The British Amateur Television Club

CQ-TV

No. 276 – Summer 2022

- The "Portsdown Double"
- What to go for - Yagi or dish?
- Microphone amplifiers and audio level setting
- Electromagnetic Field
- Filtering Is important on receive as well
- An alternative DATV repeater controller update
- Former BATC president - silent key
- BATC representation at HamRadio '22
- Contest adventures and misadventures
- The inside scoop - 'Mr Whippy'
- RP2040 – a Microcontroller Chip from the Raspberry Pi Foundation
- Internet repeater in north Cumbria
- The Tilt-O-Matic

... and much more inside!

CQ-TV 276

Contents:

Contributions

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

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

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

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

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

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

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

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/
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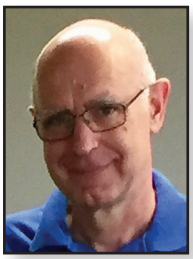


From the Chairman...

Dave Crump G8GKQ

I write this a few days after a personally successful and rewarding IARU ATV Contest. However, I realise that it was not as rewarding for some members who only had equipment for the lower bands, or who were out of range of the activity cluster in the south of England.

As the IARU ATV contest coordinator, I would like to address this in future by splitting the contest into two events. The first, in June of each year, would be for 23 cms, 70 cms and 6 m – the three IARU bands available for ATV.

Hopefully this would appeal to beginners and those unable to go out portable. The second contest would be for the bands 13 cm and above, with extra point incentives limited to 24 GHz and above. My proposals will need support from the other participating countries – I can only try!

The regional distribution of activity is a much more difficult problem; my hope is that by making the June contest simpler it might encourage more activity in regions away from the south of England. There was activity from the North York Moors and Northern Ireland during this contest, but they had few stations available to work with.

Conditions on 6 m were very good during the contest, but few members seem to have read the e-mail from the BATC telling them that there was a 6 m section in the contest. I would appreciate suggestions as to how we could improve this sort of communication to the BATC members.

I do look forward to meeting you all at CAT 22 in Coventry on Sunday 7 August; please come prepared to discuss the way ahead for ATV Contests and the BATC in general; the committee are open to your suggestions – especially if you are prepared to volunteer help us put them into practice.

CAT 22 Part 1 and General Meeting Sunday August 7th

- **ATV Equipment Demonstrations**
- **Fix it, test and measurement area**
- **Members' flea market and traders**
- **Free access to Air Museum**
- **BATC General Meeting at 11:30 am**
- **Midland Air Museum Coventry Just off M69/M6**

CAT 22 Part 2 Saturday October 22nd

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

The Listing

new and renewing members

Rob Burn G8NXG

As I write this introduction there are only a few weeks to go before the CAT 22 meeting to be held near Coventry – in fact even less by the time that this edition of CQ-TV is in your hands!

Thankfully, a new rally season is underway in the UK and it is great to see the return of many rallies, once again being able to reclaim regular slots in the diary. Keep an eye on the rear page of CQ-TV for the list of rallies where the BATC is likely to be represented; for up to date information please visit the Events section of the BATC Forum.

The latter two months of this particular membership report period of March to May have been characterised by the high number of member accounts which I have had to delete. This action applies to anyone who fails to renew a membership subscription for 12 months and this would also include any of the free membership accounts taken up by radio clubs during the early part of the Covid pandemic. Many, indeed most of these free member accounts have now expired which, if you were wondering, is why the number of stations listed in the Events section of streaming stations has reduced.

As ever, many thanks to those who continue to support the club and if you recently joined thank you for doing so and becoming a contributor to the ATV community.

Australia		
Peter Cossins	VK3BFG	Melbourne
Peter Schrader	VK4EA	Northgate
Joe Pereira	VK5EI	Parafield Gardens
Wayne Stringer	VK5BI	Seaton
Anthony Bedelph	VK7AX	Ulverstone
Austria		
Reinhold Autengruber	OE5RNL	Linz
Josef Waser	OE3JWC	Neuhofen/Ybbs
Heinz Meschnark	OE8MEQ	St Stefan
Kohlross Erwin		Steyr
Belgium		
Tim Schmitz	ON8TT	Herk-de-Stad
Patrick De Rocker	ON7ARQ	Merelbeke
John-peter Martin	ON7ZO	Montigny Le Tilleul
Thierry Wiame	ON4LTW	Temploux
Vandewalle Yves	ON4YV	Vilvoorde
Charles Verstappen	ON8YY	Waterloo
Czech Republic		
Miloslav Skála	OK1UFL	Jilemnice
Denmark		
Ole Nykjær	OZ2OE	Horsens
France		
Philippe Cavazza	F4BRC	Drancy
Teodor Gradinariu	F5VMH	Dreux
Azais Didier	F6EAJ	EPINOUZE
Robert Hauersperger	F1TZU	Hettange-Grande
Auvray Michel	F1ETU	Izy
Dominique Metayer	F1EJP	Le Grand Quevilly
Claude Berthebaud	F8BOJ	Les Noës
Nicolas Fontaine	F4HTN	Montigny-En-Gohelle
Roland Etienne	F8CHK	Pabu
Martial Lesne	F5JDI	Pont Sur Sambre
Pierre Marie Gayral	F5XG	Rurange Les Thionville
Bruno Lequeu	F1MPE	Saint Gervais en Vallière
Rolf Collette	F9ZG	Saint Gilles
Jean-Marie Vallet	F6HBW	Veretz
Germany		
Sven Ziegenspeck	DH1HN	Bad Neuenahr-Ahrweiler
Ferdinand Schmehr	DC8EC	Brunnthal
Kaspritzki Hans	DG1HTS	Dessau- Roßlau
Winfrid Flöter	DL3HQD	Dessau-Rosslau
Werner Vyhnalek	DG4DUL	Eulowutz
Hans-Joachim Faber	DC7UG	Jever
Peter Nestler	DB4ZW	langen/Hessen
Wolfgang Schreiner	DC2TH	Oberteuringen
Reinhard Paetz	DG0ARP	Oelsnitz
Thomas Meyer	DL6YEA	Oetzen
Erich Jankow	DL6ZEW	Oschersleben (Bode)
Peter Quidde	DG2AAO	Salzgitter
Ulrich Knobloch		Schwarme

Falko Troll	DG2TF	Staßfurt OT Rathmannsdorf
Rainer Schuster	DG0RS	Syrau
Peter von Reetnitz	DB8ZP	Tann (Rhön)
Per Malmbak	DC3ZB	Taunusstein
Ireland		
Dermot Flanagan	EI6FZ	Blackrock
Michael Fallon	EI5HZB	Cork
Ian McMullan	EI4DP	Greystones
Stephen Ormondroyd	EI4KM	New Ross
Italy		
Alessandro Salvatico	I2SVA	Brunate
Bergamin Andrea	IU4GAV	Pavullo nel Frignano
Giancarlo Ciullo	IU3FBD	Santa Lucia di Piave
Japan		
Nobuo Katsuma	JF1WKX	Adachi-ku
Masaji Tamagawa	JH1AOY	Kimitsu
Hideyuki Aoyama		Narashino
Gregory Overkamp	JE1ICP	Shibuya-ku
Montenegro		
Dragan Milosevic	4O6DM	Podgorica
Netherlands		
Rens Dijkshoorn	PA3AXA	Almere
Jack Hoogewerff	PA3AXO	Bosschenhoofd
Harry Paas	PA1AS	Brunssum
Martin Struijs	PE3MST	Burgum
Hans Baard	PE1NKP	Ede
Marco Geels	PE1BR	Enschede
OJM Baken	PE1PMD	Grou
Ramon Hoffman	PA3CX	Julianadorp
Dustin Snijders	PE1OZS	Pijnacker
Albert van Deursen	PA5OXW	Ulestraten
New Zealand		
Ian Ashley	ZL1AOX	Auckland
Poland		
Artur Janus	SQ7RAI	Opoczno
Jan Galuhn	SP5GDM	Serock
Portugal		
Carlos Abrunheiro	CT1XC	Coimbra
Antonio Pacheco	CT1ERW	Lisboa
South Africa		
Peter Von Puttkammer	ZS5AM	Kloof
Johan Lehmann	ZS6JPL	Pretoria
Donald Garland		Richards Bay

Spain		
Alejandro Fernandez	EA4BFK	Las Rozas
Francisco Garcia Alfonso		Santa Cruz de Tenerife
Thailand		
Tanan Rangseeprom	HS1JAN	Bangkok
UK		
John Morris	G6PEP	Abingdon
Chris Tanner	MW0LLK	Amlwch
Peter Wright	G8GYS	Andover
Mike Berry	G1LWX	Ashton-in-Makerfield
Joe Bingham	GI4TAJ	Ballyclare
Alan Rishworth	G8UHN	Banstead
Daniel McDowell	EI8ICB	Belfast
Alan Brunton	G4HTG	Billericay
Ian Gordon	G8IFT	Birmingham
John Morris	G3PHA	Bolton
Joe Peerless	G3JPJ	Borehamwood
Clive Greenwood	M0HHF	Boughton
Daniel Endean	M0IFB	Brackley
Martin Newell	G8KOE	Bridgwater
Stuart Richardson	G8XXG	Bristol
Gareth Evans	G4XAT	Bromley
Graham Jefferies	M1ASR	Broomfleet, Brough
Ali Razzaq		Bude
Art Smyth	G3XNE	Bude
Roger Jones	G7RGR	Burnham On Crouch
Steve Haseldine	G8EBM	Burton on Trent
Peter Mc Farland	GW7BZY	Caernarfon
Brian Shaw	G6HFS	Cambridge
R Beech	G1BXG	Chandlers Ford
Roderick Warner	G0KJF	Chard
Brian Corker	G8FBQ	Chester-le-Street
Paul Howey	G4BBP	Chippenham
John Nichols	M0JZN	Chislehurst
David Atkinson	G8DRE	Colchester
Philip Richardson	G8MLA	Coldham
Simon Bradshaw	G4OUK	Crewe
Rob Southerington	G0IOZ	Derby
Graham Bailey	G1ZTJ	Dideford
David Taylor	GD4FMB	Douglas
Phil Smith	GD1HIA	Douglas
Robert Harris	G4APV	Dronfield
Paul Goodhall	MM3JFM	Elgin
Alan Bye	G3TCI	Gillingham

Anthony Parker	G4AXN	Great Yarmouth
Tony Wilson	G6ZAC	Guildford
Richard Barnes		Halifax
David Warwick	G4EEV	Harrogate
Denis Smith	G4TBG	High Wycombe
Dunstable Downs R C		Kilmington
Peter Elms	G0IJU	Kings Lynn
Graham Denton	G8VAT	Knottingley
Gordon Bowhay		Launceston
Chris Smith	G1III	Leeds
Dafydd Walters	M0WDV	London
Damien Nolan	2E0EUI	London
Desmond Mardle	G6WCX	London
Peter Standley	G8RW	Longfield
Chris Wilson	2E0ILY	Lower Heath
James Gillard	M0JGX	Lowestoft
Richard Ellis		Macclesfield
David Robinson	G4FRE	Malvern
Adrian Hope	G0ACZ	Matlock
Heather Nickalls	M0HMO	Much Wenlock
Anthony Pearce	G0AZQ	Nafferton
Andy Russell	G0VRM	North Newbald
Steve Liptrott	G4EGY	Nottingham
Stephen Catlin	G8HLM	Oakham
Geoff Oliver	G0BJR	Oldham
Kelvin Crocker	G1ZSE	Poole
Tom Fanning	M0LTE	Reading
Martin Borer	G0NYM	Ripley
Ray Hill	G6TSL	Ross On Wye
Nigel Smith	G4EQD	Scunthorpe
Stephen Webster	M1ERS	Sheffield
Barry Barker	G4VRT	Sheffield
Henry Neale	G3REH	Spalding
John Newman	G0VDU	St Austell
Drew Belcher	G7DMO	Stourbridge
Michael Meadows	G4GUG	Stroud
Carlos Sartorius	M0HBK	Sunningdale
George Quarterman	G3NHX	Sutton
David Hazell		Swindon
Jim Arnott	G1WKK	Tadley
Peter Wallace	G1OAR	Telford
Dave Hall	G8VZT	Telford
Chris Pegrum	M0NAY	Tunbridge Wells
Eddie Ashburner	G0EHV	Tyne And Wear
Mike Dennis	G7FEK	Ventnor
Mark Scott	G7IRN	Wadhurst
Stephen Dale	M0TVQ	Wantage
Michael Drury	2E0GMD	Watford
Mark Kinsey		Weston-Super-Mare
Paul Coddington	M1BKL	Whitchurch
Ashley Booth	G8DPH	Windsor
Tony Harris	G4SJI	Withernsea
US		
Raleigh Stout	AC5JW	Colfax
Ed Mellnik	WB2QHS	Portland
Kurt Geisel	N3JTW	Bellevue
Charles Yurek	KD2HNS	Pennsauken
Bob Miller	WB6KWT	Tracy
Bob Tournoux	N8NT	Center Rutland
David Frackman	KD2ZDZ	Brooklyn
Kevin Hempson	KK6JPN	Sutter Creek
Michael Warren	W6MEW	Pittsburg

Agenda for the BATC General Meeting

Midland Air Museum – 11:30am on Sunday 7th August 2022

1. **Apologies for absence.**
2. **Minutes of the 2018 General Meeting and matters arising.**
   These can be downloaded from *https://batc.org.uk/wp-content/uploads/BATC-2018-General-meeting-minutes-v2.pdf*
3. **Report by the chairman on behalf of the committee.**
4. **Report from the treasurer and presentation of the accounts.**
5. **Presentation of BATC awards.**
6. **Amendment of constitution to allow for additional committee members. The proposed changes are in appendix one to this agenda.**

7. Election of committee members.

The following committee members were elected in 2018 and are not due for re-election:

- Brian Summers, G8GQS
- David Crump, G8GKQ
- Frank Heritage, M0AEU
- Clive Reynolds, G3GJA
- Phil Crump, M0DNY

The following committee members are due for re-election in 2022 – all are willing to stand again:

- Noel Matthews, G8GTZ
- Ian Parker, G8XZD
- Robert Burn, G8NXG
- Tim Forrester, G4WIM

One nomination was received in advance of the GM. Martin Charman G4FKK proposed by Gareth Evans G4XAT and Alan Mayhew G8TQK

8. Close of meeting.

Notes:

- No items have been received from members for inclusion on the agenda
- The GM is open to all but only BATC members will be allowed to vote
- Members are identified by a BATC badge provided
- All questions will be addressed through the chairman
- Please respect the chairman's decision to ensure an orderly and timely meeting
- After the formal meeting closes there will be a general question and answer session.

- After the GM is over, the new committee shall select from its number a chairman, secretary and treasurer, together with additional committee posts as required

Appendix 1: Proposed constitution amendment:

Para 4a. Amend:

(a) The affairs of the BATC shall be administered by a committee of up to eight members elected at a general meeting and, additionally, a president appointed by the committee.

To read:

(a) The affairs of the BATC shall be administered by a committee of up to 10 members elected at a general meeting and, additionally, a president appointed by the committee.

Para 4b(iii). Amend:

(iii) Up to five further committee members. These may hold specific posts, as decided by the committee, which may include:- membership secretary, editor, IT manager, BATC shop manager, contest organiser, RSGB liaison, and such other posts as required.

To read

(iii) Up to seven further committee members. These may hold specific posts, as decided by the committee, which may include:- membership secretary, editor, IT manager, BATC shop manager, contest organiser, RSGB liaison, and such other posts as required.

Para 4d. Amend:

(d) The committee shall have the power to co-opt additional members of the BATC to serve as committee members or officers, but the total number of committee members and the president shall not exceed 11. All such co-opted committee members or officers shall retire at the next GM, but shall be eligible for election at that GM. Co-opted committee members have full voting rights.

To read

(d) The committee shall have the power to co-opt additional members of the BATC to serve as committee members or officers, but the total number of committee members and the president shall not exceed 13. All such co-opted committee members or officers shall retire at the next GM, but shall be eligible for election at that GM. Co-opted committee members have full voting rights.

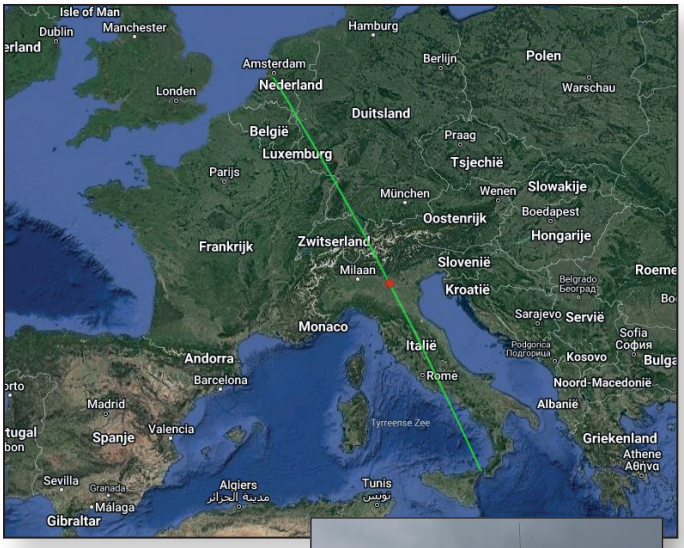
Activity and Contests

Clive Reynolds G3GJA

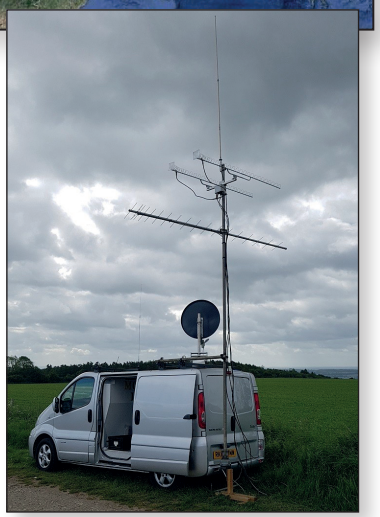
IARU International Contest

The IARU contest held over the weekend of the 11th and 12th June resulted in 31 logs being submitted by 22 callsigns. The weather was good for portable operations, although blustery on the hills. There was not much DX to be had due to the lack of Tropo; much calmer weather needed for that although several contacts were made over sixty miles on 70cm and 23cm.

6m was the exception though. PA3CRX reports that PE1ASH (JO22KF40OE) had an ATV contact with IO9DATV (JM78RE) over a distance of 1760 km. If confirmed, this contact will extend the distance record for 50MHz ATV by over ten times for a two-way.



▶ *Possible world record path for 6m ATV*



▶ *Rob M0DTS/P in Yorkshire*

Portable activity in the North was enhanced by Dave G4FRE who was staying north of Scarborough prior to a walking holiday. He chose two locations, Garrowby Hill and Rosedale Head, giving plenty of opportunities for Rob M0DTS/P to have contacts on the millimetre bands.

I managed to get on /P for a few hours on Sunday afternoon from the Yorkshire Wolds near Market Weighton. It was the first trip out with the drive on mast support, which turned out much easier to use than a pole cable-tied to the give-way road sign used during the Activity Weekend in April.

As usual, most of the activity was concentrated in the South, with six portable stations on over the course of the contest. Gareth, G4XAT/P reported working 23 stations using 'Mr Whippy', his camper, on Walbury Hill.

▶ *Mr Whippy (G4XAT/P) on Walbury Hill*

▶ *Jen G4HIZ/P (Sittingbourne) & Chris G4AYT (Whitstable)*

I had hoped to announce the UK results, but the deadline for copy for this issue was only two days after closing date for logs to be submitted. Add to that software issues caused by the summarizing tool crashing, makes it impossible to do.

The quality of the logging this year was abysmal, which has not helped trying to get a result for this issue. There have been numerous silly errors and failures to understand the rules properly.

- Do not submit more than one log for the whole contest for any one location.
- Do not change the contest numbers for the duration of the contest for any one location.
- You must enter P0 if a code was not received; don't leave the report column blank.
- Add the received code digits and send via talkback the total for confirmation that the code has been correctly received. Some of you must be skipping this basic check.
- If you are operating portable, you must add /P to your callsign in the log summary and make sure the receiving station appreciates that you are /P.
- The /P must be appended to any callsign in the log if the station worked is roving.
- The rules regarding contest numbers are very clear; do not use the pre-programmed numbers in the Porstdown.

Having had a moan, now onto some better news; The committee has approved the purchase of some attractive trophies that will be presented to the winners of the 70cm and 6cm Ladder Contests, Christmas Activity Contest, IARU Contest leading UK station and the BATC 2m and 4m contests held over IARU contest weekend.

These attractive trophies will be engraved with the BATC logo, contest details and the winner's name and callsign. The Christmas 2021 Ladder and the IARU/BATC June contest trophies will be awarded at CAT22 in August. Now you have a chance to get a prestigious shack ornament, so get operating!

Activity Weekends

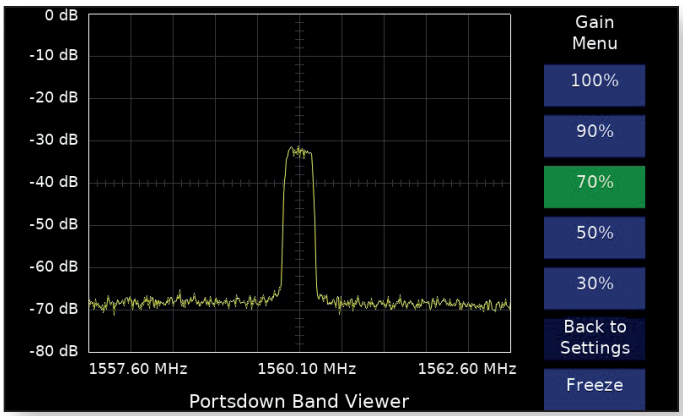
Both the April and May Activity Weekends were well supported. The 70cm focus for April reinforced 70cms' strengths via aircraft scatter, making several QSO possible that wouldn't have been possible otherwise. DVB-T was tried by G8GKQ/P and G8GTZ and it showed promise.

▶ *G3GJA/P as received by M0DTS/P on 23cm*

▶ *G8GTZ received this from G8GKQ/P*

I was out 23cm portable for the first time in several years from Nunburnholme Wold IO93PV with 4W and a 16 element on the end of a 3m pole. I also took 70cm, but the lack of a front-end filter for the Minitioune allowed it to get clobbered by a nearby cell tower, rendering the band unusable. Lesson learnt!

The May event was billed as gear check for the IARU, with G8GTZ, G8GKQ, G4FRE, G4XAT and M0DTS using bands from 70cm to 1.2cms. Highlights were Dave G8GKQ working G8GTZ two-way on 3cm over a 31km obstructed path and G4XAT working G8GKQ on 6cm over a distance of 52km.



▶ *G4XAT's clean signal on 6cm as seen by G8GKQ*

The remaining Activity and Contest dates can be found on the back cover of CQ-TV as usual.

Don't forget the 70cm and 6cm Activity Ladders. See if you bag yourself a flashy trophy for the shack!

BATC Accounts 2021

Brian Summers, Hon.Treasurer

British Amateur Television Club

Income & Expenditure account, year ending 31 December 2021

Income account	2019	2020	2021
Subscriptions	£14,650.78	£16,123.80	£15,929.68
Shop surplus (1)	£10,431.88	£2,982.11	£4,966.92
Interest received	£311.90	£201.70	£120.79
Donations received (2)	£455.03	£103.70	£127.00
Miscellaneous Items	£28.00	£0.00	£0.00
Convention & BGM	£0.00	£0.00	£0.00
Less PayPal fees (3)	-£2,649.11	-£1,695.35	-£1,933.24
	£23,228.48	£17,715.96	£19,211.15

Expend account	2019	2020	2021
CQ-TV Printing	£4,813.00	£6,217.00	£4,762.00
CQ-TV Postage	£3,600.78	£3,720.24	£4,121.48
Office expenses	£116.56	£55.79	£151.71
Committee meetings	£0.00	£14.39	£130.11
Members services	£3,243.46	£1,369.57	£2,065.24
RSGB affiliation fee	£47.00	£47.00	£52.00
Convention & BGM	£42.97	£310.75	£313.59
Awards & Prizes	£100.00	£225.00	£100.00
Web services (4)	£3,387.12	£3,184.03	£3,216.29
	£15,350.89	£15,143.77	£14,912.42

Balance sheet at 31 December 2021

Assets	2019	2020	2021
Stock, BATC shop	£6,730.40	£5,330.33	£4,188.70
HSBC account	£16,861.29	£16,039.88	£19,613.98
PayPal account	£5,869.05	£5,852.70	£11,419.52
Teachers Building Society	£43,109.93	£48,316.63	£48,437.42
Paid in advance	£562.50	£562.50	£562.50
Less Current liabilities			
Late Payments	£0.00	£0.00	-£2,178.40
Subscriptions RX in advance	-£14,094.83	-£14,491.51	-£16,134.46
	£59,038.34	£61,610.53	£65,909.26
Represented by Accumulated fund			
Balance brought forward	£51,160.75	£59,038.34	£61,610.53
Surplus or Deficit	£7,877.59	£2,572.19	£4,298.73
Balance carried forward	£59,038.34	£61,610.53	£65,909.26

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.

Equipment was purchased in 2020-2021 to the value of £45.84

The shop turnover for 2020 was £20,665 and for 2021 was £25,598

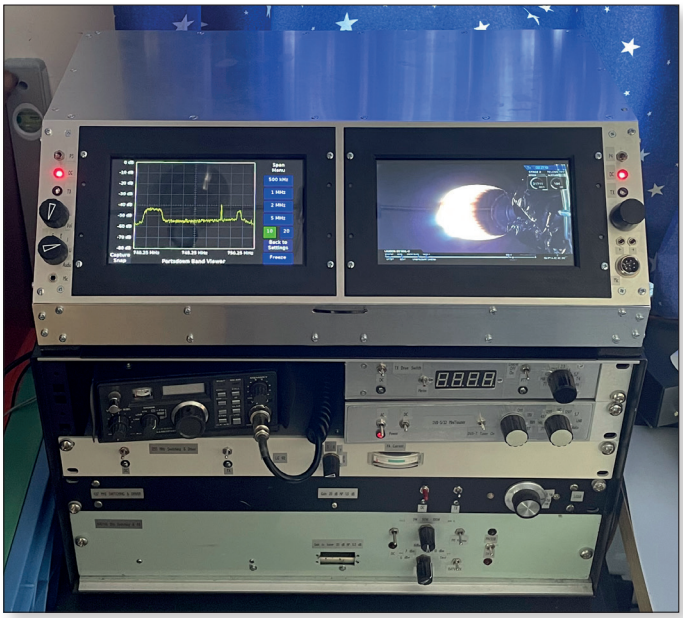
Brian Summers
Hon. Treasurer

The "Portsdown Double"

Dave G8GKQ

I have been using Portsdown transmitters and receivers for ATV portable operation and contests for a few years now, but had not found the optimum ergonomic solution. I also had issues with RF radiation from the Raspberry Pi and the seven-inch screen.

The solution I came up with was to build two Portsdowns into one RF-tight metal enclosure which would sit on the top of my two-metre/70 cm/23 cm/talkback rack.



I designed the case to be built in one-mm thick aluminium sheet, with a two-mm thick base. The basic shapes were cut by G8CPJ and G4NNS (thanks) and I made the cut-outs for the touchscreen bezels printed by G4XAT.

There are loudspeakers in the left and right side panels, and nearly all the connecting sockets are on the back panel. The exceptions are a 3.5mm jack for a "computer" microphone and a seven-pin socket for a fist microphone, both on the front panel.

Receiver configuration

In normal use, the left hand Portsdown (a Portsdown 2020 with a LimeSDR Mini) is used to display Bandviewer. The right hand Portsdown (a Portsdown 4 with no internal SDR) is used as the receiver with an external Minitiouner (or Knucker). This configuration is illustrated above, with the Minitiouner (and RF splitter for Bandviewer) in the lower half-width 1U 19 inch rack unit.

This unit also includes a "backward" eight-way switch to allow selection of one of eight band inputs; an LNB supply is provided on one the inputs to allow QO-100 receive (as illustrated here during testing).

There is an integral audio amplifier which was repurposed from a set of Logitech computer speakers. The input to the amplifier can be switched between the audio jacks or USB dongles from either Portsdown.

Transmit configuration

For transmit, I use the (left hand) Portsdown 2020 as the transmit exciter, and the (right hand) Portsdown 4 as a local receiver to check that I am transmitting something sensible.

The transmit RF goes to an eight-way switch in the upper half-width 1U 19 inch rack unit, and then to the amplifier for the selected band.

For video input, there is an "HDMI socket" on the back panel for an RPi camera extension lead, or a USB webcam can be used. A computer microphone, or a fist microphone (amplified by a Plessey SL6270 VOGAD circuit) can be used for audio.

Ancilliaries

Power can be supplied from a 12 volt input (powerpoles on the back panel) or from an internal 110/240v mains adaptor. There are individual power switches (and power LEDs) for each Portsdown.

On the right side, there is a rotary encoder and two buttons for use in a Langstone. Transmit LEDs for each Portsdown complete the front panel.

The rear panel has network connections, USB connections and BNC RF input/output sockets. Finally, there are two 25-way D type sockets to allow connection of Portsdown accessories for power and noise figure measurement.

In-practice

The unit met expectations in the contest, and did not seem to have detectable RF radiation from the Raspberry Pis or screens.

And yes, there is still room in the case for the inevitable add-ons.

The Portsdown Newsletter

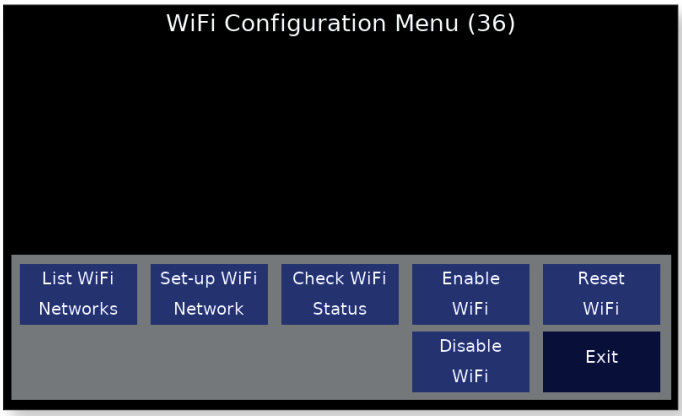
Dave Crump, G8GKQ

Although a lot of time has been spent putting together the "Portsdown Double" described elsewhere in this issue, I have added some new features to the Portsdown 4 software.

WiFi configuration

I have long intended to enable the Raspberry Pi WiFi to be set up from the touchscreen, but it needed a new "list" format menu, so that had to be built first.

You can access the WiFi configuration menu from menu 3.



Hopefully the buttons are self-explanatory.

The "Reset WiFi" button deletes any current WiFi network information and then enables WiFi ready for a new network to be set up.

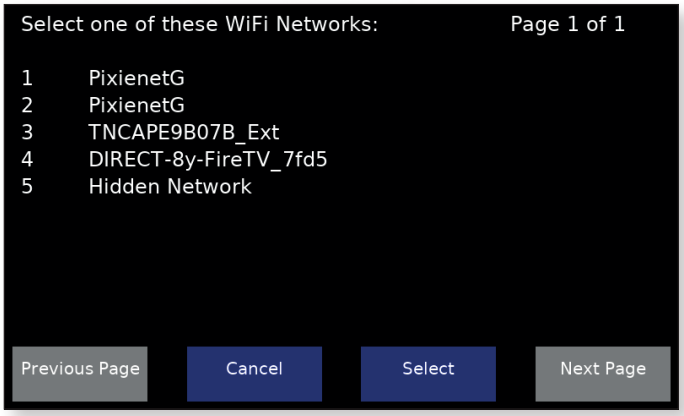
The "Enable WiFi" button enables the WiFi functionality. If no network is configured, it allows networks to be found and configured. If a network is already configured, a connection will be attempted.

The "Disable WiFi" button disables the WiFi interface but retains the network configuration information. If the WiFi is disabled, the "List WiFi Networks" and "Set-up WiFi Network" buttons are greyed out.

The "List WiFi Networks button displays a list of detected WiFi networks (after a pause). Up to 99 WiFi networks can be displayed with 10 shown on each page.

The Set-up WiFi Network starts by displaying the list of WiFi networks available. Touching a network name enables it to be highlighted. Press the select button and the Portsdown will request the network passphrase.

Enter the passphrase taking care to get the case and any punctuation exactly right. If you need special characters that are not available on the Portsdown keyboard, please post on the BATC forum with details.



After pressing enter, the Portsdown will attempt to connect to the network. If an existing network connection exists, it will be overwritten by the new connection.

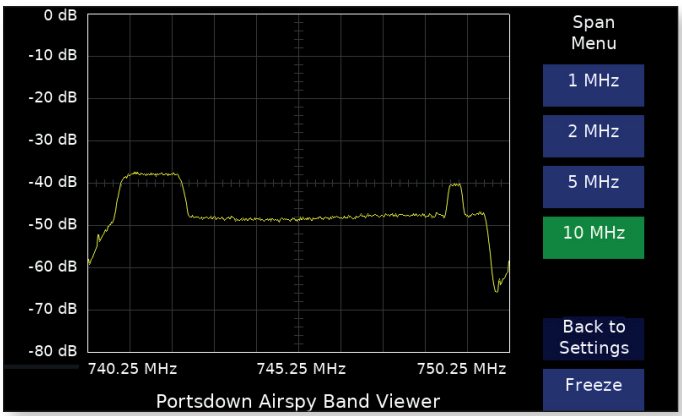
The Check WiFi Status button displays whether the WiFi is enabled and, if so, whether it is connected. The connection SSID and IP Address are displayed. Note that connections may not be established instantly after entering the network details.

WiFi configuration limitations

- Remember that WiFi may not be reliable if you are transmitting on 2.4 GHz (QO-100 or terrestrial) or 5.6 GHz
- WiFi RF pickup may cause interference on the mic audio input or the audio outputs of the Portsdown
- It is only possible to configure and save one WiFi connection
- This dialogue cannot enable connection to hidden networks
- Be careful if using the web control over flaky WiFi. Results could be unpredictable
- Although possible, it is not recommended to perform Portsdown software updates over WiFi
- This facility is not available on the Portsdown 2020

Bandviewer using an Airspy R2

I have written a version of Bandviewer that works with the Airspy R2. Quite simply, if you have an Airspy R2 connected to a Portsdown 4 by USB, it will use that for Bandviewer in preference to a LimeSDR. This facility only works with the Airspy R2; no other models of Airspy are supported.



There are some limitations with the Airspy Bandviewer. It sometimes crashes (back to Portsdown) when the span width is changed. When reselected, it comes up in the desired span width.

The 10 MHz and 2 MHz span widths show significant drop-off at the edges of the scan. However, it seems to have less spurious responses than the LimeSDR and is more sensitive.

Polycom EagleEye Mini camera

The Polycom EagleEye Mini USB camera is supported as a webcam in H264 modes. Simply select it as a C920. You must have a USB microphone dongle connected for it to work, as it has no internal microphone and the Portsdown is set to need an audio input in this mode.

Minor changes

I have updated both the Portsdown 2020 and the Portsdown 4 to use the latest version of Raspios Buster Legacy for new builds. I have also corrected the incorrect display of DVB-S2 FECs on the Portsdown 4 info screen.

Development continues.

Long distance DATV contacts made across the Mediterranean Sea

On 15 May 2002, two Italian teams made two-way digital ATV contacts over the distance of 903 km on 70 cm, 13 cm and 10GHz.

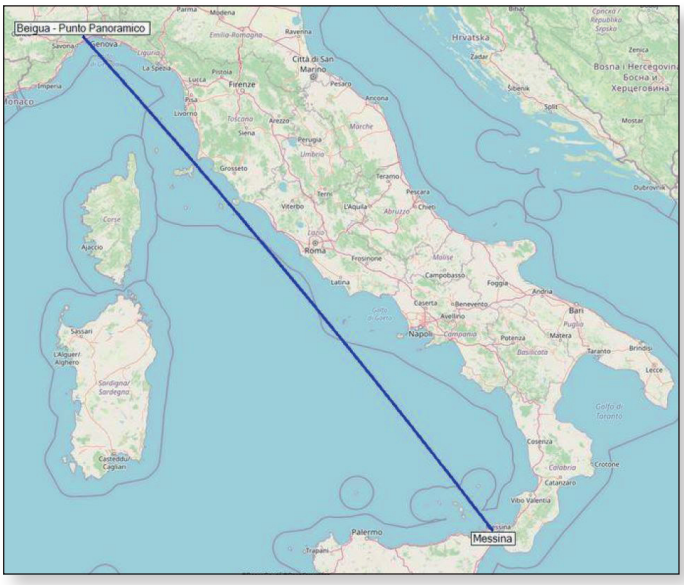
Filippo, IZ5TEP/1, and Francesco, IT9HZM/1, set up in Monte Beigua, Savona, Liguria, in northern Italy at JN44GK83, and Francesco, IT9GAJ/IT9, Davide, IW0GUR/IT9, and Johnny, IW0ARO/IT9 were in southern Italy at Monti Peloritani, Messina, Sicilia at JM78RE58.

Their signals were beamed across the Mediterranean Sea.

The contacts were made using DVB-S2 modulation and the equipment used for the three bands as follows:

- 433 MHz --- 11h00, two-way, DVB-S2, SR 333, D24
  - IZ5TEP/1 and IT9HZM/1: Pluto, 20W, 15 ele, Minitiouner
  - IT9GAJ/IT9, IW9GUR/IT9 and IW9ARO/IT9: Pluto, 10W, 15 ele, Minitiouner
- 2.4 GHz --- 13h00, two-way, DVB-S2, SR 333, D15
  - IZ5TEP/1 and IT9HZM/1: Pluto, 20W, grid 24dB, Minitiouner
  - IT9GAJ/IT9, IW9GUR/IT9 and IW9ARO/IT9: Pluto, 20W, 24dB grid, Minitiouner
- 10 GHz --- 12h00, two-way, DVB-S2, SR 333, D17
  - IZ5TEP/1 and IT9HZM/1: Pluto, transverter three Watts, 48cm dish, Minitiouner
  - IT9GAJ/IT9, IW9GUR/IT9 and IW9ARO/IT9: Pluto, transverter three Watts, offset 60cm dish, Minitiouner.

73 de Claudio,



What to go for - Yagi or dish?

Chris van den Berg PA3CRX

In the past CQ-TV magazines I mentioned horn antennas (CQ-TV271) and dishes with their feeds (CQ-TV273).

Dishes are not commonly used below the 23/24 cm band. For 9 cm bands and up, it is clear that yagi's are not commonly used. For the 23/24 cm and the 13 cm band is often the question: "What to build (or buy)?"

How about (loop)yagis for the higher frequencies?

They are offered by several brands; specifications looks sometimes good and who knows what the results will be when mounted between the other antennas in your mast.

Home made

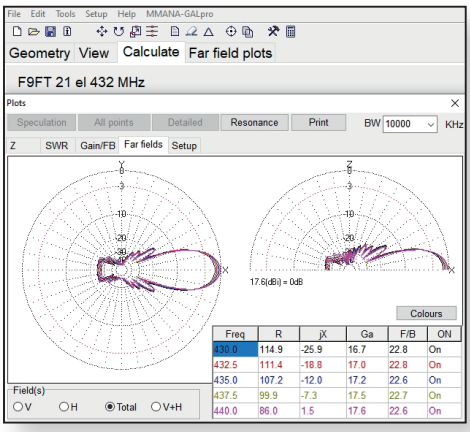
For me it is obvious to make the antenna myself, if possible. How about an antenna that is documented and/or designed by others? Many designs could be found; not all of them are reliable and/or contain more then the drawing with dimensions.

It looks logical to measure the dimensions of a commercial one with a good reputation and make a 100% copy of it. However, where to find one and could the exact same materials be found? Will the result have the same performance?

Modelling

With free antenna programs like MANNA-GAL and EZNEC, Yagi's may be evaluated, designed and optimised. Comparison could be done after some changes or to an other model.

After a learning curve some good performing antennas could be developed, theoretically.

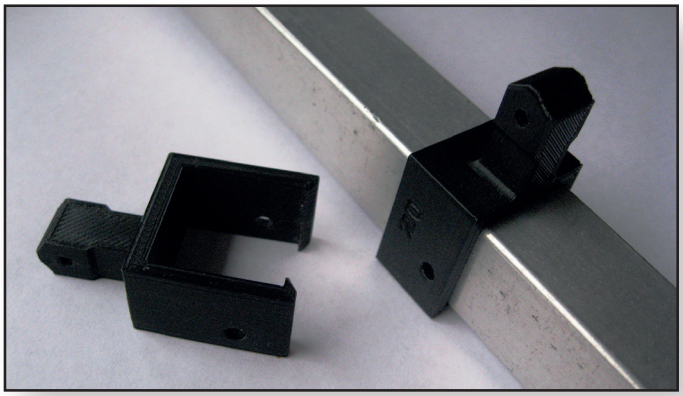


▶ *Example simulation for more frequencies by MMANA GAL*

The main challenge is to deal with the boom that supports the elements. If it is of non-conducting material, it does not influence the resonance of the individual elements. Seen are designs with small lengths of booms made out of Plexiglas, PVC or even wood. If a longer boom is needed, mechanical stability requests for materials like aluminium tubing.

Such metal boom influences the resonance frequency of the individual elements so the length of the elements needs to be corrected. How much is depending if the elements are mounted through the boom, on the boom or above the boom. It even depends if the boom is round or square.

If the distance of the elements is far from the conducting boom the boom may be neglected. Spacers to achieve that could (for example) be printed with a 3D printer.



▶ *On a trial with tinkercad I designed this element holder for aluminium welding rods as elements printed with a 3D printer.*

Searching for correction factors did not yield to an unambiguous result, information by DK7ZB could be useful (link below). It is unclear if these correction factors are still valid if the diameter of the boom is large related to the length of the elements as is the case with the higher frequencies.

And who knows what will detune the elements in case of rain, ice or snow. It is impossible to cover the whole yagi with some shield or enclosure like is often done with feeds for dishes.

Reproducibility

Gain optimised Yagis often have a narrow bandwidth. This makes the design very sensitive for small dimensional errors or deviating electrical characteristics of the used

materials. This could result in a good performing Yagi for 'an other' frequency then 'the wanted frequency'.

It is told that Helical antennas are less critical for small dimensional deviations. I don't know if this is true. Some find it difficult to make the impedance transformation (135 Ohm to 50 Ohm) and for the same length of boom you miss 3 dB because of the circular polarization. Of course this is only true if the polarization does not change in the path but that's an other issue.

In practice.

We build the developed (or copied) antenna and include some way to match the coax with the impedance of the driven element(s). Sometimes we even add a balun/choke.

Then we measure the SWR and do some trial and error manipulation of the driven element (sliding it over the boom and probably change its length). Finally we reach a good SWR and take it for granted that the antenna is performing like modelled. In the best case, we check the -3dB points, back-to-front ratio and on (large) side lobs.

If the predicted gain is really reached at the intended frequency is difficult to tell…

Maybe build two, point them to each other with some distance and sweep the frequency to find out if at least the maximum gain is on the wanted frequency? Or with a sweeping source with an antenna with a relative flat gain over the frequency span of interest, like Vivaldi or Horn? Again, good SWR does not predict the overall performance.

Gain measurement.

The only way to be sure that an antenna delivers the gain we expect is a proper measurement.

Comparing the antenna with an existing antenna with known gain is a good indication and most of the time accurate enough.

In the Netherlands, a yearly antenna measurement day was organised by the 'Meppel' department of the VERON. Builders came with their creations from all around the country. Some purchased, some very professionally build, one or two even already loosing parts during the trip.

Short description of how these measurements were done.

For the frequency of interest, an antenna with source (transmitter) was placed in the field.

To ensure a homogenous far field, a large distance was used. About 250 meters away, two in height adjustable masts were placed; one of them contains a rotator with a 1 degree step motor.

To calibrate, both masts were equipped with antennas with known gain. Coax cables connected these via a switch to a (calibrated) network analyzer. The signal values of both antennas are noted.

For measurement, the reference antenna in the adjustable mast is replaced for the antenna that is object of investigation. (Every time to be lowered and raised by hand force).

The antenna is rotated to the maximum signal level. The measured difference to the reference antenna is the gain.

Regularly is switched to the antenna on the other mast to keep an eye on the path to correct eventual changes.

The object of investigation is rotated to identify both -3dB points (possible squint), gain in backwards direction (fornt to back ratio) and eventual marked side lobs.

With the network analyser, also the SWR is measured.

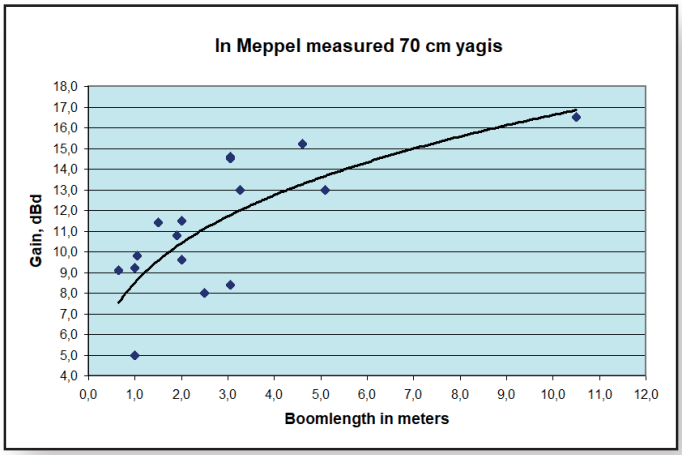
▶ *The portable set-up in the field, the dish is under measurement. The reference horn was the subject in CQ-TV271.*

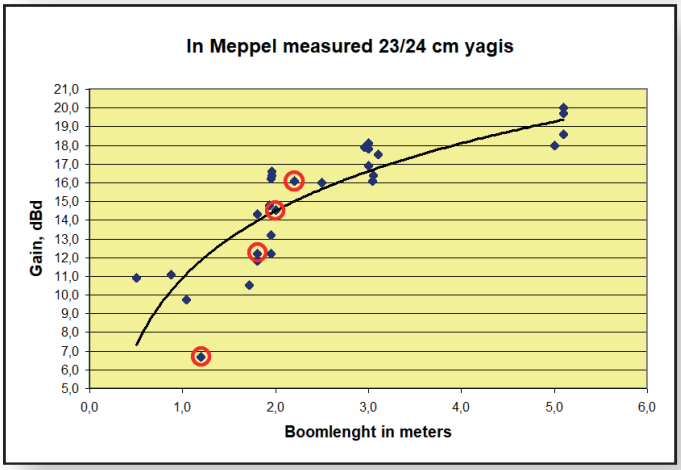
Results of the measurements were reported but not always with data like the boom length, how elements are mounted, what kind of driven element and eventual matching elements.

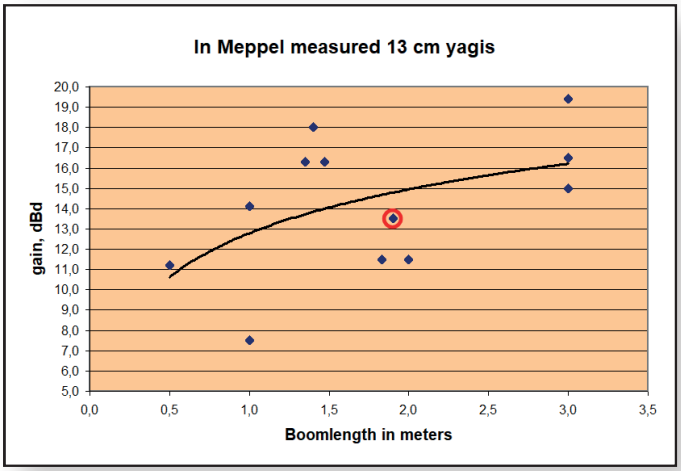
I evaluated these data over some years, to see what the spreading would be for the same boom length.

Some antennas are measured more then once, sometimes on an other frequency.

The results of the antennas for the classic ATV bands can be seen in the graphs, in which I have drawn a line showing the average of the measurements.







Obvious is the enormous spread in gain for the same boom length. The measuring points marked by circles are the results of home made loopyagis. They contain also a large spread, so that it cannot simply be concluded that loopyagis are better or worse than yagi antennas. The specified frequency is also important; a loopyagi that didn't function at all on 1296 MHz (not in the graph) performed a lot better on 1252 MHz.

Not to mention everything but some highlights; the best performing ones for 23 cm are commercials by SHF-design, length is 510cm!

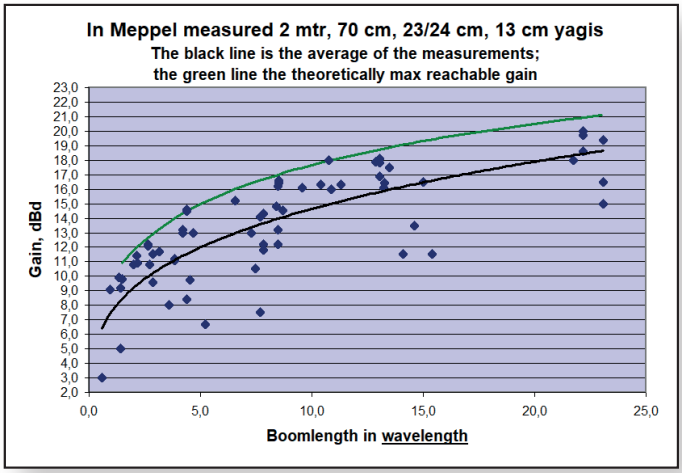
For 13 cm the SHF-design performed 3 dB less then an other yagi of the same length (300 cm) and about the same as others with half the boom length…

The one that performs rather well for its boom length is the Tonna yagi with the horn feed.

For 70 cm the worst is a 1 meter long yagi with only 5 dBd gain. The second worst is a design of DK7ZB; with a length of 2.5 meters only 8 dBd is measured. However, a shorter DK7ZB design of 1.5 meter resulted in 11.4 dBd.

Of course it could not be concluded if the designs performs bad or it is caused by deviations in materials, dimension, construction… And/or wrong boom correction?

To get an impression about the boom length in wavelength related to gain, I made an overall graph with all yagis, including those measured in the 2 meter band.



It shows that there is an enormous spread in gain.

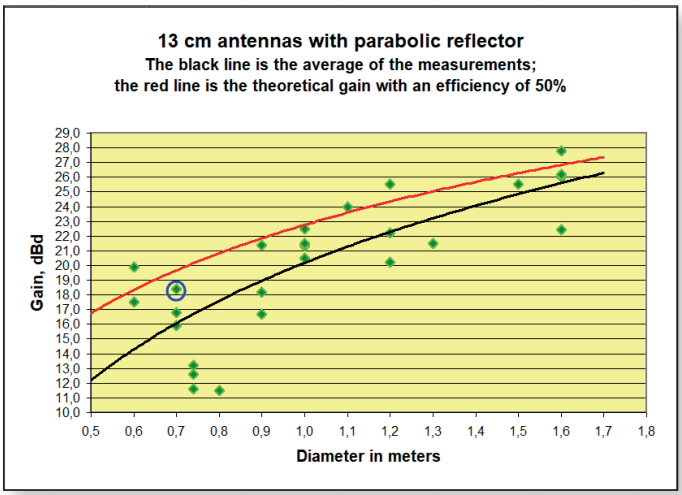
I found a formula to calculate the theoretical gain (G) in dBd related to the boom length in wavelength (B): G=10*log(5.4075*B+4.25.

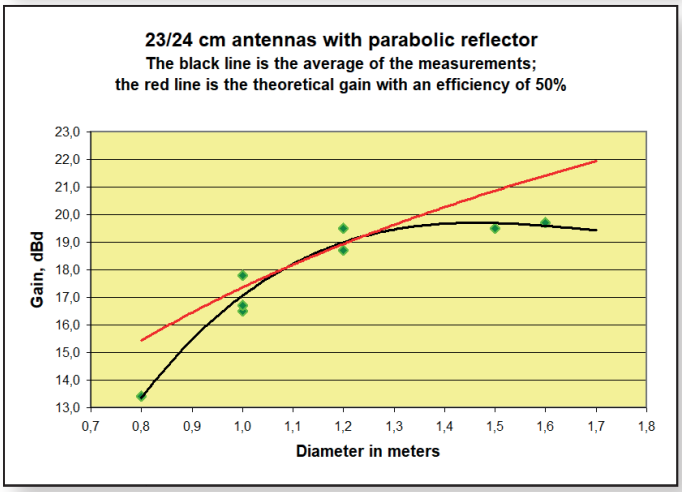
I am not sure of its origin and therefore the reliability but after adding it to the graph it shows a realistic max reachable gain since indeed the best performing antennas follow this line. However, it also shows many of these yagis do not even come close to that. In several cases, a lot of more gain could be reached by the same boom length.

How about measured dishes?

Seeing these results my interest was aroused to look at the data of the dishes that were measured by the Meppel group.

Some parabolic reflectors have been measured more then once, with different illuminators. For example, this is the case with the three green dots reflecting the 74 cm dish in the 13 cm band. No matter if the feed was a dipole, a can or a ring; with such bad performance something is really wrong.





Seen the results in the 13 cm band with respect to the dishes of 1.5 and 1.6 meters diameter; the dish itself is performing well. The lack of performance of these dishes in the 23 cm band has clearly to do with poor illumination.

In one measurement, a helical antenna was used as a feed; I circled that measurement in blue (in fact, 3 dB should be added because of the circular polarization, not bad at all).

Conclusions.

When performing (antenna) measurements: write down every detail. Often that does not look relevant at the moment of measuring but could be important (years) later. That would have helped in this case to identify relations in constructions/designs between the good and poor functioning antennas.

For yagis, it is a lot of work to build for uncertainties about the final result. Everything should be made perfect and it still looks elusively. If the result is poor, likely the whole antenna could be scrapped.

In general, the results of dishes are good, especially given the relative simplicity of building. A wide area of materials may be used and they can be obtained in the construction store. Shape accuracy of the dish could be checked easily with a wooden mould; then only attention has to been paid to the feed (and its position). If the result is poor, the feed is the cause; the parabolic reflector could still be used.

For 23/24 and 13 cm, a really large yagi is needed to get the same gain of a rather small dish. However; more vertical space in the mast is needed.

For 70 cm the dish would be too large to be efficient so we are still able to play with MMANA, a hacksaw and a drill to get the best performing antenna for this band.

Real world.

I once designed and build a 5 elements yagi for the talkback frequency in the 2 meters band. It had to replace the HB9CV that was mounted directly under my 1.3 mtr dish. I compared the HB9CV with the 5 elements by pointing a stick out of the window, holding it at the same height. Results were positive. Strange enough, it turned out to be worse then the HB9CV when exchanged. Because of the longer boom, the reflector and driven element were behind the nearby dish.

I redesigned it to a 4 elements foremast yagi (yes, complete redesign; do not make the mistake to just use a part of a yagi). The result now was in accordance with the simulation (and still better then the HB9CV).

So I learned also for yagi's vertical distance should be respected.

Be creative when there is not enough vertical space; place antennas pointing backwards is a possibility.

Links:

- MMANA-GAL (basic version is free): *http://gal-ana.de/basicmm/en/*
- NEC based antenna modeller and optimizer: *https://www.qsl.net/4nec2/*
- EZNEC Pro+ (since 2022 free): *https://www.eznec.com/*
- Boom correction factor: *https://www.qsl.net/dk7zb/2m-short/detail.htm*
- Free 3D print design on-line: *https://www.tinkercad.com/*

Microphone amplifiers and audio level setting for DATV

Dave G8GKQ

One of the often neglected parts of assembling a good ATV system is getting the transmit audio right. This can be particularly difficult when interfacing to computer USB dongles designed for an electret microphone.

The microphones are high impedance and connected to the tip of the 3.5mm jack. The ring on the 3.5mm jack is usually connected to +5v through a 10k resistor to provide the bias for the electret element.

For the Portsdown system (and a number of other projects) I have standardised on the cheap white USB audio dongle which is readily available from eBay for less than £5.

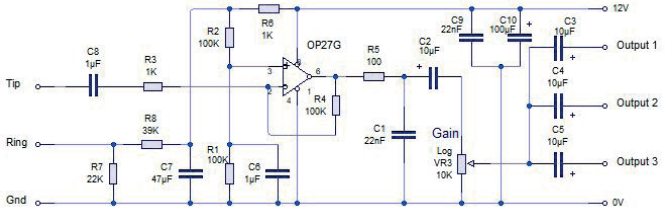
While not perfect quality, these dongles include a mono microphone amplifier and audio encoder, and a stereo headphone audio decoder and driver.

Initially for my own station I simply used a typical computer microphone which gave reasonable output, but was not perfect. I have now developed two solutions to optimise my audio when using these USB dongles for different applications.

I have also built a test oscillator which produces a similar output level to the electret microphone to enable easy alignment.

Application one: Regular DATV – Simplex or QO-100

In the shack, I use a Sennheiser PC3 headset with microphone for normal DATV contacts. The microphone quality is good (as demonstrated by G4KLB) and the headset is light and comfortable. I did find that the microphone level was a bit low, so developed the amplifier below to drive the USB dongle.



The output can drive up to three USB dongles (only the tip and the ground of the connector need to be connected). I have found that the input connectors on the USB dongles tend to be unreliable, so I have soldered wires from this amplifier directly to two dongles.

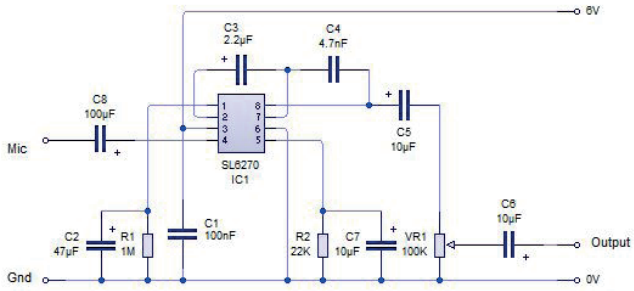
I assembled the amplifier in a box with reliable mic and headphone sockets on the front panel, together with a gain control and some switching to allow for power-free pass-through. The power input and auxiliary outputs were on the back panel with captive leads for the USB connections. I replaced the short white USB leads on the dongles with longer USB leads salvaged from other devices.

I did find a problem with earth loops between the USB connection on my laptop and the preamplifier. I solved this by putting a small 1:1 isolating audio transformer on the audio input to the USB dongle.

Application two: Portable DATV and use with the Langstone transceiver

For portable use, and particularly when using the Langstone microwave transceiver (which uses the same hardware as a Portsdown 4), a fist microphone is more appropriate, and a more compressed communications style audio is better at cutting through the noise. I recalled that Plessey used to produce a suitable IC (the SL6270) as part of their transceiver system and found that the IC (or at least clones of it) were still obtainable on eBay for about £5.

I have a number of microphones suitable for use with the FT290R and FT790R and these proved to be compatible with this IC. The circuit was straight from the application note:



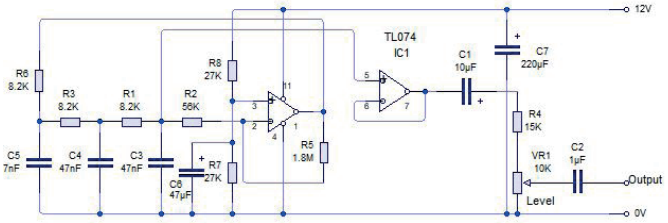
The output is fed to the tip of the 3.5mm jack connector on the USB dongle.

Particular care needs to be taken to avoid earth loops on the input side to the amplifier. Direct wiring to the microphone socket (with no other ground connections on the input lead) proved necessary to avoid picking up computer hash.

Test oscillator

This compact audio source is designed to produce a fixed output level (comparable with average speech level from a computer microphone) that allows all the gains to be set easily without continual cries of "testing testing".

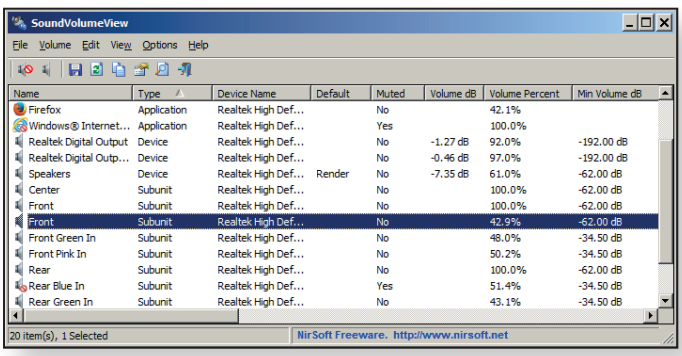
The circuit is a simple phase shift oscillator that runs at about 1 kHz, and produces about 100 mV p-p with the level set to maximum. Although not perfect, the output is a reasonable sine wave.



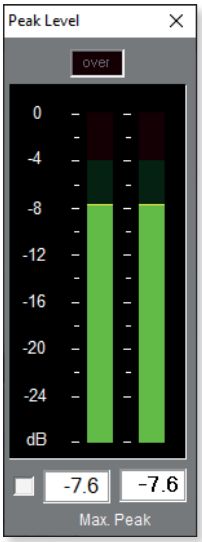
I put it in the same box as my microphone preamp, so that it could easily be switched in circuit in place of the microphone. Then by trial and error, I set the level to be similar to the microphone in normal use. This was at about half-travel on the linear level control, so about 50mV p-p.

Alignment

I found alignment of the levels on my Windows 10 computer (which I use for H265 video encoding) to be particularly difficult. I used two free Windows computer programs to understand what was going on with the levels. The first was "SoundVolumeView" from NirSoft. *https://www.nirsoft.net/utils/sound_volume_view.html* This shows the gain setting of all the audio devices on the computer. It can also be used from the command line to set audio gains.



The second was the "Darkwood Digital Level Meter", *https://www.darkwooddesigns.co.uk/pc2/meters.html#Digital* which shows the output level (after gain control) from a selected audio input device.



To give you an idea of the complexity of a typical situation, here is how my audio levels ended up:

- External mic amp gain control set to five (about half scale).
- USB audio capture dongle volume set to 21.59dB or 95.8% (as indicated on SoundVolumeView)
- Tone level indicated at -8dB on the Darkwood Digital Level Meter
- OBS Mic/Aux audio gain set to -10dB
- Tone Level showing as -17.5 dB on OBS.

So there are three level settings to balance when using OBS with Windows: the external mic preamp (if used), the USB audio dongle capture volume, and the OBS Audio Gain.

In the Portsdown 4, you can adjust the USB Audio Capture Volume from Menu three, "Set USB Mic Gain". Although this is currently an arbitrary scale (one to 30), I will be changing it to a % figure soon so that direct comparisons can be made with Windows settings.

In the Langstone, the SSB and FM Mic gains can be set separately from the "SET" menu.

Summary

These three simple circuits can save a lot of frustration with audio and let you worry about the important stuff – video!

BATC

Electromagnetic Field

Graham G3VZV

Electromagnetic Field, more easily referred to as "EMF Camp", is an event that is held every two years (2020 excepted). It is a camping festival but with a special power grid and high-speed internet access available to everyone. Temporary villages are set up for every type of geek, hacker, maker, crafter and technology enthusiast.

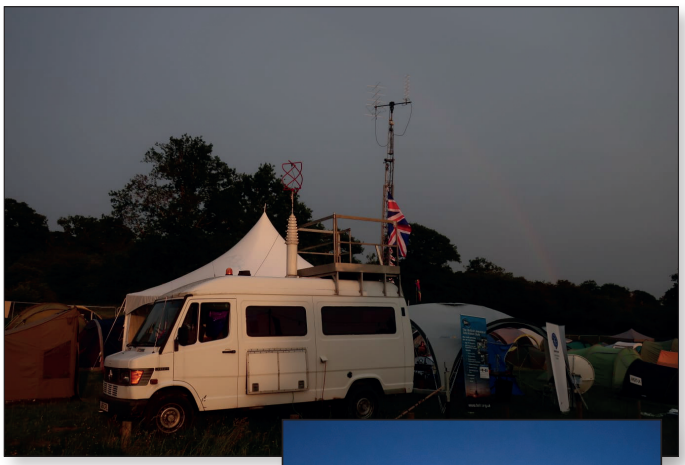
Access is available on the Thursday with talks and workshops starting at midday on the Friday and lasting until the Sunday evening. It is a not-for-profit operation supported by sponsors and volunteer efforts.

This year, as in 2018, the event was held in the deer park at Eastnor Castle near Ledbury in Herefordshire with more than 2,500 attendees.

Having had a presence in 2018, it was decided that this year, a joint enterprise, of both BATC and AMSAT-UK, would enable us to show everyone both amateur satellite operation and ATV. As the attendees ranged in age from eight to 80 years it was indeed a great opportunity to share our passion with hundreds of others.

There were several other amateur radio-themed villages around the camp together with other concentrating on HABs, remote controlled robots and similar themes. So, we were in good company.

BATC and AMSAT-UK sponsored the provision a six by six metre marquee with floor matting and lots of tables and chairs. We supported this with an "event cover" that we used for some cooking facilities. Additionally, John G7ACD brought his 40' Versatower on a trailer and Paul G8AQA and Heather M0HMO brought their ex-CAA vehicle with a very impressive 60' pneumatic mast.



We were able to demonstrate narrow band operations using LEO satellites with Dave G4DPZ operating and on QO100 in geostationary orbit using John's G7ACD gear.

In addition to the ad-hoc demos, there were several workshops and presentations held in the marquee. These were all "sell-outs" and were standing room only events.

The team also included Dave M0RPI and Jules G0NZO. Everyone worked together to help with the rigging and de-rigging and, in between, talked to the many visitors with enthusiasm and precision.

Hopefully, these images will provide a flavour of the event!

Additionally, with an impressive 55" display, QO100 amateur television was shown. Uplink was undertaken by the combined efforts of Phil M0DNY Paul M0EYT, Jason G7OCD, and Phil M6IPX. We had four cameras (one up the tower), feeding an ATEM mixer.

The newly-updated BATC computer was used to create the transport stream which was fed to a Pluto. The Pluto and a "Polish" HPA were located remote from the tent at the base of thethree-metre dish that was used for the uplink. The wideband downlink was achieved with a variety of dishes, decoders and displays.

▶ *Left, one of the 'Network Hubs' contained in a waterproof... cabin!*

Filtering Is important on receive as well

Ian Parker G8XZD

My local repeater GB3ZZ has just returned to service after losing its original site at Filton, north Bristol. Although it has only moved across the car park to a nearby building, the aerials are lower and it is closer to nearby houses, so possibly no longer clearing the ridge in my direction.

Previously I could receive it at D22, it returned briefly for tests and it was D2 and some 6dB less sensitive on receive. GB3ZZ uses two aerials on 23 cms with the receive Alford Slot at the top of mast, and it has always been spectacularly sensitive on receive.

Recently, although nothing had changed at either end, I couldn't see anything other than the odd lock confirming that it was GB3ZZ. Initial tests confirmed that my Ryde receiver was working fine and the aerial checked out OK. Still nothing though.

Other locals confirmed it was on air though one distant station near Taunton confirmed he had lost the signal but could still get in if he ran about 6dB more power - which tallied with my observations.

I would point out I've been lucky to have a signal strong enough to receive without any preamps or filters, connecting straight to the Serit tuner – though the BATC always recommend the use of a preamp ahead of the tuner.

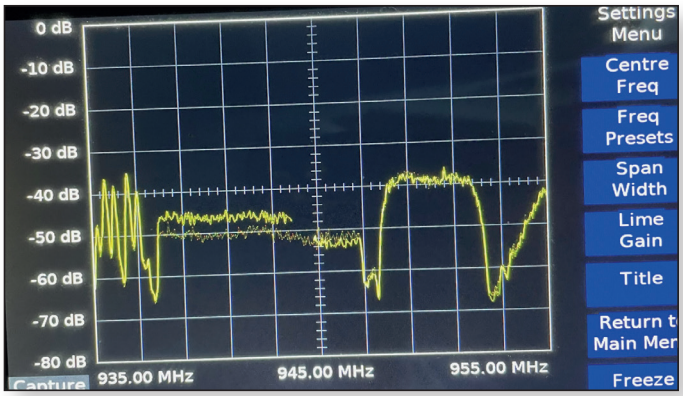
Inspired by what Justin, G8YTZ, had written in the previous CQ-TV I thought I'd look at improving the selectivity of my receiver. Justin had noted poor performance on the 70cm input of JV which has traced to his Ryde being swamped with enormous DVB-T/T2 signals from Crystal Palace transmitter which dwarfed the incoming signals on 437MHz.

The JV group looked at several solutions involving commercial filters but none could knock out the mighty Crystal Palace. Eventually he managed to solve the problem with a SAW band pass filter from eBay - yes it is lossy - but using the filter after the preamp it cleaned the incoming 70cm and all was well with non-local stations able to get back in again.

I wondered if there were any strong signals near to me but couldn't see anything significant on a spectrum analyser. Then the penny dropped. We've had a new 15m-tall mobile phone mast installed about 1/2 mile from home – on the same bearing as the repeater. It's a lot higher than the one it replaced and bristling with aerials.

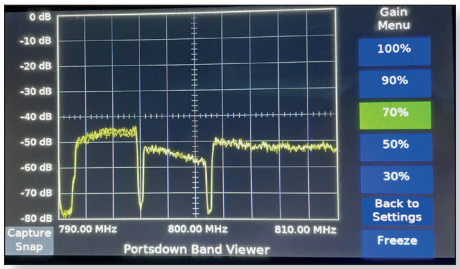
Was this it I wondered?

At this stage it's worth pointing out that there is no suggestion that anything is wrong with the phone mast and the companies are legitimately using frequencies and power levels they've paid millions for the privilege.



Using the excellent band viewer software on my Portsdown-Lime combo I could see massive signals centred on cellular frequencies between 700 and 1000MHz - within the passband of the Serit. Again these were some 20dB higher than GB3ZZ on 1316MHz.

I guessed there was probably activity between 1900 and 2300MHz as well.



The Serit has little filtering on the front end and I believe it was getting swamped by the strong cellular signals so I then tuned up an old five-pole interdigital filter for 1316MHz (ZZ output)and this restored my reception.

Lesson learned: good filtering is just as important on receive as on transmit. Not just on remote hilltops but also within the RF smog of a big city.

Experiments like this are all part of the hobby and help to justify the amateur licence and the valuable spectrum we are allowed to use for free.

An alternative DATV repeater controller – An update

Justin D. Cockett, G8YTZ

Introduction:

In CQ-TV 275 I described a new repeater controller for GB3JV, since writing the article the new controller has been in service for about three months. The completed bay, shown in Figure 1, even made the journey to Ireland where I gave a talk about Digital Amateur TV at the IRTS annual convention in April.

Figure 1: The GB3JV Transmitter Input Equipment (TiE) Bay

In this article, I'll cover how I've implemented some new features, I also mention some of the bugs that have been electrocuted during the beta test cycle and improvements made to the gb3gv.co.uk website. This article also covers what's next for the repeater and the website. I have also paid particular attention to keeping the content on the BATC streamer page and the website up to date as these are great communication channels.

The recent upgrades to GB3JV have proved to be very successful, as a result, we've seen several newcomers join the user group. In particular, the new 70cm input and the new Ryde based stream receiver have both increased local interest and activity. We're getting to the point where an activity night is becoming viable.

Bitfocus Companion v2.21 Update:

Since the first article went to press, there has been an important update to the core Bitfocus Companion software. The main changes to note are:

- The configuration tab that described the external connectivity as "Instances" has now been re-named as "Connections"
- An anticipated an important new feature called "Triggers" was in this release, shown in Figure 2. The most noteworthy use case for us, as DATV enthusiasts, enables media scheduling of the Blackmagic Hyperdeck (emulation on a Raspberry Pi) and repeater idents.
- I've also added a simple integration with SLACK. If you've not familiar with SLACK, I'll cover this later in the article but suffice to say it had become a bit of a phenonium within Californian tech companies. It was introduced in Apple with great success when I was working there in 2019. For GB3JV the SLACK integration offers registered users the ability to receive notifications on their mobile device each time a user accesses the repeater for more than a minute. This feature appears to drive more repeater activity.

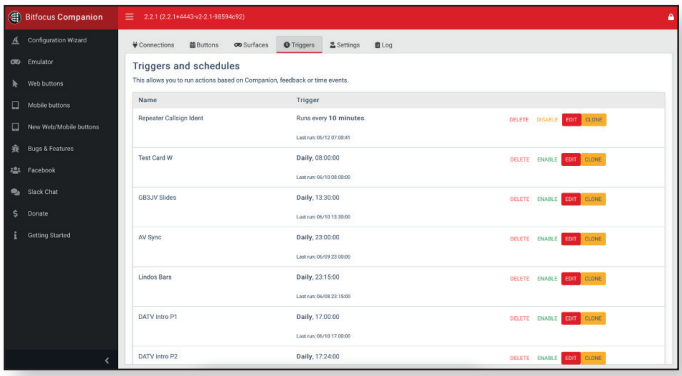


Figure 2: New "Triggers" Tab

Bitfocus Companion Triggers:

The new "Triggers" feature enables scheduling of events within Bitfocus Companion. On GB3JV this feature is used to schedule the Media Player. Setting up a schedule event is easy, below I describe two examples:

The first example is the Repeater ID schedule. This is a simple trigger that causes the Blackmagic ATEM Mini Pro to display a "lower third" ident graphic, transition to it (fade up) and then transition away after a few seconds. This event is scheduled to occur every 10 minutes. The great feature here is that the Repeater ID is non-invasive to the content, so there is no break in audio and video during the Ident. Here is the logic of how it is programmed:

- Firstly, I created a simple ATEM MACRO that selects the still media file that calls the lower third graphic and then calls the downstream keyer for 200 frames. In the MACRO, shown in Figure 3, the reference to the media file is the index="17" and the term "DownstreamKeyAuto" calls the fade up and down of the graphic as opposed to a hard switch.

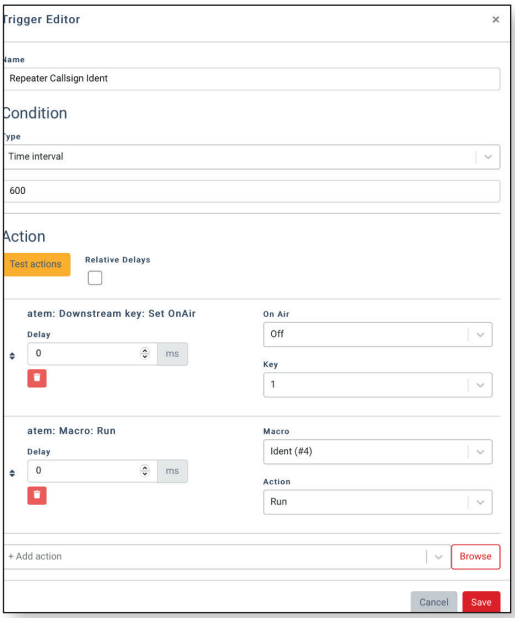
The line "id=MacroSleep frames="200">/" refers to the number of frames that the graphic caption is displayed for. This time is based on 50 frames per second, not the configured output frame rate of the ATEM's HDMI port, so 200 frames = 4 seconds.

```
<Macro index="3" name="Ident" description="Ident">
    <Op id="MediaPlayerSourceStillIndex" mediaPlayer="0" index="17"/>
    <Op id="DownstreamKeyAuto" keyIndex="0"/>
    <Op id="MacroSleep" frames="200"/>
    <Op id="DownstreamKeyAuto" keyIndex="0"/>
```

Figure 3: ATEM Ident MACRO

- Secondly, Bitfocus Companion calls the ATEM MACRO, the configuration is shown in Figure 4 where:
  - ***Name:*** The name you choose to give to the event.
  - *Condition:* In this case we select "Time Interval" as we want this event to run every 600 seconds. I chose 10 minutes as I found during testing that the ATEM will stop streaming if the still content is streamed for an extended period (for example a Test Card). The problem seems to arise after about 14-15 minutes. The repeater ident function also performs a neat work-round to this issue, hence why the period 10 minutes was chosen.
  - The first action is to reset the status of the downstream keyer to "off", this acts to clean-up any "hung" captions, although a very rare event, but good practice. It was found that hung captions can occur where a weak input signal is constantly triggering an input switch, and this coincides with the repeater ident caption MACRO being called.
  - The second action is to call the ATEM MACRO that calls the ident routine.

Figure 4: Bitfocus Companion ident caption schedule configuration



- Note that in all cases for scheduled triggers, I have set the sequence delay to equal zero, although counter-intuitive there is a very good reason for this that will become apparent when I later describe how the SLACK notification integration works.

The "Test Actions" button is a very useful feature that allows you to live test each trigger action. Don't forget to hit the "Save" button when you've finished!

Another example of a use of a trigger is for scheduling a play-out from the media server. The first thing in configuring this is to add your media player as a "Connection" in the Connections Tab, this configuration is shown in Figure 5.

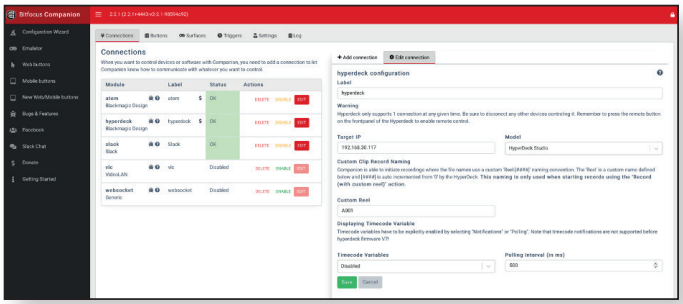
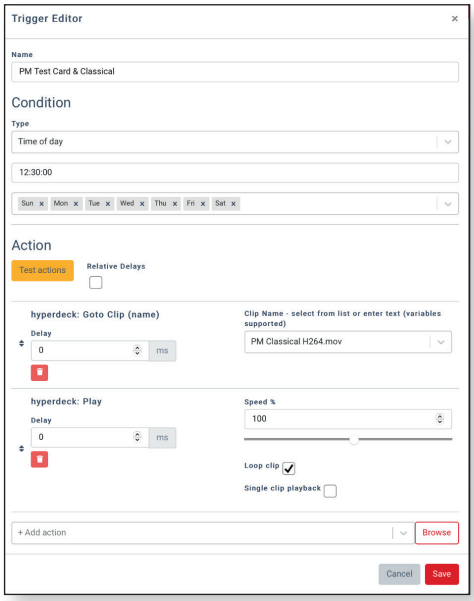


Figure 5: Adding the Hyperdeck Connection

A scheduling example using the Hyperdeck connection is shown in Figure 6. The example highlighted is one that's scheduled for each day of the week, in this case the "Test Card and Music" from the "PiDeck" media player. Overnight, the scheduler plays a media file that includes audio test tones that include a frequency response sweep to help with alignment of your audio system levels. If you have access to a Lindos test set, you can even produce automated reports yourself. We're waiting for the first ham to decode the Lindos FSK.

It's important to check the "Loop Clip" box if your media file needs to be repeated when it gets to the end, another tip is to always create your media files with a 5-second fade from/to black at the beginning and end of your file. I use Black Magic Design's Davinci Resolve editing software to create my files, paying particular attention to the project resolution and frame rate to match the settings on your repeater. Transcoding introduces artifacts and flicker as well as sound issues. Davinci Resolve also includes a capability to generate 8- and 10-bit test patterns and audio test tones. Except for the rtmp stream, the ATEM range of switchers support 10-bit video. There is a free version of Davinci Resolve available from Black Magic Design's website.



▶ *Figure 6: Scheduling a movie clip to run at a specific time*

Slack Integration:

Slack is a messaging program designed specifically for the workplace. Developed by American software company Slack Technologies, which has been acquired by salesforce.com. Slack offers many Internet Relay Chat (IRC) style features, including persistent chat rooms (channels) organised by topic, private groups, and direct messaging.

There are apps for SLACK supporting Windows, MacOS, Linux, and mobile versions for iOS and Android. Users can configure notifications on their phones, desktop etc. Apple Watch users can also be alerted on their watch. I have created a private workspace "GB3JV" and a channel within this workspace "gb3jv-input-status". This channel alerts each time a repeater input is active as well as which input receiver is active. This is how its configured:

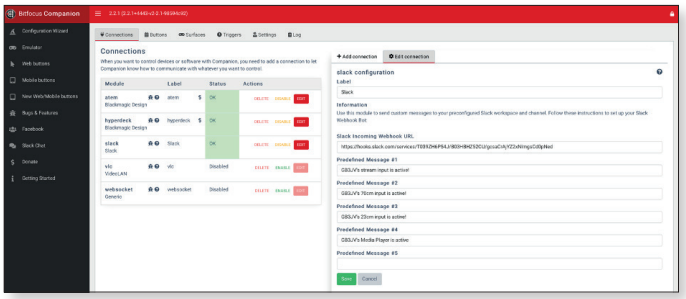
▶ *Figure 7: Slack notifications on an iPhone*

Firstly, you need to create a SLACK account and then create your workspace and channel. SLACK has a comprehensive help section on their website that will help you with the workspace and channel creation. The next stage is to create a "SLACK App". I created an App called "Repeater Notifications". The instructions on how to create a SLACK app with an incoming webhook can be found here: https://api.slack.com/messaging/webhooks After you have done this go to "Incoming Webhooks" under the "Features" menu on the left hand sidebar and activate "incoming webhooks" using the slider switch. You then copy your incoming webhook URL which you'll need for a configuration item in Bitfocus Companion.

Next, you need to configure Bitfocus Companion to send a message each time a repeater input is activated. Firstly, install the "SLACK" module under the Bitfocus Companion "Connections" tab in the edit column and populate the following:

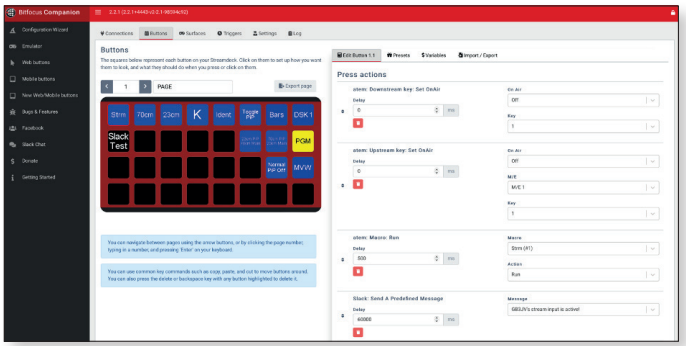
- Your SLACK incoming webhook
- Your pre-defined messages

As an example, GB3JV's configuration is shown in Figure 8.



▶ *Figure 8: Configuration of Slack messages*

Finally, you must configure the slack notifications under the "actions" for each button. In this case we want to send a message to our SLACK channel whenever an input on the repeater is active and send a message that identifies the input that is active. We do this by adding some actions to our existing button configurations. For more information about configuring buttons and why we do this, please refer to my article in CQ-TV No. 275. As a re-cap I'll walk through the sequences programmed under a typical input selection button shown in Figure 9.



▶ *Figure 9: Configuration of the Stream input actions*

- The first two actions reset the status of the ATEM. As a best practice we make sure that both the downstream and upstream keyer are reset to "off" in case things have got out of synchronisation. The downstream keyer is used for overlay graphics and the upstream keyer is used for the experimental Picture-in-Picture function that's mentioned later. I'll cover PiP in more detail in a future article.

- Next, the script runs the ATEM MACRO that causes the HDMI input transition to the active input. Here we allow a 500ms delay before we carry out the input transition; this helps filter out "false locks" from the receiver. In practice 500ms seems to be a good compromise that eliminates 99.9% of false locks. False locks are a particular problem for this controller design; if a user is active on (say) 23cm and a false lock occurs on 70cm a transition back to the media player occurs. The user must then drop carrier and resume to regain access. In the future I plan to introduce an "exclusivity" timer, once a user has accessed the repeater, they get exclusivity for a period. I've yet to think through the logic as it begins to get complex, especially when combined with the experimental Picture-in-Picture function. On GB3JV I've found that "false locks" seem to be domain of the 70cm receiver which seems sensitive to certain types of ISM traffic on 433.9MHz. Temporary traffic lights during Thames Water works outside the repeater site seem to have been the main culprit that prompted me to find a solution. Nothing like real-world testing!
- Next, you'll see the entry: "Slack: Send A Predefined Message". This message has a 60s delay, so users won't get notified unless an input has been active for at least 60s. Of course, you can change this value, but I've found that 60s seems to be a good compromise between excessive notifications and not missing content. The message is sent as an encrypted JSON payload to the SLACK webhook listener.
- There is one last configuration item to consider; although we've delayed the sending of the predefined message to SLACK by 60s, we also need to cancel the sending of the message should the input become inactive before the 60s SLACK timer has expired. We also cancel the 500ms "false lock" transition timer. We do this by adding a small action under the "k" button, which is triggered by the "Not Locked" indication from the Ryde. The action is an internal Bitfocus Companion action "Internal: Abort all delayed actions" The configuration item is shown in Figure 10 and this is also the reason why, we do not introduce delays in trigger actions to avoid potential conflicts.

The GB3JV Website

Since the introduction of the excellent new "Ryde" based stream receiver I've needed a way of managing the distribution of the input stream key. The GB3JV website is based on a third-party WordPress hosting package, I've invited users to register on the website using the free tier of a WordPress plug-in called "Ultimate Member". Prospective users register on the website, membership approval is actioned manually with the acceptance criteria being membership of the BATC or a local radio club, and a Full or Intermediate level Amateur Radio License. On approval members get access to a membership page that displays the stream key and some brief instructions on how to set up OBS and Larix Broadcaster for streaming. Stream key updates can easily be pushed to the website and change notifications sent to the SLACK channel.

Although it's not yet automated, registration on the website also kicks off the process for the new user to receive an invitation to join the SLACK notifications channel.

Conclusions:

I'm in no doubt that the combination of the various upgrades to GB3JV has contributed to the increase in local Amateur Television activity, with several new users having accessed the repeater for the first time in recent weeks. The user community has also been most helpful with feedback and suggestions for enhancements and bug swatting. Moving forward we hope to launch a GB3JV activity night and to launch a repeater control portal which will offer users several functions like managing the Picture-in-Picture function to introduce cross-input full-duplex conversations between stations.
Standby for [more] action!

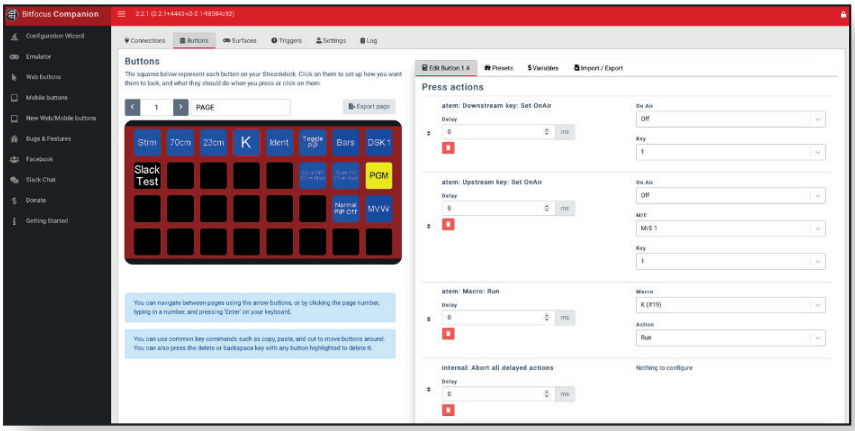
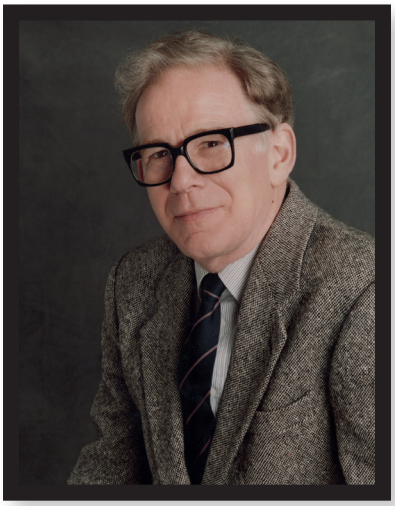


Figure 10: "k" button configuration showing the CI "Abort all delayed actions"

Former BATC president and colour TV pioneer 'will be sorely-missed'

Michael (Mike) Cox, a giant in the evolution of the UK colour television industry and amateur television enthusiast, died on 1 April, 2022 following a long illness.



After leaving at Dulwich College, Mike went to University College London to study for a BSc in electrical engineering. While at UCL, he joined the British Amateur Television Club and it was here, in 1955, he designed and built a television flying spot film scanner.

Following National Service, Mike joined Marconi in Chelmsford on their graduate apprenticeship scheme before taking up a position at Frazer Nash Electronics in Walton-Upon-Thames for a year. Then in 1959, he joined Associated Rediffusion at Wembley as a studio maintenance engineer where he built an iconoscope camera in his spare time.

In 1961 Mike joined ABC Television at their Teddington Studios, initially as planning engineer, then as Independent Television's (ITV) only colour TV development engineer for some years. It was here he was involved in the investigations and demonstrations of NTSC, PAL, SECAM and NIR colour systems on 405, 525 and 625 lines.

Mike and his small team gave demonstrations of various aspects of SECAM in the studio at ABC Television to both EBU and CCIR groups. The first ever SECAM vision mixer was demonstrated during this time, as were recording of programmes on the monochrome (RCA TR22) VTRs which were installed at Teddington. They also designed and built a lot of other ancillary colour studio equipment because, at the time, it was simply just not available commercially.

▶ *An early 405 line colour TV experiment*

Mike's team gave colour television demonstrations to the British General Post Office (GPO) to support a series of lectures which they were giving to interest groups around the UK.

For these demonstrations, a SECAM video source, because the alternative NTSC video source from the BBC would not have travelled far on the GPO's video circuits of the time, due to their bandwidth limitations.

The picture sources used in the demonstration were from a Rank Cintel polygon 35mm flying spot telecine machine and a crude colour caption facility consisting of Mike's home built vidicon camera and a colour synthesiser, the prototype of what was later to become known in the industry as the 'COXBOX'.

In 1968 Mike left ABC Television to set up his own television equipment design and manufacturing company, Michael Cox Electronics Ltd.

The successful uptake in the market of their first product, the COXBOX, underpinned the company's further development, and it grew significantly, building up a wide range of coding, switching and mixing products and, by 1985, the company employed 125 staff.

The "COXBOX" name was given to the product by a German customer (ZDF), who bought one of the first units. In all, some 400 of these were made between 1967 and 1982.

Michael Cox Electronics was bought by Carlton Communications in 1985 with Mike leaving the company shortly afterwards.

In the following year, he helped financially with a management buy-out of the company from GEC-McMichael. He became a non-executive director of this new firm called Vistek Electronics, to manufacture monitors, coders and standards converters.

At the same time he set up Cox Associates Ltd and this company produced test signal generators, title assemblers and various other television "black boxes".

Mike held a number of senior management roles within the industry before his retirement and notably was president of the BATC from 2000 to 2006.

In retirement, he built his own 3D colour television system in his sitting room and, when completed, took it on tour to many amateur radio clubs and universities in the south east of the UK.

Mike had a wonderful sense of humour, was superb at electronic circuit design, and will be sorely missed by all who knew him in the ATV community.

BATC representation at HamRadio 2022

Dave Crump G8GKQ

For the first time in many years, the BATC had its own stand at the HamRadio exhibition in Friedrichshafen. Previously, it shared AGAF or AMSAT-DL's stands but neither had their own exhibits this year.

Our reasons for attending included the promotion of amateur TV, encouraging membership of the BATC and providing support and advice to existing BATC members. Due to potential customs issues, we did not take the BATC shop, but the increased revenue from doing so in past years had not been significant.

The stand was manned by Noel G8GTZ, Richard GI4DOH and myself. Thanks to Richard's assistance, both Noel and I were able to visit other stands for liaison with AMSAT-DL and other key players. And, of course, we found time to visit the flea-market.

Highlights for me were the visits to the stand by many of the more active ATV operators from Europe, including Francesco IK3HHG who has won the IARU ATV contest more than once and Christian F5UII who has documented much of the information about using the Pluto for DATV.

It was also great to get feedback on the Portsdown, Ryde and our new repeater controller with demonstrations of them on the stand, and presentations about them (from Noel and I) in the Friday afternoon DATV forum.

Other presentations included Michel HB9DUG's DATV Linear Transponder and F1EJP's DATV Easy software. Thanks to Pierre-Andre HB9AZN for organising the DATV forum.

There were fewer exhibitors (and flea-market stands) than we remembered from previous years, but the discussions about ATV were more prolonged and we seemed to get a greater number of visits from our members than I had seen before.

A very worthwhile trip.

Contest adventures and misadventures

David Holman M0YDH

I took part in the annual ATV contest from Clee Hill using my homemade equipment. I made two-way digital ATV contacts on 23cm x2, 70 cm x 2.5 and two-metres x1.

Most were 70km away. We send a contest card shown in the pictures. The other station acknowledges receipt of the image by reporting the sum of the four numerals. This avoids giving the code away on talkback to other stations who may be listening.

Andy G7CFC joined me and sent pictures on 23cm and two-metres as G8TA/P using DVB-S2 to G3VKV Graham in Cheltenham 40 miles away. These were received P5 .

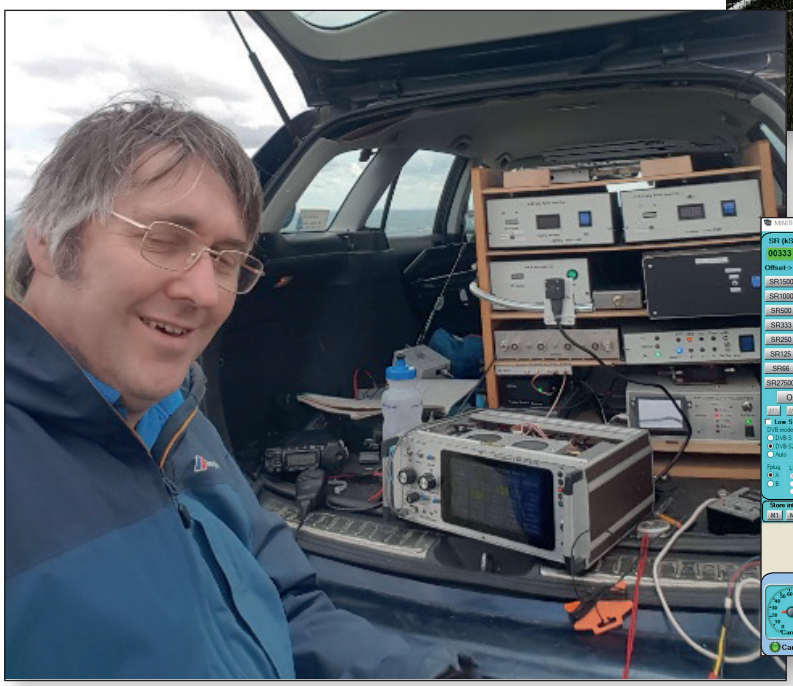
That's a '59' in image world.

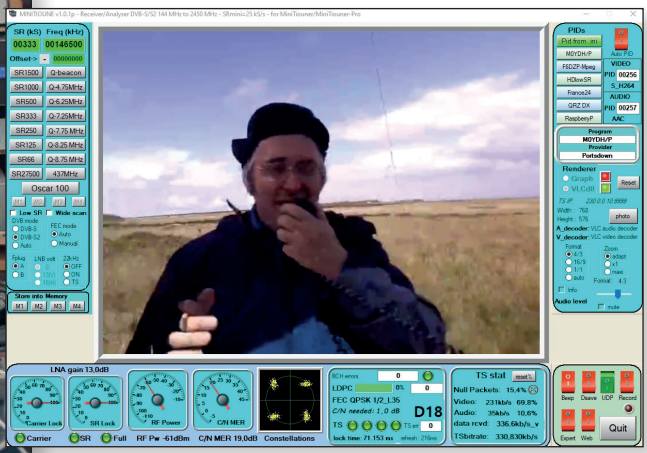
Reception was blighted by my mistakes namely connecting the receiver patch lead to the wrong port and not recharging the batteries overnight. That 12.9V at the end of a day's operating when no current is being drawn is misleading.

Andy seemed to enjoy the activity even so and the view made a big impression on him. We packed up earlier than planned. I drove round to nearby Titterstone Clee hill where we climbed slowly the top.

For his second first of the day he made four summits on the air contacts from the trig point. The views were even better. Well done Andy.

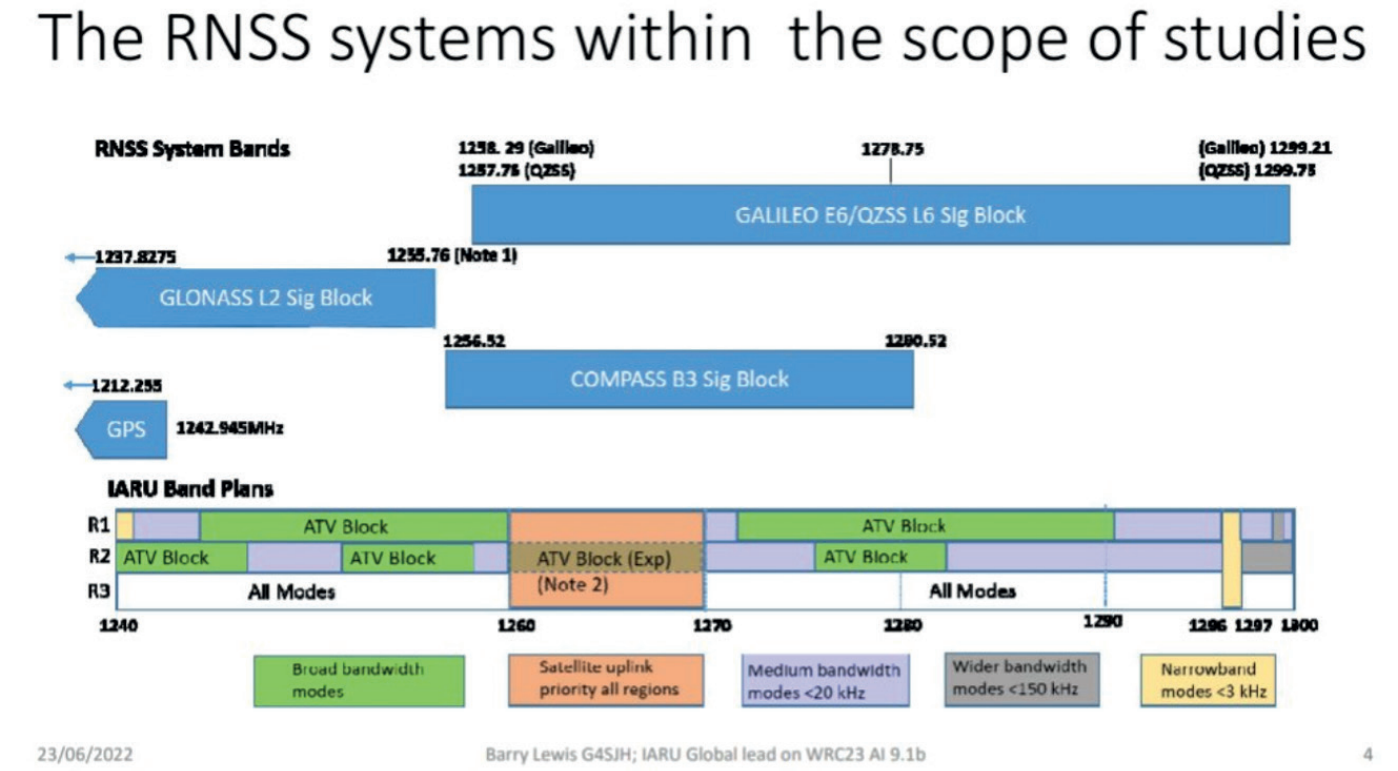
There is a video of Graham's sound and camera received by me on my Twitter feed @M0YDH





The future of 23cms – update June 2022

Noel G8GTZ



Over the past couple of years the IARU has been involved in preparing the case to defend the use of the 23cms amateur band where we are secondary users and the primary user is GNSS (Global Navigation Satellite Systems) who are becoming increasingly concerned about potential interference from amateur services.

Barry G4SJH and other members of the IARU team have as volunteers have put in a lot of hours to try and win compromises on behalf of the amateur community worldwide on this issue which will be a major topic at the World Radio Conference in 2023.

Please do take a look at it and start to understand the possible implications for 23cms so it does not come as a surprise in 2024 when there are changes made to your licence by Ofcom.

I think it is safe to say now is probably not the time to invest much money in anymore 23cms wideband FM equipment.

There is a thread on the BATC forum where we will try to publish latest updates:

https://forum.batc.org.uk/viewtopic.php?f=91&t=7939

The latest update from the IARU is available here:
https://www.iaru.org/wp-content/uploads/2022/06/23cm-Band-and-RNSS-June2022.pdf

▶ *Images from Noel's (G8GTZ) preparation for the contest!*

Ryde Newsletter

Dave Crump G8GKQ

A major new release earlier this month saw the inclusion of a remote-controlled internet video stream receiver in the Ryde receiver. This has been the culmination of months of work from Tim MW0RUD, much of it focussed on reliability, so that the capability can be used in unattended repeaters and is unlikely to crash or lockup. This "watchdog" should also initiate recovery from some LongMynd crashes as well.

To get the new capability, simply log in to your Ryde and type "menu" and then press enter. Once in the menu, down arrow to the "Update" option and press enter. The instructions will lead you through the rest of the process.

Presets

The update adds 4 new presets: GB3HV, GB3JV, GB3KM and GB3SQ. The preset list is a bit long to fit on the screen so the easiest way to find these is to press "Channel Up" on your remote control.

If you want to change the presets, I would encourage you to edit the configuration file. Small changes are very easy and low risk. There are 2 ways to edit: either from the Linux command line or by using an external (Windows or Linux) text editor, such as WinSCP.

To edit from the command line, type:

```
nano /home/pi/ryde/config.yaml
```

You can then use the down arrow to get to the presets, and move the cursor using the arrow keys to edit the entries. Keep the formatting the same and do not use tabs, only spaces.

Any preset entries that you do not plan to use can be deleted.

To save your changes, press ctrl-x, y and enter. To discard your changes press ctrl-x and then n. After that, you can type "menu" and press enter and check that the receiver works.

If it does not work, you can either go back and edit the file again, or type

```
cp /home/pi/ryde-build/config.yaml /home/pi/ryde/config.yaml
```

which will restore the factory settings. Note that you will have to reset your remote control type and the LNB offset (from the Menu) if you do this.

To use an external editor, such as WinSCP, edit the file

```
/home/pi/ryde/config.yaml
```

Again, take care to retain the formatting and do not use tabs, only spaces.

You can also edit the "default:" line to set which preset your Ryde starts up on.

Further Enhancements

You can check the list at https://github.com/eclispe/rydeplayer/issues to see what enhancements are in the pipeline, and also to add any new ones that you would like to see.

Thanks again to Tim MW0RUD for all his work on the Ryde project.

The inside scoop as 'Mr Whippy' takes to the air for the IARU ATV Contest

Gareth, G4XAT

After 'just another manic sundae' last year (when I only went portable on the second day of the contest) this year I planned to go 'mob-handed' – at least as far as bands were concerned. Last year I had a lashed together setup for 5.7GHz, which much to my amazement actually worked very well.

This year I added 10GHz and 24GHz thanks to some surplus gear from Poland and excellent control and power solutions from our amateur friends on the continent. A few years ago you would need to have been a pioneer to get going on these bands (well, beyond WBFM Gunn diode stuff). Thanks to the flexibility of the Portsdown4/ Langstone/Pluto combination, (which makes choice of IF for Rx and Tx trivial) I was able to assemble a solution that gave one Watt on 10GHz and an amazing two on 24GHz. LO for 24GHz is derived from a very stable TXCO driving a modified ADF4351 to output 1808MHz, this being multiplied by 12 in the module. Stability is adequate for SSB no less.

A painful visit to the petrol station ensued, where 'Mr Whippy' (so named due to its similarity to 1980s ice cream vans) consumed £93. A slow (M25 congestion mainly) journey followed, arriving on site at around 5pm.

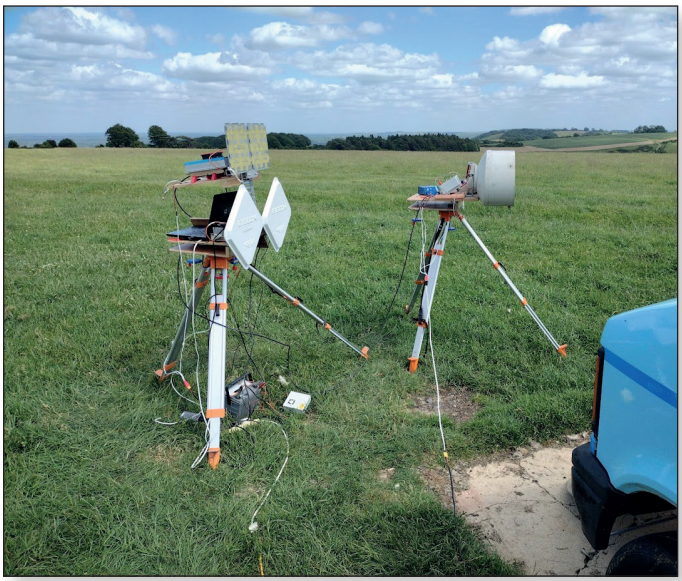
I proceeded to set up for two-metre talkback (50W into my full-wave dipole @ 8m AGL), 70cms (14 element 12dBd, 24cms (not used in the end) and 13cms (46 element loop yagi) all on the camper-supported mast.

My small generator (a £40 purchase from Woolworths just before they closed down) was deployed to power my 70cms amp, tested by accessing GB3JV back near home. It needed a significant DC input to achieve this (400W+) but it proved the amplifier worked although it did sometimes give the generator a 'coughing fit' when the load went on. A combination of the SMPSU being rather sensitive to low mains input voltage and a governor that needs better damping (work in progress) seemed to be the issue.

Anyway, back to the contest itself.

I had negotiated access to Walbury Hill so I checked over my camper/radio truck and MOTed it ready for the trip. I loaded for all bands 2m up to 24GHz, with three PD4s, two Tilt-O-Matics (see separate article) several boxes of everything else I could possibly need, basic food for the weekend and off I set early Friday afternoon.

Dinner comprised pre-prepared tuna and sweetcorn pittas and a good night's sleep was had with only a light shower of rain during the night. Saturday dawned somewhat overcast and stayed that way for most of the day, but it was dry at least.



The two tripods were set up with their microwave gear, 10GHz using a sideways-mounted 65cm offset dish with a G3WPO feed, 24GHz being a smaller ex-commercial dish. Both transverters were fitted and tested. For 3.4GHz and 5.7GHz, I use a pair of flat-plate antenna (a pair, so saving changeover relays) and this was readied. Pre-contest tests with Noel G8GTZ threw up a 10GHz problem, probably caused by a wobbly ADF4351, a combination of the significant breeze giving the cheap eBay ADF4350/keyboard module TXCO a hard time and, I think, microphonic modulation from the wind. Once this was multiplied by four from 2012MHz it was very jittery. Tests on the local beacon showed some strange behaviour on NB RX so operation on 10GHz was shelved as Noel could not decode my video produced by the system. Shame, it worked both previous times I took it out.

A very quick lunch at 12:45 and I was ready ahead of what turned into a very busy afternoon.

I was joined by Neil G4LDR with his 48GHz and 76GHz gear. I worked Noel from his three different locations and others both /P (G4KLB at Lulworth and G8GKQ at Dunkery) and home-based (Justin G8YTZ and Mike G0MJW). Several others got away due to operator overload, fatigue, too many connectors to swap etc. – my apologies if I missed you.

Dinner was cold sausages and warm couscous from a packet. Tasty enough with negligible time spent preparing, even though Mr Whippy is equipped with oven, grill, hob, fridge and hot/cold running water.

Another good night's sleep ensued to be woken by brilliant sunshine and blue sky.

Sunday involved moving the tripods to new locations and working Noel and Dave and Neil. 3.4GHz was playing up with my LNB choosing to oscillate unless my hand was over the end - but then it started working.

Thank goodness for the PD4 snapshot facility allowing me to store for later data review. As activity wound down, I started packing up at 5pm. A quick dinner (same as the day before) and I left the site at 6:30, a steady journey home where I arrived at 9pm.

So much was learnt for the future and yet more stuff to build to make operating multiple bands faster and more reliable.

What worked well?

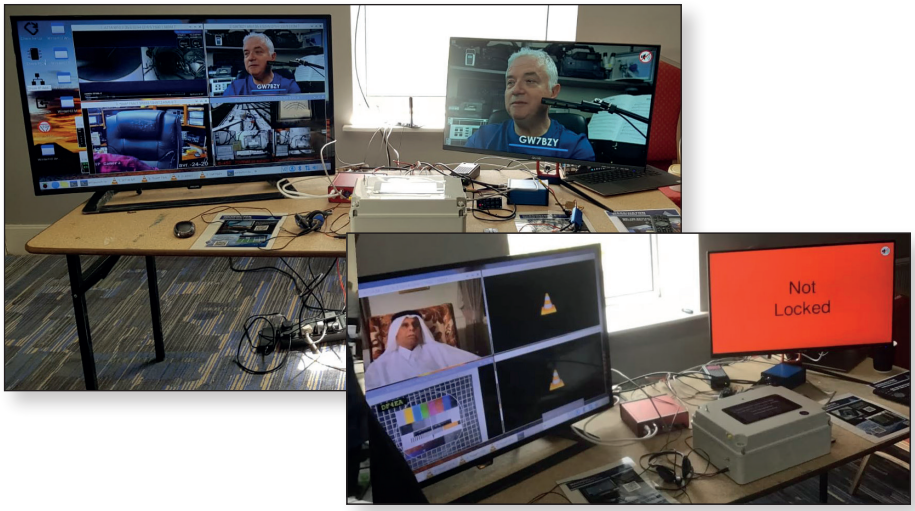
My new 70cms pallet based amp survived and worked very well indeed, as did my QO-100 UMTS pallet conversion for 13cms. The easiest of the lot was the 24GHz gear, 12V DC, TX from PD4 and RX into a Minitiouner. It just worked.

BATC represented at the NARSA Blackpool Rally

The BATC was represented at the NARSA rally in April by Mike G4VSS, Bill G4YWD and other members of the Warrington ARC.

They were able to demonstrate the Winterhill , Portsdown and Ryde together with MiniTioune and M0DTS's Quick Tune software.

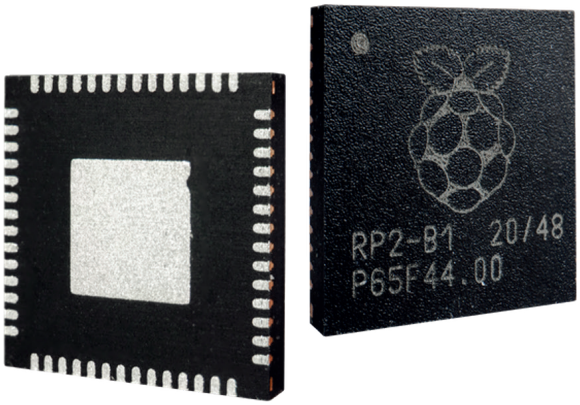
Photos by Dave M0OBW and Chris ZS1CDG



RP2040 – a Microcontroller Chip from the Raspberry Pi Foundation

Brian Jordan G4EWJ

The RPF (Raspberry Pi Foundation) are well known for their range of Raspberry Pi 0-4 SBCs (single board computers). They all use microcontroller chips made by Broadcom. RPF have designed a microcontroller chip of their own – the RP2040, released in early 2021.



It has 56 pins with 0.5mm spacing, so it is not home construction friendly, but fortunately there are many options to obtain it on a board.

Like the Broadcom chips, it uses the ARM architecture. ARM dates back to the early days of personal computers in the 1980's, when it was first known as "Acorn Reduced Instruction Set Computing Machine". Acorn made personal computers such as the Acorn Atom and the BBC micro.

The present day ARM Holdings does not sell microcontrollers, but rather it sells designs for microcontrollers. It has a vast range of chip variations and functions, for which a chip maker buys the licences and then makes their own chips from the designs. Broadcom do this for the microcontroller chips in the RPi 0-4 and now RPF has done the same with the RP2040.

ARM chips are found in Android devices, iPhones and many other devices. Over 200 billion ARM chips have been shipped.

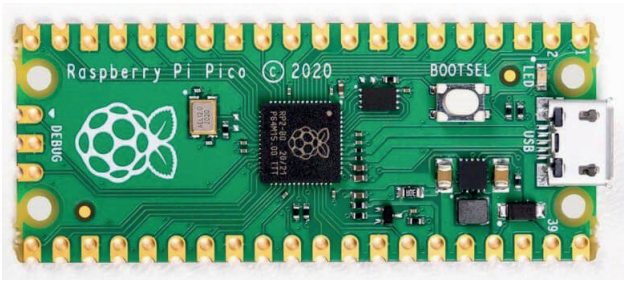
RP2040 features:

The RP2040 is a much simpler chip than the Broadcom chips used in RPi 0-4 microcontrollers: it has only 2 CPU cores, no GPU (graphics processing unit), no Neon (numeric coprocessor), nor any video outputs. Unlike the Broadcom chips, it does have internal RAM and it can run programs directly from an external flash memory chip.

- Cost about £1
- 2 x 32 bit CPU cores @ 133MHz
- USB 1.1 interface (12M bits/s)
- 264k bytes internal ram
- 30 IO pins
- 2 x SPI
- 2 x I2C
- 2 x UART
- 4 x ADC
- 16 x PWM
- SWD (software debug port)
- Flash memory interface with XIP (execute in place)
- 8 PIO SM sub-processors (programmable input-output state machines)
- Interpolator (yet to be investigated)

Many manufacturers are selling boards using the RP2040 in the Arduino style: a microcontroller plus a USB interface and optionally other peripheral chips (see Links at the end). RPF's offering, the Raspberry Pi Pico, is the cheapest board, available and can be thought of as a supercharged Arduino. It can also be programmed by the Arduino environment, amongst other methods.

Raspberry Pi Pico



- Cost £3.20
- Powered via USB or external 5v / 3.3v
- 26 IO pins available (including 3 ADC)
- 2M byte flash memory
- BOOTSEL button for program loading from PC to flash memory
- Can be used with the Arduino environment
- SDKs (software developer kits) are available for C and Python

The PCB is 1.0mm thick rather than the usual 1.6mm, which makes it feel a little flimsy, particularly as you have to press the BOOTSEL button whenever you want to load a new program. This is inconvenient if the Pico is in a box. There is a pad underneath the board to which a wire can be soldered, to bring the BOOTSEL functionality to a panel mounted button.

The USB 1.1 interface has a bus speed of 12M bits/s and can be made to look like a host or device by the program (OTG - on the go). The usual scenario is to configure it to look like a standard serial COM port.

The Pico is recognised by RPi computers and Windows 10, but earlier versions of Windows need some manual configuration.

Developing programs on an RPi 2-4, is recommended, rather than Windows, which needs more configuration.

Program Loading

When the Pico is powered up or reset, the RP2040 looks for a valid program stored in the external flash. If it finds one, it executes the program. Different parts of the program can run directly from the external flash, or can be copied to the internal ram and run from there, for extra speed.

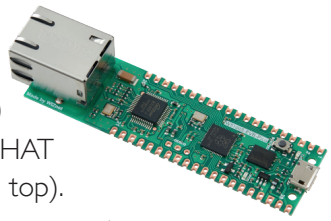
If a valid program is not found in the external flash, the RP2040 configures itself to appear to be a virtual USB drive. A valid program can be copied by a PC to the virtual drive and this is stored in the external flash. The RP2040 resets and then finds the program in external flash and executes it.

XIP (Execute in Place)

The program can be executed from where it is in the external flash. Executing from external flash is potentially a lot slower than copying it to main ram and executing from there, because the external flash has a serial connection to the RP2040. There a small section of cache ram between the RP2040 and the external flash and this can speed up execution by storing the most used parts of the program. Programs tend to execute some parts greatly more than others and spend a lot of time in loops.

Part of the program in external flash can be copied to main ram. It depends on the size of the program, how much of it needs to execute quickly and how much main ram is required for data, as to how the program might be split. The external flash is 2M bytes and the main ram is 264k bytes.

HATS and Pico Variations



▶ *WIZnet W5100S-EVB-Pico*

Many boards using the RP2040 are available. There are several HAT options (hardware attached on top).

WIZnet, who make networking chips, have produced an Ethernet HAT for the Pico and even better, a board that integrates a W5100S MAC/PHY Ethernet chip with an RP2040, which costs £10.20. They also have a WiFi equivalent, the WizFi360-EVB-Pico, which costs £7.

Availability

I have not seen the Raspberry Pi Pico go out of stock at Pimoroni and PiHut. The WIZnet boards do go in and out of stock, but usually not for long, so far.

Uses for DATV

The RP2040 has two SPI ports (a 3/4 wire serial protocol). On the WinterHill receiver, each PIC interfaces the RPi4 to the two transport stream outputs from each NIM (network interface module – the tin can) The PICs are required because the NIM SPI is effectively in master mode and the extended RPi4 SPI ports do not have a slave mode. The RP2040 does have a slave SPI mode, so both receiver outputs on a NIM can be connected directly to the Pico SPI ports.

More interesting are the 8 PIO SM sub-processors. These operate at the main CPU clock speed (usually 125MHz), completely independently of the two main CPUs.

They have a very simply instruction set such as:

- wait for pin high
- wait for pin low
- move bit(s) to output pins
- move bit(s) from input pins

Any number of bits can be moved in one instruction, enabling serial or parallel transfer. Bits can be moved to and from main CPU memory using DMA (direct memory access – automatic block transfer) without involving the main CPUs, other than to start the transfer and react to the signal sent when the transfer ends.

Extra SPI or other ports can be implemented using the sub-processors, or you can make up a protocol of your own.

The programs for the sub-processors need to be very compact. Each block of 4 sub-processors has to share an instruction space of 32 instructions - i.e. there is an average of 8 instructions available per sub-processor program.

A single Pico could use four sub-processors to interface with two NIMs, giving four receivers. For a USB connection, a utility would need to be created to run on a PC, which has the same functionality as the WinterHill software on the RPi4.

With the appropriate knowledge and some development, it could theoretically be used with the MiniTioune software.

A Design Case to Assess the Pico

This is an exercise to test the functionality of the Pico and compare it with an existing project. It is very much a work in progress. It is not easily reproducible in its present form and will not be in the BATC shop next week, if ever.

The WinterHill four channel receiver has the drawbacks of limited multi H.265 display on the RPi4 and the scarcity and cost of RPi4s and voltage regulator modules. It works more effectively in hub mode, sending transport streams to other computers and not displaying video locally.

With the ability of the Pico PIO SM sub-processors to interface directly with four SPI transport streams, such as those from two NIMs and the availability of a Pico version with an Ethernet port, the Pico seems well placed to form the basis of a cost reduced, size reduced, hub only version of WinterHill – a PicoHub perhaps.

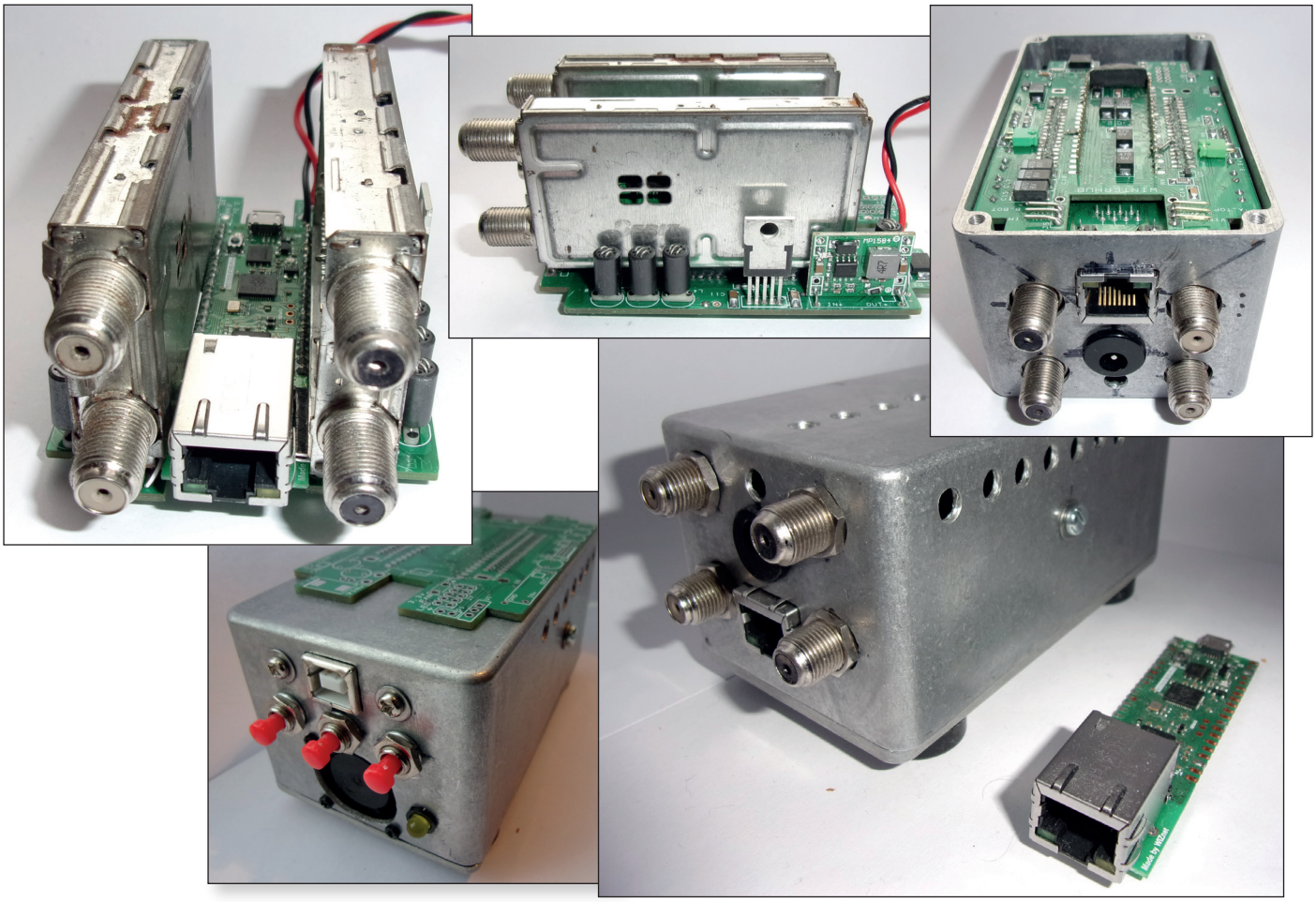
The box is too small really, so it was a bit of a squeeze. 5mm wider would be better, but you can rarely get the box you want.

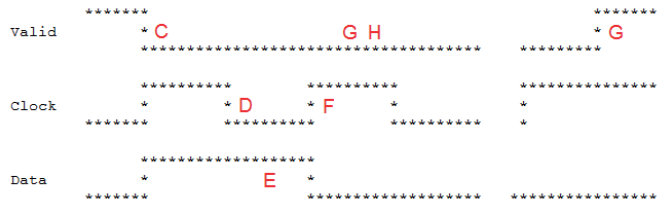
The switcher / regulator pair visible provides the 1.1v. There is another pair alongside the other NIM, which provides 3.3v. The switchers and regulators are the same as in the MiniTiouner BATC MK1/2. The 3.3v one is being slightly overrun – a 1.5A version would be better.

There are a few bugs and several issues to address, but basically, it works. Transport stream throughput is about 6M bit/s on USB and 16M bits/s on Ethernet.

The WIZnet Ethernet module is less capable than anything on an RPi / PC, but is good enough for this job. It handles TCP / UDP type protocols internally, but has only four hardware sockets – i.e. endpoints for network communication. Four sockets are required to listen for tuning commands, so it can do DHCP (get an IP address) only at startup, rather than looking for unplugging / plugging events all the time.

The sub-processor program is 8 instructions long. Each sub-processor is configured with different MY pins, so a single program can be used by all four sub-processors simultaneously.






```
A:     wait   LOW MYVALID

B:     wait   HIGH MYVALID
C:     wait   LOW MYVALID
D:     wait   LOW MYCLK
E:     in     MYDATA, 1
F:     wait   HIGH MYCLK
G:     jmp    IFHIGH MYVALID, C
H:     jmp    D
```

A and B synchronise once with the incoming data when first run, to avoid starting during a packet.

C waits for valid going low

D waits for clock going low

E inputs one bit

F waits for clock going high

G jumps to wait for next packet

H jumps to wait for next clock

Each sub-processor is configured to automatically push the data back to the main CPU every 32 bits.

Conclusion

The RP2040 is cheap, powerful, available on many boards and has some peripherals with interesting possibilities.

Links

- RP2040 product page:
  https://www.raspberrypi.com/products/rp2040/
- Boards using the RP2040:
  https://www.tomshardware.com/best-picks/best-rp2040-boards
- W5100S-EVB-Pico product page:
  https://docs.wiznet.io/Product/iEthernet/W5100S/w5100s-evb-pico
- WizFi360-EVB-Pico product page:
  https://docs.wiznet.io/Product/Open-Source-Hardware/wizfi360-evb-pico
- Overclocking the Pico to 420MHz:
  https://www.youtube.com/watch?v=G2BuoFNLoDM
  https://www.youtube.com/watch?v=rU381A-b79c
- HDMI from a Pico:
  https://www.youtube.com/watch?v=GyZS_efRyiY

IARU 2021 Contest Awards

The formal awards ceremony for the IARU Region 1 2021 VHF Contests was held at HamRadio Friedrichshafen on Friday 21 June 2022. The event was hosted by Alex IV3KKW, who is the VHF/UHF/microwave contest co-ordinator for IARU Region 1.

The DATV contest awards were presented by Dave G8GKQ (as the IARU Region 1 ATV Contest Coordinator) and more than half of them went to Noel G8GTZ who was the overall winner, and scored highest in a number of the bands.

The award for highest-placed fixed station was presented to Guido IW6ATU, and the 13 cm winner's award to Erwin OE8EGK. The 70 cm winners award will be sent on to Rolf F9ZG, the joint band winners' awards for 47 and 76 GHz will be sent on to Neil G4LDR.

Internet repeater hopes to encourage more ATV activity in north Cumbria

Dave M5TXJ

On Wednesday 1 June a new internet DATV repeater was installed at IO84SQ (NY703317) on Great Dun Fell in Cumbria, the site of two-metre repeater GB3EV. Using a BATC Ryde it receives on 1249MHz and scans 250, 333, 500 and 1,000KS/s.

It is hoped the repeater will encourage DATV activity in the north Cumbria area as we're somewhat away from any real activity and screened from the excellent GB3KM by the Pennines.

Currently there are three amateurs in the area building DATV equipment, M5TXJ, G7ITT and G4FUI, G4EXD was building a station but sadly went SK recently, his equipment has passed to his brother G4JHV so hopefully.

The repeater is a very simple one, almost entirely produced from upgrading the M5TXJ shack equipment. An Alford slot aerial feeds into an interdigital filter and from there into a BATC Minitiouner v2, this is connected to a BATC Ryde.

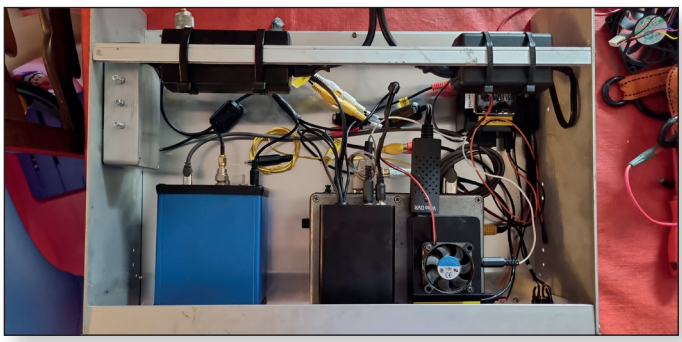
The AV output of the Ryde goes via a switching relay to a Pi3B+ running Portsdown 2020 software via an EasyCap.

The lock LED output of the Ryde drives a 2N7000 FET which switches the AV relay and also the Portsdown TX line. A Pi2 runs a slide carousel continuously feeding the other input of the AV relay, slide change is controlled by a very simple script in an Arduino Nano, the same Nano switches the Portsdown to TX for 5 minutes every hour.

This means that a slide sequence is streamed to the BATC website every hour but is overridden is a signal is received. A DTMF decoder is attached to the RX audio channel, currently a DTMF five enables the MER display and eight disables it, in future this will have additional features added.

As the aerial is at some 2,300ft ASL it is hoped the wide coverage will encourage people to give DATV a try and hopefully some /P stations will see if they can access while out and about.

I'd like to thank Dave G8GKQ and the BATC for help with this project, building the repeater has been quite enjoyable and if anyone would like more information please get in touch.



The Tilt-O-Matic

Gareth Evans G4XAT

Members may well have noticed that I like designing and building things, and lots of things. It was on this basis that Noel G8GTZ asked me to give thought to designing an easy to construct pan and tilt mechanism for the ubiquitous yellow / orange surveyor's tripod, the sort that crop up around £35 on the well-known auction site. (I paid £30 for one and collected, then £25+£10 delivered for a second).

The 'TOM' (as it has become known) has been designed to be built without access to extensive workshop facilities and is entirely DIY-able, other than the 3D printed parts (the .stl files are on the wiki). It can be adapted to suit what you have available and to suit your dish/gear mounting requirements. 'Clip-on' top tables, each with band specific transverters for instance can be quickly exchanged as required.

After 'kicking the idea around in my head for a while', I started by looking at 'Lazy Susan' bearings, as used by others and published in the Scatterpoint microwave journal. I designed it around 12mm plywood as it's cheap, lightweight and easy to work with basic tools, and of adequate rigidity. The hinge was some cheap Screwfix piano hinge (I had lots), the tilt mechanism was a cam/lever with a simple wingnut locking system. The first prototype was exhibited at CAT21.

However, the 'Lazy Susan' had far too much slack in it (price-point product) adequate perhaps for spinning around your hors'd'oeuvres in its intended application but not this, especially when added to the 'less than quality' piano hinge (non-Steinway) proved that it was not going to be a very good solution.

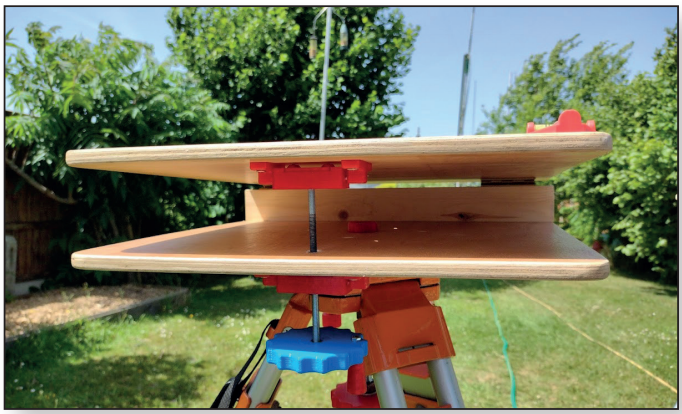
So a bit more thinking went on. This led to wondering what sort of bearing would be adequate and I recalled the last differential I rebuilt (Mazda RX 8 change of final drive ratio for the V8 conversion I did) that had large taper-roller bearings in it. A quick browse of the Simply Bearings website (*https://simplybearings.co.uk/shop/*) led to some large bearings at surprisingly low prices, so after some tripod measuring, one was ordered.

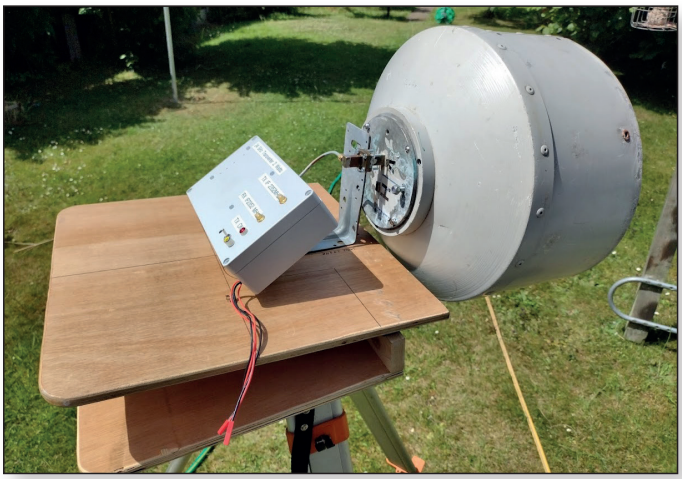
Meanwhile, I was busy with my CAD package and worked the 3D printer making trial parts. Should any of you have ever installed taper roller bearings, you may be familiar with the term 'pre-load'.

Basically, you tighten up the bearing until it takes a certain torque to turn it. Seems a strange thing to do, but it works without detriment to the bearing. I surmised that the 'damping' feel provided by many camera tripods could be replicated by two means.

At a base level, the friction between the smooth bearing outer case and the 3D printed retainer fitted to the TOM base plate. Some different sizes were tried to get the 'feel' right and to still hold the bearing assembly in when dismantled – you don't want to drop a precision bearing into the inevitable mud/sand etc.

The assembly was then retained on the tripod by a 12mm threaded rod and a captive nut, (aided by a centralising ring) fitted and tightened by a hand-wheel. By tightening the 12mm retaining rod, increased pre-load can be placed on the bearing and the damping increases. A simple 'screw-down' brake was provided, attached under one of the tripod leg bolts.





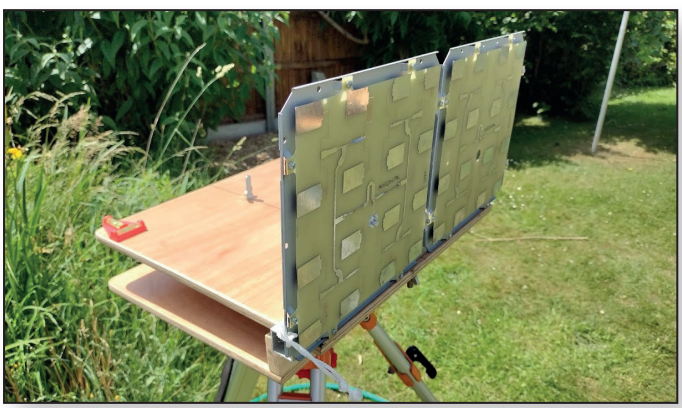
Personally I have not found it necessary yet, even with a big dish mounted. However, when the base plate was turned, the clamping screw also tightened/loosened depending on the direction turned.

This was solved by adding a second smaller 'thrust' bearing, allowing free rotation. In the engineering world, side loading a ball-race would be frowned on (although I recall that Triumph motorcycles used them on their swinging arm). For our low rotation speed (1 rpm per month) I chose the cheapest sealed unit that would do the job.

With the slack and damping sorted I turned to the actual tilt mechanism. These days quality piano hinges don't exist at budget prices and precision hinges are fairly rare or expensive. Fortunately, some mid-size brass hinges from Screwfix proved adequate and by mounting them at each end of the tilt axis the effect of any hinge slack is minimised.

Negative angles (or positive depending which way you look) are accommodated by small plastic wedges mounted under one faces of the hinge. If you have a wood plane you could add a suitable bevelled edge yourself, but it's not a common (and rarely sharp) tool these days.

So just the tilting mechanism to deal with - then the cam idea needed 'return springs' (more parts, more making needed) and although very quick to adjust, was unwieldly and cumbersome in use. A chat with my son Josh (an accomplished mechanical engineer) simplified my proposed design by pointing out that I only needed movement in one axis, negating something like a Rose joint (£s). I chose some 6mm threaded rod as the drive mechanism, so with a 1mm pitch, a whole turn would only move one end of the table 1mm. How that would translate into degrees relates to the table size and geometry, but you can work that out if you want. No need, it works fine without – just peak up that S meter!



By printing small clamping blocks that made 6mm nuts either captive and fixed or captive but able to rotate, the two fixings were then pivoted on some short pieces of 3.2mm alloy welding rod pressed into 3-D printed 'Plummer (pillow) blocks'. You may need to buy a 3.3mm drill to provide the correct fit or the friction on both assembly and in-use will be too great.

Where possible, captive nuts are used to simplify assembly as we only have two hands. Any slack in the mechanism can be adjusted to zero, any backlash in the adjustment mechanism. The Wiki assembly information provides more detail on how to achieve this.

Quick clamping methods have been considered, to allow quick change of 'transverter boards'. Consider big 'croc-clips' from Wilko, toggle clamps or even bicycle saddle post QR units.

It's really up to you to adapt as you wish or what you have available. In use, I have found very little that I would change to the point that I built a second unit with no changes other than the actual axis of rotation. Thanks to my two beta testers, Noel G8GTZ and Dave G4FRE whose feedback has been valuable.

Why 'Tilt-O-Matic'? As a fan of Heath Robinson (whose wonderful drawings would rarely work) to Wallace and Gromit (whose ideas work with various degrees of success) to Wiley Coyote (a main shareholder in ACME Products) I am, I'm afraid, a fan of 'names that imply their function'.

Adapt to your own needs, modify, improve and do please send me a picture of your own 'TOM'.

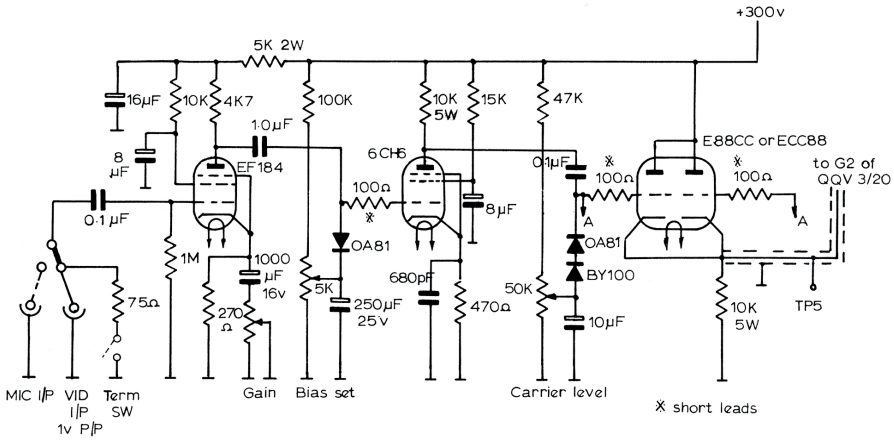
Turning Back the Pages

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

Peter Delaney - G8KZG

CQ-TV 87

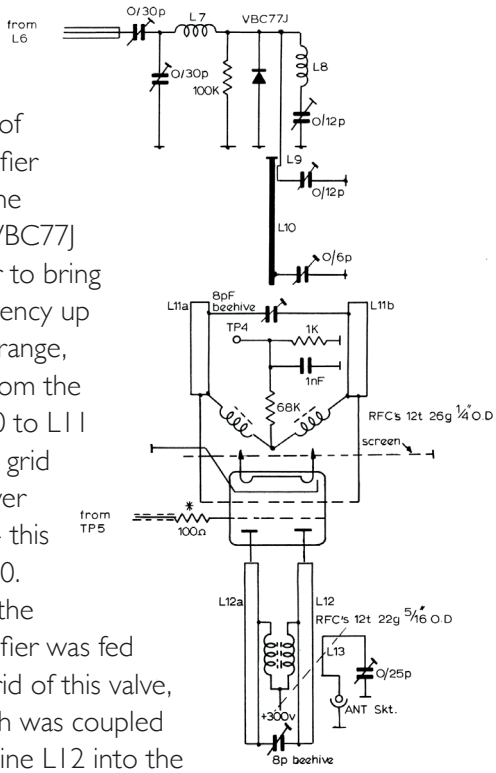
CQTV 87 was issued in July 1974, and included information for those attending BATC's Convention and bi-annual general meeting in the September. This was to take place at a new location for the Club, at the Benn Memorial Hall in Rugby - directions were given for those arriving by car or by train - "if in doubt ask for the Town Hall". Apart from an 'exhibition of members equipment' and the formal business of the general meeting, there were to be 'discussion groups' (although the topics of those were not mentioned). Club publications and sales items would be available, as would be the 'equipment registry' records.



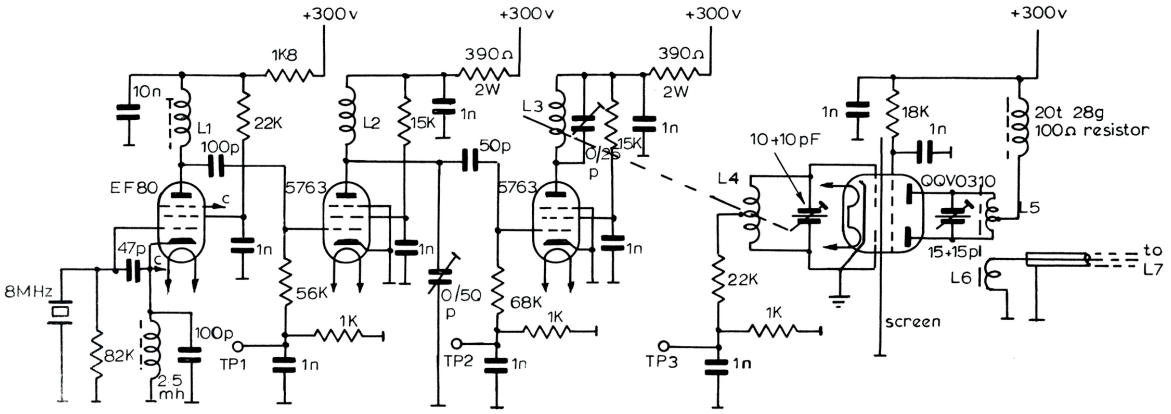
The technical articles had a spread of topics. For the 70 cm band, M J Dyke, G6AHR/T described a transmitter. He observed that "there have been a number of solid state transmitter designs published in CQ-TV, but not very much information recently on valve equipment. The idea of using valves may seem a little dated, but there is a surplus of valves in circulation". There were three sections to the design.

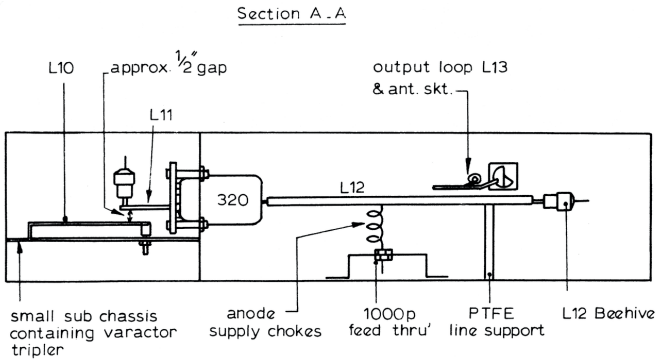
The EF80 pentode oscillator had its anode load tuned to produce an output at triple the crystal frequency. The two following, 5763, stages each acted as frequency triplers, so that the input to the QQV0310 double tetrode was at 144 MHz.

The modulator circuit was of conventional design for the period, using amplitude modulation and could either accept an audio or video input - the 70 cm band was too narrow to allow for both sound and vision to be broadcast at the same time.

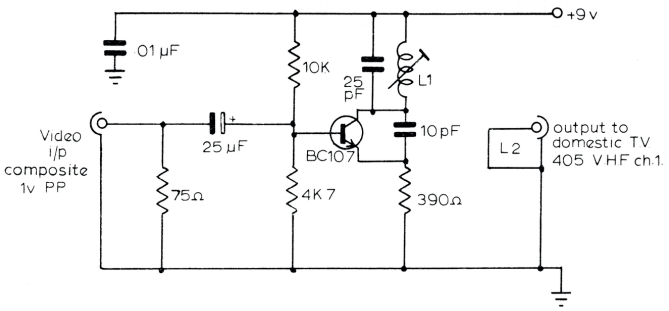


The 144 MHz output from the QQV0310 was input to L7 of the power amplifier section, where the varactor diode, VBC77J acted as a tripler to bring the carrier frequency up to the 432MHz range, being coupled from the tuned line at L10 to L11 to drive the first grid of a further power double tetrode - this time a QQV0320. The signal from the modulator amplifier was fed to the second grid of this valve, the output, which was coupled from the tuned line L12 into the loop L13 to feed the aerial, was about 6 watts at peak input.





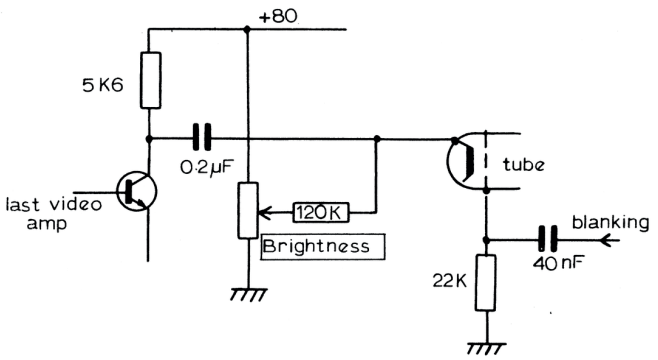
The article included guidance on the layout, particularly the PA stage, as well as notes on how to tune up the various stages in sequence. G6AHR/T advised that "when all construction work has been completed, check for any mistakes. After all, ten or so minutes checking can save hours of repairing". That is as true now as it was then!!



L1 = 15T Litz wire on 3/16 former with ferrite slug
L2 see text

Coming down in frequency (despite the article's title that it was for UHF !) was a small modulator circuit that G6AIN/T had made up in order to connect his camera to a domestic television, as his second hand monitors had failed. 405 line television was still in use at the time, and so this was designed to add rf on VHF channel 1 (45 MHz) to the video signal, which could be sent via the aerial socket to an unmodified domestic receiver. The circuit could be built into a screened enclosure - as was common at the time, a tobacco tin.

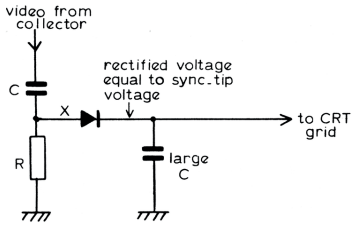
Fig.1. Original monitor circuit



Further down in frequency were various ideas for improvements to video equipment.

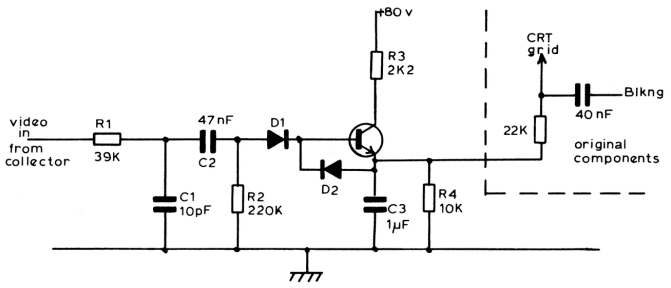
Amongst these, D J Taylor, G6SDB/T investigated the problems of black level in some transistor monitors he had. In the original circuit, the video signal was coupled from the video amplifier to the crt cathode with a capacitor. The result was that the dc component of the video signal was lost - meaning dark scenes appeared brighter than they should, whilst the reverse applied to light ones.

Fig. 2. – Idea



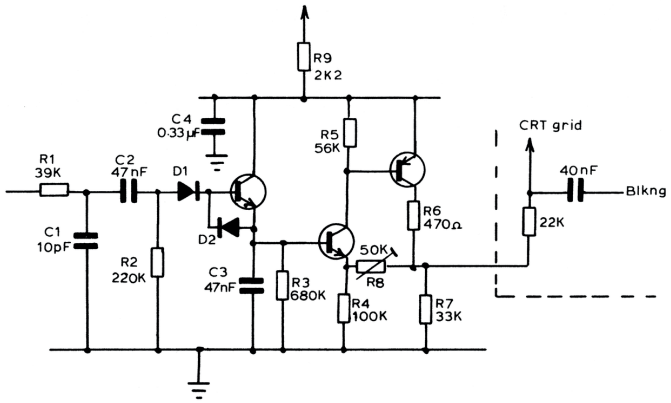
Rather than add clamping pulses to set the black level of the video signal, his idea was to use a diode to rectify the tips of the sync pulses, and pass this to the crt grid - to keep the voltage between the cathode and the grid constant at the sync tip level, and so, in effect stabilise the black level.

Fig.3-Basic circuit



The basic circuit included a transistor to minimise the current in the peak detecting diode. However, this basic version ignored the fact that the beam current in the crt would vary, changing the current in the cathode circuit, and hence its potential. To overcome this, greater correction was needed at high brightness levels, so an improved version was developed. With that it was, apparently, possible to overcorrect, and have 'blacker than blacks', and 'whiter than whites'.

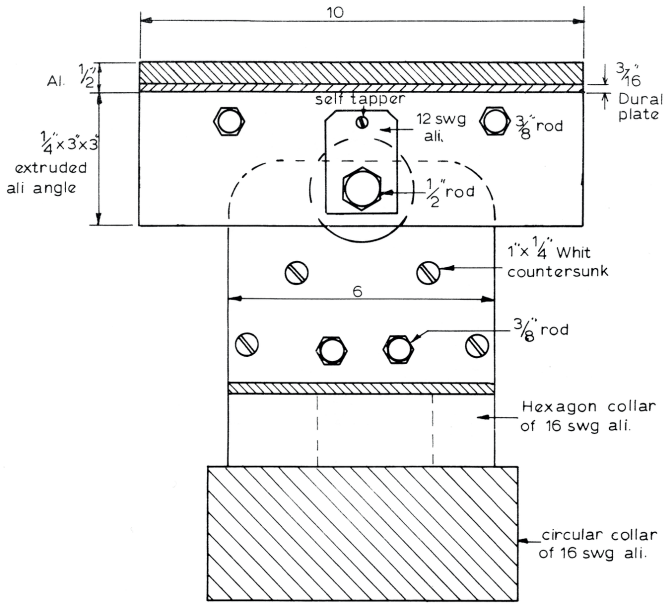
Fig.4. Amplified Corrector



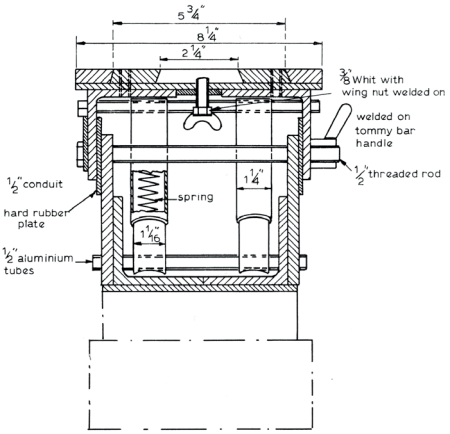
There was another article for a piece of equipment designed to operate at an even lower frequency. Designed by Alan Watson (who ran the BATC equipment registry), this was a camera tripod, with a pan and tilt head.

There was a growing interest in the use of former broadcast equipment, such as image orthicon cameras. Unlike the modern fully solid state broadcast cameras that the crew can walk about carrying, these were heavy - very heavy - around 80 kg without adding any lenses, not to mention the multicore cable hanging from one side. They needed a substantial and stable support, not just to protect the camera, but to ensure there was no risk of it falling and injuring anyone.

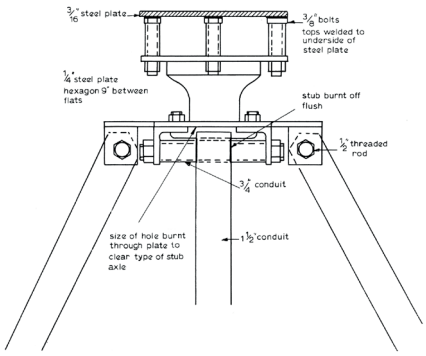
Alan listed the tools required - starting with "first aid kit" - and a "word of warning: anyone frightened of chopping pieces out of his knuckles or getting sore hands should not tackle this exercise".



The detailed drawings showed the form of construction - the top was made of 3" x 3" angle. It needed to sit fairly high from the base part to allow the camera to be tilted up and down enough. Inside the top were tubes carrying strong springs to damp the tilt movement - motor engine

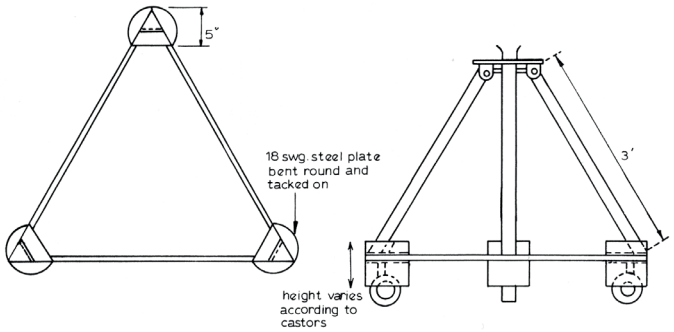


valve springs were used - the springing arrangement could be easily changed to suit the camera and lens in use. Alan added that "for really heavy cameras, diesel engine springs would be better still" (!).

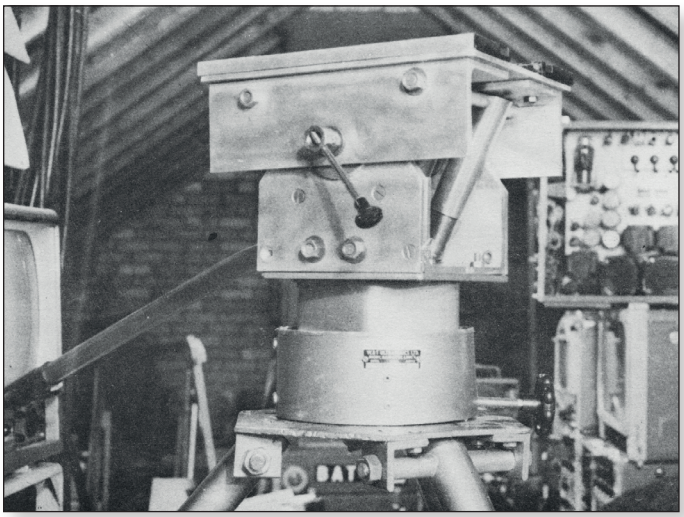


The problem of making a sufficiently robust panning assembly was solved by making use of a front wheel stub axle obtained for a moderate sum from a car breaker's yard.

The tripod's legs were built of 1½" diameter steel conduit, and to complete the construction, a wheeled skid was made using 1" square steel pieces, each about 4 ft long. The buffer plates were added around the castors, to prevent the latter running over the camera cable.



Several photographs accompanied the constructional drawings, (although this one had actually appeared on the cover of a previous issue of the magazine).



The British Amateur Television Club

Out and About

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

17 July – McMichael (Reading)

7 August – BATC CAT 22 at Coventry

14 August – Flight Refuelling Hamfest Wimborne

7/8 October – AMSAT Colloquium/RSGB Convention Milton Keynes

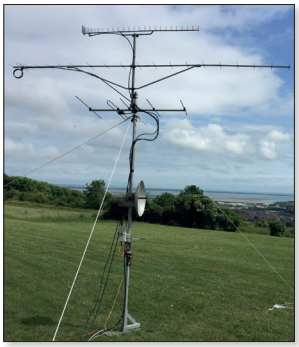
14/15 October – Lincoln Hamfest – Possible BATC Stand

3 December – Midland Microwave Round Table – BATC Stand

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



2022 Activity Days:

9th & 10th July 2022	*23cms & up*
13th & 14th August 2022	*70cms + 23cms*
10th & 11th Sept 2022	*2m & down + 23cms*
8th & 9th October 2022	*23cms & up*
12th & 13th Nov 2022	*70cms + 23cms*
10th & 11th December	*2m & down + 23cms*

BATC Online

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YouTube: https://tinyurl.com/BATCYouTube