The British Amateur Television Club

CQ-TV

No. 274 – Winter 2021

CQ-TV 274

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BATC Wiki: https://wiki.batc.org.uk/
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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

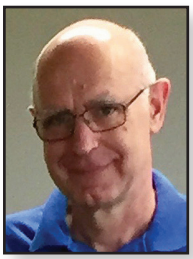
Contributing authors should note that we aim to publish CQ-TV quarterly in March, June, September and December.

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'



From the Chairman...

Dave Crump G8GKQ

I spent my Sunday afternoon watching video feeds from 21 vehicle-mounted cameras and a similar number of static and man-portable cameras at an event being staged more than 3,000 miles away.

The edited live video was transmitted by satellite to the UK and then to my TV as an HDTV terrestrial signal. While my main reason for watching this was to see Sir Lewis Hamilton win the race (sadly not), I could not help but think that the BATC actually has the technical ability (if suitably resourced) to mount a similar outside broadcast operation from Abu Dhabi.

Think Portsdown DVB-T transmitters in every car, multiple Ryde receivers around the circuit with the HDMI switching technology being used in some of our repeaters, and then editing and caption overlays using the open source OBS software. We could then H265 encode the video and send it back to the UK over QO-100 for local distribution using RF or the BATC streamer.

This amazing amateur technical capability has only come about through the enthusiasm and hard work of a very diverse group of enthusiasts and volunteers.

Too numerous to mention each one, but they include software writers, hardware designers, beta testers, shop volunteers, project managers and administrators.

At the end of another successful year for the BATC I would like to pass my thanks to all of those who have contributed to advancing our hobby, particularly the unseen volunteers working behind the scenes to keep the shop and finances running smoothly.

You can repay them for their efforts in two ways: first, get on the air using ATV to preserve the access to the valuable the radio spectrum that we currently enjoy; secondly, consider how you might be able to contribute to the BATC's efforts in the future, perhaps by thinking about greater involvement at the General Meeting that we will be holding later this year.

Wishing you and your families a very happy Christmas and a healthy 2022.

Dave, G8GKQ

▶ *Dave, G8GKQ out portable*

The Listing

new and renewing members

Rob Burn G8NXG

As is usual, our member list for this edition of CQ-TV covers three months, this time from September to the end of November. As regular readers will know, publication of the list is timed to follow the publication deadlines of CQ-TV as published in the inside front cover of each edition.

For newly-joined members the list at least confirms that you are indeed a member of the BATC! For others it can serve as a useful confirmation that your membership renewal process has been successful. For the avoidance of doubt, keep in mind that you should expect to see your entry on these pages only when you renew again.

Aside from this, you have the opportunity to judge the feasibility of contacting a fellow ATVer who may be local to you; I would be happy to make an approach on your behalf.

The list is produced by manually consolidating the 'sales' of the different kinds of BATC memberships over the period outlined above. As such, it is perfectly possible for a mistake to creep in so do advise me if something appears to be incorrect.

I am pleased to advise that total member numbers continues to hover around the 1400 mark despite the fact that I am obliged to delete around 10 to 20 members each month for non-payment or resignation. In these situations the ex-member will have decided that ATV is of no further interest, although a change of mind is welcome and can result in the member rejoining at any time.

Finally, a word about logins, in particular to the BATC website. I do note from time time that members can encounter problems in logging into the main member website, judging by the number of repetitive attempts made to do so. If you find yourself in this situation do contact me for assistance.

Thanks and welcome to our new members for joining over the period; thanks also to all our renewing members who continue to support the club.

Australia		
Ian Hocking	VK3QL	Fitzroy North
Andrew Burns	VK4YMB	Glenwood
Roy Xanthos	VK4TRX	Gracemere
Gary Beech	VK2KYP	Lisarow
Rod Preston	VK4VU	McDowall
Clint Jeffrey	VK3CSJ	Melbourne
Luke Groeneveld	VK2LGW	Punchbowl
John Lukey	VK2ZUH	Sanctuary Point
Chris Whitefield	VK3JAA	Tarneit
Justin Giles-Clark	VK7TW	Tasmania
Reast Inc	VK7OTC	Tasmania
John Kessner	VK3ATV	Williamstown
Phil Gardner	VK3GMZ	Woori Yallock
Austria		
Bernhard Hammer	OE6HBD	Graz - Weinitzen
Belgium		
Jan Poppeliers	ON7UX	Aartselaar
Rene Van de Wiele	ON6VI	Dendermonde
Guy Roelant	ON4BHM	Sint-Niklaas
Albert Van den Abbeel	ON4AAH	Wetteren
Canada		
Peter Jago	VA3PJ	Stittsville

Denmark		
Ingolf Pedersen	OZ8JYL	Aalborg
Finland		
Esko Petäjä	OH6MQM	Pojanluoma
France		
Jean Dentroux	F5CFN	Crolles
Gerard Bouvier	F5ELY	Fontenay-sous-Bois
Jouan Francois	F1CHF	Franconville
Franck Dubuis	F1SSF	La Tuiliére
Guy Gounel	F1BFZ	Magnet
Patrick Giraudeau	F6HMP	Paris
Maxime Favier	F4IQN	Paris
Dominique Taverne	F5MKM	Saint Jean le Blanc
Alain Brellier		St Laurent En Gatines
Camille Farrougia	F4IBA	Villeneuve Loubet
Germany		
Johannes Bruno Peters	DG4DC	Bad Sassendorf
Andre Polle	DG2OAJ	Hohnhorst
Dirk Zähler	DG4HAD	Gremersdorf
Hans Schubert	DL9YCC	Rheine
Uwe Giese	DF3KO	Immenstaad
Rainer Entel	DL3EF	Dinslaken
Rolf Singer	DK6IT	Berlin

Helmut Schröder	DG3KHS	Bornheim
Wolfgang Buchner	DF3RO	Offenstetten
Reinhard Trautenbach	DG2MTR	Eichstaett
Hungary		
Béla Mucs	HA4BM	Szekesfehervar
Ireland		
Craig Robinson	EI3FW	Boyle
Seamus Mccague	EI8BP	Dublin
Jim Smith	EI4CP	Greystones
Italy		
Achille Galliena	I2GLI	Milano
Alberto Ciampa		Torrita
Mauritius		
Ismet Aumeeruddy	3B8DM	Le Hochet
Netherlands		
Roel Sijbrandi	PE2CVF	Arnhem
Rein Brand		Brummen
Oebele Lijzenga	PA3BJC	Damwald
Henk van den Bor	PE1NCH	Den Helder
Herman ten Grotenhuis	PA0TEN	Eefde
Ad Valkenburg	PE1DGW	Eindhoven
Rob Hardenberg	PE1ITR	Eindhoven
Rick Olijslager	PA2RIK	Groenlo
J Koopman	PE2JKO	Haarlem
F.A. Breeman		Koog aan de Zaan
Reinoud ter Braake	PE1CYM	Lelystad
Gerard Snippert	PE5GSL	Losser
Henry Paulissen	PD0OM	Montfoort
Sjef Verhoeven	PE5PVB	Oisterwijk
Rob Krijgsman	PE1CHY	Terborg
Otto Aden	PA2OTT	Wiuwert
Jan Roos	PD0HNI	Zoetermeer
New Zealand		
Kevin Ravenhill	ZL3KE	Christchurch
Norway		
Ivar Rognstad		Oslo
Peter Ebsworth	LB0K	Steinsland
Poland		
Jakub Doroszkiewicz	SQ4ENR	Bialystok
Artur Sobiech	SP5QIR	Sochaczew
Portugal		
Pedro Meneses	CU2FH	Azores Isl.
Slovakia		
Vladimir Rybar	OM7AVR	Valaska
Slovenia		
Matjaz Zibert	S59MZ	Kranj
Stefan Lebar	S51L	Ljutomer
South Africa		
Tom Van den Bon	ZR6TG	Vanderbijlpark
Louis Haarhoff	ZS6BD	Vanderbijlpark
Spain		
Albert Ramos	EA3IBE	Caldes de Montbui
Arnau Perello	EA3FNT	Girona
Jesus Roman Rodriguez Hernandez	EA8RH	Piedra Hincada
Juan Pedro Martinez Balboa	EB3FYO	Riudarenes
Switzerland		
Michel Vonlanthen	HB9AFO	Bussigny-près-Lausanne
Martin Klaper	HB9ARK	Kappel
Olivier Noverraz	HB9BBN	Le Sentier
Achim Vollhardt	DH2VA	Zurich
United Kingdom		
Gordon Robb	GM8KXF	Ayr
Robert Brown	GI6IVJ	Bangor
Mrs Richardson		Bognor Regis
James Davies	GW6JWD	Borth
Alan Mcdowell	G0KOO	Boston
Ivor Green	G1IXF	Bristol
Brian Golding	G6AUR	Bristol
Andy Jenner	G7KNA	Bristol
Anthony Haley	G4MMT	Bude
John Worsnop	G4BAO	Cambridge
Nick Gilbey		Charmouth
Colin Keevil	G7COY	Chatham
Mike Browne	G3DIH	Chelmsford
Ian Hill	G6ZVE	Chesterfield
Nigel Jones	2E0NJT	Chingford
Richard John Cariss	G7ACD	Church Stretton
Lee West	G4TNX	Cleethorpes
Darren Smith	2E0VWF	Corby
Roger Gregory	G4OCO	Cornwall
Philip Raybould		Coventry
Clive Davies	G4FVP	Darlington
Dave Cawley	G4IUG	Dartmouth
David John	G3WCB	Dartmouth
Paul Haworth	G6OWI	Darwen
Stuart Grant	G6ENR	Driffield
John Coster	GM3SHR	Dunfermline

Steve Marshall	M0SKM	Dunstable
Chris Donne	G3YKK	East Halton
James Harris	M0GUR	Eastbourne
Edward Murphy	GM3SBC	Edinburgh
Torin Storkey	MM1STK	Edinburgh
Dave Williams	G7GQW	Ellesmere Port
Martin Perrett	G8LCE	Falmouth
Rob Compton	M0ZPU	Gamlingay
Alan Course	G4HND	Geddington
Richard Mudhar	G7LEE	Glastonbury
Geoff Cowling	G0FRX	Goole
Neil Smith	G4DBN	Goole
A Koeller	M5AGB	Gosport
Leonard Stockwell	M1DPE	Grays
Kevin Smith	G7UXW	Guildford
Geoff Wilkin	G0DDX	Hardwick
Nigel Nash	M0NGL	Hemel Hempstead
William Ball	G1FNN	Herne Bay
Karl Brazier	G7AFT	Hythe
Chas Broughton	G1RSK	Immingham
John Franks	G3SQQ	Kirkby-in-Ashfield
Colin Richardson	M0YXR	Kirkbymoorside
Michael Still		Lancing
Steve Greaves	2E0XAY	Leicester Forest East
Jon Shamash	G7RUP	Lincoln
Stephen McBain	M5SJM	Lincoln
Piotr Niewiadomski	M0PGN	London
Stephen Fletcher	G4RFC	London
Brian Greenaway	G3THQ	London
Jeremy Powell	M0JLP	Malton
Terry Bailey	G6CRF	Manchester
Mark Bryant	M0UFC	Manchester
Peter Harston	GW4JQP	Milford Haven
Stephen Drury	G6ALU	Milton Keynes
Mike Busson	GW8MER	Newport
Nicholas Camp	G7KFQ	Newquay
Kevin Francks	M0BFB	Newquay
Alan Bagley	G3XPY	Newquay
Colin Coker	G4FCN	Newton Abbot
Andrew Kett	G8VLL	Norwich
Anthony Mobbs	G8EEY	Norwich
Robert Clayton	G8SDU	Norwich
Stuart Tyler	G1ZAR	Nottingham
Stephen Lovell	G8XPZ	Nottingham
Ian Brothwell	G4EAN	Nottingham
Ian Harbert	2E0MWU	Orpington
Dave Sheppard	G8OUX	Orpington
Jeff Laing	GW6KLQ	Oswestry
Alexander Wynne	M0OOE	Oxford
Frank Cotton	G0LFI	Portsmouth
Christine Cotton	M6UBI	Portsmouth
Pete Coates	M1FHI	Rednal
David Bondy	G4NRT	Rochester
Angus Young	M0IKB	Scarborough
Mark Horn	M0WGF	Sheerness
David Leary	G8JKV	St. Ives
Stephen Smith	MM0SAJ	Stenhousemuir
Mike Binks	G0LJF	Stockport
Adrian Whatmore	G4UVZ	Taunton
Sean Yem	M7SYW	Wallasey
Ciaran Morgan	M0XTD	Warwick
Simon Tribe	G0IEY	Waterlooville
Julia Tribe	G0IUY	Waterlooville
Rob Mott	G0ECX	Weymouth
Colin Simon	M7DJL	Weymouth
Nicholas Grundy	G4NKV	Whitby
Paul Rosser		Whitland
Chris Ashby	G4AYT	Whitstable
Nicholas Harrold	G4IMO	Wisbech
Graham Le Good	G4GUN	Witney
David Holman	M0YDH	Wolverhampton
Dave Cash	G7MEG	Wolverhampton
Peter Lyall	G8FRH	Woodford Green
David Tarr	G3OUA	Worthing
Rob Johnston	G7MHF	Wrexham
US		
Chester Jaffee	KM6AVE	Berkeley
Thomas Stevens Jr	WB2AZQ	Long Branch, NJ
Gary Buck	KJ7NFE	Newberg
Carl Sorensen	NB7C	Payette

▶ *G1LPS*

Activity and Contests

Clive Reynolds G3GJA

Activity reports

2nd & 3rd October The weekend was not the best for portable operation weather wise, with added complications of a fuel shortage in the south. Best DX was between M0DTS/P and G4NVZ on 70cms. Signals were characterised by a lot of flutter from aircraft. Noel G8GTZ needed a Boeing 777 above the midpoint between him and Arthur G4CPE to achieve a contact over an obstructed 90km path.

▶ *G3NVZ's reception of M0DTS/P at 281km*

16th October Following the success on 70cms during the Activity Weekend, Steve G4NZV and Rob M0DTS arranged a sked to try the 281km path between them on 23cms. Steve received Rob at 2dB over threshold.

▶ *M0DTS as received by G4NVZ at 281km*

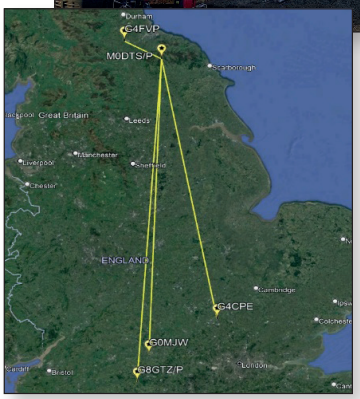
7th November This event was focused on 70cm and coincided with the Dwingeloo Radio telescope activation. Noel G8GTZ/P was seen 25dB above the noise at 560km by the Dutch group comprising Jaap PA0T, Gerard PE1BBI, Jan PA3FXB, Erik PA1ET and Nap PA1NG. They also logged another six stations on both 70cms and 23cms.

Noel also worked G4KLB/P, G4EML/P, G0MJW, G8GKQ/P, M0DTS/P, G4CPE and one-ways with G7VVF, G8AYC and G4XAT. Apparently, Rob M0DTS/P was a very good signal for most of the day and the first time they had a proper 2-way QSO despite multipath and fading.

▶ *G8GTZ/P screenshots*

Suffering from high winds on the North Yorks Moors, Rob M0DTS/P took five attempts to get an antenna up but was rewarded with a 335km 2-way contact with G8GTZ/P as best DX and three more 2-way contacts.

▶ *M0DTS/P contacts on 70cms - minimal antennas due to high winds*



70cms is clearly a very capable band for DATV DX, with better aircraft reflections and I've seen improved knife-edge refraction compared to 23cms over an obstructed path. This has led to the 2022 Activity Weekends being reorganised, so that 70cms can show its potential.

Reception via aircraft scatter (AS) is not usually successful using the Minitioune software for Windows; it doesn't lock up fast enough to catch the fleeting signals. The Portsdown 4 receive mode using the 'DVB-S2 No Scan' option is essential for AS, as is the AS prediction software from *www.airscout.eu*

2022 Activity Weekend schedule

The BATC is holding twelve Activity Weekends, spaced at four-week (+/-) intervals during 2022. The Weekends are aligned with the IARU contest in June and the Veron Activity Weekends that our Dutch friends are holding in March, June, September and December.

For 2022, the weekends will focus on three groups of bands on a repeating rota. Starting with January, the focus will be on 70cms. In February the 2m, 4m and 6m bands will be used, followed by March with 23cms and higher bands. That will then repeat for subsequent months in the same order, with June being skipped as that is the all-band IARU contest weekend. To ensure that all stations can get some activity, optionally 23cms can be used on every Activity Weekend during 2022.

Here is the schedule:

No.	Date	Bands
1	15th & 16th January 2022	70cms + 23cms
2	12th & 13th Feb 2022	2m & down + 23cms
3	12th & 13th March 2022	23cms & up
4	9th & 10th April 2022	70cms + 23cms
5	14th & 15th May 2022	2m & down + 23cms
6	11th & 12th June 2022	IARU Region 1 ATV Contest
7	9th & 10th July 2022	23cms & up
8	13th & 14th August 2022	70cms + 23cms
9	10th & 11th Sept 2022	2m & down + 23cms
10	8th & 9th October 2022	23cms & up
11	12th & 13th Nov 2022	70cms + 23cms
12	10th & 11th December	2m & down + 23cms

As usual, there are no set times for operating, although you should be aware that stations taking part in the Veron Activity Weekends operate from Saturday 12:00 UTC until Sunday 18:00 UTC.

Please try to make use of the DXSpot.TV website to find activity. The Dutch ATV stations have used it far more than British ATVers clearly showing that it helps to find ATV activity and set up contacts. The website is here: *dxspot.batc.org.uk* and is easy to use.

Christmas 2021 Repeater Activity Contest and Activity Challenge

The Christmas Repeater Contest 2021 will run again from Friday 24th December 2021 through to Monday 3rd January 2022 inclusive. The aim is to increase ATV repeater use and activity in general. On offer is a £100 prize for the repeater group with the most contacts recorded.

The on-line entry and ladder system will be used again on the BATC website (*https://batc.org.uk/ladder*) . The Ladder has fields for you to enter the points claimed and the repeater's callsign.

Please note that the rules have changed from last year; this year multi-band contacts with the same station at the same location on any one day are not permitted. However, if they are from different locations, i.e., one least significant QTH locator square different in a six character locator, the contact is valid.

The Activity Challenge will run alongside the Contest as before, so you can enter any non-repeater contacts you make. There are no prizes for the winner of the Activity Ladder Challenge but the first and second places will receive a certificate and your name and callsign will appear in CQ-TV.

The rules are available in PDF form here: *https://wiki.batc.org.uk/File:Christmas_2021_BATC_REPEATER_CONTEST-_ACTIVITY_CHALLENGE_RULES.pdf* and are reproduced below. Note the rules in the pdf document are the master version. The text below may have been changed for clarification.

Christmas 2021 BATC REPEATER ACTIVITY CONTEST and ACTIVITY CHALLENGE RULES

1. ***Introduction.*** The main object of an Amateur Television Contest is to promote ATV activity. Anyone interested in ATV, whether they are members of the British Amateur Television Club or not, are welcome to take part.
2. ***Eligibility.*** BATC Contests are open to all licensed radio amateurs who are equipped to transmit pictures by analogue or digital Fast Scan. For this contest there is also a receive only section.
3. ***Dates and Times.*** The contest will run from 0000hrs GMT on 24th December 2021 to 2359hrs GMT on the 2nd January 2021.
4. ***Location.*** The operating location must be within the terms of your licence. If operating away from your main station, please get the permission of the landowner. It is essential that you adhere to any local and national COVID restrictions in force.
5. ***Frequencies.*** Within the allocated segments of the 70cm, 23cm, 13cm, 9cm, 6cm, 3cm and 1.5cm bands for FSTV. The NoV bands of 71MHz and 146.5MHz are also eligible. Operation must be via repeaters to be valid for the Repeater Contest.

6. ***Power.*** Output power must not exceed that set out in the terms of your licence. 7. Exchange. Both a CALL SIGN and a FOUR-FIGURE code number must be conveyed via video and received via the repeater by another station. Reception of the repeater can either be via the RF output or the repeater's streaming channel. The same exchange should be used for direct contacts for points to be valid in the Challenge.

7. ***Confirmation of reception*** is by transmitting back the sum of the code numbers (not the actual transmitted number) on the repeater or on the talk-back channel. Confirmation via the streaming chat channel or other none radio means is allowed as is confirmation by another voice repeater (analogue or digital).

   Please note that all four digits in the contest number should be different and not consecutive. The numbers must be different for each band, e.g. these numbers are OK: 2741, 4820, etc, these are not:- 1111, 1138, 1381, 1234 etc. Reports should be sent using a 1-5 video quality report and a serial number, starting at 001 for each band.

8. ***Scoring.*** The following multipliers should be used: 71MHz & 146MHz @ 5 points per km 70cm @ 3 points per km 23cm @ 2 points per km Contacts on higher bands @ 5 points per km. For the Repeater Activity Contest, points can be claimed for one band per station per day. You may not claim points for multiple contacts with the same station on the same day on different bands. You can claim points for working the same contacts on each day of the contest. For the Challenge, on any day you may work the same station on different bands and claim points for each contact.

   Contacts from multiple locations are permitted on the same day, band and with the same callsigns. For example you can work into the repeater from home and then you can go out portable to two locations and all of the points earned /p can be added to those claimed for working the same stations on the same bands later in the day from the home station. RF or Internet links between two repeaters do not count for additional points.

9. ***Distance Calculations.*** All distances are calculated by the online entry program. For scoring purposes, all valid contacts shall be deemed to have taken place over a distance of at least 5 km, even if the two stations or the repeater in the contact have the same or adjacent locators. Scoring is be based on the distance between the centres of location squares, not map distance. Full 6-character length QTH locators must be used.

10. ***On-line logging.*** Use the Activity Ladder page on the BATC website here: https://batc.org.uk/ladder and fill in the boxes for each contact as appropriate.

11. ***Receive only section.*** Send an e-mail to the Contest Manager with log shee.t attached giving your Call sign / BRS No. and name and address, Band, Date/Time, Call sign of station seen, Repeater Callsign, Repeater Locator, Locator of other station, Code number received, km from your station to repeater, km from repeater to distant station and points claimed.

12. ***Disputes.*** The decision of the contest manager and/or the BATC Committee is final.

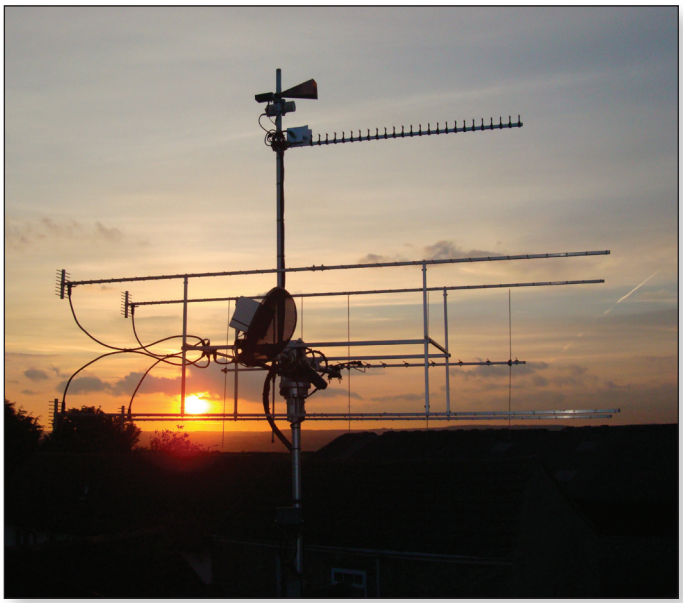
13. ***Spirit of the Contest.*** Don't leave your video transmission on any longer than necessary. Let other stations use the repeater / frequency as well. Contests mean activity and good fun, join in and, even if you only work one or two stations, please use the Ladder to record your activity.

14. ***Declaration of Interest.*** Although acting as contest manager, I reserve the right to take part.

15. ***Submission of entries.*** Transmitting section entries will only be accepted via the on-line Activity Ladder web page. No paper or spreadsheet logs will be accepted except for the Receive section.

16. ***Contact Address.*** Queries can be submitted to: C. Reynolds, 49 Westborough Way, Anlaby Common, East Riding of Yorkshire HU4 7SW.
    Email: *contests@batc.tv*

Clive Reynolds G3GJA / G8EQZ BATC Contest Manager
8th December 2021



BATC report to the RSGB spectrum Forum – November 2021

Noel Matthews G8GTZ

Whilst day to day activity continues on 70cms and 23cms, experimentation on the low bands (50 and 71MHz) plus the microwave bands above 2.3GHz continues, especially during BATC activity weekends. It is interesting to note that Dutch ATV operators have now adopted the narrow band techniques pioneered by the UK ATV community and RB-TV QSOs between the countries have taken place on 144/6 and 437 MHz.

The ATV community has recently developed products enabling the use of narrow band DVB-T based multicarrier OFDM technology with H265 video encoding to be used in bandwidths as low as 250 kHz.

This has enabled contacts on 51, 71 and 146 MHz to be made over paths not previously possible, due to multi-path with single carrier DVB-S. It is planned to carry out mobile transmission tests using narrow band DVB-T where it is hoped this will prove significantly more robust than DVB-S in this challenging environment.

Amateur operators around the world, including Europe, South Africa and Australia are now equipped with narrow band DVB-T equipment supplied by the BATC and we are hoping that we will see narrow band DVB-T video contacts with other countries / continents as the sun spot activity increases.

IARU region 1 contest

The Annual IARU contest is perhaps the best indicator of ATV activity and trends across the UK and Europe. In 2021, despite limitations on activity in some countries, there were 85 entries from 8 countries on all bands from 432MHz to 76GHz.

Disappointingly there was only 14 entries from the UK however G8GTZ was the overall region 1 contest winner and UK stations were band winners on all of the 6 bands above 2.3GHz.

A proposal to include 51MHz in the 2022 IARU region 1 contest is currently being discussed and if adopted will encourage more stations across region 1 to experiment with DVB-T which could result in some interesting DX opportunities.

The Bands

29 MHz

The inclusion of an experimental segment at 29 – 29.51 MHz has encouraged a number of operators to start building narrow band DVB-T OFDM equipment for that band.

It is envisaged operation will be 250KHz wide centered on 29.125MHz to avoid interference to the satellite band at 29.3 MHz.

50 MHz

It is hoped that the release of narrow band DVB-T equipment will result in some DX video contacts as the sunspot count increases.

71 MHz

Activity continues on 71MHz with DVB-T starting to replace DVB-S.

146-147 MHz

Many ATVers have applied for a special NoV to operate in this band and even though the maximum transmit power is limited to 100 watts ERP, ATV QSOs using 500kHz or less bandwidth over 200Km are now happening regularly with the current record standing at 407km.

430-440 MHz

This band is much more active due to the narrower bandwidth of digital TV transmissions that can now fit into this crowded allocation. Regularly there are long distance transmission of over 200 km made around the UK and into Europe.

1.3 GHz

In light of the potential changes to 23cms, BATC has published a proposed new standard migrating TV repeater outputs to DVB-S2 1Ms (1.2MHz occupied bandwidth) operation. Tests indicate a gain of 13 dB over a 16MHz FM signal with no loss in video quality.

2.3 – 2.4 GHz

There are still 2 repeaters licensed for this band and even though we lost 40MHz of the band in the PSSR process some simplex operation continues.

3.4 GHz

7 repeaters are now licensed for this band and due to a lower noise floor and easy receive systems using C band LNBs, the performance is equal to or better than 13cms. With the band having been reduced to 10MHz, there is only sufficient bandwidth to allow the digital repeater output to be on this band with inputs on other bands.

Due to bandwidth limitations there is little simplex operation on this band although stations are active during BATC and IARU contests using Reduced Bandwidth DATV.

5.6GHz

With the availability of the low cost (<£20) FPV FM ATV transmit and receive equipment we are seeing a significant increase in the number of ATV and WBFM stations using the 5.6 GHz band. There are 2 repeaters with inputs on 5665MHz and BATC is currently running a ladder contest on the band to encourage activity.

10 GHz

6 repeaters are licensed for this band and it is also quite active with simplex operation.

A number of stations are active with DATV on the band using standard narrow band transverters from 144 / 432 MHz to generate DATV signals on the band. The current best DX stands at 407Kms between M0DTS and G4UVZ worked during a tropo opening in October 2018.

24GHz

A number of stations are active on 24GHz ATV undertaking mainly portable work with the current best DX standing at 136kms.

Higher bands

A number of stations are active throughout the year on 47 and 76 GHz DATV and M0DTS has successfully transmitted video on 134 GHz.

Oscar 100

The launch of the geostationary Oscar100 satellite has seen a large increase in activity and interest in ATV – over 150 UK stations are known to be operational on DATV

TV Repeaters

We currently have 39 TV repeaters licensed on the 1.3 GHz, 2.4GHz, 3.4GHz and 10GHz bands with a mixture of analogue and digital transmission outputs.

The BATC

BATC membership continue to grow with Oscar100 encouraging more stations to be active on DATV - the Portsdown DATV transceiver based on the Raspberry Pi proving to be a popular route back in to the hobby for many.

BATC believes that building a community of ATV builders and operators through online communities on the member's forum, providing a reliable source of relevant information on wikis and in the CQ-TV magazine and reporting activity on social media is fundamental to the growth we have seen both in ATV activity and BATC membership.

The BATC continues to support and drive initiatives with a program of awards and grants to recognize achievements in the community and the use of the BATC shop stocks otherwise difficult to source components for BATC sponsored projects.

BATC has actively supported the development of the Raspberry Pi4 / Pluto based Langstone narrow band transceiver project and the Ryde DATV set top box project.

In order to further increase operator numbers, BATC has awarded a number of prizes for contest winners and organizes a monthly activity weekend timed to coincide with activity weekends in neighboring IARU countries, thereby helping to promote the use of all our bands from 50 MHz up.

▶ *G8GTZ working 47GHz*

Duplex filter for 13 and 23/24 cm

Chris van den Berg PA3CRX

Dish feeds covering several bands have been discussed in the previous CQ-TV. This means that all signals enter and leave the shack through one cable. Not very handy if you want to have a duplex contact. Can such a cable only be connected to one device (transmitter or receiver)?

So no. With a good duplex filter you can transmit on one band without a trace of interference on the receiver in another band. However, the low loss in the filter will have to be taken for granted.

For regular operation this is no problem. With very weak signals, it can sometimes make the difference to remove the filter.

Such a filter is easy to make and requires no adjustment. I made it according to the design of Jannes PA3DCP that was described in Repeater magazine 3/1998. However, mechanically it was not so easy so I made another solution for that.

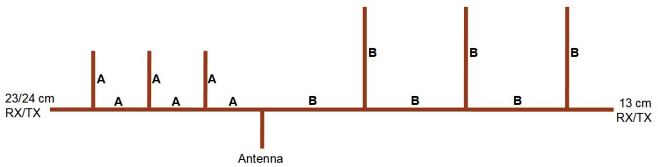
Theory

Theory is simple: per band ¼ wavelength sections of coax. With such open sections, the impedance will be low on the other side. So they will form a notch filter (for that specific frequency). They are connected to each other by ¼ wavelength sections of coax. Of course velocity factor need to be taken into account while defining the length (for the semi-rigid cable I used it is 0.69).

For the 13 cm band this means six sections of (¼ x (300 / 2387) x 0.69) results in 21.67 mm. (sections marked in the picture with 'A').

For the 23/24 cm band six sections of (¼ x 300 / 1275 x 0.69) results in 40.58 mm (sections marked in the picture with 'B').

The length of the cables to the connectors can be chosen for your convenience.



▶ *Diagram of the duplex filter*

Construction

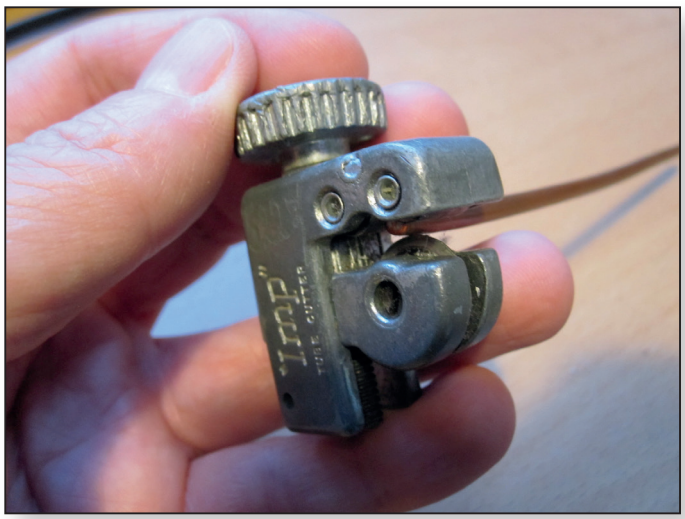
There are many ways to do it practically, I did it the following way.

Required materials: three N-connectors with semi-rigid connection, some pieces of semi-rigid and seven plates of copper or brass foil of about 15 x 30 mm. (mine was a bit thick: 0.4 mm).

And 'of course' a housing where the filter can fit in (although I know someone who never assembled it in a housing).

For easy and accurate cut of the semi rigid, a small pipe cutter is very handy. After the copper shielding is cut, a Stanley knife could cut the insulation and the inner core. At the ends that should be soldered together, the copper could also be removed by the pipe cutter (5 mm or so).

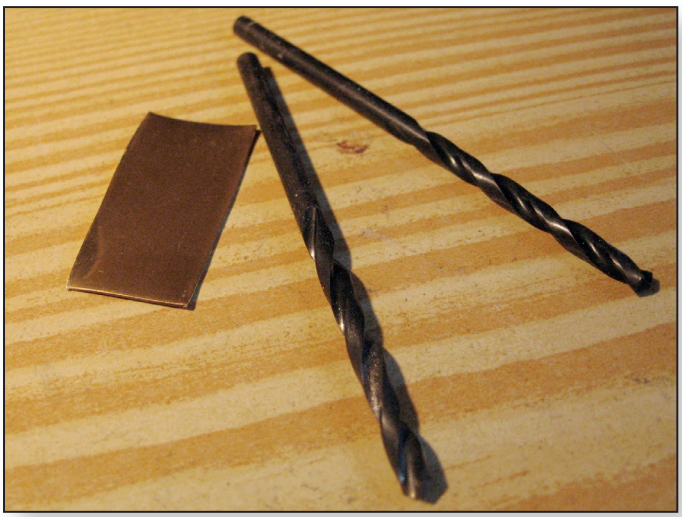
Clean the parts that need to be soldered with (for example) sand-paper or scotch bright.



▶ *Pipe cutter in action with semi-rigid coax to remove the shielding at one end*

The plates are used to mechanically connect the semi-rigid pieces together.

Fold the plate around a drill bit (that is the same diameter as the semirigid). Then hold an other drill bit at right angle and pinch at the same time the folded plate together with two (water pump) pliers.



▶ *Two drills and a plate of brass (or copper) to get the plate in the right shape*

▶ *By folding the plate around one drill and then squeezing it with the pliers, the whole is deformed appropriately*

When the inner conductor of three semi-rigid pieces have been soldered together, the homemade, slightly open 'T piece' can be clicked over it and soldered in place (while clamping it with a wooden clothespin or plier). That way it becomes a solid whole. Check if really no short circuit is made, after every soldering action. Later on, you will have no clue where to search if it happened.

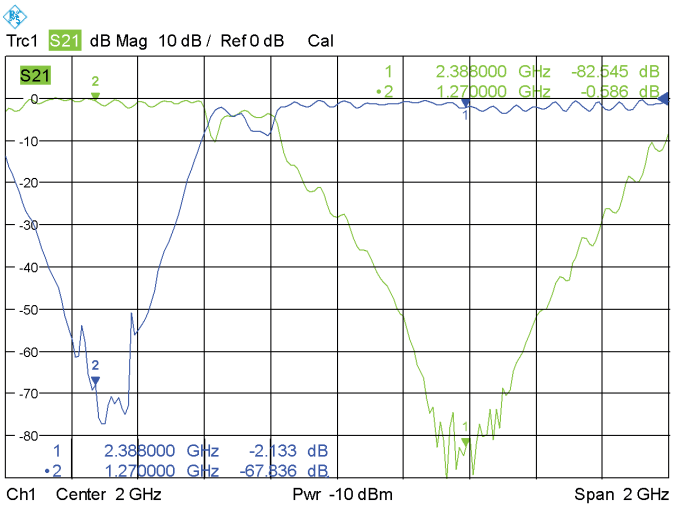
With each T connection you can choose which direction to go, so that the circuit does not necessarily have to be stretched (like the diagram). The semi-rigid can also be bend a bit, if needed to fit in the housing.

This is the way I got the whole thing in a box of 50 x 75 x 110 mm.

▶ *The entire filter, the semi-rigid sections may of course also be bend*

The result is definitely good. When transmitting with 25 watts in the 13 or 23 cm band, there is no trace in the reception on the other band.

Measurement results: see the graph showing both bands, where the damping was down to the noise floor of the measuring instrument.



▶ *Attenuation and passband of the one build by PA3CRX. Two bands in one graph over a range from 1 to 3 GHz*

As you can see, it is possible to be busy with some bits and pieces that are maybe laying around in your shack resulting in a very handy filter.

The Portsdown noise figure meter

Dave G8GKQ

The test equipment suite of the Portsdown 2020 and the Portsdown 4 now includes a noise figure meter which uses the LimeSDR Mini and a user-provided noise source with a custom switching power supply to provide an indication of the performance of preamps and transverters.

The ability to measure the noise performance of a receive system is a very useful capability and enables the system to be adjusted for optimum sensitivity. Until recently this has only been possible using expensive professional equipment such as the HP8970 automatic noise figure meter.

The release of this feature in the Portsdown system puts it in reach of the average amateur who now has the capability to optimise their receive system.

General principle

The limiting factor on the performance of many VHF and microwave receivers is the amount of noise generated by the input stage of the receiver. G8GTZ discussed this in his excellent CAT 21 Video *https://www.youtube.com/watch?v=lfSi7vTQK44* CAT 21 Video which is essential viewing before trying to use the Portsdown Noise Figure Meter.

The noise generated by input stage of a receive system can be estimated by making comparisons between the receiver output level (at IF or RF) with a dummy load at a known temperature connected to the input, and its output when connected a calibrated source of low-level noise.

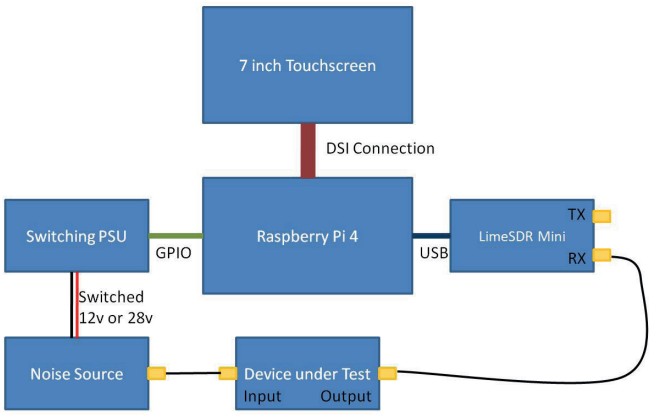
This is often referred to as the "Y Factor" method and is used by most professional noise figure meters and is the method used in the Portsdown. A noise source provides this function, it behaves as a dummy load when off and generates a known level of additional noise when on. In this implementation, it is switched on and off at about 10 Hz.

The noise level at the output of the preamp/transverter is measured during the on and the off periods, is then averaged and then the noise contribution of the receiver itself can be calculated.

The noise contribution from amateur preamps and transverters is normally stated as a logarithmic "noise figure" measured in dB, which relates to the difference compared to an ideal, noise free receiver. Noise figures of around 2 dB are acceptable for VHF receivers (where there is a lot of atmospheric noise) whereas good microwave receivers typically achieve between 1 and 2 dB.

Lower noise figures are desirable for moon bounce and satellite use where the background noise is much lower. Lower noise figures may also be stated as a noise temperature and there is a direct relationship between the two. This Wiki page provides a full explanation: *https://en.wikipedia.org/wiki/Noise_temperature*.

Equipment Required



▶ *Portsdown Noise Figure Meter Block Diagram*

To measure noise figure using the Portsdown 4, a Lime SDR Mini, a calibrated noise source and a matching switched power supply are required.

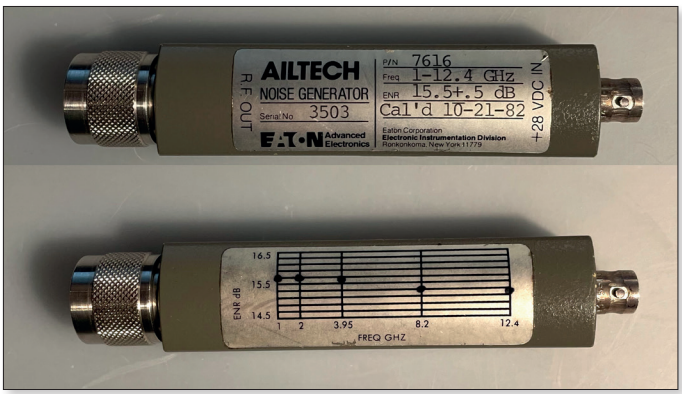
Note - The software also works with a LimeSDR USB or a LimeNET Micro (although accessing the noise source switching signal from the DIMM connector of the Raspberry Pi 3 compute module on the LimeNET Micro is a challenge – ask me for details). The Pluto SDR is not currently supported.

Noise sources

A noise source (or noise head) does exactly what it says – it generates a known level of noise when supplied with a specified voltage. To measure noise figure, this voltage (and hence the excess level of noise) is switched on and off controlled by the noise figure meter.

All noise heads have an "excess noise ratio" (ENR) which is a measure of the level of noise that they produce. Professional units will have a calibration chart or table stating how this ENR varies with frequency. Typical ENR values are 5 or 15 dB.

The accuracy of the noise figure meter is limited by the accuracy of the noise source ENR calibration. However, an uncalibrated noise source can still provide a very valuable alignment aid.



▶ *A Typical Commercial Noise Head with Calibration Chart*

Second-hand noise heads (such as the HP346B) are available on eBay for £200 or more, depending on their condition and currency of calibration. Alternatively, G8FEK of RF Design sells some suitable models *https://g8fek.com/* See the separate article about these in this issue of CQ-TV.

Many of the noise sources sold on eBay are designed to produce high levels of noise across a broad bandwidth to allow the alignment of filters using a spectrum analyser. These produce far too much noise for use with a noise figure meter and are totally unsuitable. Look for stated ENR figures of 25 dB or below.

If you do not have a calibrated HP or similar noise source, they can be homebuilt, but calibration is a problem. This webpage has an easy to build design (but note it requires -9v switched supply) complete with expected ENR charts and a PCB design which is available to order from OSH Park *http://www.janbob.com/electron/Noise/NoiseGen1.htm*

Even if you have no access to a calibrated noise source, it is well worth home-constructing one; you can still use the indications from this noise figure meter to align your receiver for optimum sensitivity, which will usually correspond to the minimum noise figure.

Noise source power supply

A switched power supply is required to turn the noise source on and off when commanded to by the noise figure meter. Many professional noise sources (as used by HP) require a 28v supply in their "on" state. Check what your noise source requires before connecting it to the supply described below.

The noise source supply switching must be synchronised with the noise detector in the Portsdown.

The switching signal is taken from pin 26 of the Portsdown GPIO port where a logic level (3.3v/0v) is used to turn the noise source on and off. This logic level controls the higher DC voltage required to drive the noise source.

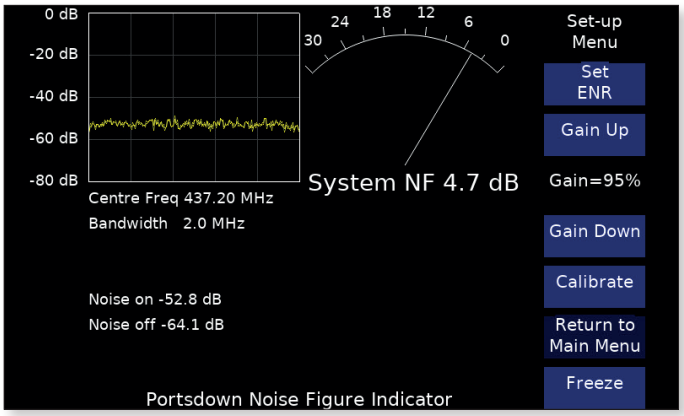
A suitable design by Dave, G8GKQ is described in this issue of CQ-TV and on the BATC Wiki. Mike, G0MJW has produced a PCB which will be available in the members' shop. The design is described in this issue of CQ-TV and on the BATC Wiki.

Preparing for a measurement

Once you have assembled all the required modules, ensure you have the latest Portsdown software loaded (Version 20211030 published 2 Nov 2021 or later) and connect your LimeSDR to the Portsdown by USB. Note - the LimeSDR Mini should have gateware V1.30 or the LimeDVB gateware loaded.

Connect your switched power supply to pin 26 of the Portsdown GPIO and connect the noise source. Then connect the output of the noise source directly to the LimeSDR Mini receive port.

From menu two, select Test Equipment, NF Meter. After the levels have settled (which may take 10 seconds or so) you should see the screen below.



▶ *Noise figure meter start-up screen*

Setup menu

The first screen shown is the set-up menu. If all is working correctly, you should see two flickering lines on the small band viewer window. The lower line is the detected noise with the noise source off, and the upper line is the detected noise with the noise source on.

You will need to visit other menus to prepare for your measurement.

Setting the measurement frequency

Press "return to main menu", "freq and bandwidth" and then "centre freq". Set your desired measurement frequency. Alternatively, you can use one of the presets (146.5, 437, 748, 1255 or 2409). The entered frequency should be the signal frequency if you are testing a preamp, but the IF frequency if you are testing a transverter (see below for some of the complications that this introduces).

Measurement bandwidth

It is suggested that the measurement bandwidth is left at the default of 2 MHz (as was standard on the early HP Noise Figure meters) but it can be adjusted down to 500 kHz and up to 20 MHz at this point.

ENR

Then select "Set-up Menu" again to enter the ENR of your noise source. Touch the ENR button and enter the exact ENR for your noise source at the selected signal frequency (read from its calibration chart). Note that if measuring a transverter you may have to change this value later.

Lime gain

Next, the gain of the LimeSDR needs to be adjusted so that it is operating in its linear region. Use the "gain up" and "gain down" buttons to adjust the "noise off" level shown at the bottom left of the screen to between -65 dB and -55 dB. If set too low, the indication will change colour and a message advising an increase in Lime gain will be displayed. If the gain is set too high, there is a risk that high gain preamps may overload the system when tested, leading to inaccurate readings.

The meter will now display the noise figure of your LimeSDR. This is very dependent on screening and digital noise pickup, but should be in the range of 5 dB to 10 dB between 146 and 1255 MHz.

Making a simple measurement

If you now insert your preamp or transverter (the device under test) between the noise source and the LimeSDR, you should see the "system" NF improve (hopefully) and you can make adjustments to your device to optimise its performance.

What is displayed on the NF Meter is the noise figure of the complete measuring system comprising of your device and the LimeSDR. This means that if your device has low gain, the LimeSDR might introduce a contribution to the total measured noise figure. However, this mode enables quick and easy optimisation, and is very useful for general bench testing.

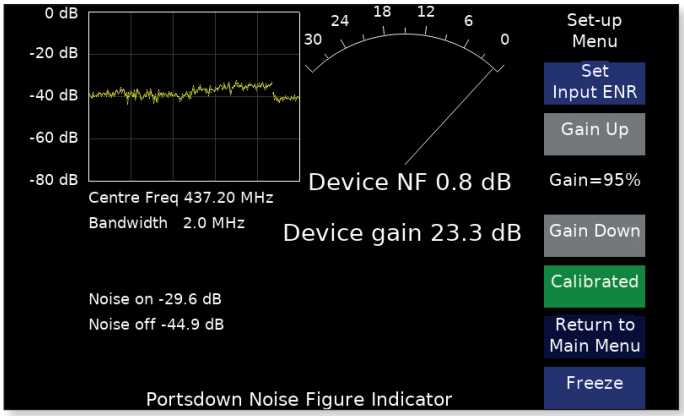
Measuring gain and NF of a preamp

By calibrating the noise levels of the LimeSDR, it is then possible to calculate the gain and NF of a preamp and exclude the NF contribution of the LimeSDR Mini. This procedure only works for one frequency and one Lime gain setting, and needs to be repeated if frequency, Lime gain or bandwidth are altered.

Note that this calibration procedure is not the same as calibrating the LimeSDR; it is calibrating the noise response of the LimeSDR.

To perform the calibration, connect the noise head directly to the LimeSDR, and set the frequency, bandwidth and gain as specified above. Then, in the set up menu, press "calibrate". The system will average a number of readings and then display the "device" noise figure and gain, which should be around zero.

Now put your preamp in circuit, and the meter will display the preamp (the "device") noise figure and gain as shown below.



▶ *Measuring the NF and Gain of a Preamp*

Once calibrated, the Lime gain buttons are locked (as adjusting them would invalidate the calibration). To adjust the Lime gain, press the "calibrated" button again to come out of calibrated mode.

Measuring a transverter or receive converter

When measuring the NF of a transverter, the noise figure meter measurement frequency should be the IF frequency (eg 144 or 432 MHz).

However, the ENR entered once the transverter is in place should be the ENR of the at the signal frequency (for example 10 GHz), not the IF frequency.

Measuring true transverter gain and NF

It is possible to provide a good indication of the transverter gain and noise figure, however the procedure is much more complex.

First, the NF Meter should be calibrated at the IF frequency using the ENR of the noise source at the IF frequency. Once the instrument calibration is complete, then the transverter can be put into circuit with an appropriate noise source for its input frequency.

The "set input ENR" button should then be pressed, and the second ENR value for the input frequency (eg 10 GHz) entered. The NF meter and gain will then indicate transverter NF and transverter gain to show that it is calculating using the two ENRs, one at IF and one at signal frequency.

Great care needs to be taken, by using IF filtering, to ensure that no local oscillator signals are presented to the LimeSDR receiver, and that only one sideband of the first mixer is being measured. A good image filter (after the first RF preamplifier in the transverter) is essential.

Meter scale

The "analogue" meter has five scale settings: a wide 30 to 0 dB, narrower 30 to 20 dB, 20 to 10 dB and 10 to 0 dB, and a narrow 5 t0 0 dB. You can move between these scales by touching the right or left side of the meter face. Note that the meter reads lower noise figure (better) to the right, and higher noise figure to the left. This is the convention followed on older analogue noise figure meters.

Sources of error

It is very difficult to perform accurate noise figure measurements; assuming none of the errors listed below are present, the Portsdown noise Figure meter should indicate within 1 dB of the correct value. To get the best accuracy, attempt to minimise the following sources of error:

1. Noise source ENR accuracy. Errors in the stated ENR of the noise source will directly affect the NF reading. If using a home-built noise source, try to compare it with a more-recently calibrated noise source at specified frequencies. microwave round tables are often good events to do such comparisons.
2. Noise source reflection coefficient variation. Many noise sources change their reflection coefficient (SWR) between the on and off states. The change in input matching can cause GasFET preamplifiers to appear to have much better NF than they actually have. This error can be minimised by using high quality attenuators between the noise source and the preamp; the attenuation value of the attenuator subtracts directly from the ENR to produce the new ENR. So if you have a 15 dB ENR noise source, always use an additional 10 dB attenuator (and hence enter 5 dB ENR) if trying to measure low NFs.
3. SDR non-linearity. The SDR needs to be operating in its linear region for accurate measurements. This is why the Lime gain needs to be adjusted before measuring, and if a preamp or transverter has particularly high gain (more than 30 dB) it is recommended to put an attenuator in-circuit after the preamp to prevent overdriving the LimeSDR.
4. Interference in the passband. Interfering signals within the noise figure meter passband should be visible on the bandviewer screen. These can cause inaccurate readings; if they are spurii from the LimeSDR, a small frequency change can often put them out of the passband. Note that the DC spike (in the centre of the bandviewer display) is rejected by the measurement software and is not a problem whatever its amplitude.
5. Connectors and cables. The noise figure indication has a resolution of 0.1 dB. Any loose connections or lossy cables will cause the indicated noise figure to increase or vary, so use the best quality possible and make sure that connectors are properly tightened.
6. Temperature. Noise sources are calibrated at a constant temperature (generally 290 Kelvin which is 17 Centigrade). Higher test bench temperatures will cause very small inaccuracies which are only significant for moonbounce and Satellite applications.
7. LimeSDR digital RF noise. The LimeSDR receiver suffers from a lot of digital noise, both from the on-board circuitry and from noise conducted along the USB cable.

▶ *LimeSDR Mini in an ESA Case*

Each sample will vary, but I took the following measurements of the noise figure of some LimeSDRs. The LimeSDR Mini in an "ESA" metal case was particularly bad; I did optimise another LimeSDR Mini by putting it in a larger sealed metal enclosure and selectively grounding parts of the device. The LimeNET Micro and LimeSDR USB measurements were also taken after some optimisation.

Test Freq MHz	LimeSDR Mini (no case)	LimeSDR Mini (ESA Case)	LimeSDR Mini (optimised)	LimeNET Micro	LimeSDR USB
146	5.5 dB	11.0 dB	6.0 dB	8.5 dB	13.5 dB
437	5.5 dB	11.0 dB	5.0 dB	8.5 dB	10.0 dB
1255	9.0 dB	15.0 dB	8.5 dB	10 dB	8.5 dB
2395	19 dB	> 25 dB	9.0 dB	18 dB	19 dB
3405	22 dB	> 25 dB	19.5 dB	25 dB	16 dB

▶ *Basic LimeSDR noise figure measurements*

Conclusion

Measuring noise figure is a complex process; do not expect to get perfect results first time. Play with the test set-up and the device under test, adding attenuators in both the input and output to check that they affect the results in the manner that you would expect them to.

To learn more, read the two HP Application Notes referenced below; the software was designed based on the principles and formulae in those notes.

The main usage of the meter should be to optimise your equipment, and provide a benchmark for your optimisation from day-to-day. If you want to know the absolute noise figure of your receiver, then take it to a microwave round table where someone might have access to recently calibrated noise figure measuring equipment costing many thousands of pounds.

Improving the noise figure of your system can be as rewarding as tweaking for maximum power output; it is well worth the effort!

References

- Agilent application note 57-1: Fundamentals of RF and microwave noise figure Measurements *https://web.stanford.edu/class/ee133/appnotes/5952-8255E.pdf*
- Agilent application note 57-2: Noise figure Measurement Accuracy – The Y-factor method *https://g8fek.com/uploads/9/4/4/3/94435411/an57-2_5952-3706e_hp_nf_measurement_primer.pdf*

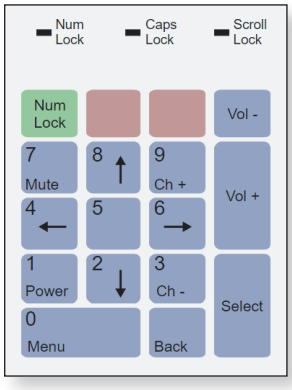
Ryde update

Tim MW0RUD

At CAT21 I said that the next thing to work on with Ryde was to tick off several small features before starting on anything big.

Since then there have been two updates each with two new features that have been on the list for a long time.

The first new feature to be added was volume control; this now displays the current volume on screen and allows the volume to be changed.



▶ *Keys to control the Ryde using the keyboard number pad*

You either need a remote with dedicated volume buttons, or the network console which has been updated to add the extra buttons (the + and – keys on the number pad).

The other feature that came out in the November update was the ability to output the current band ID to the GPIO band pins on the Raspberry Pi. When switching between bands or presets this feature can be used to automatically switch between input signal sources using an RF switch.

Support for the second Pi HDMI port was included in the December update. This is only basic support for one display at a time but it should now work with the second HDMI port if the first port is damaged. The first port is still recommended where possible due to some limitations with the second port.

Support for the MiniTiouner RF level indication (added to Portsdown in the summer), for configuring receive gain has also been added to Ryde. It uses the same calibration values as the Portsdown, so the advice to aim for a noise level indication just above -70 but not above -35 applies.

If you think of a new feature that you would like to see on the Ryde, please the check the issues list *https://github.com/eclispe/rydeplayer/issues* and add it if it is not already there.

EMF compliance for ATV Operation

Dave G8GKQ

Since November 2021, it has been a condition of the amateur licence that you conduct an EMF assessment before transmitting and take steps to ensure that members of the public are not exposed to EMF above safe limits.

The RSGB has published guidance on pre-assessed equipment configurations for rotatable beam antennas for 50 MHz to 1.3GHz, and recently provided an updated calculator for these configurations.

Most of the RSGB's guidance, which can be found online at *https://rsgb.org/main/technical/emc/emf-exposure/* has been drawn up by Peter G4DSE and Ian GM3SEK who gave the EMF presentation at the 2021 BATC convention in October. The presentation can be found on the BATCOnline YouTube channel:
https://www.youtube.com/c/BATCOnline

Following that presentation, the BATC and the UK Microwave Group (UKuG) formed a small team with Peter and Ian to coordinate the development and communication of EMF compliance guidance to BATC and UKuG members. The aim is to help prepare the RSGB "pre-assessed equipment configuration #3" report (PAEC-3) to satisfy Ofcom that it provides a valid route to claiming compliance for microwave stations using dishes.

As the full pre-assessed equipment configuration report will take some time to complete, and operators have the need to perform their EMF assessments now, some interim guidance has been prepared. You can read the interim guidance here on the BATC wiki:
https://wiki.batc.org.uk/images/0/0e/PreliminaryInfov20211122.pdf

One example presented in the interim guidance shows the "exclusion zone" for the area where members of the public should be prevented from standing in the vicinity of a 1.2m dish transmitting at 20 degrees elevation to QO-100.

This shows that the exclusion zone for a 50W transmission on this ground level dish extends forward to about 5m and, at its widest, 0.8m either side of the dish centreline.

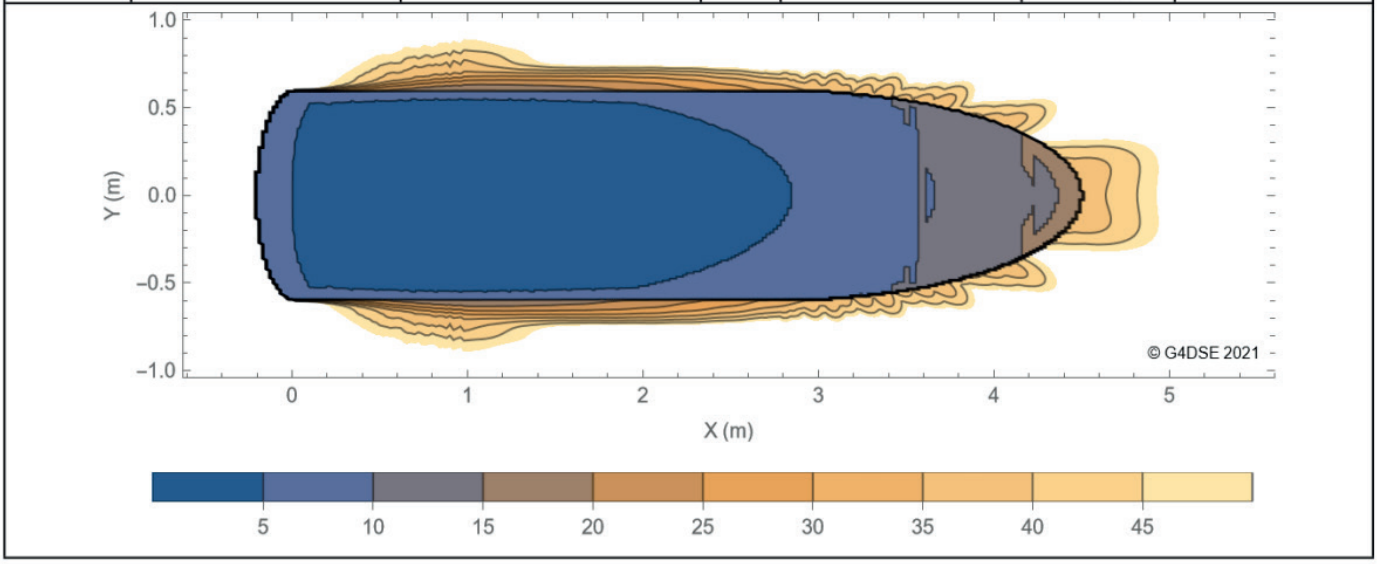
Many examples similar to this for satellite and terrestrial use are being evaluated and will be included in the pre-assessed equipment configurations for microwave aperture antennas.

The BATC and UKuG continue to be involved to make this guidance as useful and relevant as possible. Further updates will be published on the BATC forum and in future issues of CQ-TV.

Our thanks go to Peter and Ian for the enormous amount of effort that they continue to put into this work on our behalf.

"Ground level", 1.2m diameter

Freq.	Aperture diameter	Mid-aperture height	F/D	Rim attenuation	Beam Tilt	Offset/Prime
2.35GHz	1.2m	0.8m	0.65	8dB	20deg	Offset



A nice little 'Ryde' in the country

a BATC Ryde designed for portable use

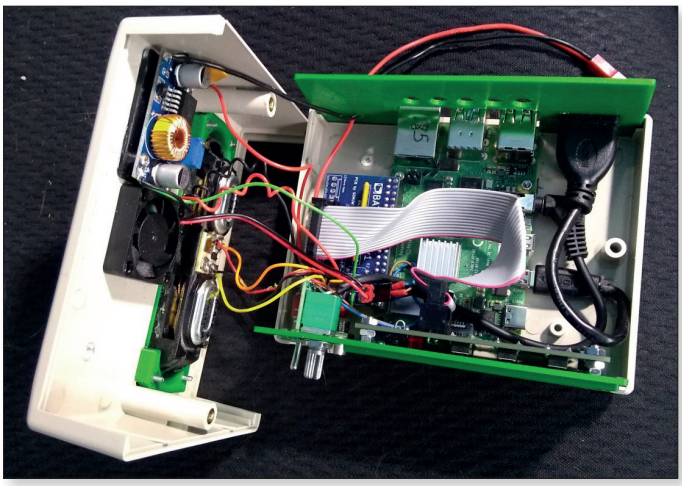
Gareth G4XAT

It didn't take much to get a Ryde receiver going for the shack – one RPi4, an IR sensor, one resistor and a recycled HDMI-capable monitor along with some PC speakers (my monitor does not have speakers, it's an old laptop screen re-purposed with a Chinese driver board).

It worked well (especially with the new 'Quicktune' on the job) and was fine for a quick test/tune. Not ideal for a bare motherboard to be on a bench which wasn't even tidy on the first day, let alone three years later.

While looking for something else I happened across a nice little 'clam-shell' plastic box that I must have bought for something a few years ago. It came from Farnell, but I did not keep the part number – sorry. Anyway, I looked at the box and the RPi4, along with the BATC front panel PCB and wondered: 'Would it fit?'

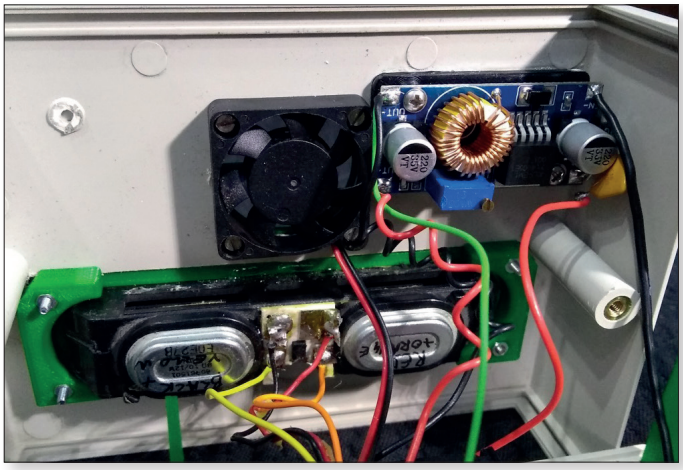
As I had already designed a front panel with bezel for the Ryde PCB, it was a logical step to use the same process (CAD and my Prusa 3-D printer) to produce a whole replacement front panel for the box, along with some nice extras.



A tiny stereo audio amp as used in my Portsdown/Langstone combo was ordered again from eBay, (search for 'PAM8403 Mini Digital Stereo Amplifier Module Board 3w Class D Potentiometer') and the second pair of stereo speakers rescued from an old flat-screen telly were found to fit – just.

With the USB and RJ45 on the back of the box, it left room for a HDMI socket (a short micro-HDMI to HDMI extension), secured with two tiny self-tapping screws into the moulded plastic surround. DC power 'in' is via a JST silicon lead, then a polyfuse, toggle switch with a 'power available' LED and into an eBay three-Amp buck down-converter set to 5.15 Volts and wired direct to the RPI4 GPIO pins.

A small five-volt fan (similar to those used on a Lime Mini) was fitted with a custom grill, air-in holes being provided along the back panel for a cooling breeze to pass over the heatsinks on the RPi4.



It is a bit of a tight squeeze in the box, but other than having to cut away one end of the ribbon cable socket it does all look reasonably planned.

The audio is routed to the 3.5mm jack by editing one line in the Ryde script and although better than nothing, the internal speakers struggle with some of the QO-100 audio (though it may not be entirely the speakers' fault).

There is room to add an extension 3.5mm socket on the back panel (also custom designed) for using external PC speakers, and a composite video out phono socket (if the RPi is configured as such).

The only issue is if I need to change the SD card - that's not accessible without opening the box (two screws) and lifting the front panel. The SD card can then be removed.

While I can upgrade from my network in-situ and edit the odd line with Putty, all should be well, and the lid can stay on. Having the pushbuttons as 'emergency reserves' for when I leave the remote control behind will, I'm sure, pay off one day. In the meantime, the Ryde sits below the baseline of one of the shack monitors, and provides entertainment in the shack depending what is being sent on the satellite. Thanks to the developers/software writers for making yet another excellent piece of kit out of a RPi.

Stop press: At the CAT21 event I spotted a small HDMI/12 volt monitor with speakers – so of course I bought it. It came with several mounting options, one of which suited the Ryde perfectly. I've been using this for the Thursday BATC QO-100 net since the summer, it's really very good and sound quality too is very adequate. Why a 'Ryde in the country'? – well, it will be going portable with me as it makes a great sanity monitor for 'is my signal decodable'.

ISS SSTV in late December

Amateur Radio on the International Space Station (ARISS) will be supporting Slow Scan TV (SSTV) operations from the International Space Station during the period of December 26-31 2021.

The images will be related to lunar exploration. The transmissions should be available worldwide on 145.800 MHz FM. The planned SSTV mode is PD 120.

Planned start and stop times are currently listed as:
Start – Dec 26 about 18:25 GMT
Stop – Dec 31 about 17:05 GMT

The signal should be receivable even on a handheld with a 1/4 wave whip. If your rig has selectable FM filters try the wider filter for 25 kHz channel spacing.

Check the ARISS SSTV blog for the latest information
http://ariss-sstv.blogspot.com/

ARISS SSTV Award *https://ariss.pzk.org.pl/sstv/*

Useful SSTV info and links:
https://amsat-uk.org/beginners/iss-sstv/

You can get predictions for the ISS pass times at:
https://www.amsat.org/track/

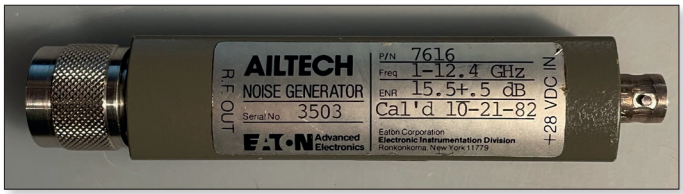
Noise sources for NF measurement

Dave G8GKQ

The Portsdown noise figure meter described in this issue requires a "calibrated" noise source for correct operation. This article presents some options to satisfy that requirement.

Noise sources from major manufacturers

Pre-owned noise sources from HP (Agilent), Ailtech/ EATON and other similar manufacturers do appear on eBay and at rallies, but usually command prices of more than £200. Some examples are illustrated below.



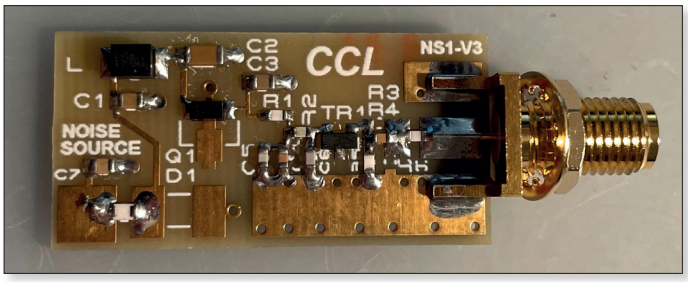
I would expect these sources to come with an (expired) ENR calibration graph, either on the side of the source, or on accompanying paperwork.

Precision noise sources from RF Design

RF Design, run by G8FEK, manufactures a number of precision noise sources and noise generators.
https://g8fek.com/

Their two precision noise Sources, the RFD 2305 and the RFD 2315 look ideal for use with the Portsdown noise figure meter, but are expensive at £195 and £175 respectively.

Cheaper noise generators from RF Design



▶ *The RF Design "BBGen pcb"*

RF Design also offers the cheaper "BBGen pcb" and "XGen pcb" at £62 each. Both would be well suited to use with the Portsdown Noise Figure Meter, although offering less absolute accuracy.

I tested the "BBGen pcb". The manufacturer's specification of the device is:

Frequency 0.1 – 5000 MHz
ENR min 21.5 dB, max 26.5 dB
Output flatness +/- 1.5 dB
50 ohm VSWR on/off max 2:1 / 10:1
DC Power: 11 – 15 v, 5.0 mA max.

The small (35mm x 18mm) PCB was well-built with a female SMA bulkhead output connector supplied with a nut and washer for easy installation in a (user –provided) protective box. It is also available boxed for an extra £35.

I measured the current consumption as 2.2mA.

Measuring ENR accurately is almost impossible using amateur equipment, but my tests indicated that the device's ENR was in the range between 25.0 dB and 23.0 dB over the range 146 MHz to 2.4 GHz. This is well within the specification (which does extend up to 5 GHz).

Given the large change in VSWR between the "on" and "off" states, I would recommend that the BBGen PCB is used with a 15 dB SMA attenuator on the output. This would have two benefits:

- The ENR would be reduced to a more practical 6.5 dB to 11.5 dB, allowing more accurate NF comparisons at low NFs.
- The change in output VSWR between the on and off states will be much reduced, allowing more accurate measurements of preamps that are sensitive to changes in input match.

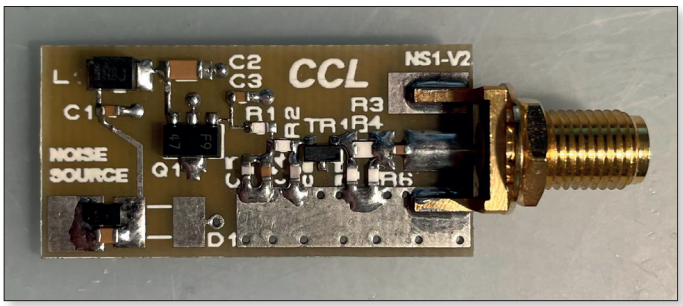
- Suitable SMA Attenuators are available on eBay rated to 6 GHz for about £10. Although their performance at above 3 GHz may be questionable, their performance at 2.4 GHz and below should be good enough for this application.

The "XGen pcb" has a similar specification but covers the frequency range 5 GHz to 12 GHz, and would need an added output attenuator rated to 12 GHz.

Calibration of devices such as the "BBGen pcb" and the "XGen pcb" is not easy; I would suggest that users try to compare the performance of their BBGen (together with any attenuator) with that of a recently calibrated noise head at one of the Microwave Round Tables.

Discontinued Items

RF Design used to offer the "RXGen" with an ENR of about 10dB covering 2 MHz to 2400 MHz. Again, this would be an ideal device for use with the Portsdown noise figure meter as its price was similar to the "BBGen pcb" and it would not need an output attenuator. I measured one of these and it seemed to perform well within its specification of 10dB ENR +/- 0.5 dB.



The discontinued RXGen test source

Kevin G3AAF has the final few of these devices for sale at reasonable prices. Please contact him directly at *kevin.g3aaf@gmail.com* .

Homebrew noise sources

It is possible to build a homebrew noise source using the reverse-biased base-emitter junction of a high frequency transistor and one such design is described at *http://www.janbob.com/electron/Noise/NoiseGen1.htm*. These are perfectly suitable for receiver optimisation, but measurement of an accurate "noise figure" would require calibration.

If you were wondering what it took to produce the online, live CAT21 Part 2... this is it!

QO-100 Accessory Unit

David Holman M0YDH

I've made the unit pictured in a 1U 19 inch rack case which combines lots of components of a QO-100 DATV system. I had a regular rats' nest of cables and no room on the operating desk. Also I learnt from Noel G8GTZ one Thursday net that the output from e.g. a Portsdown stays in transmit and the driver amplifier is powered on and off as the PTT item. After some transmit accidents, I needed to make an improvement here.

I bought an 18VDC 3.3A power supply – Stontronics T3179ST - as a starting point. The bias tee voltage into the LNB for TV is 18V so that was a good starting point. I had some Traco power DC-DC converters that James G0DQH had kindly given me. Cheaper voltage regulators would also do. I carved a circuit card in plain copper board with a small grinding disc and scalpels and mounted these. Converters. I have a quad LNB where one input is used for injecting a precision 25MHz reference frequency from a Leo Bodnar clock. The other 3 inputs are available for reception. I installed 3 bias tees sourced from Ebay. The description is "RF Biaser Bias Tee 10MHz-6GHz F HAM Radio RTL SDR LNA Low Noise Amplifier + Case". Three toggle switches connect either 12 V for NB or 18 V for TV to their respective Bias Tee. The outputs into a receiver are on the front panel.

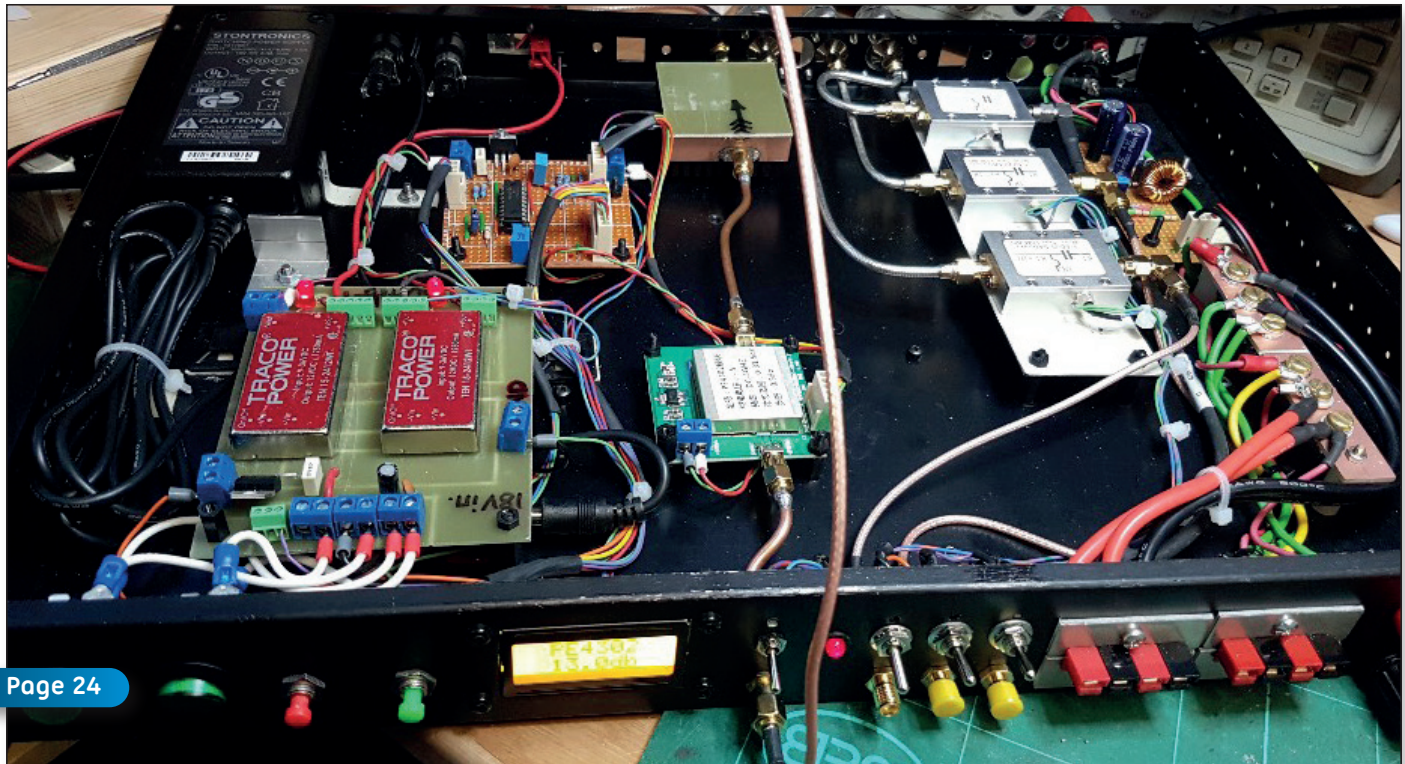
For the transmit side, I have a PE4302 programmable attenuator and the AMSAT Filtered S Band Driver Amplifier by David G0MRF. I made the attenuator controller on Veroboard as described by the club Wiki page. *https://wiki.batc.org.uk/PE4302* .

For programming the .hex file on the PIC, I used my clone PICKIT3 device and the useable but old MPLAB IPE v3.0 software. Modern Microchip software is incomprehensible to me and simply vast. I can attenuate output power up and down using the red or green push buttons whilst watching the Wideband spectrum on the internet .

I decided to build an enclosure for the driver amp from plain pcb soldered together to make sure it doesn't radiate. (Something odd had happened when all these component units were on the bench and the PA went into full power transmit.) The all important toggle switch on the front panel turns the driver amp on and off. The response of the PA is prompt and independent of software control.

The right hand side of the unit is given over to 13.8V distribution from the shack regulated power supply via Powerpoles and 4mm Banana plugs (The shack PSU is a Watson W-25AM but I've civilised it with a Noctua fan so now you can only hear the hum of the magneto-striction from the steel case!) There's a 5VDC regulator going to the blue and green terminals. The Leo Bodnar frequency reference is powered from a connection to the rear of the unit

I'm really pleased with this simple, non-groundbreaking project. I have only 3 power supplies to turn on for QO-100 TV activity, easy access to connections and direct control over transmit. Operating on QO-100 with a Portsdown 4 and receivers has become easier and more predictable.



SatController & SatServer

Michael Naylor EA7KIR

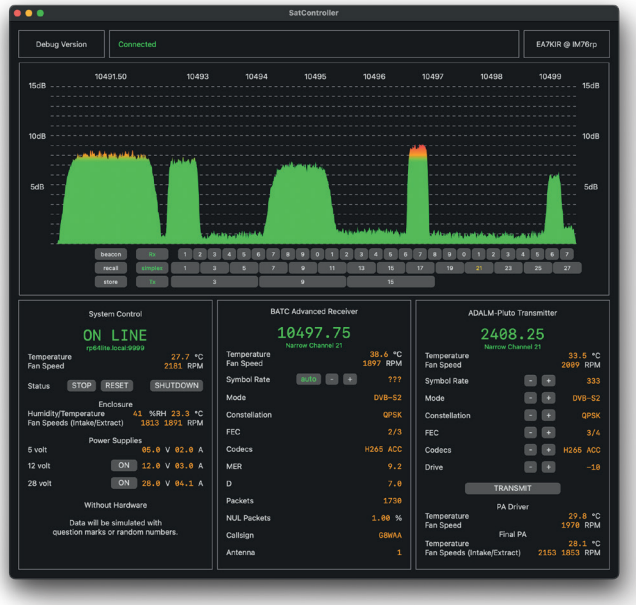
Preface

The SatController & SatServer software will be a system for controlling and monitoring a DATV transmitter and receiver over a wired local area network. It's being designed specifically for operation over Oscar-100, but could easily be adapted for terrestrial work. Unfortunately for me, living in Málaga will not be offering that opportunity anytime soon. The project is taking longer than originally envisaged, but this is giving more time to rethink some of my earlier assumptions. For example, I've been able to eliminate the need for individual on/off switches for the fans all together, which should have been obvious, because a fan can't be on if its power supply if switched off.

This is a short follow up and progress report to my CAT21 Part 2 presentation describing the Apple Mac client and Raspberry Pi server software. This is work-in-progress and most of the hardware is still under construction. However, the source code is now on GitHub for what it's worth and for anyone wishing to to follow its evolution or become involved. It's an ambitious project and especially for me, as I hold no prior experience with DATV. So maybe I'm aiming too high for a novice, but hey - I'm an amateur and I'm having fun.

SatController

The user interface is designed to exploit Apple's latest user interface technology. It's a whole new way to describe what goes on the screen. It's faster to develop and much easier to edit than anything I've tried before. The recent Swift 5.5 update also requires the latest MacOS version 12 and fairly recent hardware, but my 2015 vintage 27" iMac works just fine. Currently, the spectrum display is live streamed from Goonhilly. Later it might be possible to source this locally, direct from the receiver. Not knowing too much about DATV, I first became obsessed with the remote monitoring side of things and that's probably why there's so many voltage, current and fan speed indicators. However, I do think these could provide a reasonable way to predict a catastrophic fault condition, as well as looking nice and techy. The concept is to blend all the bits and pieces into a modern all-in-one transceiver. Outgoing audio and video will be sourced from OBS for Mac and streamed directly to the Pluto over the LAN. Received audio and video will



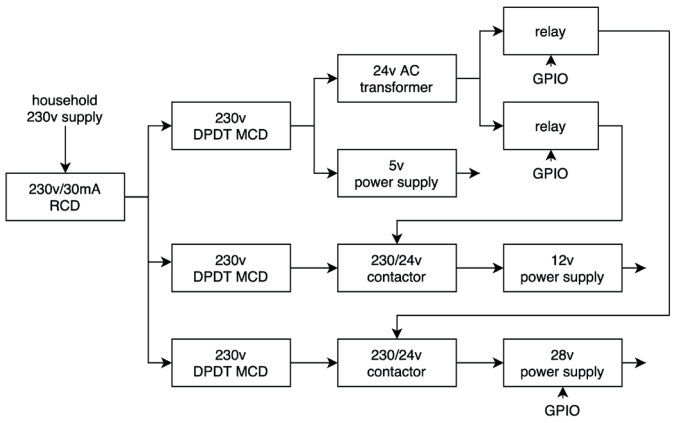
be streamed back from the receiver to VLC on the Mac and/or an external Apple TV box and HDMI monitor which I occasionally use for watching news from the UK.

SatServer

Dealing with so many things going on at the same time requires lots of background concurrency and the latest Swift 5.5 has introduced some great ways that virtually eliminate the need to think about threading and locks. It's new and challenging and I'm having to write my own libraries for the sensors and measuring the speed of 8 fans all at the same time as dealing with the networking and controlling relays. I'm also implementing all the control logic I can think of, such as sequencing the power supplies, PTT, and interlocks for fail safe operation.

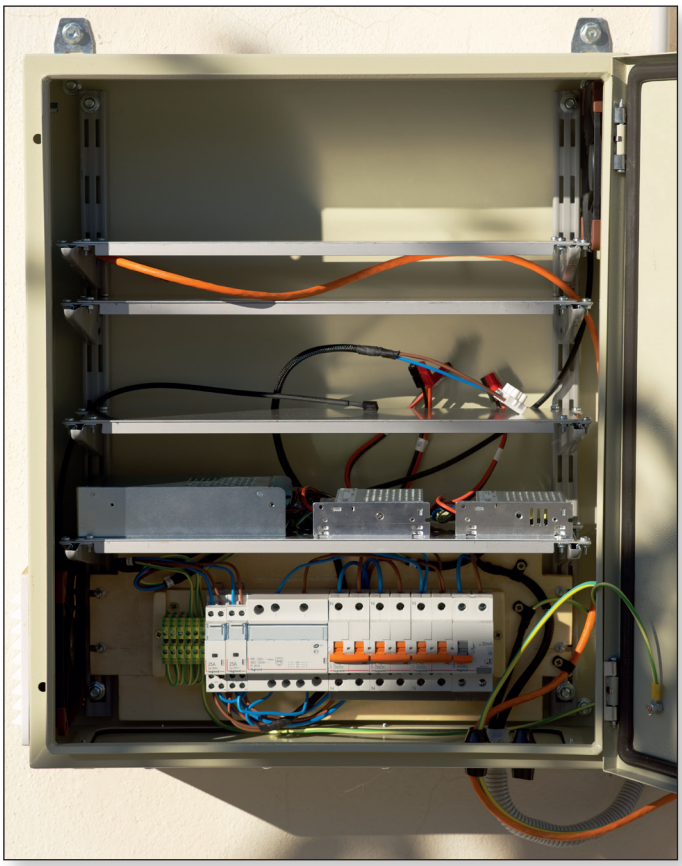
Hardware

The enclosure now houses an elaborately over engineered 230v distribution system with an RCB, two RCDs, a 24v AC Transformer and two 20 amp 230/24v contactors to handle high surge currents during switch on. Above are three XP-Power power supplies for the required 28, 12 and 5 voltages. The Raspberry Pi, an 8-Relay module and three Voltage/Current Sensors are being squeezed into a die cast box.



▶ *Power supply diagram*

Three more boxes will house the Pluto, PA Driver and Advanced Receiver. With everything connected to ground, I'm expecting to eliminate stray RF popping up all over the place. On each side of the enclosure I've fitted 140mm fans. One for intake at the bottom left and and the other top right for exhaust. Smaller 40mm fans will cool the Server, Receiver, Pluto, and PA driver. The Final PA, supplied by Bert Modderman, will have two 120mm fans, one on each side of the 200mm through air heatsink. Temperatures of around 35 centigrade is fairly normal in Málaga during summer.



▶ *The cabinet, showing the positioning of some of the components*

```
//     A simple example in written in Swift

import Foundation
import SwiftyGPIO

let gpios = SwiftyGPIO.GPIOs(for: .RaspberryPi4)
let pin8 = gpios[.P14]!

pin8.direction = .OUT

// blink an led 5 times
for _ in 1...5 {
    pin8.value = 0
    sleep(1)
    pin8.value = 1
    sleep(1)
}
```

Summary

I know this project won't be of interest to the majority of Windows users. But for those who like to experiment with Python on a Raspberry Pi, I've written detailed instructions on how to do a clean install of Bullseye, Swift (including the Swift Package Manager) and everything else needed to get going. Swift is a modern high level language which is type safe and compiles to run fast. I use Xcode to edit, but I'm told Microsoft's Visual Studio is also very good. The instructions are in the README file on my Github SatServer page noted below. I hope this article will be of some interest to others.

Requirements:

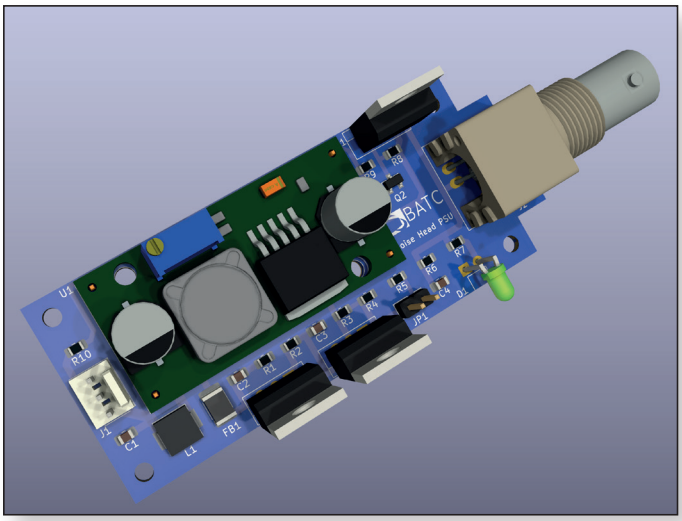
- Apple iMac from late 2015
- macOS Monterey version 12
- Raspberry Pi 4B with 8 GB of memory
- RaspOS BullsEye Lite for Arm 64
- Xcode version 13.1 or later
- SHT31 I2C humidity/temperature sensor
- INA226 I2C current/voltage sensors
- DS18B20 1-Wire temperature sensor
- 3-wire Fans
- 8-way GPIO Relay Module
- 4-way Ethernet switch
- Power supplies

References:

GitHub: *github.com/ea7kir*
Email: *ea7kir@icloud.com*
Web: *michaelnaylor.es*

Noise Source Power Supply

Dave G8GKQ



This simple unit is designed to switch a 28v (or 12v) power supply for a Noise Source and be controlled by the Portsdown Noise Figure Meter. The input switching signal is 0v for the "off" state and 3.3v for the "on" state. The output is on a BNC socket, which is the de-facto standard power connector for professional noise sources.

A printable circuit diagram and a Bill of Materials is available on the BATC Wiki at
https://wiki.batc.org.uk/Noise_Source_PSU
Thanks to Mike G0MJW for the PCB design.

Design and Operation

The Noise Source PSU has 4 distinct circuit functions:

- ***Voltage Step-up***
  An XL6009 eBay booster converter is used to derive a 33v supply from the incoming 12v. The actual input voltage is not critical; it should be in the range 5 – 25v (or 5 – 15v for 12v output). L1 and C1 reduce the amount of hash fed back down the supply line. FB1, R1 and C2 provide extra smoothing on the output. The potentiometer on the eBay booster converter should be set for 33v output if a 28v Noise Source is being used. If a 12v Noise Source is being used, the booster output should be set to 17v.

- ***Current Limiting***
  The first LM317T (U2) is used to limit the current in the event of a short-circuit (or worse, connection of a 50 ohm attenuator to the BNC socket on the output). R2 sets the current limit to 56mA, and C3 provides a low impedance input to the next stage.

- Note that the early batch of PCBs (currently available in the BATC Shop for £2 each) had pins 1 and 2 (Adj and Vout) of U2 transposed; the modifications to the PCB to correct this are set out in the box on the next page. The unit will function without the modifications, but the current limit will not operate.

- ***Voltage Regulation***
  The second LM317T (U3) regulates the output voltage to 28v. If jumper 1 is fitted, the output voltage is set to 12v. R5 can be substituted for a different value to set intermediate output voltages.

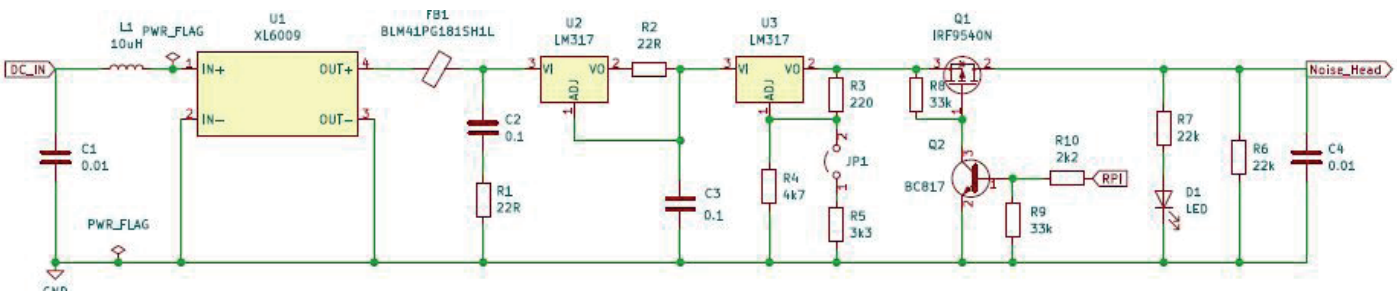
- ***Switching***
  Q1 is a p-channel mosfet and is used to switch the supply on and off. The switching signal (from GPIO pin 26 on the Portsdown Raspberry Pi 3 or 4) turns an NPN transistor on or off to switch the MOSFET. The exact types of transistors are not critical. The MOSFET should be able to handle 100mA and 30v. The NPN transistor needs to be able to handle 30v Vceo.

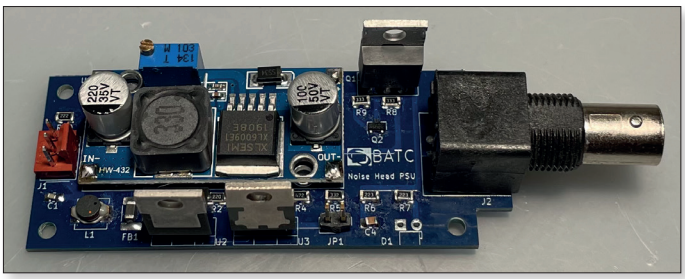
Construction

The PCB is designed to fit in a Hammond 1590A aluminium die-cast box with a BNC for the output socket. The input supply and switching cable is fed through a grommet into the box.

Note that none of the regulator or transistor tabs should be connected to the die-cast box. If there is risk of them touching the box then insulation tape or an insulating washer should be used to prevent this happening.

▶ *Schematic*





▶ *The completed unit prior to "Boxing Up*

Measured Performance

The prototype drew 35mA at 12v without a noise head connected, and 75mA with the noise head connected and permanently on. Average current drain during operation was about 55mA.

The output current limiting was measured at 56ma; a typical noise head draws about 10ma.

Adjustment and Testing

After checking the PCB for correct component alignment and short circuits, apply 12v to the power input. Adjust the potentiometer on the booster module for 33v on its output (or 17v for the 12v version). Check that the output voltage on the BNC is 0v. Fit JP1 for the 12v version.

Then connect a 10K resistor between the switching input and the 12v supply. Check that the output voltage is 28v (or 12v).

To check the current limiting, with the 10K input pull-up resistor in-place, briefly connect an ammeter on a high range (at least 1A fsd) directly across the output. The current should be limited to 56 mA.

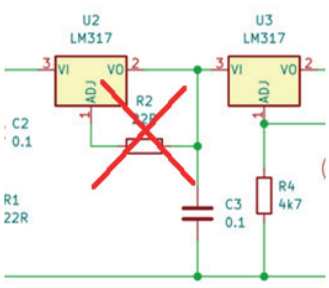
Connection to the Portsdown

A 3-core cable can be used to connect the unit to the Portsdown. If the Portsdown standard 25-way connector is being used, the ground should be connected to pin 1 or 13 (analogue or digital ground), the 12v supply to pin 2 (12v supply) and the switching signal to pin 7 (Raspberry Pi GPIO pin 26).

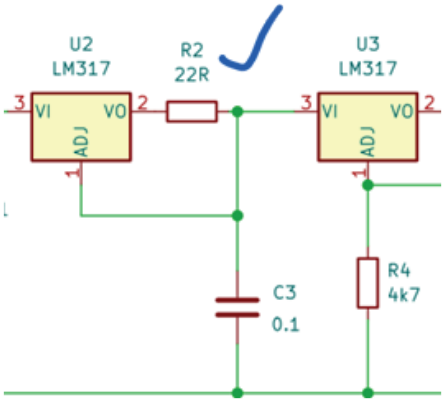
Error on the First Batch of PCBs

The first batch of PCBs for the noise source power supply need modification due to an error on the original circuit diagram. The Vout and Adj pins on the current-limiting LM317T (U2) were reversed. The unit functions if assembled with the error, but the current limit will not work correctly.

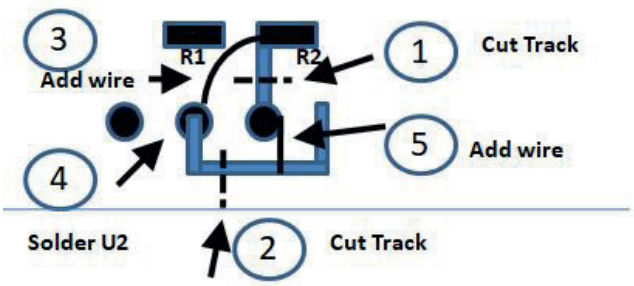
These slightly imperfect PCBs will be available in the BATC Shop for £2 each until they are sold out.



To correct the error, either pins 1 and 2 on U2 should be swapped or the PCB should be modified as shown below.



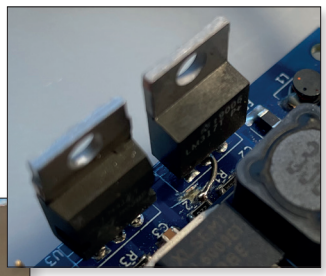
To modify the PCB, first cut the tracks 1 and 2 and scrape away the solder resist adjacent to the middle hole for U2 and the second cut. Then add wire link 3. Solder in U2 (LM317T) being careful not to displace the wire link. Then add wire link 5.

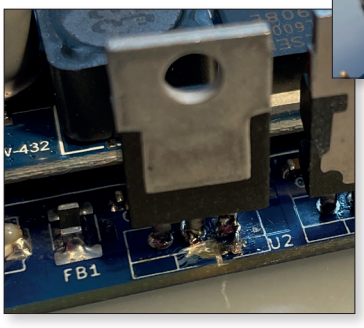


After Modification:

Cut track 1 and wire link 3

Cut track 2 and wire link 5





The Portsdown Newsletter

Dave Crump, G8GKQ

I have continued to introduce incremental capability improvements to both the Portsdown 2020 and the Portsdown 4.

For the Portsdown 4, the ability to select from a range of different test cards (and user-provided images) for transmission has been added.

Thanks to the loan of a camera from Tony G0AZQ, I have added support for the Logitech C930E webcam. I was also able to enable the use of USB dongle or EasyCap audio with webcams on the Pluto.

▶ *The Logitech C930e webcam*

Improvements to the Portsdown 2020 have included the addition of 16:9 streaming from either the EasyCap or webcam inputs.

Portsdown Test Equipment

The majority of my effort on the Portsdown has been to expand the range of in-built test equipment. In addition to the signal generator, bandviewer and power meter, three new functions have been added.

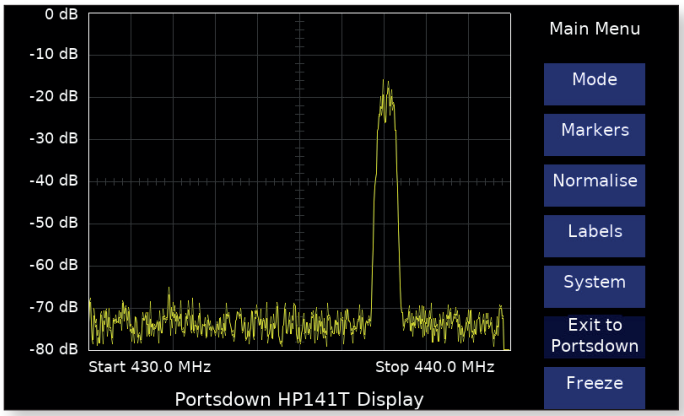
The most complex new feature is the Portsdown noise figure meter which is described elsewhere in this CQ-TV. This builds on the existing bandviewer with the LimeSDR to provide the facility to measure the input sensitivity of pre-amplifiers and receive converters.

The second new feature is the frequency sweeper, which combines the signal generator, power meter and the graphical display to enable the frequency response of amplifiers and filters to by plotted.

This currently uses the LimeSDR and the power meter head as generator and sensor, but I hope to be able to use different generators and sensors in future, which may enable a faster sweep time.

The last added feature is the XY display. I first designed this more than a year ago, but had not completed the user interface. It now provides a very good alternative display for the HP141T spectrum analyser, and with slightly different interface circuitry, could do the same for many older spectrum analysers.

As with most of the Portsdown features, it is described in detail on the wiki: *https://wiki.batc.org.uk/Portsdown_XY_Display*.



▶ *The Portsdown XY Display*

The test equipment is available (selected from menu two) on both the Portsdown 2020 and in the Portsdown 4. The functionality on the Portsdown 2020 is slightly restricted as it does not support the Pluto SDR.

Langstone With a LimeSDR (not Pluto)

Colin G4EML has added the ability to use the LimeSDR Mini (in addition to the Pluto) to a new version of the Langstone software. I hope to add this as a selectable feature for the co-hosted Langstone functionality on Portsdown 4 soon.

LimeSDR USB

Thanks to the loan of a unit from Charles G4GUO, I am slowly adding full LimeSDR USB support to the Portsdown. I have previously only been able to test features using the LimeSDR Mini. So, if you find a feature that does not work with the LimeSDR USB, please let me know and I will try to correct it.

▶ *The LimeSDR USB*

RASPIOS operating system updates

The next version of the Raspios operating system for the Raspberry Pi, Bullseye (replacing Buster), has recently been released. Migrating Portsdown to that version is not straightforward as much of the specialist H264 encoding functionality has been changed and moved into ffmpeg, so it is not available for use in Portsdown without significant changes.

There is a new "Buster Legacy" version, which will be supported until June 2024. I am considering whether a migration to Buster Legacy is the easiest thing to do while I work out how to support all the current Portsdown features on the latest Bullseye version.

This continual change in operating systems enables new features and the closure of security loopholes. However, it does incur significant work to maintain the ability to construct new builds of Portsdown. Old builds will continue to function (until the hardware dies), but it is not possible to add new features to these old builds.

Portsdown popularity

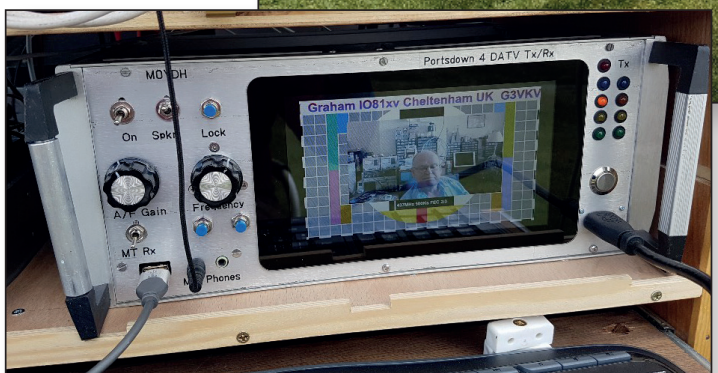
On the positive side, I am pleased to report that the BATC Shop has sold in excess of 750 Portsdown SD Cards, and more than 500 unique users have purchased Portsdown components. So, potentially, there are 500 digital ATV transceivers out there that could be put on the air!

Please don't let your Portsdown be "Shelfware"; put it on the air.

Out and about

David Holman M0YDH

I went to Magpie Hill near Clee Hill village in Shropshire for the first time. I had to position away from NATS radar on Titterstone Clee Hill which made my receiver deaf last year. Whereas I made lots of successful transmissions last year with a Lime mini and Mini-kits amps, in this hot weather the Pluto, driver amps and Mini-kits amps struggled. Graham G4VKV in Cheltenham and I exchanged contest numbers on 2m and 70cm quite quickly. I was treated to live images of the man himself in the shack and other video. Sound too. After spinal surgery Graham was doing this in pain. Quite a bloke!



All other stations all weekend were twice as far away. I made no further successful transmissions. I did receive G8GKQ on each day, Steve M0SKM on 70cm and (fanfare) my first 23cm using the homemade beam and Mini-kits pre-amp. Arthur G4CPE transmission was received to his evident delight. I was using a very good broadcast-quality 437 bandpass filter. 125Ks and much higher power than I could send were more successful. Thanks to all the stations including many P0 transmissions. See you in the June contest?

GB3NQ Transmitter Upgrade

Paul Andrews G6MNJ

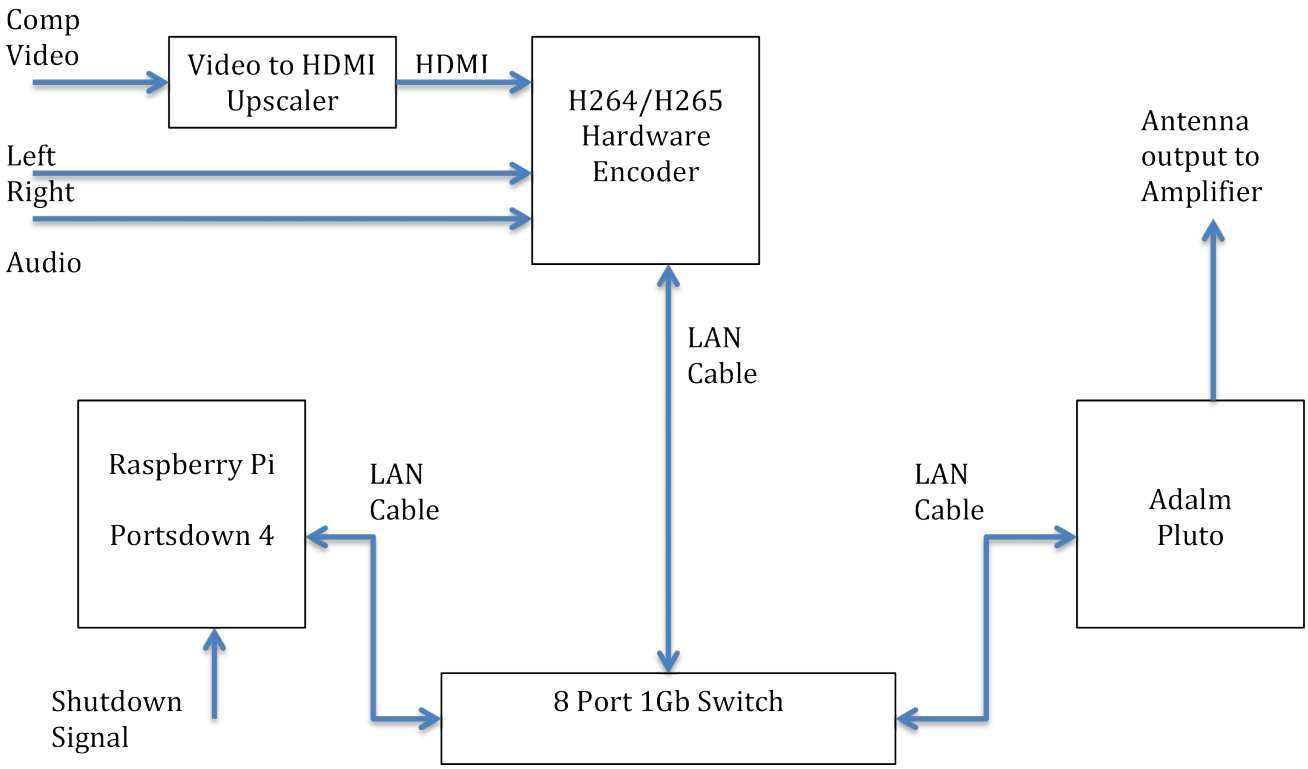
It is with grateful thanks the Mid Cornwall Beacon and Repeater Group have been given a bursary from BATC to upgrade their aging 19" rack mounted NDS encoder, modulator and up converter. This combo produced a quite blurry Standard Definition picture on 23cms for the locals for some years. Since the upgrade of its set top box receivers to 3 Ryde units on 2m, 70cm and 23cm it was a natural choice to replace the transmitter. The old transmission was 2Ms/s with a FEC of ½ which made for a punchy signal but as stated disappointing video quality.

After much experimentation with the 'preferred' audio and video capture devices their quality was felt to be under par. We wanted more! Initially it was accepted the composite PAL switching of the receivers, test cards and media player would have to stay but once the new transmitter had settled in a move to HDMI connections and switching would be made.

So we had to include this requirement in the design, and thus a Composite Video to HDMI Upscaler would be used to convert our PAL Composite Video to 720p HDMI. This was then passed on to a H264/H265 Hardware Encoder. This encoder was programmed to stream H264 and AAC to a dedicated 1Gb switch and then on to the IPTS input of the Portsdown 4.

Oddly we found we achieved much better audio quality feeding the audio directly to the encoder rather than via the upscaler. Additionally lip sync was spot on direct to the encoder but slightly off with the audio in to the upscaler, so a win win.

The Portsdown 4 was configured for a DVBS-2 output at 1Ms/s at a FEC of 2/3 and set using the terminal menu to automatically transmit on power up. A small edit of the Portsdown 4 configuration files was also made to increase its delay to transmit to 15 seconds to give the rest of the hardware time to be up and ready. Another small edit was to change the command line to the Pluto to increase the audio bandwidth to 128ks/s – we were keen for the best sound and pictures!



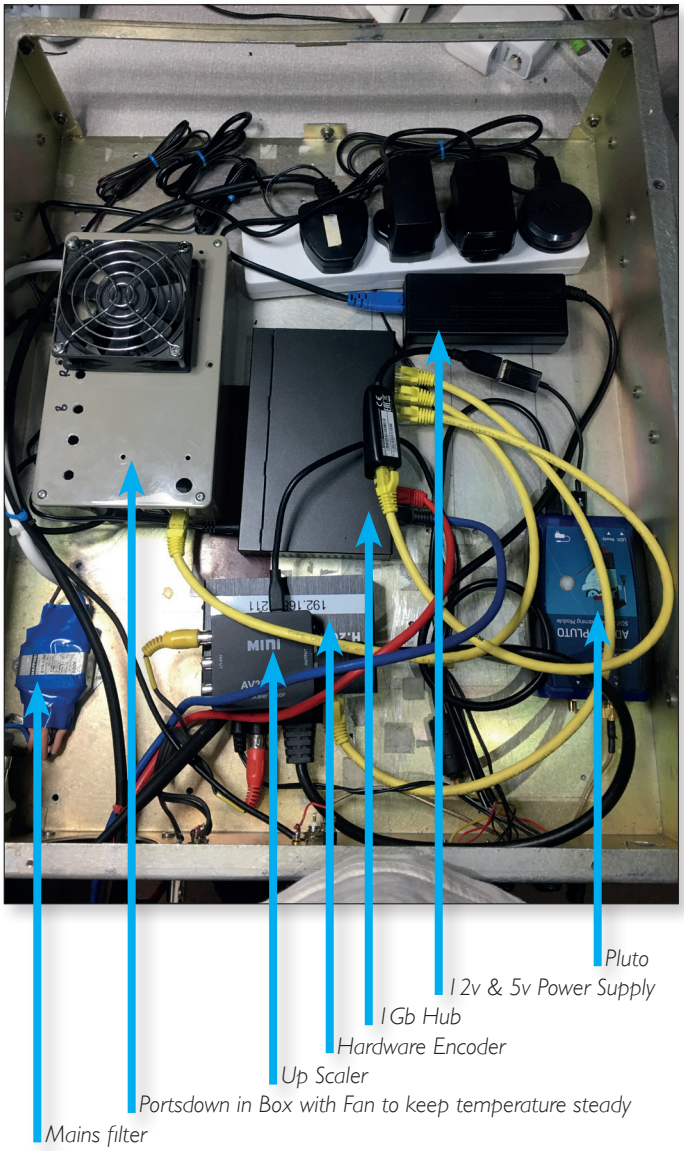
The previous upgrade to install 3 Ryde receivers led us to design an orderly shutdown of the Raspberry Pi's so we decided to adopt the signal from that to shutdown the Raspberry Pi 4 used to run the Portsdown too. However this proved to be challenging as the Ryde requires a 0v or closed switch to start its shutdown process whereas the Portsdown needs 3v3 on its GPIO connector to do the same! So a small relay fired by a low signal connects the Portsdown pin to a 3v3 voltage down converter from the 12v power rail and we had the signal required.

The RF output level from the Pluto despite being advertised in the few mW range was considerably lower than this. GB3NQ's amplifier section requires a few mW to bring it into life so a couple of small amplifiers were acquired from eBay and their output set to an acceptable level without causing the shoulders of the signal rising too high.

Once we had set the correct levels in the hardware encoder of stereo 128k and video 920k (approximately 70% of the available bandwidth) the received pictures on MiniTioune, and Set Top Boxes reported 1280x720 and were very pleasing to the eye.

▶ *GB3NQ before Transmitter Upgrade – the 3 Ryde receivers can be seen on the monitor.*

▶ *The new transmitter tray*



As a test of things to come the encoder was fed directly with a HD signal from a television tuner tuned to BBC 1 HD. (This was done on the workbench into a dummy load.) The resultant picture quality was stunning given how little bandwidth this system was using. Clearly up scaling a standard definition picture is clever but it is not true to the original!

So there we have it in the past few years GB3NQ has moved from a basic analogue FM TV repeater to now a 720p digital output and receive on 3 bands. We look forward to the next lift and seeing some distant stations through our repeater. It is streamed on the BATC streams so please if you can't receive it direct take a peek there.

Turning Back the Pages

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

Peter Delaney - G8KZG

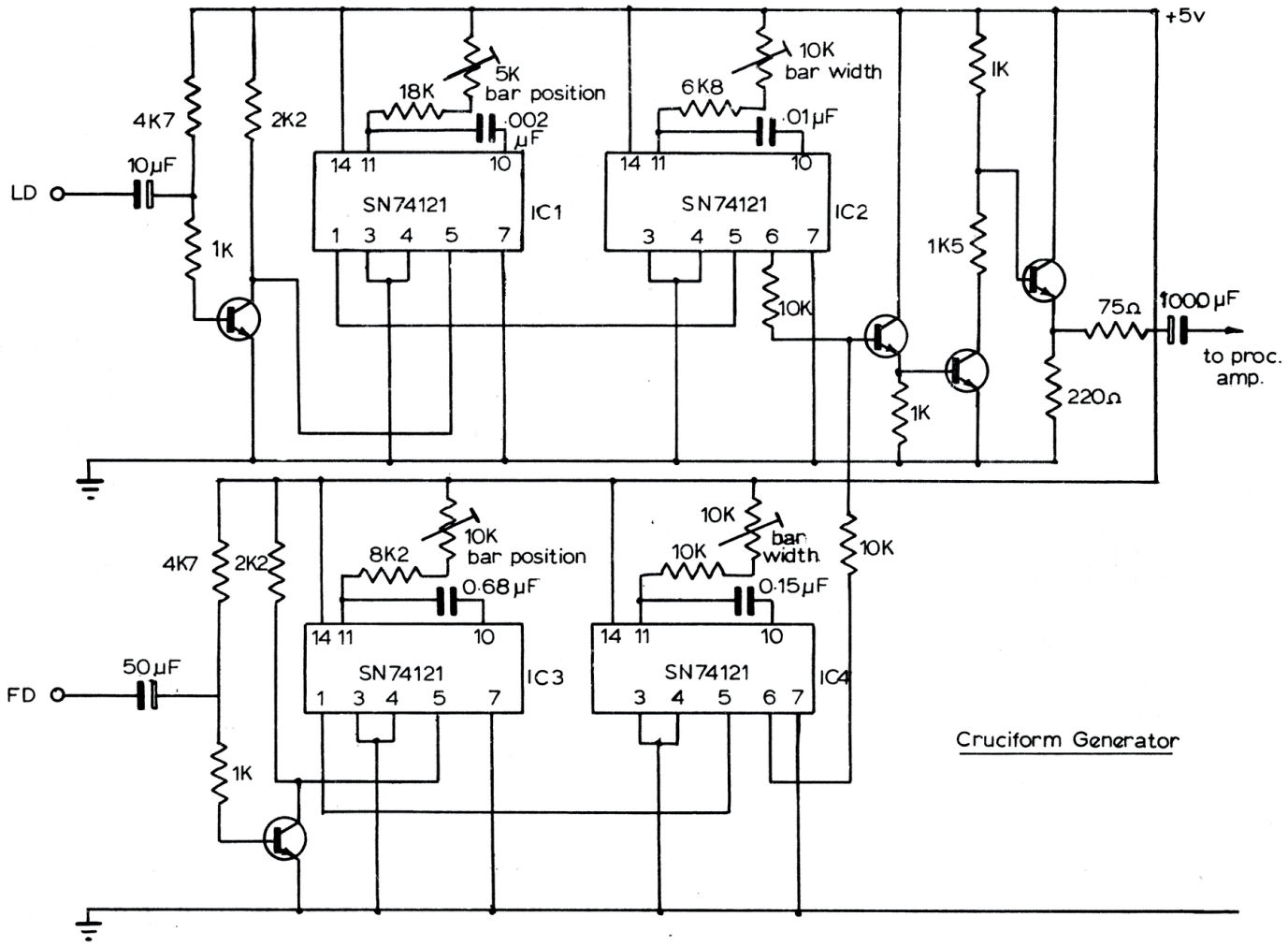
CQ-TV 85

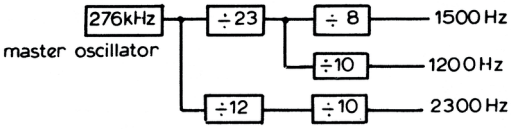
The three technical articles in CQTV 85, which was dated February 1974, (although all quite different) were concerned with generating various test signals.

Trevor Brown (later to serve as Club Chairman for many years) had deigned a cruciform generator, as a way to increase the number of video signals available when testing vision mixers and special effects generators. He "apologised for its simplicity" (!!), but it was useful to show low frequency distortion in the system, whilst 'on-air' it could be easily recognised by receiving stations over noisy rf paths.

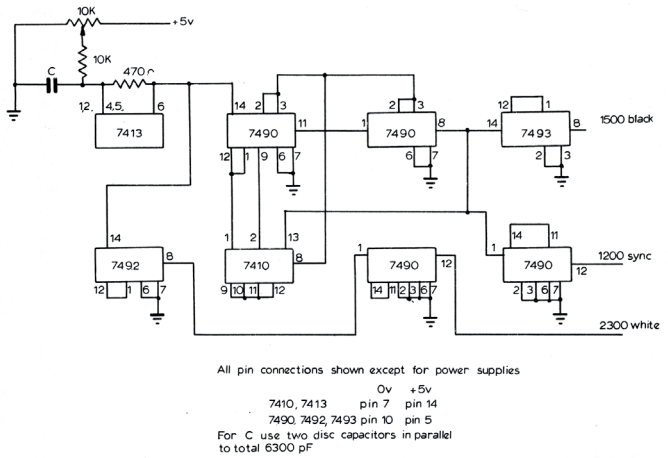
The relevant line (top half) or field (lower half) drive signal from the sync pulse generator triggered the left hand 74121 monostable circuit. By adjusting the timing resistor at pin 11, the time delay could be varied, and so the position across, or down, the screen set. The resulting pulse then triggered the right hand 74121 monostable in each case, and altering the corresponding timing resistor set the width of the relevant bar. The signals representing the vertical and horizontal bars respectively were then summed at the 3 stage amplifier, giving a 0.7 V video signal. The output was fed to a processing amplifier ('proc amp') to have the appropriate mixed blanking and mixed sync pulses added.

Former Club Chairman, Grant Dixon, noted a difficulty with slow scan tv signals from some stations. SSTV was transmitted as an FM signal, with the 1200 Hz sync pulse being extracted by using a filter. There was a move to use more sharply tuned circuits to do this, but that had shown that some amateurs did not have their sync signal precisely on frequency. He therefore had designed a circuit which used a master oscillator and series of counters to generate the 3 standard SSTV frequencies of 1200 Hz (sync signal), 1500 Hz (representing black) and 2300 Hz (corresponding to peak white level).





Ideally, the master oscillator would use a 276 kHz crystal, (or, Grant suggested, a 2.76 MHz crystal oscillator followed by a divide by 10 counter might be less expensive to make), but the one shown was based around a 7413 Schmitt trigger ic. The divide by 23 stage was implemented by using two 7490 decade counters, and using a 7410 to detect the count of 23, and then reset the counters.



In the latter case, the precise frequency could be adjusted using the small preset resistor (top left). Grant suggested that, for those not having a frequency counter, they could set the output using a 'well-tuned piano'. Middle C is 261.6 Hz, so 1200 Hz is in the range 2 octaves above, between D and D# (1175 Hz and 1244 Hz respectively) and the circuit could be tuned to be between those.

The third article was John Lawrence's design to generate a grey scale or colour bars, and could be adapted for used with fast scan tv or for slow scan tv.

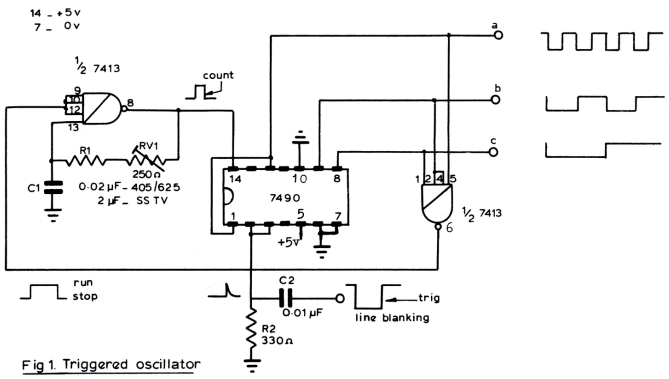
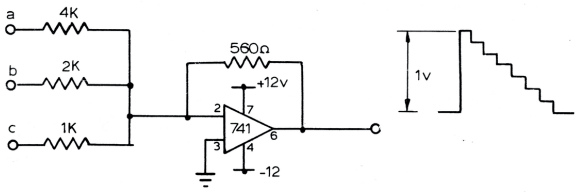


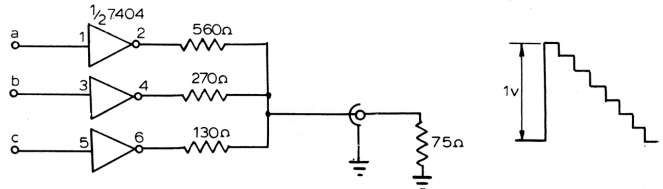
Fig 1. Triggered oscillator

This also used half of a 7413 Schmitt trigger circuit as the master oscillator. If pins 9, 10 and 12 were at logic level 1, the output, at pin 8, would be the opposite of the level at pin 13, the timing capacitor. If this was at a low level, the high level at pin 8 charged C1 through R1 and RV1, until the voltage at pin 13 reached the trigger level, when pin 8 would change state, the capacitor C1 discharged, until the voltage level to the lower threshold level, when the process repeated itself. The square wave that produced was used to clock the 7490 decade counter. If the signal at pins 9, 10 and 12 were taken low, the oscillator was stopped. That would happen when all the outputs, a, b, and c, were at logic level 1, as the gate on the right hand side would then change state, and stop the oscillator. The line blanking signal would reset the 7490 counter, and so set the process going again. The pattern was therefore locked to the line timing signal.

The output stages, however, differed depending on the application. For slow scan work, the signals a, b and c could be fed to a 741 type op-amp, with the gain level set by the feedback resistor between pins 6 and 2, to give an 8 level grey scale with white on the left and black on the right.



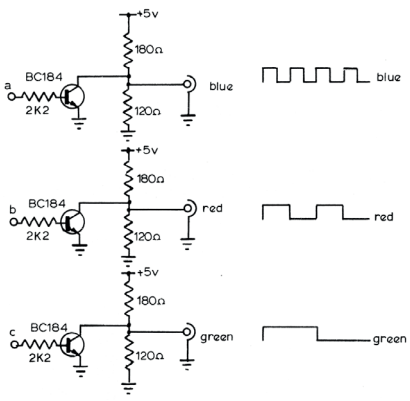
Slow scan grey scale generator



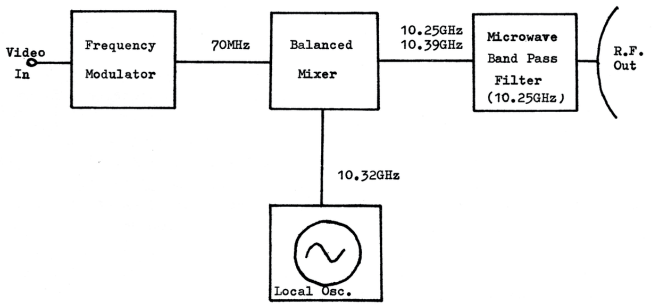
405/625 Grey scale generator

The 741 op amp did not have a good enough frequency response to be used for fast scan tv, and so in this case each signal a, b and c was passed through a logic inverter, and their outputs added using the resistor network.

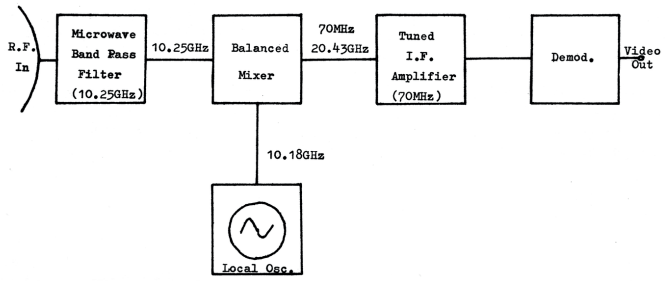
For making colour bars, the signals a, b and c were fed separately to transistor output stages that produced the signals for blue, red and green respectively, which could be fed to a monitor, or to a coder to produce composite colour video.



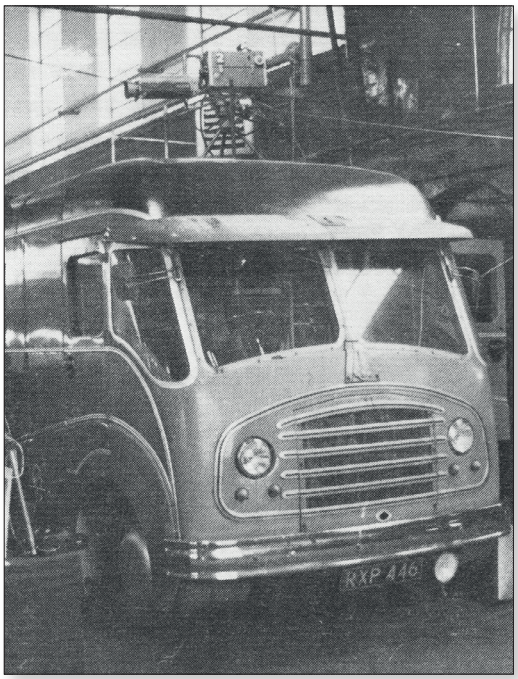
R.G.B. outputs Fig. 3



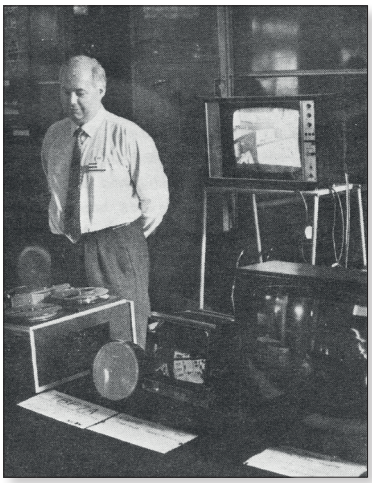
The RF side of amateur television was not forgotten, with a forward-thinking article on 'Amateurs in the Microwave Bands'. Work was being done on two projects - the design of a television link using the 10 GHz band, and the modification of some commercial 7 GHz equipment to run in the 5.65 - 5.85 GHz band. Ideas considered using Gunn diodes (fairly expensive at the time) or reflex klystrons (which could be found as 'surplus equipment'. For the 10 GHz system, block diagram proposals for both a transmitter and a receiver were shown, each using a local oscillator and balanced mixer to translate the signals between the 70MHz IF frequency and the microwave band



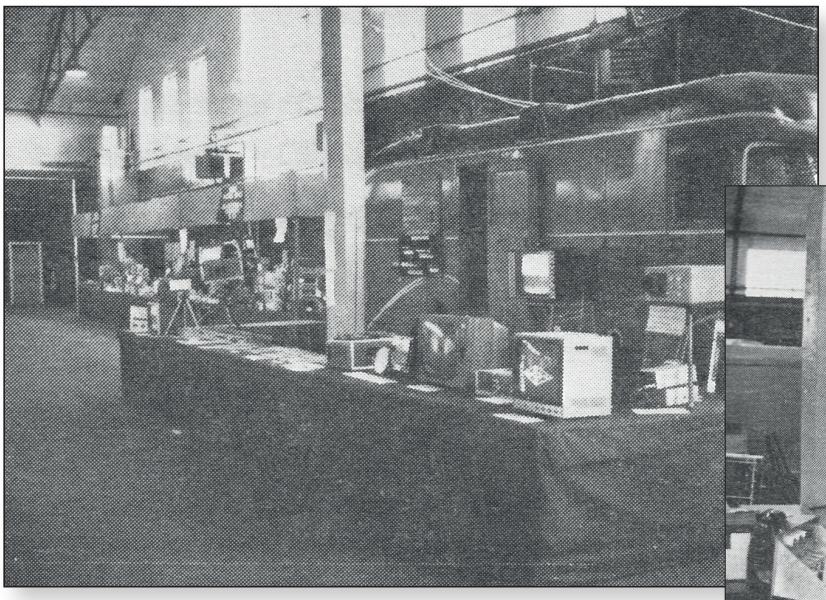
The Midland National Amateur Radio Show had been held in Leicester during the autumn, and the magazine included a selection of photographs of the BATC display.



It was easy to spot, as - rather unusually - the tables were set out in front of 'Monoculus', an outside broadcast van that had been taken inside the exhibition hall. It was equipped with ex-broadcast image orthicon cameras, one of which was perched on top of the vehicle roof, with a view across the hall.



The then Club Chairman, Malcolm Sparrow, is keeping an eye on the open reel video recorder - video tape was something relatively rare in amateur circles in 1974.



Another view of 'Monoculus', which belonged to the then Club Secretary, Joe Rose, who had brought it from Lincolnshire.

The British Amateur Television Club

Out and About

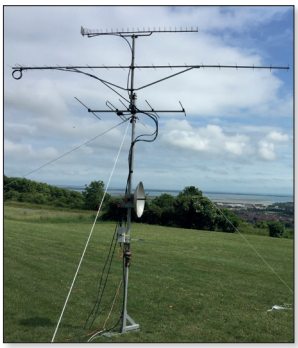
Rallies and events with a BATC stand: (subject to change)

Many amateur radio rallies are still postponed or cancelled.
We will show any that will be running in a future issue.

The most up to date status can be found on this RSGB web page:
https://rsgb.org/main/news/rallies/

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

Activity Weekends & Contests



2021/2022 Activity Days:

Dec 24 2021 - Jan 3 2022	*Christmas Activity Ladder & Repeater Activity Contest*
15th & 16th January 2022	*70cms + 23cms*
12th & 13th Feb 2022	*2m & down + 23cms*
12th & 13th March 2022	*23cms & up*
9th & 10th April 2022	*70cms + 23cms*
14th & 15th May 2022	*2m & down + 23cms*
11th & 12th June 2022	*IARU Region 1 ATV Contest*
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 Dec 2022	*2m & down + 23cms*

BATC Online

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