The British Amateur Television Club

CQ-TV

No. 282 – Winter 2023

Season's Greetings from the BATC

The future of the 23cms band

New SSTV relay in Chatteris, Cambs

Serit FTS-4334 NIM / tuner

Switched attenuator for QO-100 transmission

Evaluation of the quality of transmitted and received analogue video signals

Mid-Cornwall beacon and repeater group goes green

A multiband multimode transceiver

Raspberry Pi 5 - First impressions

Jamboree on the Air 2023

Using an external clock with the Pluto

A quick transition for 3.4GHz

CAT 24 - Initial plans

David Mann, G8ADM – President of the BATC

... and much more inside!

CQ-TV 282

Contents:

Cover: Photo of the ARISS DATV receiver by Phil, M0DNY - article about the unit in the next edition of CQ-TV. Christmas montage by Frank, M0AEU

Contributions

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

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

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

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

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

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

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

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From the Chairman...

Martin Charman G4FKK

2023 – well, that seems to have flown by! Progress at G4FKK on the new workshop/shack/TV studio has been slow but steady. I now have windows, power, a door and even heating installed. The next step is to get the bench layouts designed and built and I'm hoping most of this can be done, in the dry, over winter.

It's been a busier and more productive year for the BATC; several appearances of the club stand at rallies and other radio related events around the country and also our first foray into the Netherlands at the Zwolle "Day of the Radio Amateur" towards the back end of October.

Committee and other members have been researching an answer to the current lack of Serit FTS-4334 NIMs/tuners for the minitiouner board which forms the heart of Portsdown, Ryde, OpenTuner and Winter Hill DATV receive systems and there is some good news to relate – further details later in this issue of CQTV!

The club has also approved a number of bursaries for TV related projects; details of which can be found on the forum. Don't forget if you or your local club have a project in mind, a TV repeater for example, then it's always worth filling in the bursary application form which can found on our website here:- *https://batc.org.uk/club-info/bursary-fund/bursary-application-form/*

CAT23 parts 1 and 2 were enjoyable and extremely informative events and the committee has already started the planning for CAT24 next year. There's more information later in this edition; do try to keep August the 4th 2024 clear in your diaries.

Have a great Christmas and I look forward to meeting you either in person or on the air in the coming new year. I leave you with a picture of Martin, G8KOE, who I saw looking very festive on QO100 earlier today.

73, Martin G4FKK

The Listing

new and renewing members

Tony Stone G3UIS

I am delighted to present my first listing, having taken over from Rob on 1st October. I am pleased to report that there is a steady flow of new and renewing members, although this is unfortunately offset by those who decide to leave the club and not renew. As has been mentioned in previous issues, this listing covers the last three months ending 30th November.

As I am new to the role and Committee, perhaps a little of my radio amateur history may be of interest. I was licensed in 1965 and by the early 70's, together with Brian G3UIT, and Alan G3VAL, we were successfully exchanging 625 line black and white analogue TV. As today, it was highly experimental, there was no commercial equipment available, and provided an excellent learning opportunity.

In the late 70's/early 80's, due to family and work pressures, I left the hobby although maintained the licence and a working shack. In August 2021, as my working career was coming to an end, I returned to amateur radio and following a visit to Tim G4WIM, my interest in TV was re-kindled and with an enormous amount of help from Tim, I now have a DATV working set up.

Finally, I must express my thanks to Rob for such a smooth handover and his continued assistance with the membership tasks. Thank you to all our new members for joining and our longer term members for continuing to support the Club.

Austria		
Thomas Völker	Bad Waltersdorf	OE6EMF
Australia		
John O'Shea	Revesby	VK2ATU
Luke Groeneveld	Wiley Park	
Tom Robertson	Firle	VK5TOM
Clint Jeffrey	Melbourne	VK3CSJ
Mark Harris	White Hills	VK3EME
Roy Xanthos	Gracemere	VK4TRX
Belgium		
Erik Platteeuw	Saint-Michiels	ON4LP
Johan van Brabandt	Zedelgem	ON7UC
Paul Andries	Oostduinkerke	ON1AP
Jan Poppeliers	Aartselaar	ON7UX
Stefan Dombrowski	Brussels	StefanD
Rene Van de Wiele	Dendermonde	ON6VI
Canada		
Peter Jago	Stittsville Ontario	VA3PJ
Switzerland		
Olivier Noverraz	Le Sentier	HB9BBN
Martin Klaper	Kappel	HB9ARK
Cyprus		
John Bosch	Hilversum	PD2PRT
Germany		
Matthias Moeser	Rendsburg	
Helmut Schröder	Bornheim	DG3KHS
Wolfgang Beckett	Verden	DL1BJV
Rainer Entel	Dinslaken	DL3EF
Hans Schubert	Rheine	DL9YCC
Denmark		
Ingolf Pedersen	Aalborg	OZ8JYL
Christian Holst	Billund	
Spain		
Antonio Ciscar	Valencia	EA5IS
Albert Ramos	Caldes de Montbui	EA3IBE
Finland		
Jouni Anttila	Littoinen	OH1CO
France		
Franck Dubuis	La Tuiliére	F1SSF
Guy Gounel	Magnet	F1BFZ
Stéphan Robert	Maurepas	F1UBL
Flavo Robles	Saint Amand	F5ASM
Marcel Gibelin	St Marcel en Marcillat	F1GE
Olivier Guerin	Arles	F4JJI
Masset Michel	Haulchin	F1VNI
Camille Farrougia	Villeneuve Loubet	F4IBA
UK		
Kenneth Vickers	Bridgnorth	G3YKI
Steve Marshall	Dunstable	M0SKM
Alexander Wynne	Oxford	M0OOE
Gary Franklin	Canvey Island	G4GHD
Nigel Jones	Chingford	2E0NJT
Alan Mcdowell	Boston	G0KOO
Bruce Ashdown	Fakenham	G4KZT

Christopher Wallwork	Tunbridge Wells	G6AHK
Steve Bunting	London	M0BPQ
Greg Hopkins	Hungerford	G4CST
Chris Weaver	Swindon	G1YGY
Malcolm Grisdale	Newcastle Upon Tyne	M0VNA
Dave Cawley	Dartmouth	
David Whitehead	London	
Simon Murphy	Bristol	M0SMU
Nicholas Harrold	Wisbech	G4IMO
Martin Goodrum	Stowmarket	G3ZQU
Colin Richardson	Kirkbymoorside	M0YXR
Mike Binks	Stockport	G0LJF
Peter Harston	Milford Haven	GW4JQP
Stuart Tyler	Nottingham	G1ZAR
Roger Gregory	Cornwall	G4OCO
Barry Chambers	Sheffield	G8AGN
Ivor Green	Bristol	G1IXF
Pawel Markiewicz	Abram, Wigan	M7TSA
Derek Latham	Skelmersdale	G6HXL
David Cockram	Swindon	M0RQQ
John Warwick Franks	Kirkby-in-Ashfield	G3SQQ
George Knox	Hove	G0UCF
Tony Walker	Birmingham	2E1TBW
Kevin Francks	Newquay	M0BFB
Brian Cook	Alfreton	G7TYP
John Quartermaine	Northampton	2E1FUQ
Peter Watts	Matlock	G0FQB
Gregory Head	High Wycombe	G4EBY
John Quartermaine	Northampton	2E1FUQ
Matthew Miller	Stone	M0DQW
Michael Still	Lancing	
David Leary	St. Ives	G8JKV
Paul Stallibrass	Bury St Edmunds	M0PDA
John Marlow	Welshpool	G1ORP
Martin Smith	Great Yarmouth	
Ian FOORD	Newhaven	G0TJH
Brian Woolnough	Leiston	M5ADQ
Tom Mitchell	Milton Keynes	G3LMX
James Brown	Aveley	2E0SUQ
Robert Brown	Bangor	
Michael Featherstone	Newcastle on Tyne	
Angus Young	Scarborough	M0IKB
David Butler	Hereford	G4ASR
Brian Coleman	Andover	G4NNS
Philip Howarth	Isle of Skye	GM3YAC
Graham Le Good	Witney	G4GUN

Chris Donne	East Halton	G3YKK
Robert Williams	East Cowes	G0PEB
Karl Brazier	Dibden Purlieu	G7AFT
David Bondy	Rochester	G4NRT
Paul Haworth	Blackburn	G6OWI
Neil Smith	Goole	G4DBN
mark bryan	Sheffield	
David Holman	Wolverhampton	M0YDH
Richard John Cariss	Church Stretton	G7ACD
Stuart Grant	Driffield	G6ENR
Gordon Robb	Ayr	GM8KXF
Steven Maxwell	Wallasey	G6IHD
Chris Ashby	Whitstable	G4AYT
Clive Davies	Darlington	G4FVP
Ciaran Morgan	Warwick	M0XTD
Stephen Drury	Milton Keynes	G6ALU
Nigel Nash	Hemel Hempstead	M0NGL
Dave Sheppard	Orpington	G8OUX
Mike Busson	Newport	GW8MER
Rob Johnston	Wrexham	G7MHF
Terry Bailey	Manchester	G6CRF
Seamus Import	Appleby-in-Westmorland	G7ITT
Lee Molyneux	Wigan	G0DBH
Julia Tribe	Waterlooville	G0IUY
David John	Dartmouth	G3WCB
Lee West	Cleethorpes	G4TNX
Simon Tribe	Waterlooville	G0IEY
Stephen Yates	Tewkesbury	G4NZV
Lyndon Reynolds	Hull	M0LDR
Steve Pettitt	Wellingborough	M0MOI
John Spurgeon	Goole	
John Worsnop	Cambridge	G4BAO
John Saunders	Bridgwater	M0JES
Martin Perrett	Falmouth	G8LCE
Vincent Lynch	Stretton	M0LCR
Phil Taylor	Leicester	M0VSE
Ian Parker	Bristol	G8XZD
Stephen Lovell	Nottingham	G8XPZ
Keith Parker	Gillingham	G8SYA
Ireland		
Seamus Mccague	Dublin 14	EI8BP
Thomas May	Dublin	EI9LA
Craig Robinson	Boyle	EI3FW
Roddy Walsh	Rathcoffey	EI7DF
Jim Smith	Wicklow	EI4CP

Israel		
Yoram Rotbach	Modiin	4Z5YR
Italy		
Renzo Sartori	Treviso	I3SWR
Japan		
Hideo Yanagisawa	Kunitachi	JA7JJN
Latvia		
Janis Dimpers	Riga	YL3AKC
Netherlands		
Andre Koopman	Langweer	PA0AKV
Dion Volmer	Vriezenveen	PE1ORG
Rob Krijgsman	Terborg	
Gerard Snippert	Losser	PE5GSL
Otto Aden	Berltsum	PA2OTT
Auke van Balen	Helmond	
Jack Godlieb	Den Helder	PA3CPI
R Snijder	Zwolle	
Cor Drinkwaard	Sliedreicht	PA3FOE
GJ Dam	Hoofddorp	Dam
Jan van Muijlwijk	VEENDAM	PA3FXB
Frank Marx	Uden	PA2MRX
Roel Sijbrandi	Arnhem	PE2CVF

New Zealand		
Keith McRoberts	Nelson	ZL2TKM
Poland		
Waldemar Sznajder	Mokronos Gorny	3Z6AEF
Slovakia		
Vladimir Rybar	Valaska	OM7AVR
Slovenia		
Matjaz Zibert	Kranj	S59MZ
Stefan Lebar	Ljutomer	S51L
South Africa		
Henry Stephan	Johannesburg	ZS6MC
USA		
David Carlson	Batava	N2OA
Dale Hagert	Eagan	W0IR
Larry Nussbaumer	Westminster	N8GGG
Ronald Fredricks	Jenison	K8DMR
Mark Culross	Fort Worth	KD5RXT
Gary Sutton	Castle Rock	WB5PJB
Rodney S Fritz	Mesa	WB9KMO
Peter Johnson	Rawlins	KI7DOM

Out and about in 2023 with the BATC

McMichael Rally

Newbury Rally

Activity and Contests

Clive Reynolds G3GJA

Christmas Repeater Contest and Christmas ATV Activity Ladder

These two events will run concurrently from Saturday 23rd December 2023 to Tuesday 2nd January 2024 inclusive. Contacts for the Repeater Contest can also be entered into the Activity Ladder. The rules for both are unchanged and can be found here: *https://wiki.batc.org.uk/Christmas_2023_Repeater_Contest_&_Activity_Challenge*

Remember that there is a £100 prize for the winning repeater group.

Activity Weekends for 2024

These are the tentative dates for 2024; some slight jiggling may be needed to avoid clashes with BATC events that have not been given firm dates. As usual, the schedule is aligned to the IARU ATV Contest in June with four-week intervals and all feature 23cms in addition to a particular focus.

- **January 20th/21st** – 70cms (note this has been put back two weeks from previously published lists)
- **February 17th/18th** – 13cms and up.
- **March 16th/17th** – 2m, 4m and 6m.
- **April 13th/14th** – 70cms.
- **May 11th/12th** – All bands (IARU preparation).
- **June 8th/9th** – IARU Region ATV Contest.
- **July 6th/7th** – 2m, 4m and 6m.
- **September 7th/8th** – 13cms and up.
- **October 5th/6th** – 70cms.
- **November 2nd/3rd** – 2m, 4m and 6m
- **November 30th/December 1st** – All bands

2023 Activity Ladders

Due to an oversight, the 2023 70cm and 6cm Ladders were not reset after the 2022 events. That has now been corrected, so please enter all of your 2023 contacts made on these bands on the BATC website here: https://batc.org.uk/contests/70cm-ladder and here: https://batc.org.uk/contests/6cm-ladder

The ladders will be reset again at the end of January, so you have got until then to record your 70cm and 6cm activity.

IARU ATV Contest changes

Dave G8GKQ reports that changes to the rules of the IARU Contest have been made to even out the advantage of roving stations, with microwave equipment, over fixed stations. Changes have been made to band multipliers, that reflect the current perceived difficulty of operating on each band, restrictions on the number of sites used and separate sections introduced for roving and fixed stations. Further details can be found on the Forum here: *https://forum.batc.org.uk/viewtopic.php?f=75&t=8674#p34534* where there is a link to the amended rules on the IARU website.

Dave has now retired from the position of IARU R1 ATV Contest Manager after a seven-year tenure; thank you on behalf of all ATVers in Europe for your dedication and time promoting ATV by way of contests.

Activity reports

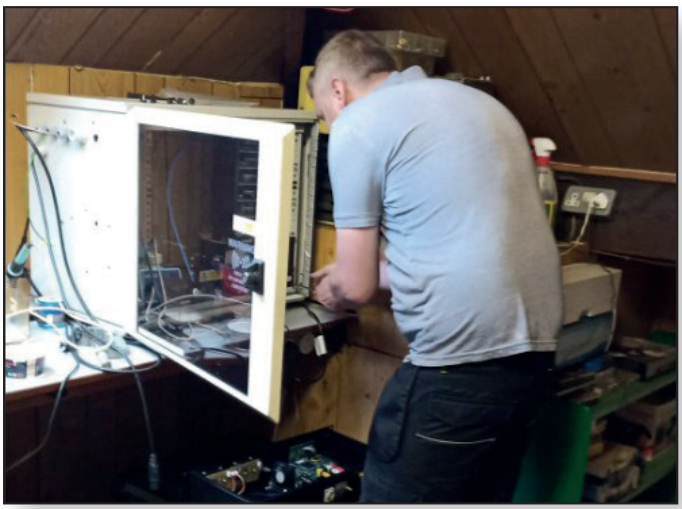
Bad weather has put paid to participation in the last three Activity Weekends, with the December one being particularly bad. Persistent rain and high winds killed any portable activity and even operation from home was not easy as towers had to be lowered. Although I kept a listening watch on 144.75, nothing was heard. Hopefully some of the dates selected for next year will coincide with good weather. Oh, and a tropo lift would be good too!

Repeater updates

GB3GG (Grimsby) is off-air until the weather improves to allow access to the antennas. A fault was found on the receive antenna and work is under way to repair it. Early in December the streaming Raspberry Pi developed a fault and that too is now under repair.

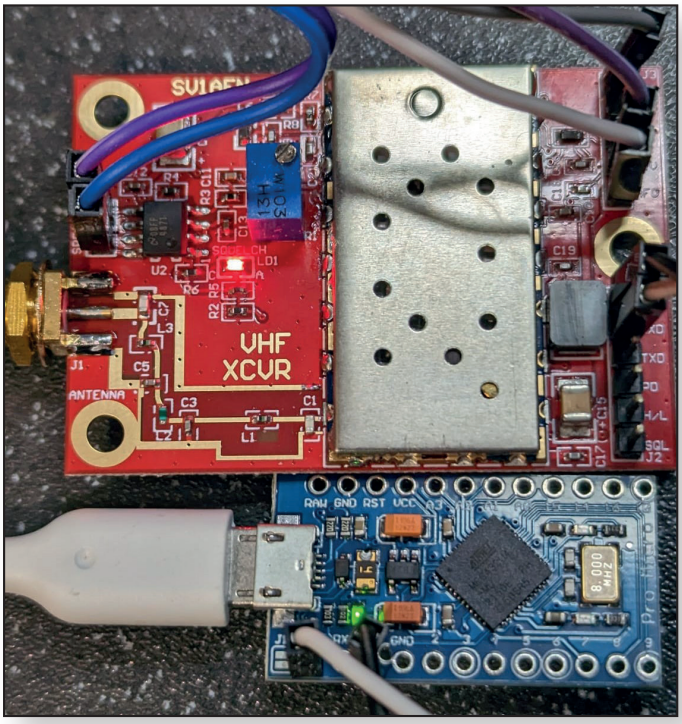
GB3YT (Barnsley) The attended beacon operation from Ken G8VDP's QTH continues to give good results. Another DTX1 modulator has been sourced and tested to replace the original that failed in service when the repeater was based at Mirfield. Ken has also been busy helping locals receive the beacon.

- *Here Malcolm G4HIZ is pleased he can see YT on his Satlink receiver*



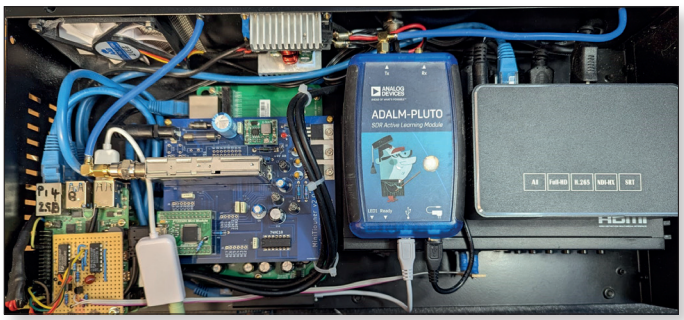
Meanwhile Gary M1EGI is busy with the YT cabinet

GB3EY (Hull) The all-digital controller for the repeater is nearly finished. It has been run for several weeks continuously and it appears to be stable. Some issues were found with the BATC controller software that corrupted the Morse ident and the slideshow would not play out more than ten pictures. These bugs were quickly sorted by Dave G8GKQ. Thank you Dave!



SV1AFN module & Arduino

Just before this went to press, the miniature VHF transceiver from SV1AFN.com arrived that will receive DTMF commands on 144.75MHz, allowing users to modify the repeater's behaviour. The transceiver module needs a serial string sent from an Arduino to set it up. Thanks to Lyndon M0LDR for helping with the debugging.



The new EY controller has three Raspberry Pis, a Minitiouner, 8-port Ethernet switch, ADALM-Pluto, Ethernet to USB adapter, LinkPi H265 Encoder and two 4-port Portta HDMI switches squeezed into a 200mm deep 2U rack case. The little bit of space bottom right is reserved for the 2m DTMF receiver.

If you have any ATV repeater news you'd like to share please email me: *contests@batc.tv*

CAT 24 - Initial plans

We are planning to hold CAT 24 at the Midland Air Museum on the outskirts of Coventry again.
The chosen date is Sunday 4 August 2024 - please put it in your diaries now.

Remember that we will also be holding the BATC's two yearly General Meeting at the museum early on Sunday afternoon and plan your day accordingly - it is important for the committee to hear your views on what the club is, is not, or should be doing.

In response to feedback from CAT 23 the museum will be making more parking available, and will have more sitting-out areas for discussions and rest. The museum café will also be accepting pre-orders for sandwiches to avoid the midday rush.

Again, there will be an informal dinner on Saturday 3 August at the Old Mill Hotel in Baginton. The same room as last year has been booked, and we hope to be able to accommodate a few more diners than last year. A booking list will be opened on the BATC forum nearer to the date, and attendees will need to pre-order their food so that the hotel can serve us more easily.

At the time of writing, rooms are still available at the Old Mill Hotel. Nearby alternatives include The Oak and the Dakota Guest House.

Hope to see you there!

David Mann - G8ADM President of the BATC

Who is the BATC President? Well here are some answers:

Early years: I was born near Hendon Aerodrome at the start of World War II. I started making electronic valve products at an early age due to the encouragement of my father who was an engineer.

I had a small workshop in the garage. In 1964 I took out a class B amateur radio licence, G8ADM, initially for 70cm and up. Later in 1968 I took out another licence for ATV, it was a separate 70cm+ licence in those days, G3OUO/T. I had many ATV contacts with stations in the London area.

Now G8ADM is a general license and covers LF, VHF and above, including ATV. We moved house several times in this period, and I usually put up a big aerial mast much to the annoyance of my neighbours.

Later Years: After school I started a five-year apprenticeship with EMI. After this I joined the Antenna division of EMI where the team designed and built high power, mostly television, transmitting aerials. These were put on big masts of up to 1000ft tall. I used to travel around the world helping with the installation. I checked and adjusted the match, quite a challenge at the top of big masts.

I later helped run a company making television receivers for a rental organisation, next I ran a company up in Essex making tuning components for R.F. equipment before setting up Link, see below. I continued transmitting ATV. I was also appointed to the BATC committee.

I had several roles here including general secretary and CQTV editor. In 2018 I resigned from the BATC committee due to pressure of work. My original work included setting up a new company, Link Electronics Ltd. with John Tanner in 1965, later we moved to Andover in Hampshire where I bought a bungalow on a 250 ft high hill.

At Link we designed and manufactured a variety of television CCTV products including monochrome cameras and broadcast products including colour cameras. Later we sold the company, and I moved to Gerrards Cross near London and started a new company with my brother, Len, Link Research Ltd.

We won the Queen's Award to Industry twice and on one occasion I went to the palace and shook hands with the Queen. We made a variety of television broadcast products and sold them through agents around the world.

In 2005 I was getting old, so we sold this company and I retired. In 2020 I was asked to be president of the BATC which was great honour, a position that I hold to this day. So how am I motivated? By electronic design and invention.

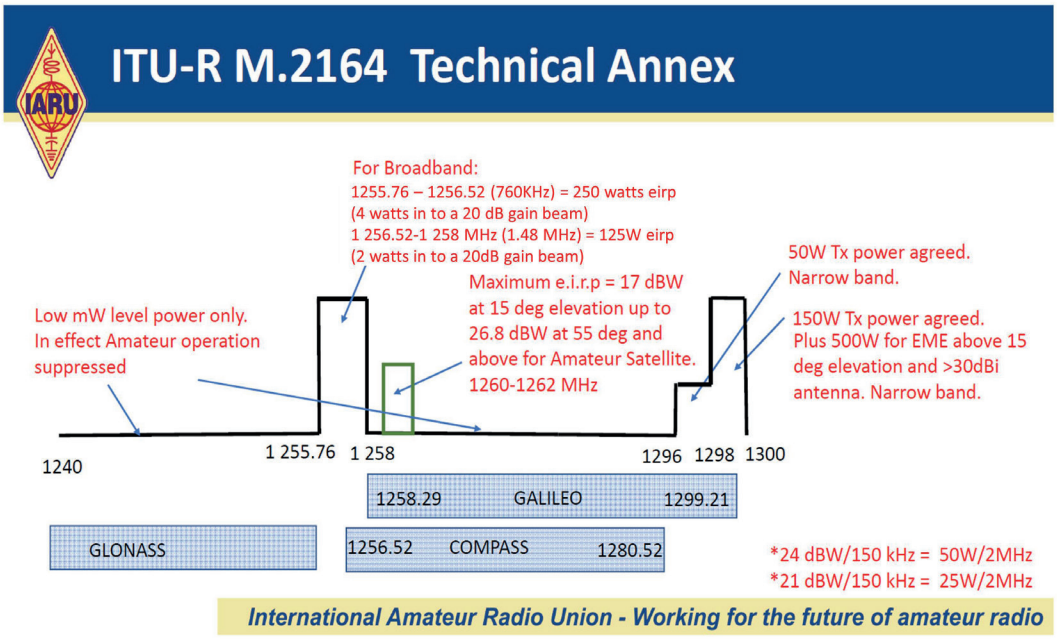
Most things I mention above are to support this motivation. Problem, I have damaged my right leg which is going to take many months to recover. This prevents me from attending BATC events, but hopefully I will get out again soon.

Enjoy your ATV, Dave, G8ADM

The future of the 23cms band – December 2023

Noel Matthews G8GTZ

As has been widely reported WRC23 has been considering proposals to protect Global Navigation Satellite Systems (GNSS) operating in the 1,240 – 1,300 MHz band from potential interference by amateur radio stations operating on the 23cms band.



The IARU has been fighting a number of proposals to severely restrict our access to the band and through the dedicated efforts of IARU volunteers, led by Barry G4SJH, it was announced last week that rather than mandate action, the WRC had agree that a footnote should be added to the worldwide regulations.

IARU President Tim Ellam, VE6SH, said "This is a very good result for the amateur services. The decision reached at WRC-23 on this agenda item makes no change to the table of allocations nor incorporates by reference M.2164 into the Radio Regulations.

The addition of a footnote that provides guidance to administrations in the event of interference to the RNSS is a good regulatory outcome for amateurs and the primary users of this band."

What this means is that the restrictions shown in the chart from the footnote which will be added to the worldwide regulations, but it is up to the individual regulators how they interpret this and make changes to the amateur radio licence in their country.

It is not known how regulators will act – it is possible EU countries will implement the footnote in full to protect Galileo services and other countries may ignore it completely. Any changes are likely to implemented from the beginning of 2025.

If the footnote were to be implemented by regulators as mandatory it will mean FM ATV is no longer possible below 1300MHz (except at very, very low power levels) and there are very strict power limits for anywhere below 1296MHz.

We are very fortunate in the UK to have access to 1,300 – 1,325 MHz where our repeater outputs are located but if the footnote was implemented we would need to look at band/repeater planning as it is likely that repeater inputs will have to move and we would need to allocate new simplex working channels, possible above 1,300MHz.

Amateurs should always remember we are secondary users in 23cms and must not cause interference to primary services. The big danger in countries where the footnote is not implemented is that any interference issues in the future through continued amateur use may force the regulator to implement the changes.

We should therefore all continue to use 23cms with caution.

Further details can be found here:

- BATC forum where we will update you on any developments:
  https://forum.batc.org.uk/viewforum.php?f=91
- IARU announcements:
  https://www.iaru-r1.org/2023/23cm-band-outcome-approved-at-the-7th-plenary-meeting-of-wrc-23/
  https://www.iaru-r1.org/wp-content/uploads/2023/12/Report-from-WRC_Dec-2023_23cm.pdf

The Portsdown Newsletter

Dave Crump, G8GKQ

It's been a while since the last Portsdown newsletter; that doesn't mean that nothing has been happening - just that I had too much else to write about.

The big picture

The Raspberry Pi 3-based Portsdown 2020 is now more than seven years old. I will continue to support capability and security updates while I can, but I fear that there may come a time soon when the only option will be to freeze the capability and not attempt online updates. In the meantime, if updates to the Portsdown 4 are directly applicable to the Portsdown 2020, I will try to back-port them.

Portsdown 4 remains the main effort. I will continue to work on bugfixes and new capabilities. However, the operating system is aging and can't be updated as the newer operating systems don't support some of the video-specific features that we use.

The Portsdown 4 NG project that I was working on has been abandoned. Many of the features that I tested in the project will be used in future Portsdown 4 and Raspberry Pi 5 builds.

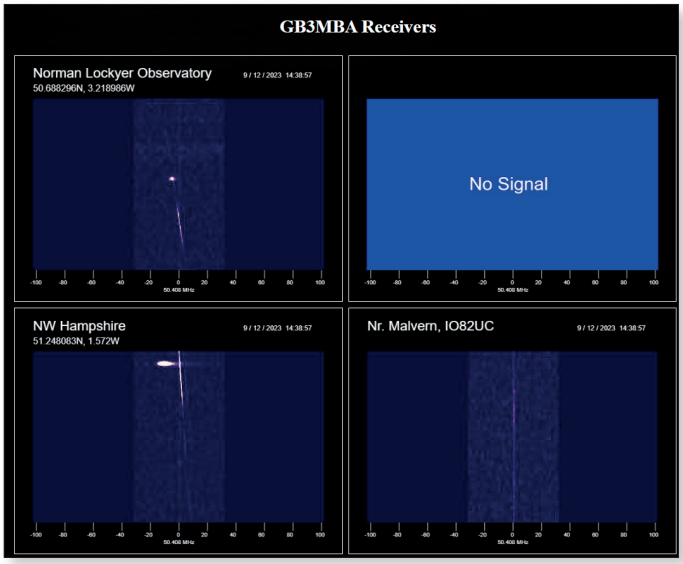
The more powerful Raspberry Pi 5 has recently been released, and only works with the newest "Bookworm" operating system which does not include many of the video encoding features that we have used in the past. I am experimenting with this as a shack-based desktop capability prior to considering whether a "Portsdown 5" is worthwhile.

Bug-fixes

I have released one major bugfix to all of the BandViewer variants across the Portsdown 2020 and Portsdown 4. This corrects an amplitude calculation error in the displayed spectrum and means that carriers now appear with constant amplitude rather than with the flutter that they had before. The bug was not noticeable with DATV signals.

New features

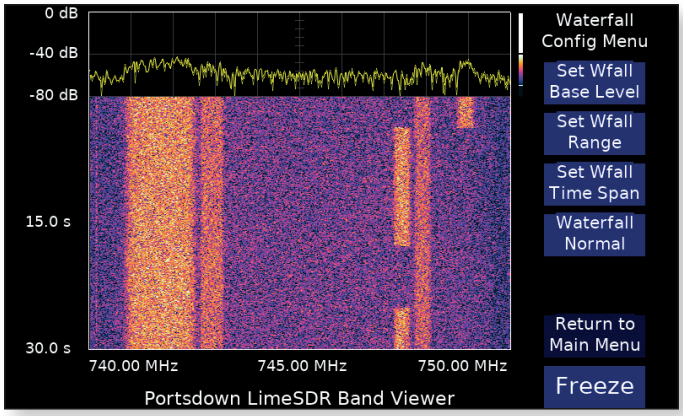
Away from ATV, I have been working on a capability called MeteorViewer. This uses an SDRplay rspDX to receive echoes from the GB3MBA meteor beacon on 50.408 MHz. It then sends the IQ data of the received echoes to a website *https://ukmeteorbeacon.org/beaconclient/* which displays the echoes on a waterfall. The idea being that by analysis of the doppler shift on the echoes received from different locations the velocity and location of the meteor could, in due course, be deduced.



The GB3MBA Website Display Showing meteors, aircraft reflections and direct signals

This MeteorViewer software is built into the Portsdown 4 build, and has the capability to display a local waterfall on the touchscreen. Following on from this, I have added a version of BandViewer that works with the SDRplay series of SDRs to the Portsdown 4 build. This also has the ability to display a waterfall.

I have incorporated the waterfall capability into the LimeSDR version of BandViewer on both the Portsdown 2020 and the Portsdown 4. I will add it to the Pluto BandViewer when time permits.



BandViewer waterfall showing QO-100 activity over 30 seconds

The Portsdown Noise Meter is described elsewhere in this CQ-TV. Since writing the article, I have added another mode - absolute carrier level measurement. This simply measures the absolute level of the highest carrier within the passband.

Composite video capture

For some time, it has been very difficult to obtain the Fushicai Easycap video capture devices that work with the Portsdown system.

The BATC Shop now stocks the MS2106 EasyCap and I have updated the Portsdown 4 (only) to use this version for Lime and Pluto DVB-S/S2 H264 transmissions only. It will not work for DVB-T or MPEG-2. It needs a valid video signal to be present at the start of the transmission. This EasyCap, based on the MS2106 chip from MacroSilicon, will also work for streaming to the BATC streamer.

You can easily check the type of EasyCap that is connected to your Portsdown 4. Go to "menu 2", "file menu", "list USB devices". If there is an entry in the list that reads 534d:0021, that is an MS2106 EasyCap. If there is an entry that reads "Fushicai USBTV007" then you have a Fushicai EasyCap.

Undocumented feature

I was recently asked whether it was possible to automatically divert the received signal from the aerial from a MiniTiouner (for receiving video) and the Pluto receive input for displaying on BandViewer.

There are two ways of solving this problem; the simplest is to use a 3 dB splitter on the incoming RF and simultaneously feed RF to both the MiniTiouner and the Pluto. However, this is only practical if a high gain preamp is used in front of the splitter.

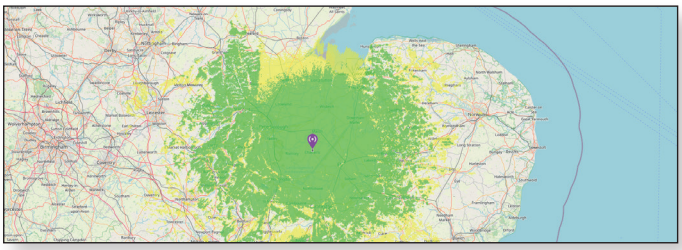
The second way is to use the switching signal that is present on GPIO pin 21 of the Raspberry Pi 4 GPIO to control a coax relay driver transistor; this signal is low when the Portsdown is receiving or transmitting, but goes high when the Pluto BandViewer is selected.

New SSTV relay in Chatteris, Cambs

Andy Dunham G6OHM

MB7TF is an SSTV relay located in Chatteris, Cambridgeshire. Frequency is 144.5125 mhz - narrow deviation required. Planned coverage of the relay will be the Fenland area, operational the odd evening during week but will be active over the weekend and evenings.

Times aprox 18:00 – to 22:00 hrs



Coverage area of relay.

To access the SSTV relay using the MMSSTV program:

1. TX a 1750Hz tone burst for 2 seconds and key off.
2. Listen and wait for MB7TF to reply with its CW K – this says it is ready to repeat.
3. TX your SSTV image . Any mode/speed.
4. Once finished wait for your image to be repeated with MB7TF logo on the screen.

Every ten minutes the relay will give out a picture beacon: either last pictures received; details of this site; info on how to send pictures; or other info like QRA Locator / WAB.

Any reports welcome: email to *andyg6ohm@gmail.com*.

MB7TF is using MMSSTV software. All timings and idents are done in program as well as the beacon and cw ident.

Relay transceiver is a Kenwood TM-D707a running the required output as per the NoV. A G3LIV Isoterm interface is used to control audio levels, with a homemade flowerpot antenna with 3db gain, 33ft above the ground.

Here in Chatteris we are only 1 metre above sea level, but here in the Fens I have an uncluttered view. No trees, no hills, no holes. So signals go for miles.

All details can be found on *www.g6ohm.com*
Or on *qrz.com* under MB7TF.

Serit FTS-4334 NIM / tuner - good news at last

Noel Matthews G8GTZ

As members will know, the Serit FTS-4334 NIM is currently used in the Ryde, Portsdown, Winterhill and Opentuner receive systems and is the only reliable way to receive narrow band DATV signals as used on QO-100 and our terrestrial amateur bands.

Back in 2022 Serit told us they were unable to produce any more FTS-4334 units as the STV0910A demodulator chip had become obsolete – they offered us a "last time buy" of 400 units which have served us for18 months and we have now run out of stock.

This poses a significant risk to the future of amateur television as we currently do not have a receiver design that newcomers to the hobby can build, and any operator wanting to expand his station can no longer buy a DATV receiver.

As a result the BATC initiated a project to look at alternative designs for a DATV receiver and Dave G8GKQ presented the options for this at CAT23 in October.

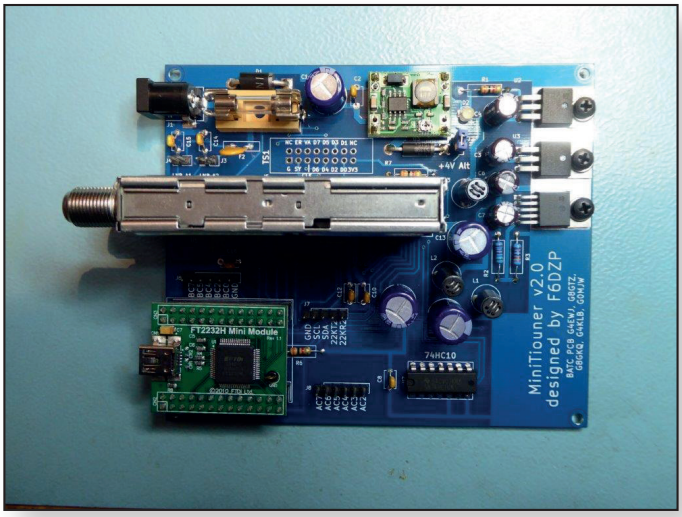
Several approaches were investigated including modifying software for an existing tuner, building a new tuner hardware (with software) and investigating using SDR hardware with custom software. All of these approaches either required a large amount of volunteer effort to achieve a viable design or were incapable of producing the performance we require from a DATV receiver.

In the background Noel G8GTZ and Dave G8GKQ investigated the potential of sourcing components to either build more of the FTS-4334 NIM or an identical alternative.

This included negotiating with Serit who rejected a source of supply for the STV0910A that we had found, but were motivated to do further searches of their approved suppliers.

As a result of this work, Serit found a reliable supplier who had a batch of the genuine chip and have offered to build a significant quantity of the FTS-4334 NIM exclusively for BATC which we envisage will meet demand for at least the next five years.

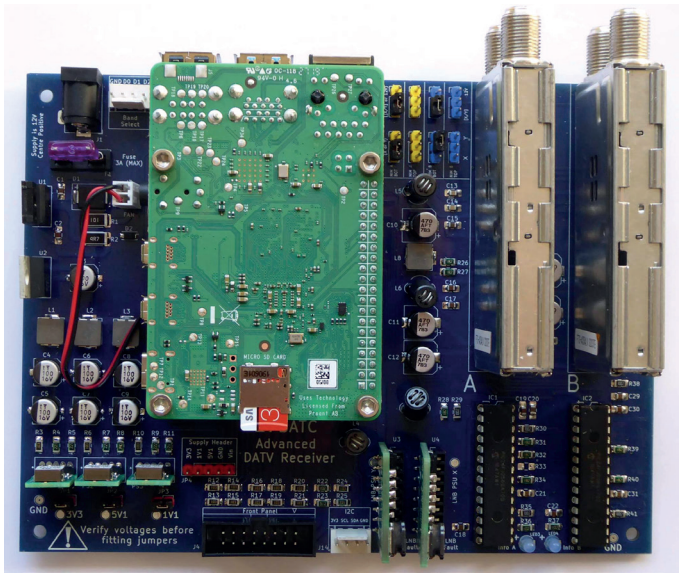
Such is the importance of this capability to the hobby, that the BATC committee agreed to invest over half of our available funds (all to be recouped through sales) on the purchase.



The units should be available from the BATC shop during February 2024 but will be more expensive than our previous stock as general component costs have risen and the supplier of the now rare STV0910A has demanded a higher price for the chip.

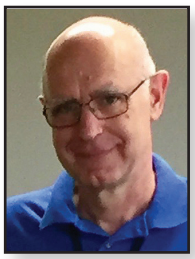
In order to compensate for this price increase, we have started a project to look at reducing the cost of the overall MiniTiouner hardware build, potentially by placing the FTDI USB directly on the PCB rather than using the expensive Mini-module carrier.

Once we receive them, we will release the new FTS-4334 tuners for general sale – please monitor the BATC forum for updates.



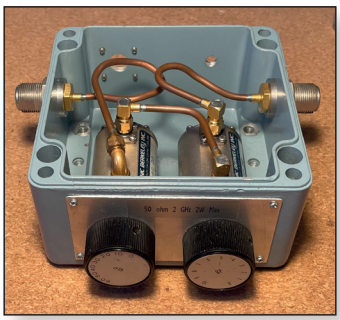
Switched attenuator for QO-100 transmission

Dave Crump G8GKQ



One of the limitations of the Portsdown transmitter is that it is not possible to change the transmit output level without dropping carrier and then reselecting transmit.

During my early QO-100 DATV transmissions I used a large mechanical switched attenuator between the LimeSDR and the PA to adjust my power output while transmitting, but I wanted to replace this with something smaller that would fit in the same box as the QO-100 PA (remote) shack controller.



The original mechanical attenuator

At the time, the PE43703/PE43713 (and similar) electronically controlled attenuators were available cheaply on eBay and had been used in the original Portsdown design.

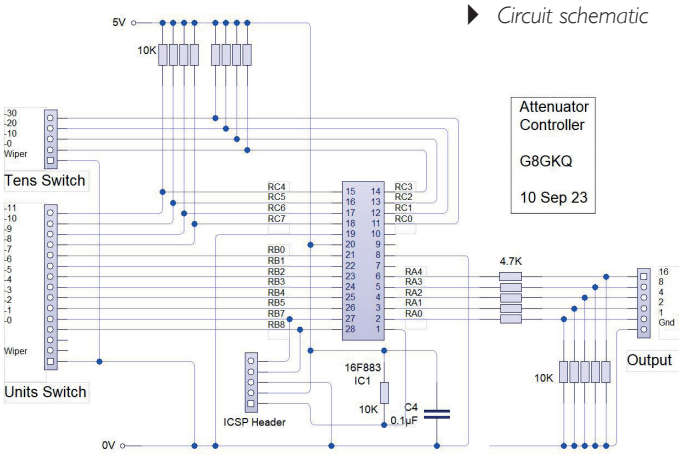
They are still available for around £20 - just search on PE43703. These digital attenuators can handle up to 200 mW over a frequency range from 48 MHz to 6 GHz, and can be controlled in 0.25 dB steps between 2 dB and 33 dB attenuation.

In the Portsdown, these attenuators were controlled over a serial link, but I wanted simpler solution, so used the parallel interface. Additionally, I only wanted 1 dB steps, so I left the 0.25 dB and 0.5 dB control lines set to low for minimum attenuation. The specification for the PE43713 can be found here:
https://www.psemi.com/pdf/datasheets/pe43713ds.pdf
The PE43703 is almost identical.

I designed a short PIC program to read the setting of two rotary switches (tens and units of dB) and translate it into the binary code for the five lines (1 dB, 2 dB, 4 dB, 8 dB and 16 dB) connected to the attenuator board.

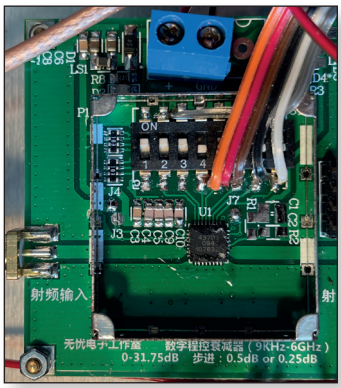
Particular care was taken to protect against switching glitches - all indeterminate states result in high attenuation to reduce the risk of overdriving a QO-100 PA. The PIC Code (assembler and hex) is published on my GitHub page: *https://github.com/davecrump/pic-code/tree/main/attenuator*. This would need to be programmed into the 16F883 PIC.

Very few external components are required apart from a few pull-up and potential divider (5v to 3v3) logic)



Circuit schematic

resistors allowing simple construction on veroboard. Nearly all of the components can be purchased from eBay (search "rotary switch 12 position", "collet knobs with pointer" and "sil resistor array"). The connection to the attenuator board is shown here. I had to cut an opening in the screening cover to route the ribbon cable out.



Wiring to the attenuator

The switches two and three are set to "on" so that the 0.25 dB and 0.5 dB attenuators are not activated. The solder jumpers (J3 and J4) need to be set to allow parallel control; each eBay board is different, so I cannot give instructions here - check the PCB and the data sheet.

The wiring to the front panel switches can be seen here:

The front panel is simple and easy to adjust with reference to the web spectrum monitor (and the PA current monitor on the LCD).

The attenuator has been in use for more than three years. I recognise that I could simplify the design by converting to a 3.3v supply for the PIC, but it works as it is, so I will not be changing it.

Evaluation of the quality of transmitted and received analogue video signals

Chris van den Berg PA3CRX

It is clear to everyone that a video signal is much more complex than an audio signal. In this article, I hope to give a simple insight into what an analog video image looks like and how the performance of the transmitter and receiver can be evaluated.

First some basics, for those who are not really familiar with it.

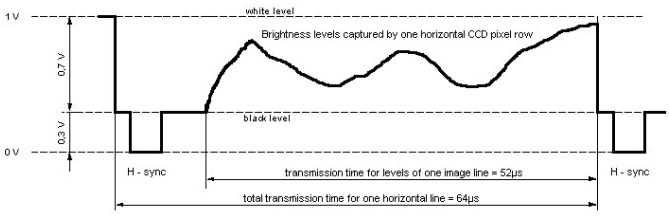
In this part of the world a so-called PAL system is used. PAL stands for Phase Alternating Line. Characteristic of this system is the number of lines that are written in the way a book is read: from top left to bottom right. Not line by line, but first the odd lines, then the even lines. So alternately. This is called 'interlaced scanning'.

This optimization was mainly developed for the then standard CRT (Cathode Ray Tube) display tubes with a phosphor layer.

This interlacing made movements in the image smoother and the image flicker less.

The interlaced-scanning PAL standard has 25 whole images (frames) per second.

The video signal contains a signal at the end of the line indicating that must gone back to the left side of the screen. This is called a line synchronization pulse. A full line is written in 64 uS. Not everything of this line is visible on the screen: of course not the synchronization pulse, nor is the colour burst seen that comes just after the synchronization pulse.



One PAL video line.

After the bottom line in the image there is another pulse, which we call the frame synchronization pulse. Because a total of 625 lines are written with the PAL system (i.e. in two times), the frame synchronization pulse comes after 312.5 lines, approximately 20 mS.

A complete image is therefore built up on the screen in approximately 40 mS. Hence the 25 images per second, made up of 50 even and odd fields.

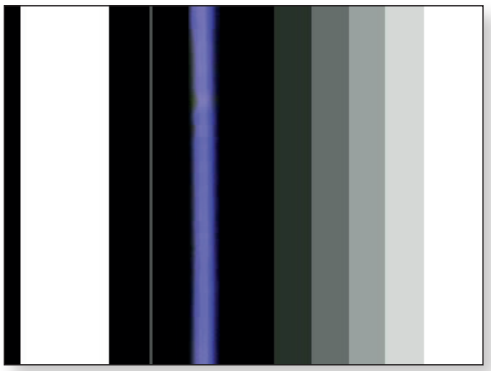
Not all 625 lines are visible on the screen; with broadcast some contain test signals and teletext, which we will ignore for now.

If we look further at one line, approximately 52 uS contains the information we see in the image. If we assume the black level as reference, the synchronization pulses are located below that level, the image information above it.

If we ignore the colours for a moment, it means that the larger the signal is during that 52 uS, the whiter the image is. Of course within certain proportions. The size of this signal is called the luminance.

If we wanted to fill the entire image from left to right from black to white, there would be a diagonally increasing voltage during the 52 uS of each line.

A number of bars with shades of gray will show a stairs.



20T test signal containing a white bar, a thin white bar, a modulated pulse en a grey shades stairs.

Colour

The colour information actually consists of red, green and blue. This is being combined. What is important here is the colour carrier modulated with colour information, which has a frequency of 4.43 MHz. This burst is positioned between the line synchronization pulse and the image information. The so called 'composite video' signal is created based on the information from the luminance and the colour carrier (chrominance). Of course, all mentioned pulses and levels have a standardized length, amplitude and phase.

So totally a few pulses of which the lowest frequency is 50 Hz, the highest frequency is approximately 16 KHz and then 4.43 MHz.

However, the image content could contain higher frequencies: the speed of rise and fall of the amplitude determines the image sharpness. Those could indeed be higher frequencies!

Various video sources provide rather high frequencies, but due to the bandwidth of our transmission signals we limit it often at 5.5 MHz. Please note, we are talking about an amateur video signal here.

Measurements

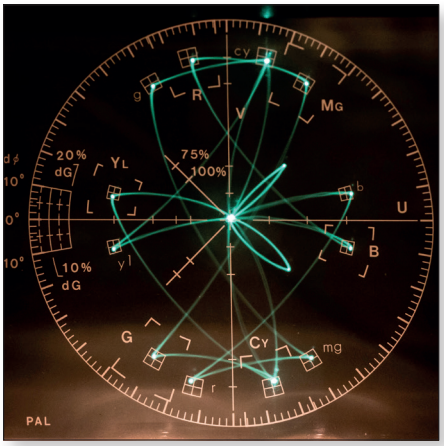
To see the timings and amplitudes in voltage we can use an oscilloscope that has enough bandwidth. Professionally, a synchronizing Waveform monitor is used, which displays the times and levels on the screen according to the standard. This allows you to quickly see whether the signal to be measured corresponds exactly.

Vectorscope and Wave monitor often used together.

A Vectorscope can be used to easily see colour deviations.

This has positioned the primary and secondary colours in a circle on the screen. Seen from the center of that circle, the intensity of the colour in a specific direction is displayed. With little colour the display remains in the center, with intensity up to 100% points are placed on the 'circle'. If the phase is a certain colour, it will end up exactly in the square where the colour is shown. At 50%, the dot will be placed between the center and the 'circle'.
The Vectorscope can be used for the entire image but also for a single line.

Colour bars image on the screen of the Vectorscope.

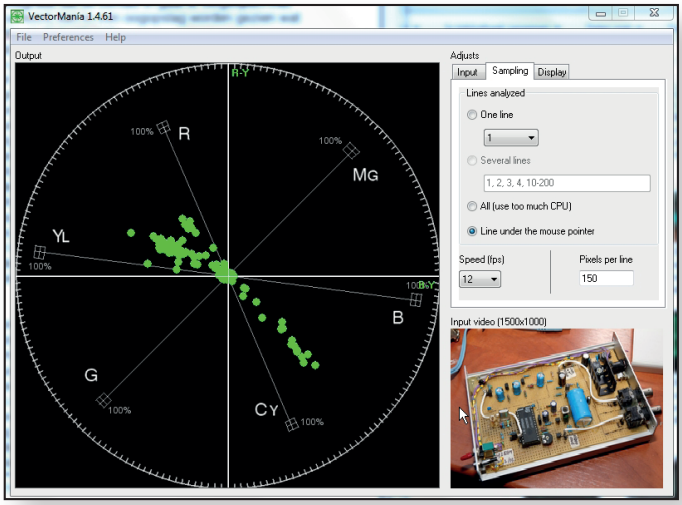


By using a vectorscope the video signal entering the transmitter could be compared with the video signal coming from the receiver. At a glance you see what has happened to the chrominance and luminance.

A Vectorscope is traditionally a device with a cathode ray tube, like a traditional oscilloscope.

Nowadays, in addition to waveform monitors and vectorscopes (which even support modern variants such as digital HD), there are software packages intended editing video images, with which the colour balance of the images can be directly adjusted.

To get an impression of how a Vectorscope works, there are free programs that can be downloaded and allows playing with an image or moving (camera) image. One of those programs is called Vectormania and is self-explanatory (runs fine on Windows XP, when used with Windows 7 or higher use the available compatibility mode). The included instructions are in Spanish, but there are not that many bells and whistles. By setting the language to English you can have fun playing with various images. Own or received video signals can also be viewed with a USB video grabber.



Vectormania demonstration, example of a (pointed) line of the image shown at the right bottom.

Video resources

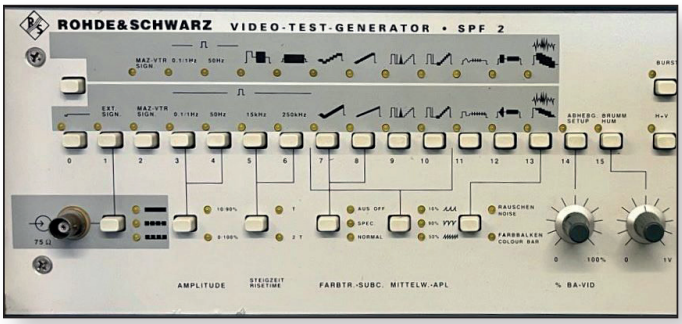
Nowadays, the amount of video resources offered cheaply is generous and very affordable. A cheap photo camera with a video output, a video camera, DVD player, computer: we probably don't have to worry about whether the pulses come at the right time and if the video contains the correct information. If such a device is connected directly to a monitor or television, the image will generally synchronize well and be displayed properly.

If the video source is connected to a transmitter, the question is what the modulator and transmitter does with the signal before the signal reaches the antenna. And it can also be messed up at the receiving side.

In fact, we expect that the image that appears on the screen connected to the receiver is identical to the image that is delivered by the video source at the transmitter's side. In many cases it looks that way at first glance.

If we really want to determine whether a video signal is distorted, test signals are very useful. A particularly nice test device for this is the SPF 2 from Rohde & Schwartz.

As can be seen, various test signals are easy to select. The image next to the keys shows the picture of the video content of one line.



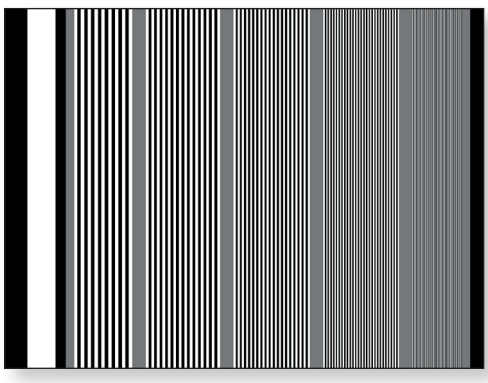
Rohde & Schwartz Video Test Signal Generator SPF2

DIY test patterns

However, it is also possible to make simple test signals yourself. In the image we can place vertical bars with a certain thickness/distance to create certain frequencies. It could be made with a simple drawing application on the computer.

The video device often provides already the correct synchronization pulses and colour information so we only have to fill in the 52 uS.

Such test image can be generated for amateur purposes with a computer, media player or (photo) camera, which can play an image.



Home made test bars 'multiburst' with in steps increasing frequency

With a trick the test image can be stored on the memory card of a simple digital camera. I experienced the camera can be fooled by modifying an existing made photo that is on the SD card. This could not be done with the card in the camera, a card reader is needed. Card readers are often present in laptop computers.

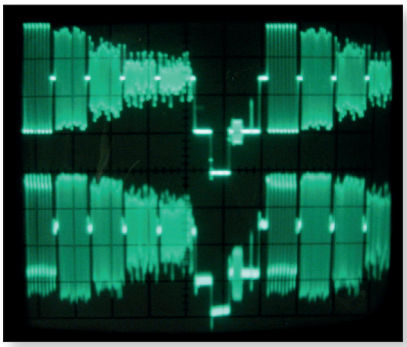
Just make a photo, remove the SD card, place it in the card reader, open the made photo with (for example) 'Paint', paste a picture with bars or an other test image, save. This way works for me with some older Canon cameras. Replacing the file on the card does not work here; it will no longer be recognized.

Or store the test signals on a CD and play them with a DVD player.

Now this video signal could be used to examine and compare the signal after it has passed through a circuit (or via transmitter and receiver).

Depending on the video source not all high frequencies have the same white level, they have also limited bandwidth. However, whether it is completely good in terms of absolute levels is less relevant, it is about the difference.

For example: if my professional receiver is accepted as 'good', my 24 cm transmitter clearly favors higher frequencies in the video signal.



Result of the self made multiburst (1, 2, 3, 4, 4.43 MHz) coming from the Canon photo camera (top) and after passing my home made 24 cm TX and a professional satellite receiver (bottom).

Mismatch of impedance

As is known to radio amateurs, a mismatch causes a reflected signal. This can be immediately seen with an oscilloscope in the signals as strange peaks or overshooting of pulses. Filters are suspicious here (video filter but also IF filter).

Whether this is immediately visible on the screen depends on the severity and the image content, but we obviously want to get it right.

However, things could also go wrong during the measurement itself. Perhaps unnecessarily to mention: a high-impedance oscilloscope connected to the (usually 75 Ω) video source also produce reflections! A correct

method is to connect a T-piece on the oscilloscope connector to a 75 Ω termination resistor (dummy) is connected and supply the video signal also at the T-piece.

If you see round corners in steps, high frequencies are lost. The image has lost its sharpness. This could be caused by bandwidth limitation in the video part but also in the HF part of the transmitter or receiver.

AM modulation

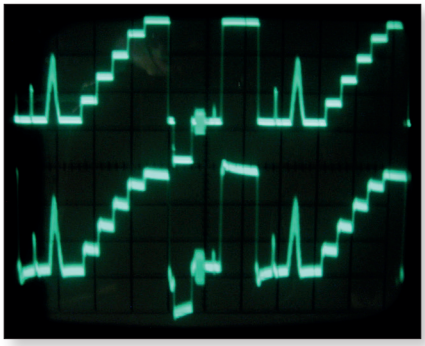
By using a test image with different gray scales, stairs should be seen on the oscilloscope screen. When linearity of the transmitter is poor, the steps will vary in height. Overdriving the (final) amplifier will reduce the highest steps.

FM modulation

With FM modulation, pre-emphasis is first applied to the video signal, favoring the higher frequencies. In the receiver, those higher frequencies are attenuated proportionally, called de-emphasis. Because the noise (higher frequencies) is also attenuated, the total signal/noise ratio is better than if this system was not used.

If this system is not sufficiently matched, it will of course result in deviation compared to the original signal. The CCIR-405 is the used standard for this, in all devices the same amount of 'high' is added as is removed later.

Cheap video links (now popular for use in the 6 cm band but also the famous G1MGF/Comtech modules) handle this differently. These links are intended to work with each other and a few parts can be saved by creating their own 'standard'. As long as they are used as a set it looks fine.

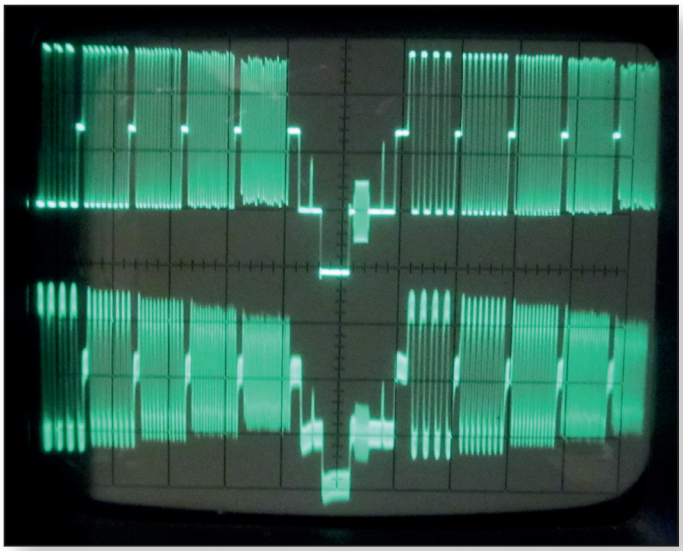


20T self made test signal after passing the 6 cm transmitter and receiver video link modules (bottom)

It is therefore easy to explain why images look poor when transmitted with such 'non-standard' or even completely without pre-emphasis while viewing with a receiver with CCIR-405 de-emphasis.

So it makes sense to add a few components as pre-emphasis to the cheap video link transmitters, if they are going to be used with other equipment.

This looks easier then it is. What part of what circuit has to be replaced? Or just leave the existing circuit untouched and add an additional circuit?



Self made multiburst (0.5, 1, 1.5, 2, 2.5 MHz) to the 'modified' 13 cm Comtech transmitter en below the result out of a professional 13 cm receiver. Still some work to do.

Also have a look at the frame synchronization pulse. The video signal often went through a large capacitor. The low frequency of this pulse could be heavily distorted if the capacity it not large enough or is deteriorated. With signal strength P5 likely not a problem but with weaker signals you could loose vertical synchronization.

Dig up the (old) oscilloscope, make (or download) test images and perform some tests! You could transmit them to other stations, maybe even repeaters could transmit test cards now and then. Viewers could then easily check the modifications in their own receiver.

Conclusion

So it really makes sense to check your analogue transmitter(s) and receiver(s), even when they always worked fine. Watch out, if they have not been used for some years! I experienced smoke after switching one on…

Maybe better to offer unused ATV gear to others to make them enthusiast for ATV?

Links:

- Vectormania: *https://sourceforge.net/projects/vectormania/*
- G1MGF (wiki of the BATC and: *http://ve6atv.sbszoo.com/platinum/mods.htm*)
- PAL video measurements: *https://www.cieri.net/Documenti/Misure%20audio/Tektronix%20-%20Television%20Measurements%20-%20PAL%20Systems.pdf*
- NTSC video measurements: *https://download.tek.com/document/25W_7247_1_rfs.pdf*

Mid-Cornwall beacon and repeater group goes green

Luke M6YEN

On 4 June The Mid Cornwall beacon and repeater Group installed a 5kW solar array at their Hensbarrow site. This article written by Luke M6YEN appeared in their latest newsletter and is reproduced here with permission.

The group host the GB3NQ DATV repeater, the GB3NC and GB3HB voice repeaters and the nine GB3MCB beacons at IO70OJ.

The MCBARG mast

With soaring costs over the past year making our, already high, expenditure almost crippling it became obvious to the committee that other means of powering the services had to be found as a matter of priority.

After some investigation by Peter G8BCG and Paul G6MNJ into our power usage it was discovered, we were using on average 14kWh/day. This meant that any green alternatives to the power problem would have to be of substantial size and unfortunately cost.

Undeterred, Peter went above and beyond contacting potential sources of funding and in early March 2022 an application to the RSGB legacy fund was submitted. By late April we received a response for the RSGB with good news, our application was successful.

The fund was willing to provide us with the £11,224.59 required to make the project a reality. Peter and Paul then set about finding the specification of array that would be needed to suit our needs, it was decided that a 5kW array consisting of 12x 410W panels feeding into a 3.6kW inverter system would be sufficient. As the services are 24hr a 10kW battery array was also installed to keep things running in the darker hours, the system is monitored remotely and is reporting great results so far.

The solar array

The array was fitted by Kevin M0BFB, Alan G3XPY, Paul G6MNJ, a group of dedicated XYLs and later signed off by a certified electrician.

BATC represented at "The Day of The Radio Amateur" in the Netherlands

The committee of the BATC is aware of the need to stay in touch with the BATC membership to ensure that we are steering the club activities to best support the members.

We take the BATC stand to as many UK rallies as we can get to, but since a significant proportion of our membership is overseas, so we do try to visit major overseas radio meetings when possible.

In recent years we have been to the Friedrichshafen Hamfest in Germany, but this year it was decided to visit the largest radio rally in the Netherlands, the "Day of the Radio Amateur" at Zwolle.

It is organised by VERON, the Dutch equivalent of the RSGB and is held in two halls in a large exhibition centre. One houses the clubs, societies and a few commercial traders, the second larger hall houses the flea market.

The BATC stand was in the clubs and societies hall, which was less crowded than the flea market, but we were quite taken aback soon after opening time to have visitors three-deep across the front of the stand.

Later in the day things quietened down, but there was rarely a time when we did not have visitors.

As Phil M0DNY drove from the UK (via the Channel Tunnel) we were able to show off the Portsdown and Ryde projects and also some of Phil's experimental work using a Jetson and LimeSDR.

We were very grateful to Benno PA3FBX who brought along his impressive Portsdown/Ryde integrated transceiver and helped us on the stand for much of the day.

M0DNY, PA3FBX and G8GKQ

PA3FBX's Combined Portsdown and Ryde 3-Band Transceiver

The BATC Stand during a Quiet Period

Visitors to the Stand

As usual we had a mix of members and non-members visiting the stand. Language was rarely a problem as most Dutch amateurs speak good English; the Belgian and French visitors less so, but we use many of the same words for DATV!

All the visitors (including the President of VERON) were very pleased to see us there and made us very welcome.

The demographic was very similar to what we see at UK Rallies, although there may have been a slightly larger proportion of younger enthusiasts. Topics discussed included the use of the Ryde receiver in repeaters (there is one repeater in the Netherlands with 6 Ryde receivers), and the replacement of the MiniTiouner. There were a number of visitors who worked at the European Space Agency and we had some very productive discussions about possible future amateur TV payloads on geostationary satellites and the future of HAM TV on the ISS.

We were able to sort out a few membership issues with existing members, and had a number of new Dutch members sign up soon after the event.

The Rest of the Show

A typical selection of clubs and societies were represented, and it was good to see the Dutch Microwave Group demonstrating PE1ITR's Portsdown Transmitter on their stand.

The Dutch equivalent of OFCOM were present with their detector vans which were very well equipped with direction finding aerials, spectrum analysers and coffee makers!

The Netherlands Army were displaying some of their equipment, with several HF and Satellite communications vehicles and a very impressive deployable Microwave mast.

Deployable Military Microwave Mast

The large Flea Market had an above average range of surplus VHF and Microwave equipment, at very similar prices to those seen at UK rallies.

Radio Detector Van

Future Years

This was the last year that the "Day of the Radio Amateur" is being hosted in Zwolle as the (ageing) exhibition centre is being demolished to make way for housing. Plans for next year have yet to be announced.

The BATC's visit was certainly worthwhile, and this rally should be considered alongside Friedrichshafen for future overseas BATC representation.

Thanks to Phil M0DNY for the photos and driving, and to Benno PA3FBX for his help.

A multiband multimode transceiver

Benno PA3FBX

We all know the situation. It's nice to build a station somewhere in a special location, but what do we have to take with us? Or even worse, what are we going to forget?

Some special QSOs require many different separate boxes, with preamplifiers, output stages, modems, computers, etc. and it is very easy to forget a cable or something else.

The end goal was one transmitter and receiver for all possible connection types.

Whether you want to make an 80m QSO or a 20m FT8 connection or a QSO via QO-100. Yes, even ATV connections via the local ATV repeater or the contest should be possible.

Whether comfortably at home in the shack on the mains or on location, with only a 12 volt supply available. This means all modes on all amateur bands was the ultimate goal.

The BATC has a few nice projects including Portsdown and Langstone with which a transceiver can be made using an Adalm-Pluto and Minitiouner.

The Pluto has a range from 1MHz to 6GHz, and using a DX-Patrol transverter, up to 47GHz with harmonic mixing.

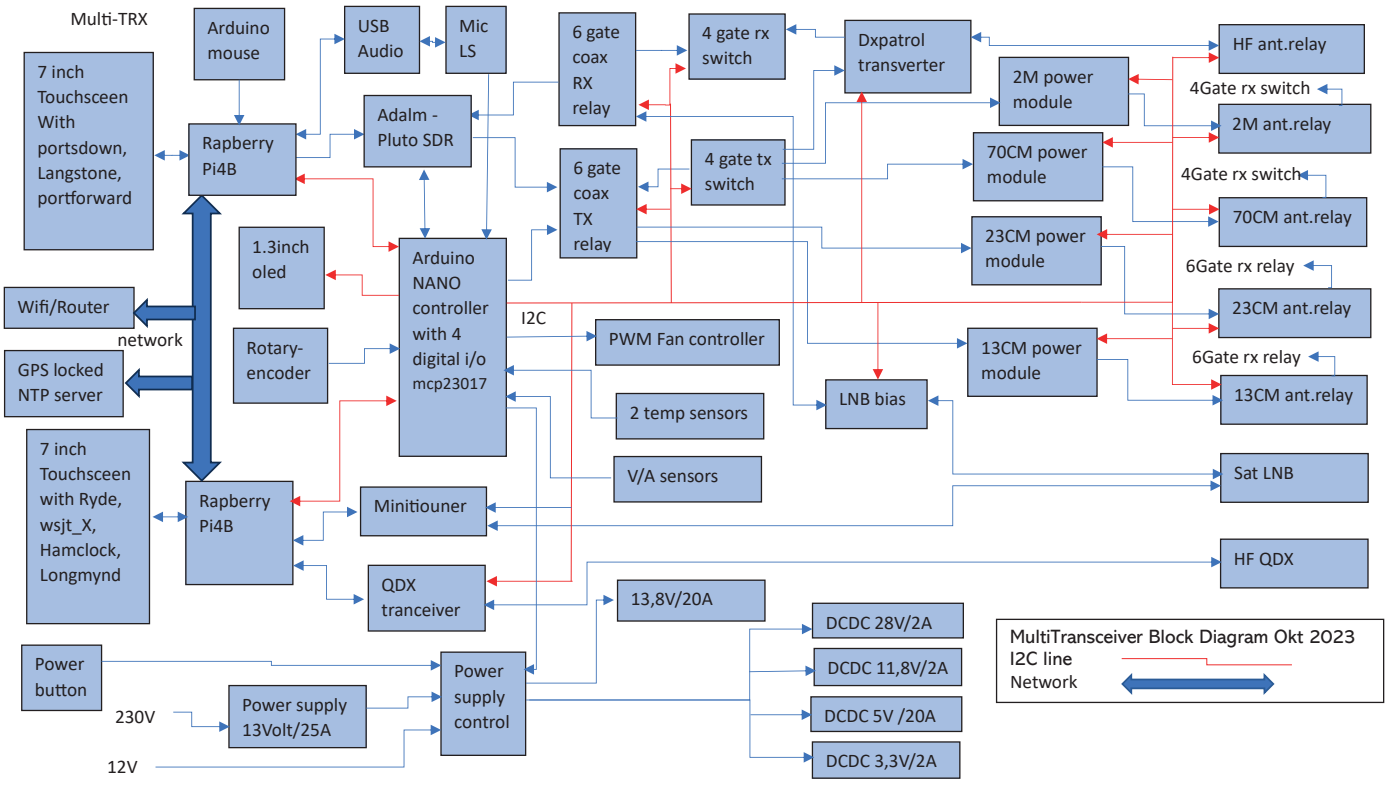
This of course requires some switching work to get to the right antenna plug via the right filters, control, and output stages. It was decided to use an Arduino with an OLED display to make the various switching options visible. Monitoring of temperature, current and voltages, as well as power, must also be easy to display in the field so troubleshooting is simplified.

The entire project is therefore a collection of boxes, circuits, and programs that we know separately or can find on the internet. This project must also be viewed in this way, otherwise it will become a very complex story. It also means that we can continue to implement new ideas, wishes or possibilities.

Portsdown.

Dave, G8GKQ, is the lead designer for Portsdown project which uses a Raspberry 4B with a seven-inch touchscreen.

A DATV transmitter and receiver can be created using a Lime-SDR or Pluto. He has also built in various practical tools, such as a band scope and some measuring options. In addition, a Langstone project is under way that is also built into the Portsdown so in as well as DATV, CW, SSB, AM and FM transmission and reception became possible.



Ryde

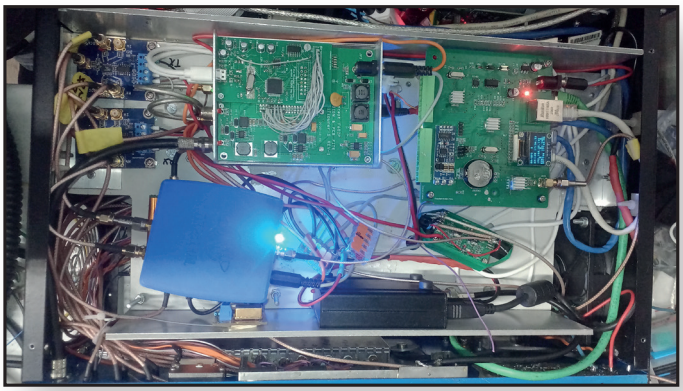
Tim MW0RUD has designed a standalone DATV receiver that also works on a Raspberry 4B using the Minitiouner hardware. Because the Portsdown can only transmit or receive simplex, I chose to install the Ryde next to the Portsdown so that I can monitor my own DATV transmission or see the output of the local repeater during my transmission.

WSJTX

Because the Ryde receiver can only be used for DATV, the screen often remained unused and black, which made me decide to use the screen for other purposes. For this purpose, a multiboot system has been installed on the Raspberry Pis so that a desktop with an installation of Hamclock or WSJTX can also be installed.

QDX

QRP-labs has a project QDX which is a four-watt digital transceiver for four bands the size of a pack of cigarettes. Together with the WSJTX and a Bluetooth mouse you easily have a standalone FT8 (and of course the other digital modes) transceiver for up to five HF bands.



NTP

To run FT8 you need accurate time calibration. Because the internet is not available everywhere and NTP cannot be done via a mobile hotspot, another option had to be found. For this purpose, I found an NTP server that keeps track of its time via a GPS signal.

Router

The NTP server must of course be connected to the Raspberry Pis via a network and a WiFi access for a remote notebook is also useful, so a router with WiFi had to be added.

Power supply

To power all this, a 13V 20A power supply is of course required with the necessary DC-DC conversion to 3.3/5/12/24/28 Volts. 28 Volt is for all coax relays that are good and affordable at that voltage.

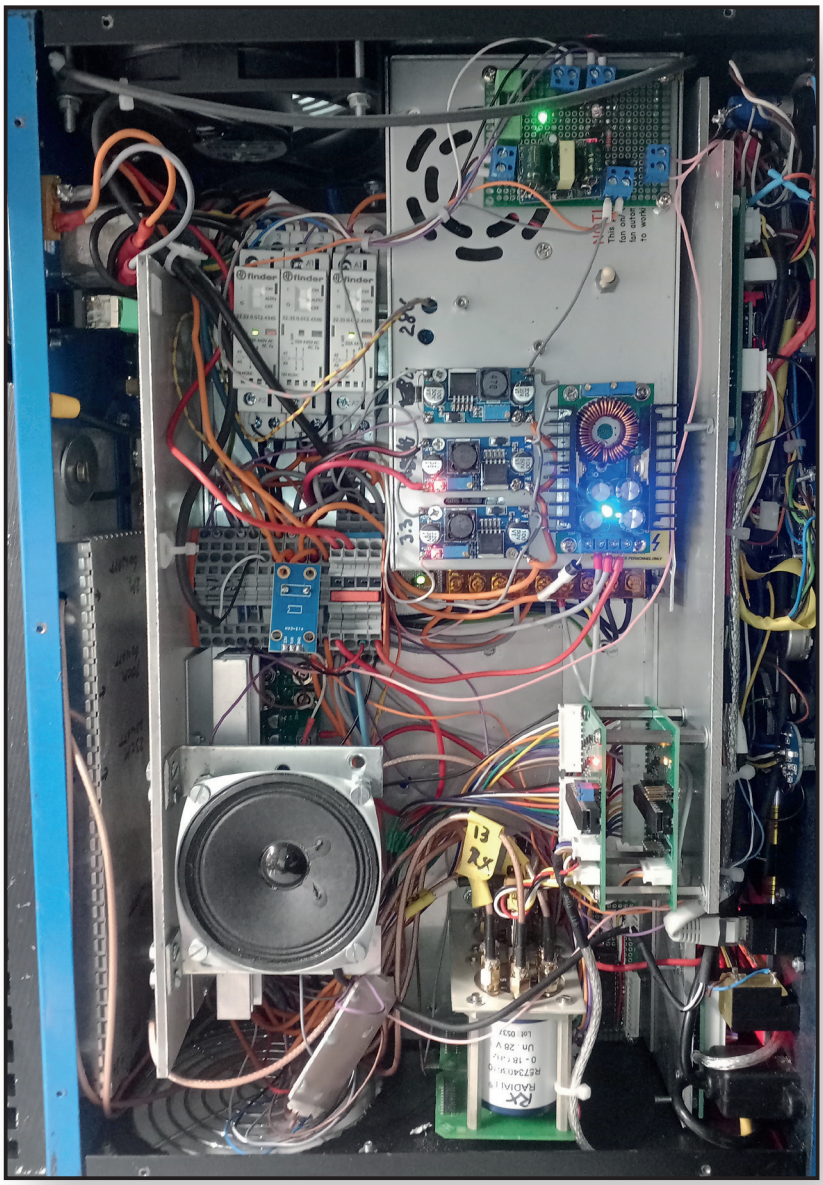
The Raspberry Pis want to be shutdown properly (just like any computer) so a hardware shutdown is a must, but you don't want all the buttons for every action on your control panel.

And of course, when we're done, everything should be able to be turned off with a simple button. This is done with an auxiliary supply and a power button monitoring and shutdown assist by the Arduino.

Arduino Nano

All controlling and monitoring is done by an Arduino Nano. Together with a 1.3-inch OLED display and a rotary encoder, you can quickly gain insight into and control many things.

But an Arduino nano only has 13 digital I/O and 7 analog I/O and all relays and switching options require a lot more.



The I2C line of the display has been expanded with an MCP23017 that provides an additional 16 digital I/O. In the meantime, I already have 4x an MCP23017 (64 extra I/O) because switching seven output stages, eight normal coax relays, two x six-port coax relays, two x four port solid state coax switches, eight mosfet power line, seven band filter selection switching is quite a task.

Additionally, mosfet power switching is used to turn off parts of the system that are not required. Both the Portsdown and Ryde provide information about band selection and PTT via GPIO lines. The transverter and QDX also have PTT lines that can be controlled.

A few OneWire sensors measure the temperature in various places, this temperature is used to control the fan with a PWM signal. An ADS1115 is also on the I2C, which allows voltages and therefore powers to be measured accurately.

The project started in 2022 and in the meantime, with some breaks in between, the device is already becoming usable. Beautiful connections are made almost every day.

But I can only guess as to when the project will be finished. Getting an idea and implementing it is still a daily occurrence for the time being. The switching and internal connections are still not finished.

There are also some design errors and unadjusted parts, so it will still be an ongoing project in which many things will be improved and adapted to practical wishes. Because that was partly the goal - one device for all the possibilities we have as amateurs.

All Kicad drawings, PCB's, Arduino sketches and lots of settings in the Raspberry Pis are documented and can be distributed on request.

And it can always be different, but you can think of it and build it yourself.

Amateur television at the Spennymoor radio rally

Clive, G4FVP

Each year in late November or early December the Bishop Auckland radio amateurs' club holds its annual radio rally at the Spennymoor library and leisure centre in County Durham.

In 2023 the event was held on 3 December, a day of snowfall and sub-zero temperatures. For more than 10 years (apart from two years when the rally was not held due to Covid-19), a group of BATC members have organised a demonstration of amateur television. The rally is also an opportunity to sell some surplus junk.

The amateur television stand is usually the only demonstration and attracts quite a lot of interest, although this year, due to the inclement weather attendance was notably down on previous years.

Nevertheless, we were able to talk to interested radio amateurs from across the north east of England, Cumbria and beyond. A decade ago, most of our discussions were about analogue television and in the early days demonstrating the Comtech modules as a low-cost entry point. More recently the focus has been on digital television and microwave activity.

In 2022 and again in 2023 we had Portsdown equipment on demonstration. It is also an opportunity to introduce our local repeater GB3KM which is housed at the QTH of G1LPS at Kirk Merrington, which is a village very close to Spennymoor. GB3KM has good coverage of County Durham, Teesside, and the northernmost part of North Yorkshire.

A chance e-mail exchange between Clive, G4FVP and Dave Crump G8GKQ resulted in a package of BATC journals and membership forms being put on display. Several of these were taken away and it will be interesting to see if it results in any new members. A few people commented on the high quality of CQ TV and these were snapped up by some of the attendees.

Rob, M0DTS and Clive G4FVP managed the stand and took the lid off their Portsdown systems for inspection. Several observers commented on the neat modular approach. The two systems were side-by-side with one transmitting a picture to the other as a simple demonstration.

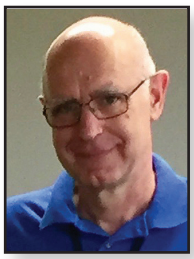
Although the north east is England's least populated region, there is certainly ATV interest although activity levels remain quite low. Nevertheless, we are eager to demonstrate our equipment with a view to attracting new participants.

All being well, we will be back in 2024 and we understand from the organisers that since the rally had covered its costs despite a lowish turnout due to the weather that it is likely to go ahead again.

Rob, M0DTS (left) and Clive, G4FVP (right) with their PORTSDOWN systems at the Spennymoor Radio Rally, Co Durham, in December 2023.

Raspberry Pi 5 - First impressions

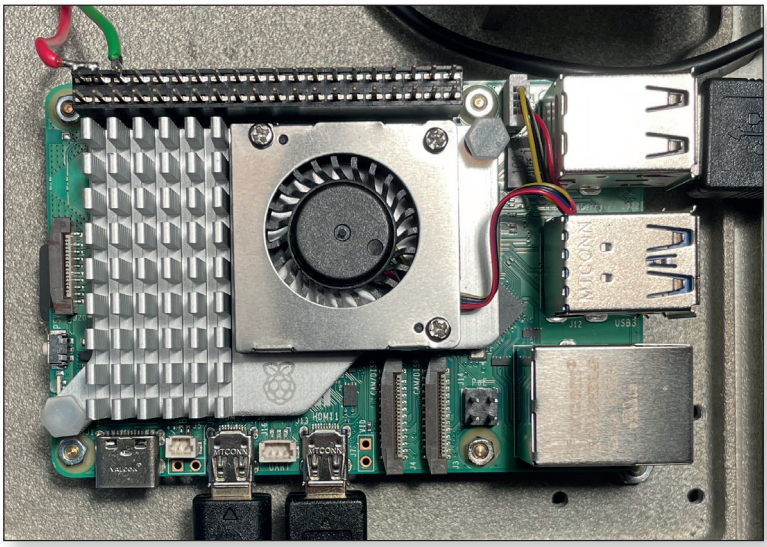
Dave Crump G8GKQ



The Raspberry Pi 5 (RPi 5) was released two months ago; it is a natural successor to Raspberry Pi 4 with the same form factor.

There are two major differences from an amateur TV perspective: the processor is between two and three times more powerful but the on-board graphics processor cannot be used for video encoding.

The design team made the decision that the ageing hardware video encoder was not worth supporting now that the processor could do a better job with software encoding. The hardware video decoder is still supported.



Raspberry Pi 5 with active cooler fitted

Hardware

The RPi 5 looks a lot like the RPi4, although the network port has swapped position with the USB-2 sockets. There are two dual-purpose camera/display CSI-2 sockets, and these are of the same smaller form factor that is used on the Raspberry Pi Zero. There is also a PCi Express connector and power button at the same end of the board as the SD card slot.

Because the RPi 5 can run hotter than the RPi 4 (when working twice as hard) two official cooling solutions are being marketed with it. I went for the "active cooler" which is a heatsink with forced air cooling.

There is also a case with fan. In practice, the RPi 5 runs cooler than a RPi 4 doing the same task - it's just that it can take on a lot more. The fan on the active cooler is normally inaudible, and I am very pleased with it.

Software

The RPi 5 will only work with the latest "Bookworm" version of the operating system. This is two iterations on from the "Buster" operating system used in the Portsdown 2020 and Portsdown 4, so there is no easy migration route for those systems.

Capabilities

I decided to test the RPi 5 as a desktop computer, rather than in the touchscreen (Portsdown) format.

Initially, I tried some ffmpeg scripts to stream to the BATC streamer from a webcam, and the results were encouraging. I then copied across some of the Portsdown transmitter code, and after some changes found that it would transmit good 720p H264 pictures at 333 kS using a LimeSDR Mini.

Some of you may have seen me demonstrate it on the Thursday evening QO-100 net. It will also take an input from the USB output of an ATEM Mini HDMI video mixer.

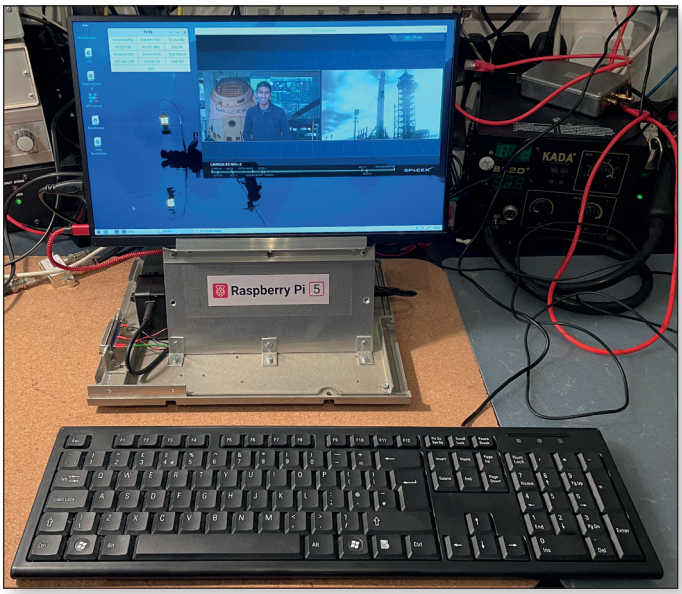
The LongMynd receiver code also needed some modifications, but I managed to get it working as a fixed-frequency, fixed symbol rate receiver with MiniTioune, displaying the picture with VLC. Notably, the RPi 5 had the capacity to receive at the same time as transmit, running at about 70% processor workload.

Applications such as BandViewer are more difficult to run on the desktop, as they are specifically designed for the 800x480 touchscreen of the Portsdown. However, I have managed to get LimeSDR BandViewer running and displaying a spectrum, but with no button (control) capability.

GQRX is a full-featured SDR program similar to SDRSharp; I installed that and it ran well with both an RTL-SDR and the LimeSDR Mini.

Controlling applications

The Portsdown software is all controlled by touchscreen buttons. Clearly these will not work without modification in a desktop and mouse environment. I have started trying to use the GTK4 User Interface to build applications to control some transmit and receive functions, but it is a slow learning and building process.

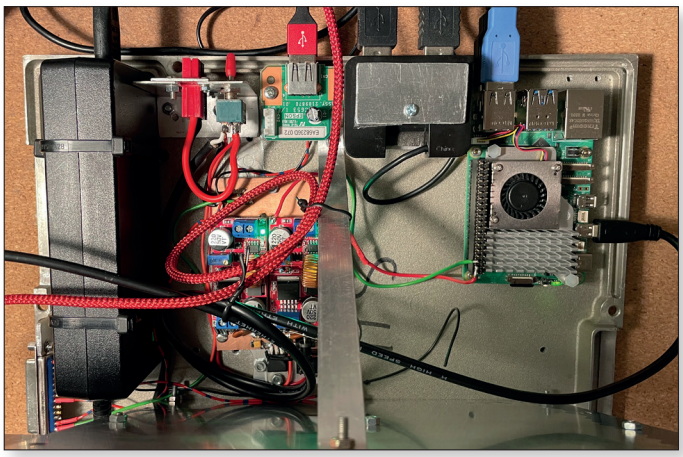


The Raspberry 5 desktop in use

Build

I bought a 14 inch full-HD HDMI screen and mounted it above the RPi 5 and power supply on a baseplate. I used two 5A 5V eBay buck regulators; one to power the screen and one to power the RPi5 through the GPIO connector.

An old laptop power supply enables either mains or 12v DC to power the unit. I also added a four-port USB-2 hub as the four USB connectors on the RPi 5 are insufficient for mouse, keyboard, SDR, MiniTiouner and audio dongle.



Raspberry 5 and power supplies on the baseplate

What's next

I will use this RPi 5 desktop to further investigate the potential for ATV and electronic test equipment use. At the moment, I am not going to rush into building a "Portsdown 5". Doing so would require a massive re-write and so far the only advantage that I can see would be the ability to transmit 720p pictures from an HDMI source in a portable environment.

Finishing off with my first impressions: the Raspberry Pi 5 is a major step forward and the designers were right not to bother with the hardware video encoder. The processor speed is such that better transmitted pictures can be obtained with software encoding.

Jamboree on the Air 2023

A tale of two stations

GB2GP - Gilwell Park, Chingford London - Frank M0AEU

Gilwell Park is the headquarters of the Scout Association in the UK, and consists of 110 acres of fields and woodland. The Park is used for camping and activities throughout the year, as well as serving as the main volunteer training centre for the Association.

There's been an amateur radio station here since the late 1950s and it was issued with a permanent Special Event callsign in the 1990s. JOTA is the highlight of the year for the station, with up to 300 youngsters visiting the station for the event in pre-Covid years. Since lockdown the station has been building up to running a full event again, and this year hosted 60 youngsters over the two days for

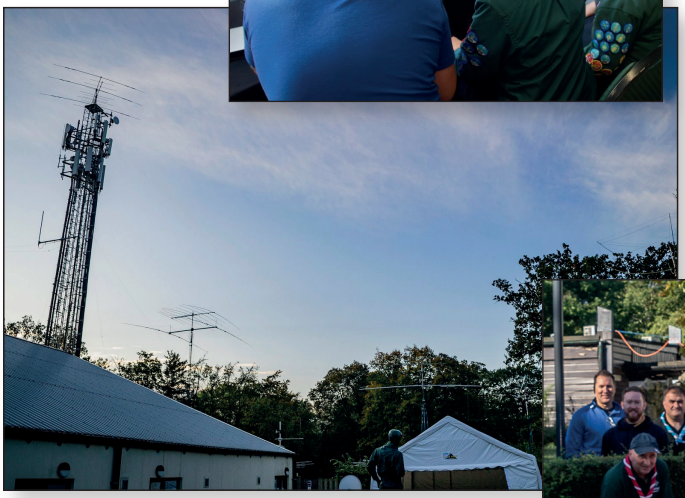
a variety of activities - half a day of technology, and half a day of adventurous activities – including climbing, crate stacking, fencing and the 3G Swing.

Scouts enjoying the thrill of the 3G Swing

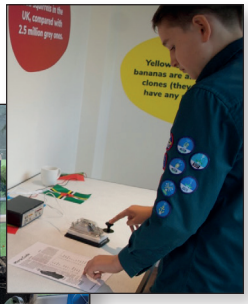
The technology activities focussed around contacting other Scouts around the world using three Flex Radio based HF stations; an Icom 9700 for VHF; and a station for narrowband QO-100 contacts. Overall the station made over 380 contacts in 54 countries, including 48 Scout to Scout contacts.

Even the digital modes proved to be popular!

With the impressive aerial farm at Gilwell, the station is usually a very good signal!



Other activities included an electronic kit building base; a Skype base contacting other Scout groups around the world (The Zimbabwean group singing and dancing stole the show!); whilst the morse code activity still proved to be popular.



We had a full green-screen studio again this year, complete with autocue, and the youngsters delighted in presenting the weather.

The station also provided the lunchtime entertainment for CAT23 on the Saturday, with Frank, M0AEU giving a live video tour of the station – the video can be seen here: *https://www.youtube.com/watch?v=RJM7Jhbciqs&t=11647s*

The tour starts at 2 hours 48 minutes into the video.

We had intended to be active on QO-100 with a DATV station, but unfortuantely Phil, M0DNY, who was providing the station was ill, and had to pull out of the event at the last moment.

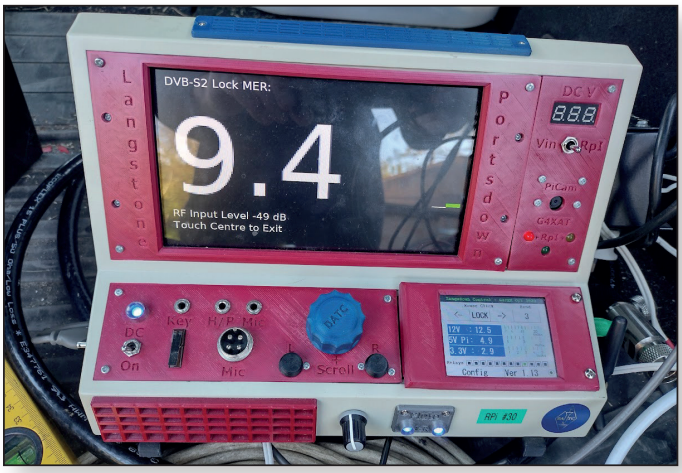
There's always next year…

The Team at GB2GP

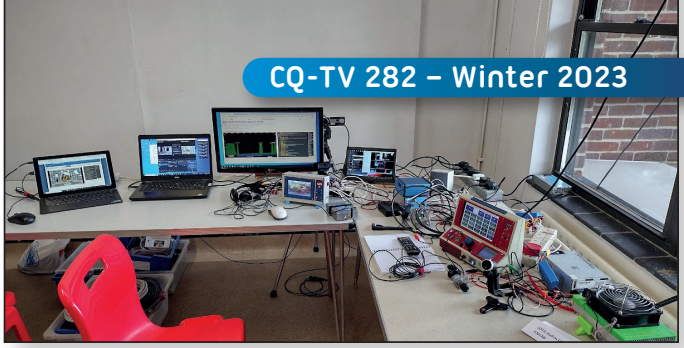
GB2BW - Broadstone Warren JO01AB - Gareth G4XAT

I was asked by Frank if I could contribute a DATV capability for this years event at my local Scouting centre, about 50 minutes away in the Sussex countryside. Having sorted my /P QO-100 DATV system (as seen at CAT23 and subsequently tested/used several times) it seemed a good chance to contribute to this event. A few weeks previously I visited the site and had a look at the operating area. Pretty much perfect with a good line to the satellite clear of any trees and a location in the hall which would accommodate a 10m feeder run of LDF4-50.

I arrived on site mid Friday afternoon under a blue sky and set about mounting the dish and POTY/LNB. Using the very handy LIDL angle finder secured to the LNB arm allowed prompt setting of the elevation and my trusty compass soon got me on the satellite. Using the Portsdown MER-meter makes peaking up very quick so I progressed to setting up the station inside the hall we had been allocated. In the interests of a successful weekend, I brought two systems, my laptop with DATV Easy and a Pluto running 0303 firmware. This was tested fine and allowed me to use pre-prepared screens and camera inputs from OBS as the driving source. My other system was my trusty Portsdown4 system, with a Ryde, speaker and monitor providing the RX capability. Both systems were tested fine in good time for sunset.



Saturday morning involved a quick panic as the site manager required my car moving to improve group access. This meant I had to quickly re-align the dish, but only a small tweak was needed and all was ready again.



Groups of scouts/guides turned up and they were split into groups of three to pursue a range of opportunities ranging from Morse code, software coding, VHF/HF contacts and several other communication based activities, including DATV. There were fewer JOTA stations on than I expected (illness and business calling AFAIK) but we did manage a couple of hook-ups with the Swiss JOTA station HB9AZN/JOTA who gave excellent performances of their national song. The UK participants were fascinated by the time delay in their picture (a 4-5 seconds round trip) which I found surprising, given their likely familiarity with social media on their phones etc.

The acoustics in the hall proved difficult, very little sound-absorbing material on the walls and multiple exciting things going on with the youngsters.

Wi-Fi was available so the WB band viewer was left running to check occupancy and to demonstrate our own signal appearing. The only thing missing was live tune by Tom as I don't yet own a Hack RF, hoping instead that he can make a RSP1 do the job in a similar way.

The only problem I ran into was caused by an unknown. The laptop suddenly switched off and the Pluto went into full drive, making the 13cm amp draw 22Amps (at 28V, so 600+ watts DC input!). Re-booting the laptop restored the laptop, but the Pluto was resolutely dead and smelt suspiciously of magic smoke. Hence working exclusively with my PD4. That the amp survived such abuse was a relief (I did have a spare that would have done at a pinch) and the rest of the equipment behaved itself. Sunday dawned dry and after showing four groups the wonders of DATV via QO-100, I packed up the station, removed the dish from the roof rack and left for home.

Subsequent examination of the Pluto showed that the micro-USB lead was melted/bonded to the case and inside, both the 5V initial power supply chips showed evidence of terminal suffering through magic smoke egress.

I'm still wondering why, everything 240V was running from the same mains socket via a 6 way block, with just the Ryde, PD4 and pre-driver running off my Fogstar LiPO4 battery, extracting 40A/Hr over the event. Whatever it was also killed the USB hub port the Pluto was plugged into (hub was powered from 5V laptop only, no external source involved).

There's always next year…

Using an external clock with the Pluto Rev C/D

Bert PA3AOD

There are several methods to switch to and from an external 40MHz clock on the Pluto Revision: C/D.

Firstly, if you are using Pluto firmware V0.32 or later, you can log into your Pluto by using putty and enter the following lines:

```
fw_setenv refclk_source external
fw_setenv ad936x_ext_refclk_override 40000000
pluto_reboot reset.
```

However, when you want to use your Pluto in combination with a Portsdown 4, Pluto firmware V0.31 is required, so it is not possible to switch over from internal to external clock by the commands above. Additionally, you always need a PC/laptop with putty to send the commands

For DATV the Pluto is stable enough, but for Narrow Band it would be nice to have a GPSDO or something like that for a more stable frequency.

So, we need a hardware solution. The following pictures show my solution.

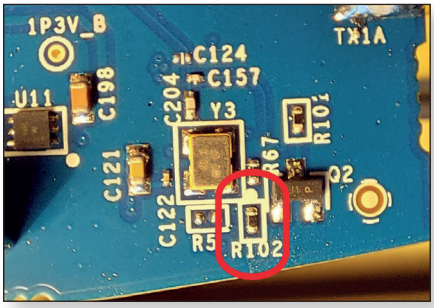


Figure 1

On the underside of the Pluto PCB search for R102 and remove it.

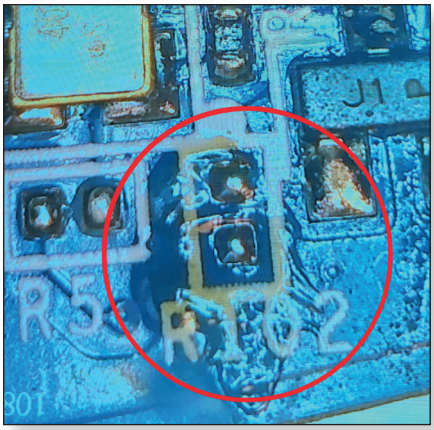


Figure 2

After removing R102, use a magnifier to make sure that there are no solder shorts to any of the nearby components.

On top side of the Pluto, solder a small wire to the gate of Q3 (red circle) and again don't make any shorts. Solder the other end of that wire to a switch S1 as you can see in figure 5.

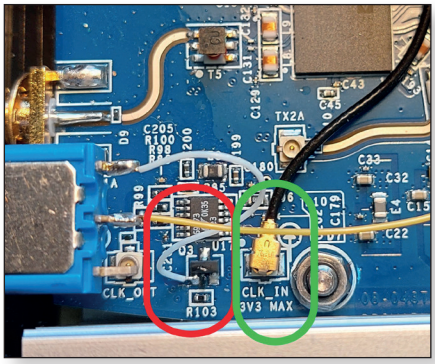


Figure 3

The green circle is the small u.fl connector to SMA cable, wired to the front panel as shown in figures 5 and 6.

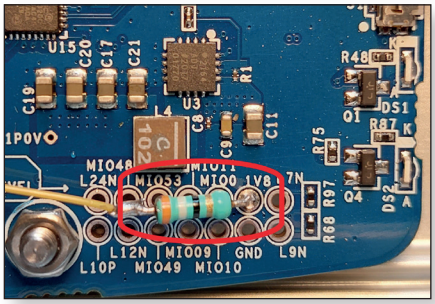


Figure 4

Connect one leg of a 39 Ohm resistor to the 1V8 line and the other leg via a wire to the switch S1.

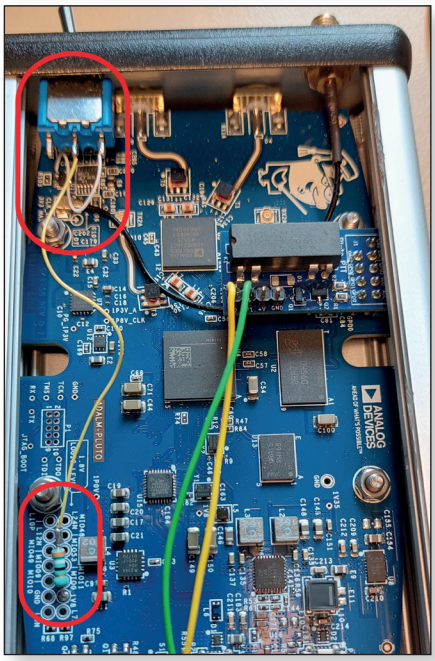


Figure 5 The Switch

The switch and reference input connector can be mounted on the front panel of a Hammond box which just fits the Pluto PCB. This is available from DigiKey (HM892-ND). Test the operation of the switch before closing the box.

Figure 6 The finished Hammond Box containing the modified Pluto

There is not much power needed for the external clock. My 40MHz GPSDO clock gives -25 dBm and that is more than enough for the clock input of the Pluto.

A quick transition for 3.4GHz, or 'microwaves in a mustard (O.K, coffee) tin'

Gareth G4XAT

After several years of learning, asking and buying bits and pieces for DATV on the microwave bands I've pretty much got the gain side of things well covered all the way up to 47GHz. There is a bit of a low-gain gap though, 3.4GHz.

At the moment I'm using a 4x4 flat-plate array culled from WiMAX outdoor subscriber units, now available again from here: *http://tinyurl.com/yw6v5m36* at the bargain price of £28.20 for a pair.

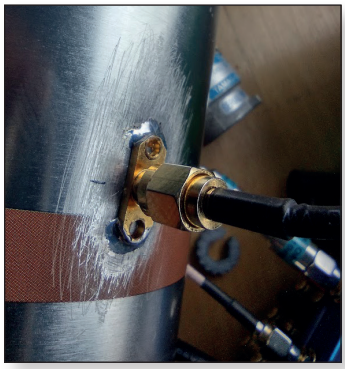
So after adding a SMA to the back of each unit (see previous CQ-TV) I used one for RX, one for TX, both mounted side by side and fed RF at up to 40W from a Toshiba amplifier. Estimates as to the gain suggest around 18dBi, based on similar commercial offerings.

Talking to fellow amateurs on the Tuesday HV net, my suggestion of stacking four of these panels, along with suitable phasing and splitting was met with, shall we say, 'other suggestions'.

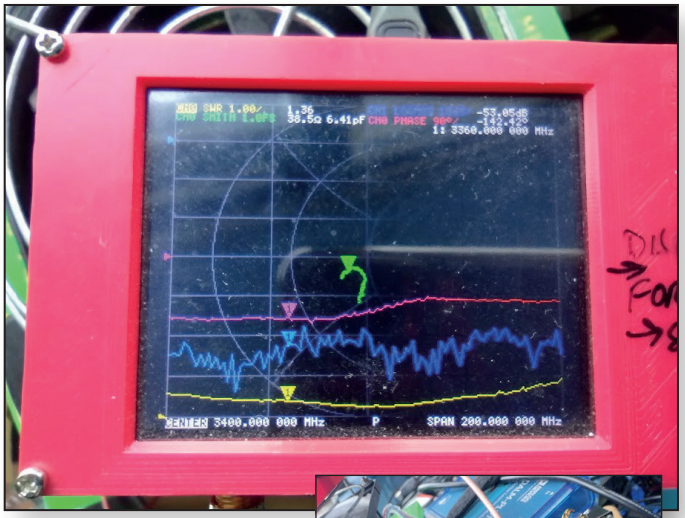
Still 18dBi+2.5+2.5+2.5 = potentially over 25dBi – is very useful when fed with 40W. A single panel is understandably fairly broad-beam, not always a bad thing and I have successfully worked stations by various means.

Anyway, a casual Google led me to this page *http://www.g3pho.free-online.co.uk/microwaves/9cm7.html* where a neat little soup-tin feed for 3.4GHz was shown. It just happened that my wife Jayne had just finished a tin of coffee which included a LDPE snap-on cover.

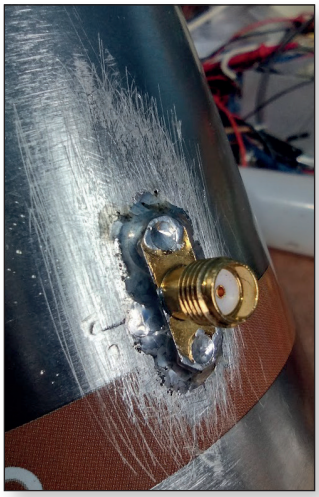
An almost 'Instant' transition then. The tin was drilled 4.5mm as per the dimensions stated,



the paint sanded away and an SMA tack-soldered onto the tin. A probe was made from some copper pipe, 1/8" (3.15mm) diameter and made initially long at 26mm.



A quick scan with the nanoVNA showed it was indeed too long, so progressive shortening was undertaken until I have a lovely match at 3.4GHz. At this point the probe was soldered to the SMA centre pin and more solder was added to the SMA, effectively sealing it.



Adding the 'radome' made negligible difference. My final probe length was 22.2mm, possibly due to my tin being larger than specified (72mm diameter, 115mm long) or perhaps the lack of any PTFE protrusion into the cavity.

Next to mount it on a spare Sky dish, or maybe my ex-Meteosat 95cm prime focus where a web calculator suggests a gain of 28.4dB.

Now add 40 watts to that - alternatively a 60cm dish still offers 24.4dB, pretty close to what four stacked flat-plates might offer. Decisions, decisions.

It's good to experiment and this could fill the gain-gap in my kit.

Turning Back the Pages

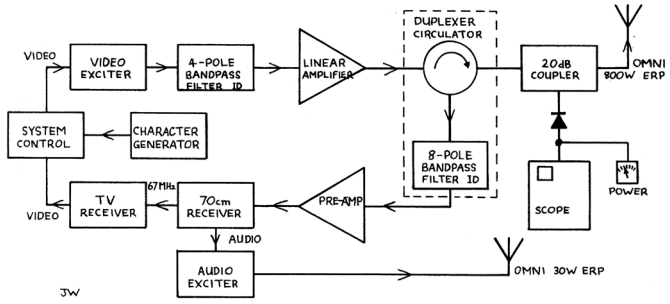
A dip into the archives of CQ-TV, looking at the issue of 47 years ago

Peter Delaney - G8KZG

CQ-TV 93

CQ-TV 93 appeared in February 1976 (in case readers are wondering, when this series began, it looked back 50 years, and although it has marked some special anniversaries along the way, irregular appearance of the magazine in the late 1960s has led to it reflecting on issues an odd number of years ago!).

An idea was put forward by John Wood, G3YQC, for introducing repeaters for amateur television. His suggestions were based on a pioneering American 70cm band repeater that was in use in Virginia, that could handle simultaneous audio and video at the standard carrier spacings used in the USA (4.5MHz) and included its 'own visual identification character generator'. The transmitter had an e.r.p. of 800W.



John explained the benefits of such a system included increasing the working range of a station, and enabled vision nets a possibility. As the repeater would transmit its identification on receipt of an incoming signal, it would provide a simple test for transmitter operation. He added that as the separation between the video and audio carriers was at the standard used by the broadcasters, a standard tv set could be used for reception (although the spacing in use in the UK was 6MHz, so keeping the overall bandwidth within the 70cm allocation would have been less straightforward).

John Lawrence's "Circuit Notebook" included a further tabulation of crt phosphor types - this time the American 'P' series.

These included the popular 5FP7 (a 5" diameter device popular for use in a slow scan monitors) or the 5FP4 (also a 5" tube used for the viewfinder on fast scan television cameras), whereas the 3RP1 was a 3" diameter medium persistence tube that might be found in an oscilloscope.

The other part of John's article was for a useful piece of test equipment. Many amateurs had been able to obtain

TYPE	FLUORESCENCE	PHOSPHORESCENCE	RELATIVE LUMINANCE	RELATIVE WRITING SPEED
P1	Yellowish-green		45	35
P2*	Bluish-green	Green	60	70
P3	Greenish-yellow		45	15
P4	White		50	75
P5	Blue		3	15
P6	White		70	25
P7*	Blue-white	Yellow-green	45	95
P8*	Obsolete - Replaced by P7			
P9	JEDEC registration withdrawn			
P10	Dark trace storage - Not luminescent			
P11	Purplish-blue		25	100
P12*	Orange		18	3
P13	Reddish-orange		4	1
P14*	Purplish-blue	Orange	40	60
P15	Bluish-green		15	25
P16	Bluish-purple		0.1	25
P17*	Yellowish-green		30	15
P18	White		18	35
P19*	Orange		25	3
P20	Yellowish-green		85	70
P21*	Orange		25	8
P22	Three-color dot pattern for color television			
P23	White		80	35
P24	Greenish-blue		8	6
P25*	Yellowish-orange		12	4
P26*	Orange		17	3
P27	Reddish-orange		20	7
P28*	Yellowish-green		50	50
P29	Two-color stripe pattern			
P30	Not registered with JEDEC			
P31	Green		100	75
P32*	Blue-green	Yellowish-green	25	15
P33	Orange		20	7
P34	Blue-green	Green	17	15
P35	Blue-white		55	45

C.R.T. PHOSPHORS Relative writing speed and relative luminance

* Phosphors having low level decay lasting over one minute under conditions of low ambient illumination.

government surplus oscilloscopes to use in their stations. Although these could display the television waveform, they lacked an actual volts per cm scale in the vertical direction, which limited their usefulness in adjusting a video signal to have the correct amplitude of video information and synchronising pulses.

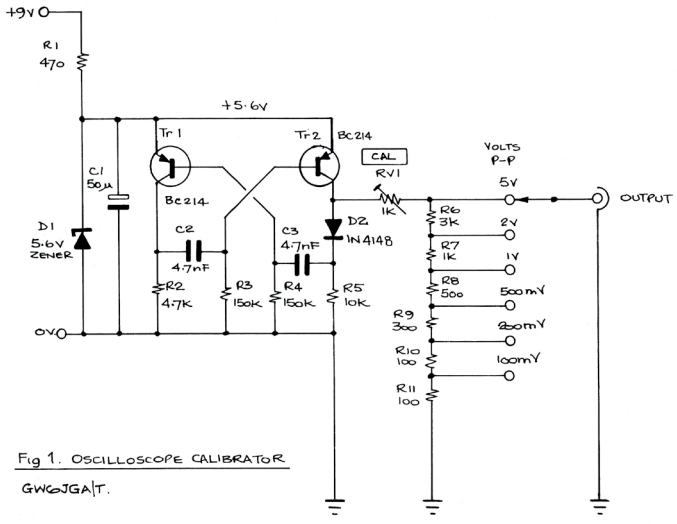


Fig 1. OSCILLOSCOPE CALIBRATOR

GW6JGA/T.

His oscilloscope calibrator overcame this problem. It consisted of a multivibrator that produced a square wave output at the collector of Tr2. Various set proportions of this would be available at the various output terminals. It needed calibrating itself, of course, and this was achieved by shorting out the base and emitter of Tr1, which stopped the square wave being formed but left Tr2 in a conducting state, and setting RV1 using an accurate voltmeter to produce exactly 5V at the output. Removing the temporary short circuit would result in a square wave of 5V peak to peak at the output - the accuracy of the

other outputs being dependent on the tolerances in the resistor chain (1% being recommended).

Another circuit idea came from J Brown, with his "blinkin' light".

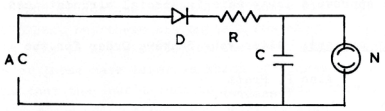


FIGURE 1

D	IN4002
C	·068 – 2μF 100v
R	150 – 220K Ω
N, LP	60v NEON

The intention was to give an indication of the state of the power supplies in use - a flashing light being more likely to catch the eye, and therefore act as a warning if a piece of equipment was left on when the lights were turned off when leaving the room. Typical circuit values were given - the larger the capacitor, the slower the flash rate. An extended version of the idea was also offered.

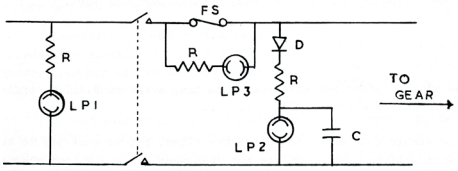


FIGURE 2

In this set up, the neon LP1 indicated if there was mains available, neon LP2 was the "blinkin' light" showing that the item was still turned on, whilst neon LP3 would be lit if the fuse had blown.

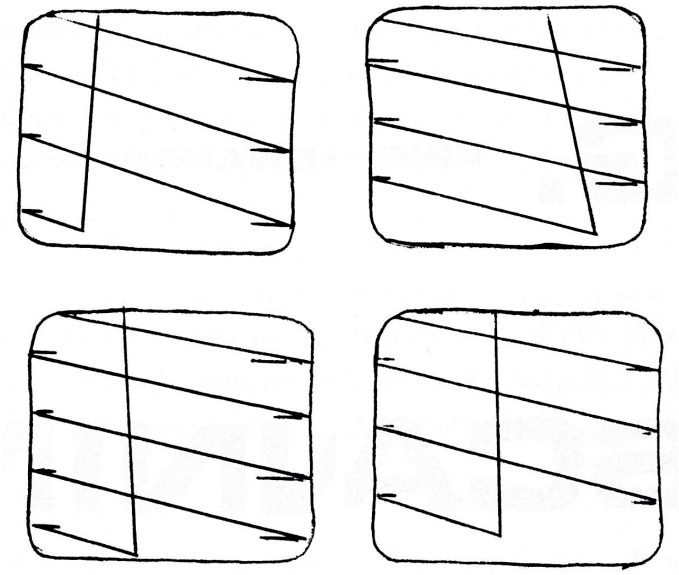
A fundamental aspect of all television systems - mechanical or electronic, fast scan or slow scan, analogue or digital - is that the image is scanned by a detecting device, and the picture is displayed by creating light in a correspondingly scanned sequence. In one of the longer articles in this issue of CQ-TV, Eric Edwards examined the differences between random, 2:1 interlaced, and sequential scanning His calculations were based on the 405 line system, then still in use by many amateur stations, but the principles were applicable to any system.

It might be thought, he wrote, that with random scanning with a 405 line picture, the monitor would display 405 lines, but this was not the case - it only showed 202½ lines. The line timebase frequency was 10.125kHz, whilst the frame was scanned at 50Hz - from which he deduced that the

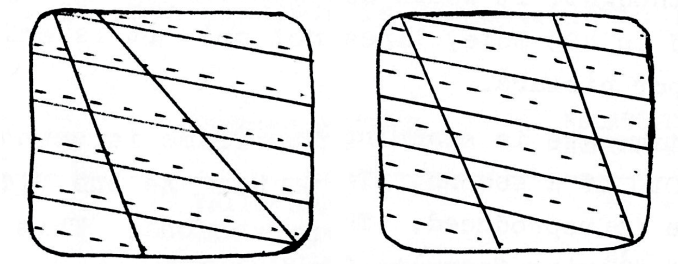
$$\frac{\text{Line frequency}}{\text{Frame frequency}} = \text{number of lines per frame}$$

ie: 10125 / 50 = 202.5

As the line and field oscillators are random, the former has no control over the latter, and so when the vertical scan reaches the bottom of the picture, the horizontal scan could be at any position along the line.

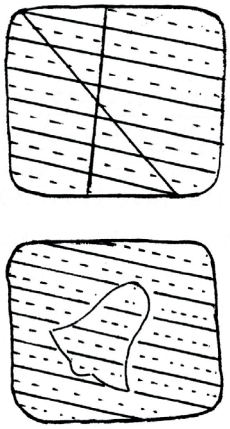


The field flyback could therefore happen at any point across the picture, as shown in his examples. As a result, the next frame may start anywhere relative to the one before it - sometimes it would be in virtually the same position, and others the first line might occur mid-way between the first two lines of the preceding frame.

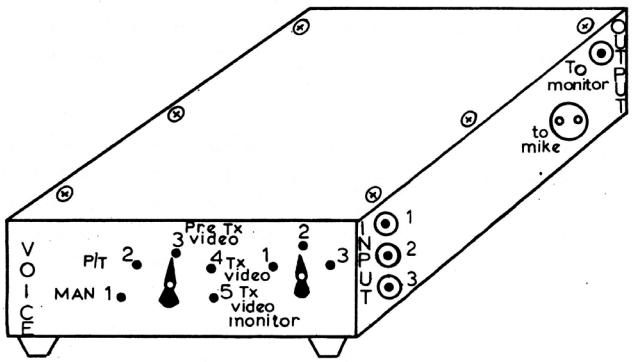


In effect, it would jump in and out of interlace, but due to persistence of vision, the eye would be deceived into thinking it was a 405 line image

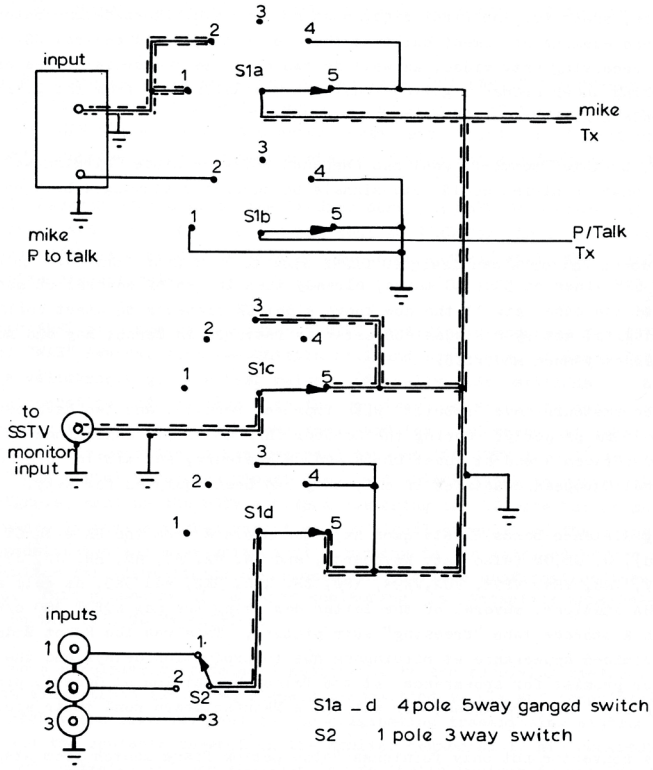
With 2:1 interlaced scanning, using the same frequencies for the line and field scans as before, but by deriving the field scan from the line frequency using divider circuits, the point on the bottom line of the picture at which the flyback occurs would be under control - at the end of the first field it would jump to the top half way along the line, and after the second field it would revert to the top at the end of the line, so that the complete frame consisted of 2 fields each of 202½ lines interleaved with each other to form a 405 line frame. The first scan sees only half of the picture (represented by the solid line) and the second scan sees the other half (shown by the dotted line).



Sequential scanning would also require a fixed relationship between the horizontal and vertical scans, and in order that the line pattern traces out an identical path on each scan, an even number of lines per frame, so that the flyback occurs consistently at the same point horizontally on every field. It would be capable of higher resolution - but also took up double the bandwidth, so was not suitable for transmitting.



Sprayed Eddystone diecast box with rubber feet



mike wiring in screened cable

Slow scan television again featured, with a suggestion for a switching unit from J Brown, to enable quick switching between audio, sstv, or other modes. The other technical article dealt with the conversion between analogue and digital ways of representing a signal. At the time, the devices available at moderate prices to amateurs did not have a sufficient frequency range for fast scan television - although the principles involved were applicable to those as well - hence why the ideas were presented for slow scan type of signal. Lewis Elmer began by discussing the way in which a 'number' could be represented as a binary coded sequence of '1s' and '0s', the columns in the code representing 1, 2, 4, 8, etc, from right to left.

A simple way to achieve digital to analogue conversion was to use a summing op-amp, where the gain of each input is Rf / Ri, Rf being the value of the feedback resistor, and Ri being resistor in line for the particular input. By making these resistors in proportion to the values represented by each "1" of the binary code, the output will be the analogue equivalent of the binary input.

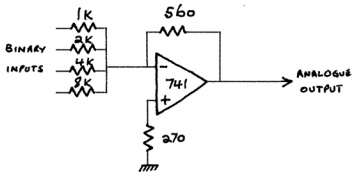


FIGURE 2

The output from a TTL device to produce the binary inputs was not really precise enough to drive this circuit, so Lewis proposed an alternative, in which by switching on the relevant transistors, the current through the common collector load resistor was proportional to the binary code at the inputs.

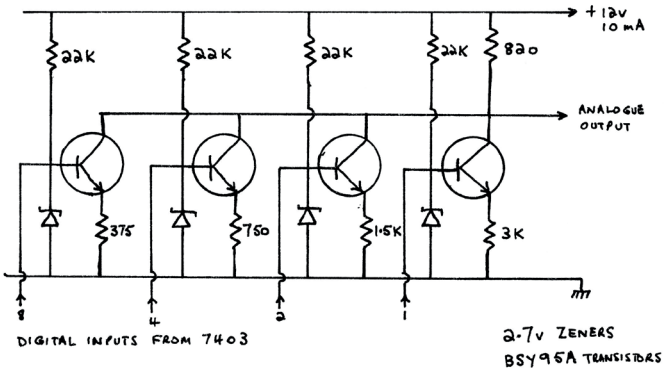


FIGURE 3

The reverse process, digitising an analogue input, was rather more complex. Several methods were possible, and the system known as simultaneous conversion was likely to be suitable for fast scan television, as well as the slower rates applicable to slow scan.

The input signal about 3 volts peak to peak, was applied to the + inputs of a ladder of comparator circuits. The - inputs were connected to a reference voltage through a chain of resistors, the bottom of the resistor chain having values to separate the sync pulses, but for the video part of the signal the resistors were identical. In this way, the highest comparator in the chain to change state represented the level of the video input at that instant. The comparator outputs were then encoded into a 4 bit binary code by means of the two 74148 priority encoders and associated NAND gates.

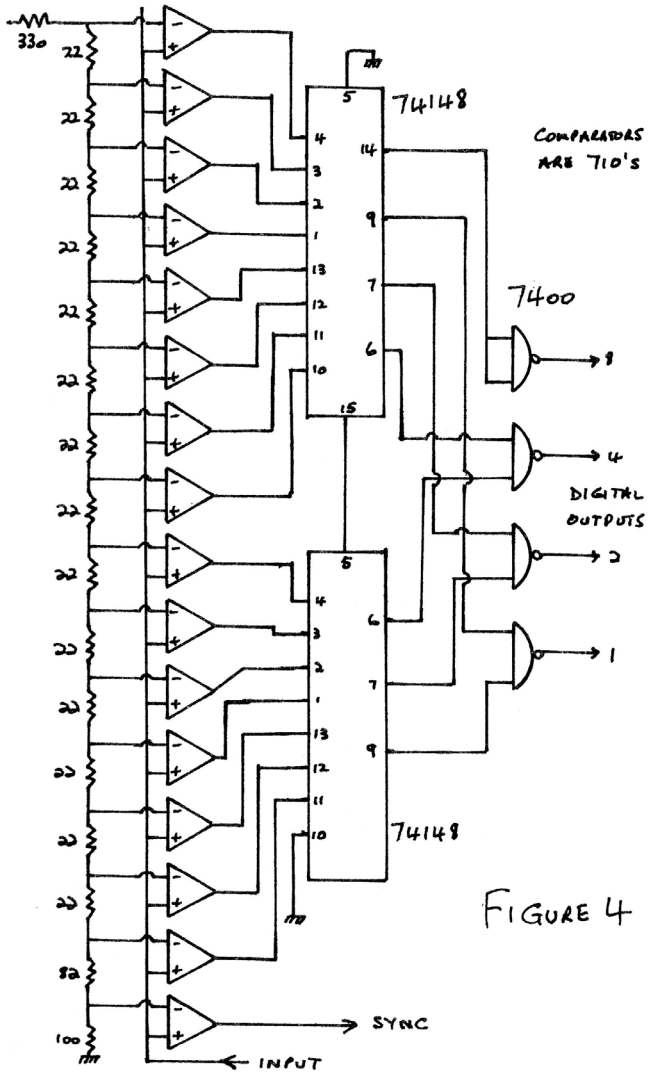


FIGURE 4

An alternative process could be used for slow scan signals, in which the comparator reference voltage was derived from a digital to analogue converter, driven by a counter that cycles through all the possible levels. The counter also feeds the inputs to a 7475 latch device. When the comparator reference matches the level of the input signal, its output changes state, so enabling the corresponding count into the 7475 device.

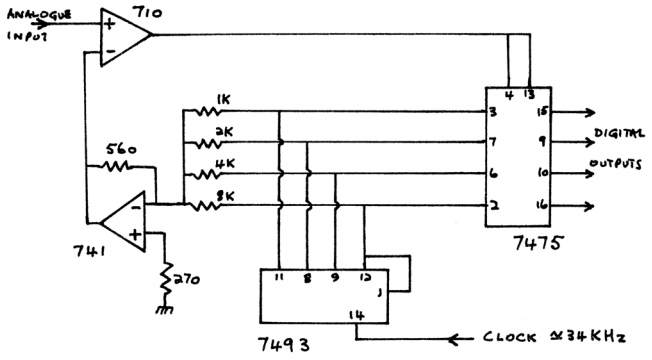
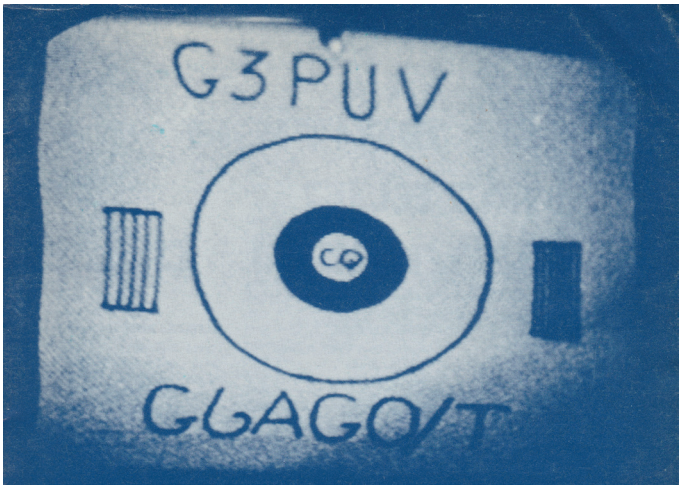


FIGURE 5

Operation on 70cm was not forgotten, with the regular "TV on the Air" column discussing the use of the 2m band calling frequencies, suggesting an additional one for ssb on 144.23MHz as an alternative to the well known 144.75MHz one, as well as the usual reports of contacts made. The cover included a picture of G6AGO/T as received by Malcolm Sparrow, G6KQJ/T.

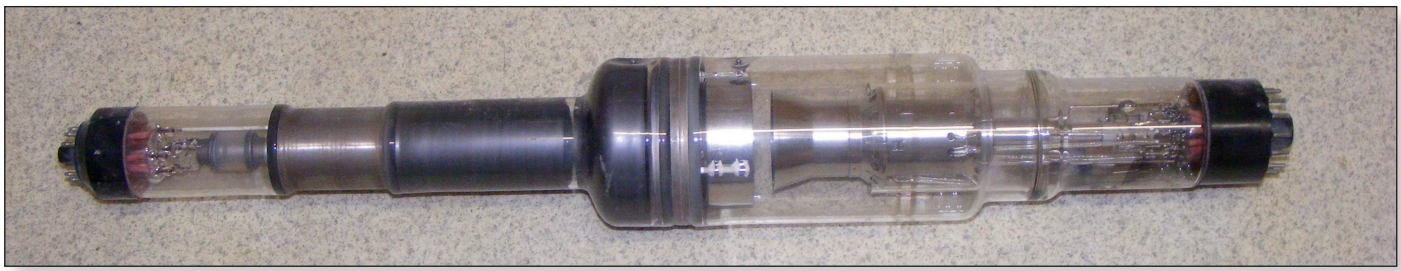


...And finally...

...a puzzle picture. Can you work out what the television application of this component is?
It is about 26¼" long (*66.6 cm in new money - Ed*).

Just for fun, email the Editor with your answer - *editor@batc.tv*

All will be revealed in the next issue of CQ-TV!



The British Amateur Television Club

Out and About

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

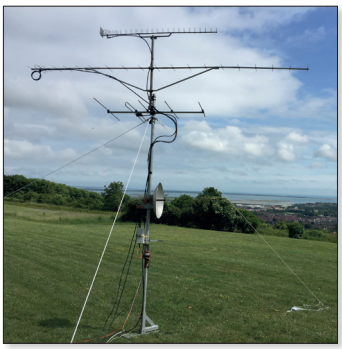
21 April	Norbreck rally (no BATC shop)
19 May?	Dunstable Downs boot sale (date tbc)
23 June	Newbury rally
14 July	McMichael rally Reading
4 August	CAT 24 and general meeting
11 August	Flight Refuelling rally Wimborne
27/28 September	Newark Hamfest

Unless otherwise stated, the BATC Shop will be available at all these rallies and will be offering cheaper prices than online, and accepting card payments.

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

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

Activity Weekends & Contests



2023/24 Activity/Contest Days:

The Christmas repeater and activity challenges will commence on 23 December 2023 and run until 2 Jan 2024.

20/21 January 70cms (note new date)

17/18 February 13cms and up.

16/17 March 2m, 4m and 6m.

13/14 April 70cms.

11/12 May all bands (IARU preparation).

8/9 June IARU Region 1 ATV contest.

6/7 July 2m, 4m and 6m.

7/8 September 13cms and up.

5/6 October 70cms.

2/3 November 2m, 4m and 6m

30 November and 1 December all bands

BATC Online

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