The British Amateur Television Club

CQ-TV

No. 285 – Autumn 2024



CAT24 Part 1





... and much more inside!

CQ-TV 285

Contents:

3 From the Chairman…

4 The Listing - new and returning members

5 Activity & Contests

6 Jamboree on the Air - 2024

7 Adding a RTC (real time clock) to a Portsdown 4

8 BATC at the Telford Rally

9 Conversion of old pallet amplifier to 13cm

10 A look back at BATC history and the work of Mike Cox

11 PicoTuneWH - Ethernet software for the BATC PicoTuner

12 Muntjac - a Pluto alternative for QO-100 DATV

16 The Portsdown Newsletter

17 My DATV transmitter

19 Mr Whippy moves on…

20 CAT 24 – a report of Part one

23 Presentation of awards at CAT 24

24 Antenna element holders made by a 3D printer

26 Adalm Pluto PTT Control

27 YASS – Yet another signal source

28 Turning Back the Pages

31 CAT24 Part II

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

It's hard to believe it's already nearly 8 weeks since CAT 24 Part 1 took place at the Midland Air Museum! It was a very enjoyable event and great to see friends old and new from all parts of the country and further afield. We held the Biannual General Meeting and a few changes in the committee ensued. Tim, G4WIM and Rob, G8NXG, both decided to retire from the committee and I'd like to thank both of them on behalf of the club for their time and effort over the last few years. Rob, in particular, had the unenviable job of keeping track of all of us as the immediate past Membership Secretary and organised a very smooth handover of those duties to Tony, G3UIS, a few months ago. This meant that we were now one committee member short of the required number and we were very lucky that Gareth, G4XAT, accepted a nomination from the floor to be elected to join us. So your committee now looks thus…

Dave G8ADM	President
Martin G4FKK	Chair
Noel G8GTZ	Secretary; Shop; ETCC Rep
Dave G8GKQ;	Treasurer; Forum Admin; Portsdown Development
Gareth G4XAT	
Tony G3UIS	Membership Secretary
Frank M0AEU	CQ-TV Editor
Phil M0DNY	Web Technical Architect
Ian G8XZD	Publicity & Social Media; CQ-TV Sub-editor
Clive G3GJA	Contests
Brian G8GQS	Immediate Past Treasurer

We also announced and presented the awards for the winners and runners-up of the various competitions and tables from the last twelve months as shown here…

Award	Trophy	Certificate
2023 6cm Ladder	Chris Ashby G4AYT	Runner up: Dave Butler G4ASR
2023 70cm Ladder	David Holman M0YDH	Runner up: Tony Pearce G0AZQ
2023 Christmas Ladder	Ken Roberts G8VDP	Runner up: Graham Jefferies M1ASR
2023 Christmas Repeater		East Yorkshire Repeater Group GB3EY
2024 IARU ATV Contest UK Fixed	Leader: Gareth Evans G4XAT	Runner up: Rob Swinbank M0DTS
2024 IARU ATV Contest UK Roving	Leader: Noel Matthews G8GTZ	Runner up: Dave Robinson G4FRE

Congratulations to all the award winners and many thanks to all those who took part in and supported the various ATV activities throughout the last year.

This year's Grant Dixon Award was awarded jointly to Colin, G4EML, for his work developing the PicoTune and to Tom, ZR6TG, for his OpenTuner software. Worthy winners indeed!

The committee was also delighted to offer Brian, G8GQS, honorary membership of the BATC in recognition of his many years on the committee and especially for his work as the immediate past Treasurer.

If you were not able to attend CAT 24 Part 1 this year then never fear; CAT 24 Part 2 will take place on Saturday October the 26th. This is an on-line 'get together' which will be streamed via Zoom. The stream will commence at around 09:45 BST with presentations starting from 10:00 BST. After myself welcoming everyone the speakers will be:

10:00 – Dave, G8GKQ. Dave will bring us all up to date with the latest Portsdown developments and demonstrate some of the extremely useful facilities available on what is much more than a DATV transmitter!

11:00 – Michael, EA7KIR. Michael is a very keen and capable 'home brewer' of all sorts of electronic gadgetry and will be showing his DATV transmitter and receiver and discussing his methods of design, programming and construction.

13:00 – Tom, ZR6TG. Tom will be updating us on his well-known Open Tuner software, showing its capabilities and how to integrate it with PicoTune which has largely replaced the original BATC Minitioune hardware.

14:00 – Noel, G8GTZ. Noel will bring us up to date news on HamTV and how to receive ATV pictures from the International Space Station once transmissions start.

There will be Q&A sessions after each talk so timings are likely to drift from those I've outlined. A more precise running order, along with Zoom sign-in details and other means of watching, will appear on the BATC forum shortly. Many thanks to Tammy and David who have, once again, agreed to provide all the production and streaming facilities; so we can look forward to a very professional show.

73, Martin G4FKK

The Listing

new & returning members

Tony Stone G3UIS



Firstly, I was delighted to meet many members at CAT 24. The initial flurry of arrivals made the badge distribution a little tricky, I've already planned a more efficient system for next year. However it was helpful in identifying members for the future.

This past three months has seen little change in the ebb and flow of members, it's a bit of "as one door closes another opens" I've always hoped over the years that more than one would open at once, but they never do.

I'm sure those how attended the general meeting found the presentations very interesting, and remind us all of the tremendous work put in by the committee, and other dedicated members.

You will recall our treasurer (Dave G8GKQ) asking for volunteers for the annual inspection of our accounts. He mentioned, I did this last year, and it was no way a huge task, but certainly one that led to a greater understanding of our club's finances. If anyone is vaguely interested and would like some feedback from me, please get in touch.

My thanks as always go to all our new members, and a continued thanks to those who have recently rejoined.

My next report will be just before the Christmas festivities.

73s Tony

Australia		
Michael Chellew	VK2MJC	Kirrawee
Stephanie Spirat	VK5FQ	Kidman Park
Austria		
Rudolf Strohmer	OE1RSC	Vienna
France		
Patrice Bersania		L'Isle sur la Sorgue
José Manuel Rodriguez	F4LNW	Bavilliers
Patrick Giraudeau	F6HMP	PARIS
Germany		
Werner Masek	DL1EB	Oberhausen
Thomas Seydel	DO1TFS	Eisenach
Franz Boschert	DK8GO	Oberkirch
Alexander Buehler	DL6UF	Renchen
Alexandru-Cosmin Herlas	DL7HAC	Crailsheim
Peter Zabelt	DL3VPZ	Dohna
Michael Illgen	DH8WC	Unterwellenborn
Poland		
Krzysztof Bielus	SP4LIN	Zalewo
Portugal		
Steve Brown	CT7ANL	Lagos
Spain		
Jose Angel Calvo	EA2EYI	Vitoria-Gasteiz
The Netherlands		
Peter Mulder	PE1IEE	Harderwijk
Andre Heuver	PE1AH	Hengelo
Jochem Herrmann	PE0JHM	Nuenen
Dr. Will-Christian Hildering	PA0WCH	Waalre
Werner de Vos	PA3GYV	Alphen aan den Rijn
Gerrit Kingsfield	PC7GM	Wirdum Fr
Eric den Hollander	PA4ERC	Rotterdam
Rena Post	PE9RX	Waddinxveen
Tristan Dijkstra		Zuidschermer
United Kingdom		
David Robinson	G0FRE	
Clive Reynolds	GB3EY	
James Mould	2E0JML	Dunstable
Andrew Birch	M0YGB	High Wycombe
Stuart Potts		Stoke Goldington
Jordan Cook	G7SMD	Hemel Hempstead
Edward Harris	M7HRS	Haddenham
Michael Rackham	GW4JKV	Blackwood
Michael Davis	G1EET	New Malden
George Jacob	G0HSV	Sailsbury
John Townshend	GM3JMT	Biggar
Yvonne Watts		Bournemouth
John Daniel	G8DGN	Leighton Buzzard
Ron Wellsted	M0RNW	Wolverhampton
John Matthews	M0JIJ	Bungay
Howard James	G3UPZ	Whiteley
Barry Horning	GM4TOE	Banff

Total paid memberships at 1st September 2024: 1399

John Russell	M7FZC	Lewes
Stephen Thornber	G6SGA	Stoke-on-Trent
Robert Smith	M6TMA	Stockport
Alan Brown	G8LTN	Thatcham
Roderick Warner	G8HOI	Chard
Ikongkar Singh	M7IMZ	London
John S. May	G0CDB	Paignton

United States of America		
Rohn Daughtry	KD4HCT	Beulaville
Ian Millett	N3CVA	Baltimore
Wade Marshall	W7ITL	Tacoma
David Elkins	KN4LQN	Chesterfield



Activity & Contests

Clive Reynolds G3GJA

Activity Weekends

Here are the remaining Activity weekends in 2024:

- October 5th/6th: 70cms.
- November 2nd/3rd: 2m, 4m and 6m
- November 30th/December: All bands

Contests

The BATC Christmas repeater Contest starts this year on the 23rd December and runs through to the 2nd January 2025. The repeater group gains points for any contact that generates a QSO with at least one leg using its RF input or output. That means a valid contact could be with one station using a stream input and the other using RF. However, I'm undecided about stream to stream QSOs; what do members think? Use the Activity & contest section of the Forum to let me know.

As usual, the repeater group scoring the most points will receive a £100 prize at the next CAT. This is a good opportunity to boost group funds.

Running alongside the Christmas repeater Contest is the Christmas Activity Ladder. It's been won by Ken, G8VDP for three years in a row and his sideboard is now groaning under the weight of the very attractive BATC trophies.

70cm and 6cm Ladders

Don't forget to enter your 70cm and 6cm contacts into the Ladders for your chance to get a shiny BATC trophy. There's no restriction on when the contacts are entered, just so long as they took place this year from the 1st January.



Ken's trophy collection

It's been brought to my attention that the rules for the 6cm Ladder allows voice contacts too. I haven't had the time to go through them carefully, but I'd be interested to hear member's views on this, again via the forum.

Repeaters

Gary, M1EGI and Ken, G8VDP continue to make good progress renovating GB3YT. Having replaced the original DTX1 modulator that had failed and replaced the commercial receiver with a Ryde it has been tested as an attended repeater from Ken's QTH.

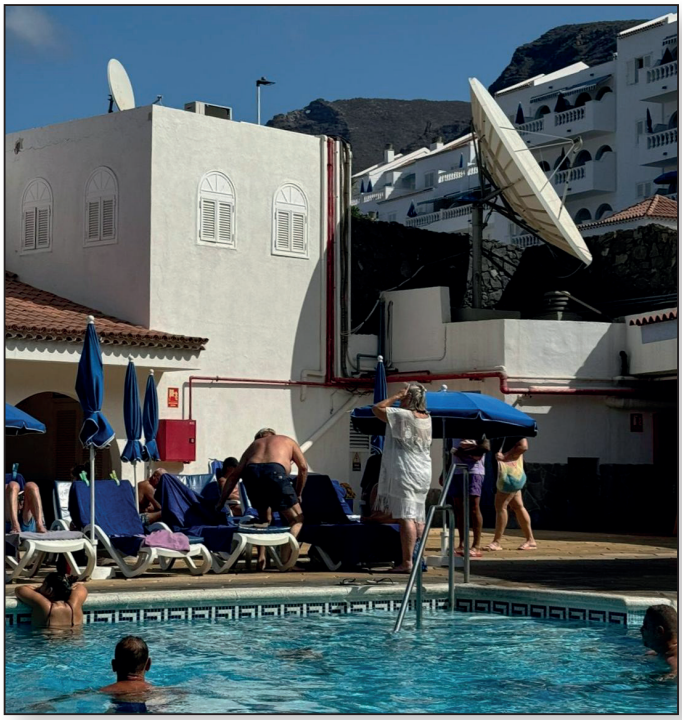
One of the tests fortunately coincided with one of Rob's, M0DTS, outings to IO94LI north of Helmsley in the North York Moors to catch the Tropo. Rob managed to access the repeater (just), but wasn't able to see it.



YT is still looking for a site, although there is a possibility of one above Stocksbridge that would work well. The site is 316m and would give good coverage to the north as far as Thirsk, Gainsborough to the east and Chesterfield to the south. The west is obstructed by the Pennines.

Stream inputs

GB3EY in East Yorkshire has gained a stream input that replaced a video player facility. The change was simply implemented by swapping an SD card in one of the repeater's Raspberry Pi 4s to run the Ryde stream receiver and adding a link between one of its GPIO pins and those of the BATC Repeater Controller. The best DX so far was from Graham, M1ASR/EA8, on holiday in Tenerife. Details of how to obtain a key for the stream inputs are on the repeater's stream output on the BATC Streamer.



Graham was using the larix streaming app on his iPhone.

The stream input has been used for the GB2RS News, read by myself on the repeater at 10am on Sundays successfully. It's a lot more stable than my RF feed when transmitting for the best part of 30 minutes.

Please send any activity or repeater news to *contests@batc.tv* or in the activity / repeater sections of the Forum.

Jamboree on the Air - 2024

Frank M0AEU

Jamboree on the Air (JOTA) takes place on the third full weekend of October every year (19/20 Oct 2024), and is the Scouts largest annual event with over a million young people expected to take part this year. Radio amateurs assist Scout Groups to make contact with other Scouts worldwide, on all the radio bands and modes - including some using TV.

The UK Headquarters station, GB2GP, is located at Gilwell Park in north London (JO01ap) and will once again entertain up to 240 youngsters over the weekend. The activities will include two HF stations, a data station, electronic kitbuilding and a variety of demonstrations. It will also have a green screen tv studio again this year, and will hopefully be live on the QO100 wideband transponder. I did a live 'walkthrough' of the station at CAT23 part II last year, and the station will be very similar again this year. The walkthrough can be seen here: *https://www.youtube.com/watch?v=57Tu-hX8dxo*





Adding a RTC (real time clock) to a Portsdown 4

Gareth G4XAT

Based on the chaos I ended up with when running three Portsdowns during the recent 2024 IARU contest, I asked Dave G8GKQ if it would be possible to time-stamp the screen-grabs taken when using the Portsdown receive capability. Within days, my wish was granted.

On a recent GB3SQ net Colin, G4KLB, showed a power monitoring/data-logging device that used a tiny RTC module. On the same net, Dave, G4FRE, mentioned that he had added a RTC capability to his Portsdown for similar reasons to my own.

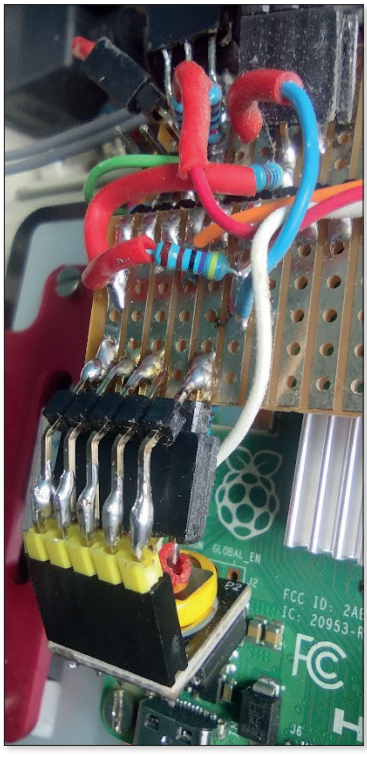
My experiences of adding RTCs to my own fleet follows:

There are a lot of different modules available, as I was only interested in the time and date I chose these "DS3231 Real Time Clock RTC Module For Raspberry Pi x" which I found on eBay for a bargain £5.72 for four, delivered.

Other similar modules are available, some with replaceable coin-cells. I think (the whole part-number cannot be seen) that these yellow-shrink-wrapped cells (CRxxx) are possibly rechargeable units. Colin reported that even plain coin-cell backed units keep time fine for up to 2 years.

Fitting these particular models involves connecting them to the RPi GPIO innermost row starting at the micro SD card end. The RTC PCB is marked with +V etc and is intended as plug and play onto a Pi.

All three of my PD4s are built in different ways so other than ensuring correct connections, that part is up to you. The picture shown is my first version where I used a long-pin GPIO socket and some Vero board for the many extra connections I ended up needing. It's tucked in over the top of the I2C connections which it shares with the Langstone extended I/O as the case back is now very close to the RTC module.



Power up your PD4 and ensure everything remains as expected, upgrade to the latest software version if not already running it. For the RTC to work requires some basic commands. I used the info contained here, following the instructions for September 2015 or later.
https://www.cjemicros.co.uk/micros/products/rpirtc.shtml

I have extracted what I used below in case the link no longer works:

Log into your PD4 via SSH/Putty or your preferred method. eg 192.168.0.xxx where xxx is your PD4s address. No need to scan your network, the info button, menu 2 centre bottom conveniently lists it for you.

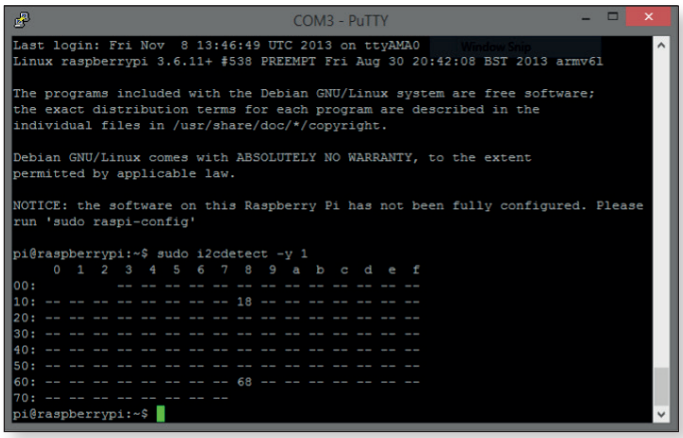
Type (or copy/paste)

- sudo raspi-config <ret>

Install i2c-tools using:

- sudo apt-get install i2c-tools <ret>
- sudo i2cdetect -y 1 <ret>

It should appear as 68 as shown below, along with anything else you have on the I2C bus.



Edit config.txt to add the following:

- dtoverlay=i2c-rtc,ds1307
- sudo nano /boot/config.txt <ret>

At the end of the file (use the arrow keys to navigate) add

- dtoverlay=i2c-rtc,ds1307

Save your changes - To save your edits hold control and press "X" then press "Y" and then return or enter

Add the module to /etc/modules:

- sudo nano /etc/modules <ret>

Add at the end of the file (use arrow keys to navigate)

- rtc-ds1307

Save your changes - To save your edits hold control and press "X" then press "Y" and then return or enter

Next edit /lib/udev/hwclock-set

- sudo nano /lib/udev/hwclock-set <ret>

Comment out the following lines with # like this:

- #if [-e /run/systemd/system] ; then
- #exit 0
- #fi

Save your changes - To save your edits hold control and press "X" then press "Y" and then return or enter.

Reboot the Raspberry Pi.

- sudo reboot <ret>

If the Raspberry Pi is connected to the internet the correct date and time should be set automatically otherwise you can set the current date and time using:

- date -s "2 OCT 2015 18:00:00"

You can check the current linux date with the command (date). To save the date onto the RTC Pi use the following command:

- sudo hwclock –w <ret>

Verify the date has been saved onto the RTC Pi with:

- sudo hwclock –r should show you the time and date.

then sudo reboot <ret> and away you go. Time and date for the foreseeable future.

BATC at the Telford Rally



David M0YDH

David M0YDH ran the BATC stand at this year's Telford Hamfest. He reports that the new venue in the sports hall was excellent.

David used his own projects as the demonstration on the stand: a Portsdown 2020, amplifier and dummy load transmitting on 436MHz to a Portsdown 4 and MiniTiouner. The second Portsdown 4 displayed BandViewer (as seen in RadCom).

David reports that there was lots of interest and chats about ATV plus the usual game of "see your past" ie five seconds ago on the receiver screen.

A number of the CQ-TV back issues were given away. David also mentioned that "I had full conversations in Welsh on ATV with Aled and Dilwyn which was challenging with my available vocabulary of ancient British. Very good for my soul though."

We are always looking for volunteers to run BATC stands demonstrating ATV at local rallies. If you are able to help, please contact any member of the committee.

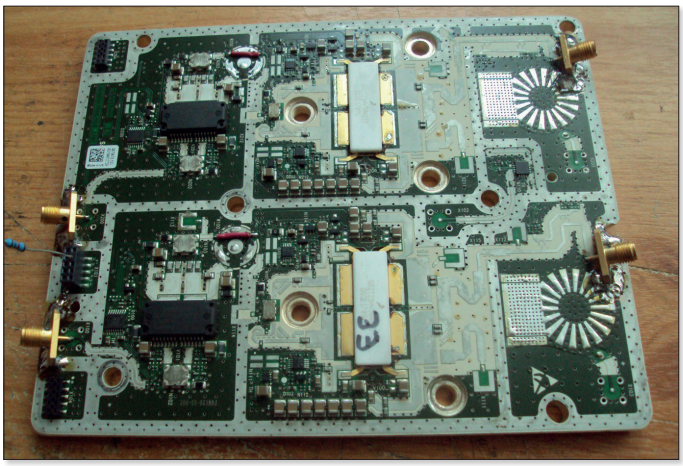




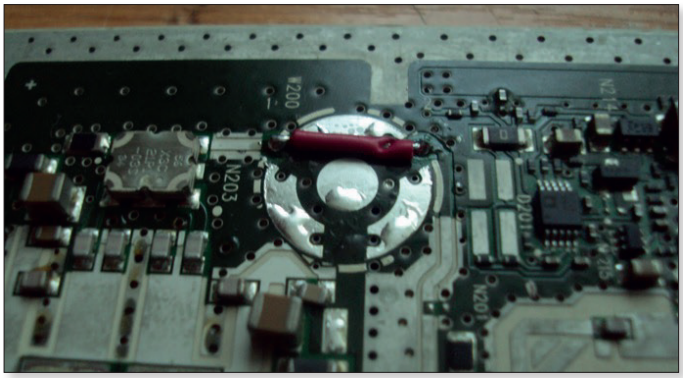
Conversion of old pallet amplifier to 13cm

Jim Smith G7NTG

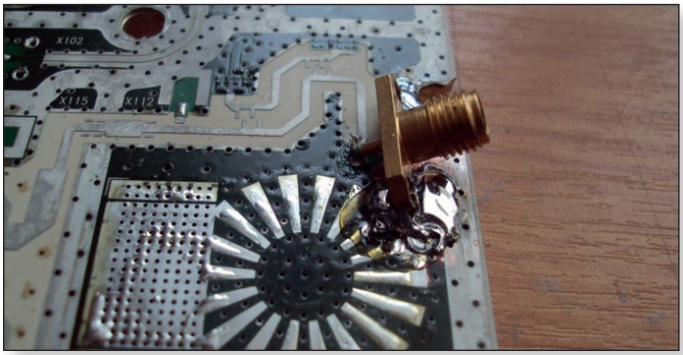
This article concerns the conversion of an old RF pallet with twin amplifiers using SAT2T21H450W19S for use at 13cms for Ham Radio. A pallet with BLC9G22XS-400AVT also works but lower power.



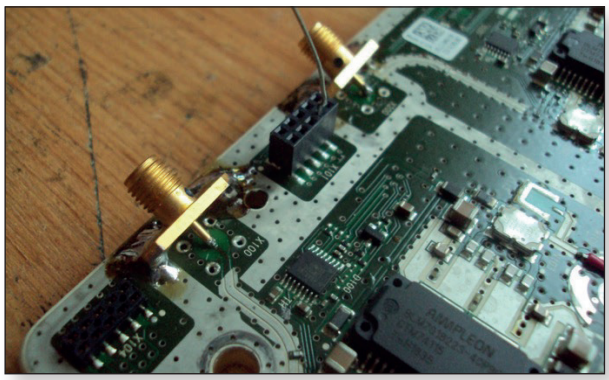
First very carefully remove all four circulators and all four connectors using a hotplate set to about 230C. Try not to knock any other part of the circuit.



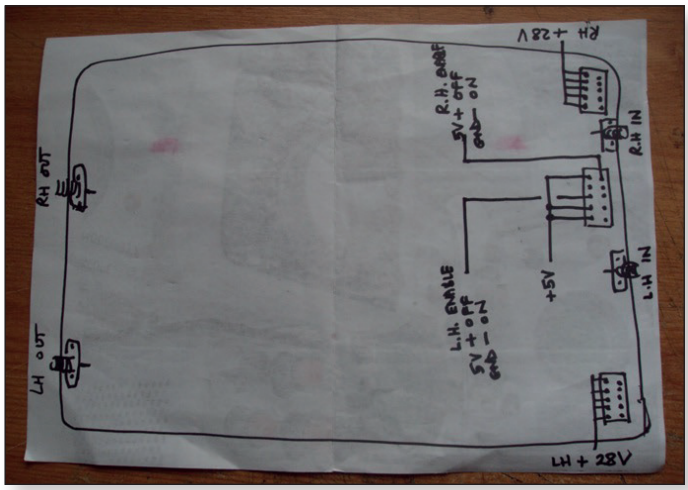
Next fit bypass links (shown with red wire) to smaller circulator positions.



Next, I installed SMA connectors to allow easy connection with semi-rigid RG-402 cables to the amplifier panels.



I then found some pin headers of the correct spacing in my junk box for the power and enable connectors.



The amplifier was then powered up with a 250W output attenuator fitted.

- Idle current was about 0.8A with no enable power and 1.1A with the enable power 28v via a 1k resistor
- At 2.4GHz, I got 200W for 20A at 28V for 7.7dBm drive saturated. I also got 104W for 11.7A at 28V for 0dBm drive
- At 2.3GHz, I got 290W for 22.3A at 28V for 6dBm drive saturated. I also got 200W for 17A at 28V for 0dBm drive

A very useful amplifier for QO-100 or EME and it has two completely separate amplifiers on the same pallet in case you blow one up. (This is very difficult to do with these amplifiers – the only way to guarantee failure is to remove the 28v supply while it is transmitting)

The pallets are available from eBay – bisonelectronics-sp2jyr

73 de Jim G7NTG *thebigclunk@virginmedia.com*

A look back at BATC history and the work of Mike Cox

Brian Summers, G8GQS



At the recent CAT 24, I put on a small display of some items from the BATC's archive.

More than half a century ago the club's BGM was held at the IBA, Brompton Road, London SW3. This was organised by Mike Cox who was a member of the committee in 1966. He remained very active in the BATC and became the club's president for 2000 - 2006, see *https://batc.org.uk/club-info/club-presidents/*

A full report of the meeting was published in CQ-TV 61. More than 200 members and guests attended and at the time this was a significant proportion of the membership which then stood at 800. All back issues of CQ-TV are downloadable from the BATC website.

The programme for the convention makes interesting reading, Mike Cox described and displayed his home built three-vidicon colour camera. This is before the start of colour broadcasting in the UK and it is my understanding that this camera played a part in the colour demonstrations given at Thames TV to officialdom.

BRITISH AMATEUR TELEVISION CLUB

1966 CONVENTION - Saturday, October 8th

Place: The Conference Suite, 70 Brompton Road, London, S.W.3.
(N.B. We are asked to use the side entrance in Lancelot Place as it is easier for unloading equipment etc. and nearer to the ITA car park - see below).

How to get there:
Train - nearest Tube station is Knightsbridge (Piccadilly Line)
Car - Brompton Road is the continuation of the Cromwell Road (A4-M4), it also leads west from Hyde Park Corner.
No. 70 is almost opposite Harrods (one of the best landmarks in the world!).

Car Parking: We have reserved the use of the ITA garage for a limited number. Priority is being given to those who filled in and sent back the questionnaire sent out with the last CQ-TV. The fee for this will be 7/6d for the day, and cars should be removed from the park by 7.00 p.m.
Street parking will be difficult nearby before 1.00 p.m., but Hyde Park is only 5 minutes walk away, and space should be available there for the impecunious, careful or mean! After 1.00 p.m. the problem virtually disappears and ample spaces should be available nearby.

Refreshments: There will be tea, coffee and sandwiches available during the day in the Conference Suite, and there are a vast selection of eating places and pubs in the vicinity. Please enquire at the Reception Desk for suggestions.

General: Will all members and visitors please call at the Desk to sign the book; they may also take the opportunity to renew their subscriptions, buy back copies of CQ-TV, raffle tickets, vidicon tubes and so on.

Programme of Events

10.00 a.m. Convention opens - members arrive and exhibition of equipment is set up.
2.30 p.m. sharp General meeting of Club in Hall. This should last about half an hour.
3.30 p.m. Symposium of papers in the Hall. Offers received up to September 23rd include the following:-

'Helical Scan Video Tape Recorders'	John Tanner
'A Sound-Vision Combining Unit for 70cms'	Ian Waters
'Slow Scan Television'	Tony Griffiths
'A Home Built Three Vidicon Colour Camera'	Mike Cox

(If any member would like at this stage to offer a paper, another session can be arranged in the morning.)
6.00 p.m. End of Convention.

Exhibition of Equipment

So far 11 members have returned forms saying that they are bringing equipment, and given good fortune, a good show will be given. Colour equipment has been offered by 4 members, and a large selection of cameras and telecine channels. The R.F. side is also well represented. The experiment is being tried this year of holding most of the exhibition in the two committee rooms at the end of the Hall. Equipment which is required for demonstration during the Symposium will be set up on the stage in the Hall. This allows for a larger audience for the papers as chairs will be already set out for the General Meeting.

If any members have any last minute queries, please give me a ring on RIChmond 5494.

Michael Cox.

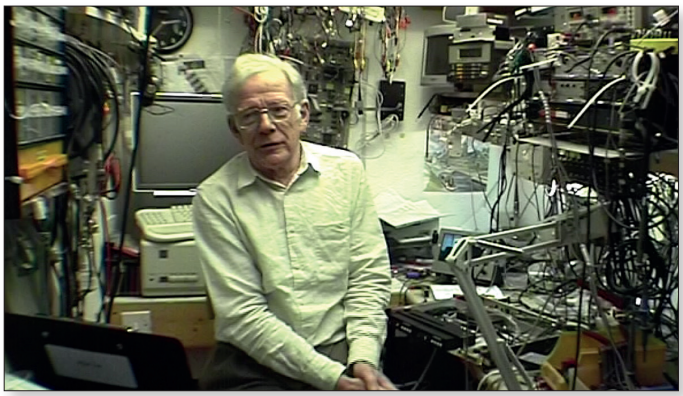
BATC 1966 Convention schedule.

Mike was an amazingly productive designer and builder of television equipment. Much of his recent work has been published in CQ-TV and I would encourage members, new and old, to go back through the archive at *https://batc.org.uk/cq-tv/cq-tv-archive/*

Sadly Mike died a few years ago and is greatly missed, but I was invited to help clear his laboratory and garage as the property was to be sold.

In a way it was quite sad to be taking his work apart but it had to be done. So I now have, as part of the BTTT, the Cox archive of papers, documents, notes and a few of his home constructed prototypes which went on to be commercially produced.

Most notable is the Cox colourised prototype unit, made on Veroboard, this went on to be the famous "Cox Box" widely used in the TV broadcast world for the colourising of monochrome captions.



Mike Cox in his compact laboratory

One little known unit is this rather nice compact oscilloscope, with 13 valves and a build date of 1958. It had a three-inch CRT with post deflection anode and the Y bandwidth was 10MHz/s. It was displayed at the Physical Society Exhibition on the Etel Stand who made the CRT.



The 310D prototype

It went on the be marketed by Cinetronics Ltd. At a price of only £75. The prototype unit is in the Cox archive.



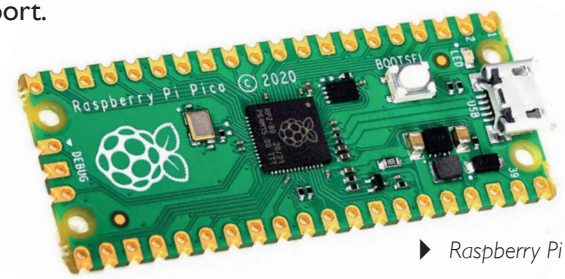
The finished product



PicoTuneWH - Ethernet software for the BATC PicoTuner

Brian Jordan, G4EWJ

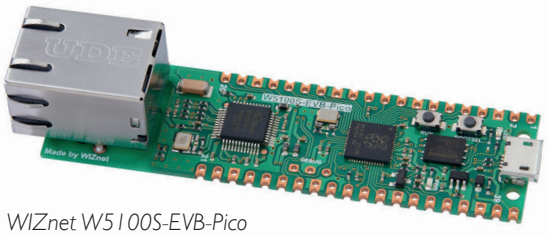
The BATC PicoTuner, with software designed by G4EML and pcb by G0MJW, connects via USB and enables simultaneous reception of two DATV signals with the standard FTS4334L NIM (tin can). Control, status and transport streams are transferred over the Pico USB port.



Raspberry Pi Pico

The PicoTuner has replaced the FT2232H USB module used in the F6DZP MiniTiouner by a Raspberry Pi Pico module, which is a single board computer in the style of Arduino. Not only is this much cheaper, but it enables the PicoTuner to use both receivers on the NIM. ZR6TG's OpenTuner software allows two signals to be received and displayed simultaneously.

The very efficient sub-processors in the RP2040 chip in the Pico can do simple input / output tasks at very high speed, independently from the main processor. Each receiver in the NIM is configured to provide a serial output of the transport stream, which requires only three pins per receiver on the Pico, plus two pins overall for I2C control and status.



WIZnet W5100S-EVB-Pico

Ethernet chip manufacturer WIZnet have combined one of their chips with an RP2040 chip to effectively give a Raspberry Pi Pico with an RJ45 socket. By replacing the standard Pico module in the PicoTuner with one of these, it gives the facility to connect to the PicoTuner via Ethernet rather than USB, in the same manner as the four channel WinterHill receiver. A W5500-EVB-Pico module may also be used.

It is a straight swap, with only a panel cutout for the RJ45 socket needed. The original G4EML PicoTune software can still be loaded to use the USB connection.

There is currently no software available to use both USB and Ethernet connections for transport streams at the same time.

In my article in CQ-TV 276 (available on the BATC CQ-TV archive) about the RP2040 chip, I showed an in-house project called PicoHub to demonstrate the capabilities of the chip. This used a W5100S-EVB-Pico and two FTS4334L NIMs, to effectively give a WinterHill without a Raspberry Pi4. The PicoTuneWH software is a single NIM adaptation of that software for the PicoTuner.

Operation

When the program starts, it obtains an IP address from a router using DHCP, sets both receivers to the QO-100 DATV beacon, calibrates the frequency errors in the LNB and NIM and then waits for tuning commands.

The WIZnet chip does not have a MAC (12 character network hardware address) so one is formed by using the 6 character manufacturer ID for a Pico W and the last 6 characters of the serial number of the flash chip on the W5100S-EVB-Pico.

The status of PicoTuneWH can be viewed via the USB serial port. There is also a broadcast packet sent over Ethernet on port 9997 every second. This packet can be received by any machine on the local network, even if the PicoTunerWH has not been able to obtain an IP address. The IP address is shown, which avoids the usual problem of finding out what it is.

```
=======================================
            PicoTuner Broadcast
=======================================
      Sequence  1294
      Run time  1301s
Broadcast port  9997
    Pico serial  E6623C3767449A2E
   Net hardware  WIZnet W5500
           MAC  28:CD:C1:44:9A:2E
     Host name  PicoTunerWH-449A2E
   DHCP state  Success
Lease remaining  2305s
    IP address  192.168.77.196
      NIM type  FTS4334L
  LNB supply X  HI
  LNB supply Y  absent
      Software  ptwh0v3e-w5500.uf2
```

```
          Mode  WinterHill
   Base IP port  9904
           RX5  10496.700T DD0CW
           RX6  10491.501T A71A
TS target RX5  192.168.77.247:9945
TS target RX6  192.168.77.247:9946
=====================================
```

To display the broadcast packet, Linux usually comes with a 'netcat' utility. Windows does not seem to have a similar utility built in, but one called 'ncat' can be downloaded.

Tuning commands can be sent using the usual programs - QuickTune or whpcrxcom, the WinterHill utility where any combination of frequency and symbol rate may be entered. Just as for WinterHill, the transport and info streams are sent to wherever the tuning command came from and the standard viewing programs can be used. OpenTuner 0.B can control and display both receivers over Ethernet.

If you already have a WinterHill, a jumper can be applied to the 10 way expansion socket on the PicoTuner pcb, to make it behave as receivers 5 and 6, in the style of a second WinterHill. The IP address range used by PicoTuneWH can be set to any value by sending a command over Ethernet, although this setting disappears at power off, at the moment.

The maximum bit rate of either receiver is about 15M bits/s. This is equivalent to SR10000, FEC 3/4.
The maximum Ethernet throughput for the two receivers combined is about 15M bits/s.

The PicoTuner pcb also has an option for an RT5047 based circuit to provide protected 13v/18v plus 22kHz tone control for an LNB. PicoTuneWH responds to the commands for this in the normal way and it also accepts commands for the second WinterHill voltage generator VGY. This could be used to control another voltage generator, added manually.

Links

- *https://wiki.batc.org.uk/PicoTuner_Ethernet_Interface*
- *https://docs.wiznet.io/Product/iEthernet/W5100S/w5100s-evb-pico*
- *https://github.com/cyberisltd/NcatPortable*
- *https://batc.org.uk/cq-tv/cq-tv-archive/*
- *https://wiki.batc.org.uk/PicoTuner*
- *https://www.zr6tg.co.za/open-tuner/*

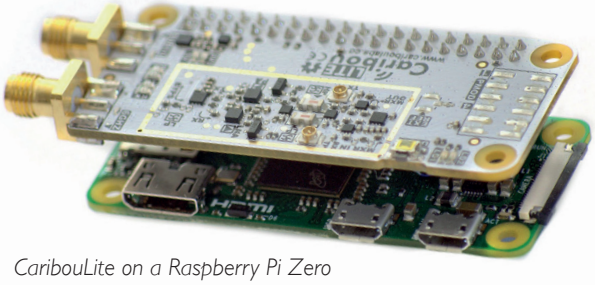
Muntjac - a Pluto alternative for QO-100 DATV



Brian Jordan, G4EWJ

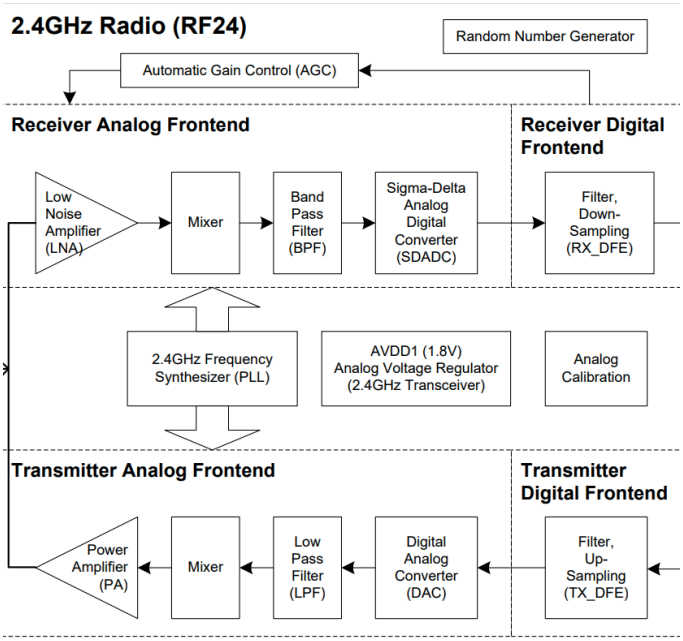
"A deer that's not dear, but less powerful than a caribou".

Muntjac is an investigative project to determine if some of the capabilities of the CaribouLite SDR can be used for DATV, more simply and cheaply.



CaribouLite on a Raspberry Pi Zero

The CaribouLite comes in two forms: basic and expanded. The expanded version has a mixer to increase its frequency coverage to a range of 30MHz – 6GHz. Its main components are an FPGA and an AT86RF215 IQ modulator / dual band RF transceiver. It is designed to be used as a hat on an RPi. The cost for the basic version is about £85 delivered in the UK and £145 for the expanded version.



AT86RF215 High Band Block Diagram

The AT86RF215 in the basic CaribouLite covers 389.5MHz-510MHz and 779MHz-1020MHz in the low band section and 2400MHz-2483.5MHz in the high band section. There are two other members of the family, with fewer facilities on board. It will operate outside these ranges, but not very far.

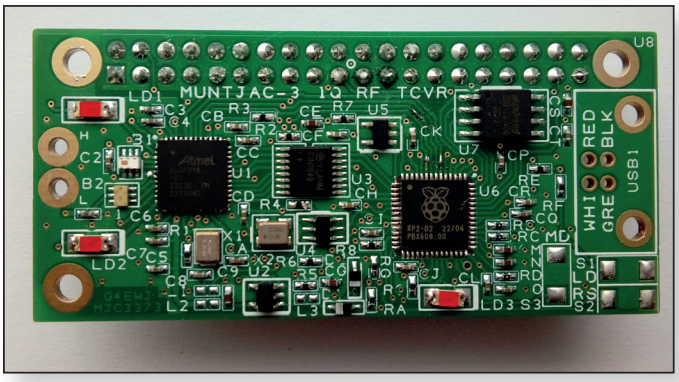
The large amount of software that has to be installed for the CaribouLite has put me off trying to use it for DATV. The AT86RF215 is very capable, so I decided to see if it could be utilised in another way.

Design Considerations

A circuit was designed to connect an RP2040 micro-controller, as used on the RPi Pico and an AT86RF215, via an LVDS transceiver (low voltage differential signalling), to see if QPSK could be transmitted. An RPi Pico cannot be used, because the RP2040 must run on a clock derived from the same clock as the AT86RF215 crystal oscillator, to maintain synchronisation on the LVDS bus. The RP2040 does have external clock inputs, but they cannot be connected to the PLL (phased locked loop) to generate a 128MHz clock to match the AT86RF215 LVDS clock rate.

To get around this, the RP2040 has to boot up using a 12MHz crystal oscillator, for USB and program loading compatibility and then switch its crystal input to a clock output from the AT86RF215, derived from its 26MHz crystal oscillator.

A design goal was to allow the Muntjac to be directly connected to a Windows PC. The only option is the USB1.1 port on the RP2040, which has a bus speed of 12M bit/s. It can be connected to an RPi via USB in the same way.



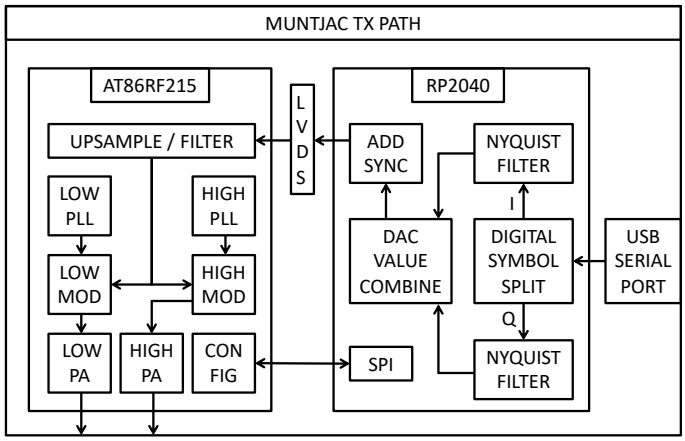
Muntjac-3 Test Board

As you can see, this will not be a homebrew project. It is only with the generous help of more skillful friends who built it by hand, that I have been able to get this far.

The four large chips from left to right are: AT86RF215, LVDS transceiver, RP2040 and 16M byte flash. 16M bytes is not required for the program, but that much memory can store a three minute transmission at SR333, which might be useful for some sort of beacon.

The balun for 2.4GHz (B1) incorporates a low pass filter and second and third harmonic notches. The maximum power output of the AT86RF215 is about 25mW, although its internal power setting needs to be greatly reduced to bring it down to the same levels as a Pluto, to give a good spectrum for DATV.

The USB connection is on the right and on the left are the two antenna connections for vertical RG174 cable attachment.



Muntjac Capabilities

For DATV, it should be able to transmit symbol rates 125, 250, 333, 500 and 1000 on 2.4GHz, 437MHz and also 928MHz, if you have that band. There is a single LVDS connection for transmission, but the same data can be transmitted on 2.4GHz and also on a low band frequency at the same time. By transmitting DATV on low band at 1005MHz and a carrier on 2.4GHz, a mixer will give an output on 3405MHz. I just happened to have a SIM-63LH surface-mounted mixer on a pcb, that should work well to try this.

If the tests are successful, Muntjac would probably be made available as a component rather than a complete device, leaving the user to add connectors and a choice of flash chip. The flash chip is a SOIC type with 1.27mm pin spacing, so not too difficult to solder.

Costs

Looking at the major component costs, for a Pluto, the one off cost for an AD9363 and an XC7Z010 is about £140, whereas for a Muntjac, the cost of an AT86RF215 and an RP2040 is about £7, so there is plenty scope for making a low cost unit. There is still the manufacturing cost to add.

AT86RF215 Interfacing

The low band and high band sections of the AT86RF215 can each be used independently in one of two ways: IQ mode and baseband mode. With baseband mode, you give it packets of data and the baseband processor handles all the transmission and reception using various protocols, some proprietary. In IQ mode, you send 13 bit I and Q values that are then filtered and applied to the DACs (digital to analogue converters) of the modulator. IQ mode should allow many types of modulation to be generated, such as QPSK.

Digital IQ samples are sent and received serially to and from the AT86RF215 over an LVDS bus using a 64MHz clock. A data bit is sent on each edge of the clock, giving a data rate of 128M bits/s. This is 4M IQ groups per second, with each group of 32 bits containing a 13 bit I sample, a 13 bit Q sample and a synchronisation pattern. An SPI bus is used for control and status.

128M bits/s serially is a significant task for a microcontroller. All the standard peripherals such as SPI, I2S and PCM send only one bit per clock cycle. The CaribouLite uses an FPGA (field programmable gate array) and the little used parallel SMI (secondary memory interface) on the RPi. Fortunately, the flexible sub-processors in the RP2040 should be able to handle this, in an output mode at least.

Testing

An RP2040 sub-processor was set up to output a 64MHz clock with data changing on both edges. This looked good on a scope.

As a first test for the AT86RF215, there is a mode to transmit carriers and these were generated on various low band and high band frequencies to confirm that SPI control was functioning correctly. Next, 32 bit groups containing the sync pattern of 0x80004000 were sent over the LVDS bus at 128M bits/s and the AT86RF215 reported correct synchronisation. One method of using a Pluto is to give it DAC values. The USB data rate is 96M bit/s for an SR1000 signal, so not practical for Muntjac.

Another method is to send the raw transport stream over USB and have the RP2040 do the conversion to DVB-S2 frames and then the filtering. The USB data rate is about 1.3M bit/s for SR1000 FEC 2/3. I have written software to do that on an RPi 1, but the RP2040 uses the more restrictive Thumb instruction set and it would require a lot of conversion. The task may be too much for the RP2040 anyway, although it can be severely over-clocked, so it would be worth trying at some point.

The method selected was to send DVB-S2 frames as digital symbols and have the RP2040 digitally filter them using a 127 tap Nyquist filter to produce DAC values, which gives the usual steep-sided spectrum. I used this method in my DigiThin project many years ago. The USB data rate is about 2M bit/s for SR1000.

Interfacing with Linux and Windows

I wrote a utility some years ago for the quad core RPi's that will convert transport stream packets to DVB-S2 frames and output each frame as digital symbols. F5OEO uses this in some of his Pluto software.

I do not have similar software to run on Windows. Current Windows programs would need a small modification to output digital symbols. Software such as DATV-Express and GNU which convert transport stream packets to DVB-S2 frames and then to DAC values, appear to convert to DAC values before performing the final step of PLS (physical layer scrambling), whereas Muntjac needs IQ symbols after PLS. It should be simple for Windows software to convert the DAC values back to digital symbols.

The symbols (2 bits each for QPSK) are packed into bytes and then frequency, power and other configuration data is added. The Muntjac appears as a standard USB serial port: COMx on Windows and ttyACMx on Linux.

Alternative Connection and Usage

As an alternative to a USB connection, the Muntjac can sit on the standard 40 pin header on an RPi. This allows a direct connection to the RP2040 via the SPI bus at greater data rates than the USB connection allows. The combination of a Muntjac and an RPi Zero2W could make a compact and low cost DATV transmitter for QO-100 and 437MHz. The Muntjac would need to digitise a microphone input and send the data to the RPi for conversion to AAC.

Could Muntjac transmit SSB on 2.4GHz? That would be a useful facility. I know the basics of SSB generation by mixing signals with 90 degree phase shifts, but not the finer points of converting that to the data rates used by the AT86RF215. Perhaps someone could advise. CW should be possible.

Can it receive? Receive is more difficult for the RP2040 sub-processors, as they have to synchronise to the incoming 64MHz LVDS clock. There is a receive LVDS data path for each band, which delivers a configurable width of spectrum as IQ values. Unfortunately, 740MHz is outside the published range of the AT86RF215, so this could not be used on QO-100 with most LNBs.

Coming downwards from the specified value of 779MHz, the PLL would not lock reliably below 750MHz. DATV and SSB receive on 432MHz may be possible.

Could the receive LVDS bus be connected directly to the transmit LVDS bus to form a simple bent pipe repeater? It is worth trying.

Further Hardware Development

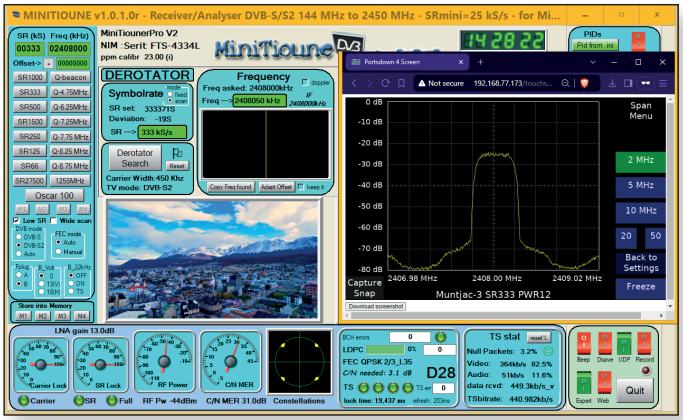
The next version will have a connector to attach a WIZnet Ethernet module for remote use and a connector to bring out several digital and analogue pins for equipment control and monitoring.

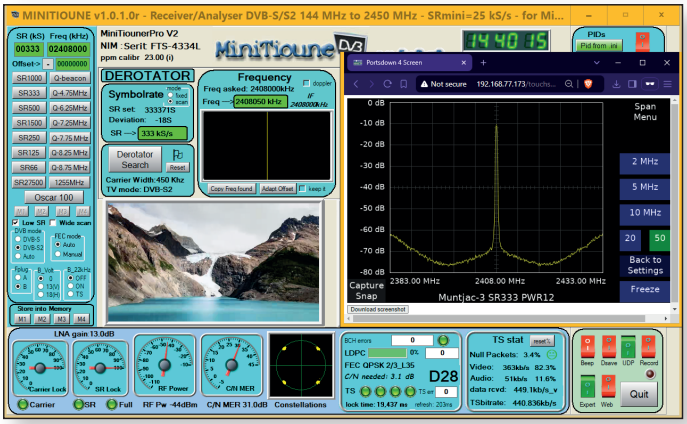
Receive components may be removed if it does not appear to be possible. The AT86RF215 receive data and clock pins could be made accessible for other experiments.

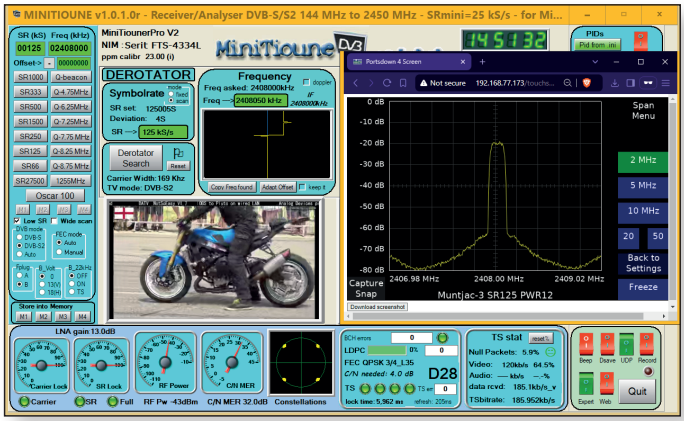
Muntjac in Operation

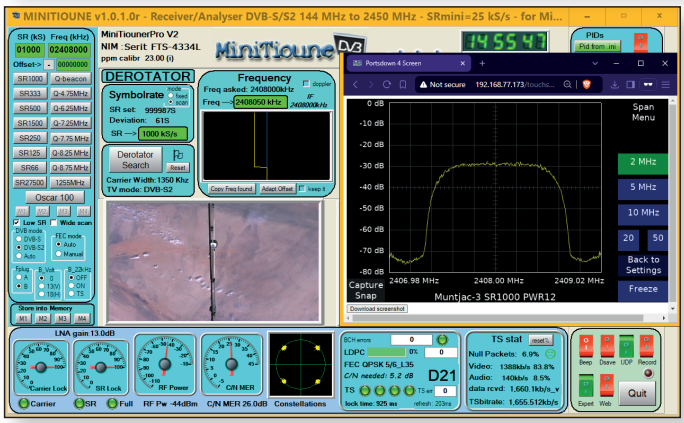
Actual transmitting tests are looking promising. Here are some screen captures using MiniTioune and the Portsdown Pluto Band Viewer. I believe that the rising edges on the band viewer are an artefact due to the strength of the signal and are not actually there.

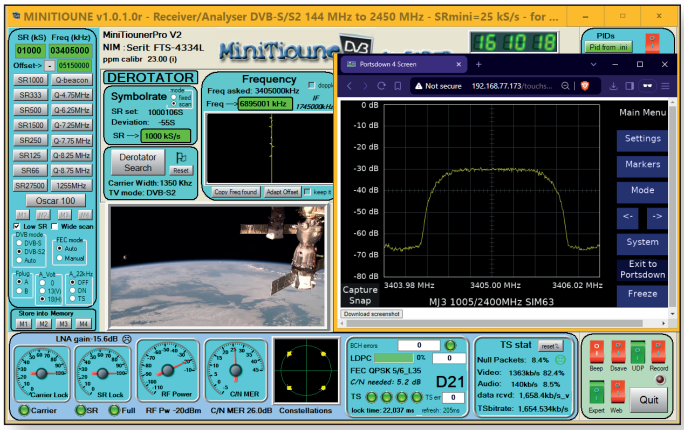
For the tests, the Muntjac was connected to an RPi4 by USB and the source material was pre-recorded, raw transport stream files.











Links

- https://www.crowdsupply.com/cariboulabs/cariboulite-rpi-hat
- https://www.microchip.com/en-us/product/AT86RF215
- https://wiki.analog.com/university/tools/pluto
- https://www.raspberrypi.com/documentation/microcontrollers/pico-series.html
- https://docs.wiznet.io/Product/ioModule/wiz850io
- https://wiki.batc.org.uk/The_Portsdown_DATV_transceiver_system
- http://www.vivadatv.org/

The Portsdown Newsletter

Dave Crump, G8GKQ

It has been a quiet few months for Portsdown development; I have been concentrating on other projects that might in due course contribute to Portsdown 5, but are not currently relevant to Portsdown 4.

Portsdown 4 time display

Elsewhere in this issue, Gareth G4XAT describes how to incorporate a real-time clock into the Portsdown 4. He found that after operating portable with no internet, the timestamps on the image files (snaps) that he had been saving made no sense. This is because the Raspberry Pi 4 does not have a clock that runs when the power is off, and usually updates its time from the internet at start-up.

To make things easier, I have now added the facility to overprint saved screenshots with the time and date of capture. If enabled from menu three, system menu, each time a screenshot is taken, two images are saved in the "snaps" folder. The first is clean with no overprint, and the second has the time and date in the bottom left corner.



Saved image with date/time overprint in bottom left corner

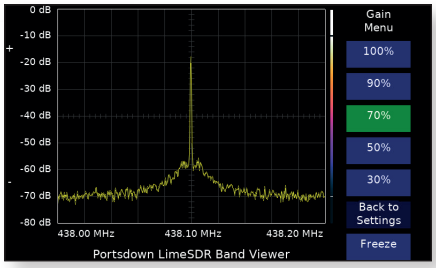
Additionally, I have added the time, date and band (if other than direct) to the text on the received data overlay. Lastly, to enable the facility to be checked, the time and date are now displayed on the info menu.

BlackMagic ATEM Support

The Portsdown 4 can display the USB video feed from an ATEM mixer (select from menu two) and also control a Jetson to encode the video from the USB feed. This capability was incompatible with the recent ATEM firmware major update (V0.95). I have added the new ATEM naming convention to the Portsdown 4 code so that this now works. Compatibility with the old firmware is also maintained.

BandViewer gain control

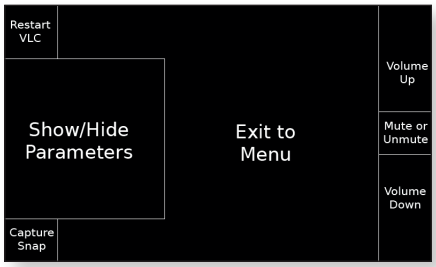
While using BandViewer, Lime or Pluto gain adjustments are often required to ensure undistorted spectrum display. This used to require navigation through two menus for adjustments. I have now added small + and – symbols to the left of the amplitude scale to allow the gain to be adjusted independent of what menu is selected.



Gain adjustment buttons (+ and -) at left side of BandViewer Display

VLC volume control

Russ G4SAQ recently reported that the stream and received audio from some stations was distorted on peaks. We discovered that this was because the VLC volume on his Portsdown was set too high. It is not obvious, but this can be adjusted by touching the bottom right or top right of the received image. You can also mute the audio by touching the middle right edge of the image. A caption is displayed for a few seconds in the top left corner after each selection. Here is the full overlay.



The Portsdown Receiver Touchscreen Overlay

Lime PTT switching

I had previously implemented a fixed time delay between transmit selection and PTT (GPIO pin 40) activation to reduce the risk of PA damage by the LimeSDR calibration spike. I have now been able to amend this to raise the PTT line as soon as the valid DATV transmission starts, reducing the transmit start-up delay by up to five seconds.

New developments

If you have an idea for an enhancement to the Portsdown that will benefit the wider user community, please post it on the BATC forum, and I will consider it for implementation. Please think about how it might be mechanised within the current touchscreen menus – these tend to constrain the art of the possible.



My DATV transmitter

Harrie PE1JXI.

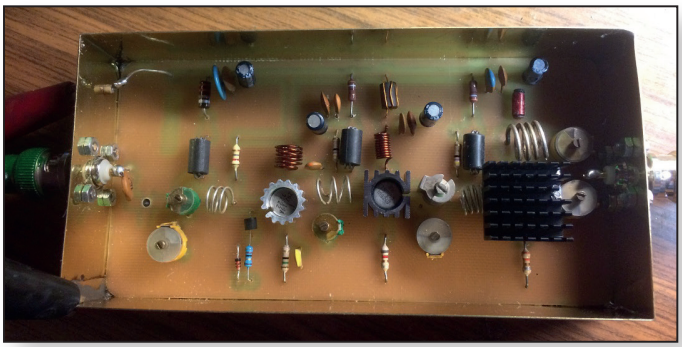
Last year I had a voice QSO via the QO-100 with Benno, PA3FBX.

After the contact I visited his QRZ.com site and saw his DATV transmitter for the first time and I thought: "Wow, I want to build that too".

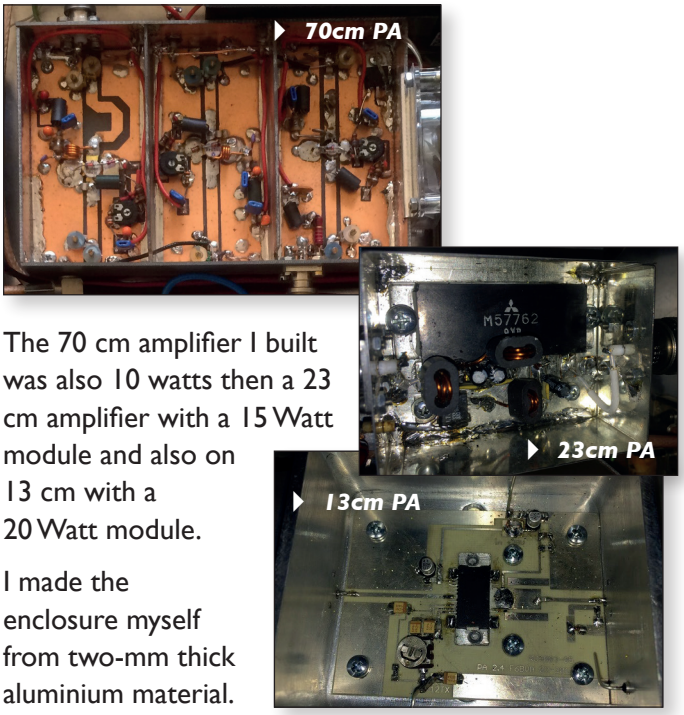
So I started searching on the internet and found the Langstone Portsdown project.

I wanted to know more about it and immediately became a member of the BATC.

I was able to buy an Adalm Pluto and a Raspberry Pi 4 second hand and even bought the seven-inch display new for 35 euros. I had a lot of the other parts in my junk box.



I started building a two-meter amplifier to go from 0dbm to 40dbm (10Watts) with a BFR96, 2N2219A, 2N3553, MRF237, and a BLY88 in class A/B.

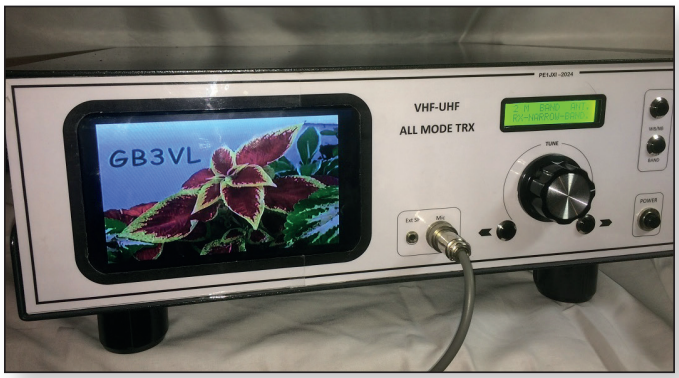


The 70 cm amplifier I built was also 10 watts then a 23 cm amplifier with a 15 Watt module and also on 13 cm with a 20 Watt module.

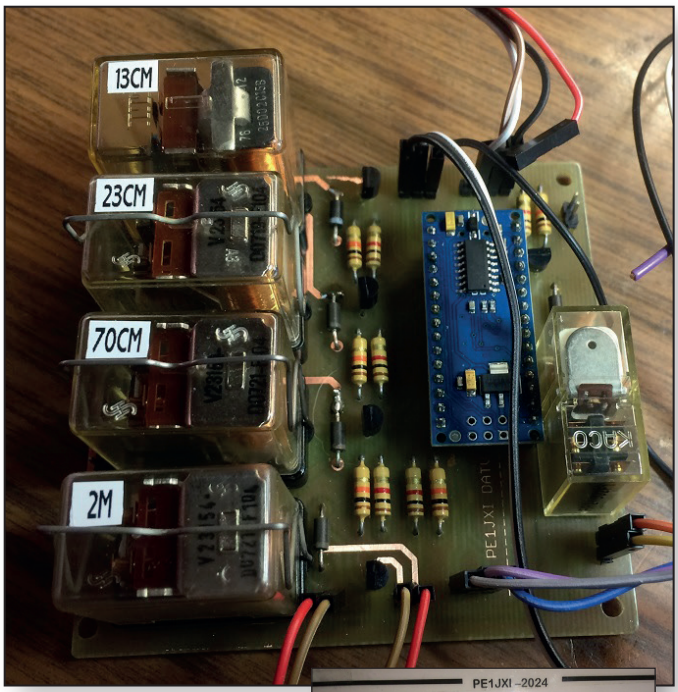
I made the enclosure myself from two-mm thick aluminium material.

After a much measuring, fitting and drilling lots of holes, I cut the panel for the display so that it was flush with the front.

I pasted the control layout over the front using Publisher and after printing, I laminated the front panel.



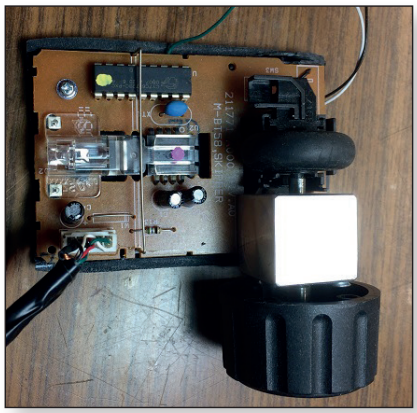
I drew a PCB with the Eagle CAD programme - this is for switching multiple relays - and, for the Arduino nano, I printed and exposed the PCB and then simply etched it with ferric chloride.



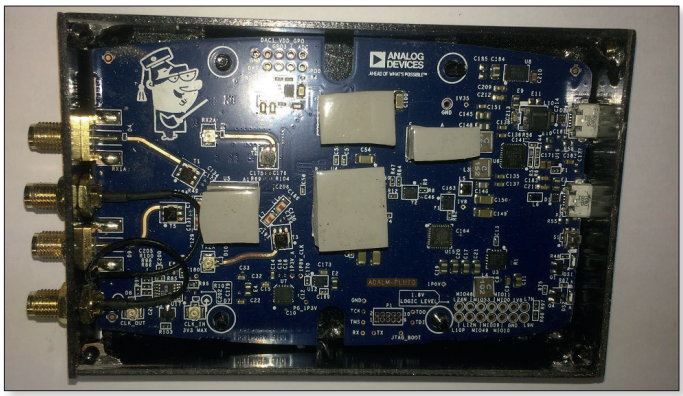
I programmed the Arduino nano to switch with only one push button to select the antenna and to switch from WB to NB receiving.



For the tuning I used a USB mouse, I cut a block of aluminium and mounted two bearings in it with a six-mm axle, I brought wires from the mouse switch to the front and used a new pressure switch, see photo.



The Adalm Pluto is a C version because I also want to use the TRX for the QO-100 and I want to stabilise the Pluto externally via GPS.



This could be done with software and I also succeeded with the firmware 032, but this does not work with Langstone software. So I took the soldering iron and brought out the 40 MHz from the Pluto and made a 40 MHz input.

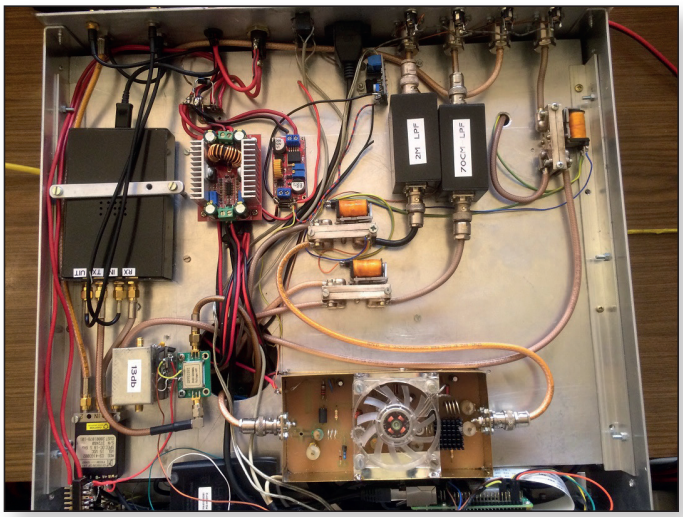
For the Pluto I made an enclosure to shield for possible RF radiation because the Langstone software sometimes crashes and I have to restart everything - but despite the new enclosure, this still happens, anyone have any ideas?

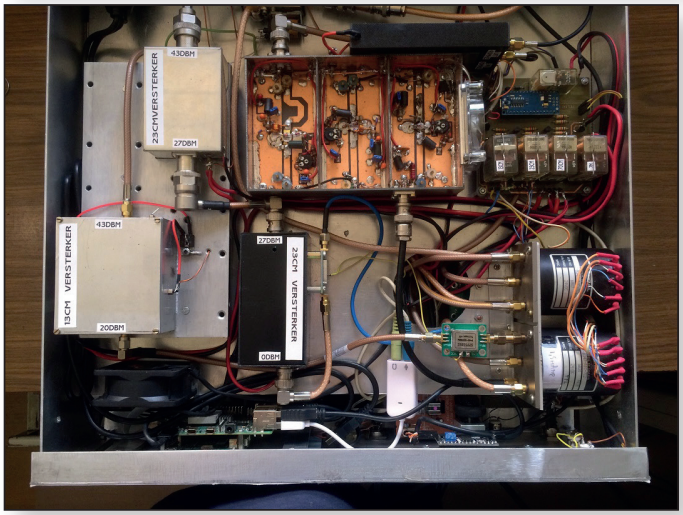


Of course I also built the Minitouner and ordered the parts from the BATC shop, which arrived within two days, thanks to Benno. The build went great without any problems.

I could write a lot more about it, but I think the story is way too long and my English isn't very good.

If you are interested I have posted several photos of my other designs on my *qrz.com/db/PE1JXI* page.











Mr Whippy moves on…

Gareth, G4XAT



So after 5 years of ownership Mr Whippy has been sold to a restorer in Scotland who is undertaking the work for his brother who lives in Munich…

As you may have read, I have enjoyed various radio-related exploits in Mr Whippy and found it adequate and fully functional although a bit slow and thirsty by modern standards. It was a joint purchase by my wife Jayne and I so that we could try a bit of camper-van life…and I could have a 'radio truck'. It took until August this year for us to organise a trip together. We drove to Anglesey to join our son Josh who was taking his Roadster for a track day at the excellent Anglesey race circuit. Jaynes reasoning was that if we only went local and she didn't like it, we would simply return home. We split the journey up a bit, stopping overnight at Warwick where Josh lives. Departing next morning we completed the journey to the camp site and enjoyed lovely afternoon sunshine. The sleeping arrangements involved a step ladder to get access to the 'upstairs bedroom'. A somewhat cramped night's sleep followed….it's not too bad for one person (as I'd found, but I can sleep almost anywhere anyway) but two involves seeking permission to roll over etc…

Trying to cook and feed three people showed that it was more than a bit cramped, although certainly functional. The second night wasn't much better so after the track day (very successful and fairly toe-curling as a passenger… but in my son's driving skills I trust!) we decided to return to Warwick. Some four hours later, we arrived having used the A55, A41, M54 & M6. After a restful nights sleep, we returned home to Bromley without incident. MPG was between 22-24 depending on motorway cruising at around 55mph or local roads.

We decided that 'camper van life' wasn't for us, and although usable as my radio truck, I have evolved to use my Mazda 6 estate for that side of things. If pressed, I could even overnight in it. I initially advertised the camper on make-related Facebook groups. As expected, several dreamers/messers but one interested person did come to view, but declined. So I wrote a comprehensive description, took video inside, outside and underneath and placed an eBay classified advert (£19.99) with links to the YouTube videos. It sold a couple of days later for a price that included a small profit.

With space on the drive I can have another project so I sought out a Jago Geep (copyright claims by the real Jeep needed the change of name). This is a kit car, available from the early 1970's until sometime in the 1990's. I built one in 1987 and used it as my daily until 1999 when I swapped it for something else (another story). Found on the Jago Owners FB group, I asked for a 'project' and by extraordinary luck, secured pretty much exactly what I wanted. Pre-1984 (so historic and ULEZ/VED exempt) correctly registered, with a hardtop (the soft-tops leaked, flapped a lot and fell to pieces) with a modern EFI engine and a 4 speed automatic gearbox. Being based on Ford Mk2 Escorts spares are easily available and a relatively modern EFI engine means turnkey reliability and better economy. I never quite got round to 'radio-trucking' my original one, although I did begin the process. This one will get a full rebuild and then some adaption to support portable radio & TV activity.

Quite how long this will take I have no idea… picture shows the vehicle, 2 more wheels, bonnet, grill and wings not in photo. You get the idea…



CAT 24 – a report of Part one



Rob G8NXG

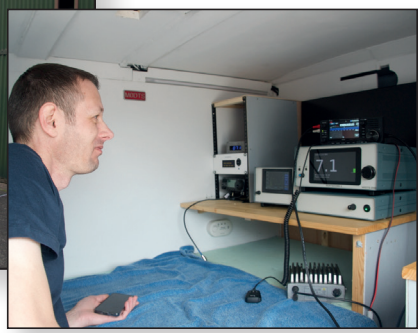
Members of the BATC have held a convention each year for some time. Since the advent of the Covid pandemic each BATC CAT (Convention for Amateur Television) has been held in two parts: an in-person event where ATV enthusiasts can meet, plus a second, part two, streamed via the internet. This year part two will be held on 26 October – details are published on the BATC website and forum.

For part one, once again BATC members and ATV enthusiasts travelled to the village of Baginton, near Coventry to attend the yearly CAT event, this time CAT24. It has become customary for attendees to get together on the Saturday evening before the event and some 24 folk enjoyed dinner, held in the Grey Lady Suite at the Old Mill, Baginton.

Fine weather conditions were a welcome feature of the Sunday, and we were greeted at the Midland Air Museum by our new Membership Secretary, Tony G3UIS plus his wife, who assisted with badge distribution etc.

As in previous years, the displays and stands had been erected in the 'Robin Hanger' which happens to be at the opposite end of the museum site, entailing a short walk from the entrance amongst some of the museum exhibits.





One of the advantages of the use of the Robin Hanger is the availability of outside exhibitor space and this time four members arrived with interesting kit to show. Jen G4HIZ was in the usual position just outside the hangar doors with two very heavy duty satellite dishes, wired to the display tables inside the hangar. Next to this was Gareth G4XAT with his car-mounted dish assembly and QO-100 kit. For the second year running, Rob M0DTS arrived with his van DATV installation. New for this year was the welcome addition of Colin, G4KLB with his repurposed BBC radio car.











The table layout inside the hangar was much the same as in previous years, with the addition of a seating area, this feature resulting from feedback last year.



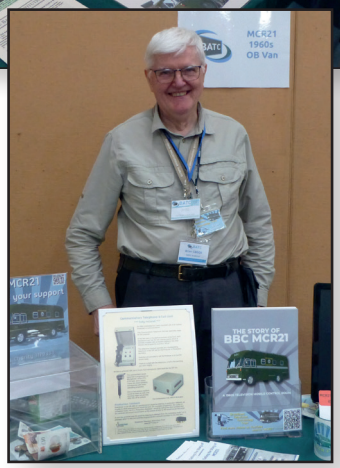
Thanks are due to committee members and supporters who provided technical support for club projects. The test and fix-it area was operated by Clive G3GJA plus Lyndon M0LDR and the Portsdown section was operated by Mr Portsdown himself, Dave G8GKQ.



The BATC shop was also in operation by Noel G8GTZ which this time featured lots of early editions of CQ-TV made freely available on a last time basis for anyone who wanted to seek out the odd copy. As usual, those special parts for BATC projects were also available to buy at discounted rally prices.

The remainder of the space was largely taken up by the bring and buy and show and tell tables all of which provided much of interest. Jen G4HIZ laid out her QO-100 station which was on continuous demonstration. Next to Jen was Phil, M0DNY with his latest digital transmission projects.



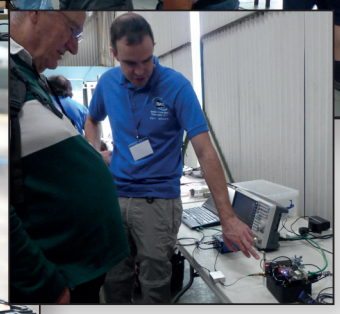


Away from advanced DATV, old-style analogue TV was presented by Brian G8GQS in the form of artefacts of early BATC paperwork and a display of items concerning the refurbishment of MCR21 – a 1960s BBC OB van.

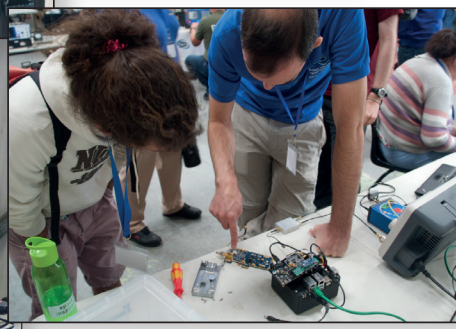
All the tables put aside for bring and buy use were well populated and bargains were to be had and taken advantage of.

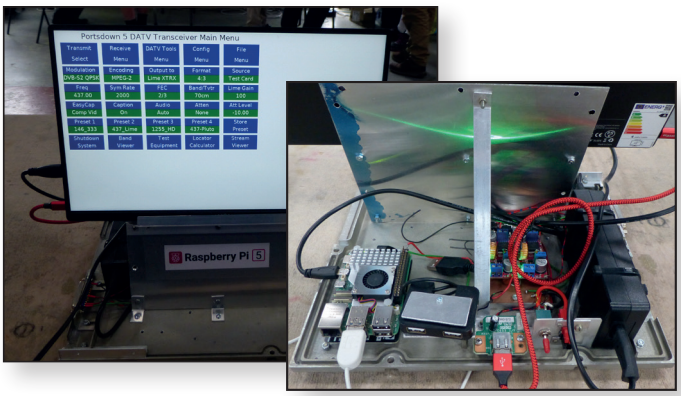








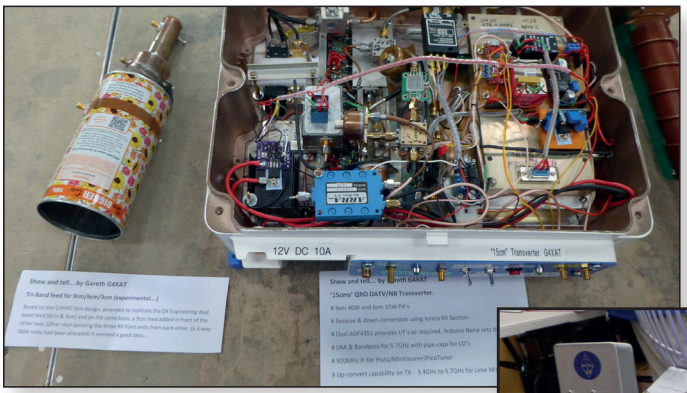




Last but not least, a section was reserved for show and tell; the area where ATVers can bring along ATV projects for demonstration and discussion. A prototype Portsdown 5 using the Raspberry Pi 5 was on display along with a Portsdown/Langstone/Ryde multi-mode multi-band Transceiver brought to us by Benno PA3FBX.



Among lots of other interesting items were a couple by Gareth G4XAT: an experimental tri-band feed plus an experimental DATV/NB transverter.



A Portsdown 2020 (remember those?) was also on display, constructed by members of the Wolverhampton ARS.

This year was one of those years when the bi-annual general meeting was due to be held and this was duly carried out in the Argosy Suite – the agenda had been published in the summer edition of CQ-TV 284. Brian Summers, G8GQS was recognised for his service to the club as the immediate past Treasurer. The minutes of this meeting will be published on the BATC website in due course.





The BATC convention is a great way to meet up with like-minded people, meet up with old friends, make new friends and to create new ideas – and if you happen to have a garage half-full with ATV related stuff no longer required bring it along next year.





Presentation of awards at CAT 24


David Holman M0YDH


East Yorkshire Repeater Group GB3EY


Colin Durbridge G4EML


Noel Matthews G8GTZ

Award	Trophy	Certificate
2023 6cm Ladder	Chris Ashby G4AYT	Runner up: Dave Butler G4ASR
2023 70cm Ladder	David Holman M0YDH	Runner up: Tony Pearce G0AZQ
2023 Christmas Ladder	Ken Roberts G8VDP	Runner up: Graham Jefferies M1ASR
2023 Christmas Repeater		East Yorkshire Repeater Group GB3EY
2024 IARU ATV Contest UK Fixed	Leader: Gareth Evans G4XAT	Runner up: Rob Swinbank M0DTS
2024 IARU ATV Contest UK Roving	Leader: Noel Matthews G8GTZ	Runner up: Dave Robinson G4FRE


Gareth Evans G4XAT


Dave Robinson G4FRE


Rob Swinbank M0DTS

Antenna element holders made by a 3D printer



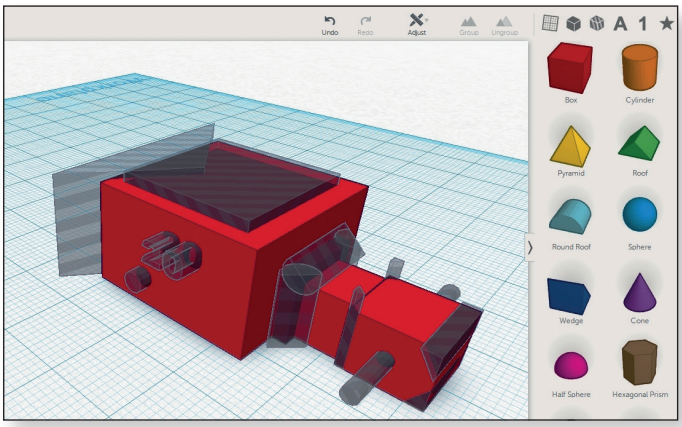
Chris van den Berg PA3CRX

Regularly you hear a lot about 3D printers. Of course it must also be possible to make element holders for antennas with it.

Completely without any experience, I was attended to a graphic online program www.tinkercad.com. Free registration is straight forward.

The program contains lessens and tutorials which you may learn step by step how to build up objects. However, you can also just try something (like I did).

There are a number of basic shapes to start with (such as cylinder, cone, pyramid, block) but also letters and numbers.



The selected shape can be changed in size, shape, rotated, moved and can be set as 'positive' or as a 'hole'.

After playing with it and having acquired the routine to drag, rotate (right mouse) and zoom (scroll wheel) I designed an element holder. Likely unnecessarily complicated but as an exercise.

The target was that it could be clicked directly onto a 20 mm boom (of course it is just as easy to make for any other size boom).

Design.

In order to prevent influence of the elements, I wanted them not too close to the boom. At the higher frequencies that is less risky than applying boom corrections on the element lengths.

Around the element, I had a nice curve in mind, but that turned out to be the limitation of the printer. Seen from the 'table', the angle 'up' should not be greater than 45 degrees. Of course, horizontal protrusions cannot be printed in the air either.

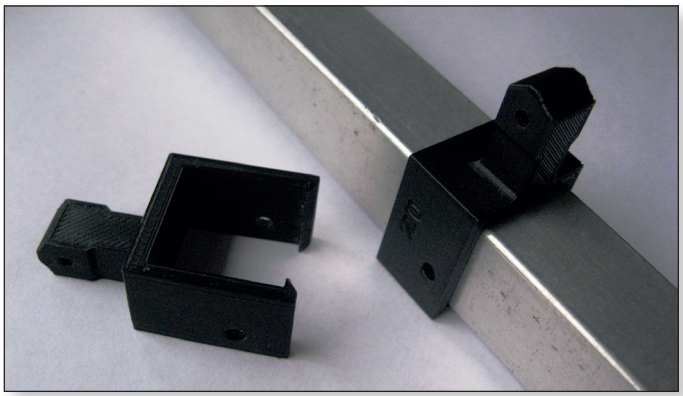
In Tinkercad I did not find a routine that checks for these types of printer limitations.

Result

My exercise was printed by a friend, so that it could be seen whether the idea of the element holder would work. After all, it is always a gamble if you are not yet familiar with the flexibility of the material, in this test case PLA. For long term use outside (humidity and UV) it is recommended to use other material like ASA, PETG or Nylon12 (PA12).

The used 3D printer was a relatively cheap one from China.

The result is astonishingly good!

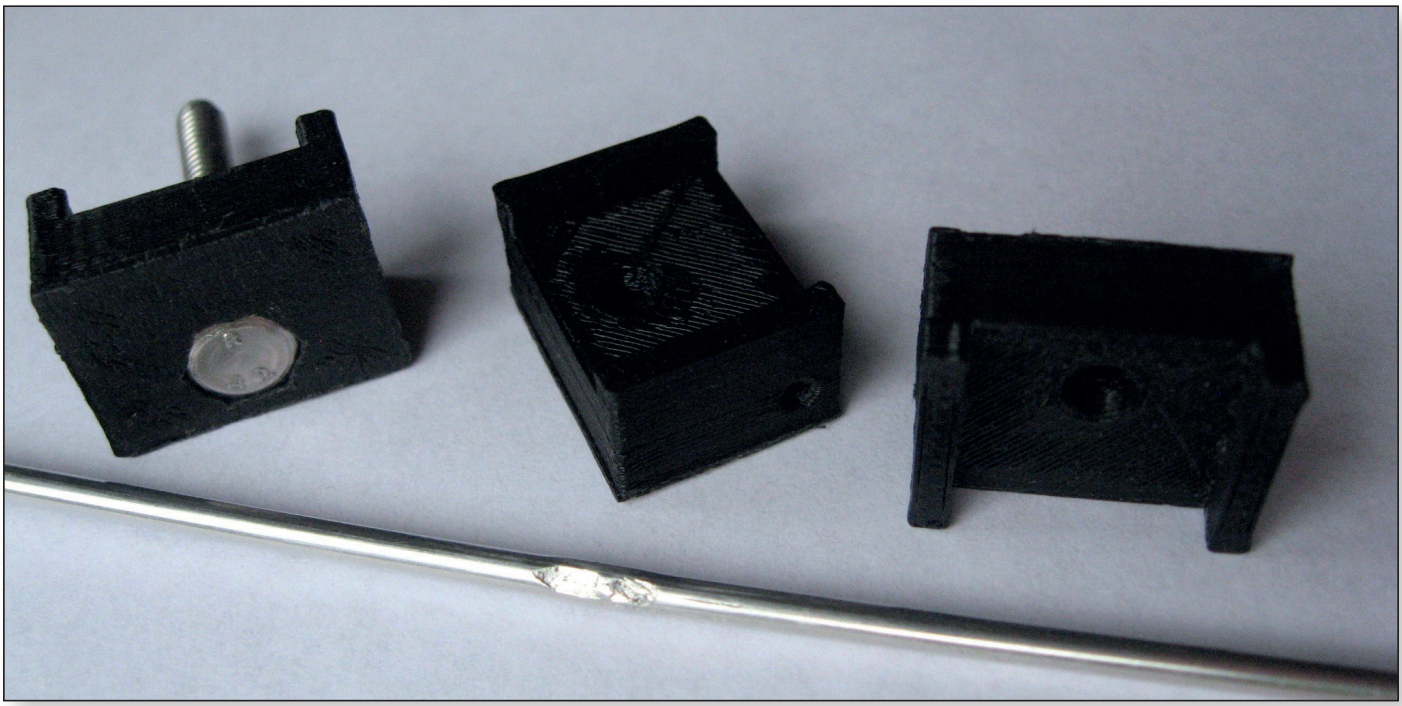


The printed element holder and clicked on the boom

However, there appeared to be small dimensional deviations. The space for the boom turned out to be 0.15 mm smaller than designed, and the hole diameter for the element is not nicely round and up to 0.2 mm too small. A small edge remained on a bevel.

If one sample is printed, the design could be adjusted accordingly, after which new printings will hopefully be good. In case of printing with other materials, dimensions could differ a bit. Tolerances will always exist, also with the boom itself.

Because the element holder is not massive, the weight is very low.



An other design of 3D printed element holders (with the elements too close to the boom?) and a prepared (deformed) element

The flexibility of the PLA material turned out to be fine for clicking onto the boom, despite the fact that it feels quite hard.

The element holder can still slide on the boom, so a self-tapping screw is needed to prevent that. That's where the hole is for.

Well, then perhaps the whole clicking thing could just as well have been omitted and a self-tapping screw could have been screwed into the boom from above...

Future design?

Thinking further about a next design: maybe adding a small bump in the corner that clamps around the boom. The idea is to make corresponding notches in the boom at the element positions with only a few strokes with a file. It should prevent shifting on the boom once the element holders are clicked at that position. That would omit drilling holes.

Or the boom completely clamped with the element holder by a screw? Then no machining of the boom is needed. Everything is possible, you just need to have the imagination and be able to translate it into a design.

Where to print?

To find companies that could print your design, you only need to consult your search engine.

Just select 'export' in Tinkercad to download the .stl file and upload it to such a company. Then everything is calculated and often even a nice visual presentation is shown, sometimes including shadow. Of course you don't have to order the product there.

While checking more then one company you find out considerable price differences, even between volume discounts. Local pickup saves on shipping costs in any case.

Since 3D printers have been purchased by many hobbyists, there is a good chance that there is someone in the immediate vicinity who can print them for you much cheaper. Just ask around. Maybe they are even happy to put their printer to work.

Fastening of the elements.

This element holder is designed for elements with a thickness of 2.4 mm but it depends of course on what you have laying around or what you could get.

For fastening of the elements they are slightly flattened/ deformed in the middle (with a hammer or vice). Then they can be forced in place in the element holder. They clamp well in the plastic and do not shift.

Anyway, it was interesting playing with this tool to challenge the brain with spatial insight.

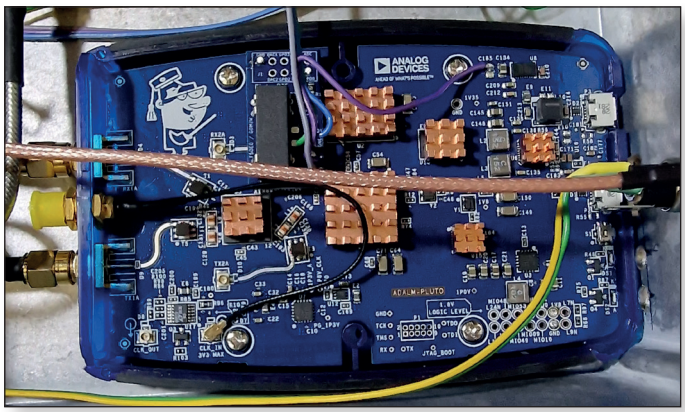
If you are more familiar with designs for 3D printers you likely find several objects that you need that could be printed.

Adalm Pluto PTT Control

Brian Shaw G6HFS

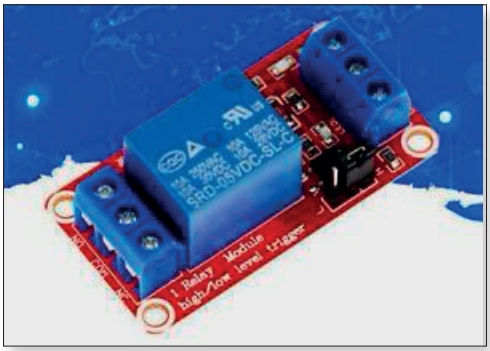


I decided to add the BATC Adalm Pluto low profile relay board to my system,



https://batc.org.uk/shop/pluto-ptt-output-driver-pcb-2/

After obtaining all the parts, building the board and installing into my Pluto all worked, my DATV 13/23cm tx unit, consists of the Pluto, rf switch, 13cm, 23cm preamps, variable attenuator and two 3.5mm mono jack sockets for ptt.



Each main rf amplifier has a high current relay control board fitted to switch its bias on/off.

There are four switches in total controlling ptt, auto/off/man, in auto mode ptt is controlled by the pluto, off is no control from pluto and manual is user control, this is handy if you use the pluto for ssb and to switch on an amps bias.

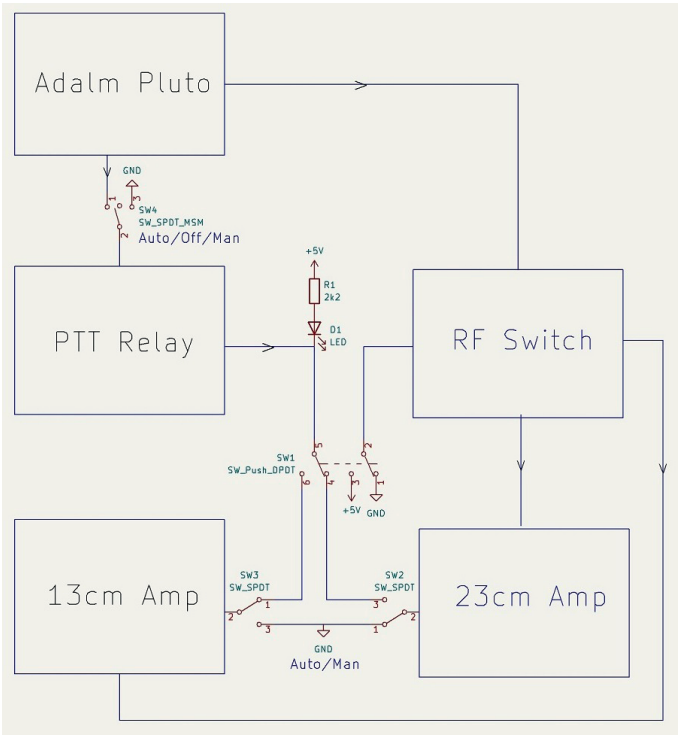
SW1 rf switch and ptt jack

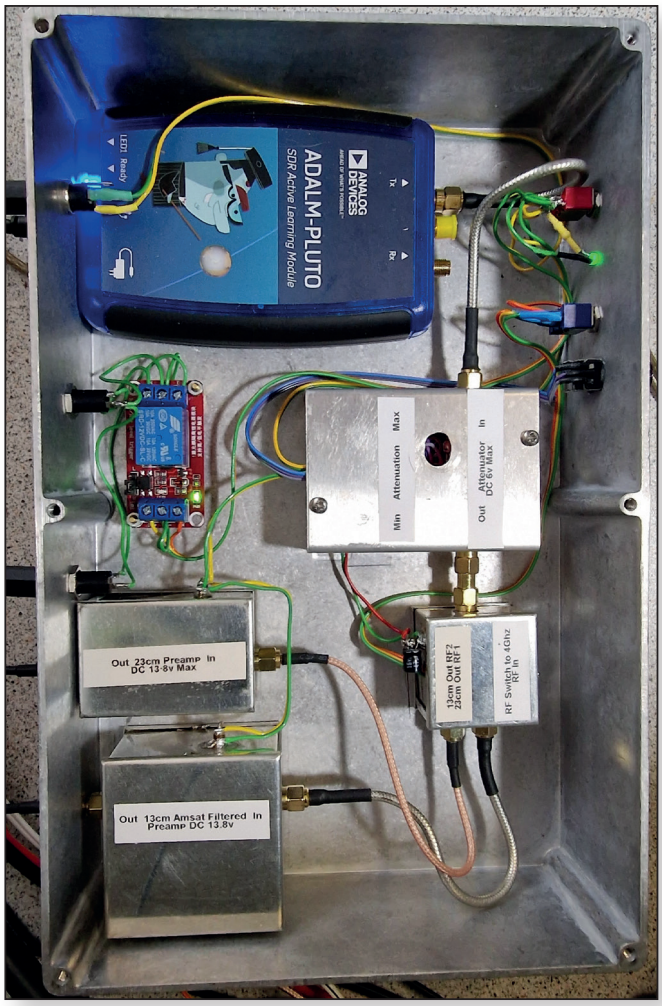
SW2 23cm amp Auto/Man

SW3 13cm amp Auto/Man

SW4 Pluto ptt Auto/Off/Man

D1 led ptt on







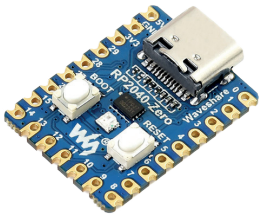
YASS – Yet another signal source

Gareth G4XAT

What fascinates me about the hobby of amateur radio is just how much there is to experiment with and progress our capabilities. Electronics has fascinated me since my first crystal set and the advances during my lifetime have kept me captivated. From LEDs, through the first LSI chips, CMOS, through to where we are now. I've always enjoyed the building and experimenting side of the hobby, initially VHF (as a G6) and then HF once I gained my G4. When I retired (7 years ago now) it coincided with the arrival of the Portsdown 2018 and so my journey into DATV (now that it was significantly more affordable than early digital) began. The more I built the more I found out and the broader my ambitions became – especially in getting going on the higher microwave bands. This has been helped by the availability of some excellent surplus commercial gear, notable 13cm (QO-100 PAs) and for 10 and 24GHz. It's probably best if I don't add up what I've spent over the years with the well-known Polish eBay seller…

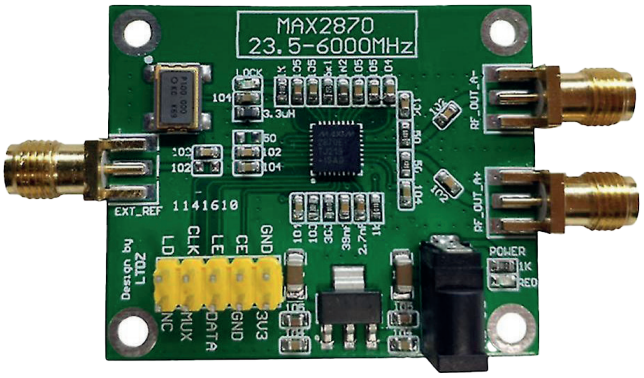
Part of that journey involved using the same gear for narrow band microwave contacts, themselves often the precursor to trying DATV over the same path. Inevitable, having the time to attend the various microwave round tables leads to more bargains and very often interesting and informative talks. This is exactly what happened at the recent Crawley Microwave round table.

Colin, G4EML, (he of Langstone and Picotuner fame) gave a talk about his work with the recently released RP2040-Zero board. This tiny PCB uses the same chip as the RPi Pico which we have already benefitted from in the excellent Picotuner.



The difference is it's available from AliExpress at around £1.50. Colin explained that he had developed a universal piece of software to control three of the popular Fractional N synthesiser chips, all conveniently available from the usual sources. It currently supports three different type of synthesiser chip, the ADF4351, the Max2870 and the LMX2595.

Having used quite a number of ADF4351's in my various microwave projects, I thought I'd try the slightly better spec Max2870, not least it covers both lower and higher frequencies (up to 6GHz) than the ADF4351. One was ordered from AliExpress (whose service is really very good indeed, the development board arrived in 7 days with regular tracking updates) along with six RP2040-Zeros. Why six – well with free shipping and at under £1.50 each I'm sure they will get used. All the info you need is available on Colin's Github page which gives comprehensive instructions and information for the adventurous, see it all at *https://github.com/g4eml/RP2040_Synth*.



Wiring up the RP2040 to my MAX2870 was simply a matter of connecting Gnd and +3.3V plus the CE, MUX,LE, CLK and DAT pins to the RP2040-Zero board. As per the Picotuner, programming the Zero involves the same simple process of dropping the required file into the Zero drive. If you want multiple frequencies there is the option of connecting a BCD switch to spare I/O which will allow you to select one of 10 pre-sets.

Control of the many options is via your favourite serial terminal on your computer, I use Putty as it has always 'just worked' for me. GPS time-sync can also be added by connecting the cheap Neo-6 GPS receiver. This is needed if you want to try the various JT data modes (for e.g. beacon ID strings) that the software also offers.

Colin mentioned that this work is very much 'early days' and that further developments will no doubt come forth.

I can see having a simple 2 or 4 line LCD and some push-buttons could easily make the unit nicely portable. If the Portsdown4 has any spare screen-buttons left maybe it could be expanded to include the MAX2870 and maybe the rather nice (but expensive) LMX2595.

Turning Back the Pages

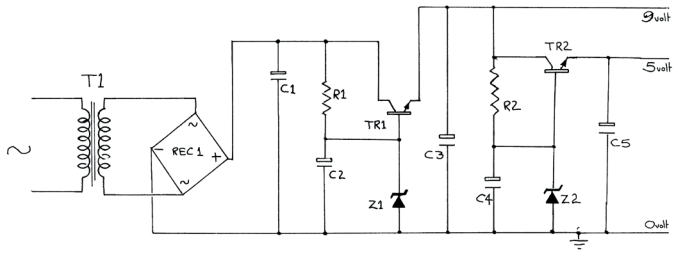
A dip into the archives of CQ-TV, looking at the issue of 48 years ago

Peter Delaney - G8KZG

CQ-TV 96

Although CQ-TV largely considers the technical and operating aspects of amateur television, other topics are covered from time to time, and amongst the articles in CQ-TV 96 was one by G3LPB (J Brown, although his name did not appear alongside the article) entitled "The Artistic Side". He commented that "Many of us see presentations both live and recorded that look professional; this is thanks to imagination and easily obtainable materials". He advocated the use of dry print lettering, such as Alfac, Blick, or Letraset, which were available in a wide range of typefaces and sizes. One suggestion was for use with flying spot scanners, with the lettering laid onto a sheet of transparent plastic that was then placed directly onto the face of a cathode ray tube. For use with cameras, the letters could be fixed to a piece of "formica or similar material". If this was the method used, then G3LPB recommended that the surface of the panel be first lightly rubbed down with a fine grade sandpaper, as this would not only help the letter transfers to adhere to the sheet, but also to stop the otherwise polished surface of the panel reflecting light into the camera lens. An alternative method for producing caption cards was to use magnetic letters and figures, which could be re-used for different occasions (contest numbers for example). "For the more artistic of operators", the use of crayons or felt tip pens was a possibility, with the text etc being put onto a postcard that could be placed onto a holder in front of the camera, which would ensure that each card was the same size and in the same focal plane from the lens.
A particular card that was mentioned was one called "The Rings" - a set of concentric rings drawn with a black marker pen onto a white sheet, which "when scanned by the camera give an excellent effect", whilst "BATC have also available from the Sales Dept a very excellent test card printed on hard card. There is even a space for one to put the call sign in" (the latter, maybe, using the dry print lettering). The question of lighting was also discussed, in particular that damage could be done to the camera tube by any bright light that reached the light sensitive target, whilst readers were reminded that a vidicon tube should be used in a horizontal, not vertical, position. This was because if the heater or one of the electrodes of a thermionic device (as a vidicon is) started to have a flaky surface, the particles could fall inside the tube onto the target and damage it.

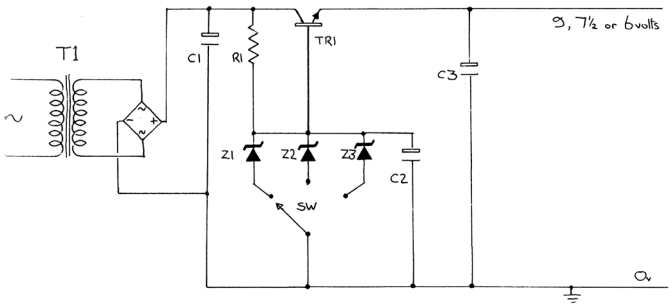
J Brown (identified by name this time) G3LPB had also contributed an article about power supplies. He observed that "from time to time the constructor needs a decent power supply", adding that "in most cases cheap components were used, all cheaper than integrated circuit regulators which are available" - admitting that he had not had much success with those.



Component values	
C1, C3, C5	2200µF 25V
C2, C4	470µF 25V
R1, R2	1k 1W
Z1	9.1V 400mW
Z2	5.1V 400mW
TR1, TR2	AD161
T1	12V secondary
REC1	4 x 1N4003 or 25V 1A bridge

The first had been designed for a specific application, (a circuit to display low definition tv on an oscilloscope), but the basic ideas would have much wider use.
It provided two fixed well-regulated voltages - at 9V for oscillator and amplifier circuits, and 5V for the integrated circuits (that being the standard for the 74xx series of logic devices commonly used at the time). "Even on long runs of many hours, the output voltages have never been known to vary", the author said.

Component values	
C1, C3	2200µF 25V
C2	470µF 25V
R1	1k 1W
Z1	6.0V 400mW
Z2	7.5V 400mW
Z3	9.1V 400mW
TR1	AD161
T1	12V secondary
REC1	4 x 1N4003 or 25V 1A bridge

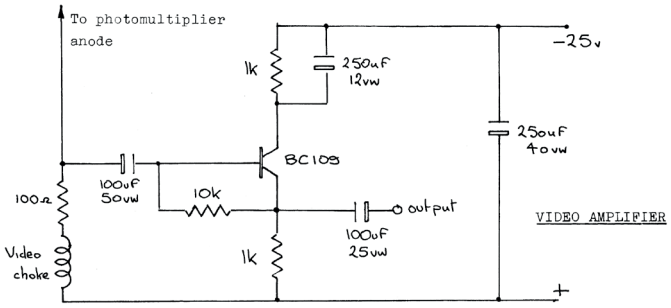


A variant of the basic circuit, enabled a range of output voltages to be available to suit cassette recorders then available.

Component values	
C1, C2	32µF 500V
C3, C5, C6, C8	2200µF 25V
C4, C7	470µF 25V
C9, C10	10,000pF 50V disc ceramic
R1, R2	470k 1W
D1, D2	1N4007
Z1	5.1V 400mW
Z2	12V 1W
TR1	AD161
TR2	2N3055
BR1. BR2	4 x 1N4003 or 25V 1A bridge

A development of the same idea was intended for powering a flying spot scanner, the upper section being needed to supply the cathode ray tube, and G3LPB commented that the "whole power unit cost less than the regulators would have cost". (The transformers were what was described as 'bits and pieces available' - which was typical of many amateur experiments in earlier times, where the proverbial 'spares box' or surplus equipment were the source of components).

Flying spot scanning featured in a couple of other articles in CQ-TV96. Cyril Chivers was pleased with the results he obtained with just a single transistor amplifier for the video signal from the photomultiplier anode, the video choke having 'as many turns as possible until you get overcorrection'.



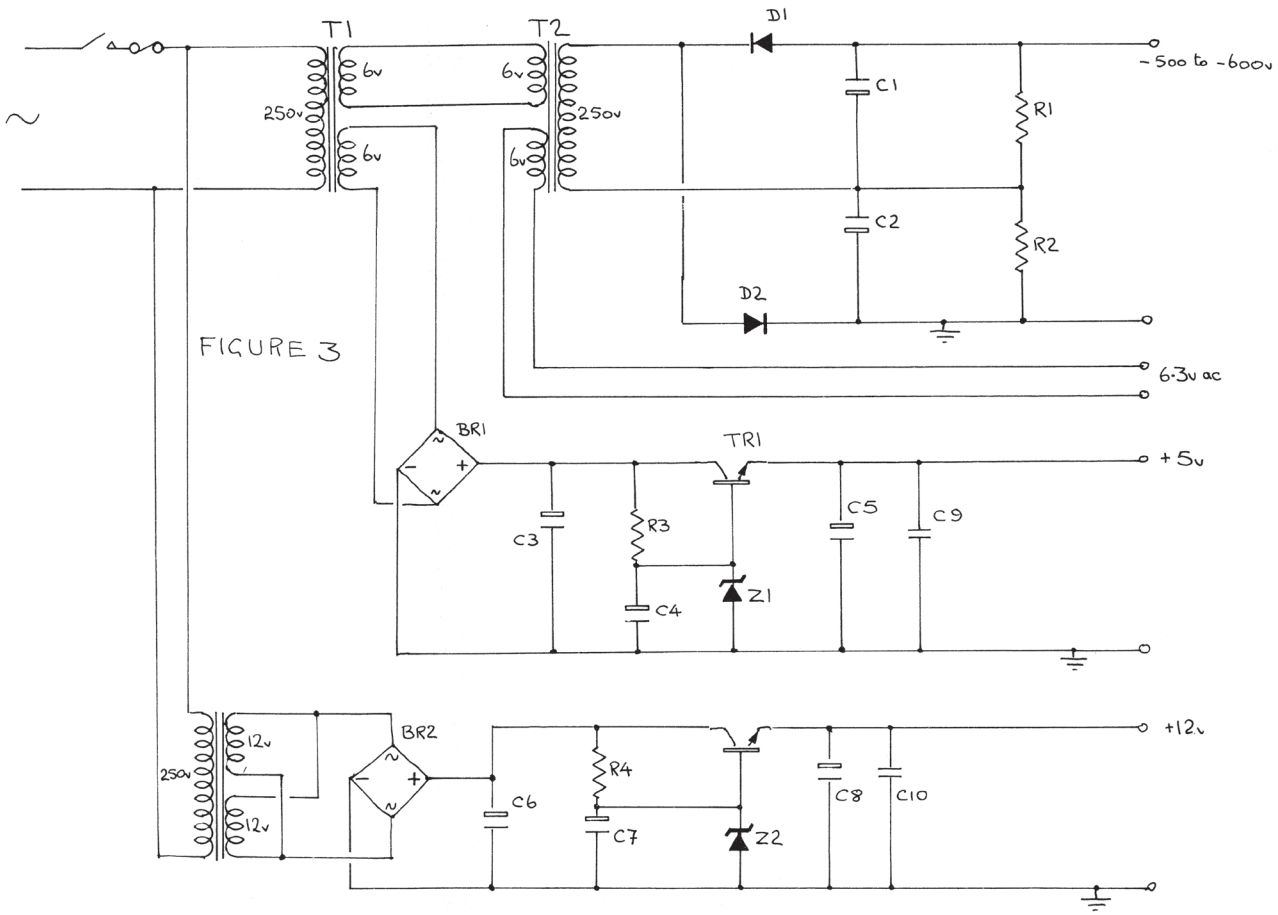
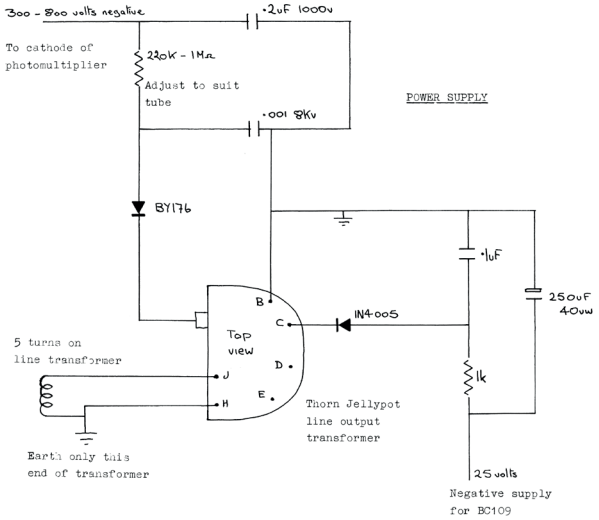


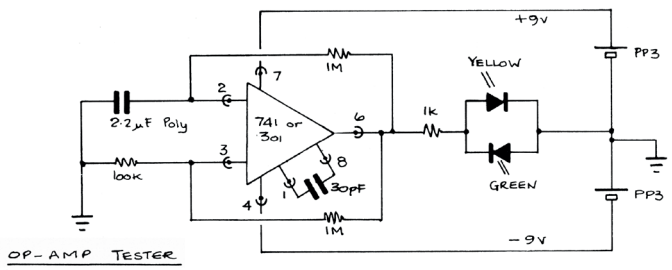
FIGURE 3

The scanning of the cathode ray tube was 'conventional'. The power supplies for the photomultiplier tube and the transistor amplifier were based on a Thorn television Jellypot line output transformer - another example of the use of components that 'happened to be available'.



Choosing a suitable cathode ray tube for use in amateur television work was not just about its physical size or electrical properties, but also the nature of the phosphor, its colour and - in particular - it's persistence. A tube best suited to a slow-scan system, for example, would have a medium to long persistence (ie the time that pixel gave out light after the scanning beam had passed), whereas for a flying spot scanner intended for fast scan tv a short persistence was better. John Lawrence, in his Circuit Notebook series, was able to provide more detailed lists of the types available - manufacturers did not have a standard method to designate such things!

The table top right was taken from data supplied by Ladislaw Vig, in Switzerland, and listed the JEDEC type numbers as used by the Westinghouse company, whilst the table below on the right was a selection of phosphor designations used by the UK manufacturer Ferranti, with the approximate JEDEC equivalents.



The other part of John's article was a circuit to test the popular 741 type of operational amplifier, or the similar 301.

Type	Color (Kelly Chart.)	Spectral Peak (Angstroms)	CIE Co-ordinates x	CIE Co-ordinates y	Persistence	Decay to 10% Brightness	Application
P1	Yellowish Green	5250	.218	.712	Medium	24 msec	General Purpose Visual Displays
P2	Yellowish Green	5350	.279	.534	Medium Short	-75µsec	Oscillography & Reduced Flicker in Console Displays
P4	White	4600 5600	.270	.300	MedShort	20 µsec 60 µsec	60 Hz. Television
P7	Blue Yellow Green	4400 5550	.151 .357	.032 .537	Med Short Long	-50µsec .35 sec	Radar & Oscillography
P11	Blue	4600	.139	.148	Med Short	-50µsec	Photographic Recording
P12	Orange	5900	.605	.394	Long	200msec	Low Frame Rate Displays
P14	Purplish Blue Yellowish Orange	4400 6000	.150 .504	.093 .443	Med Short Medium	25 µsec 5msec	Radar
P16	Bluish Purple	3800	.175	.003	Very Short	12µsec	Flying Spot Scanners & U V Recording
P19	Orange	5900	.572	.422	Long	220msec	Radar
P20	Yellow Green	5600	.426	.546	Med Short	-.2msec	Bright Visual Displays
P24	Green	5100	.245	.441	Short	-1.5µsec	Color Flying Spot Scanners
P25	Orange	6100	.557	.430	Medium	45 Msec	Radar
P26	Orange	5950	.582	.416	Very Long	-10 sec	Radar
P27	Reddish Orange	6350	.674	.326	Medium	27msec	Night Vision Displays
P28	Yellow Green	5500	.370	.540	Long	-.5sec	Reduced Flicker Console Displays
P31	Green	5200	.193	.420	Medium Short	40µsec	Bright Visual Displays & Oscillography
P33	Orange	5875	.559	.440	Very Long	-10 sec	Radar
P36	Yellow Green	5500	.400	.543	Very Short	.25µsec	Flying Spot Scanners
P37	Blue	4700	.143	.208	Very Short	.15µsec	Flying Spot Scanners Photographic Recording
P38	Orange	6000	.561	.437	Very Long	1 sec	Low Frame Rate Displays
P39	Yellowish Green	5250	.223	.698	Long	150msec	Medium Frame Rate Displays & Radar
P40	White	4400 5500	.276	.311	Med Short Long	150µsec -.5 sec	Reduced Flicker Console Displays

Ferranti Cathode Ray Tube Phosphors (Abridged list)

Ferranti	Nearest JEDEC	Application
A	P24	Blue/Green. Suitable for flying spot scanner applications, particularly colour.
H	P26	Orange. Suitable for long range radar applications.
J	P 7	Blue flash and orange persistence, suitable for general purpose radar and oscilloscopes.
K8	P39	Green anti-flicker phosphor which is more burn resistant than fluoride phosphors. It has a critical fusion frequency between 20 & 30 HZ dependant upon the application and is suitable for computor generated displays.
L	P33	Orange. Suitable for medium range radar applications.
M	P25	Orange. Burn resistant, suitable for marine radar applications.
P	P11	High efficiency blue phosphor which is suitable for photographic displays.
Q	P16	Blue/Violet, has very short persistence and is suitable for flying spot scanners.
S	P31	Green, has high visual efficiency.
T	P 4	White for television displays.
V	P20	Yellow/Green, suitable for high brightness visual displays.

If the device was working properly, the two LEDs would flash alternately with a 1 second on period, but if neither LED lit, there was a fault in the 741 output, whilst if one LED was lit all the time, there was likely to be a fault at one of the inputs, and if the LEDs flashed asymmetrically, it indicated that the input leakage currents were unequal.



The RF aspect of the hobby was not forgotten, with the test card of G6ACR/T in Solihull as received by G6AHT/T some 45km away near Northampton adorning the front cover. In his 'On the Air' column, though, G6AHT/T remarked that activity had been somewhat quiet during the summer, as 'who can blame anyone for not wanting to spend the evening in the shack when the temperature outside is in the 80s, especially those with large afterburners that emit almost as much heat as an electric fire?" John did add, though, that contrary to the impression some people had, it was not necessary to have a high output power to transmit tv - although such might be needed to for the receiving station to have noise-free pictures over a long-distance path, mentioning a station who was 25 miles away, but not line of sight, and who had just 500 mW of peak power.

A service provided by the Club was the supply of vidicon camera tubes to members building their own camera. These were of 'amateur grade' supplied by either EMI or English Electric, and were new working devices that were might be slightly out of the published specification. The standard 1" or 2/3" diameter vidicons cost about £11 at that time, but an announcement was made in the magazine that EMI were offering the 9777 type Ebitron tube to members at £28 each. These were based on a ½" vidicon, which could be operated using the 2/3" scan coils already available through the Club Sales. The Ebitron, however, was a low light type of camera tube, having an image intensifier section at the front, and capable of working with light levels down to 'half-moonlight'.

CAT24 Part II

Saturday 26th October.

This is an on-line 'get together' which will be streamed via Zoom. The stream will commence at around 09:45 BST with presentations starting from 10:00 BST.

- **10:00 – Dave, G8GKQ**. Latest Portsdown developments
- **11:00 – Michael, EA7KIR**. Demonstrating his DATV transmitter and receiver
- **13:00 – Tom, ZR6TG**. Update on his well-known Open Tuner software
- **14:00 – Noel, G8GTZ**. Up to date news on HamTV and how to receive ATV from the ISS.

There will be Q&A sessions after each talk so timings are flexible. A more precise running order, along with Zoom sign-in details will appear on the BATC forum shortly.

The British Amateur Television Club

Out and About

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

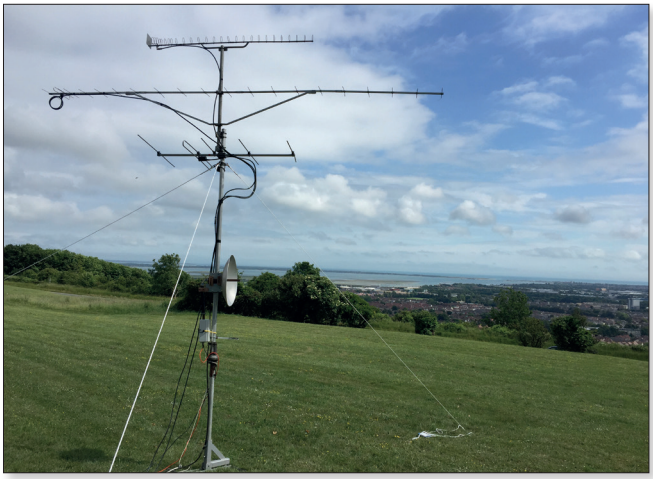
27/28 September	Newark Hamfest
11/13 October	RSGB Convention Milton Keynes
13 October	Hornsea ARC rally (No shop)
26 October	BATC CAT 24 part two (online)
November	CATS bazaar
December	Midland MRT

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

2024 Activity/Contest Weekends:

5/6 October	70cm
2/3 November	2m, 4m and 6m
6/7 December	All bands

BATC Online

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



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