The British Amateur Television Club

CQ-TV

No. 279 – Spring 2023

Treasurers Report for 2022

Rx-Tx changeover control board

Receiving HAMTV

GB3NQ H264/H265 encoder box

IARU Region 1 ATV Contest 2023

Network remote control for the Yaesu G5500 rotator

Portable power for 28V and 50V

Making a front panel fascia using a vinyl label

The LimeSDR Mini 2.2

Wideband data tests on QO-100

Band filters on epoxy board and simulation software

OpenTuner Windows software for MiniTiouner hardware

... and much more inside!

CQ-TV 279

Contents:

3 From the Chairman…

4 The Listing - new and renewing members

8 Activity and Contests

10 Treasurers Report for 2022

12 Rx-Tx changeover control board

14 Receiving HAMTV

17 GB3NQ H264/H265 encoder box

19 IARU Region 1 ATV Contest

20 Network remote control for the Yaesu G5500 rotator

21 Portable power for 28V and 50V

23 Tributes paid to TV amateur- Roger G8IUC

24 Making a front panel fascia using a vinyl label

25 The LimeSDR Mini 2.2

26 Wideband data tests on QO-100

27 Band filters on epoxy board and simulation software

30 The Portsdown Newsletter

32 OpenTuner Windows software for MiniTiouner hardware

33 Turning Back the Pages

Contributions

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

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

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

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

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

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

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

BATC

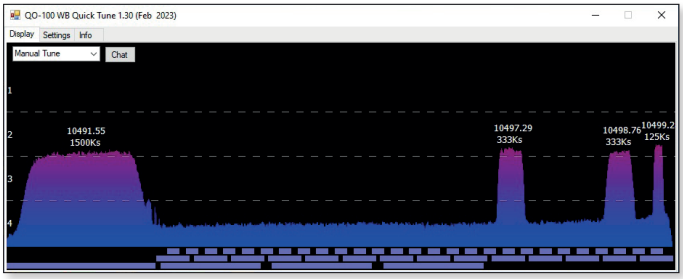
BATC Online

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/

Printed in Great Britain. ISSN 1466-6790

From the Chairman...

Martin Charman G4FKK



Apart from obtaining an Airspy SDR and using it to implement Tom, ZR6TG's excellent offline QO100 Wideband Spectrum Monitor software (see *https://www.zr6tg.co.za/2022/06/29/offline-oscar-100-wideband-spectrum-monitor-with-sdr/*), which enables me to run Rob, M0DTS's latest Quicktune version without needing an internet connection, not much radio work has been done at the FKK QTH lately. Others, however, appear to have been very busy since the last CQTV as you'll find in the following pages.

We were delighted recently to welcome Matt, M0DQW to the Thursday evening BATC net on QO100 (every Thursday at 20:00 UK local time). Matt has made very rapid progress getting his DATV station up and running and has made some very professional and watchable videos published on his TechMinds YouTube channel.

If you're thinking of going digital then it's well worth watching them for ideas and inspiration. Once you're inspired then the BATC wiki and forum pages will take you deeper into the technicalities. TechMinds can be found here – *www.youtube.com/@TechMindsOfficial/featured*

A lot of you will remember HAMTV which was, and hopefully will be again soon, the DVB-S transmitter aboard the International Space Station, ISS, on 2.395 GHz. The original unit is being sent back to the ISS and may be commissioned in May this year. Noel, G8GTZ, has written an excellent article for this edition of CQTV with all the relevant details and a lot of useful links to further information. Check out the link to Colin, G4KLB's video on how he received HAMTV – another rather inspirational watch!

The BATC shop will be operating at the Martlesham Microwave Roundtable on the 16th of April and, of course, don't forget CAT 23 on the 6th of August later this year. I hope to meet lots of you there.

CAT 23 Part 1
Sunday August 6th

- **ATV Equipment Demonstrations**
- **Fix it, test and measurement area**
- **Members' flea market and traders**
- **Free access to Air Museum**
- **Midland Air Museum Coventry Just off M69/M6**

CAT 23 Part 2
October date TBC

- **Online Lectures**
- **The latest in ATV**
- **Something for everyone – from beginners to advanced.**

The Listing

new and renewing members

Rob Burn G8NXG

I am pleased to report once again that the club continues to attract new members and now has the support of around 1450 members; another small and welcome increase.

In connection with joining the BATC and renewals, the preferred payment method for membership payments is via PayPal. Occasionally we can experience the odd hiccup with a payment issue, which is often resolved at the second or third attempt. So, if you happen to meet a problem with PayPal which does not clear after a couple of attempts just get in touch for advice.

Due to changes in international shipping processes, parts ordered from the shop often suffer delays in transit. If you pay for a membership renewal on the same order, your membership period will not update until your part(s) have been cleared.

The solution to overcome this is straightforward – don't combine your membership renewal with a parts order – just create an order just for your membership payment.

Most membership payments and renewals automatically update once payment is made except those which entail a change in membership type – for example cyber to full or one year to two year. These are normally manually corrected within a couple of days of payment being received.

You will always be notified if a remittance goes awry and here I would like to remind any members who pay via bank transfer that the BATC bank details changed with effect from January 2023 – full details are on page seven of the previous issue of CQ-TV.

The new details also appear on the 'How to Pay' web page on the shop tab on the main website.

Finally, my thanks to all members for their support of the BATC and as is usual details of those who joined or renewed membership during the three months to 28 February appear in the following list.

Australia		
Ray Spargo	VK5RR	Adelaide
Mark Fairbairn	VK3XVC	Bendigo
Peter Sturt	VK2ZTV	Cardiff Heights
John Cooper	VK3JCO	Chelsea
Keith Rainbow	VK6JT	Dianella
Raymond Murphy	VK2ME	Erskine Park
Paul Roper	VK2KZO	Linden
Gary Beech	VK2KYP	Lisarow
Andy Salmon	VK3XKA	Lysterfield
Rod Preston	VK4VU	McDowall
Stephen Rapley	VK2RH	Newtown
Michael Baldock	VK5MCB	Port Pirie
Gary Shipton	VK2CRJ	Ryde
Jules Corben	VK2EXT	Sydney
Roger Jordan	VK5YYY	Whyalla
Austria		
Josef Waser	OE3JWC	Neuhofen-Ybbs
Belgium		
Etienne Nisolle	ON4KEN	Braine-le-comte
Wim De Smedt	ON8DSW	Dendermonde
Marien Patrick	ON4APP	Dendermonde
Roland De Beukelaer	ON4RDB	Diest
Luc Halbach	ON6JY	Esneux
Frans Van de Velde	ON4VVV	Gent
Patrick Hernaelsteen	ON5AV	Haren
Pierre Decamps	ON8GE	Heppignies
Denis Goffaux	ON4MU	Ixelles
Kenneth Rogge	ON5KR	Lievegem
Frank Huygevelt	ON5AN	Mariakerke-Gent
Christian Dumortier	ON1RC	Melle
Jean-marie Hermant	ON4HDX	Thieu
Brazil		
Hipolito Luiz	PY5HC	Curitiba
Canada		
Wayne Getchell	VE3CZO	Ottawa
Stephen Birkill	G8AKQ	Squamish
Chile		
Patricio Lancellotti	CE3BSK	Santiago
Czech Republic		
Leo Hucin	OK2UUJ	Olomouc
Denmark		
Hans Rasmussen	OZ1CMV	Maaloev
France		
Lionel Dekieber	F6DZR	Bressuire
Patrick Jacquemin	F6EXX	Dijon

Hubert Riera	F5LCT	Lacanau
Christian Martz	F1FAQ	Palaiseau
Guy Lemoine	F4DAI	St Christophe Du Ligneron
Patrice Soutoul	F1GIU	St Orens
Cristiano Gagliardi	F4VUD	Thoiry, Ain
Michel Amiard	F6ANO	Tournan-en-Brie
Germany		
Wolfram Winkler	DB5SL	Aspach
Raimund Jakob	DG9MAQ	Augsburg
Oliver Welp	DL9QJ	Bendestorf
Hubertus Rathke	DC1OP	Bremen
Reinhard Trautenbach	DG2MTR	Eichstaett
Helmut Rapp	DL1HEL	Goerlitz
Jörg-Michael Kamla	DK3VK	Goslar
Ralf Gorholt	DL5EU	Großefehn
Andreas Meier	DO7EN	Hennigsdorf
Klaus Kramer	DL4KCK	Koeln
Christian Schuppener	DH3CS	Kreuztal
Hans-Joachim Mueller	DL3RY	Kumhausen
Frank Lohse	DL2JFL	Limbach-oberfrohna
Thomas Stiefl	DL6RCG	Marktredwitz
Norbert Pingel	DK8DT	Modautal
Gerhard Härtel	DB4AS	Northeim
Josef Schmitt	DK6RS	Pentling
Jörn Bockwoldt	DL1LQ	Preetz
Juergen Graetsch	DK8AP	Seesen
Hans-Juergen Marx	DJ3LE	Silberstedt
Franz-Josef Rechin	DL5VG	St . Ingbert
Martin Hahn	DL2GHM	Teningen
Tobias Jacobi	DL7TJ	Winsen
Roland Sobotta	DD0AO	Wolfenbuettel
Heiko Hinke	DL1HTY	Zeitz
Greece		
Yiannis Koulougeris	SV1COA	Attica
Ireland		
Des Walsh	EI5CD	Ballinhassig
Tony Baldwin	EI8JK	Bantry
Aengus Cullinan	EI4ABB	County Galway
Italy		
Ottorino Odoardi	IZ6BMP	Alanno Stazione
Claudio Ariotti	IK1SLD	Casale Monferrato
Piero Forno	IK1IYU	Montegrosso d'Asti
Domenico Dal Mas	IU3NMQ	San Vendemiano
Piero Andreini		Sarteano

Japan		
Kitamura Hiroyuki	JH3TXF	Jōyō
Hideo Yanagisawa	JA7JJN	Kunitachi
Luxembourg		
Dan Jungels	LX1JU	Hautcharage
Albert Koob	LX1AT	Pétange
Malta		
Mansueto Grech	9H1GB	Mqabba
Netherlands		
Rusty Salemink	PA0RKA	Aalten
Hans Scholtze	PE1PZN	Almere
Jaap Last	PA0T	Annerveenschekanaal
Pascal Witjes	PA1PAS	Arnhem
Oebele Lijzenga	PA3BJC	Damwald
Jelle Meintema	PE1AEE	Drachten
René Kint	PA1RKT	Haarlem
Paul Veldkamp	PA0SON	Kralendijk
Tonnie Luijerink	PA3GLL	Losser
Marco Klomp	PE2SHF	Nieuw-Lekkerland
Frits Aden	PE1DWQ	Rohel
Rick Wesselink	PE2AAB	Waalre
Poland		
Artur Schreiber	SP3VSS	Poznan
South Africa		
Stewart Clark	ZR6WT	Johannesburg
Douglas Defty	ZS1DUG	Loevenstein, Bellville
Spain		
Joan Pou	EC3DBA	Canyamars
Michael Naylor	EA7KIR	Málaga
Josep Martínez	EB3DYB	Sta. Eulalia De Ronçana
Sweden		
Jan Andersson	SM0OFV	Solna
Switzerland		
Walter Greter	HB9TLX	Kriens
Pierre-andre Probst	HB9AZN	Vallamand
UK		
Edward Hatherall	GW6BXU	Abergavenny
Paul Kerry	G6LSD	Alfreton
Lloyd Farrington	M5LDF	Andover
Nicholas Borrett	G8NXB	Ashtead
David Palmer	G7URP	Attleborough
George Miller	G6WWY	Axminster
Robert Best	GI3VAF	Bangor
Luke Rose	M0LXX	Belper
Stephen Osborn	G8JZT	Bexleyheath

Christopher Kentch	G0FJY	Bideford
Paul Hubbard	G4DKB	Billericay
Norman Hunter	G8DQN	Billericay
Brian Jordan	G4EWJ	Birkenhead
John Churchill	2E0EGP	Birmingham
Keith Prosser	GW8TRO	Blackwood
Bill Edwards	G8GHD	Bognor Regis
Andrew Boardman	G7ROM	Bolton
Keith Wevill	G4UKW	Bradford
Petrie Owen	GW0KAX	Bridgend
Darren Hobbs	G8PVG	Bridgwater
Ken Stevens	G4BVK	Bristol
Stephen Michie		Bristol
Richard Perzyna	G8ITB	Bromley
Malcolm Bay	M0MBO	Buckingham
Stephen Outen	GW0DWG	Burry Port
Darren Coe	G7SDC	Bury St Edmunds
Barry Cope	G7EKI	Canterbury
Robert Lang	GW0FJV	Cardiff
Mark Slade	M0CUK	Chaddleworth
Nick Gilbey		Charmouth
Robin Dakin		Chelmsford
Alexander Slade	G0IJN	Chelmsford
David Brocklehurst	G4VDB	Chesterfield
Richard Naden	G0NAD	Clacton on sea
Phil O'Ryan	G8WWF	Congleton
Wesley Clinton	G8KZN	Consett
Leslie Lea		Didcot
David Williams	G6ONE	Doncaster
Peter Myers	G3UWT	Doncaster
John Raybould	M0IVJ	Dorrington
Alan Rademaker	M0LTN	Dunstable
Dave Williams	G8PUO	Eastbourne
Peter Dick	GM4DTH	Edinburgh
David Taylor	GM8ARV	Edinburgh
Leonard Entwisle		Elland
Allan Mitchell	G3YJZ	Enfield
Brian Bambury		Evesham
Bob Thornton	G3WKW	Fleet
Howard Ling	G4CCH	Gainsborough
Bob Fisk	G7AVU	Gainsborough
John Ferrier	G0ATW	Grimsby
Paul Egan	G1WTX	Guildford
Malcolm Sanders	G8HST	Hainault
Paul Marshall	G8MJW	Harby Notts
John Van Dyken	G0SPE	Harrow

Barry Grylls	G4ZCN	Hartlepool
David Butler	G4ASR	Hereford
Martin Porter	2E1CAQ	Hertford
Owen Williams	M7OMW	Heswall
Andrew Dickson	G8DJF	High Wycombe
Wirral ARS	G3NWR	Hooton
Steven Roberts	M0OYR	Hull
Barrie Procter	G8AWN	Ilkley
Ray Hurt	G0HDS	Immingham
Ian Wilson	GM4UPX	Jedburgh
Paul Bolton	G4CXE	Kings Lynn
David Ross		Leeds
Ian Bailey	G8PQY	Leeds
Sarah Elliott	M1SJE	Leicester
Andrew Glendinning		Leyburn
Ronald Sherrard	GI3VAW	Limavady
Stephen Carey	G4MJW	Liskeard
Robert Fisher	M5RMF	Liverpool
Peter King	G6BOK	Liverpool
Piotr Niewiadomski	M0PGN	London
Graham Smith	2E0JOG	Loughborough
Daphne Newsum	G7ENA	Louth
Ray Groom	G4RKP	Lowestoft
Richard Norton		Ludlow
Dave Perry	G6JIE	Luton
Jenny Easdown	G4HIZ	Maidstone
Christopher Hall	G6HTH	Maidstone
Darren Storer	G7LWT	Manchester
Chris Gibbs	G8GHH	Margate
Robert Copeland	G4PDF	Market Rasen
Roger Ray	G8CUB	Marlborough
Doug Simmul		Matlock
Ashley Burns	GW0UXJ	Merthyr Tydfil
Ken Powell	G0PPM	Nailsworth
David Swash		New Milton
John Wiggins	G8KUZ	Newcastle Under Lyme
Jenny Bailey	G0VQH	Newmarket
Gerry Somers	G7VFV	Newquay
Kathleen Woodhams	M0RRL	Newton Aycliffe
Martyn Gawthorpe	G8FEK	North Ferriby
Tony Nicholson	G8FLV	Northallerton
Kevin Robinson	G8ZMH	Northampton
Nigel Watkinson	G0NGL	Northwich
Alisdair Boyle		Northwich
William Hill	M1BKF	Norwich

Colin Jacobs	G4LEP	Norwich
Dave Sykes	G0JOX	Nottingham
Derek Hughes	G7LFC	Ormskirk
Roger Meakins	G8HKN	Orpington
Malcolm Johnson	G0UHY	Paignton
Clive Peacock	GW6CZE	Pencoed
Alan Farmer		Penicuik
Paul Paterson	GM4JOJ	Peterhead
Michael North		Polegate
Donald Mobbs	G4MEE	Preston
Eric March	G8EOJ	Redditch
Geoff Findon	G3TQF	Rugby
Paul Phillips	G4KZY	Salisbury
Nigel Bourner	G4JYU	Sandwich
David Swale	G8ETS	Scarborough
Roger Wilson	VK4TV	Scunthorpe
David Hay	M0TGC	Seaton
Robert McLintock	G1TGZ	Sevenoaks
Joseph McElvenney	G3LLV	Sheffield
J Oates	G3LZI	Sheffield
John Hirons	G6TGJ	Shrewsbury
Ray Hughes	G8JBQ	South Perrott
Denis Nicole	M0CYJ	Southampton
Michael Rhodes		Southport
Terry Roxby	G1LPS	Spennymoor
Paul Andrews	G6MNJ	St Austell
Patrick Kemmis	G4MGI	Stafford
Alastair Macarthur		Stone
Brian Smith	G4ETN	Taunton
Dave Woodhall	G3ZGZ	Thornton Cleveleys
Chris Pegrum	M0NAY	Tunbridge Wells
Norman Green		Twickenham.
Myles Sewter		Uppingham
Wayne Sheldon	G8ZBJ	Walsall
Adrian Hurt	G0OJY	Ware
Andy Chamberlain	G7CFC	Wednesfield
Michael Scarlett	G4CAK	Wellington
Roger Davis	G3IUZ	Wells
Rob Sutton	G1WVV	Wem
Jonathan Gudgeon	G4MDU	Wicken
Paul Reeves	G8GJA	Wincanton
Ian Hart	G8IVC	Winchester
Robert Hammond	G4FKR	Winchester
Malcolm Burrell		Wisbech
David Brooke	G6GZH	Wisbech
John Ashmore	G8GXF	Wolverhampton
Chris Wherrett	G4IIX	York
US		
Rodger Southworth	WB8NZU	Beavercreek
Donald Nelson	N0YE	Boulder
David Stepnowski	KC3AM	Claymont
Michael Scheel	K0QCS	Davenport
Kerry Banke	N6IZW	La Mesa
Endaf Buckley	N6UTC	Long Beach
James Anderson	K8OS	Maple Grove
William Thompson	N3DC	Maryland
Burt Guillot	N7CS	Marysville
Douglas Niessen	K6STS	Ocala
George Blake	W6BDD	Olathe
John Kozak	K0ZAK	Reisterstown
Lloyd Weekes		Roanoke
Richard Spanbauer	W1DSP	Stonington
Richard Kowalsky	N7RAY	Tulalip
Michael Resnick	N2WOQ	Vineland
Ray Quinn	W6RAY	Visalia
Art Towslee	WA8RMC	Westerville
Nigel Gunn	W8IFF	Xenia

Dish installation at the QTH of Seamus G7ITT, with Dave Shaw, M5TXJ bolting up the dish.

Activity and Contests

Clive Reynolds G3GJA

2022 competitions roundup

The 6cm Activity Ladder was won again by Noel, G8GTZ, with 1257 points, with Gareth, G4XAT, a close second.

The 70cm Activity Ladder was won by Rob, PE1ITR, having amassed 6817 points, more than three times second placed Gareth, G4XAT, with 2272 points. Third place went to Corné, ON7MOR, with 522 points.

The Christmas Activity Ladder was again won by Ken, G8VDP, with 130 points with myself runner up with 104 points. The Christmas Repeater Contest was won by GB3EY in East Yorkshire with 8572 points.

All winners will receive the BATC trophy and runners-up framed certificates which will be presented at CAT23.

The 6cm and 70cm Ladders are running again this year. Please support these activity initiatives.
See *https://batc.org.uk/contests*

- *M0DTS/P braving the weather for the January Activity Weekend at Rosedale Head, 1362 feet ASL*

Activity Weekend date changes

Since the Activity Weekend dates were announced, the date for CAT23 has been fixed. To avoid a clash with the Convention, the Activity Weekend in August has been moved to the 19th & 20th of August. This was chosen to coincide with the Veron ATV Activity Weekend for 6m, 2m & 70cm. To match our friends in the Netherlands, the BATC weekend focus will feature 6m, 2m and 70cm and, as usual, 23cm.

Here are the confirmed dates for the remainder of 2023:

- Apr 15th/16th Activity Weekend - 2m & Down + 23cm (coincides with Veron event)
- May 13th/14th Activity Weekend - 70cm & 23cm -All Bands (IARU Prep)
- Jun 10th/11th IARU Region 1 ATV Contest
- Jul 15th/16th Activity Weekend - 6m & 4m + 23cm (Es Special)
- Aug 19th/20th Activity Weekend - 6m, 2m, 70cm & 23cm (coincides with Veron event)
- Sep 16th/17th Activity Weekend - 13cm & Up + 23cm
- Oct 14th/Oct 15th Activity Weekend - 2m & Down + 23cm
- Nov 11th/12th Activity Weekend - 70cm & 23cm
- Dec 9th/10th Activity Weekend - 13cm & Up + 23cm (coincides with Veron event)

Activity reports

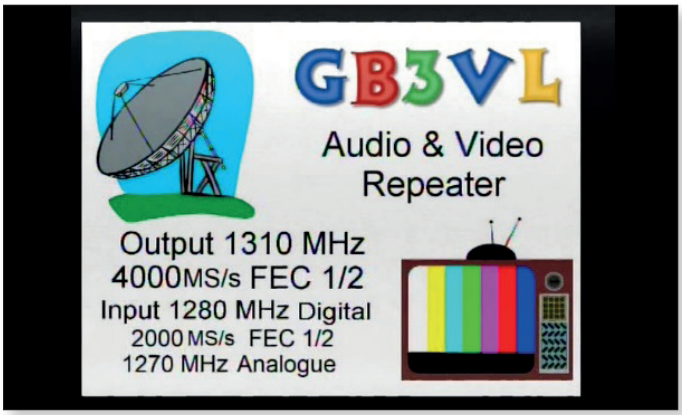
Tropo enhanced paths across the North Sea produced some excellent DX for the November Activity Weekend. Rob, DL/PE1ITR/P, located just on the German side of the border with the Netherlands achieved a two-way 70cms with our Rob, M0DTS/P at a distance of 645km with an MER of 15dB. Rob's perch on the North York Moors produced another four contacts, each exceeding 400km.

January's Activity Weekend highlight was a 2m tropo assisted 2-way 246km contact between Rob, M0DTS/P and Mike, G0MJW. The log was supplemented with local 23cm contacts from G3GJA, G8VDP and G4YTV.

- *G3GJA received this from North Yorkshire over an obstructed 80km path*

February saw some excellent Tropo and I saw GB3VL on Lincoln Cathedral in Hull for the first time since it changed to a digital output. Although not far, about 57km, its 4MS/s output on 1310MHz is not easy to receive with EY on 1308MHz at 10km and GB3GG on 1310MHz at 30km.

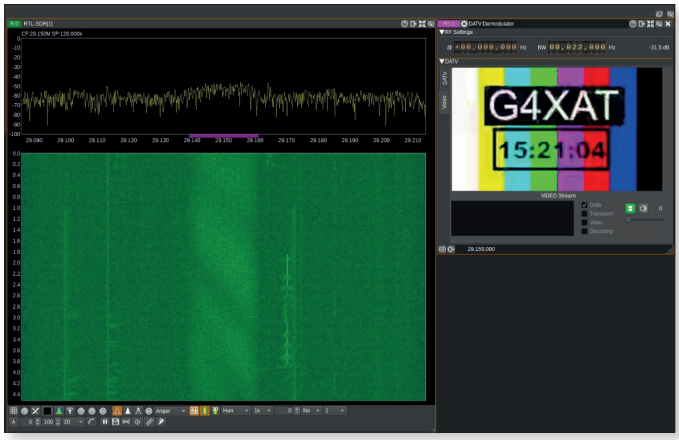
There really is no need to run 4MS/s outputs now and it certainly improves the repeater's coverage when switched to 1MS/s or less.



GB3VL received on 14th February

February's Activity Weekend was quiet, possibly due to the tropo during the week prior, but I managed some 23cm contacts with G4YTV and M0DTS/P. That I think justifies having 23cm for every Activity Weekend as many of us are not equipped for terrestrial 13cm and up operation.

There has been a lot of excitement about the experiments on 10m across the Atlantic. It has proved to be challenging and the goal of moving pictures has yet to be achieved. This screenshot from John K0ZAK shows that he was able to decode a sequence of individual frames from Gareth G4XAT using SDR Angel and an RTL USB SDR.



G4XAT as received by K0ZAK on 11th January

Perhaps when 10m opens up more as the Solar Cycle progresses there will be a chance of moving pictures. Currently, it looks as though the restrictive licencing in the US will prevent a two-way contact though.

Please send your activity reports to *contests@batc.tv* or use the Activity & Contests section of the Forum. Don't forget to make use of *dxspot.batc.org.uk* to log your contacts.

2022 6cm Ladder

Position	Callsign	Points
1	G8GTZ	1257
2	G4XAT	1002
3	G4AYT	488
4	G6PKS	180
5	G8GKQ	104

2022 70cm Ladder

Position	Callsign	Points
1	PE1ITR	6817
2	G4XAT	2270
3	ON7MOR	522
4	M0YDH	260
5	G8GTZ	221
6	G8GKQ	200
7	M0DTS	160
8	G4KLB	57
9	G8TA	30

Christmas Activity Ladder*

Position	Callsign	Points
1	G8VDP	130
2	G3GJA	104
3	G4YTV	60
4	M0DTS	15
5	G0AZQ	13
6	G4EEV	10
7	G8GKQ	5

Christmas Repeater Contest*

Position	Callsign	Points
1	G8VDP	3192
2	G8VAT	1971
3	G4EEV	936
4	M0DTS	725
5	G3GJA	720
6	G4YTV	608
7	G0AZQ	420

* 24th December 00:00 - 2nd January 23:59

Treasurers Report for 2022

Brian Summers treasurer (acting) March 2023

Banking

The HSBC changed the class of our account from a free community account to a chargeable business account.
This has now been closed and a new one opened with Lloyds.
When making payments to the BATC please make sure to use the new bank details:-

Sort code = 30 99 50 A/C Number = 30070860
Name = British Amateur Television Club
See also CQ-TV 278 page seven.

Notes to accounts

Due to timing of the Christmas edition of CQ-TV and the need for a sharp year end cut off there are only three issues of CQ-TV in these accounts. If the normal four issues had been included the surplus of £1273 would have been a deficit of about £1000. The office expenses figure includes a replacement computer for the streaming system.

The accounts to 31 Dec. 2022 are available for any member to inspect by appointment.

The Shop (1)

The BATC continues to make a significant investment in digital ATV. 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. The stock held figure is higher than in previous years.

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.

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). It is of note the postage costs for the paper CQ-TV have gone up considerably. The committee decided to absorb these costs in the short term.

The Treasurer

At the last AGM I stood down as treasurer and Dave Crump was elected as the new treasurer. Due to practicalities, I continued to operate as acting treasurer until Dec 31 2022 and the preparation of these accounts is my final duty.

The email address for the treasurer remains the same = *treasurer@batc.tv*

From the Treasurer - Dave G8GKQ

First of all, I must express my thanks to Brian G8GQS who has continued as club treasurer until 31 December 2022 so that we could have a handover after he had completed the 2022 accounts, as published in this edition of CQ-TV.

Although they have not been examined by a non-committee member (due to lack of volunteers), having studied them during the handover I am confident that they would stand up to scrutiny.

I am looking for a volunteer (now) to examine the 2023 accounts; this is not an onerous task and is well within the capabilities of anyone who has been involved in running any community fund such as a workplace tea bar.

As all the relevant information is now available electronically, the volunteer might never need to meet me, and I see it more as a monitoring role during the year, rather than a large one-off effort at the end of the year.

Please contact me at *treasurer@batc.tv* if you are able to give a small amount of your time to the club for this task.

Over the past few months, we have opened a new current account (as announced in the last CQ-TV – please take note if you make direct payments) and closed the old current account.

We are also trialing the use of QuickBooks as an online accounting package. These new accounting procedures have enabled us to investigate taking card payments for shop items at rallies.

We will trial this at the Martlesham Microwave Round Table on 16 April and, hopefully, all subsequent rallies in 2023.

It only remains for me to report that the BATC is in a good place financially, and say that we are actively looking for worthwhile amateur television-related projects to support so as to promote the hobby.

It's easy to apply for a bursary; there is an online form on the website. If you have any questions, please contact any committee member beforehand.

British Amateur Television Club

Income & expenditure account, year ending 31 December 2022

Income account	2021	2022
Subscriptions	£15,929.68	£15,717.84
Shop surplus (1)	£4,966.92	£2,921.60
Interest received	£120.79	£293.67
Donations received (2)	£127.00	£153.95
Miscellaneous Items	£0.00	£21.00
Convention & BGM	£0.00	£0.00
Less PayPal fees (3)	-£1,933.24	-£1,319.71
	£19,211.15	£17,788.35

Expend account	2021	2022
CQ-TV Printing	£4,762.00	£3,717.20
CQ-TV Postage	£4,121.48	£3,602.27
Office expenses	£151.71	£1,555.55
Committee meetings	£130.11	£174.28
Members services	£2,065.24	£2,812.65
RSGB affiliation fee	£52.00	£52.00
Convention & BGM	£313.59	£250.00
Awards & Prizes	£100.00	£388.56
Web services (4)	£3,216.29	£3,962.01
	£14,912.42	£16,514.52

Balance sheet at 31 December 2022

Assets	2021	2022
Stock, BATC shop	£4,188.70	£7,605.09
HSBC account	£19,613.98	£3,824.72
PayPal account	£11,419.52	£15,923.31
Lloyds account (5)	£0.00	£5,010.00
Teachers Building Society	£48,437.42	£48,731.09
Paid in advance (6)	£562.50	£562.50
Less Current liabilities		
Late Payments	-£2,178.40	£0.00
Subscriptions RX in advance	-£16,134.46	-£14,473.62
	£65,909.26	£67,183.09
Represented by Accumulated fund		
Balance brought forward	£61,610.53	£65,909.26
Surplus or Deficit	£4,298.73	£1,273.83
Balance carried forward	£65,909.26	£67,183.09

Notes to the accounts

(1) This is the shop surplus, net amount, before for the PayPal fees.

(2) The donations figure includes some corrections of shortfalls in payment elsewhere

(3) The PayPal commission is included in income as a deduction as it is deducted at source.

(4) The cost of our web presence & cyber CQ-TV dispatch.

(5) The new account to replace the HSBC account which has been closed.

(6) ½ year payment (2023) for website maintenance

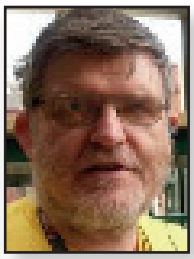
Equipment was purchased in 2022 to the value of £1651.00

The shop turnover for 2021 was £25,598 and for 2022 was £15,252

Brian Summers
Treasurer (acting)

Rx-Tx changeover control board

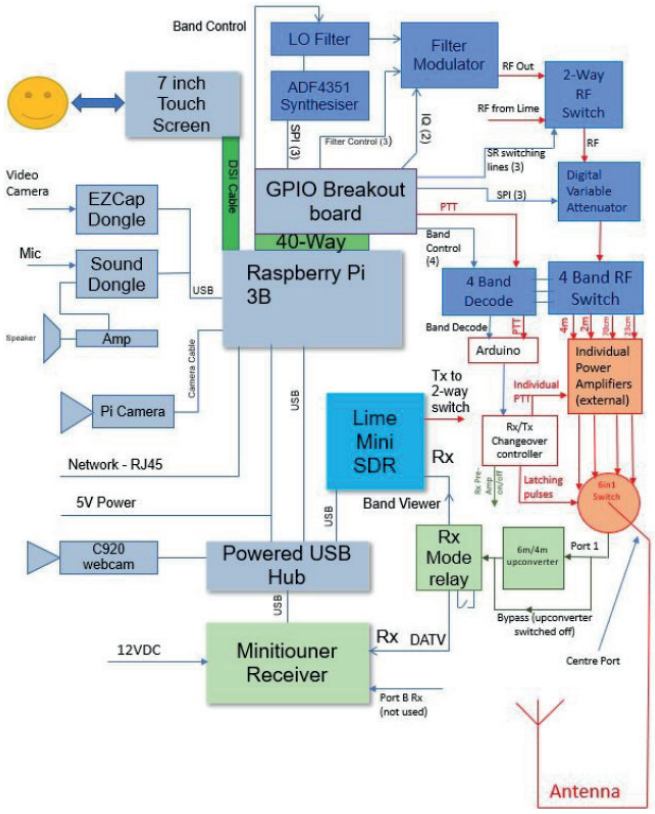
David Holman M0YDH & Ron Wellsted M0RNW



Introduction

In CQ-TV 278 we presented the Wolverhampton Amateur Radio Society, G8TA, Centenary Portsdown unit. Since then the major development towards finishing the unit in time for the RSGB construction competition has been the completion of the Rx/Tx changeover controller.

The video presentation of the finished unit is at *https://youtu.be/6mdzod8yfY0* so readers can see the unit and its operation.



Here's a block diagram of our unit in the style of Dave G8GKQ.

Our brief from the club included ease of use and mentioned that members are accustomed to the PTT key on their HF transceivers. They're not usually worried about the changeover from receive to transmit and back again.

Once the correct antenna is connected, then the unit should automate the changeover process. The Portsdown system in terms of driving PAs and pre-amps etc ends at the four and eight-band decode boards and, as constructors, we must work from there.

Six-way co-axial relay

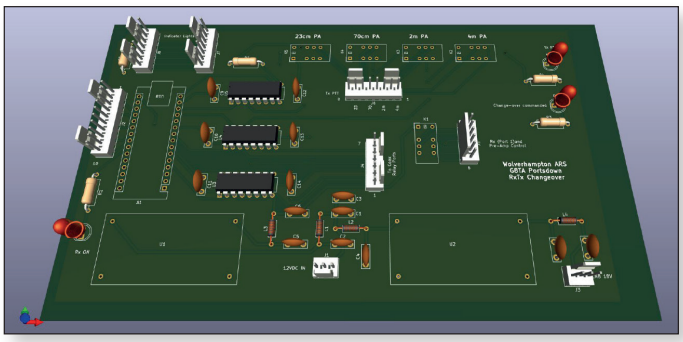
A Dynatech latching six-into-one N-type 24V co-axial relay (06-118E801) was obtained in 2019 at Telford Hamfest on the premise that it would come in useful one day. David fabricated a mounting bracket in order to mount the relay on the back panel of the unit using rivnuts. Ducommun Part No. 06-118DH28 seems to be the current equivalent. Their on-line catalogue indicates power handling at around 250W at 3GHz so our members are not going to harm it.

Control board

This was designed by Ron M0RNW and is based around an Arduino Nano together with suitable relay drivers and relays for the linear amplifier PTT lines.

The inputs from the BATC decode board are connected to the Arduino Nano A0-A5 lines. These are configured as digital inputs with 10k pull-up resistors (internal to the Arduino). When Tx ON is pressed on the touchscreen, the firmware then generates the correct sequencing for the co-axial relay and the PTT relays:- one to enable/disable the receiver, and four of these to select the correct PA for the transmission. Panasonic TX2-24V (ATX204) are used. When the user presses the screen again to end the transmission, the sequence runs in reverse.

The relay drivers used are SN754410 quadruple half-H drivers, usually used as stepper motor drivers. The sections of the SN754410s driving the co-axial relay utilise the enable line together with the software timer in the Arduino to provide the correct timing. A 50ms pulse makes the switch latch.

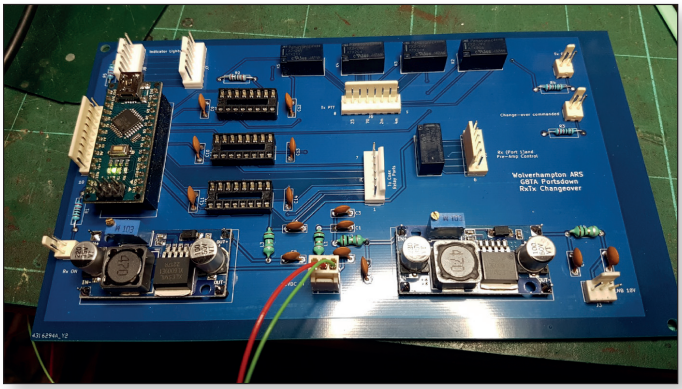


KiCAD model view of the PCB

The SN754410 sections used to drive the PTT relays are permanently enabled and sequenced by the Arduino. The flyback diodes for back EMF protection are integrated into

the IC so none appear on the PCB. The sketch controls the connection of the antenna to the receiver as a default action. A receive pre-amp can be switched in and out of circuit in sync with the receiver. The PCB controls the red PTT, amber change over and green receive LEDs on the front panel.

On the first test when switching on, the unit went click and the receive connected LED came on but nothing happened upon pressing PTT. The sketch was hastily altered and uploaded while the unit was powered – DO NOT DO THIS! An Arduino Nano smells horrible when it releases its magic smoke. A replacement Arduino was loaded with the third version of sketch and worked successfully.

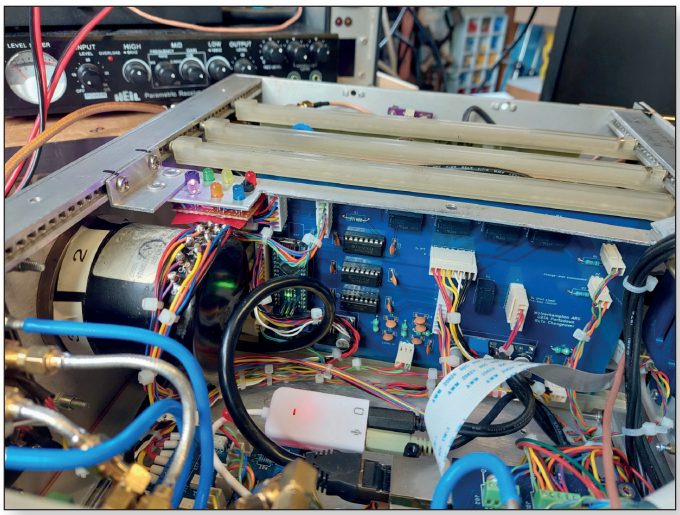


Board assembled for the first time and voltages checked out before fitting the ICs.

On the co-axial relay, port one is connected to the receiver and is selected as the default on power up. Port six is a spare for future use if required. Ports two to five are the unit's four bands in frequency ascending order (4m, 2m, 70cm and 23cm). David made up an LED indicator light set for the co-axial relay's indication terminals.

It's very reassuring to see the correct one lit as the system goes to transmit and the routing to the PA is made. A surprise, nice touch is that the changeover LED flashes twice while it's in the delay portions of the switching sequence.

The 24V supply required for the co-axial relay is provided by cheap boost converter XL4005 with the output set to 24V. A second boost converter was used in order to provide an 18V supply for a LNB if required. In order to minimise the potential for RFI from the switched mode boost converters pi LC filters are fitted on the inputs and the outputs.



Coax switch, indicator lamps and the controller board

The code for the Arduino is available on github at *https://github.com/rjwellsted/G8TA-TV-RxTxChangeover*. Any future developments will appear here.

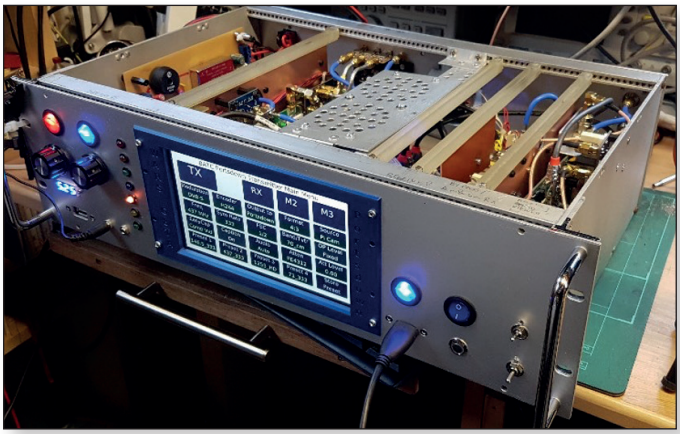
https://wiki.batc.org.uk/Gerber_Files#M0RNW.27s_G8TA_Rx.2FTx_Changeover_Controller_Board

The initial Arduino sketch, gerbers archive and the schematic described here are at the above club wiki location. JLCPCB were our fabricators.

Future enhancements

The Arduino Nano currently has two unused analogue input pins. One of these could be used to provide selection between a latching or non-latching co-axial relay. The PCB is currently sized to fit the 19" sub-rack that the station has been built in. With a bit of work it should be possible make the PCB a lot more compact. However we entered the RSGB construction competition before the deadline so this version one will do nicely for now.

Our club members have tried the G8TA Portsdown out with a 70cm PA under its control and were making DATV overs across the clubroom quite easily with David's Portsdown 4 on the other end.



Receiving HAMTV

Noel G8GTZ

Following repairs carried out last year it now looks likely that the original HAMTV unit will be returned to the ISS this spring with potential commissioning by a visiting astronaut during May 2023.

HamTV transmitter on the ISS

During the repair the system has been updated to correct the DVB service information problems seen during the Tim Peake Principia mission in 2016 meaning that a standard DVB-S compliant receiver should be able to receive the signal. A HDMI to NTSC converter with onboard pattern generator has also been included, enabling the use of the HDMI cameras on the ISS.

Tim Peake using HamTV from the ISS

As the cameras are only normally used during an ARISS schools contact, the test patterns, rather than a blank screen (with blue line), will be transmitted when the cameras are not in use.

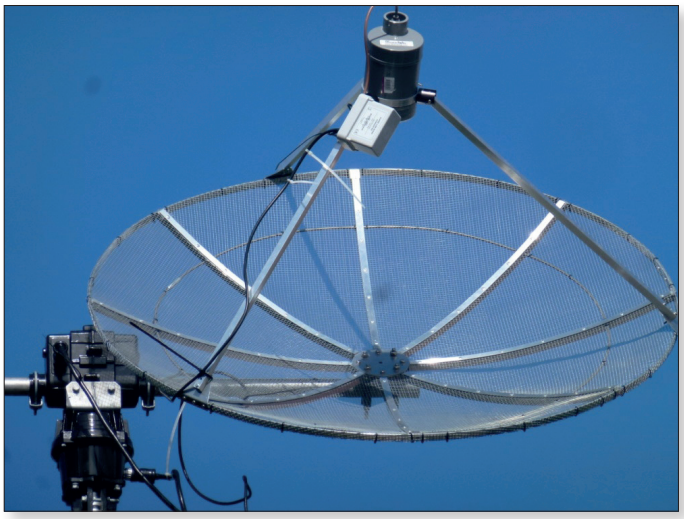
As it is more than five years since the ISS transmitter was used, this article is a refresher on the challenges of and the equipment required to receive the transmissions for the average DATV station.

Equipment - antennas

The HamTV transmission runs relatively low power on 2395MHz to a simple patch antenna on the ISS. This patch antenna is located on the earth side of the ISS but is surrounded by solar panels, thermal radiator panels, two or more visiting vehicles and robotic arms. The ISS also "flies" slightly nose down to protect the cupola windows from space debris and so the RF performance, particularly when it is rising from the west, is slightly unpredictable.

This means an antenna with reasonable gain is required to receive the signal and while it is possible to receive the signal when the ISS is overhead on a simple antenna, to enable more than five minutes of reception, a higher gain antenna such as a dish with an efficient feed system is required.

A one-metre or larger dish is optimum but smaller antennas such as flat plate or patch antennas will work and have the advantage of a wider beamwidth making it easier to track the ISS.



1.2mt RFHams dish and Yaesu G5500 rotator

The transmissions are right hand circular polarised (RHCP) meaning in theory a POTY patch antennae designed for transmit on QO-100 may work to receive the ISS.

Pre-amp and filter

A low noise pre-amp with band pass filter tuned to 2395MHz should be connected directly to the antenna feed point to minimise co-ax losses. Note that 2395MHz is only 5MHz below the 2.4GHz WiFi channel one, so

good filtering will be needed to prevent WiFi getting into the wide band satellite tuner.

The HAMTV frequency on 2395MHz is outside the frequency range of a standard consumer set top box or satellite tuner. Unless you are using the BATC MiniTiouner equipped with the Serit 4434 NIM, which can tune up to 2450MHz, you will need a frequency down converter such as the unit made by DB6NT.

The downconverter should be placed between the low noise amplifier and satellite receiver – placing it at the masthead will mean that lower grade feeder can be used to bring the IF signal back to the shack.

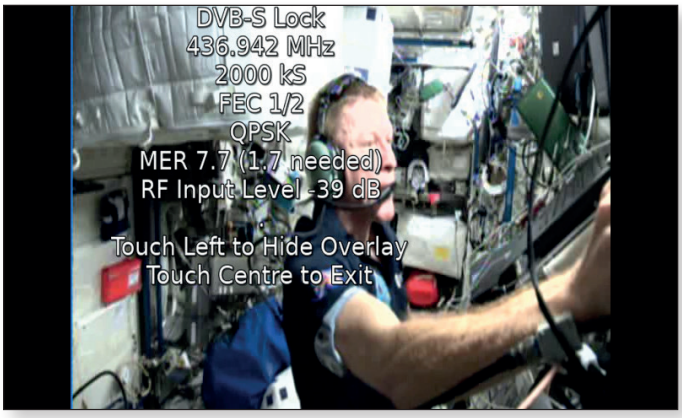
If a downconverter is used, a bandpass filter at the IF frequency may be adequate to protect the satellite tuner and avoid any losses at 2395MHz.

Receiver

The HamTV transmissions can be received using a DVB-S receiver capable of decoding 2 Msymbol / second MPEG2 transmission.

This means that a consumer set top box can be used, however because the signal is only available during the ISS pass it is essential to use a receiver which can be set to both the frequency and symbol rate before the pass. A receiver which needs to scan the frequency is unlikely to lock to the signal in the time available during the pass.

Ideally a receiver designed for receiving DATV signals should be used and the BATC Ryde, Portsdown and LongMynd receivers have already been tested and will receive HamTV – note OMX player will not decode the ISS video transmissions.



Portsdown receiver decoding HamTV I+Q recording

The MiniTiouner software by F6DZP was also designed to receive HamTV and also includes the ability to record the received video.

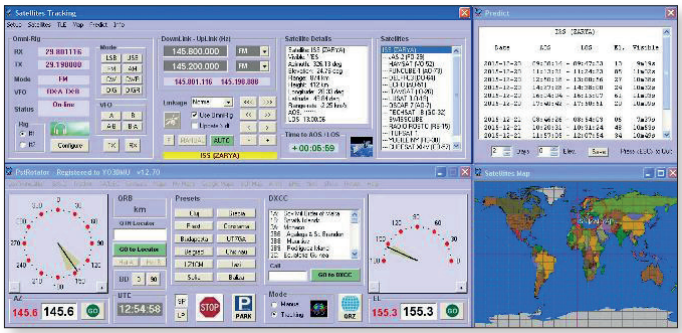
Finding the signal

Always check the HamTV transmitter status before attempting to align your system as It is unlikely that it will be left on 24/7 and it certainly will not be available when EVAs (space walks) and docking of space craft are happening. It is likely but not confirmed that the status will be published on the ARISS international website and Twitter account – the ISSfanclub website may also have the status updates.

Perhaps the most challenging aspect of receiving HamTV is that, unlike the QO-100 satellite available in the Europe and Africa, the ISS is not geo-stationary and orbits the earth every 96 minutes and is visible at any location for a maximum of 11 minutes.

In order to track the ISS, an azimuth and elevation rotator system is required. The most commonly used system is the Yaesu G5500, which is capable of rotating a 1.2m dish with a five-degree beam width to track the ISS. When choosing/designing your system remember the ISS does go north of 50 degrees and so any system will need to be capable of flip mode to track it when it goes overhead.

Computer software is required to control the rotator system – there are a number of programs out there but I prefer PSTrotator which is a very versatile system with almost unlimited number of interfaces to control rotators.



PSTrotator in satellite tracking mode

There are a number of mobile device applications (such as GoISSwatch for the iOS) and PC software which will alert you to when the ISS is visible at your location and you will soon find your life is ruled by the 96 minute orbit time.

Testing your system

As the ISS is not visible every day at a given location and then only for short periods, it is difficult to see if your system is working.

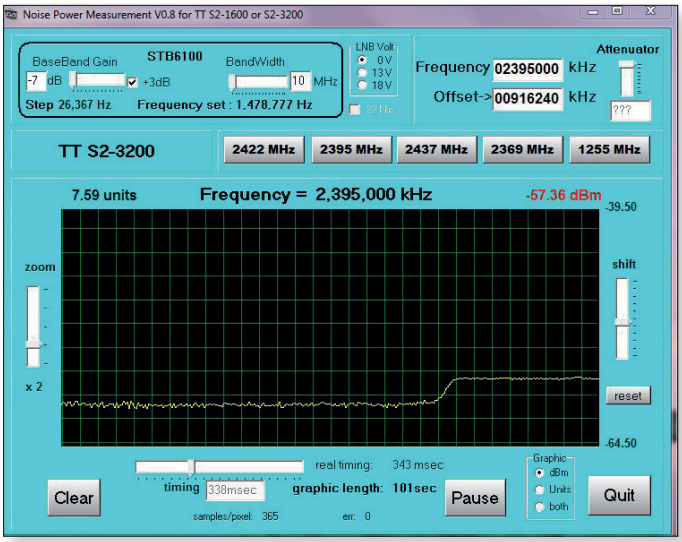
There are a number of tests you can do to ensure your system is optimised but the most useful is to measure the sun noise received on your system. This will not only measure your system performance but if you leave it

running for a few hours with your rotator control system set to track the sun, it will confirm the accuracy of your tracking system.

Measuring sun noise can be done using SDR software running in continuum mode and running a program such as spectra view on the audio output – a Google search for sun noise measurement will show several techniques.

Alternatively F6DZP developed a suite of programs to help test a HamTV receive system which included a noise power Measurement program (see CQ-TV253 page 27 for more details). This was available as part of the MiniTiouner v0.8 package but appears to have been dropped in later releases.

The program can be used to measure the noise power received by a Serit 4334 tuner over a period of time and requires no extra software or equipment to make sun noise measurements – the picture shows the sun noise recording from a RFHams 1.2 m mesh dish used to receive HamTV for the Principia mission in 2016.

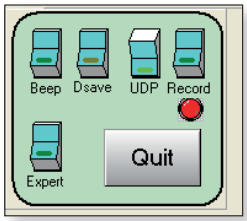


Once you have checked your system sun noise and tracking accuracy it is worth testing you're your system can receive a locally generated 2Ms DVB-S signal on 2395 MHz. If this is successful you should be set to receive HamTV.

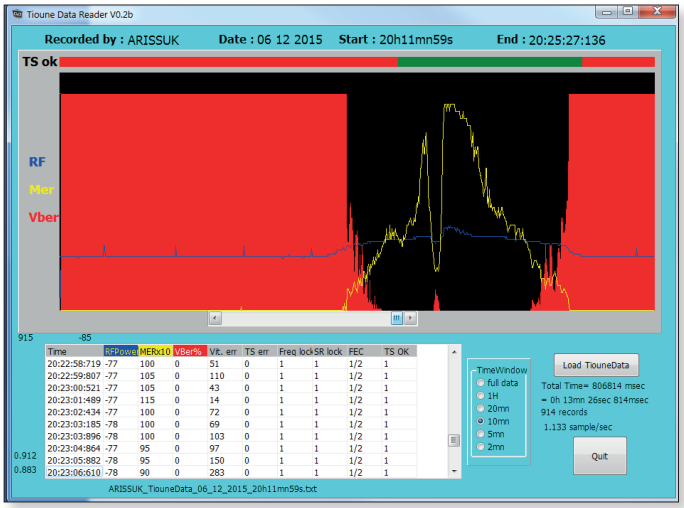
Receiving HamTV

All that remains is to wait until it is confirmed that the HamTV transmitter has been turned on then set your tracking program to follow the ISS and wait for the magic signs on the spectrum display (BandViewer?) or lock indicator that you are receiving the signal.

Once you have successfully received the HamTV transmission, the Dsave button in MiniTioune can be used to record data such as RF level, MER and Vber to show how well and for how long you received the pass.



These recordings can then be played back using the TiouneDataReader (also included in the V.08 package) which enables comparisons between different equipment configurations and station setups. The screenshot below shows the signal received by the 1.2m RFHams dish on a Yaesu G5500 rotator - Note that the dip was were the ISS went North of the receive location and then the rotator had to rotate through 90 degrees Az in the middle of the pass.



Further information:

- We have setup a new forum thread to discuss receiving HamTV. Please post any questions, comments and status updates here: *https://forum.batc.org.uk/posting.php?f=2&mode=post&sid=9c1b12a07706567454ebeca685548796*
- Receivers compatible with HamTV: *https://wiki.batc.org.uk/Ryde_Receiver* *https://wiki.batc.org.uk/DVB-S/S2_Reception* *https://wiki.batc.org.uk/MiniTioune*
- A lot of information is available on the BATC forum: *https://forum.batc.org.uk/viewtopic.php?t=4389*
- Handheld reception using an RTL dongle *https://forum.batc.org.uk/viewtopic.php?t=4387*
- Colin G4KLB made a video on how he received HamTV *https://www.youtube.com/watch?v=9keVA2 I DPBc*

GB3NQ H264/H265 encoder box

and other useful notes

Paul G6MNJ

I have seen a lot of concerns about the usability of these low cost H264/H265 encoder boxes from eBay/Amazon and I hope to put some of those fears to rest.

Let me start by saying our repeater in St Austell, Cornwall GB3NQ uses one of the encoders and produces a stream which is fed directly to a Pluto for transmission.

We did initially use a Portsdown between them but soon discovered it was unnecessary and it got re-purposed to producing 15-minute ident test cards.

Additionally, despite rumours to the contrary, the repeater Pluto also can run at 2Msyms/s continuously for 12 hours day. It must be noted however the Adalm Pluto website clearly states its temperature operating range is 10C – 40C so ensure the covers are removed and the PCB is placed under a good fan to keep it cool.

Before I get into the encoder one final point on the Pluto is despite the manufacturers specifications the best operating voltage from our experience at GB3NQ was to run it just under 5v and certainly not at a voltage level a Raspberry Pi needs.

So I have set the groundwork, we have a Pluto configured via its LAN interface by a web browser on a Raspberry Pi waiting for a suitably encoded IP stream into its LAN port.

It was decided NQ was to be digital in and out, so we have an automatic HDMI switch selecting from three Ryde receivers, ident test cards and a 30 minute video running on the hour to help new users get tuned in and setup.

First lesson learnt is to set all these devices to the proposed output resolution. For the hardware video player that was done in its on screen menu. The Raspberry Pis needed the following lines in their boot up configuration file that can be found in the \boot folder. Enter the line below to start the editor to make the changes required.

```
pi@raspberrypi:~ $ sudo nano /boot/config.txt
```

These lines must be present to ensure the Pi outputs 1080p, and is also not upset if the HDMI lead is not connected to anything at boot time.

If the lines below already are in the file then change them to match below.

```
hdmi_force_hotplug=1
hdmi_drive=2
hdmi_group=1
hdmi_mode=16
```

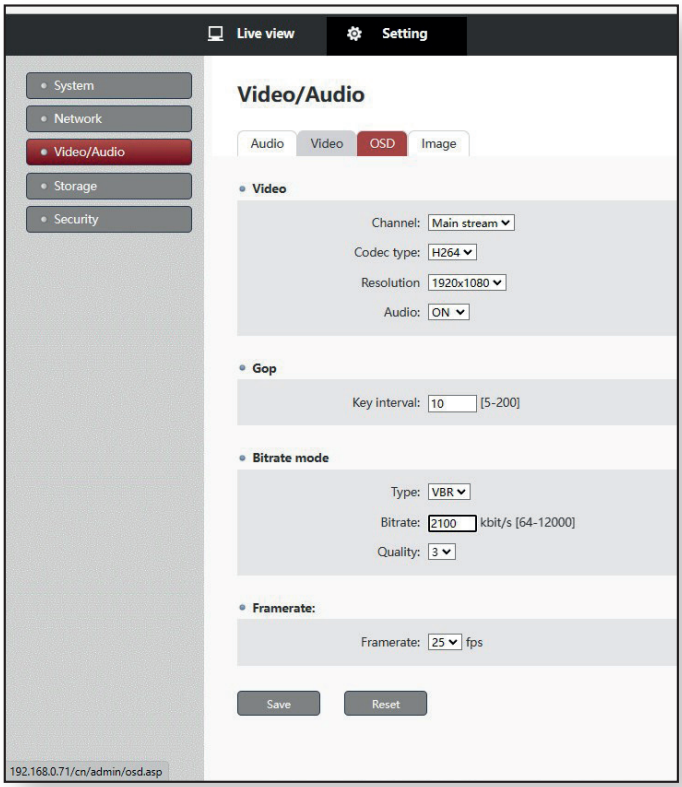
If you want to run other resolutions a quick Google search will provide up to date tables of these commands and which to select.

The HDMI signal from each device is now fed through a quality HDMI switch,(cheap Chinese units are not up to the job) use good quality HDMI leads throughout.

The output of the HDMI switch then is fed to a HDMI EDID emulator. This keeps the encoder in sync with the HDMI switch output. Without this device when the input changes to the HDMI switch the encoder loses sync and the transmission stops. It then takes some time before transmission restarts.

So finally we have an encoder with a valid HDMI signal on its input.

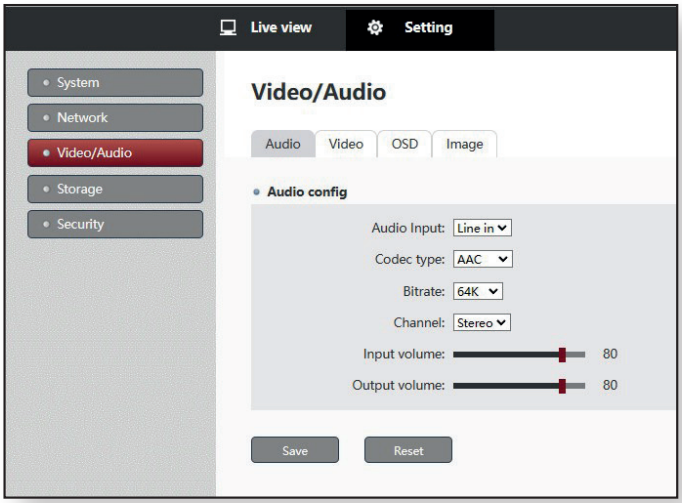
Apart from configuring the LAN interface of your encoder, which is presumed you have done correctly, there are now three items to setup. audio, video and network stream.



It has taken some months to perfect this in terms of robustness and to provide the best picture quality from this low cost encoder.

In order to provide the inclusion of DVBS-2 set top boxes it was decided we would use H264 encoding. Maybe when these set top boxes can decode H265 this may change.

Audio configuration was set to 64k stereo and due to lip sync issues we opted to use the analogue audio inputs and use another HDMI device to strip the analogue audio from the HDMI lead. This device is readily available from eBay at a low cost and sits just before the EDID unit plugged into the encoder.



It is understood this is a hardware issue within the encoder that at the time of writing has no fix available. So it's not strictly all-digital but nobody will ever know.

Video setup is not what you would expect to configure, and this is where a lot of trial and error and help was needed.

The software running in a Pluto, or for that matter a Lime, is written by Evariste Courjaud F5OEO. Whatever is sent into the transmitter if it is under the data rate expected by the transmit specifications (symbol rate FEC modulation type etc) then his software will pad the data with nulls to ensure it is sent at a constant bit rate.

So the encoder main stream is set to H264 codec 1920x1280 resolution and audio on. The group of pictures (GOP) is set to 10, bit rate mode to VBR with a bit rate of 2100 and quality of five, and finally a frame rate of 25 fps.

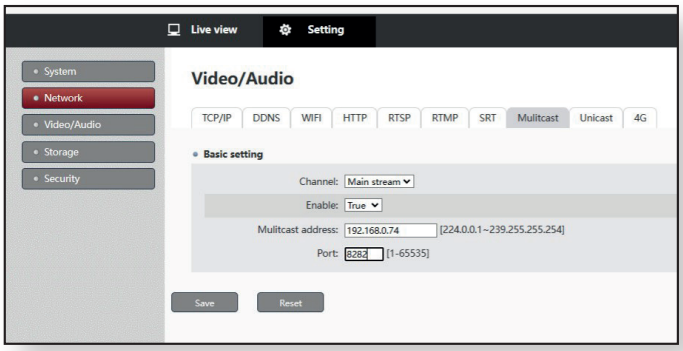
These are not random numbers but build on experience and a desire to get the best out of the encoder. The transmitter at GB3NQ runs at 2Msyms/s with a FEC of 4/5 using DVBS-2, using the calculator at *https://www.satbroadcasts.com/DVB-S_Bitrate_and_Bandwidth_Calculator.html*

This informs us a transport bit rate of 3.1 Mbps is needed for these settings.

It is generally accepted 70% of this bandwidth can be used for video which is 2.17Mbps. This figure is shown above as 2100Kbps the remaining space in the stream will be occupied by audio and other overheads plus some headroom to expand into for noisy or fast moving pictures.

The group of pictures (or GOP structure) value of 10 means every 10 frames a full picture is sent and in-between these are interframe and predicted frames. At this rate, and 25 frames per second, fast movement such as waving looks fairly smooth on the receiver.

A setting of three for quality was selected, as it was the value to produce smooth video with least blocking.



Finally the encoder has to be told where to send its output. For the Pluto it is required that this be a multicast stream - option under the network tab. In here select the main stream (as before) select true for the option to enable enter the IP address of your Pluto and port 8282.

A lot of the testing to get the best out of the encoder was done, by changing the output IP address to a local PC on the network. Then using VLC (Video LAN) on that PC to play the incoming stream on the corresponding port and observing the picture and bitrate in tools option helps find the sweet spot.

The results for what is a sub £100 device is very good but don't expect to emulate the broadcasters who pay tens of thousands of pounds for their encoders.

Take a look at our HD stream at *https://batc.org.uk/live/gb3nq* to see the results.

73 Paul G6MNJ

IARU Region 1 ATV Contest
10/11 June 2023

Dave Crump, G8GKQ

The next IARU Region 1 ATV Contest runs from 1200 UTC on Saturday 10 June until 1800 UTC on Sunday 11 June. The rules are unchanged from last year, as any changes will need to be approved at the IARU Region 1 General Conference in October. I will summarise the responses to the rule changes that I proposed in the next CQ-TV.

The 2023 rules can be found at *https://wiki.batc.org.uk/images/5/5c/2022_ATV_Contest_Rules.pdf* and a guide on how to enter is also on the Wiki at *https://wiki.batc.org.uk/IARU_ATV_contest* .

It's really easy to participate – you just need to exchange a four-number code by video with the other stations. The code must only be sent by video, but you'll need to exchange a report, serial number and locator by some other means (sound on the video, talkback etc). Choose a sensible four-digit code, not all the same like 2222 or sequential like 1234. Codes such as 2234 are OK but you'll need a different one for each band.

Submitting an entry only needs you to fill in the details on the spreadsheet that can be downloaded from here: *https://wiki.batc.org.uk/File:ATV-contest-log-callsign-20230610.xls* .

Save the file on your computer, and change the filename to include your callsign. Then open it, enable macros (to calculate the scoring), and fill in the summary sheet.

Then log the contact in the tab for each band. Remember that reports must be a P2 to count for points – you would not have been able to see the numbers if it was only a P1. Save the file and check the scores on the summary sheet; then e-mail it to *contests@batc.tv*. International participants can use the address *atv@iaru-r1.org*.

The contest runs across all bands from 432 MHz upwards and all ATV modes are acceptable within the licence regulations: DATV, FM ATV (use your new IC-905) or even AM with appropriate filtering.

Please make an effort to participate even if you only have one contact. It all helps to show that we are making use of the bands.

This will be my last year of organising and scoring the contest on behalf of IARU Region 1. I will have been doing it for seven years, so it is time for somebody else to take on the task.

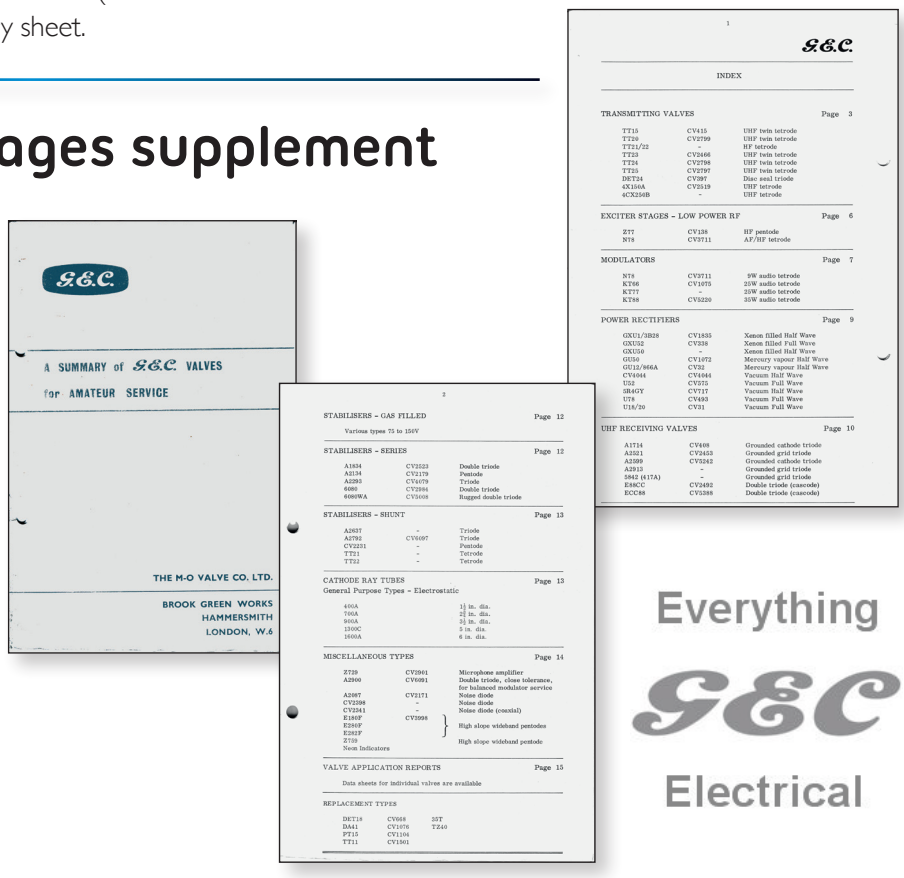
Please, if you think that you might have the time to give something back to the hobby and encourage its development, let us know by e-mailing *atv@iaru-r1.org*.

I will be on-hand to provide help and assistance for the first year.

Turning Back the Pages supplement

Harold Skelhorn, G8BPU, formerly G6SOG/T, has sent some interesting data sheets, which relate to items of a similar vintage to the Turning Back the Pages articles. Amongst them is a somewhat surprising 20 page booklet produced by GEC - "A Summary of GEC Valves for Amateur Service" . It is doubtful that any manufacturer would now-a-days produce a 'catalogue' specifically for the amateur market. The index shows a wide range of valve types, for use in transmitting, receiving, power supplies, and even lists a range of cathode ray tubes.

Some other data sheets from the collection may be featured from time to time in CQ-TV.



Network remote control for the Yaesu G5500 rotator

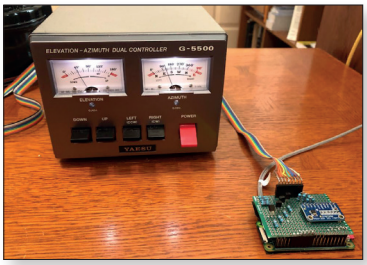
Noel G8GTZ

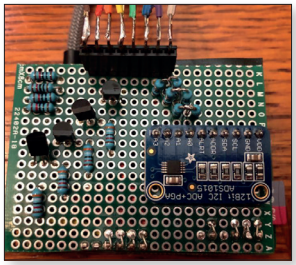
The Yaesu G5500 is the most cost effective azimuth and elevation rotator available for amateurs and once problems with water ingress, particularly in the elevation unit, have been fixed it proves to be reliable and accurate enough for amateur satellite use.

The basic G5500 does make some provision for remote control by providing azimuth and elevation relay control and potentiometer outputs on an eight-pin DIN socket. This can be used by the very expensive Yaesu RS232 interface box or other control programs such as K3NG Arduino-based system but which need a PC to be in close proximity to the rotator controller.

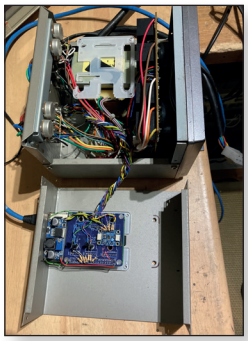
Early this year I decided to resurrect my Az El antenna system to try and receive the Greencube satellite and potentially ISS HamTV when it returns later this year. The only problem was that the system is mounted on the fence at the bottom of the garden 30+ metres from the shack and I either had to run the actual rotator control cables or find a different way. I tried using the K3NG unit and extending the USB over 30mts of CAT5 but it proved very unreliable.

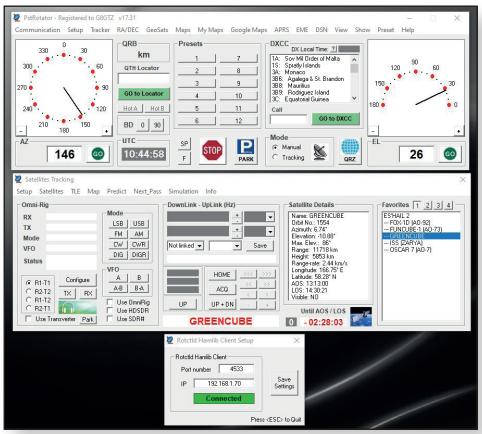
Searching around I came across the G5500pi project by Elwood WB0OEW
https://www.clearskyinstitute.com/ham/G5500/





This project seemed to provide exactly what I needed. A Raspberry Pi is mounted with the G5500 controller (I put mine actually in the case) and provides both a web interface, which can be used by a PC or mobile devices, plus a rotctld client. This is the standard Hamlib client and enables the commonly used rotator programs such as PSTRotator to connect to it over the network.





Any specification Raspberry Pi will work as the server, I had a RPi2 lying in a drawer, but you will need to get an SD card with the latest OS and then download the software from Elwood's site. There is a good PDF on the site which I followed but fell in to a couple of holes so to save others doing the same these are my notes:

You will need to enable the Pi for SSH access and use an FTP program such as WinSCP to load the program file into the Pi.

Use the command "tar -xvzf G5500pi.tgz" to unzip it into a new directory called gG5500.

Then follow the instructions in the pdf file and run the various test programs to check out your hardware. I got to step nine but found the main program appeared to hang and did not generate a cal text file.

After some excellent remote support from Elwood, we discovered that due to a noisy azimuth potentiometer, the software was unable to detect when the rotator had reached the end stop and so did not complete the calibration cycle. Once the pot was replaced – not an easy or pleasant job which resulted in several ball bearings rolling across the floor – the system worked exactly as described.

I bought a 30mt prebuilt lead of outdoor CAT5 from eBay to extend the home network to the shed and set up PSTrotator version 17.31 by selecting Rotcld Hamlib client as the Az/El controller. Then under controller set up select Rotcld Hamlib client and enter the IP address of the Rpi and press save settings. The button should turn green and all you then have to do is to calibrate the rotator heading – if you have a dish with a 10GHz LNB this is easy using QO100.

I can now use PstRotator and its built-in satellite tracker in the shack on either the laptop or desktop plus I can also stand in the kitchen and control the antennas on my iPhone/iPad – great fun!

Portable power for 28V and 50V

Gareth G4XAT

With my entering the field of QRO when /P with my 70cms ex-NEC amplifier pallet for 437MHz and with growing interest in 29MHz DATV experiments (which also benefits from MRF300/50V device based amplifiers) I had a need for portable power that can reliably deliver 28V (e.g. for a Nokia Dolphin) or 50V (MFR300 family) from a nominal 12V source.

Yes I have a small generator but very few generators like being given a SMPSU load at 600W, resulting in engine hunting and voltage surges, none of which are conducive to the long term continued functionality of electronic equipment or indeed the generator.

I have acquired various eBay-sourced 150/400/600W rated up-converters but they all fall short of the output wattage required for my amplifiers mainly due to the very high feeder currents needed at 12V.

A determined browse on eBay for high power DC converters led to some described as "1500W" so I took a chance and ordered a pair at what seemed a very good price, even if the wattage was perhaps over-stated. *https://www.ebay.co.uk/itm/334483142365* Do note however, three 20 amp fuses on the input side (implying to me up to 60A input) and a PAIR of stacked torroids.

They arrived and have three adjustment potentiometers. A visit to YouTube found an excellent set-up and testing video which I duly followed.
https://www.youtube.com/watch?v=AGGkljZIk8k&t=3110s

With the output set to 15V and the input 'low input voltage' set to 11.4V, I ran the unit up with my variable DC load. It was easy to set the current limit to 15A, beyond that load-point the output voltage steadily reduces. Hopefully it's reasonably good at protecting extremes of current in the PA device.

My next step was to try it on my MRF300 amp for 29MHz, this usually draws around six amps at 50V. The DC input source was one of the many HP Server PSUs tweaked to 13.8V. It was entirely happy at this power level and the heatsink barely warmed, certainly not enough to cause the temp controlled fan fitted to kick in. Next step was to hook up the 70cms amp and drive it to full power. With 600 watts at 50V output the power supply output was steady and the fan soon kicked in, showing it was a variable speed controller.

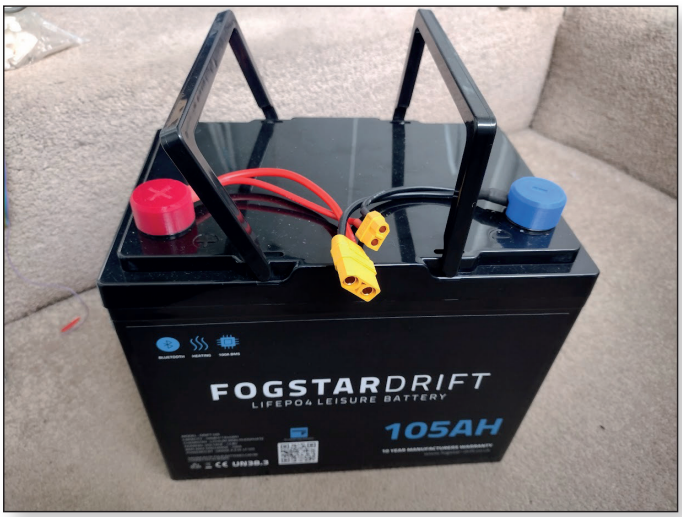
My main concern was that at 12V input, the input current would exceed the fuse rating and so limit the RF power I could raise. These concerns were unfounded, which given the 60 amps of input fusing, makes perfect sense. 50*12=600W output. Input current was not initially measured although it was enough to warm the 2.5mm^2 DC supply cable from the HP PSU and at 80% efficiency [it's probably better than that] it would need 62.5 amps . If the high DC current become an issue, it crossed my mind to use two in series, the first stepping up to 28V, the second taking the 28V up to 50V. For a slight loss of efficiency less electronic strain would be put on them each.

In use the boost unit is fed with 4mm2 twin cable fitted with my standard XT90 or XT60 connectors and the output is via some 2.5mm2 twin. The unit tested in the YouTube video has slightly different input and output connections – there seem to be several variations on the theme. Suffice to say, this particular unit breezes along at my required power level and step-up ratio so if needs be, I can run generator-free although it will punish the battery supply, something that can be easily replenished with a float charge powered from a small generator.

Historically we generally use some sort of lead-acid based battery when out portable. Our camper/radio truck 'Mr Whippy' came with a nearly new dual purpose leisure battery with a stated capacity of 90A/Hr.

During the June 2021 contest I used about 45A/Hr (measured with one of these handy little gadgets which I leave in line with all my gear – search eBay for a 'DC 60V/100A digital monitor LCD Watt meter ammeter RC battery power amp analyser'). They give lots of useful info, not least the cumulative A/Hr used. The battery was beginning to drop below 12V under load, so not doing too badly. It is however, very heavy – around 25kg – and a horrible job to get it in/out of the camper for use with car/P.

Last autumn Rob M0DTS mentioned he had upgraded his van supply with a nice set of 280A/Hr Lithium Iron Phosphate cells complete with a Bluetooth-enabled cell tracking battery management system. (*https://en.wikipedia.org/wiki/Lithium_iron_phosphate_battery*) He bought them from a company called Fogstar *https://www.fogstar.co.uk/* a company known to provide quality cells.



Browsing their website showed some smaller cells (105A/Hr) of which four would weigh all of nine kg. So I ordered four (12.8V in total) along with a suitable 100A rated Bluetooth BMS. The order went straight to back-order, so I sat down to wait. In January I received a flyer from them showing a new battery range, already in a proper case with built-in BMS for just another £36. So I spoke nicely to their customer services department and upgraded my order, getting put on another long back-order.

Imagine my joy when it arrived two months early. It's one of these *https://www.fogstar.co.uk/collections/lithium-leisure-battery/products/lithium-leisure-battery-fogstar-drift-105ah* and I have to say I am hugely impressed with its performance. I used it in the garden shack for driving my 13cm amp for the February activity day. Although no contacts were made, it was happy to supply 34A into the DC up-converter and maintain a cell voltage of 12.8V, not something a lead acid could do.

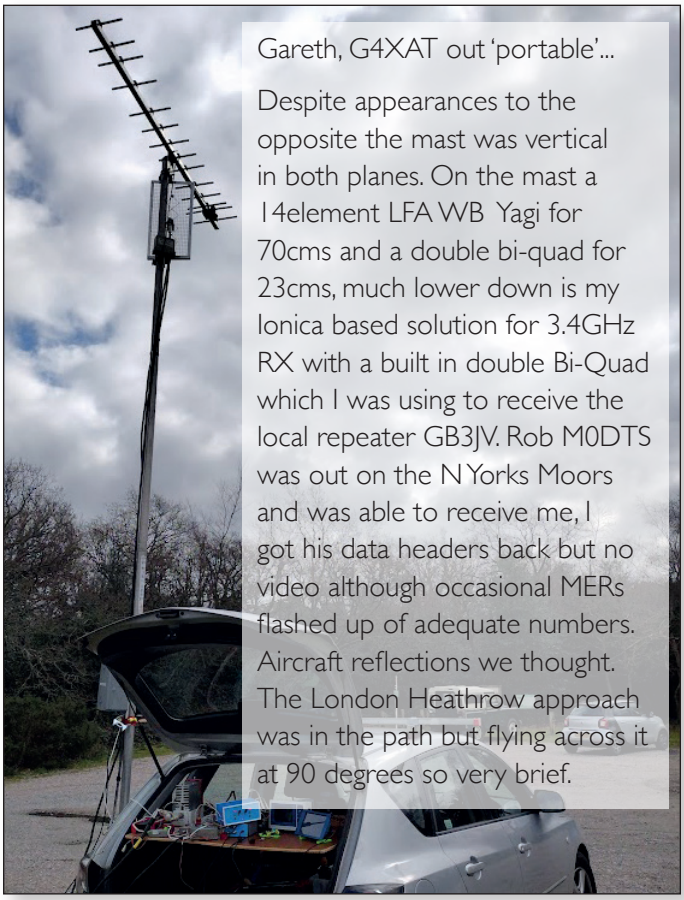
On Sunday 19 March I was out /P again using my Fogstar LiFePo4 battery and both it and the Boost converters worked fine, peak DC in 50A and everything was still working fine with the battery holding 12.4V even at a continuous drain of 35A.

How long it will last?

Ask me in 10 years when the guarantee runs out.
In the meantime I have added a pair of XT connectors and designed/printed two terminal protectors. Not something to short out. I have plans to fit both DC converters into a suitable vented die-cast box, with a single DC feed in, vents in/out and PSU enable controls (it used a TL494 SMPSU chip).

It's extremely unlikely that I will need both outputs at the same time and the metal box will help screen any undesirable harmonic signals from the up-converters at least.

Picture shows the actual DC up-converter units I have tested and the Fogstar battery.



Gareth, G4XAT out 'portable'...

Despite appearances to the opposite the mast was vertical in both planes. On the mast a 14element LFA WB Yagi for 70cms and a double bi-quad for 23cms, much lower down is my Ionica based solution for 3.4GHz RX with a built in double Bi-Quad which I was using to receive the local repeater GB3JV. Rob M0DTS was out on the N Yorks Moors and was able to receive me, I got his data headers back but no video although occasional MERs flashed up of adequate numbers. Aircraft reflections we thought. The London Heathrow approach was in the path but flying across it at 90 degrees so very brief.

Tributes paid to TV amateur who encouraged everyone 'to have a go'

Andrew G8FSL & Duncan G7VVF

The man who was instrumental in getting the north London TV repeater, GB3EN, on the air has died in hospital.

Roger Glover, G8IUC became interested in radio at school, and was always buying tank aerials at an army surplus shop. One day he was quite indignant that the owner didn't have any tank aerials left, and wasn't going to get any more - something about the war having been over for years apparently.

He and a schoolfriend sat and passed the RAE, but this was before the B licence as neither of them could get on with learning morse code.

Roger left school and became a GPO apprentice - and was with the GPO, and later BT, for all his working life.

By the mid 70s he rediscovered radio and took up his licence. He was in the UK FM Group (London) and became interested in repeaters. He built GB3LV (Lea Valley), the 70cm voice repeater, which initially operated in G3KSW's house in Cheshunt.

G3TZZ was then a councillor (and sometime mayor) of the London Borough of Enfield and smoothed the way for radio kit to go in a building on the roof of the civic centre.

'Building evacuated'

By then Roger had become interested in ATV, but was frustrated by the lack of space in the 70cm band.

When he discovered 24cm ATV and that G0OJY was working on an ATV repeater, the plans just dropped into place to use the Civic Centre.

Eventually the roof hosted GB3LV (70cm voice), GB3NL (2m voice), and GB3EN (24cm ATV). There was briefly a GB3LN (23cm voice) repeater planned, but never got further than a lash-up in Roger's shack.

The installation of the equipment was enthusiastically accepted by Enfield council - even after Roger managed to set off the fire alarm forcing the evacuation of the whole building.

He was always prepared to roll up his sleeves and get on and fix problems - there was a time when a rogue security camera appeared close to GB3EN's input frequency.

Roger DF'd it to its location, made a few inquiries with the locals, and it disappeared pretty sharply.

But his great skill was to encourage others to have a go - he wanted to spread knowledge and skills, not for him to be the great expert.

Roger passed away on 1 March 2023.

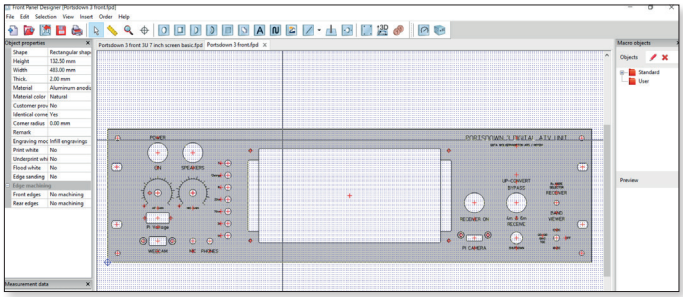
Making a front panel fascia using a vinyl label

David Holman M0YDH

In CQ-TV 278 I described the WARS G8TA Portsdown unit and wrote that I hoped an offer to remake the front aluminium panel would arrive. The one that I'd hand made was by then rather scruffy and had no labelling on it. I did make a solid model of the panel with improvements and modelled engraving and posted it on the BATC Wiki in a zip archive at *https://wiki.batc.org.uk/File:Portsdown_3_Front_Panel.zip* .

https://wiki.batc.org.uk/Assembling_Portsdown wiki article has some build pictures of the unit and the link to the above.

This was after I had laid out the panel in Front Panel Designer v6.35 software by Schaeffler AG.



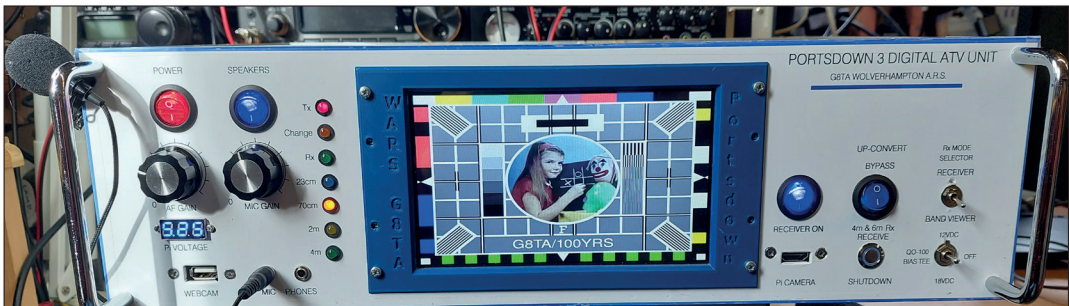
When I asked for a quote in the Schaeffler shop, it gave a basic price of $160. I could only guess what the post, packing and import duties meant in terms of a final price. I cut my losses and used the program's export functions to make a .dxf drawing of the panel. It does a .stp solid model too. If I had not made the panel already then this would form a good starting point for making the panel as a label.

Without access to an engraver or a CNC milling machine, I decided to use CAD and graphics software to mock up the front panel and make the exact artwork for the local print shop Oxley Stationers and Printers to print on their sheet vinyl label plotter. This normally does self-adhesive adverts and general labels so making a front panel fascia was a first for me and the shop.

But the design above is improved by lining up the features and better spacing them. I converted the .dxf to a solid model in CATIA V5 which I've used for over 20 years. I did try Fusion 360 [best free of charge CAD/CAM software] but I hadn't the time to learn it against the deadline to which I was working. I measured the actual holes and apertures for size and position with my electronic calipers to give a representation of the current, wonky panel. The solid modelled engraving is fine if you are going to machine the panel using e.g. Fusion 360 CAM software but was pointless here. In the end I used the V5 drafting package to make a scale drawing of the model, position the text and potentiometer scales about the features and added a blue border and a blue underline to the title block. The unit is electronically colourful in terms of LEDs and a touchscreen already so graphics were kept to a minimum. I hid the outlines of the holes and apertures – not needed on a label. I had to choose a font which gave an outline then fill each letter with hatching before changing this to a colouring fill. Just tedious! I found that the pdf plot of drawing view gave poor text quality so I exported it as a .dxf. I used Autodesk DWG Trueview to import the drawing. I suspect that an old copy of AutoCAD would do all this process for less effort but I went "round the Wrekin" on this instead. Finding high quality PDF print settings took a few goes and visits to the print shop. The size of the page has to be exactly that of the panel because the plotter cuts the outline of the label. So a means of making a custom page size was found. Different options in plot had to be explored before a pdf of the panel was acceptable to the shop. An A2 print cost £15. They gave me a complimentary spare label too – thank you very much.

Applying the label is a team sport! A fine mist of water is sprayed onto the aluminium panel using an atomiser spray bottle. The waste material from sawing out the screen aperture was recovered and placed in its former location in the panel - all on the table. Peeling off the backing and holding the label leading edge taut is one person's job. Lining up and pushing down with a dense foam block to remove air bubbles is the other person's job. The wetting of the panel allows for a second go. We needed this when the vinyl went slack where the screen aperture is. With the waste piece in place we had a successful label application. An hour of careful cutting out with a new craft knife blade followed. The edges were sealed with Scotch magic tape. Our club members now like the very smart appearance of the front panel.

I hope this technique gives everyone a chance to finish unit front panels to a high standard.

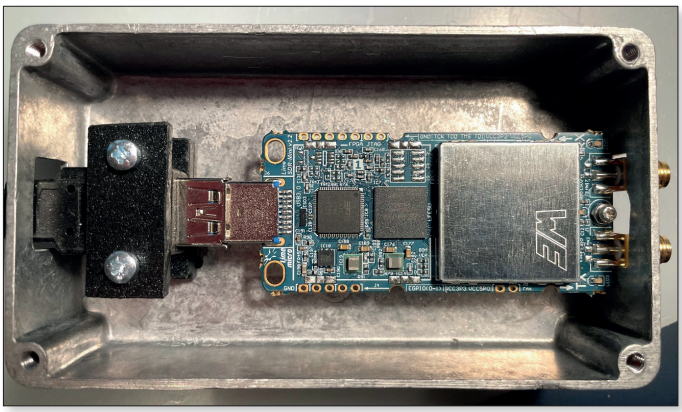


The LimeSDR Mini 2.2

David Crump G8GKQ

A new version of the LimeSDR Mini (the V2.2) is now available from Crowd Supply in the USA. The price is now $399 plus $18 shipping, and it has almost identical functionality to the earlier version. Full documentation is available here: *https://limesdr-mini.myriadrf.org/index.html* .

The first batch of 1000 units shipped in January/February, and orders placed now are due to ship in June 2023.



The LimeSDR Mini V2 mounted in a Die Cast Box

First impressions

The board layout is very similar to the LimeSDR Mini V1 with mounting holes either side of the USB3 connector. There is a new mounting hole in between the 2 SMA RF connectors, and two extra LEDs either side of the SMAs.

The V2 does not run as hot as the earlier versions as the power consumption has been reduced by 300 mW as shown in the table.

Activity	V1.2 Current	V2.2 Current
Idle	300 mA	240 mA
BandViewer	360 mA	300 mA
DVB-S2 TX at 437 MHz	400 mA	340 mA
Sig Gen at 437 MHz	460 mA	410 mA
Sig gen at 3.4 GHz	510 mA	470 mA

I mounted the board in a small diecast box for physical protection during testing. The USB3 lead was clamped to prevent any strain on the PCB.

Software requirements

A new version of LimeSuite has been released for the LimeSDR Mini V2. This is backward compatible with the other LimeSDR models. Once the updated LimeSuite has been loaded, all the applications for the LimeSDR need to be recompiled.

Most applications will then work without modification, although I did find (for BandViewer) that I needed to add an extra receiver calibration step after each occasion that the receiver bandwidth was changed. This is sensible, and really was an omission in my original code.

RF performance

The transmit RF performance seems to be almost identical to the earlier versions; output levels were within a dB or so, and there did not seem to be any new spurious signals. This is only to be expected as the RF section has not been changed significantly.

The receive RF performance was less affected by digital noise than the LimeSDR Mini V 1, especially when connected to the USB2 port of the Raspberry Pi 4. Noise increased by a few dB when USB3 was used. The consistent low digital noise when using USB2 enabled me to do some reproducible approximate noise figure measurements at 100% Lime Gain. The values in the table are approximate (plus or minus 1 dB?) as the noise sources used had not been calibrated in many years.

Frequency	Noise Figure
50 MHz	5.9 db
100 MHz	5.3 db
146 MHz	4.8 db
437 MHz	4.8 db
800 MHz	5.2 db
1255 MHz	6.6 db
1900 MHz	6.7 db
2100 MHz	5.2 db
2400 MHz	8.0 db
3000 MHz	12.7 db
3400 MHz	18.0 db

Clearly, the LimeSDR Mini V2.2 would benefit from a receive preamp on all the UHF and SHF bands, but this is not a surprise, and considering the wide bandwidth covered, the figures are reasonable.

GPIOs

The two extra LEDs either side of the SMA connectors indicate when the unit is set to receive or transmit. These are useful, but are connected to four of the original GPIO connections, making these unavailable for other purposes. However, the four GPIOs 0 to 3 are still available and can still be used for Portsdown band switching. GPIO 7, which on the LimeSDR Mini V1 is used to command the PTT can still be used, as it drives the TX LED (to red) on the LimeSDR Mini V2.

However, its sense is reversed, so it is normally high, and goes low when it is safe to power up the power amplifier.

Summary

The LimeSDR Mini V2 performs slightly better than the LimeSDR Mini V1 with lower receive noise figure and lower power consumption. It will not directly replace the LimeSDR V1 without all the software being used to drive it being recompiled with the new version of LimeSuite. However, the Portsdown 4 suite is now upgraded so that it supports both versions, and I gather that development is under way for SDR Console.

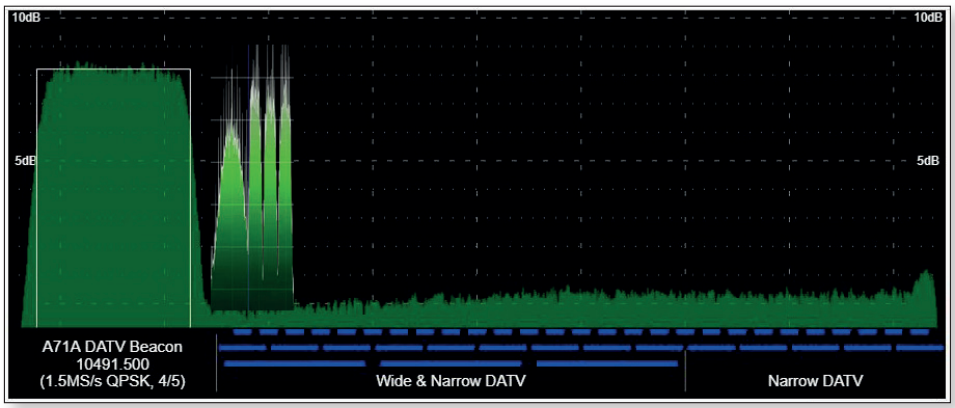
Thanks to Lime Microsystems for supplying the test unit and for their help.

Wideband data tests on QO-100

Dave G8GKQ

It had always been stated by AMSAT-DL that the QO100 wideband transponder should be available for any form of wideband digital transmissions including DATV.

Until recently, no-one had developed a suitable bandwidth-efficient data protocol that they wished to experiment with and so the transponder has been solely used by DATV operators.



The probable appearance of the data signals on the wideband spectrum view

However, there has been a request to AMSAT-DL by Guillaume F4HDK to conduct some wideband data tests on the QO-100 wideband transponder.

He has developed a multi-frequency time division multiplexing access (MF-TDMA) protocol that he and some colleagues wish to test. You can read more details about this (fully open) protocol here:
http://f4hdk.free.fr/NPR_VSAT/

In preparation for these tests an "expert team" has been put together by AMSAT-DL to discuss:

- The technical feasibility
- The link performance
- Implications for transponder long-term health
- Band planning
- Non-interference with DATV.

Following the first online meeting of the team, it is planned to conduct some short-duration tests in the "experimental" section of the band plan between 10,492.5 MHz and 10,494.0 MHz. The actual occupied bandwidth should be less than 1 MHz and the power density will be broadly similar to the wideband beacon.

The results of these tests and a parallel technical appraisal of the protocol will be discussed at the next team meeting.

Existing DATV users are well represented on the team (50%) so do not fear a total spectrum-grab by the data enthusiasts.

Please do not interfere with the tests, and if you have any concerns please contact me.

Band filters on epoxy board and simulation software

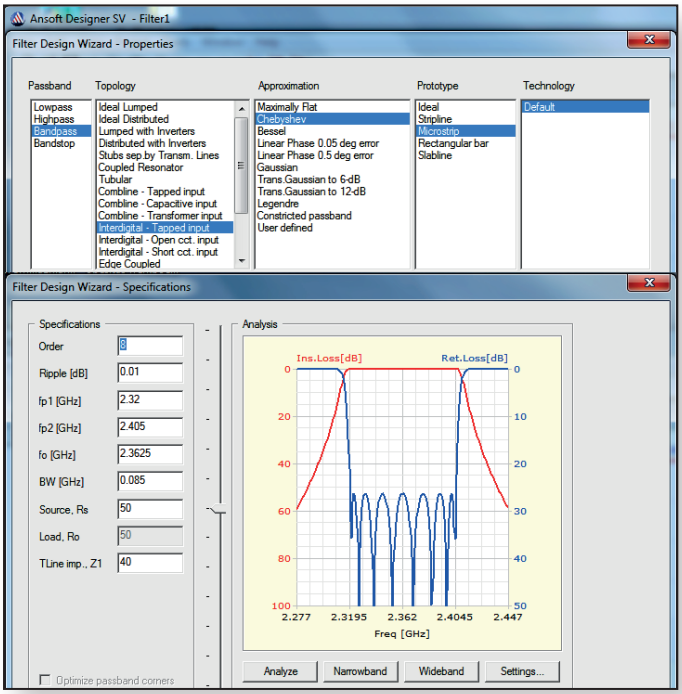
Chris van den Berg PA3CRX

Band filters remain an exciting but unfortunately necessary affair for the hobby but to what extent can software be used to design a workable one on printed circuit board?

As a starting point using epoxy board, reinforced with glass fibre, on one side or both sides covered with copper, leftovers seen offered at rallies: formally named FR4.

That is to say: as an evaluation model, and to see to what extent this material would still be usable at higher frequencies.

By using the 'Ansoft Designer SV' software (a study version of which is free of charge), an interdigital filter is designed and built for the 13cm band.

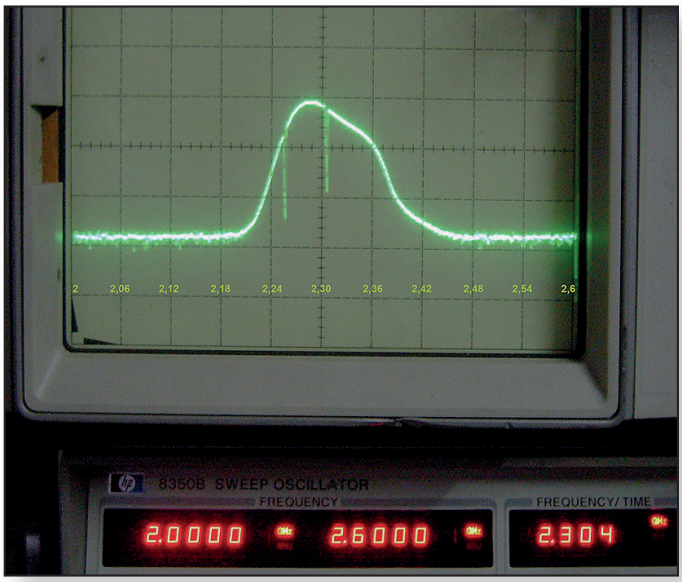


Eight-pole interdigital filter on epoxy board designed with Ansoft.

Both the simulation and the filter itself looked great, thanks to Henk PA0JMD.

Measurements showed that the shape of the pass band looked fine but the attenuation was even there 22 dB: therefore unusable.

The relatively small frequency shift seems to be normal due to material spreading. Therefore, professionals make at least three (corrected) prototypes before the design can be considered good.

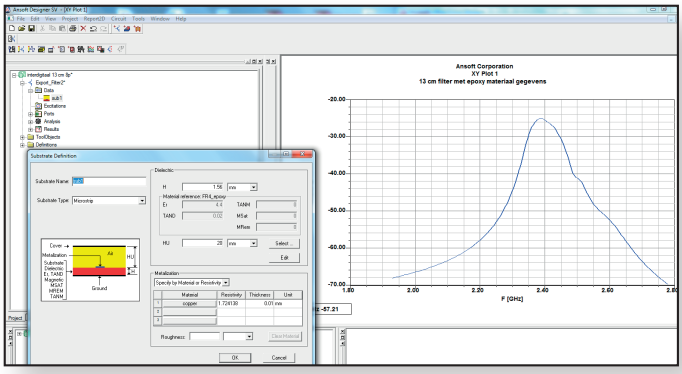


Result of the interdigital filter on epoxy board.

After realising that the input and output are not connected as usual with an interdigital filter, this was adjusted and the connectors were moved.

The pass band had barely changed; however, the damping had increased even further.

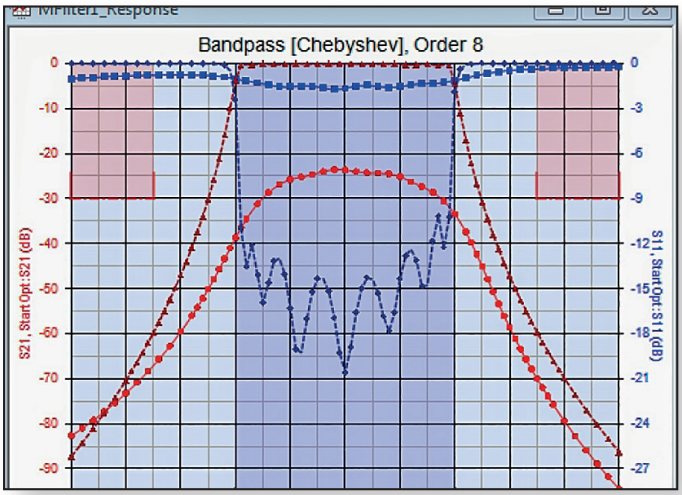
Closer examination with Ansoft showed that the material data of the board also must be entered in another field. After a new simulation, it suddenly corresponds rather well with what has been measured in practice.



Ansoft simulation after the material data has been taken into account.

The shifted frequency can then be corrected; however, many actions have to be performed in order to create a graph with the new data.

In the meantime, another design program was found: Agilent Genesys (a 'trial licence' of 30 days). The material losses of the epoxy board are directly included in a simulation. Of course, the damping did also look bad with this software.



Design of the same filter with Agilent Genesys, with the predicted board losses.

The upper red line is optimal and the lower red line with FR4 printed circuit board.

The loss tan of the FR4 material is 0.02, which is too high.

It is likely not possible to make a low loss band pass filter at 13 cm with this material.

However, FR4 is not necessarily unsuitable for every application. For example in a multiplier whereby attenuation could be compensated by an additional MMIC (like used in CQ-TV 270 page 37: Amplifier/ doubler/tripler/filter for 9 cm designed using two SNA486 MMIC's).

In such designs it should be taken into account that the tolerance of the dielectric constant of FR4 material is large (in specifications I have seen from 3.9 to 4.7). This influences directly the frequency.

FR4 is therefore only usable for wide filters or you have to make an other filter, after measuring and dimensional correction.

In case of high pass filters attenuation is not much influenced by material losses but the cut off will not be as steep (picture shown in CQ-TV275).

Incidentally, much more can be done with Genesys software than just calculating filters; entire circuits can be designed and tested without the soldering iron having been in the vicinity. Search YouTube for 'Agilent Genesys' (or 'Keysight Genesys') and watch the interesting demonstration videos.

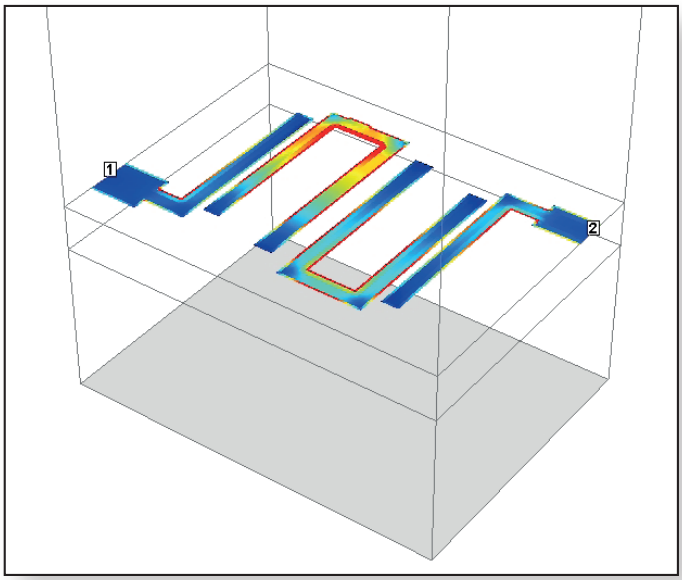
Another approach to reduce the dielectric losses at filters with FR4?

We actually assume double-sided printed circuit boards as standard for stripline filters. The dielectric of the board fills the space between the resonator and the ground plane.

However it might be a lot better if the dielectric is air.

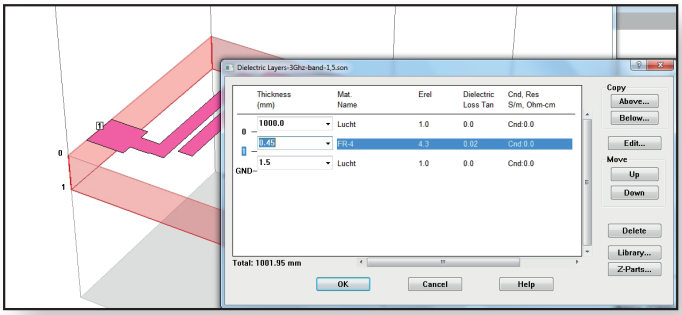
Since copper strips cannot float in free space we need some kind of support. Why not as a start point use (thin) epoxy board for that and air to the ground plane? Then there will be two different dielectrics between the resonators and the ground plane. After all, if the material losses of the combined dielectric is lower, the filter losses will also be lower.

This simulation appears also to be possible with the simulation program Sonnet (from Ansoft). For these simple simulations, the free (Lite) version is fine.
The (below) mentioned website also describes how to start (English) and after some learning curve beautiful filters can be simulated.

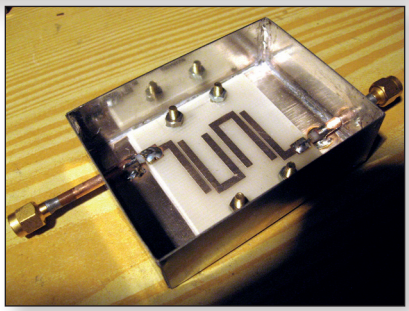


In addition to various parameters, the current in the circuits is also graphically displayed.

That is exactly what is done with Sonnet: design of a 13 cm hairpin filter on 0.5 mm epoxy single-sided board, with 'air' as the second dielectric layer. With this filter there is no need to solder through the board as with the interdigital filter.



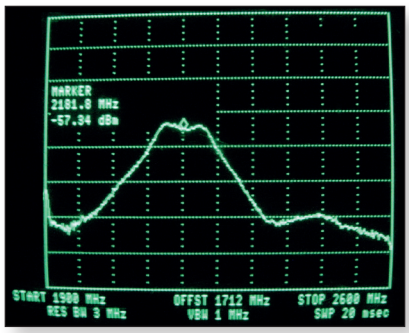
- *The layers are displayed graphically and the parameters can be set for each layer*



- *The board is etched and an enclosure is made with adjustable distance screws*

The aim was to change the distance to the ground plane a little to see to what extent the effect would match the simulation.

As measuring equipment I used my HP spectrum analyser with converter (see CQ-TV275) and as a signal source my 13 cm PLL FM-ATV transmitter.

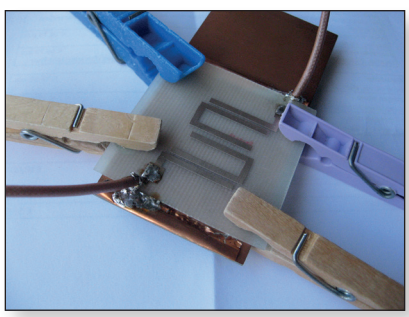


- *Example of one of the measurements with 0.5 mm FR4 and air as dielectric.*

This distance adjusting system was well thought out but not easily to perform. There are connectors connected and every time the distance was changed slightly, they had to be unsoldered; washers to be replaced and then the connectors had to be soldered again. So that wasn't very practical.

It turned out to be easier with the following setup: I provided the ground plane with two strips of copper foil, on which the board with etched filter rests. With coax cables attached to it, the epoxy print 'floats'. By adding distance strips at the edges and clamping the whole (clothespins), the distance is well defined and easy to change.

The used spacers are strips made of paper (including business cards) and located outside the field of the microstrips. Therefore they really only served as spacers.

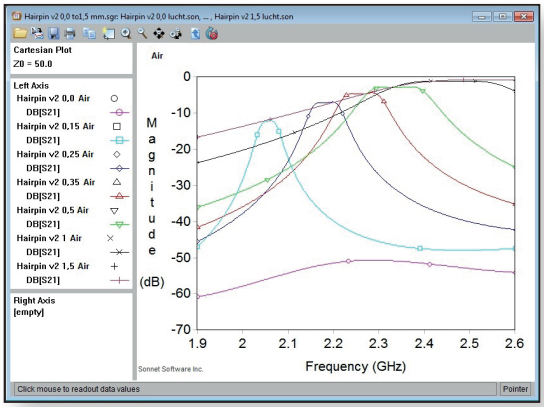


The distance is varied between zero and 1.8 mm.

The results turned out to deviate slightly from the previous few measured trials when the PCB was mounted in the enclosure.

It became clear that in addition to the attenuation, both the bandwidth and frequency of the filter were significantly influenced by the change in distance.

The smallest distance gave the largest attenuation and the largest distance the lowest. Results are very much in accordance with the simulation performed with Sonnet.



- *Results simulated with Sonnet are in reasonable agreement with the practical measurements.*

Conclusions

For wide filters the epoxy board and air as a dielectric could perform. Stability of the construction is a challenge, reproducibility likely poor. Small mechanical changes will cause considerable differences in bandwidth and frequency, especially if the thickness of the air dielectric is small. I don't think this is very useful in a practical circuit.

Playing with this simulation software (and especially Sonic) is found to be both educational and fun. The results also appear to correspond well with practice, if the software is used correctly.

All in all it has been an educational project.

Links:

- Ansoft Designer SV is no longer available from the Internet or the Ansoft homepage. Information (and download at your own responsibility): *http://www.gunthard-kraus.de/Ansoft%20Designer%20SV/English%20Tutorial%20Version/index_english.html*
- Agilent now seems to be Keysight: *https://www.keysight.com/us/en/lib/software-detail/computer-software/pathwave-rf-synthesis-genesys-software-2216771.html*
- Ansys simulation software: *https://www.ansys.com/academic/students/ansys-electronics-desktop-student*
- Sonnet: *https://www.sonnetsoftware.com/products/lite/*

The Portsdown Newsletter

Dave Crump, G8GKQ

I have continued to make incremental improvements to the Portsdown 4 capability, and also published some minor bug-fixes for the Portsdown 2020.

Portsdown 4 and the Jetson Nano

The wiki page describing how to build a Jetson Nano as a companion H265 encoder for the Portsdown system has now been updated to work with the latest operating system released by NVIDIA. Full details at https://wiki.batc.org.uk/Jetson_Nano

This update includes the introduction of support for the ATEM Mini Pro as a video source.

The ATEM Mini Pro

The ATEM Mini Pro is a four-input HDMI video mixer which retails for about £278. In addition to an HDMI output, it also has a USB3 output. The USB3 output can be connected to the Jetson; the Portsdown 4 can then be used to control the Jetson to transmit H265 video from the mixer using a LimeSDR Mini.

Unfortunately, the Portsdown 4 itself is not powerful enough even to transmit H264 from the ATEM, it will, however, display the ATEM's output if connected by USB3, using the "HDMI Monitor" function.

HDMI input to the Portsdown

I have spent many hours (and days and weeks) trying to configure the Portsdown 4 to transmit DATV from an HDMI input. None of my attempts have been particularly successful. There are two aspects to the problem.

The first challenge is capturing the HDMI and making it available to the H264 video encoder in a form that it can handle. I have tried:

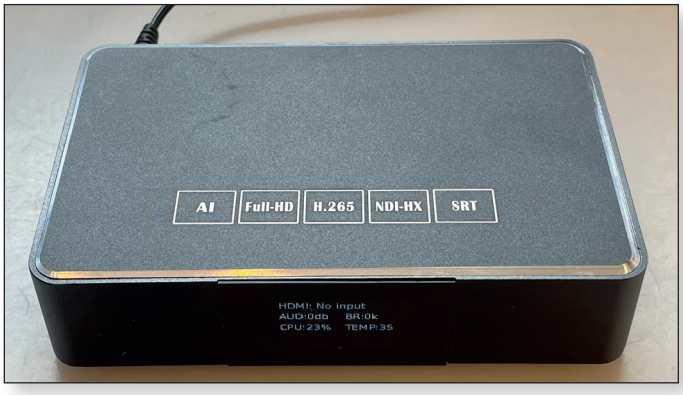
- The HDMI-to-CSI adapter boards based on the Toshiba TC358743XBG chip. These claim to imitate an RPi Camera, but in fact are quite different, and so do not work with any of the H264 encoders that I have tried
- USB3 input from an ATEM Mini Pro. The USB3 input from an ATEM Pro is in 1080p MJPEG format. By the time that the Raspberry Pi has decoded the MJPEG format, there is no spare capacity left for encoding
- IP input from an LKV373A HDMI extender. This works at reasonable SRs (1 MS) and 720p definition with a Pluto SDR. It does not work with the H264 encoder required for the LImeSDR
- USB3 input from an Elgato CamLink 4K HDMI capture device. This works at reasonable SRs (1 MS) and 720p definition with a LimeSDR. It does not work with the Pluto.
- USB input from cheap HDMI dongles. As with EasyCaps, these devices come in many designs, and those that have been tried do not seem to work well.

The second challenge is to encode the video and audio as an H264 stream. The hardware encoder on the Raspberry Pi is an ageing design and does not perform well at high definitions and low symbol rates. The practical limits seem to be:

- 720p at 1 MS FEC 2/3
- 800x448 at 333 kS FEC 2/3

The three ways of transmitting low SR high definition video from an HDMI source that seem to work are:

- Use a Jetson Nano controlled by a Portsdown 2020 or Portsdown 4. This will accept HDMI inputs from an LKV373A, ATEM Mini Pro or Camlink 4K dongle and transmit 720p at 333 kS (or 1080p at 1 MS) using a LimeSDR.
- Use an external LinkPi Enc1 V2 encoder with the Portsdown 4NG software and a LimeSDR Mini. This has been developed as a repeater TX solution, but not as a touchscreen-controlled unit yet.



The LinkPi Enc1 V2

- Use a Windows PC with a recent graphics card and F1EJP's excellent DATVEasy software. Various capture devices can then be used with OBS as the video source.

The bottom line is that if you want to capture and transmit high definition HDMI video, you need to use a Portsdown-controlled Jetson Nano, or a recent Windows PC. The Portsdown excels at lower definitions and in portable scenarios, but is not powerful enough to transmit high definition at low symbol rates.

BandViewer

The BandViewer functionality for the RTL-SDR has been improved with a span width bug being corrected, and the addition of a 500 kHz span option. This change has been implemented on both the Portsdown 4 and the Portsdown 2020.

Work continues on the waterfall display for BandViewer. It has now been successfully implemented on a non-ATV related project and will be introduced into the Portsdown BandViewers when time permits.

Web viewing and web control

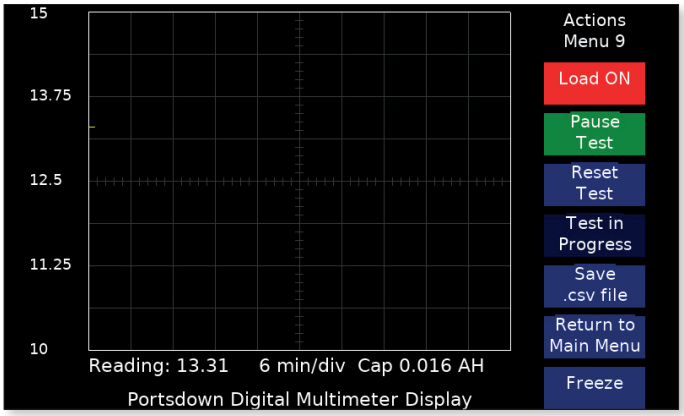
The web viewing functionality on the Portsdown 4 has been extended to the power meter and the XY Display. As with the BandViewer and the DMM Display, this is ONLY web viewing functionality, not web control.

It is now possible to enable web control of a Portsdown 4 without a touchscreen. The full instructions are at the bottom of this Wiki page:
https://wiki.batc.org.uk/Portsdown_4_Web_Control

In essence, by selecting "browser" as the display option in the SSH Console Menu, the Portsdown will reboot ready for web control of the transmitter (and a UDP-streaming receiver). This enables the construction of a remote station without a touchscreen.

DMM display and logger

The DMM display and logger I described in the CQ-TV 278 has been developed to include unattended rechargeable battery capacity measurement. It can be set up to log the battery voltage during discharge by a constant current or resistive load, disconnect the load when the battery is at the lowest safe discharge level and display the calculated ampere-hour capacity of the battery. Full details are at *https://wiki.batc.org.uk/Portsdown_DMM_Display_and_Logger*



- *The start of a battery discharge plot*

LimeSDR Mini V2.2

The most recent Portsdown 4 update provides support for the LimeSDR Mini V2.2. This adds another currently available (if expensive) SDR option to the Portsdown transmitter and BandViewer. The LimeSDR Mini V2.2 is described elsewhere in this issue.

Future developments

Work continues to add extra features to the Portsdown 4, and to add touchscreen capabilities to the Portsdown 4 NG. Any new features and bug-fixes that are compatible will be added to the Portsdown 2020 build when time permits.

Turning Back the Pages supplement 2

This was held over from the last issue due to a lack of space…

A short note looked back 25 years to an early edition of the magazine, in 1950. "A postage due letter has come from G3___ saying he is now licensed for UHF tv; after due celebration and black coffee the next morning he removed the panels disguising the tv transmitter as "Whistler's Mother" and the trip wire from the door! He would be glad to show the GPO round the shack now, although since he has no licence for the tv receiver, he has put a BC221 panel in front of it - anyway he doesn't think much of BBC programmes!".

The GPO were the licensing authority at the time - and as a condition of the licence was the ability to receive transmissions of the frequency and mode being transmitted, G3 ___ would have been 'in difficulty' with the GPO if he did not have a receiver, and likewise if he did, but without a licence! In 1950, the BBC were the only broadcasters of television programmes in Britain, of course. Maybe the fact that the letter to BATC was a 'postage due' one says something about G3___ as well!

OpenTuner Windows software for MiniTiouner hardware

Dave G8GKQ

Unfortunately, due to a family bereavement F6DZP is currently not developing the MiniTioune software – MiniTioune has become the go-to Windows software for DATV reception and the ATV community wishes Jean Pierre well for the future.

However, all is not lost as coincidently Tom ZS6RTG has just released the first version of his Windows OpenTuner software which uses the same standard MiniTiouner hardware. Tom has used the LongMynd receiver developed by M0MHO as the basis for this capability and his C# source code is published on his GitHub repository. Other users have already demonstrated that the software can be modified and recompiled.

The software has been developed primarily for use on QO-100 and includes a click and tune waterfall display and a window showing the QO-100 chat facility.

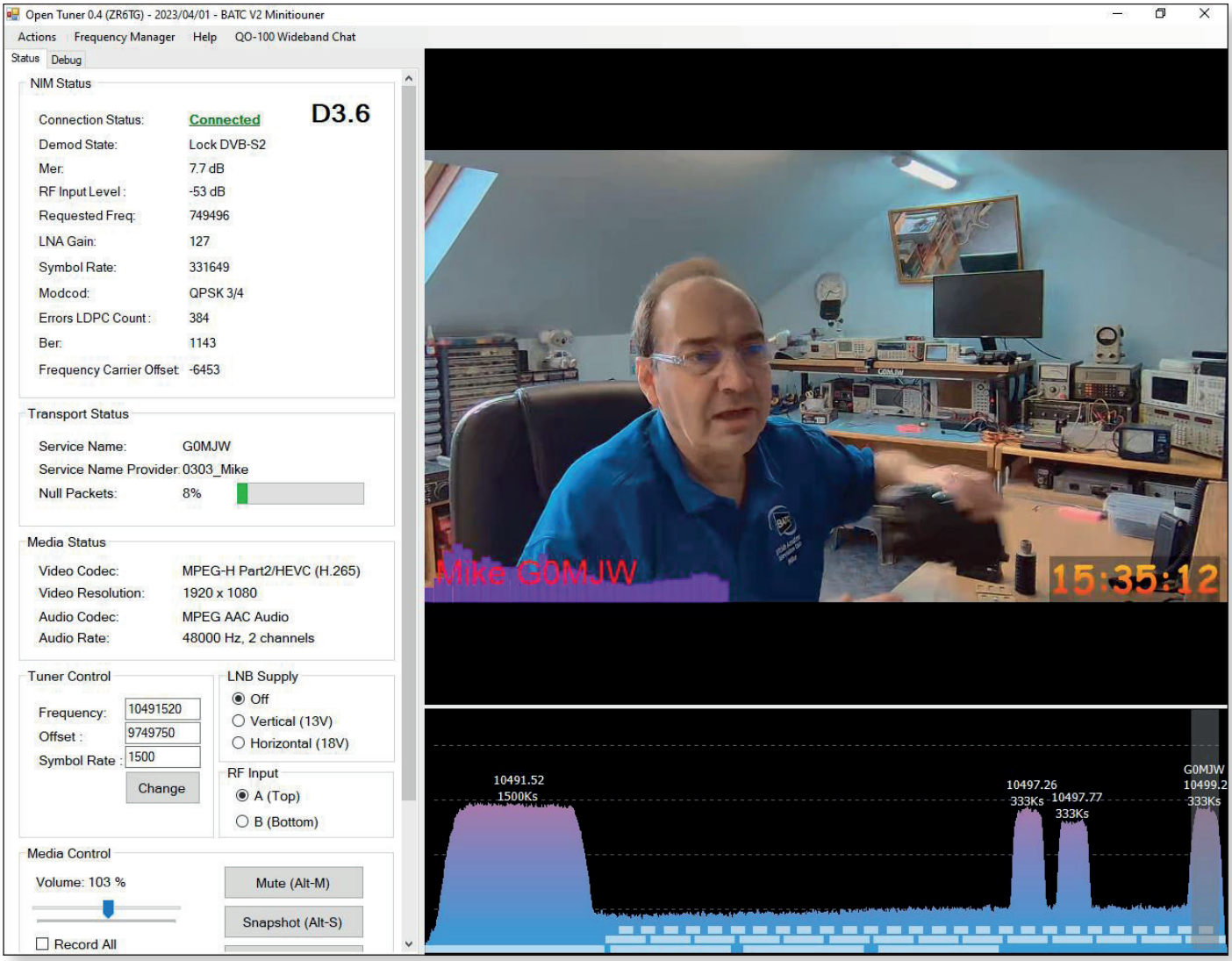
Features include Transport recording, a UDP output and the ability to customise the user interface in a foreign language. New features are being added every week.

For non QO-100 use, tick disable QO-100 and then enter the frequency, LNB offset and symbol rate in the tuner control box and press change. Note for terrestrial use put 0000 in the LNB offset box.

For more details on the software and how to download it go to *https://www.zr6tg.co.za/open-tuner/*

There are already active discussions on the BATC forum – look there for answers to your questions:

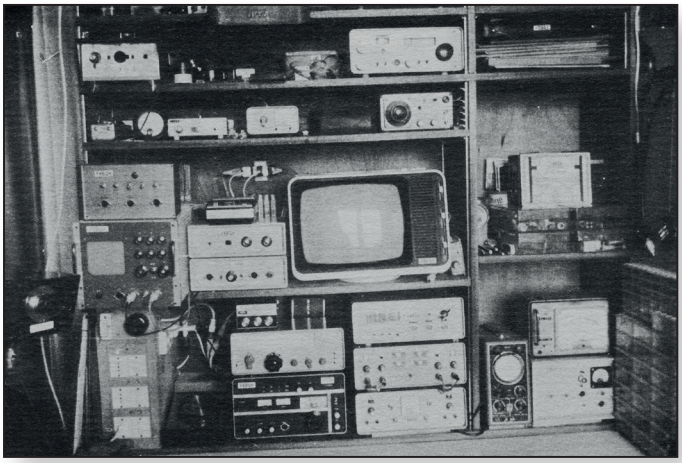
https://forum.batc.org.uk/viewforum.php?f=142



Turning Back the Pages

A dip into the archives of CQ-TV, looking at the issue of 48 years ago

Peter Delaney - G8KZG



Although the Club is the British Amateur Television Club, it has always had an international membership, and a photograph of the station of a French member, F6BHQ/T, in Calais greeted members on the cover of CQ-TV 90 in May 1975.

This issue included the second part of P Hayes' design for an image orthicon camera - the block diagram and video circuits being in the last "Turning Back the Pages". He commented that a surprising amount of scanning power is required by an image orthicon, approaching the amount required by a 12" to 14" crt.

The field scan used a 2N2160 unijunction transistor to generate the sawtooth waveform. The following amplifier stages not only drove the scan coils, but also produced a signal at the emitter of Q5 to be fed back to the input to control the charging rate of the timing capacitor, and hence improve the linearity of the scan. The line scan circuit, based on one used in Marconi cameras of the time, used a 5-stage transistor amplifier to produce a drive of about 45 volts into the valve stages that drove the line output transistor. The camera tube required a supply of -600V for the image section and +1500V for the dynode chain, and both of these were derived from the line scan transformer through V5 and the associated transformer.

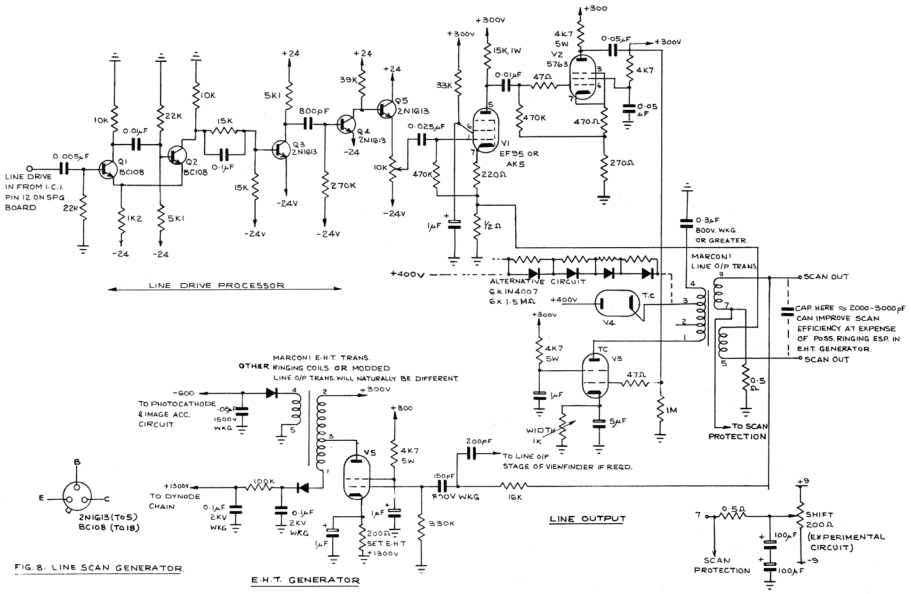


FIG. 8. LINE SCAN GENERATOR.

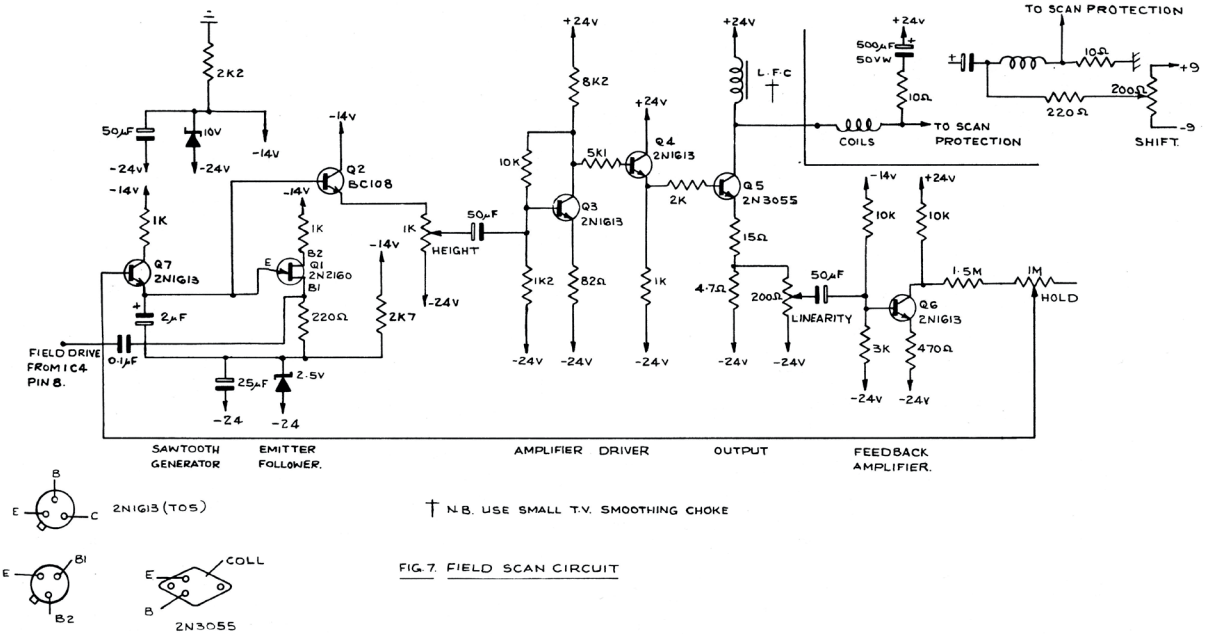


FIG. 7. FIELD SCAN CIRCUIT

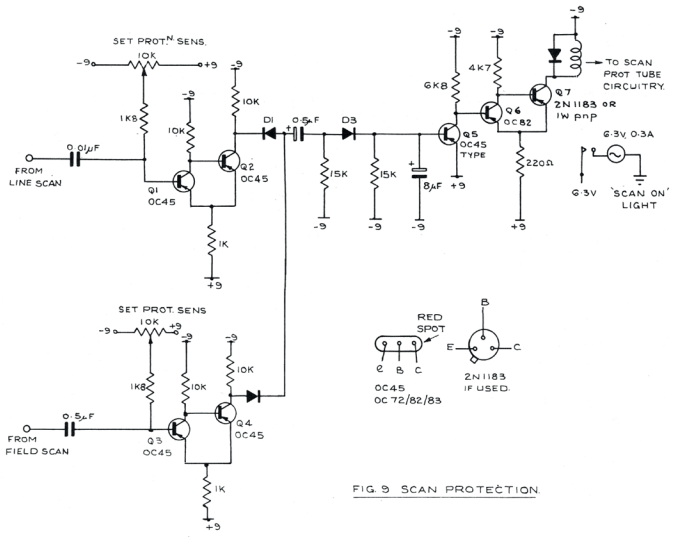
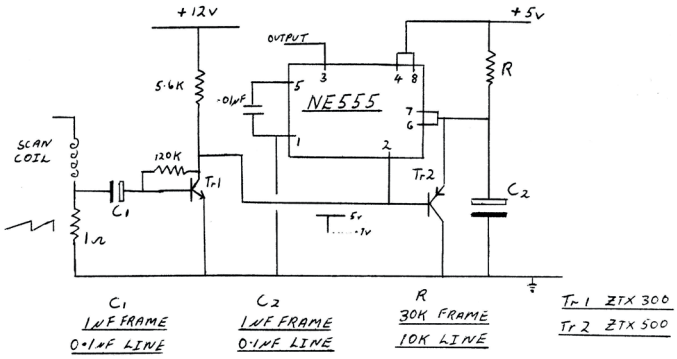


FIG. 9. SCAN PROTECTION

If either the field or line scan circuits should fail, the (expensive!) image orthicon tube would be severely damaged, and so a protection circuit was also included. On the left were two Schmitt trigger level detectors - one for vertical and one for horizontal scan signals, and their outputs were combined to feed the amplifier of Q5 - Q7, so that the relay would only be powered on if both scan circuits were providing sufficient drive signals.

The power supplies were fairly conventional, including stabilised +24V and -24V feeds for the various transistor circuits (bottom right), and HT for the valve stages of the line drive circuit (top left). A focus current of about 125mA was needed to create suitable magnetic fields for both the image section and the scanning part of the camera tube. In order to compensate for the changes in the focus coils as they warmed up, the current was sampled across the 100Ω resistor, R1, to control the focus supply regulator - also using valves to provide sufficient power. As most members would not have been familiar with setting up an image orthicon camera tube, the article also included a set of notes on the process - checking that all the power supplies, scanning circuits and amplifiers were working correctly before installing the image orthicon into the camera.



Another circuit for scan protection was the basis of an article by Mike Cook in Manchester - in this case intended for a vidicon camera. A sample of the scan coil drive current is sampled across the 1Ω resistor on the left-hand side, and amplified to produce a negative going

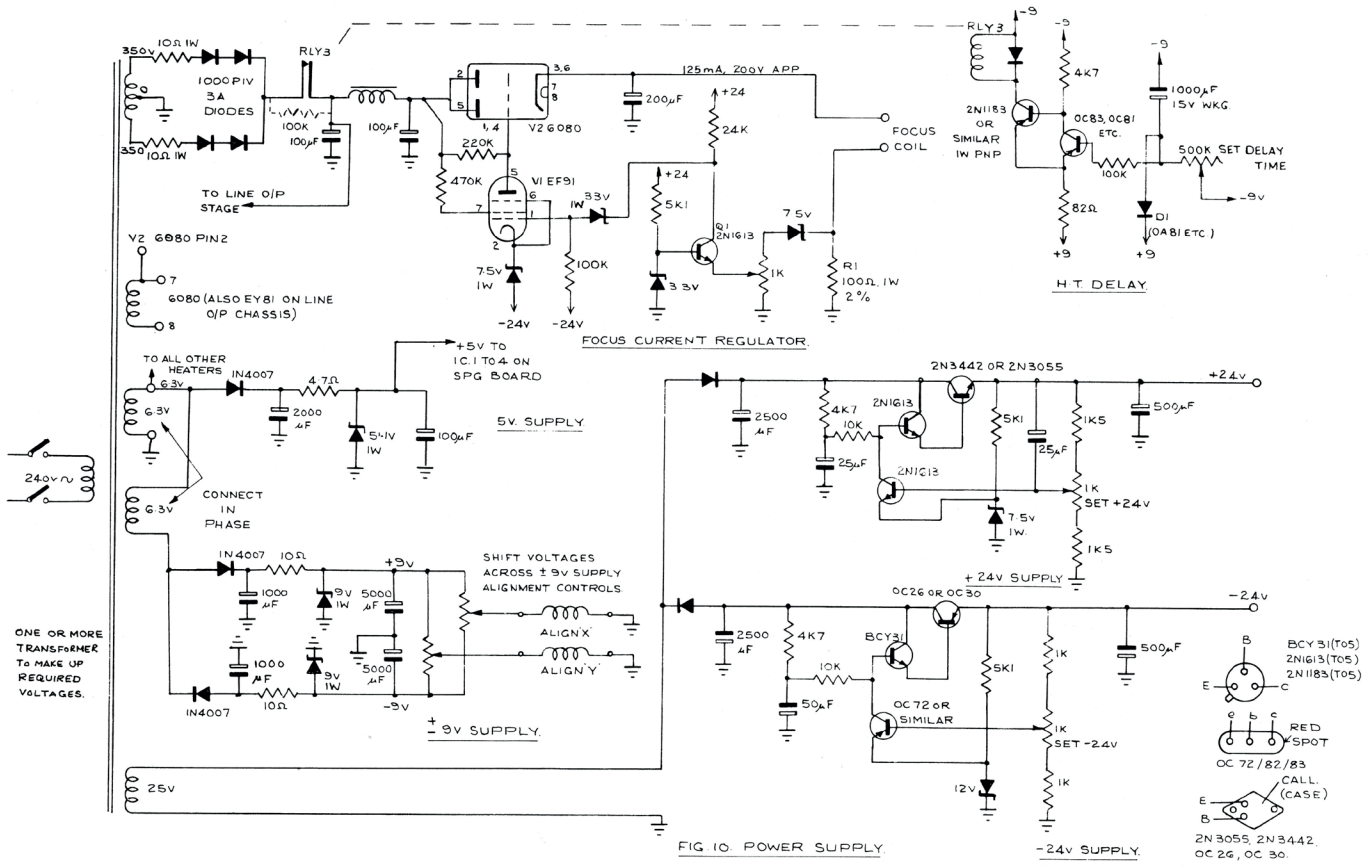
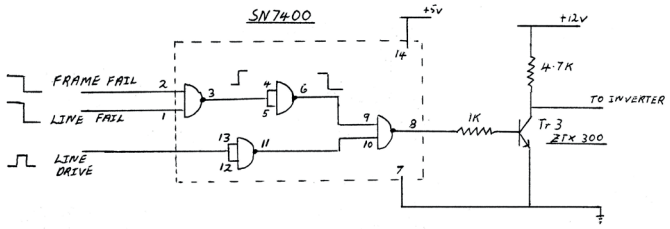
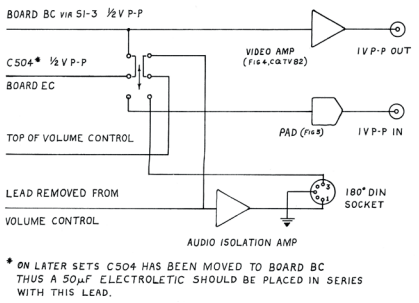


FIG. 10. POWER SUPPLY

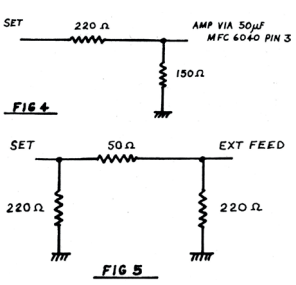


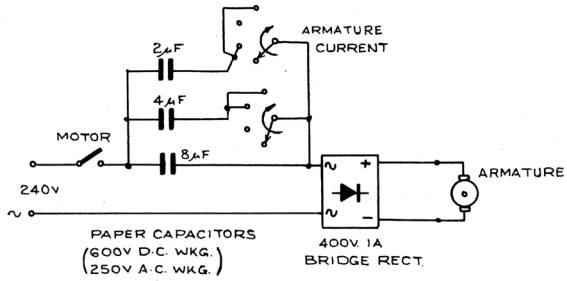
pulse at the end of each scan, which is used to discharge the NE555's timing capacitor before the 555's threshold voltage is reached. If the input pulse is missing, the 555 timer completes its cycle and the output pulse falls from a logical high to low level - a separate circuit being needed for the frame and line scans, with the appropriate values given on the diagram.

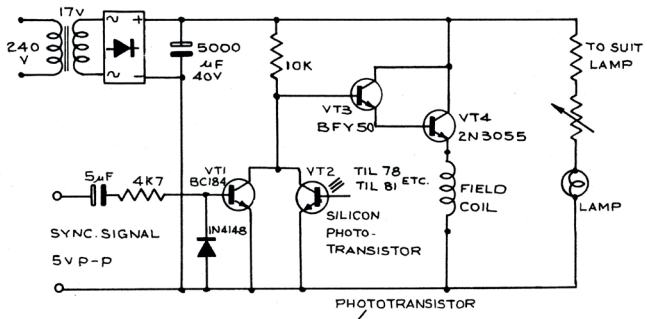
The logic outputs from both of these were then gated together to then gate the line drive pulses that drove a transistor inverter that generated the vidicon tube high voltage supplies so that if either scan circuit were to fail the vidicon would be turned off.

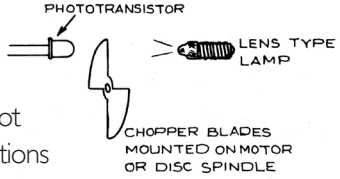


In order to provide a monitor for their video signals, most amateurs at that time used a domestic television set. This could be fed by a small low power modulator (often built in a tobacco tin which screened the oscillator as well as providing protection and support). An alternative method, described by Mike Crampton (later to become the Club Chairman) was to modify the receiver to accept the video signal at the point where the unmodified circuit would also have baseband video, just beyond the detector. Mike showed how this could be fitted to the Sony TV9-90UB, a small transistor portable set, although the principles were applicable to any television receiver. The receiver detector output to the following amplifier stage was intercepted at C504, and fed a dpdt switch, with the standard video signal fed via a resistive pad to match the ½V peak - peak level of the set's video level at this point. The received video signal was also made available (top right) with a small video amplifier to bring the level up to 1V peak to peak as normal. The other half of the dpdt switch was used in a similar way to select either the received audio signal or a baseband one, with a small amplifier again included to make the received signal available. The video amplifier stage suggested was that using an MFC6040 that had appeared in CQTV 82, with the input attenuator shown there replaced by the simple network of Fig 4, whilst the attenuator needed as the pad at the video in the main circuit is shown in Fig 5.









At first sight, John Lawrence's "Circuit Notebook" about motor control circuits might not seem to relate to have applications in picture transmission and reception. However, as he commented, there was a n increasing interest in the use of low definition television (using mechanical scanning similar to Baird's original ,method) and FAX as methods for amateurs to exchange images, whilst a further use was for rotating a filter wheel for a field sequential colour system, The motor armature was fed with rectified ac, the current being adjustable by selecting the best capacitor combination for sufficient drive power without the motor speed becoming unstable. The field current was used to control the precise speed, and to lock the rotation to synchronising pulses. A wheel fixed to the motor shaft was arranged to interrupt the light path between a lamp and a photo-transistor, producing a signal locked to the motor in both speed and phase. The photo-transistor formed one half of a long-tailed pair (VT1 and VT2) that acted as a comparator between the sync signal and that from the rotating disc, the output then controlling the field coil current and hence motor speed.

Amongst the "Adverts" at the back of the magazine was one from Arthur Critchley - author of many articles in CQ-TV about the then new topic of integrated circuits. He was planning to emigrate to Canada in the near future, and "therefore had a lot of bits and pieces for disposal by haggling". The list included a camera, monitors, camera tubes and sets of scan coils, variacs etc. The note also mentioned that as a result 'the continuation of the series on ics has been postponed for several issues'.
On the 'Postbag' page was mention that the Club's President, Bob Roberts, had just been awarded a Fellowship of the Royal Television Society - the citation mentioning BATC before the many industry organisations and committees.

The British Amateur Television Club

Out and About

Rallies and events with a BATC stand: (Provisional – more to come, and subject to change)

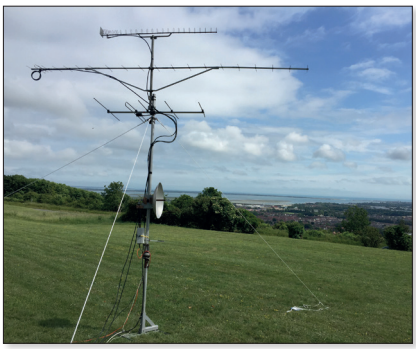
16 April	*Martlesham Microwave Round Table*
23 April	*NARSA Rally (Representation only, no BATC shop)*
21 May	*Dunstable Downs*
18 June	*Harwell Microwave Round Table*
25 June	*Newbury Radio Rally*
16 July	*McMichael Rally (Reading)*
6 August	*BATC CAT 23*
13 August	*Flight Refuelling Rally (Wimborne)*
14/15 October	*RSGB Convention Milton Keynes*
2 December	*Midland Microwave Round Table*

It is hoped that the BATC shop will be available at all these rallies (except NARSA), offering cheaper prices than online, and accepting cash and card payments.

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



2023 Activity Days:

15/16 April activity weekend - 2m & Down + 23cm
13/14 May activity weekend - 70cm & 23cm - all bands (IARU prep)
10/11 Jun IARU Region 1 ATV contest
Jul 15th/16th Activity Weekend - 6m & 4m + 23cm (Es Special)
Aug 19th/20th Activity Weekend - 6m, 2m, 70cm & 23cm (coincides with Veron event)
Sep 16th/17th Activity Weekend - 13cm & Up + 23cm
Oct 14th/Oct 15th Activity Weekend - 2m & Down +23cm
Nov 11th/12th Activity Weekend - 70cm & 23cm
Dec 9th/10th Activity Weekend - 13cm & Up + 23cm (coincides with Veron event)

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