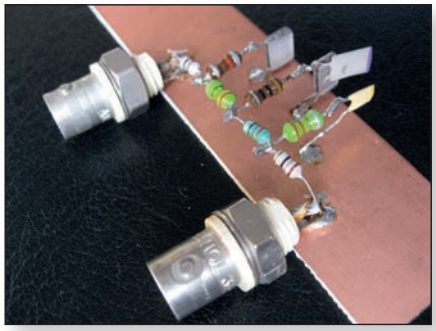
With free software program Elsie (Tonnesoftware) I designed a low pass filter with the following result.



▶ *Simulated plot of the video filter by Elsie.*

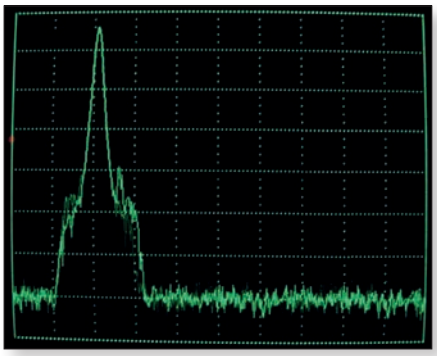


▶ *Schematic of the video filter.*



▶ *Practical way to make the filter, more shielding makes a better performance.*

If this filter is just added in the line between the video source and the (present) AM transmitter, it will result in a much narrower HF signal. If the sound carrier is also switched off, the resulting spectrum shows a lot of difference.

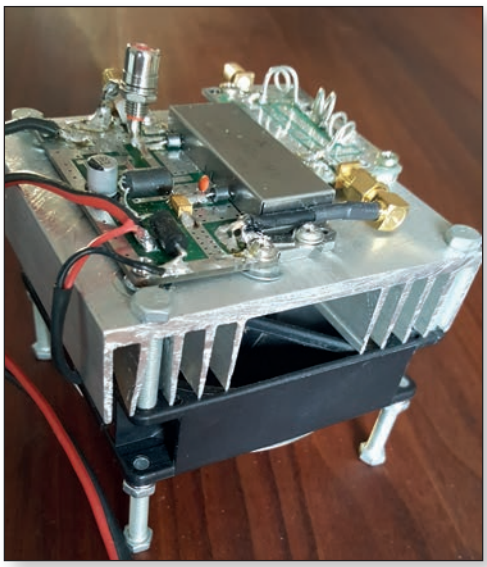


▶ *Measured spectrum same as the other measurement, now with video filter added and sound carrier switched off.*

The higher frequencies contain the contrast and of course the color burst and you will see in the received picture that this is a dramatic difference. Also some shadow lines could be seen, caused by the sharpness of the filter.

Many stations already receive AM-ATV with an RTL stick and TVsharp. With TV sharp the receiving bandwidth is already narrow so in fact, with this device the difference of the received signal with or without the video filter could not even be seen! So why not limit the bandwidth if it makes no difference for the receiving station? An other advance for the receiving station could be if this signal is transmitted out of the ISM band. For example at 435 MHz (in accordance with the IARU bandplan; in case of interference with Satellite Service, the Satellite Service should have priority). Keep in mind that without this filter also a lot of signal would be present on 435 MHz. Without the interference of ISM signals, the wanted signal could be seen sooner so the transmit time could be further limited.

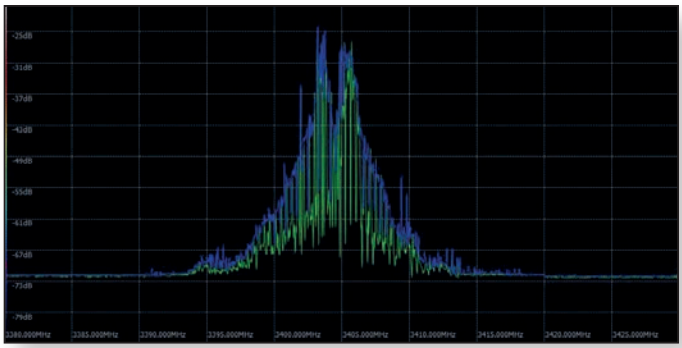
Looking closer to the resulted HF spectrum, it could be noticed that the suppressed sideband filter has not really added value. This means that even when generating full AM (with both sidebands) the result will be the same spectrum, if using the video filter! So in fact, a very easy AM TV transmitter could be made by (for example) using a signal generator, driving a PA that is modulated with video. This is demonstrated by Frans PC2F and described in issue April 2018 of Electron, the Dutch HAM magazine. He used a cheap handheld, an attenuator of 10 dB resulting in a source of about 100 mW. In China, he ordered a board and a Mitsubishi PA module (RA30H4047M1 or RA60H4047M1 will do) and used this as the final stage that he directly modulated. The quick and dirty way to modulate this PA was just adding the video signal (via the video filter!) to the gate of the module. During this test he did not use DC offset (in accordance with the datasheet of the module, linearity would be better if higher DC level would be added). To prevent overheating, a heatsink with fan was mounted. Harmonics are prevented by an additional low pass filter.



▶ *The easy AM ATV transmitter of PC2F. SMA connector to the driver (attenuator and handheld), the cinch connector for the video signal.*

9 cm band.

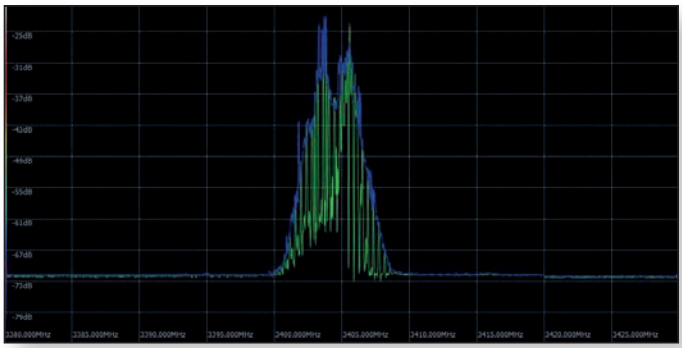
On amateur bands above 1 GHz the standard was FM (now also DATV). The 9 cm band measures (in the Netherlands) 10 MHz. In fact, it was unused for ATV because a common FM signal exceeds the band limits a lot. The bandwidth of the FM signal is defined by the Carson's rule to be calculated by the sum of the peak frequency deviation plus the highest frequency in the modulating signal, multiplied by two. The result of this calculation is the bandwidth that contains 98% of the total power of the FM signal.



▶ *Measured color FM ATV signal (without sound carrier).*

So there are two parameters that could be adjusted to make the FM signal narrower. A baseband signal contains frequencies up to (and include) the highest sound carrier frequency. For simple experiments like the ATV activity weekend sound channels and color are not needed, also not the details in a picture. So in fact, by limiting the higher frequencies of the video signal, the bandwidth is also reduced!

Using the same filter as described above, the transmitted signal just fits in the 9 cm band.



▶ *The same FM ATV signal with the use of the described video filter.*

If needed, even a narrower filter could be designed and build, or the video level could be slightly adjusted to prevent passing the band limits.

How to receive this narrow FM ATV signal? This could easily be done with a cheap C-band LNB and a FM receiver, set to 1745 MHz.

▶ *Purchased LNB for 9 cm, price was €10,- including shipment.*

As indoor unit it is possible to use the RTL stick (on its frequency limit, eventual a converter could be added) using TVsharp. TVsharp is intended for AM signals but with the frequency on the edge of the FM signal the picture is visible. Just enough to be acquainted with the 9 cm band, antenna's, propagation and possibilities.

In accordance with the IARU C5 bandplan almost the lowest MHz of this band is for EME and beacons. Also a part is reserved for satellite downlinks. Change of interference with these users is unlikely since the 9 cm band is most of the time unused and users have directional antenna's. ATV stations that use almost the whole band like described do only short transmissions, mostly during ATV activity weekends.

Receiving with SDRsharp (with TV module).

A short description for the ones that missed the use of TVsharp; with the cheap RTL stick with the R820T chip inside (formally designed as DVB-T receiver), a SDR receiver could be configured.

I used this setup many years with narrow AM receiver 'TVsharp' but in Windows 10 I did not succeed to get it working again.

Then I was attended to a newer version of SDRsharp; 'Community Package with Plugins', that already has a TV module in it, even AM and FM!

Details to get this operational.

First the correct (Zadig) driver needs to be downloaded and installed. Do not use the driver that is delivered with the stick (unless you want to receive DVB-T signals). For information and downloading of the Zadig driver: *https://www.rtl-sdr.com/tag/zadig/*

When the driver is installed this way, do not execute the SDRSharp.exe (step 12 in the description in the link mentioned above) but download on page *https://airspy.com/download/* the 'Community Package with Plugins' and execute this.

When you have already SDRsharp (the version without plugins) running, you already have the Zadig driver so you could start directly with downloading of the Community Package with Plugins.

In the left top corner, select the source 'RTL-SDR (R820T) and ▶ (play).

▶ *Selecting the RTL stick*

The receiving frequency (on top) could be filled out (or just click on a digit and use the scroll wheel of the mouse).

Tons of information about SDRsharp is on the web (and don't forget to look at the possibilities of the settings) so I will not mention it all here.

When this version of RTLsharp is running, the PAL/SECAM/NTSC TV 'triangle' should be clicked (unfolded) and 'TV' could be selected (to be found in the column on the most left side of the screen).

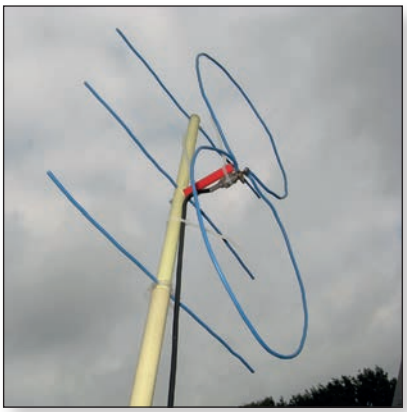
A new window opens with the resulting screen. This could receive directly a 70 cm band ATV signal or even a 23 cm band ATV signal. And instead of choosing between running SDRsharp or TV sharp, you have both at the same time. This is very handy while pointing the antenna or finding the exact frequency (in case of uncertainties caused by drift).

I first ask the transmitting station to transmit without video, so only the carrier. Then the signal of the station could be found and antenna direction could be optimized. Then I ask to add the video source and it appears in the Video screen, eventual optimized by adjusting the frequency. When the picture is received, it could be paused.

▶ *Left column: PAL/SECAM/NTSC TV is selected and the video window appears, in this case showing the received contest code of analogue RB-TV. If preferred, with settings other MSPS could be tried.*

The size of the TV screen could be changed by selecting the corner. My experience is that smaller windows helps to see the received code more easy then with a large window.

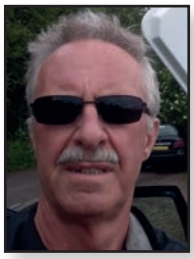
Many (non ATV) stations use this RTL stick for reception of all kind of signals. Several of them do have a good antenna system that could be used to receive ATV. If they are made aware of the possibility of receiving ATV signals with this version of SDRsharp, maybe some more stations could be made interested in ATV! Antenna's do not need to be large to receive several stations. Some wiring and plastic tubing could do the job.



▶ *Doppelquad antenna for 70 cm sticked out of the window received with the RTL stick many stations in the 70 cm band (despite the used RG58 cable)*

Related links:

Elsie filter designer: *http://www.tonnesoftware.com/elsie.html*
Pictures and plots related to this filter: *http://www.itr-datanet.com/~pe l itr/432mhz/satv-met-70cm-zender.htm*



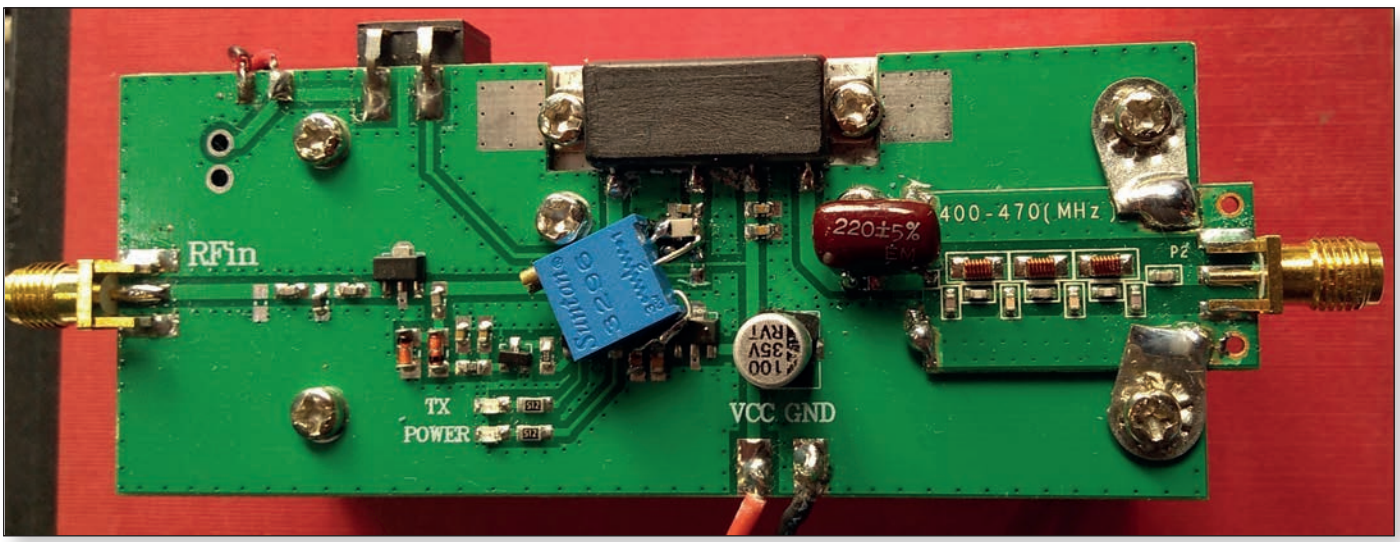
Portable stable bias voltage

Gareth G4XAT

Following on from Jim's useful little article about the 70cms amp he 'hacked' for use on DATV, here is my take on the same product.

As I would generally be using it portable, I wanted a stable bias voltage so I tapped off the on-board 5 volt regulator via a multi-turn pot. My unit didn't draw the same amps as Jim's, but it did deliver a very handy 11 watts or so, with a bit less for DATV use.

As it had no output filtering, I wondered if one of the cheap low pass filters from eBay might survive. Testing showed it got slightly warm but no visible duress shown so I cut off the input SMA, used a decent silver mica coupling capacitor and removed solder resist as required to solder it down to the motherboard (LHS) or solder tabs under existing screws (RHS). A handy little unit to go lightweight /P with or to use with the Langstone.



Turning Back the Pages

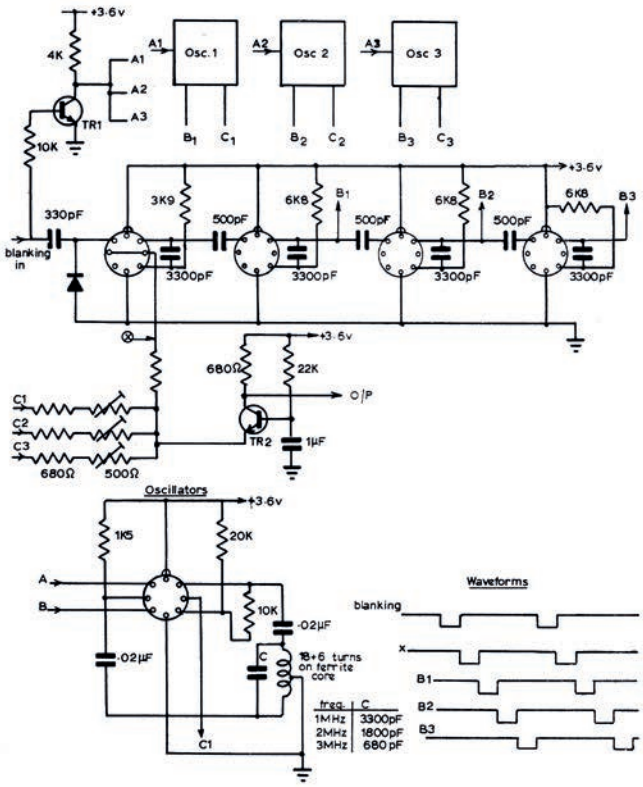
A dip into the archives of CQ-TV, looking at the issue of 47½ years ago

Peter Delaney - G8KZG

CQ-TV 80

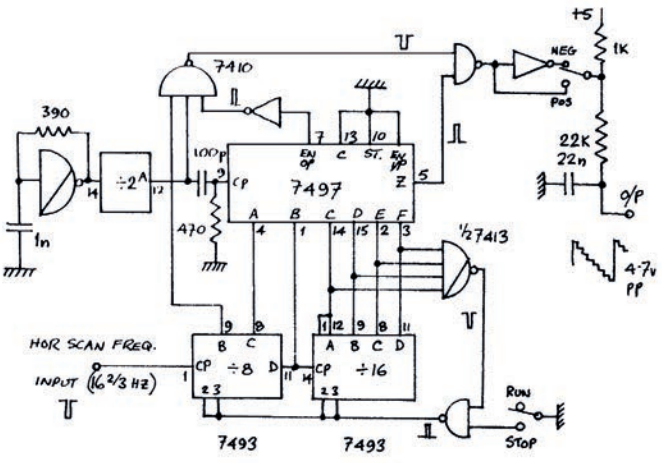
Although most amateur television transmissions in 1972 - CQ-TV 80 appeared in November that year - were on the 70cm band, some BATC members were experimenting with higher bands. The front cover of the magazine featured the 3cm equipment of Colin German. Based in Midlothian Scotland, he managed to transmit over a ¼ mile path on 10.05 GHz from a site specially agreed with the licensing authority, using just 25mW. The transmitter was based on a KS29A klystron (such being obtainable in surplus radar equipment at the time) and run from a 12 volt battery - and is 'much simpler than a 70cm transmitter" Colin had said. The picture source was a home-made vidicon camera.

An unusual device described by David Wilkinson was a multiburst generator. For testing video amplifiers a series of sine waves at different frequencies is useful for assessing their performance. A number of test signal generators had been shown in CQ-TV based on digital logic circuits, but those produced square, rather than sine, wave outputs. This design, however produced sinewave outputs at 1MHz, 2MHz and 3MHz. Each oscillator was built using a µL914 integrated circuit, one half of the device being the actual oscillator and the other half a buffer. Each oscillator was inhibited by mixed blanking applied from Tr1, so that the pattern was locked line by line. The line blanking also triggered the series of monostables in the middle of the diagram, which produced a a pulse of white level at X and a sequence of pulses to gate the 3 sine wave oscillators. The C1, C2 and C3 outputs of the latter were combined with the white level signal and fed to Tr2 and the output.

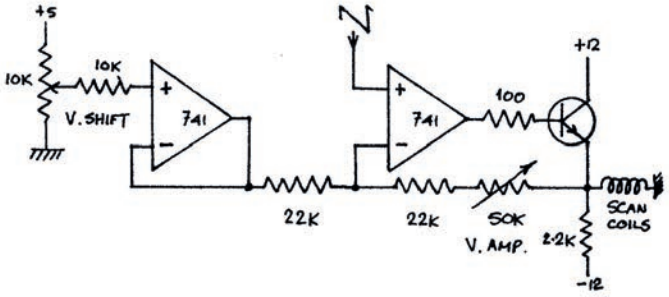


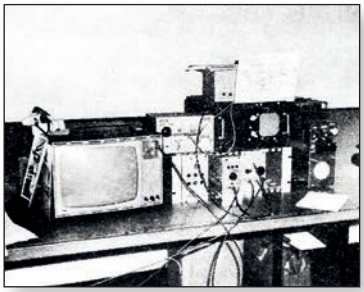
(CQ-TV 259's 'Turning Back the Pages' has details of what was inside the µL914)

Arthur Critchley's series on integrated circuits continued looking at op-amps, but also considered a logic device - the 7497 binary rate multiplier - which did not 'multiply' but carried out division! It comprised a 6 bit (ie divide by 64) counter, with access to some of the internal circuitry so that the output pulse would correspond to anything between 1 and 63 clock pulses. One application of the device was to make an analogue to digital converter, by integrating the output pulses. Slow-scan television (sstv) was a popular low-bandwidth mode, and Arthur included

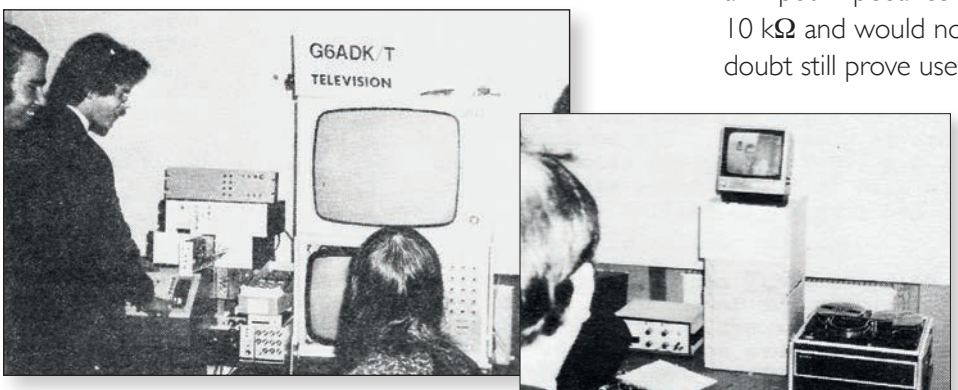


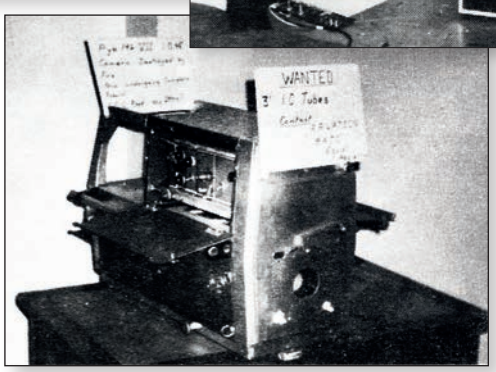
a circuit for generating the sstv frame scan. High frequency clock pulses are fed to pin 9 of the 7497, with the count controlled by the pair of 7493 devices. The output at pin 5 could be passed through the inverter (or not) top right, and then integrated to produce a 120 level staircase signal (corresponding to the 120 line sstv standard). The output stage formed of two 741 op-amps raised this 5V signal to a +/- 10V one to drive the scan coils, and also provide a shift control.



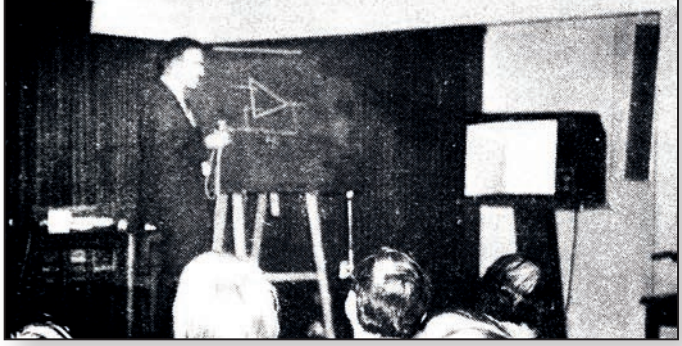


Slow-scan also featured in the displays at the club bi-annual convention which had been held at the Independent Broadcasting Authority premises in London, where Robert Skegg's display included a converter to create slow-scan signals from a 625 line picture source. Nigel Walker was able to put on a demonstration of the amateur colour television equipment he was describing in CQ-TV, (CQ-TV 80 included the switching logic for the vision mixer in the previous issue) and also gave a lecture on the topic.



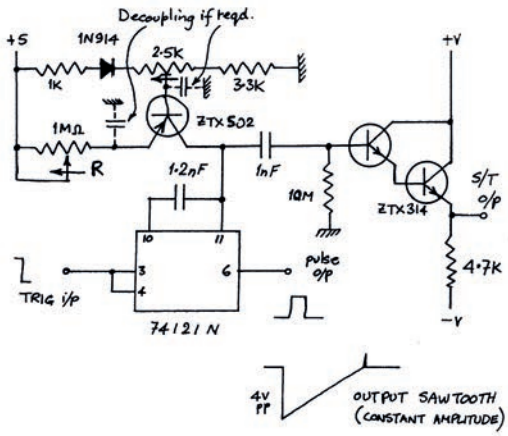


Other displays included a Pye Mk VII image orthicon camera that was being restored following fire damage, and a then 'state of the art' open-reel Sony video recorder.

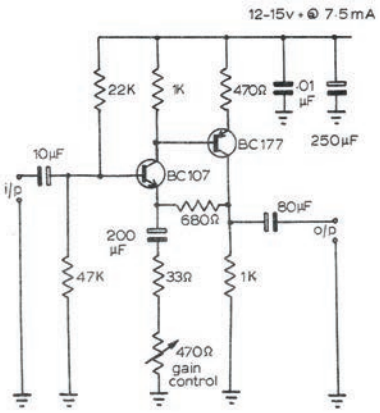


The other lectures on that occasion were one on slow-scan tv, and one by Arthur Critchley revealing more about integrated circuits.

Although a 'digital' circuit, the 74121 monostable could be used to generate a linear sawtooth signal, by replacing the normal timing resistor by a constant current source based around the ZTX502 transistor. To prevent loading of this current by the output, the voltage across the timing capacitor was buffered by the very high impedance Darlington pair stage formed by the ZTX314 transistors.



The video line amplifier circuit had a gain adjustable from 2 to 10 over a frequency range of 10Hz to 5MHz, and an input impedance over 10 kΩ and would no doubt still prove useful.



In addition to the 'Member's Adverts', a facility being offered by the BATC at the time was an 'Equipment Registry', run by Alan Watson. Members could let Alan know if they had television equipment surplus to their requirements, or if there was an item that they wanted to obtain, and Alan would match the items for disposal with those who had a need for them.

The British Amateur Television Club

Out and About

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

All amateur radio rallies have been cancelled.

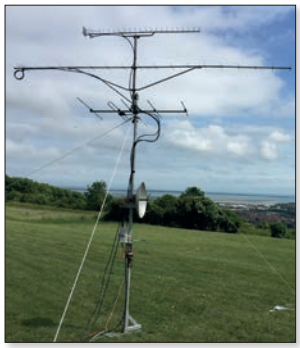
We will show any that will be running in the next issue.

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 or stay-at-home events.

25th October – 70cm and 23cm Activity Day
19th & 20th December – 13cm and up Activity Weekend
Christmas Repeater Challenge

Plus:

CAT20 - the BATC convention,
this year online
on the 24th October 2020

(details on page 11)

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