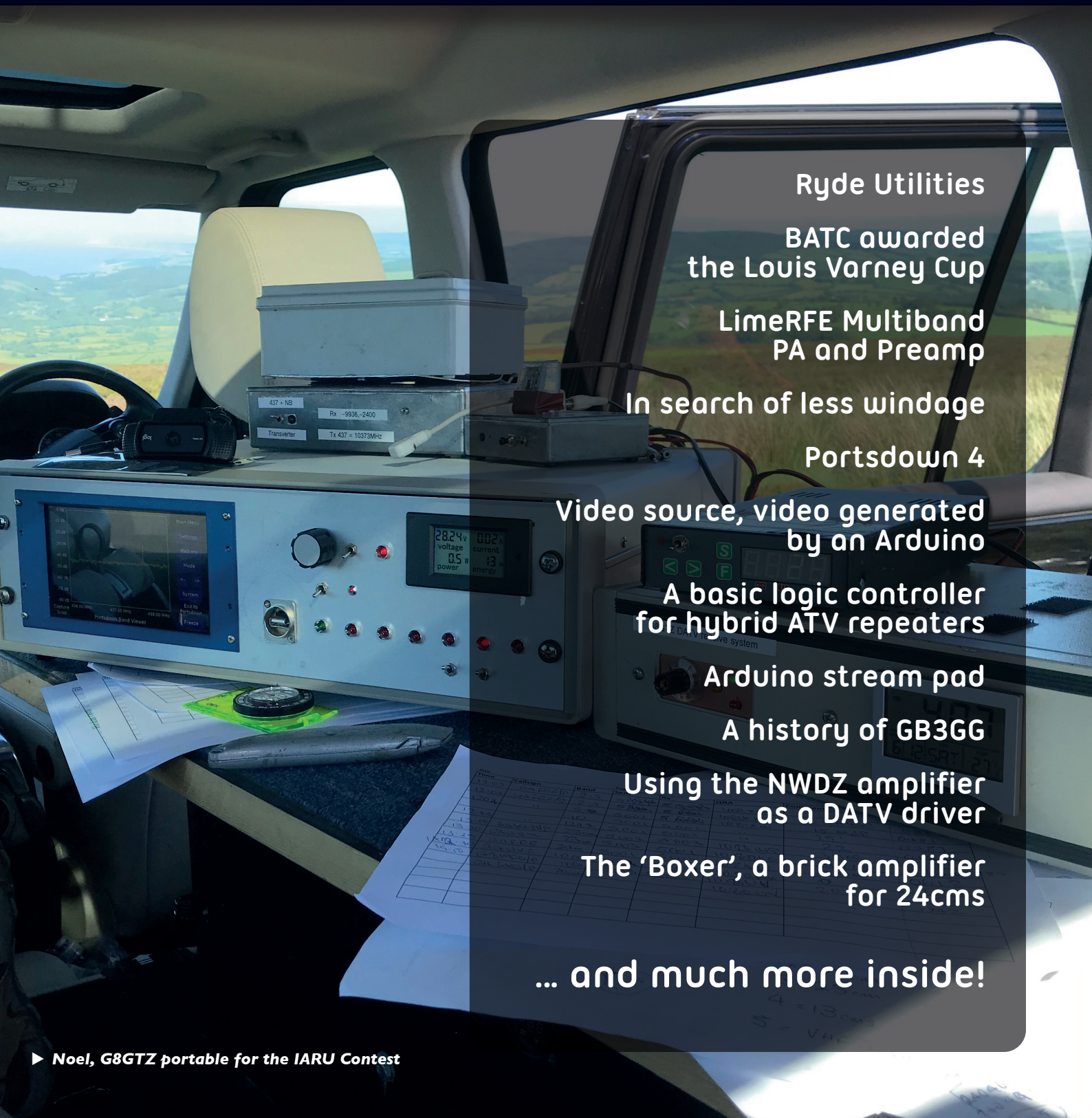
The British Amateur Television Club

CQ-TV

No. 272 – Summer 2021



Ryde Utilities

BATC awarded the Louis Varney Cup

LimeRFE Multiband PA and Preamp

In search of less windage

Portsdown 4

Video source, video generated by an Arduino

A basic logic controller for hybrid ATV repeaters

Arduino stream pad

A history of GB3GG

Using the NWDZ amplifier as a DATV driver

The 'Boxer', a brick amplifier for 24cms

... and much more inside!

► *Noel, G8GTZ portable for the IARU Contest*

CQ-TV 272

Contents:

Contributions

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

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

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

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

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

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

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

BATC

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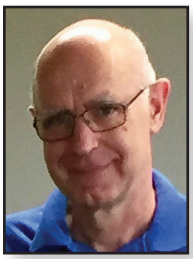


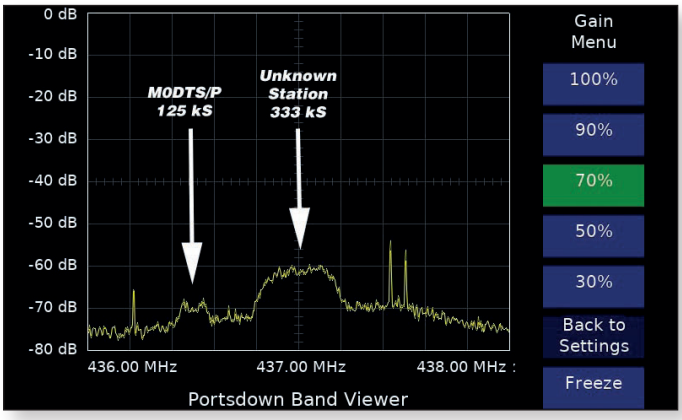
From the Chairman...

Dave Crump G8GKQ

I'm still recovering from a busy, but extremely rewarding, ATV contest weekend. Personally, I made more contacts than during any previous contest and the activity levels seemed to be high. Thanks to all of you who made the effort to get on the air; I know that there was ATV activity on every band from 146 MHz to 76 GHz, which is pretty impressive.

After a couple of years of optimising everything for the QO-100 satellite (especially during lockdown), the contest gave many stations the incentive to work on their terrestrial systems. Just as QO-100 has taught us a lot about low signal-to-noise DVB-S2, there is much still to learn about DVB-S2 (and reduced-bandwidth DVB-T) for terrestrial paths.

The Portsdown BandViewer gave many of us a view of 70 cms (and the other bands) and is similar to the QO-100 wideband spectrum monitor during the contest. Not only was it useful to see signals that were (or were not) present, it also provided an insight into what propagation was doing to those signals.



I would encourage all of you experimenting with DVB on the terrestrial bands to look at the BandViewer if you have the equipment. You'll learn a lot – my reception of Rob, M0DTS, at 420 km would not have happened without it.

The peak for the Sporadic-E should be approaching as this CQ-TV is published. Who will be first to use DATV on 50 MHz for a long distance contact? Post on the forum if you want to set up some skeds.

A small number of volunteers (including the committee) devote a lot of time to the BATC, and in many cases build multiple prototypes of the club's projects at their own expense. In recognition of this, the BATC committee have decided to offer them a 15% discount on BATC shop purchases. The volunteer list is maintained by the shop manager and reviewed annually. Currently there are fewer than 10 on the list, but we would be happy to add anyone who makes a significant contribution.

There have been a few incidents of technical abuse (usage of dangerous power levels) on the QO-100 transponder recently. We do not believe that the culprits are BATC members, but if you have any information about how we might prevent future incidents, please contact *office@amsat-dl.org* .

We are still hoping to run CAT 21 in some shape or form at the Midland Air Museum in Coventry on 21/22 August, however, we have decided to postpone the BGM until we can conduct it in a format that everybody feels safe with.

Putting more than 30 of us in a small meeting room does not seem like a good idea at the moment. Please keep an eye on the BATC forum for the latest updates.

▶ *G8GKQ/P at Okeford Hill during the IARU Contest*

The Listing

new and renewing members

Rob Burn G8NXG

Well, here we are again! Before I outline the parameters of this current list a postscript about my advice to do with checking your spam folder from time to time. I use the Thunderbird mail application and recently discovered that incoming spam is not necessarily flagged as arrived; in fact it appears that it is not downloaded until you check the folder. I have no idea if this is a recent change in the program as earlier iterations certainly did gather spam into the appropriate folder and flagged the fact that it was available to check. In common with many people I do make use of multiple e-mail addresses for different purposes so this recent change came as a surprise as I do not think to check each one!

Anyway, I thought that this is worth passing on and I have another tip to suggest. When you are issued with new log-in details please remember to key in each character individually. Why? Well if you choose to copy and paste the information into the appropriate entry boxes, you could be also pasting a space, which of course you do not see. However the computer does, so your new username or password will appear not to work!

As regular readers will know, this new and renewing member list appears in each edition of CQ-TV. For the benefit of new members I just need to reiterate advice given before: it will only relate to three months worth of member details; for this edition only those members who have renewed or joined during the three months to 31st May, in line with the publication cycle of CQ-TV. Additionally, you will not see your details again until you renew next time.

Finally, a word about e-mail addresses. For obvious reasons it is important that you keep the e-mail address registered with the BATC up to date. In common with many (perhaps most?) organisations these days your e-mail address is the main point of contact with you and we would not necessarily be aware if your e-mail fell out of date unless you advise us. Finding that we cannot advise when a new edition of CQ-TV is available is often too late!

That's it for now. Please let me know if you find any errors or if you happen to prefer not seeing your details published. Thanks to all new members and those who continue to support the club.

Australia		
Joe Pereira	VK5EI	Adelaide
Paul Hadlow	VK2PNH	Balranald
Ross Pittard	VK3CE	Bendigo
Richard Carden	VK4XRL	Brisbane
Peter Sturt	VK2ZTV	Cardiff Heights
Neil Muscat	VK3BCU	Delahey
Dale Hughes	VK1DSH	Flynn
Andrew Wollin	VK4ZXI	Highland Park
Martin Diggens	VK6MJ	Meadow Springs
Adrian Booth	VK2JBX	North Nowra
Peter Schrader	VK4EA	Northgate
Wayne Stringer	VK5BI	Seaton
Geoff Taurins	VK3GE	Toolern Vale
Austria		
Andreas Neubauer	OE3DNA	Amstetten
Robert Kiendl	OE6RKE	Deutschlandsberg
Josef Donschachner	OE3JDA	Oed-Oehling
Heinz Meschnark	OE8MEQ	St Stefan
Belgium		
Tim Schmitz	ON8TT	Herk-de-Stad
Geert Cruypelants	ON5AAS	Hombeek
Raphaël Ghislain	ON3GE	La Hestre
Krist Perneel	ON4API	Roeselare
Thierry Wiame	ON4LTW	Temploux
Vandewalle Yves	ON4YV	Vilvoorde
Canada		
Martin Bruchanov		Halifax
Dave Cahill		Surrey
Denmark		
Ole Nykjær	OZ2OE	Horsens
Patrice Boyer	F1NSU	Aulnay Sous Bois
Eric Vacassoulis	F6FLQ	Beaumont les Valence
Francis Picq	F6DES	Breugnon
Alain Fort	F1CJN	Carrieres Sur Seine
Yves Petit	F4HSL	Courseulles sur mer
Bernard Calmels	F1NST	Dauphin
Patrick Jacquemin	F6EXX	Dijon
Jean Louis Barthel	F5AJJ	Dijon
Philippe Cavazza	F4BRC	Drancy
Teodor Gradinariu	F5VMH	Dreux
Azais Didier	F6EAJ	Epinouze

Auvray Michel	F1ETU	Izy
Paul-André Schmid	F4WAG	La Roche sur le Buis
Dominique Metayer	F1EJP	Le Grand Quevilly
Bastrios Jean	F1AYJ	Limas
Keller Denis	F6GXI	Marseille
Roland Etienne	F8CHK	Pabu
Joël Kaiser	F1JMJ	Petite-Rosselle
Bricout Dany	F5IDK	Recquignies
Pierre Marie Gayral	F5XG	Rurange Les Thionville
Claudy Benard	F1EOF	Saint Valery en Caux
Patrick Samson	F6GWE	Sainte-maxime
Radioclub de Valenciennes	F6KJU	Valenciennes
Jean-Marie Vallet	F6HBW	Veretz
Jean Claude Darge	F1HGJ	Veules les roses
Germany		
Josef Grimm	DJ 6 PI	Augsburg
Frank Hägerling	DO3FRH	Bergkamen
Rudolf Pfeiffer	DJ3DY	Bochum
Ralf Crüsemann	DL4DAE	Bochum Eppendorf
Walter Plaschke	DB2BG	Bremen
Mike Rupprecht	DK3WN	Brombachtal
Ferdinand Schmehr	DC8EC	Brunnthal
Ralph Mundt	DG4LX	Stuhr
Kaspritzki Hans	DG1HTS	Dessau- Roßlau
Winfrid Flöter	DL3HQD	Dessau-Rosslau
Andreas Bittner	DG6FFD	Immenhausen
Hans-Joachim Faber	DC7UG	Jever
Burak Özhan	DL7BUR	Köln / Cologne
Guenther Borchert	DF5FC	Lautert
Dietmar Austermuhl	DL1ZAX	Lohfelden
Wolfgang Lux	DL8BBC	Lohne
Hans-Walter Peters	DC5EO	Mönchengladbch
Ian Spencer	G3ULO	Much
Hans-Gerhard Hass	DC8UE	Norderstedt
Gert Weinhold	DG8EB	Oelsnitz
Thomas Meyer	DL6YEA	Oetzen
Erich Jankow	DL6ZEW	Oschersleben (Bode)
Robert Knoblach	DD4YR	Penzberg
Achim Kruck	DL3SFQ	Pfedelbach
Andreas Foellmer	DL1AF	Roedinghausen
Peter Quidde	DG2AAO	Salzgitter
Andreas Preuss	DL5APR	Selm
Falko Troll	DG2TF	Staßfurt OT Rathmannsdorf
Per Malmbak	DC3ZB	Taunusstein
Guenter Bauer	DK9CL	Waldmuenchen
Carsten Möller	DM4CM	Wartenberg
Axel Bitsch	DG1DAV	Wesel
Frank Panser	DD0CW	Wildeck
Hungary		
Lajos Keri	HG1DFL	Gyor
India		
Peter Jacob	VU2BCM	Palakkad
Ireland		
Tony Baldwin	EI8JK	Bantry
Michael Wright	EI2DJ	Dublin 13
Stephen Ormondroyd	EI4KM	New Ross
Italy		
Ottorino Odoardi	IZ6BMP	Alanno Stazione
Mario Armando Natali	I0NAA	Assisi
Alessandro Salvatico	I2SVA	Brunate
Accomazzo Gian Marco	IW1ECD	Grava (Alluvioni Piovera)
Cristian Sandri	IW3IAA	Sedico
Japan		
Satoshi Yasuda	7M3TJZ	Sayama
Luxembourg		
Jean Weber	LX1WJ	Huncherange
Montenegro		
Dragan Milosevic	4O6DM	Podgorica
Netherlands		
Ton Willemsen	PA3BBY	Alkmaar
Rens Dijkshoorn	PA3AXA	Almrere
Jack Hoogewerff	PA3AXO	Bosschenhoofd
Harry Paas	PA1AS	Brunssum
Martin Struijs	PE3MST	Burgum
Jeroen Bastemeijer	PE1RGE	Delft
Hans Gerritsen	PH4ANS	Deventer
Hans Baard	PE1NKP	Ede
Han Van loenhout	ON4MM	Eersel
Marco Geels	PE1BR	Enschede
OJM Baken	PE1PMD	Grou
Frank de Wilde	PH2M	Hazerswoude-Dorp
Gerrit Nieuwpoort	PD0RZJ	Hillegom
PJ. Halfweeg	PA0VAB	Hippolytushoef
Ramon Hoffman	PA3CX	Julianadorp
Benno Plantagie	PA3FBX	Nijeveen
Dustin Snijders	PE1OZS	Pijnacker
Wim Meijerink	PA4EVR	Rijswijk ZH
Koert Wilmink	PA1KW	Uithoorn

David Roosendaal	PE1MUD	Utrecht
Portugal		
Carlos Abrunheiro	CT1XC	Coimbra
Jorge Amarante	CT1XV	Parede
Romania		
Dan Robu		Brasov
Slovenia		
Andrej Medved	S57NML	Lasko
Bojan Majhenic	S52ME	Maribor
South Africa		
Charles le Roux	ZS1CF	Langebaan
Ronald Verweerdt	ZS6RVC	Northcliff
Sweden		
Jan-Olov Gråsten	SM0VPJ	Sollentuna
Spain		
Francisco Haro	EA7GLU	Almeria
Benjamin Piñol	EA3XU	Barcelona
Pablo Cruz corona	EA8HZ	El Rosario
Blas Cantero	EA7GIB	Sevilla
Jose Maria Gomez-Salazar	EA2AA	Urduliz
Switzerland		
Christoph Joos	HB9HAL	Domat/Ems
Thailand		
Tanan Rangseeprom	HS1JAN	Bangkok
UK		
John Morris	G6PEP	Abingdon
Tim Keep	M0KEP	Abingdon
Peter Wright	G8GYS	Andover
Mike Berry	G1LWX	Ashton-in-Makerfield
Joe Bingham	GI4TAJ	Ballyclare
Chris Cole	G8FIG	Beaconsfield
Mark Jones	G0MGX	Belper
Graham Perry	G0GEP	Birmingham
Ian Gordon	G8IFT	Birmingham
Keith Holland	G3MCD	Bodmin
Joe Peerless	G3JPJ	Borehamwood
Colin Watts	G4KLB	Bournemouth
Daniel Endean	M0IFB	Brackley
Elliot Riddle	M0JBY	Braintree
Martin Newell	G8KOE	Bridgwater
Stuart Richardson	G8XXG	Bristol
David Stone	G8FNR	Bristol
Gareth Evans	G4XAT	Bromley
Art Smyth	G3XNE	Bude
Steve Haseldine	G8EBM	Burton on Trent

John Marsden	G8PEF	Bury
Gary Franklin	G4GHD	Canvey Island
Terence Cross	GW4LFW	Cardiff
Martin Charman	G4FKK	Carshalton
John Houldridge	G6KYD	Chessington
Peter Day	G3PHO	Chesterfield
Peter Braidwood	M1TCP	Cirencester
David Atkinson	G8DRE	Colchester
Philip Richardson	G8MLA	Coldham
Martin Butler	G8KTX	Coventry
Brian Dinsdale	G4CJS	Cramlington
John Melton	G0ORX	Crawley
Rob Southerington	G0IOZ	Derby
Mike Stevens	G8CUL	Didcot
Graham Bailey	G1ZTJ	Dideford
Howard King	G8DXV	Doddinghurst
Graham Jefferies	M1ASR	Driffield
Mick Worsfold	G4PRJ	Eastbourne
Chris Esposito	M7BPX	Fakenham
Norfolk ARC		Great Ellingham
Tony Wilson	G6ZAC	Guildford
Leslie Dodd	G7VTC	Hallaze
SPARC Radio Club		Hamilton
David Warwick	G4EEV	Harrogate
Bob Barnes	G4BGQ	Harrowbarrow
Raymond Brooks	G8KPS	Hook
Raymond Newsome	G1MSD	Huddersfield
Bob McDermott	G6TDR	Ilkley
George Brutnall	G4PAV	Irchester
James Marston	G1JSP	Kettering
Peter Elms	G0IJU	Kings Lynn
Nigel Booth	M0CVO	Kirkby in Ashfield
Graham Denton	G8VAT	Knottingley
Jeremy Harmer	M6IGP	Leeds
Barry Day	G3WIS	Leigh
Robin Ayers	G4ZWB	Leiston
Ian Hutchinson	M0LIH	Lincoln
Stephen Carey	G4MJW	Liskeard
Bernie Wright	G4HJW	Little Wilbraham
Kieran Fagan	G8CHB	London
Thanasis Tsigas	M0HXU	London
Gregory Wellington	2E1GW	London
Chris Wilson		Lower Heath
Richard Ellis		Macclesfield
Patrick White	G6CJB	Maidenhead
Andrew Thomas	G0SFJ	Market Harborough

Adrian Hope	G0ACZ	Matlock
Anthony Pearce	G0AZQ	Nafferton
Aled Jones	G0UCI	Newport
Mark Taylor	G0LGJ	Norfolk
Darrell Rose	M0XDR	Northwich
Steve Liptrott	G4EGY	Nottingham
Ed Magnuszewski	G6UAP	Nottingham
Nigel Reeve	2E0EHH	Nottingham
Stephen Catlin	G8HLM	Oakham
Greg Smith	G3UGJ	Oxford
Ian Marsh	G4EXD	Penrith
Martin Rigby	G4FUI	Penrith
Kelvin Crocker	G1ZSE	Poole
Keith Ferguson	G8ELA	Ravensden
David Blowers		Reigate
Barry Knight	G7MSC	Ripple, Nr Deal
Laurence Cook	M0LDZ	Rochdale
Ray Hill	G6TSL	Ross On Wye
Ray Burlingame-Goff	G4FON	Saffron Walden
Brian Cutts	G1FNS	Sandhurst
Nigel Smith	G4EQD	Scunthorpe
Richard Harris	M0TUW	Shepton Mallet
Richard Yarnall	M0SNR	Solihull
Keith Le Boutillier	GU6EFB	St Andrews
John Newman	G0VDU	St Austell
Stephen Thompson	G8TNA	St Austell
Andrew Ellis	M1DNS	St Stephen St Austell
Patrick Kemmis	G4MGI	Stafford
Malcolm Piper	G6UEV	Stanley
Warren Dibden	G6OXW	Stockport
Drew Belcher	G7DMO	Stourbridge
Michael Meadows	G4GUG	Stroud
Carlos Sartorius	M0HBK	Sunningdale
George Quarterman	G3NHX	Sutton
David Hazell		Swindon
Ray Gathergood	G4LUA	Tadley
David Wright	G3XOU	Tavistock
Peter Wallace	G1OAR	Telford
Martyn Vincent	G3UKV	Telford
David Fairchild	G0DDF	Torquay
Chris Pegrum	M0NAY	Tunbridge Wells
William Parker		Twickenham
Eddie Ashburner	G0EHV	Tyne And Wear
Mark Scott	G7IRN	Wadhurst
Michael Drury	2E0GMD	Watford
David Edwards	G8BFV	Wells.
Sean Finch	2E0SAF	Wigan
William Davies	G4YWD	Wirral
Tony Harris	G4SJI	Withernsea
Colin Durbridge	G4EML	Woking
Tony Kelly		
US		
Kurt Geisel	N3JTW	Bellevue
Greg Beat	W9GB	Elmhurst
August Merker	K3TAZ	Finksburg
Mike Irving	N6BYH	Fresno
Allen Vinegar	W8KHP	Hebron
Michael Warren	W6MEW	Pittsburg
Kenneth Goldstein	KD5HEH	Rio Rancho
Richard Kinne	KE1ML	Somerville
Edward Rainsberger		Woodbridge

QO-100 Transponder Availability Warning

There have been 2 recent instances of grossly excessive power being used on the uplink for the QO-100 Wideband Transponder. In at least one of these cases, valid 500 kS QPSK DVB-S2 video was transmitted, so it seems likely that the transmitting station was part of the Radio Amateur Community.

These incidents could have an effect on the future availability of the transponder. Please do everything that you can to prevent such incidents from happening again. AMSAT-DL (*office@amsat-dl.org*) are coordinating our response to these events.

AMSAT-DL

Activity and Contests

Clive Reynolds, G3GJA

May 15th & 16th All Bands Activity Weekend

The weather was appalling for that weekend and everyone rightly decided to abandon any portable operation. Its intention was to offer a test run for the International in the following month. Some stations replaced the dummy run on the 5th June with an ad-hoc event organised on the Forum.

▶ *Colin G4KLB/P enjoyed a useful outing that identified several problems*

▶ *More problems found with some solutions at Dave G4FRE/Ps operation from IO91GI*

IARU International ATV Contest 12th & 13th June

So far, nineteen logs have been received, four of which were from entrants outside of the UK. From my perspective, activity in the north-east of the UK was low with the highlight being M0DTS/P providing excellent ATV contacts on 23 and 70cm over long and very obstructive paths.

As the logs are still coming in, I have not checked to see what DX was worked but our chairman, Dave G8GKQ, worked M0DTS/P at over 400km.

It is becoming difficult to match the performance of 333kS/s DATV with usable talkback on 144MHz FM, especially if vertical omnidirectional antennas are used. Rob's DATV audio was far superior to the 2m talkback. We should make more use of the excellent *dxspot.batc.org* web, as the Dutch participants did, to get around the talkback issue.

Another issue that needs attention is the sheer amount of equipment and time required to mount a competitive multi-band station. There is a discussion on the Forum here *https://forum.batc.org.uk/viewtopic.php?f=75&t=7445* where some rule changes have been proposed that would separate VHF/UHF from Microwave operation into separate contests. Please make some time to read through the thread and then add your thoughts.

I'm hoping that some of the changes go through, so that not only is there less effort required to be competitive but also the bias to towards Microwave is removed. I think that will encourage participation by stations without Microwave equipment that are likely to be newcomers to ATV.

5.6GHz Activity Ladder

To encourage the use of cheap and readily available FM ATV equipment, developed for drone use, as an entry level introduction to microwave ATV operation, the BATC is running an operating ladder until the end of the year. It's run on the same lines as last year's Christmas and 'Lockdown' ladders. You can find details of the rules here *https://wiki.batc.org.uk/2021_5.6GHz_Activity_Ladder* and the Ladder scoreboard page is here: *https://batc.org.uk/contests/6cm-ladder*. You can register to take part and access the score entry forms from the ladder scoreboard. Good luck!

Forthcoming events

Please check the Forum here: *https://forum.batc.org.uk/viewtopic.php?f=75&t=7224* for any changes to the schedule that might happen if a later International type contest is agreed. For now, the schedule is:

Running to the ***31st December 2021*** is the 5.6GHz Ladder

July 10th and 11th is Low Bands Activity, hopefully we will catch some Sporadic E.

There are *no Activity weekends in August* due to the CAT.

September 11th - 12th 50 MHz to 1255 MHz BATC Contest. Please check Forum for details.

October 2nd - 3rd is 2.4 GHz to 76 GHz Activity Weekend

November 6th and 7th is All Bands Activity Weekend

December 24th to January 3rd 2022 is the Christmas Activity Ladder and the Repeater Activity Contest, both with online entries as last year.

Ryde update – latest news

Dave Crump G8GKQ

Although there may not appear to have been much progress on the Ryde over the past three months, Tim has now managed to integrate DVB-T reception, using the Knucker tuner, into the main menu system. There is still some more work to do implementing the display of received signal strength and quality, but initial tests of the basic concept were successful.

There has been one major change released for the DVB-S2 receiver in Ryde. The search/scan width has been reduced from about twice the symbol rate to about 0.6 times the symbol rate. This means that for a 333 kS signal, the search width is only plus and minus 200 kHz. This prevents the receiver locking onto an adjacent channel on QO-100, but does mean that the LNB frequency needs to be accurately set. You can set the LNB frequency from the SSH console menu.

BATC awarded the Louis Varney Cup for amateur TV innovation in satellite communications

I was pleased to accept the award of the Louis Varney Cup on behalf of the BATC and the amateur TV community at this year's RSGB AGM.

The award, for Advances in Space Communication, was in recognition of all the recent software and hardware development that has enabled the efficient utilisation of the wideband transponder on QO-100.

▶ *The Louis Varney Cup*

Although the projects involved were not specifically mentioned, they include: the MiniTiouner hardware and MiniTioune receive software, the Rpidatv software and the Portsdown Transmitter, the LimeSDR and Pluto DATV transmit software, the POTY dish feed, the LongMynd receive software, the Ryde and WinterHill receivers and the Quick Tune receiver controller.

The successful developments have been enabled by the Goonhilly wideband spectrum monitor and the information resources provided by the wideband chat, the BATC Forum, the BATC Wiki and CQ-TV Magazine.

The BATC shop has stocked PCBs and hard-to-get components so that home constructors could take full advantage of the new projects.

There are far too many individuals, both in the UK and abroad, who have contributed to this effort to mention them here. I would just like to extend my thanks, and those of the wider amateur TV and radio community, to all of them.

Dave, G8GKQ

Ryde Utilities

Tim Clark MW0RUD

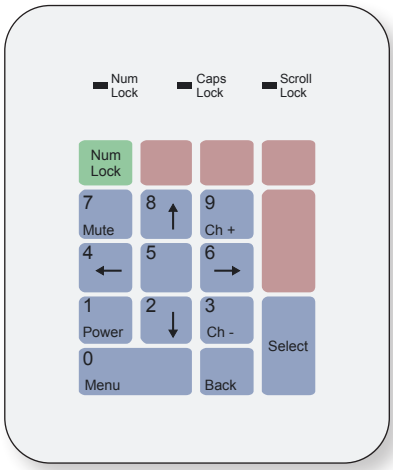
During various parts of the Ryde development I found a need for some functionality that didn't really fit well into the player itself, so I wrote some utilities to provide it instead and so Ryde Utils was born.

Ryde Network Console Handset

One of the goals of the Ryde is to be as easy as possible to get started so I am always looking for ways to move hardware from the "required" to the "highly recommended" category. While adding the network support to allow M0DTS's Quick Tune to work it was easy to add an extra endpoint that allowed buttons to be "pushed" remotely over the network.

This means building and connecting hardware to the GPIO is no longer required, although still very much recommended for everyday use. Good developer etiquette says when you add network control you should provide an example of how to use it and my example code got away from me.

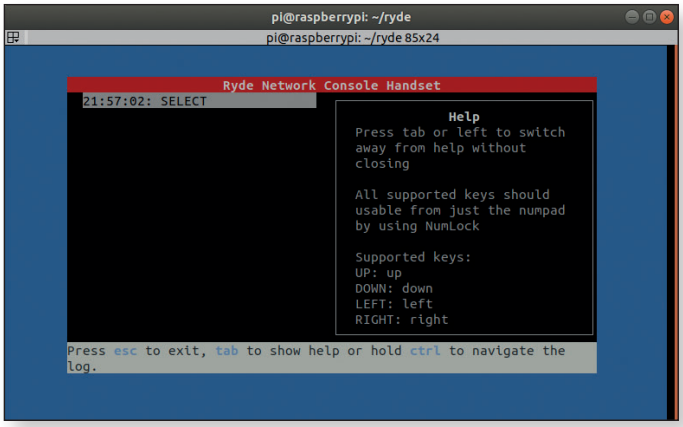
The goal was to be useful to new builders by allowing them to test before building the GPIO board as well as allowing the likes of repeater keepers to interact remotely with the receivers. All the keys used are on the numpad so a full keyboard isn't even required and are mapped to the Ryde buttons logically as far as possible with the given keys.



The utility is available from the Ryde console menu in the latest release for quick access but should be able to run on other platforms too. Once it is running, keys pressed on the numpad are sent to the Ryde, don't forget to turn numlock on for the arrow keys. Pressing tab will bring up the help including a list of which keys map to which Ryde buttons, pressing tab again will go back to button mode.

Tuner FTDI module configuration utility

As with so much development, necessity is a great motivator and the BATC Knucker recently created a need to program a different FT2232H module.



As I don't have any computers with Windows on them at home I started investigating if there were any alternatives to the FTDI-provided FT_PROG utility. What I found was the python pyftdi module which did all the hardware specific work but was lacking an easy-to-use user interface. I could have cobbled something together quickly to program the one module I needed but things got away from me again.

The idea of this utility is to identify all FTDI modules connected and allow (re)programming of known modules into the correct format for either MiniTiouner or Knucker formats.

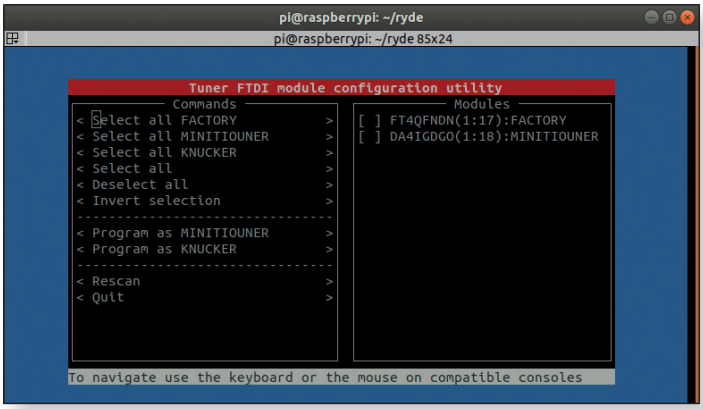
All connected modules are fingerprinted so that only the known modules can to reprogrammed to prevent breaking other devices that use the same chips. This allows programming of factory modules as well as modules already programmed as either MiniTiouner or Knucker so junk box modules can be given new life. The ability to program multiple modules at once was added to make programming all the modules for the BATC shop easier.

This utility is also available from the Ryde console menu in the latest release for quick access but should also be able to run on other platforms too. During start up the program scans and resets all the FTDI devices which will cause Ryde to lose contact with the tuner.

Once started there is the command menu on the left and the module list on the right and you can navigate both menus using the arrow keys. Modules can be selected or deselected either using the select all functions in the command menu or individually from the list and then programmed form the menu.

Manual Install

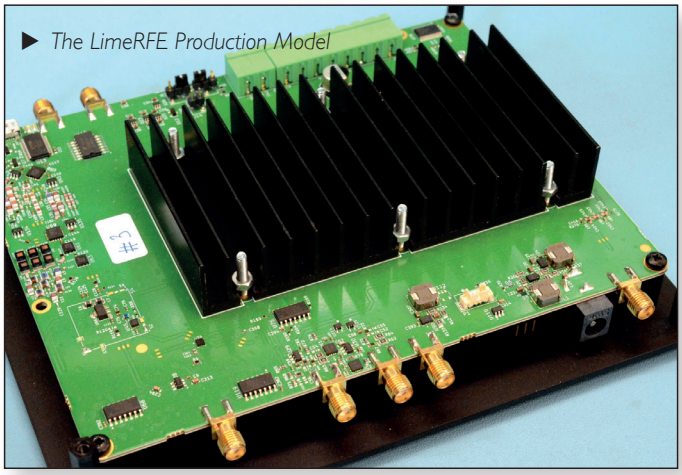
I have only tested these on the Raspberry Pi 4 but they should be fully capable of running on other systems, as long as they support Python 3 and the dependencies. Both these utilities are written in Python 3 and are available at https://github.com/eclispe/ryde-utils. Both utilities depend on urwid and ftdiconf also depends on pyftdi, both of these are available from pip.



LimeRFE Multiband PA and Preamp Supported by the Portsdown Digital TV Transmitter on the Raspberry Pi 3

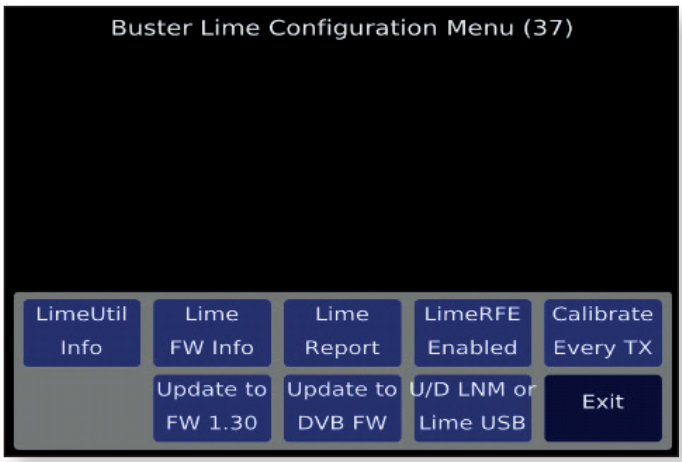
Dave Crump G8GKQ

Lime Microsystems have recently shipped the first batch of LimeRFEs. The LimeRFE is a software-controlled multi-band and wideband PA and preamp, specifically designed to work with the LimeSDR. The initial specification is on the CrowdSupply website here *https://www.crowdsupply.com/lime-micro/limerfe* but essentially it is capable of half to one watt output on all amateur bands from 1.8 MHz to 2.4 GHz and about 200 mW on 3.4 GHz. The receive preamps are matched to the requirements of the LimeSDR, but crucially, like the transmit stages, all have bandpass filtering.

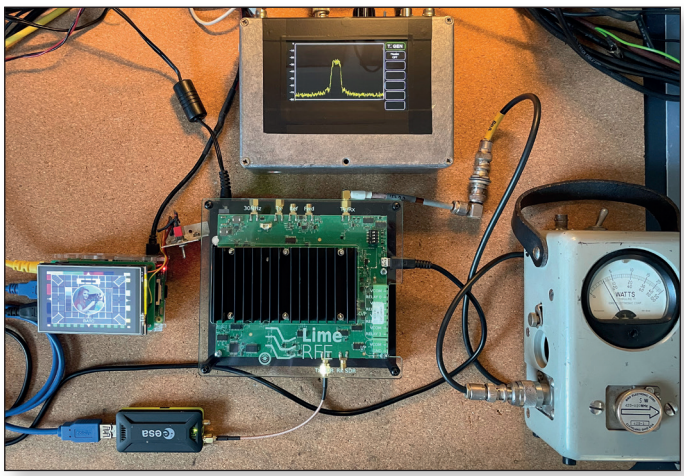


▶ *The LimeRFE Production Model*

Using an early (pre-production) prototype model I have added LimeRFE support to the Portsdown 2020 Digital ATV Transmitter (which uses a Raspberry Pi 3). The LimeRFE is controlled through a USB connection to the Portsdown, and is band-switched and PTT switched automatically. Control is currently very simple with the LimeRFE either enabled or disabled in the Lime Configuration Menu.



Using this configuration, I was able to generate half a watt of very clean DVB-S2 on 70cm (437 MHz). The shoulders were over 40 dB down at this power level. CW power obtainable was almost 2 watts. Results were similar on 146 MHz. Tests on other bands, and on the performance of the receive preamps, are ongoing.



In search of less windage

Gareth Evans G4XAT

It's interesting how things evolve – what started as a quick curious Google search suddenly became a necessity.

It probably began after seeing a picture of someone operating /P with an inverted offset dish. Of course for /P terrestrial work it would be quite difficult to angle a normal offset dish to give a signal aimed at the horizon. Inverted (or sideways) mounting solves this and Google led me to this interesting site:
http://watkin-online.com/openpage.html

Here the author detailed the required changes to set up for something like this and after trying /P operation with an offset dish on a tripod I decided that something 'ground mounted' would be a lot easier to adjust, especially for /P operation via QO-100. I tried this with a huge dish (1.5M, it only just fitted into my radio truck) in the summer of 2019 and saw my first signal through QO-100 on it.

I then cut up a pallet and mounted a 95cm dish on it in an adjustable way. This would allow for uneven terrain and not suffer from 'blown over tripod' syndrome when operating /P. I displayed it at the Didcot mini-convention in November 2019, but as it was outside and raining heavily, I don't think it was a popular exhibit.

My home based QO-100 station uses a 1.15x1.05m offset dish, previously mounted on a brick garden wall with K and T brackets but peeping up over the top of the garage roof (on a 15' piece of scaffold pipe) with a clear view of the satellite. It's also in a bit of an elevated 'alleyway' between my neighbour's house and ours. Last winter a very strong wind blew from SSW, this is a very unusual direction here.

So the wind whistled down the alleyway and met the full frontal area of my dish. If you think about the K and T brackets down below, and the scaffold pipe above, you can see there was significant leverage involved. The K bracket thought so too, and bent in a very unusual manner as a result. The dish no longer pointed at QO-100.

Fast forward to solving the problem was spurred on by a neighbour having something delivered on a nice big pallet (which I duly acquired). The dish I was hoping to mount originally came with an L shaped wall mounting plate (which did 'come in useful one day'). With a bit of angle measuring and some pieces of surplus wood, I devised a suitable mount modification, got out the angle grinder and the MiG welder and re-shaped the bracket.

Some concrete blocks were acquired from a different neighbour's skip and the assembly was duly mounted and adjusted for QO-100. Other than needing three hands (to hold/use two spanners and adjust the dish) it was a five-minute job to optimise QO-100 signals on the NB beacon.

TX capability was next so a POTY feed was mounted after a bit of minor metalwork. Being inverted the green radome doesn't need any front face (although I designed it to trap a layer of polythene when assembled – the wonders of a 3-D printer), it's just there to keep the rain out of the space between the patch and its reflector.

A 1m length of RG402 with N-type male to 90-degree SMA female completes the feed arrangements, although the 0.6dB loss it contributes is less than ideal. A PET water bottle 'shield' keeps the rain off the Bullseye LNB and will last many years even in sunshine.

The other night the wind blew again, this time however, the dish stayed put. A combination of reduced windage and a bit of shelter has worked well. It's also a lot less obvious from the road, so less likely to attract unwanted attention. My /P version is the same concept, just a smaller dish and pallet offcut, with turnbuckle adjustment of the elevation.

From mentioning this concept on the BATC forum, I have been educated about some possible pitfalls. Whilst it works nicely when using a 'designed for satellite TV' LNB (lens view matches the dish) it was pointed out to me that the POTY feed may not be quite so well matched to dish size and so may 'see' what is around the dish.

With most offset dishes tending to be vertical, this means that you would be looking mainly at the sky (i.e. cold). With my arrangement, any spillage around the edge will be looking at my 'warm' garage roof, so contributing to raised system noise. (Thanks to Mike G0MJW for the explanation).

That said, I seem to be getting similar NB SNR readings and WB beacon MER to a similar sized dish mounted more conventionally. The good news is however, despite the recent gales, my current system hasn't moved.

Every day's a school day!

Software for BATC projects

Most of the current BATC projects involve software being written and supported by volunteers. When asking for help, please remember:

- The volunteers write the software because they enjoy doing it to produce something that they want. The moment they are asked to write software for a requirement that they don't believe in, their enthusiasm starts to ebb away
- Having specified the precise hardware requirements for a project, developers are unlikely to want to modify the software just because you haven't bought the right components. However, if you can write software modifications to make additional hardware compatible, please share them so that the developer can include them in the next release
- If you ask for a new feature in software, it is more likely to be implemented if you give the developer a good idea about how it should work and why it is required. The idea is more likely to come to fruition if you can help by providing example code
- The developers are far more likely to respond to a bug report if you give them the full details of the problem and then help them with subsequent tests
- Please check the Wiki before asking questions. Our volunteers tire of answering questions that are already answered on the BATC Wiki
- If you find a useful piece of information, please add it to the Wiki. Anyone can do it

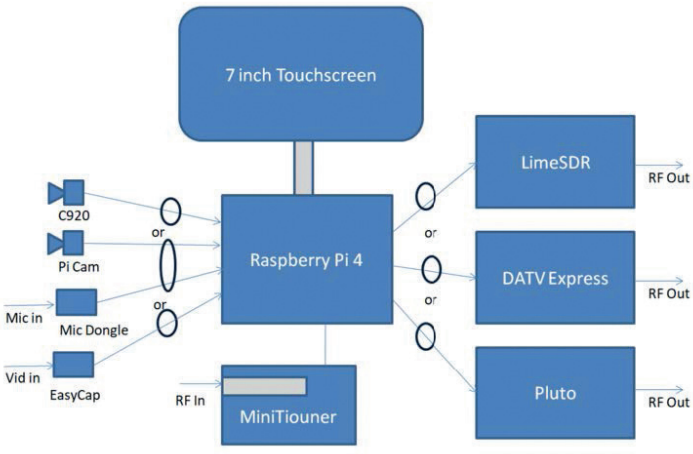
Noel, G8GTZ, showing how much kit it takes to go out portable on all bands!

Portsdown 4

Blas Cantero EA7GIB

The project of making this motherboard after some conversations Telegram Group "RADIOTRASTORNADOS" and "BLASMAKERS". Basically it is a motherboard to fix the RPi / ENCODER / POWER SUPPLY / DISPLAY / ARDUINO. To have the unit neat and clean. And as a complement to the work of ALEX EA4BFK is working on the design of the LNAs, filters and switches.

Currently I have only performed tests with PLUTO SDR.



Portsdown 4 – Simplified Block Diagram

The Portsdown 4 system has been specifically designed to be used with the Raspberry Pi 4 and the official Raspberry Pi 7 inch touchscreen.

It will drive a LimeSDR Mini, LimeSDR USB, the DATV Express board (DVB-S only) and the Pluto SDR (when loaded with, and only with, F5OEO's FIRM2101RC of 5 February 2020).

Portsdown 4 is the simplest and easiest to construct, with a barebones system consisting of:

- Raspberry Pi4 2Gb model
- 7" touch screen
- 16Gb SD card
- Adalm Pluto or Lime SDR mini

This will give you a basic DATV transmit system from 70 MHz to 3.4 GHz and, if you are using the Pluto, can be easily upgraded to include the Langstone microwave NB transceiver!

With the addition of a MiniTiouner USB receiver, you will have a full spec DATV transceiver.

Powering the Pluto

The Raspberry Pi 4 has increased power capabilities on its USB ports, and the Pluto does not work well with USB Hubs, so it is recommended that you connect the Pluto directly to a USB3 port (the blue ones) on the Raspberry Pi 4. Do not use a USB hub or power the Pluto from its USB power port.

Software

The Portsdown 4 software is available on a pre-programmed SD card from the BATC shop *https://batc.org.uk/shop/portsdown-transmitter-pre-programmed-sd-card/*

If you wish to build your own card the build is on GitHub at *https://github.com/BritishAmateurTelevisionClub/portsdown4*

You MUST start with a fresh build of Raspios Buster (NOT Raspbian) on an SD Card of 8 GB or greater, so you will need to rebuild any previous Langstone or Portsdown A27 card.

Langstone Microwave transceiver

The Portsdown 4 software build is also compatible with the Langstone Microwave transceiver software, which can be loaded from touchscreen selections (menu 2) AFTER the Portsdown software has been installed.

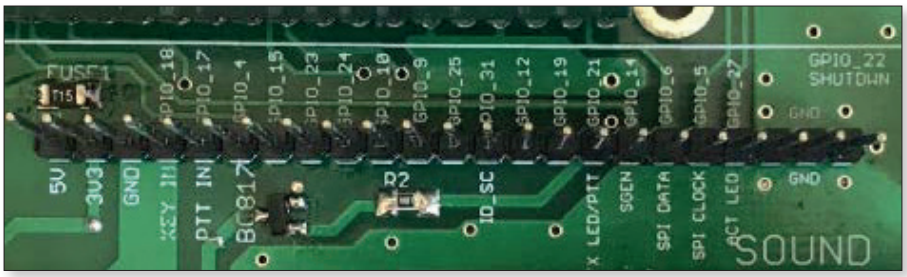
See *https://wiki.microwavers.org.uk/Langstone_Project* for more details and the full spec of the Langstone.

To operate, the Langstone software needs a Pluto to be connected by USB, and a compatible USB Audio dongle.

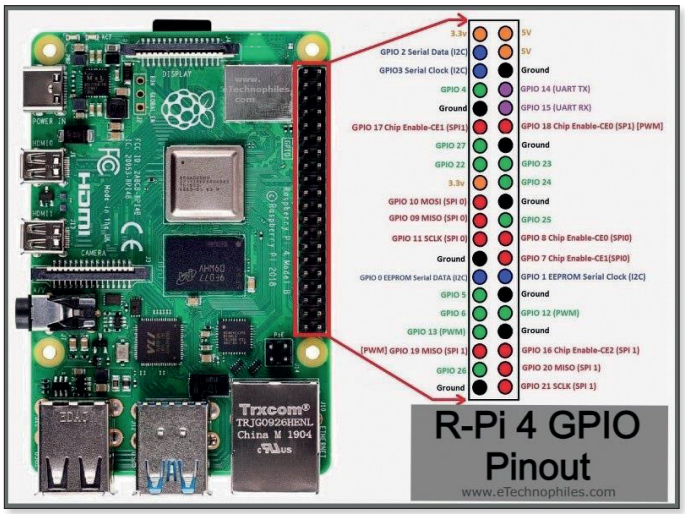
The Portsdown 4 support for the Pluto SDR is experimental at the moment and it has limited functionality as described here *https://wiki.batc.org.uk/Portsdown_4_Pluto*

List of GPIO connections

Pin No	BCM No	Wiring Pi	RPi Pri	RPi Alt0	Primary Use	Secondary Use	Notes & GPIO breakout board connections
1	-	-	3.3v	-	-	-	-
2	-	-	5v	-	-	-	-
3	2	8	GPIO 2	SDA1	-	-	-
4	-	-	5v	-	-	-	-
5	3	9	GPIO 3	SCL1	-	-	-
6	-	-	0v	-	-	-	-
7	4	7	GPIO 4	GPCLK0	Band D2 (T)	Langstone band D2	Label 7 on J07. "T" on 8 band boards
8	14	15	GPIO 14	TXD0	ADF5355 LE	Elcom & Nort SLO LE	For Sig Gen
9	-	-	0v	-	-	-	-
10	15	16	GPIO 15	RXD0	Atten LE	-	Label 10 on J07
11	17	0	GPIO 17	FL1	-	Langstone PTT Demand in	Active low
12	18	1	GPIO 18	SPI6_CE0_N	Transmit Demand	Langstone CW Key in	Label 12 on J07
13	27	2	GPIO 27	SD0_DAT3	"Active" LED	-	Active high. Label LED on J06
14	-	-	0v	-	-	-	-
15	22	3	GPIO 22	SD0_CLK	Shutdown Button	-	Active high. Label PB on J06
16	23	4	GPIO 23	SD0_CMD	-	Langstone band D4	-
17	-	-	3.3v	-	-	-	-
18	24	5	GPIO 24	SD0_DAT0	-	Langstone band D5	-
19	10	12	GPIO 10	SPI0_MOSI	-	Langstone band D6	-
20	-	-	0v	-	-	-	-
21	9	13	GPIO 9	SPI0_MISO	-	Langstone band D7	Set lo for P'down, hi for L'stone
22	25	6	GPIO 25	SD0_DAT1	Band D3	Langstone band D3	-
23	11	14	GPIO 11	SPI0_SCLK	-	-	-
24	8	10	GPIO 8	SPI0_CE0_N	-	-	-
25	-	-	0v	-	-	-	-
26	7	11	GPIO 7	SPI0_CE1_N	-	Noise source?	-
27	0	30	ID_SD	SDA0	(was ADF4351 LE)	-	DO NOT CONNECT
28	1	31	ID_SC	SCL0	(was Band D0)	(was Langstone band D0)	DO NOT CONNECT
29	5	21	GPIO 5	GPCLK0	spi clock	-	Label CLK on J04
30	-	-	0v	-	-	-	-
31	6	22	GPIO 6	GPCLK2	spi data	-	Label DAT on J04
32	12	26	GPIO 12	PWM0	new Band D0	new Langstone band D0	Band select LSB. Label I on J03
33	13	23	GPIO 13	PWM1	new ADF4351 LE	-	Label Q on J03
34	-	-	0v	-	-	-	-
35	19	24	GPIO 19	SPI6_MESO	Band D1	Langstone band D1	Band Select MSB on J05
36	16	27	GPIO 16	FL0	-	-	SR select LSB D0 on J02
37	26	25	GPIO 26	SD0_DAT2	-	-	SR select NSB D1 on J02
38	20	28	GPIO 20	SPI6_MOSI	-	-	SR select MSB D2 on J02
39	-	-	0v	-	-	-	-
40	21	29	GPIO 21	SPI6_SCLK	TX LED/PTT Drive out	-	TX LED J05

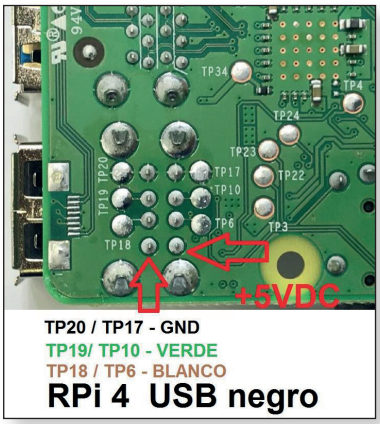


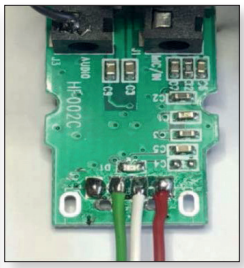
Hardware

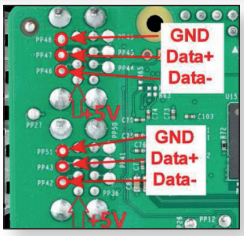


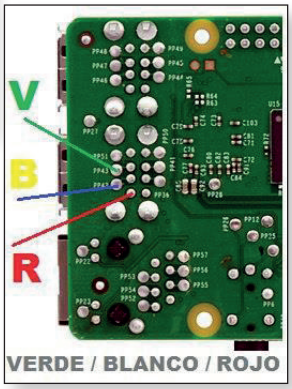
USB

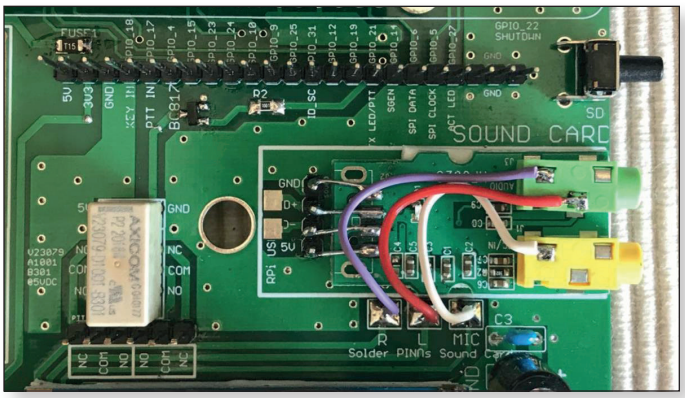
▶ *SOUND CARD* - NEDIS USCR10051BU or similar











▶ *ENCODER* - *https://github.com/g4eml/Langstone-Mouse*

This design configures an Arduino Pro Micro board to behave as if it is a USB mouse. This is optimised for use as the tuning control of the Langstone transceiver. A good quality rotary encoder can be connected and used as the tuning knob. Such encoders often have a high number of pulses per revolution which can be more than is needed by the Langstone software. The arduino code allows the pulses per revolution to be reduced before feeding the Langstone.

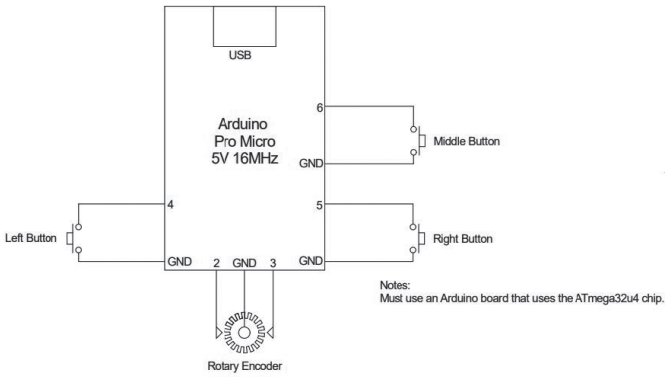
Requirements

This code will only work on an ATmega32u4 processor such as used on the Pro Micro board. Other processors do not support the mouse library that is needed.

Aduino Pro Micro boards are available for about £6 on ebay. Make sure you buy the 5V 16MHz version.

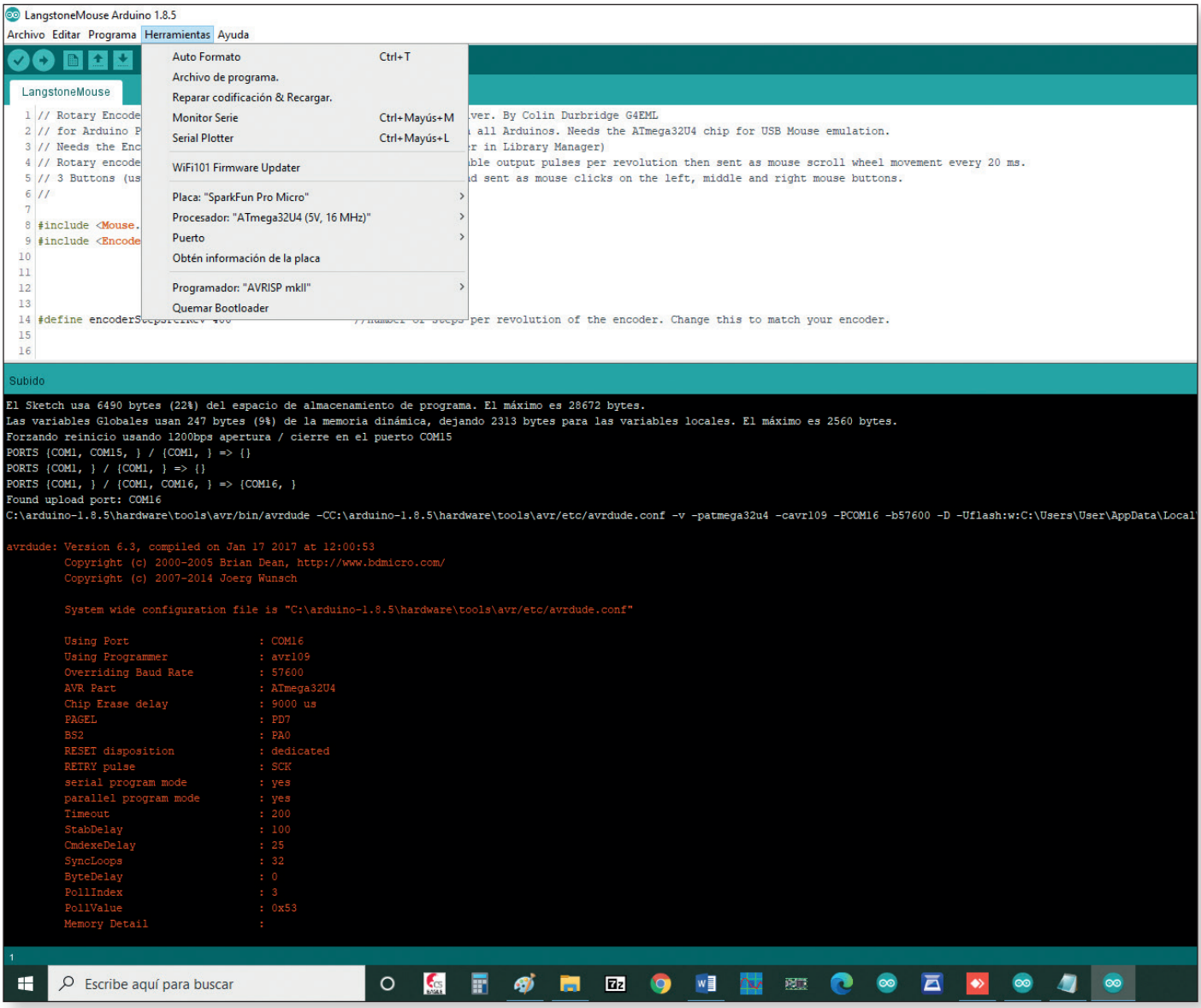
The Rotary encoder needs to have quadrature outputs that are either open collectors or switches to ground.

Connections for the rotary encoder and switches are shown in the schematic.

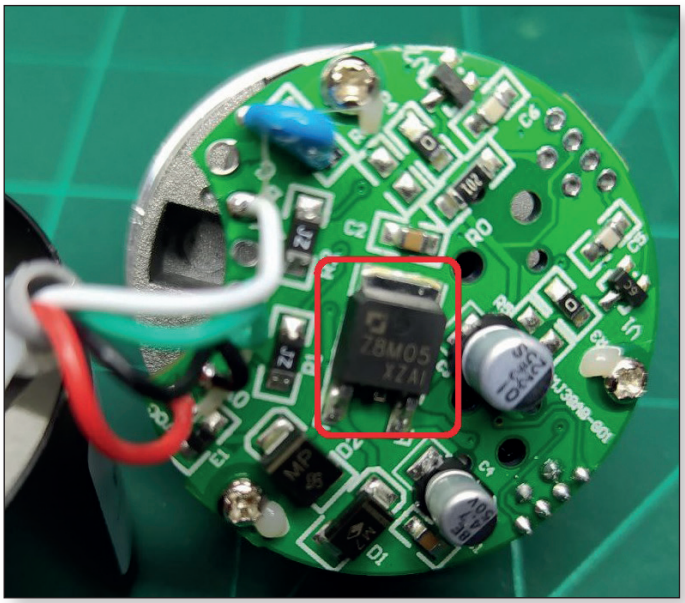


▶ *ENCODER – NIDEC RES20D50-201-16 or similar item*

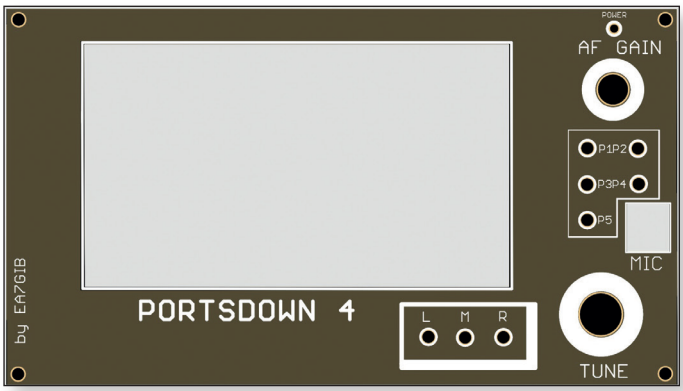
Contact the Author:
TELEGRAM: **@EA7GIB**
or
EMAIL : **EA7GIB@GMAIL.COM**



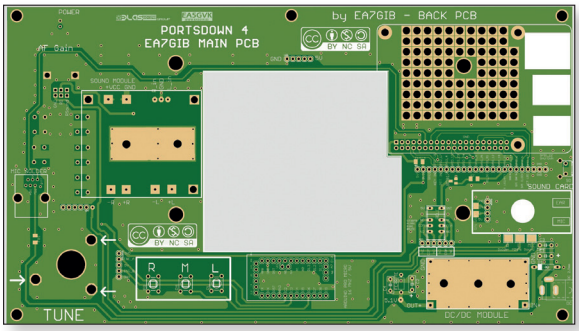
Many low cost ENCODERS have a 7805 regulator internally. In my case, open it and remove the regulator.

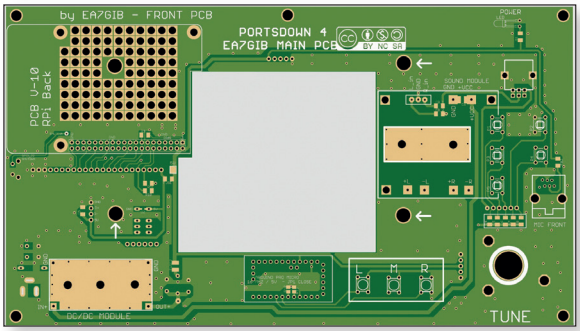


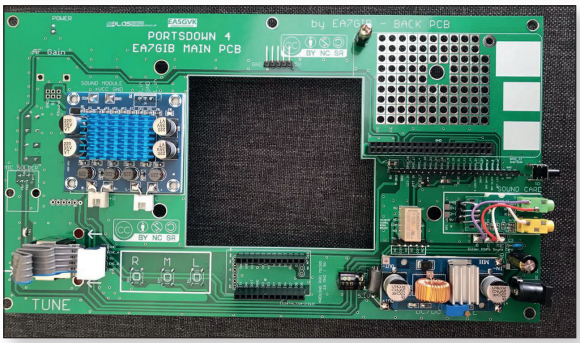
Front Panel

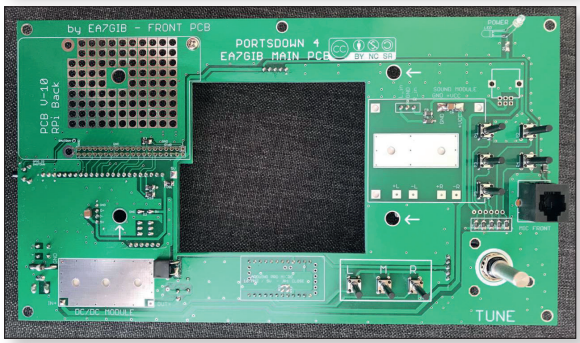


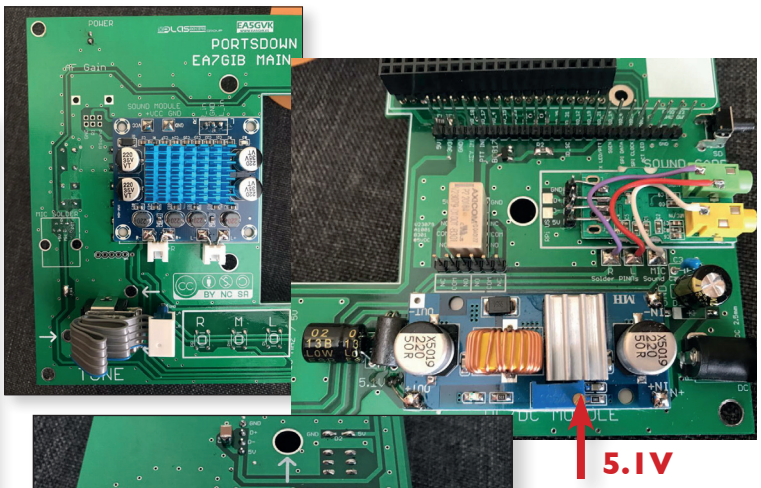
Main PCB

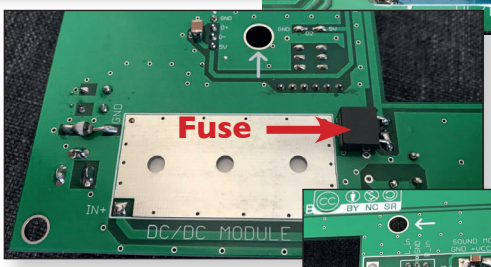


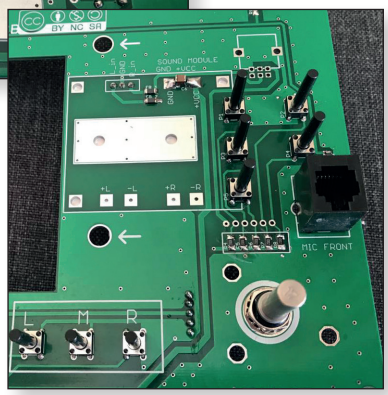






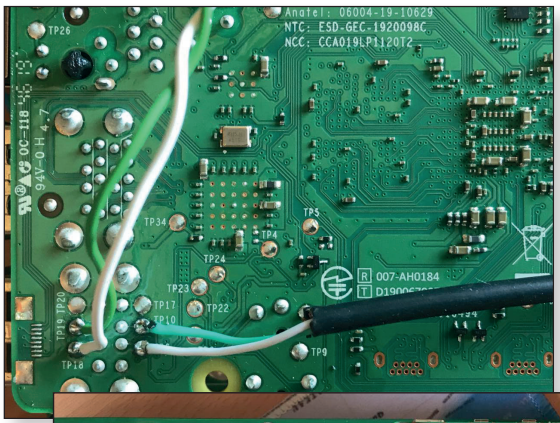


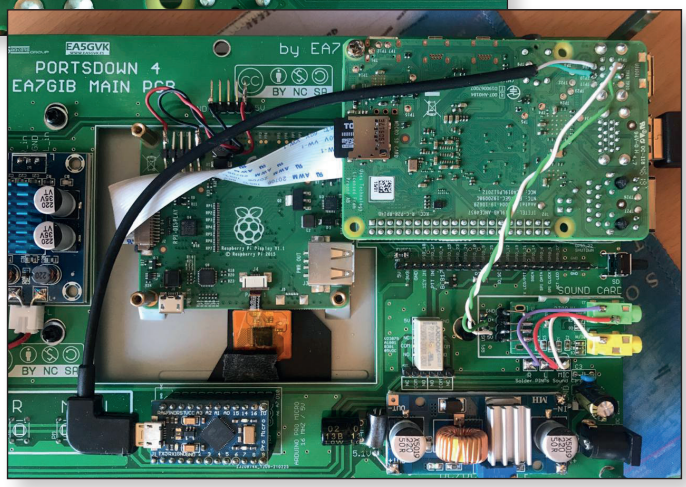




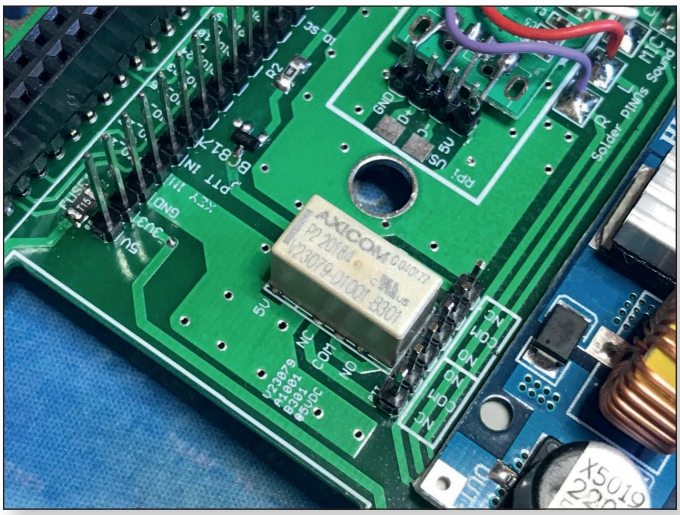
IMPORTANT:
adjust the voltage to 5.1 Volts, without having the OUTPUT connection wire .... an overvoltage can cause damage to the devices.

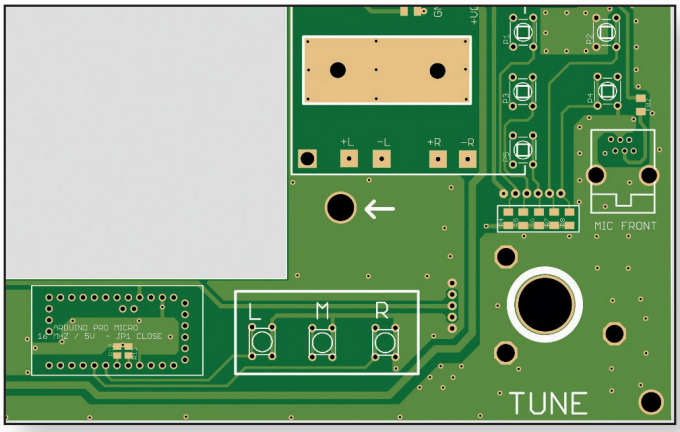
USB WIRE: USB for External Audio and Arduino



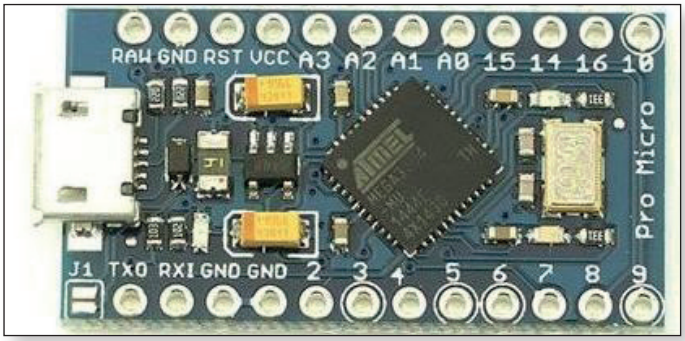


PTT / RELE: The PTT pin controls a small transistor (BC817 NPN or similar) to drive 5V DC RELAY.



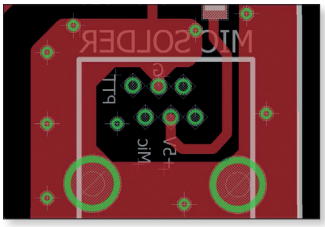


- P1 – P5 – Optional pushbuttons for future connections to the GPIO RPi. 10K resistors (R4-R8)
- Close JP1 ARDUINO for external DC 5V.
- R12-R13 – Optional, It depends on the selected encoder.



MIC SIGNAL: RJ11 MIC

MIC / PTT / + 5V signals are present at the connector. An external PCB can be used to process the microphone signal.



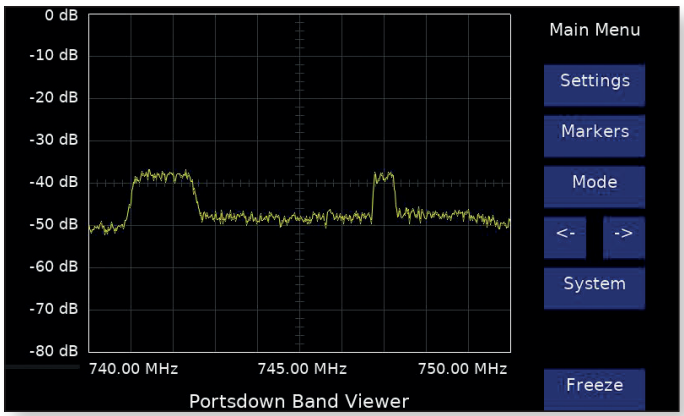
- *https://es.aliexpress.com/item/4000501936463.html?spm=a2g0s.9042311.0.0.2a3d63c071lwL2*
- *https://es.aliexpress.com/item/4000416977399.html?spm=a2g0s.9042311.0.0.2a3d63c071lwL2*
- *https://www.ebay.es/itm/Modulo-XL4015-alimentacion-regulable-5A-75w-con-disipador-DC-DC-BUCK-steep-down/223098717946?ssPageName=STRK%3AMEBIDX%3AIT&_trksid=p2060353.m2749.l2649*
  XL4015 DC MODULE 5A 75w DC-DC
- GERBER / EAGLE CAD BRD / STL 3D BOX EB7DLN available on the website *www.ea5gvk.es* or via email / telegram

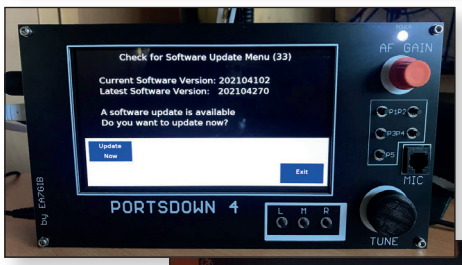
Update:

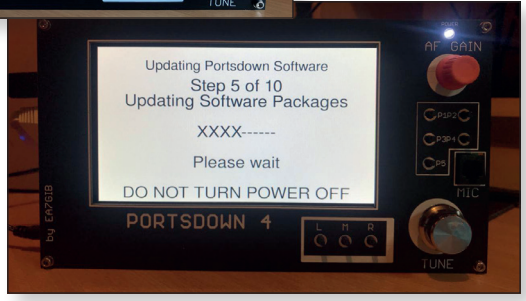
https://forum.batc.org.uk/viewtopic.php?f=103&t=7328

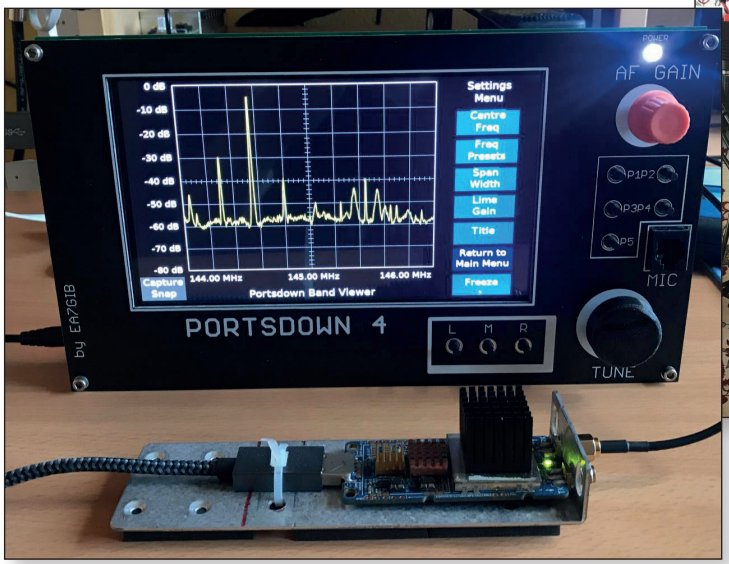
https://wiki.batc.org.uk/Portsdown_Band_Viewer

The "Band Viewer" software is included with the Portsdown 4 and Portsdown 2020 and can be used to provide a basic spectrum display of band occupancy using the receive section of a LimeSDR Mini (or LimeNet Micro). It only works with the 7 inch screen, not the 3.5 inch screen; neither will it work with any other SDRs. The frequency range is from approximately 30 MHz to 3.5 GHz, and span widths from 500 kHz to 20 MHz are available.



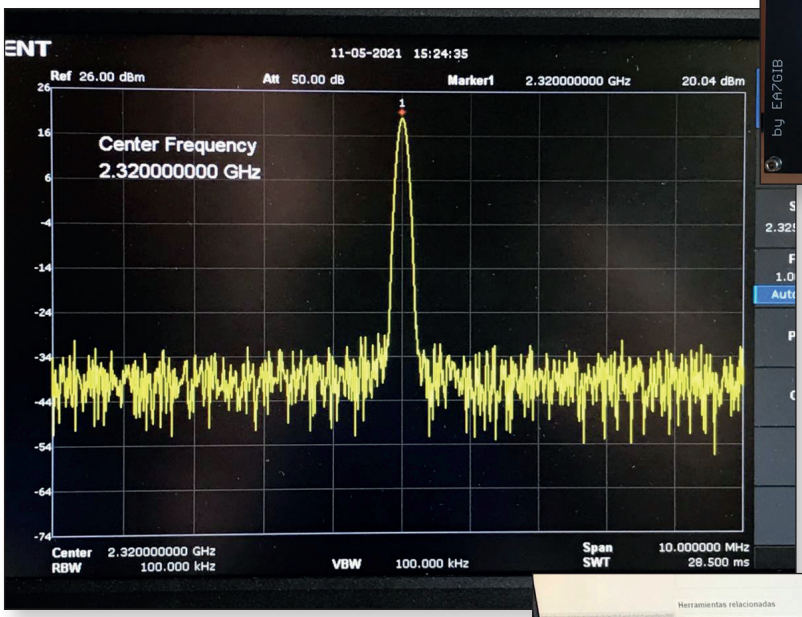




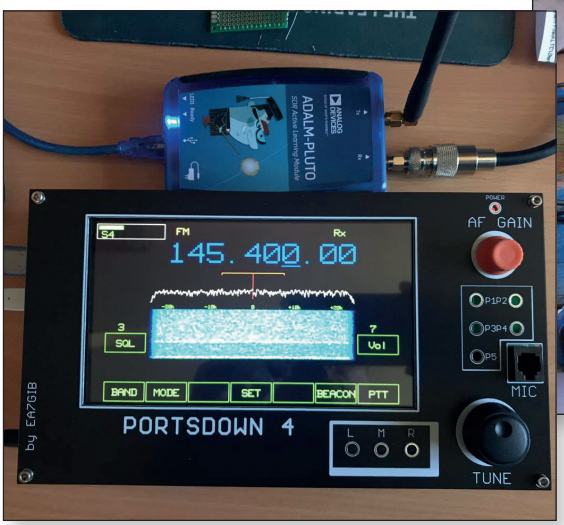

AF GAIN
Settings Menu
Centre Freq
Freq Presets
Span Width
Lime Gain
Title
Return to Main Menu
Freeze
Capture Snap
144.00 MHz
146.00 MHz
Portsdown Band Viewer
P1P2
P3P4
P5
MIC
PORTSDOWN 4
L M R
TUNE
by EA7GIB


ADALM-PLUTO
739.661.20
RIT
BAND
MODE
SET
BEACON
PTT
TUNE


TX
RX
M2
M3
AF GAIN
P1P2
P3P4
P5
MIC
PORTSDOWN 4
L M R
TUNE
by EA7GIB


11-05-2021 15:24:35
Ref 26.00 dBm
Att 50.00 dB
Marker1 2.320000000 GHz
20.04 dBm
Center Frequency
2.320000000 GHz
Center 2.320000000 GHz
RBW 100.000 kHz
VBW 100.000 kHz
Span 10.000000 MHz
SWT 28.500 ms


P1P2
P3P4
P5
TC
TUNE


ADALM-PLUTO
FM
145.400.00
AF GAIN
P1P2
P3P4
P5
MIC
BAND
MODE
SET
BEACON
PTT
PORTSDOWN 4
L M R
TUNE
by EA7GIB


FM
2320.000.00
AF GAIN
BAND
MODE
SET
BEACON
PTT
PORTSDOWN 4
by EA7GIB

Video source, video generated by an Arduino

Chris van den Berg PA3CRX

When you go portable starting with one band, you start experiencing what is handy and where is room for improvement. The moment that you add a second station you have to do some additional actions while switching from one to the other. Of course disconnecting and connecting the power, monitor and video source, every time. You will soon find out the number of connections and peripheral equipment should be limited to the minimum, to reduce time and a number of mistakes.

When I go portable, most of the time I use my photo camera as a video source. In case of ATV activity weekends I transmit pre-recorded pictures with the four digits. Switching to the other band means also choosing the other recorded picture. Especially when the weather conditions are not so good, this could be forgotten and also rain is not too good for the camera.

So I was looking for a cheap, small way to generate the four digits with the generator inside the transmitter housing. Then every portable station could use its own video source with the unique numbers, no switching or showing wrong digits.

This is not a construction article but more an encouragement to have a go yourself. It just describes the way I get my result, likely much more intelligent solutions could do a much better job!

Arduino

An Arduino is a cheap, small PCB (68.5 x 53 mm) with a micro controller, some memory, several in- and output possibilities, an USB connector and a DC connector. So many in- and outputs but no video out connector present!

However, for activity weekends we do only need to send high contrast black and white pictures, switching of voltage levels may do the job.

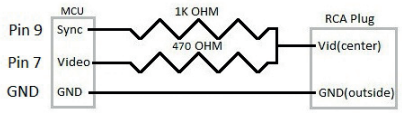
On the internet I found out this was already developed!

The trick is to generate sync pulses and the white level by using two digital outputs connected to two resistors for the wanted DC levels.

Hardware

Ordering an Arduino Uno is easy via Ebay or AliExpress, costs are a few dollars including shipment. To prevent short circuits on my desk, I also ordered a transparent enclosure for less then a dollar.

After receiving, the resistors were soldered between the digital-PWM outputs and a cable that is fitted with a cinch connector connected to a video monitor.



▶ *Figure 1: Schematic of additional components besides the Arduino.*

By playing with the resistor values, you could change output voltages. For example handy if you want to set the output at 30% and 100% output of an AM modulated amplifier, like described in CQ-TV269.

Software

The Arduino could be programmed via the USB connection of a computer, when the driver and program is present. I managed to get it working, surprisingly with my laptop running Xubunu (Linux), the Arduino driver was already present.

I will no go deeper into installing software and libraries, there are tons of information and youtube movies on the internet explaining everything. Just start with the simple demo.

The program to be used in this case may be downloaded from the following website:
https://code.google.com/archive/p/arduino-tvout/downloads

As can be seen; many versions are offered,
I downloaded version *TVout_r3.ZIP*

After downloading the ZIP file and adding it to the library, chosen the correct USB port of the laptop and I was in business!

In the library, also a demo program (in Arduino jargon called a 'sketch') is present, PAL and NTSC. After opening the PAL demo, it shows several lines with instructions. It includes the link to the standard subroutines like the sync generator, the graphical stuff etc.

With a mouse click it was compiled and send to the Arduino. A lot of errors and a warning that using the maximum level of memory makes it unstable…

A few seconds later, I saw the test program running on the screen of the video monitor! It shows all ASCII characters alternated and building up of white and black lines.

My programming experience is from a long time ago, in BASIC, with an interpreter that directly shows the result of every change in the program. Arduino works a different way; after every change of the program (sketch) it must be compiled an loaded into the Arduino to see the effect.

Looking through the sketch it is more or less understandable what the individual text blocks do. I removed several lines, compiled and uploaded every time (just a mouse click) checking the impact on the video screen. I finally ended up with only my callsign and 'ATV' in the middle of the screen.

```
#include <TVout.h>
TVout TV;
unsigned char x,y;
void setup()  {
      x=0;
      y=0;
      TV.start_render(_PAL);
}
void loop() {
      TV.print_str(40,16,"PA3CRX");
      TV.print_str(50,32,"ATV");
 }
```

▶*Figure 2: Result of the small sketch: call and 'ATV' in the centre of the screen.*

That's all! Nice, however, the digits are too small for my purpose.

The build-up of the characters is not defined in the sketch but in one of the other files in the library. My knowledge of this programming language turned out to be very low so I asked for some help in the BATC forum. A few suggestions followed but not the final clue what lines to change.

In the mean time, more video applications were found around Arduino, including an on screen display and even a method to have a logo of a high contrast picture on the whole screen. This was where I was looking for and after digging in de programs and trying a lot, I could not get the result, only errors messages that files could not be found. The different program versions are not completely compatible. In the sketch are other files mentioned then the ones that I have present. When I switch over to an other version TVout I get still errors. I let it rest for some time…

New point of view

How about building large characters by blocks that are the size of a small character, in the sketch?

In that case I should create a 'white block' as a 'character'. In font_set.h the definition of the characters could be found, for example 'P' is defined as:

```
//P
0b11110000,
0b10001000,
0b11110000,
0b10000000,
0b10000000,
0b10000000,
0b00000000,
```

Assuming that the lowest line with '0' defines the space between two lines of text, I changed character '#' and made all digits '1'. When I choose to display '#' in the sketch, indeed a white block appears. However, '##' did show space between the blocks.

Again searching in the library and the solution was found in TVout.cpp. Changing number '6' to '5' in line 'x += 6' did the job. The following character appears now subsequently on the screen, so no longer a gap between the blocks.

In the sketch, the X and Y location of the start of a line with blocks could be defined and characters created. A block is seven positions high so the next line should start with Y coordinate 'added seven'.

Looking at the sketch and the result on the video screen makes this more clear.

▶ *Figure 4: The result of the sketch*

So at least I have large characters, build up by blocks. The result looks like the old days when we used circuits with EPROMS containing data. Of course it is possible to have large characters build up in the same way with the same details as the small characters. I did not manage it…

The actual result is not very nice but useable for the intended purpose.

If someone has a version working with more details in large characters, I would be delighted to try it.

Arduino Nano

To limit the needed space inside the portable station I ordered the Arduino Nano (size only 18 x 45 mm). The Nano is functionality about the same as the Uno, other USB connector and no power connector. It runs on 6-20 VDC unregulated external power supply (pin 30) or 5 VDC regulated power supply (pin 27).

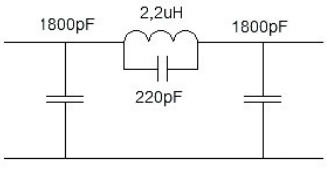
Settings for uploading the sketch are different (I had to select Nano and 'ATmega328P (old bootloader)'). Just try and see.

In practise

Because the video is build up by switching digital pulses a lot of harmonics are present. If the transmitter does not already contains a video filter, it is something you should add to prevent using a lot of bandwidth. You won't believe what you see when you connect the output of this video source to a spectrum analyzer!

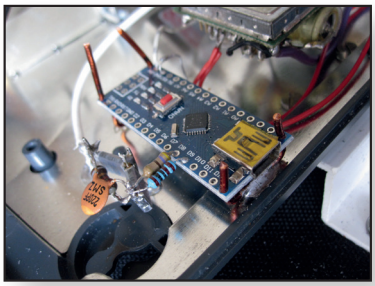
In several (older) CQ-TV publications schematics of video filters could be found (CQ-TV 156, CQ-TV 182). Not having the needed component values present, I used Elsie (free program from Tonnasoft) that did the job. Elsie makes it possible to see the impact of changed values of inductance and capacitance so it is easy to play around a bit with what you have. Because no colour is present, my target was to pass signals to about 3.5 MHz. The result is a low-pass filter that likely is not very good for video but it removed the unwanted signals and I don't really see any picture difference on the video monitor.

▶ *Figure 5: Schematic of the used video filter.*



The mechanical work is to make a small hole in the housing of the transmitter so the USB connector could be plugged in if the digits (or call) needs to be changed. Mechanically fastening of the Nano was a challenge: four very small holes in the corners of the PCB are present. Because I did not have such small screws I bended two 1.5mm copper wires in an U-shape and soldered it to the present earth screen. Looks stable enough for me and nothing bends if the USB connector is plugged in or out.

The video output is switched with a regular toggle switch so the arduino or the outer video source (if connected) may be selected. DC to the Arduine is switched with the same switch (second deck). After switching on, the sketch starts and within a blink the video signal is present.



▶ *Figure 6: Built-in Arduino Nano with the U-shaped fastening and the low-pass filter.*

What else?

It is possible to have several different texts that could be chosen by using digital inputs. Modify the program in a way the status of the input is red. It was not my intention to have more switches on the portable station so I did not do this.

When you search on the internet ("TVout"), several examples could be found how to deal with generated video by an Arduino. With some additional hardware (sync separator) an on screen display could be made, even with dynamic measurement results on screen. What about developing a unit that handles 'blue screen' issues by using the generated sync?

Enjoy yourself playing with Arduino finding applications for our ATV hobby!

Links:

- *https://playground.arduino.cc/Main/TVout*
- Logo on screen: *https://www.open-electronics.org/a-video-overlay-shield-for-arduino/*
- Link to the BATC forum: *https://forum.batc.org.uk/viewtopic.php?f=2&t=6592&p=22240&hilit=arduino#p22240*
- Help for defining characters: *http://www.eran.io/the-dot-factory-an-lcd-font-and-image-generator/*
- As OSD with even showing dynamic parameters: *https://nootropicdesign.com/video-experimenter/*
- Youtube: *https://www.youtube.com/watch?v=DT9K0ZZI_rQ*
- Download free design (video) filter: *http://www.tonnesoftware.com/*

A basic logic controller for hybrid ATV repeaters

Jason Haywood G7KPM

There have been many designs over the years for logic controllers of varying complexity and more recently, based on Raspberry Pi units. The unit described here is based on the PIC16F877A PIC microprocessor and the source code is written in Proton Basic. A free version of the Proton Complier with unrestricted PIC16F877A support can be downloaded from: http://pds.protonbasic.co.uk/

The logic can be used with most 16 channel CCTV multiplexer units which have quad and 9 screen display modes and may also work with newer HDMI multiscreen processors. It has 8 video inputs for sync detection, IP1 to IP8. The inputs are intended to connect into the video 'loop' and therefore has no 75R termination provided on the PCB. Each input is fed into a MAX7461 Sync detector IC as described by G0ATW in CQTV 264. Looking at input 1 as an example, when no sync is detected, Pin 4 is pulled low and goes high (5v) when valid sync is detected. When this pin goes high, the capacitor, C17 is charged via D1. This will then turn on the transistor TR, pulling pin 40 (RB7) of the PIC16F877A low (normally held HIGH due to the 10K pull-up resistor in RP1 resistor pack). When the video signal is lost, PIN 4 of the MAX7461 is pulled low and the capacitor C17 will start to discharge, providing a switch off delay which will prevent nuisance 'K's under poor signal conditions/fading etc. The value of C17 to C24 is not critical and can be set to your requirements.

Digital inputs are provided at CN1 and your digital receiver should pull the required input pin 1 – 8 low upon valid RX via a closing contact. If the input is digital only, then the sync detection components can be omitted.

CN2 provides 8 selection lines for an audio switcher unit, which are active LOW. On GB3CT, this output is buffered and inverted using a pair of HEF4049 Hex inverters to operate the audio switcher. When more than one input is active, then the audio of all active inputs will be mixed together to one output to the TX. GB3CT uses a pair of 4 channel audio switch PCB modules obtained from Ebay.

JP1 and JP2 set the output to your video processor unit as latched or momentary. Latched is normally used when connecting to the multiplexer unit alarm inputs and momentary when connecting to selection buttons.

JP1 controls the output latch for 9 screen and Quad selection (PORTE.1).

Placing a jumper at positions 1-2 pulls PORTE.1 High (Momentary) and placing the jumper at positions 2-3 pulls PORTE.1 Low (Latched)

JP2 Controls the switched outputs 1 to 8 as momentary or latched by pulling PORTE.0 high (Momentary) or low (Latched). A power off restart is required when jumper settings are changed.

All outputs on CN5, 6 & 7 are open collector.

An RS422 output has been provided in the PCB design to enable serial control of video switchers/video matrix where available. This has not been implemented in the CT build, but can be added using the PIC basic HRSin and HRS out commands. TTL level serial data is also available via the 3 pin DATA OUT header to use with RS232/ RS485 modules available from Ebay etc.

Logic Operation:

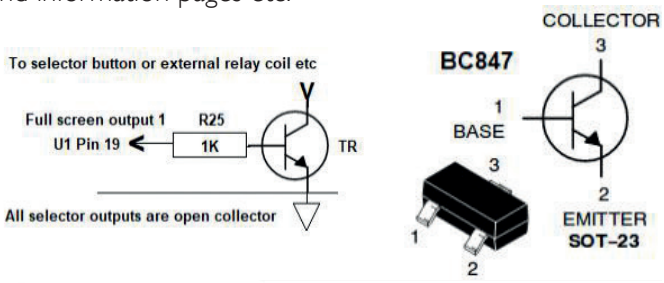
When any input 1 to 8 is active, then the logic will switch the corresponding output on CN5.

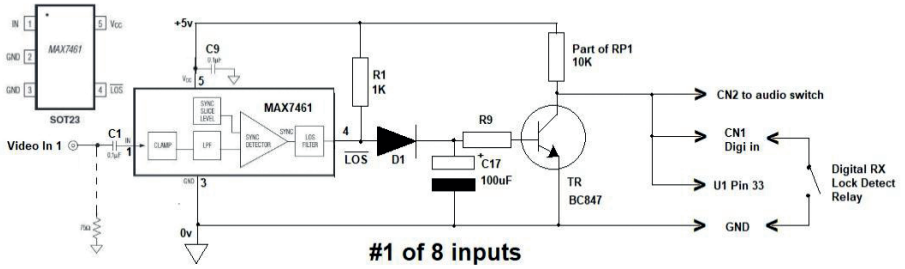
When more than 1 input (1 to 4) are active, the logic will select QUAD output on CN6.

When more than 1 input (5 and above) is active, then the logic selects the 9 SCREEN output on CN7.

Any loss of input signal will momentarily activate the 'K' output on CN7 and provide a 'K' in Morse code at the K Audio Output connector. The audio output level can be set by the adjustment of the preset resistor, VR1.

When no inputs are active, the logic will activate the TESTCARD output to select the identification test cards and information pages etc.





Component List

U1 – PIC16F877A

U2 – 7805 (5V Regulator)

U3 - MAX490 (optional)

IC – MAX7461 (Loss of Sync Detector IC)

TR – BC847 (SOT23)

D1 to D8 – 1N4148 or similar

C1 to C16 – 0.1uF

C17 to C25 – 100uF (Select for required turn off delay after loss of sync)

C26, C30, C31, C32 – 220nF

C33 - 47uF

C27, C28 – 22pF

C29 – 470uF

C34, C35 – 220nf (0805)

C33 – 100uF (1206)

R1 to R8 – 1K (0805)

R9 to R16 – 1K (1206)

R17 - 10K

R18 to R29 – 1K

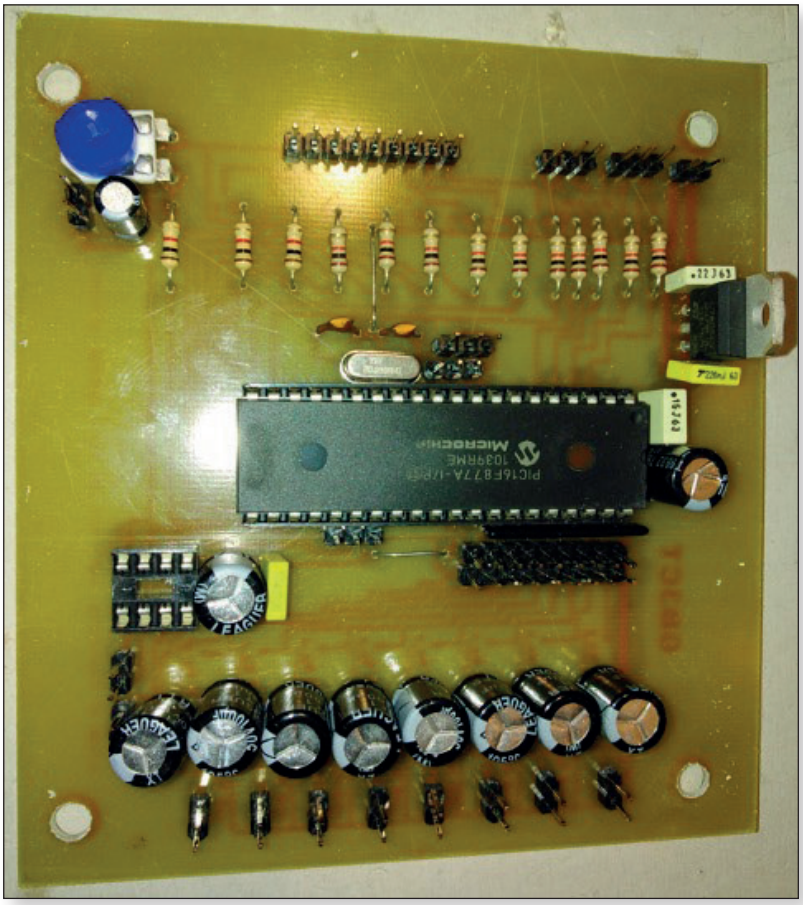
R30 - 10K

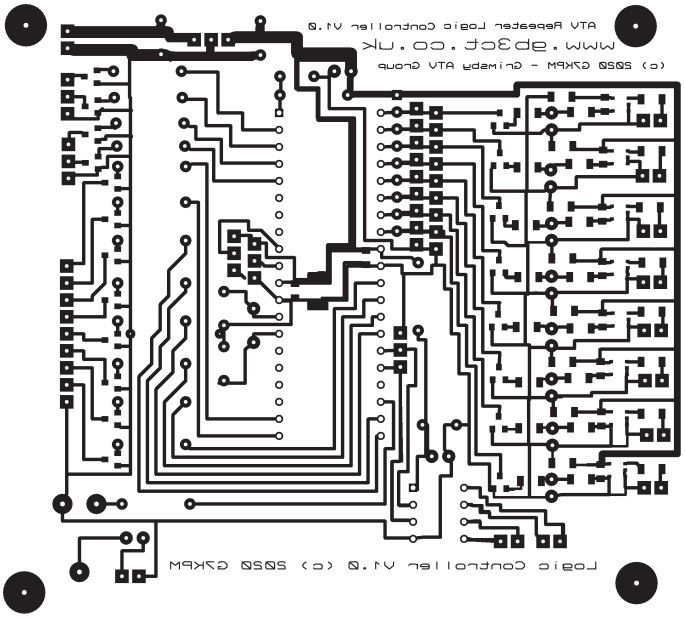
VR1 - 100K

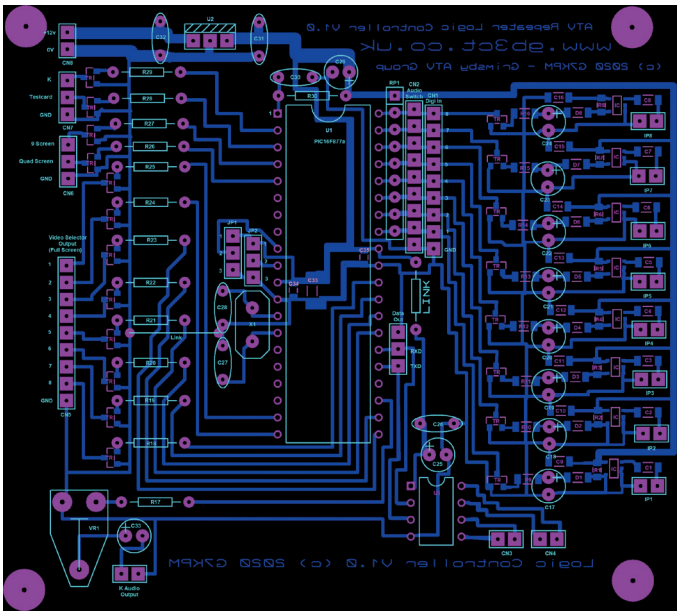
RP1 – 10K 8 way SIL resistor pack

X1 – 20MHz Xtal

The Proton Basic source code as used in GB3CT is available (to copy & paste into the Proton basic complier) from the Repeater Technical Topics section of the BATC forum and can be modified to suit your requirements. There is no identification timer provided within the code as this is not required when the repeater transmitter is digital and identifies itself with the service information.







BBC MCR21 progress report June 2021

Brian Summers G8GQS

I had planned to write about the start of colour and the OB vans built for that use, but alas the work on our MCR21 has stolen all my time. So briefly:-

MCR21 is now in the correct colours and we are completing the exterior work. Perhaps by the time you read this it will say "BBC" on the front and sides.

Work continues on the locks and door fittings and we will soon be refitting the roof rack which was removed for a full restoration. To call it a roof rack is misleading, it's bigger than some garden patios.

▶ *Lunch Break L to R, Brian, Paul, John, Jeremy, Chris, Steve & Steve.*

Work has started on the inside, we have perhaps two "work days" per week when our team of volunteers come and work their magic, much cleaning and painting has been done and work on the structure is under way. Soon we will be re-installing the equipment and cabling up.

A small but satisfying increment of progress was the repair and refitting of the lighting director's seat and table. In the original installation, this and a headset jack socket, was all that was provided.

In latter days the LD had a much more important position, often in the auditorium with two monitors, the lighting desk and extensive talkback.

If you are local to Camberley and want to join in, please get in touch, many skills are needed to bring the project to a successful conclusion. Wood, metal, wire, perseverance.

Read our "top-level" newsletters *https://bttt.org.uk/newsletter-archive/* Our June issue is in preparation as I write. There is also an occasional engineering newsletter.

▶ *The lighting director's seat*

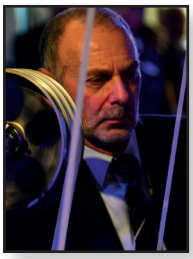
There is much difficult equipment to find A list PDF is on our website. In particular we need two or more 14" Pye black & silver monitors. A Gresham Lyons valve Pulse and Bar generator is also sought. Apart from the BBC, I understand the GPO used these as well.

Further information can be found on our websites:-

▶ *www.mcr21.org.uk*	About MCR21
▶ Our YouTube channel.	Search "mcr21"

MCR21 is owned by our Trust, the BTTT which is a Registered Charity. We are partly funded by the Heritage Lottery Fund and donations from Friends of MCR21.

I would like to thank my fellow trustees, our supporters and volunteers for their help in preparation of this article.



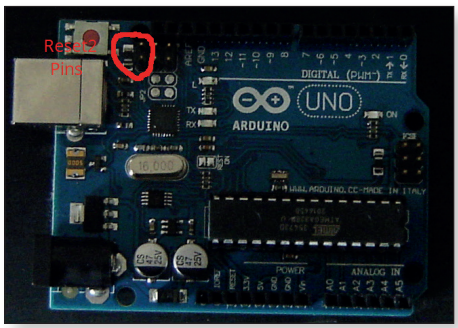
Arduino stream pad

Phil Hayes M0PIT

I've always found it frustrating using a mouse to manipulate faders, buttons or remembering what 'F' keys do what when using OBS to stream to Portsdown. Then came lockdown, so with lots of time on my hands, I set about looking at building a Streamdeck-style keypad, to interface via USB to OBS.

Keeping the cost down

As this project was just an experiment to keep me occupied under lockdown, the cost needed to be minimal, so looking into my box of spares, I found an Arduino UNO (16U2) and a MCUfriend 3.5"TFT display, ideal components for the project. However if you were to purchase them both on eBay, the total cost could be less than £20.

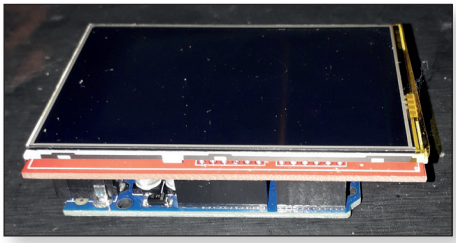


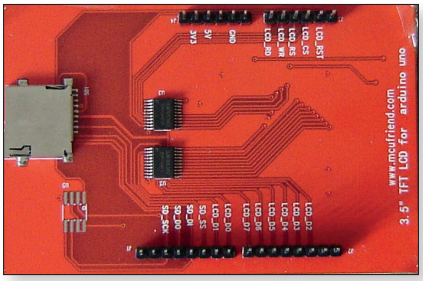
Programming

On your PC you will need to have installed Arduino IDE[1] and Flip[2], both will be needed for programming the UNO, you will also need to download my obs-streampad program available on Github[3]. Three libraries will also need to be added into Arduino IDE[4], Adafruit_GFX.h, MCUFRIEND_kbv.h, TouchScreen.h.

TFT Calibration

With the TFT fitted to the UNO and connected to the PC, using Arduino IDE upload the IDE TouchScreen_Calibr_native program into the UNO, it can be found under, File, Examples, MCUFIRIEND-kvb. With the TouchScreen_Calibr running on the UNO, follow the programs calibration instruction, when the calibration has completed, take note of the values displayed on the TFT screen for the Portrait Calibration, as this may be needed if you need to re-calibrate for your TFT screen.





Stage 1 (UNO Programming)

Using IDE, upload obs-streampad to the UNO and when loaded, test the 15 keys on the TFT screen momentarily go black when touched. If the TFT screen needs re-calibration, take the values previously taken from the calibration program and amend the calibration valves in the obs-streampad file and then upload to the UNO, this will recalibrate the streampad program for you particular TFT screen.

Stage 2 (USB Programming)

The UNO USB I/O chip will need to be reprogrammed for the UNO to be recognised as a HID keypad. With the TFT screen removed from the UNO, connect the UNO to the PC and open Flip. With the UNO connected via USB, reset the UNO USB I/O by momentarily shorting pin Reset2 on the UNO to GND. Using Flip upload the Arduino-keyboard-0.3.hex[3] file into the UNO[5], then disconnect UNO from PC and refit the TFT screen. When connected by USB your UNO, if has gone well your UNO should now be recognised by PCs as a HID keyboard and ready to be used in conjunction with OBS.

If you want to revert the HID (UNO) to be recognised as an Arduino UNO, follow the procedure in stage two but replace the keyboard hex file with Arduino-usbserial-uno.hex[3] file.

1. *https://www.arduino.cc/en/software*
2. *https://www.softpedia.com/get/Programming/Other-Programming-Files/Atmel-Flip.shtml*
3. *https://github.com/justcompile/obs-hid-keypad*
4. *https://www.arduino.cc/en/guide/libraries*
5. *https://www.instructables.com/How-to-Make-a-Arduino-HID-Keyboard/*

The Portsdown Newsletter

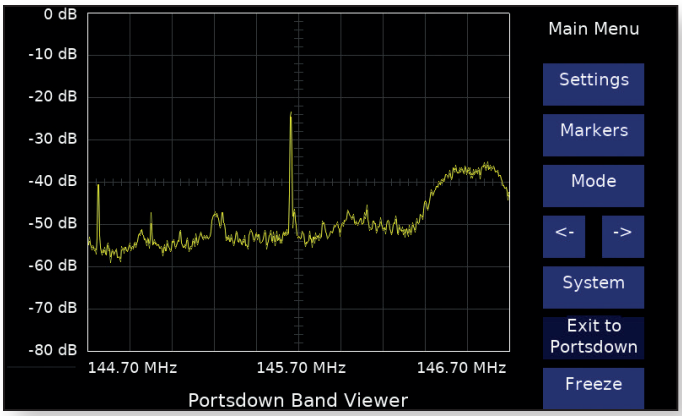
Dave Crump, G8GKQ

Since the major effort to implement DVB-T earlier in the year, most of the recent progress on Portsdown has been related to the peripheral applications. However, two significant bug-fixes have been applied to the Portsdown 4: the transmit over-run that used to happen when transmitting the test card on the Pluto has been cured, and the DVB-T receiver in the Portsdown 4 will now correctly lock to 1.7 MHz bandwidth DVB-T transmissions – these could not be decoded before.

BandViewer

The major new feature, on both the Portsdown 2020 and the Portsdown 4, is the BandViewer. Using the receive side of a LimeSDR, this provides a spectrum analyser style view of between 500 kHz and 20 MHz of bandwidth on any frequency between 50 MHz and 3500 MHz.

The BandViewer is selected from Portsdown Menu 2, or from the Portsdown Receiver page (for terrestrial reception). The Portsdown system can also be configured to boot directly to the BandViewer (Menu 3, System Config, Start-up App).



A typical off-air BandViewer display is shown above with a 144.75 MHz FM signal at the left, a 146.5 MHz DATV signal on the right, and an FM repeater in the middle.

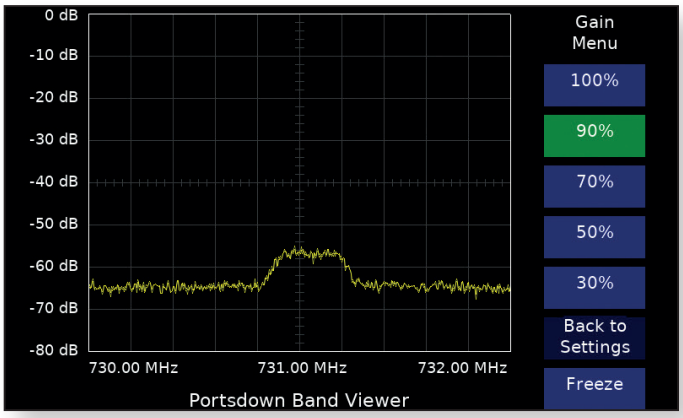
The BandViewer settings may need some adjustment to achieve the optimum display. Any overload of the SDR input can wipe out the display or cause a massive spike at the centre frequency. From the settings menu, it is possible to adjust the Lime Gain to minimise this problem, although extremely strong signals might need external attenuators. Sometimes the Lime may need to be recalibrated (System menu, Re-cal LimeSDR) to minimise spurious responses, but some spurs do remain.

Although it is not possible to provide an absolute calibration for the vertical scale, the relative calibration between levels is accurate, as is the frequency calibration. An expanded (20 dB total range) vertical display is available from the Mode menu. Markers can be used to measure both frequencies and levels. The detection of short-duration signals can be made easier by using the Peak Hold function on the marker menu.

Direct entry of the centre frequency is available on the Settings menu, as are five configurable presets. These can be configured from the Mode, Set Config menu. Arrows on the Main menu move the centre frequency higher or lower by a tenth of the scan width. When selected from the Portsdown receive menu, the centre frequency is initially set to the DATV receive frequency.

The display can be frozen for closer examination, or captured as a "snap" which will be stored in the /home/pi/snaps folder on the Raspberry Pi SD Card.

The BandViewer is particularly useful for peaking up weak signals, or for tracking down sources of noise or interference. The screenshot below shows a signal from the IF of a 2.4 GHz downconverter, after the signal had been peaked by aerial adjustment.

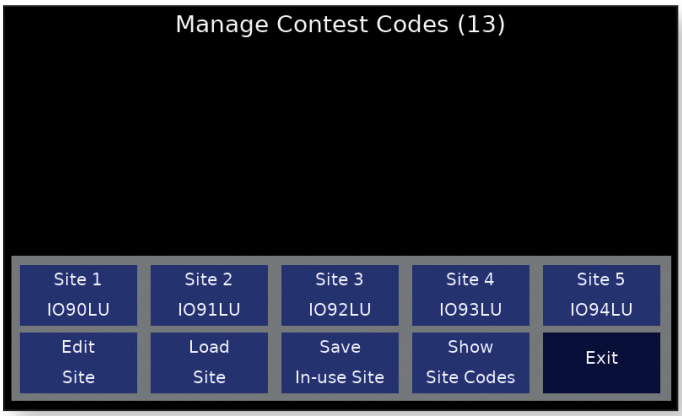


Development is ongoing to enable the estimation of the noise figure of a preamp or down-converter using elements of the BandViewer software and a LimeSDR together with a switched noise source.

Contest number management

Managing the Contest Numbers for nine (or more) bands is a challenge, particularly if operating from multiple sites during a contest. It is now possible to create up to five sets of Contest Numbers, each tied to a specific location.

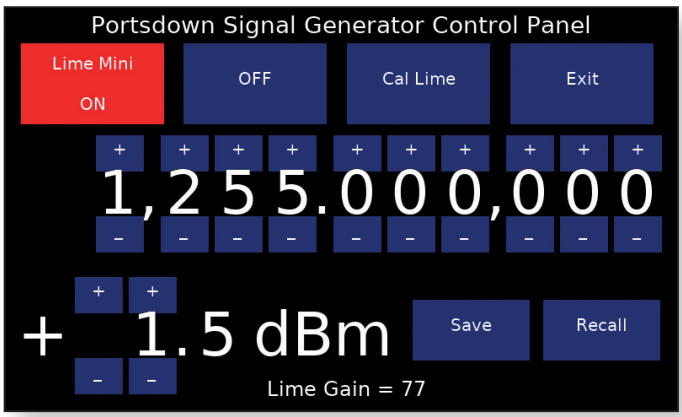
So you can create the sets of Contest Numbers before leaving home and switch between them easily when you move sites during the contest. To access, go to: "Menu 3", "Set Call, Loc & PIDs" (remember this is locator-based), "Set Contest Codes".



- To create a set of codes, select "Edit Site" and that button will turn Red, indicating that you should select the Site that you want to edit. So select Site 1 and then enter or confirm the locator for Site 1. Then it will ask you to enter the numbers for each of the 9 bands in turn. At the end, the numbers will be stored against Site 1. You can repeat the process for each of the sites.
- To view the codes, select "Show Site Codes" and then select the site. All the codes will be displayed on one page. Exceptionally, you can also view the in-use codes by selecting the "Show in-use Site" button which appears when "Show Site Codes" is selected.
- All the editing is off-line, so to load a site's codes (and locator) for use, you should select "Load Site" and then select one of the Sites.
- If you want to save the codes (and locator) that you are currently using, select "Save In-use Site" and then the Site Button that you want to save it to.
- If you want to edit the codes directly, they are stored in the file /home/pi/rpidatv/scripts/portsdown_C_codes.txt

Portsdown 4 signal generator enhancements

Having initially enabled the Pluto to be used as a signal source driven by the Portsdown 4 signal generator, I have managed to duplicate a similar capability with the LimeSDR Mini. It is not perfect, but with a frequency range of 50 MHz to 3.5 GHz and variable output level, it can be used as a signal source for aligning transmitters or receivers.



Like the Pluto, the LimeSDR needs to perform self-calibration (initiated from the Cal button) at the requested frequency before it can be used. Note that this calibration may involve outputting a high-level signal (up to 40 mW) on the output, so take appropriate precautions. Once calibrated, small frequency changes do not require recalibration, but changes of over plus or minus 20% will benefit from recalibration.

The output levels correspond to Lime Gain settings, so are not linear steps. I have measured the levels using my LimeSDR Mini and an HP432 power meter, and provided compensation for frequency variations, so the displayed level is generally within 2 dB of the measured level for my uncalibrated equipment. The output is reduced from that indicated at higher powers due to limiting in the LimeSDR Mini output stage. The spectral purity also suffers at these extremes.

I have also added the facility to control a Nort Microwave Synthesized Local Oscillator (SLO) from the Signal Generator. The Nort SLO is described here on the Microwave Group Wiki *https://wiki.microwavers.org.uk/Nort_SLO*.

The Raspberry Pi GPIO pin connections for the Nort SLO are: SPI Clock 29, SPI Data 31 and SPI Latch Enable 8. These are the same pins as are allocated for control of an ADF5355 or an Elcom source from the signal generator.

DVB-T using LimeSDR on Portsdown 4

Previously, DVB-T transmissions were only available using a LimeSDR Mini on a Portsdown 2020, or a Pluto on a Portsdown 4. The LimeSDR DVB-T transmit capability has now been added to the Portsdown 4.

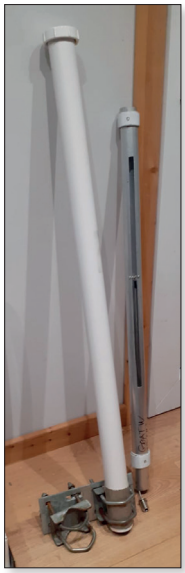
A history of GB3GG

John Ferrier G0ATW

The Grimsby ATV repeater lost its output frequency with the reduction in space on 13cms at the same time the site location, a 15 story block of flats in the centre of Grimsby was condemned and subsequently demolished.

To say that the future of GB3GG wasn't looking good was an understatement but with the enthusiasm of a local group of amateurs it has slowly been rebuilt.

First a new location only 250m away from the original location was suggested by Chris G1HZN whose family own the property, then we installed a pan and tilt camera linked to the BATC streamer; next we added new logic and receivers on 23cms and 5.6Ghz. At this point we had a repeater to the internet but no RF output.

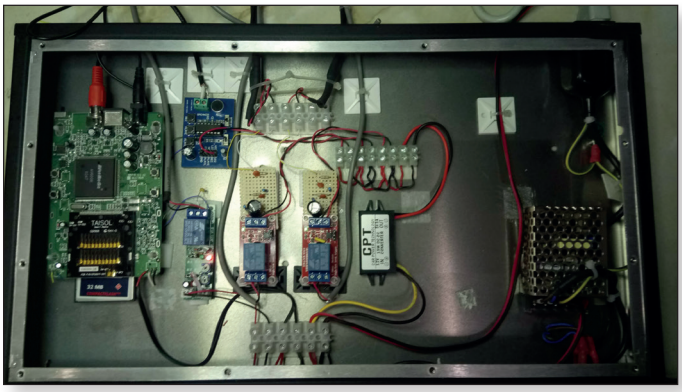


Meeting Noel G8GTZ at one of the Finningley conventions we were encouraged to apply for a 23cms output which was granted faster than we thought possible but with very little funds available we had a licence but no transmitter.

Then to the rescue came the BATC bursary scheme, Jason G7KPM started building the transmitter which was finished by me and is now on test at my QTH.

A new slot aerial was built and we are very close to putting GB3GG back on the air.

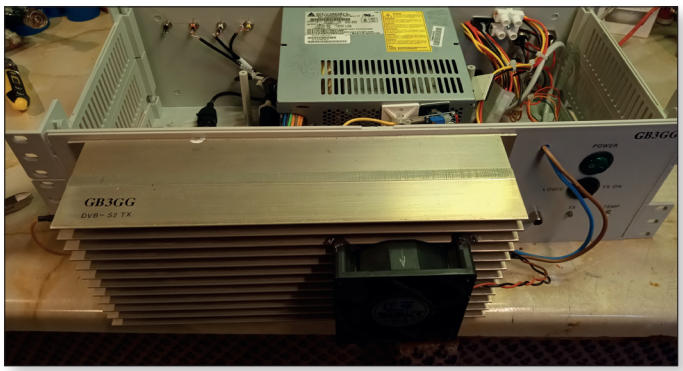
With the site much lower than before the aim is for good coverage of Grimsby and Cleethorpes and longer range contacts being made possible by linking with GB3CT currently being built by Jason and located on top of the Lincolnshire Wolds with 13cms, 70cms and 10Ghz receive inputs.



Unfortunately Covid restrictions around working together on site, bad weather conditions and an unexpected stay in hospital for me resulted in a longer than expected build time.

On the build we started with the philosophy of keeping it as simple as possible and backward compatible for local amateurs who have invested in analogue equipment. The logic is based around a CCTV alarm driven multiplexer, a timer module, picture viewer and audio recorder module for voice and Morse identification, along with MAX7461 sync detectors for the analogue receivers. There is a windows PC with capture card for controlling the camera and streaming to the BATC site.

The new transmitter follows a standard Portsdown build with a Pi3, a Lime mini, LPF followed by a Mitsubishi RA18H1213G PA giving us about 5W out.



The whole thing is powered from a PC power supply using the 12V output with an adjustable DC to DC converter to supply 5.1V to the Pi, the PC 5V supply was not quite enough to drive the Pi correctly.

On test we are running at 1Ms DVB-S2 and have generated interest in the local amateur community but with cheap satellite receivers not working below 2Ms activity seems to be limited to users with PCs powerful enough to run Sdrangel and those that already have a Minitioune.

The temptation is to increase the symbol rate when full operation starts if coverage allows.

The next upgrade is planned to be a basic Ryde receiver for multi symbol rate RX. I already have the new PCB and am just waiting to see how much to populate for a single channel bare-bones no display build and of course for the software to be ported across from the old RX.

At this point I must add our thanks to all involved in all the recent ATV software that makes a lot of this possible.

Recently we have been asked to add a slow scan input / output, I know this isn't the high definition wide screen direction other repeaters are going for but we hope to add users and activity with novel modes of operation.

Also on site is our WEB SDR *http://grimsbyradio.co.uk/* covering 10m 6m 2m and a downlink from Oscar100 with a sister SDR in Cleethorpes *http://www.radiogeek.co.uk:81/* covering 2m 70cms and 23cms one section of the 70cms coverage is used by the high altitude balloon community for remote tracking.

As well as local listening the SDRs perform well as reverse beacons and can be useful testing aerials using the signal strength plot to check polar patterns.

A WSPR receiver to check HF propagation locally completes the current set up.

All this with the encouragement and assistance of Chris G1HZN, Jason G7KPM, Lee G4TNX, Dave G0IIQ, Adrian G1BRB, Roger M1CDQ plus other local amateurs.

Using the NWDZ amplifier as a DATV driver

Noel, G8GTZ

The NWDZ Mk2 amplifier is widely advertised on eBay and other places as a three-Watt amplifier but this is rather optimistic given the output device is marked K2 which means it is likely to be an RD01MUS1, a one-Watt 520MHz device.

Despite this exaggeration it can be used as a useful driver, particularly on 70cms, but requires modification to avoid destroying the output device.

YO5PBG gives a full description of the unit and schematic on his website: *https://yo5pbg.wordpress.com/2019/10/28/the-ultrawideband-1-1000mhz-nwdz-rf-pa-2-0-initial-tests-and-improvements/*

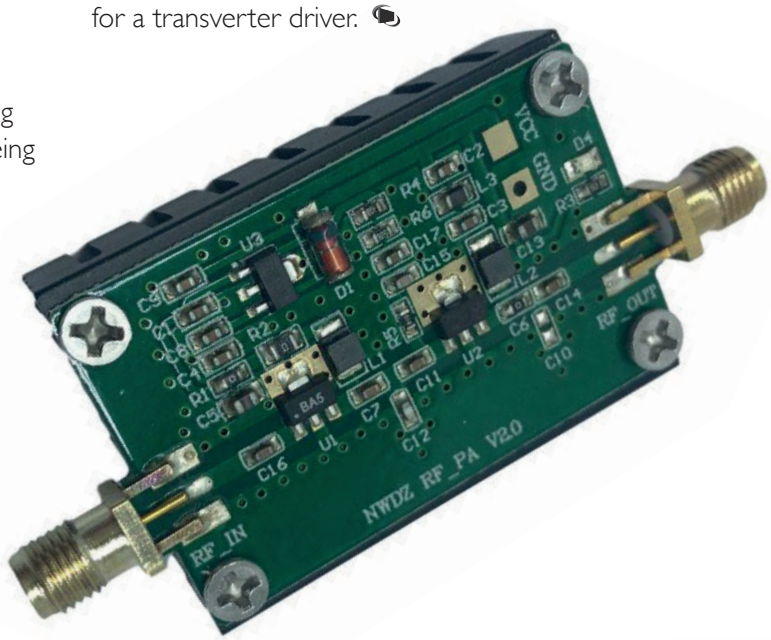
He found that as supplied they draw too much standing current and get very hot, caused by the bias voltage being far too high at 3.55V.

This was true of my unit so I put a 2.2k across R6 to reduce the bias to 2.3v. I then did the modification described on his site to increase gain at 70cms by replacing C11 with a two-turn wide spaced coil wound on a three mm drill bit.

I wanted a transverter driver amplifier which would cover VHF and UHF and after these modifications the performance was as follows:

Band	Power out	shoulders
146 MHz	800 mW	30dB**
	1 Watt	25dB**
437 MHz	500 mW	40dB
	750 mW	35dB
	1 Watt	30 dB

** Note, these figures on 146MHz are NOT good enough to be used for transmission at 146MHz but adequate for a transverter driver.



BATC general meeting postponement notice

Dave, G8GKQ, BATC chairman

The BATC committee have discussed the practicality and safety of holding a general meeting at the proposed CAT 21. An open survey of members had recently indicated that less than half of those who would normally attend a CAT would be prepared to attend a physical meeting in August.

To go ahead with such a meeting would risk it being both non-quorate (we need 30 attendees), and unrepresentative.

The committee considered whether there was a pressing need for a general meeting and decided that they were not aware of one (no items or proposals for the agenda had been received from the members).

A proposal to postpone the general meeting for up to one year beyond the date called for by the Constitution (ie to extend the time period from three years to four years since the last GM on 16 September 2018) was unanimously approved. This period of up to four years would be treated as one "term" for the purpose of committee appointments.

The committee's intention is to hold a general meeting, in person, as soon as it is possible to conduct one safely with a representative quorum of members.

Michel HB9DUG sent us this picture of his 10 GHz equipment during an outing to the top of the 1600 metre Chasseron in the Jura mountain range.

He was participating in one of the monthly French "Journée d'activté Hyper" (JA Hyper) Microwave Activity Days organised by REF. More details here: ***https://hyper.r-e-f.org/***

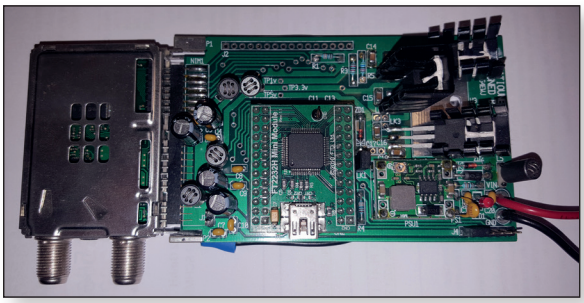
Although the activity on this day was SSB, he uses the same equipment (and site) for DATV.

My QO-100 DATV station

Rainer, DG8KD

My name is Rainer, call sign DG8KD, licenced since 1986, and I'm living in western Germany, not far from the Dutch border.

My QO-100 story began right after the launch of Es´hail2 with the reception of the bird using a Minitiouner based on the original BATC PCB, and an old 90cm offset dish.

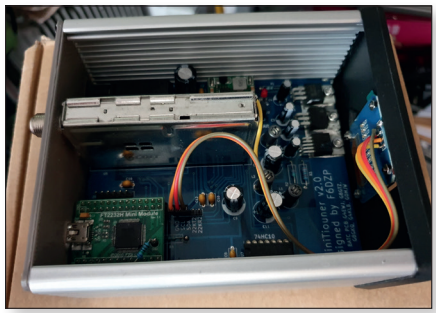


As the reception was not so good as hoped, the receiving dish was changed to a new 1.2m offset antenna located on my garage.

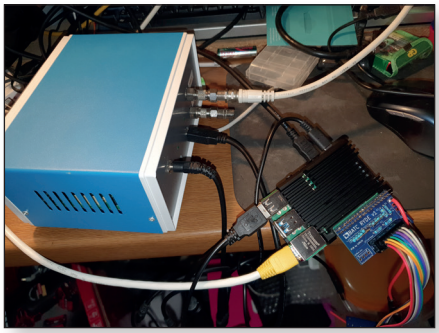
As the new version of the PCB became available I switched over to this receiver and sold the original.

Version two found a place in a suitable housing and was used for a while, but the lack of 14/18V and 22kHz switching capability brought its lifetime to an earlier end. I am also using the MT for receiving conventional satellite TV.

The version two PCB was replaced by the Minitiouner Pro version of the R-E-F (Réseau des Émetteurs Français), the French version of the RSGB.



The MT pro is still in use and will be accompanied by a Winterhill receiver in the very near future. Picture to the right shows the MT pro together with my Ryde receiver



The Winterhill has the advantage of bringing his own CPU power by a RPi4 and not needing a separate PC for decoding.

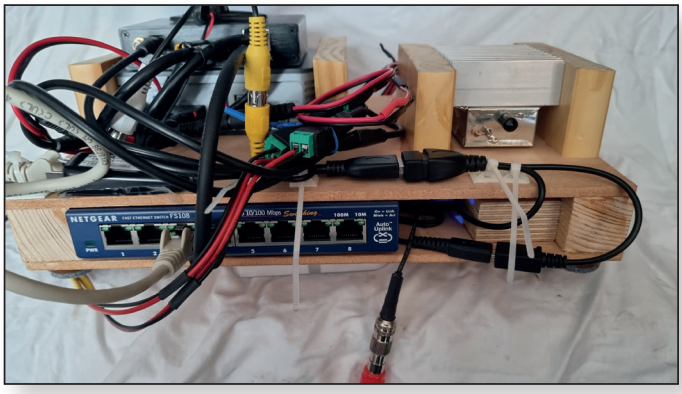
But receiving the QO-100 is only part of the story. For the transmitting part a ADALM Pluto is used.

With the well-known modifications such as common ground, TCXO swap, heat sinks on the major chips, activating the second CPU, expanding the frequency range and changing the firmware to F5OEO, the base of the uplink was set.

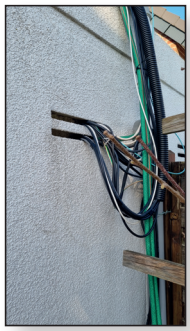
To avoid a long high power coax cable from the PA to the antenna, I decided to move the PA as close as possible to the dish. Therefore a small driver PA behind the Pluto was necessary. A saw filter is eliminating the unwanted mixing products.

My playout center consists of a mediaplayer, a H.265/H.264 hardware encoder, an analogue control monitor, the ADALM Pluto SDR (in a tinbox) and a SAW filter.

On the back sits a eight-port network switch and the 1 Gbit/s OTG adapter. Several step down PSU converters are located behind the switch.



To span the distance (approx. 12m) from the playout to the PA, I used a 40mm diameter duct pipe putting the following cables and wires together: coax H2007 (Tx), 75 ohms coax (Rx), Cat5 network cable, two 4mm² wire for the power supply of the PA, a multi core with seven thin wires and a second multi core with for thicker wires - hopefully enough to cover all circumstances.



This ductwork enters the garage through a vent together with a lots of other cables for short wave, QO-100 narrow band.

The outdoor PA is located in an old distribution cabinet. Very robust, good protection against rain, a door which can be locked, enough place for other equipment and cheap to get.

The PA is one bought on eBay from a Polish ham, it is an AxisNT TDD 2.3 – 2.4GHz amplifier including the Arduino - I am still looking for a monitoring script to control all possible internal values on the board.

I added an extra bandpass filter at the input of the final PA just to be on the safe side. The additional loss of 2dB is no problem due to enough capacity of the small driver amplifier.

The output filter has been modified (move filter characteristic upwards in frequency) by a German ham.

Input to the final PA is in the range between -10 dBm and -5dBm to generate an output level of 20 – 50 watts, suitable for DATV transmission symbol rates from 35Ks to 1Ms on a 1,2m PFA dish.

I have chosen a PFA as it is simpler to modify in mechanical dimensions. I replaced the three original LNB feed holders by three stainless steel thread rods to be able to fine adjust the POTY position.

For aligning the dish a LNB is mounted on the back of the POTY. Adjustment was done in two steps. For a rough alignment I took a normal satellite finder with screen, used BBC Arabic HD on BADR-4 (26 E) at 11996 MHz SR 27500 FEC 3/4.

As Es`hail2 is at 25,8 E, the final adjustment was done with the Minitiouner using the DATV beacon.

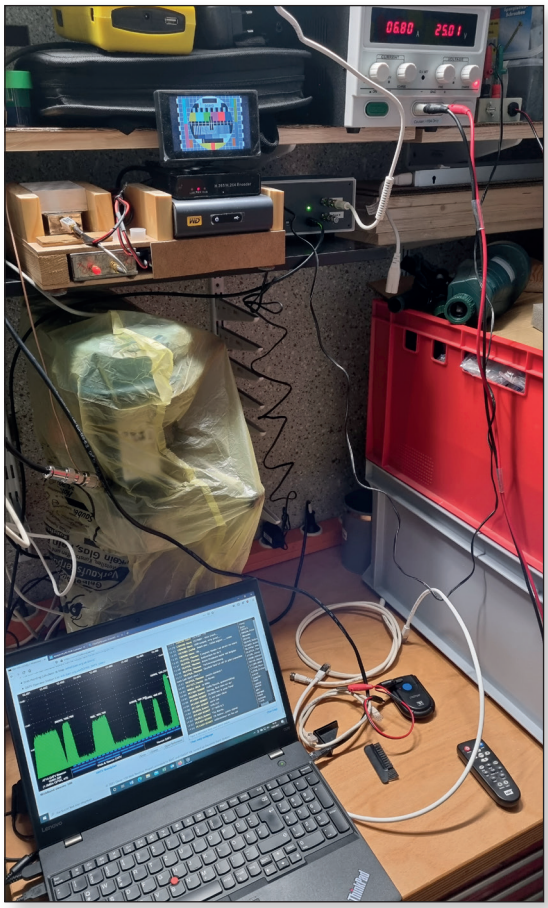
This 0,2 degree deviation makes a real difference. Do not forget the LNB skew of approx. -15 degrees. It is only 3dB less in the receiving path if fully misaligned, but if you are using also the NB transponder, it makes a difference.

As weather protection for the POTY and the LNB I took a part of a drainpipe, cut it into several pieces, put it over the LNB and POTY and fixed it with duct tape. To avoid that spiders or other small insects are entering the wave guide I inserted one part of the dielectric lens from a rocket LNB to it. The receiving performance was influenced in a positive way. So this little part has a huge effect. In my case the MER increased more than 1dB.

The PA feeds the POTY via a short coax (H2010). Reception of QO-100 is done with a separate 1,2m offset antenna (grey antenna on the left), using a modified LNB with a TCXO.

In the garage the regulated power supply (30 volts / 20 amps) is located. Operation can be done locally or remotely via the internal IP network also from the shack under the roof of our house.

As the whole system is setup for 12 volts (OK, the PA needs at least 15 volts) I can operate everything via two solar panels (100 watts each) and a big battery which are based next to the dishes inside the garage.

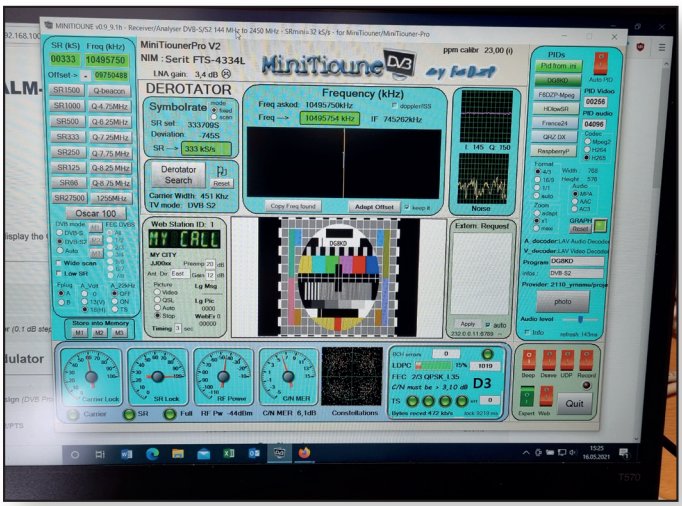


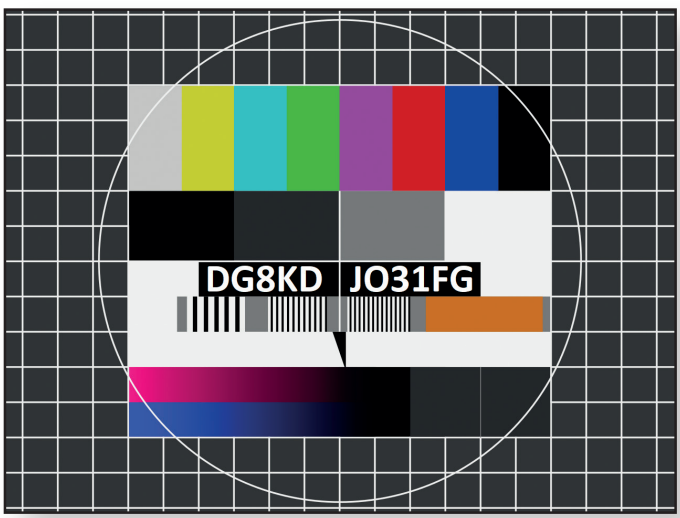
Shown in the picture above is my first attempt to send 1Ms in DATV QPSK in H.265.

I was astonished how easy it was to get it properly working on the satellite. Setting up the station step by step, checking each and every component separately has reduced the risk of failing significantly.

It took longer to be ready for transmitting, but the first attempt has been a success so it was a wise decision to spend the preparation time.

Next steps will be adding the Winterhill receiver, inserting a HDMI switch to add a camera for live footage and setting up OBS for live broadcast.





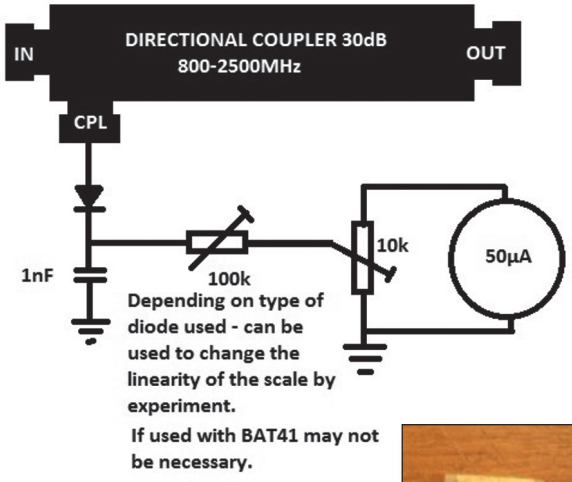
Simple single range high power meter for 23cms or 13cms

Jim G7NTG

This article describes how to build a simple, low cost power meter and is aimed primarily at QO-100 DATV users who need to measure high power levels when testing or operating at 2.4GHz. It can also be used for 23cms DATV and can be calibrated up to 200 Watts (or more if you push the rating of the directional coupler).

It uses a cheap directional coupler as the heart of the unit – the one I use is an 800-2500MHz , 20 or 30dB , 200W coupler that can be obtained for around £11 on Ebay and other sites. The meter is a cheap and cheerful Chinese 50uA movement which can be obtained for less than £5.

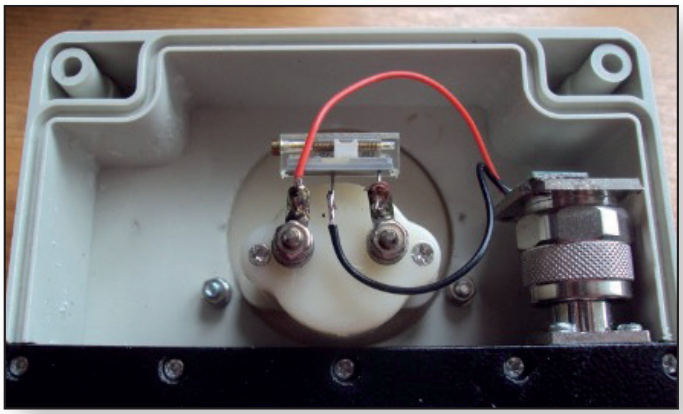
I use a BAT62-02 diode as the detector because of its high voltage withstand and reasonable linearity at high power levels. It is also possible to use a BAT41 for a more linear scale. A 1N5711 will also work.

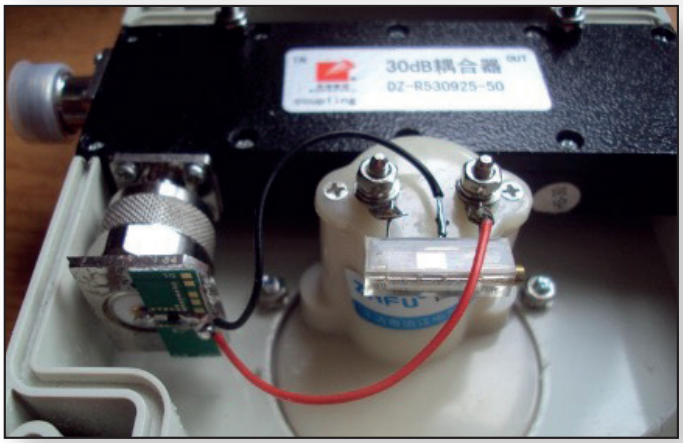


The detector and 1nF cap are mounted on a scrap offcut of PCB on the back of a sawn off N plug to make it small enough to fit in the box I used. The preset is a 10 turn 10k and is fitted on the back of the meter.

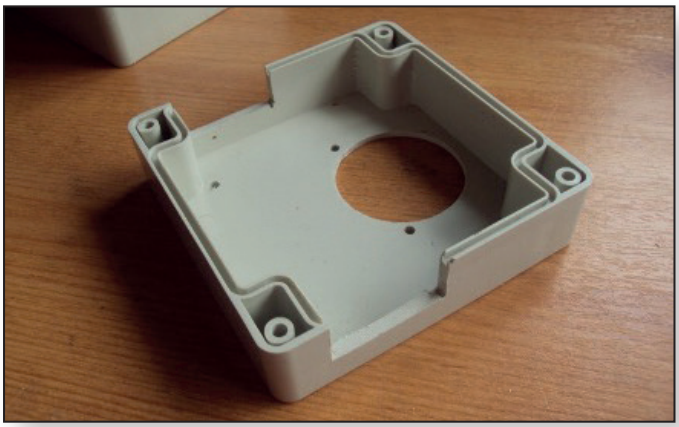
An additional resistor may be fitted between the diode and the preset if the preset is having to be set to the extreme lower end. This will also affect the scale linearity.

By experimenting with the resistor values the scale can be made nearly linear to nearly logarithmic depending on your preference.





In my version, the case used is a 120 x 120 x 90mm ABS box which is available from Ebay for about £7. I cut two rebates in the box to be a snug fit for the coupler and used 2 x M4 screws to secure it in place. I also cut a 50mm round hole for the meter using a Q-Max cutter.

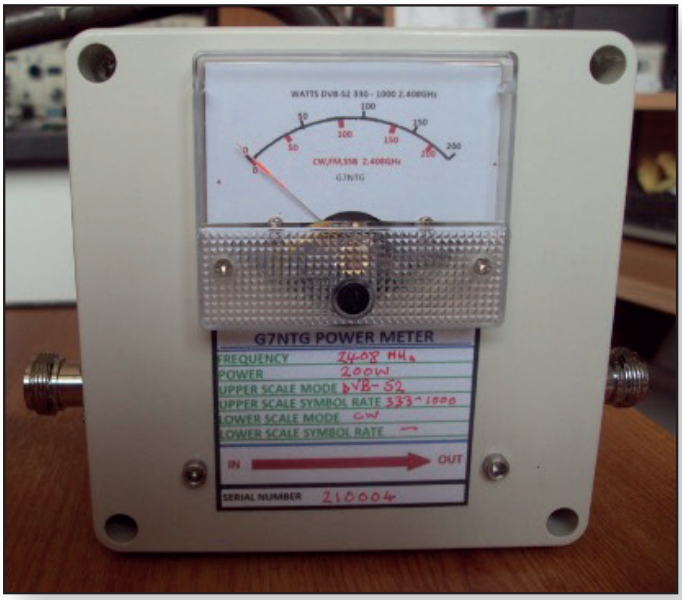


When testing, it is sometimes necessary to adjust the coupling of the directional coupler by means of the socket screw located under the QC label. If this screw is a bit gummed up , it might be necessary to dismantle the coupler to get at the screw from the inside.

The meter then needs calibration against a known, accurate meter. I use a 250 watt 20dB Weinschel attenuator driving a 10 watt 10dB attenuator, driving a 20dB Marconi attenuator into an HP432A + HP478A power meter.

(these are calibrated with my HP435A + HP8484A power meter so I know my measurements are within a couple of percent)

Because of this, I reckon to be able to calibrate within +/- 5%



The meter is then calibrated for the required range(s) using the original 50uA scale.

I then do a bit of magic using Windows Paint to produce and print a new scale which is printed on an adhesive label (using print scaling).

The meter cover and scale are then unscrewed carefully and the new scale label stuck on.

The meter is then given a final calibration trim to allow for slight positional inaccuracies.

A label is also printed for the front of the meter.

Building of this meter is simple and straightforward but calibration can only be done using a power amplifier and very good test gear so if you build one , you will need to get it calibrated by someone with both the equipment and the extreme patience needed to do it!

The meter can be made for whatever single frequency and power you like , providing you can get a directional coupler to suit. A reasonable limit ,though ,is about 2.4GHz because of the diode used in this case.

I would be happy, for a small charge, to calibrate meters that anyone has built for up to 150W at 23cms and 300W at 13cms.(as long as the meter is of a type whereby the scale can easily be removed)

Scaling for DVB-S2 is a bit of a problem because the linearity changes from symbol rate to symbol rate although 333-1000 rates are all nearly the same.

I usually do a scale for DVB-S2 and a scale for CW on the same meter but scales can be mixed like one for 125s/r and one for 66s/r.

No two meters are the same so each one has to be calibrated individually.This would explain why commercial meters can be miles out on calibration.

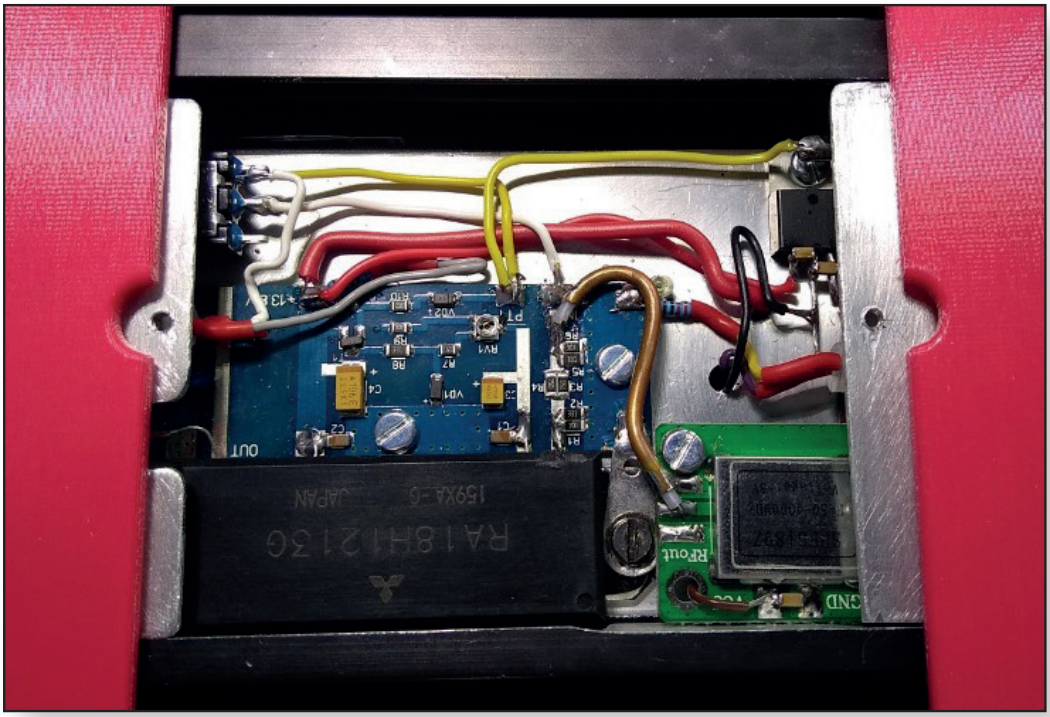
I can build you one for £55.00 + £8.00 postage and packaging but I will need to know the following;

- Frequency
- Maximum power
- Upper scale mode
- Upper scale symbol rate
- Lower scale mode
- Lower scale symbol rate
- Input on left or right.

Email me at *thebigclunk@virginmedia.com* with any quote requests so that I can tell you whether what you ask for is possible.

The 'Boxer', a brick amplifier for 24cms
...and other projects!

Gareth G4XAT



Based on how well these newer mosfet-based modules work on six and four metres, I acquired one for 1300MHz from Aliexpress, a (RA18H1213G). This seems to give about 8 watts of DVB-S/S2 with 20 dB of gain.

The control board came from the transverter store on eBay. Looking through my box of heatsinks I happened across an old TO3x3 Redpoint unit that I had widened on one side by a quick trip onto a milling machine equipped with a fly-cutter.

The metalwork to fix the brick module wasn't very tricky. It involved drilling and tapping five M3 screw holes. The module, like its 4m counterpart, needed the back sanding flat to compensate for the offset of the fixing lugs. Five minutes on my inverted belt-sander did the job.

For cooling, I decided to go for my favoured 'ducted fan' approach so ordered five 30x30 miniature fans (under a £5 delivered - these are popular with 3D printer enthusiasts). Top and bottom aluminium lids were formed, 1.6mm on the top side and 0.9 on the underside. End plates were also made from some 1.6 alloy and secured to the heatsink with M2.5 screws.

These panels mount the power on/off and LED, PTT phono in, RF input and at the other end, a bias switch (wired in parallel with a phono to liaise with my Portsdown PTT) and another red led so I know when it's biased on.

Some CAD work produced end plates that trapped the alloy top and bottom sheets, shielded the switch toggles a little, and mounted the four fans. They all run together, but depending on noise levels I may add a dropper resistor which, if things get too hot, will be shorted out by a TO220 thermal switch. The increase in fan noise acts as a useful reminder that you have been on-air for five minutes.

As it was intended for /P use (well, 12V anyway), and possibly up a mountain, I wanted it to be fully drivable from a Pluto in either DATV mode or Langstone NB mode. Initial trials with a single SPF5189 eBay preamp board showed I could drive the amplifier to saturation so one was permanently fitted on the input side, fed from a 7805 regulator.

Output filtering will be taken care of externally by a three-pole interdigital that I acquired along the way.

Why 'boxer'? Well, it's a 'FLAT-4' (OK, fans not pistons!) so why not?

Adventures with pipe cap filters.

There is a strange fascination using plumbing parts for make high-grade microwave filters and based on this excellent article *http://www.w1ghz.org/filter/Pipe-cap_Filters_Revisited.pdf* I felt inspired to try. I stocked up with some pipe-caps ('end feed stop ends' in plumbing speak) from eBay and Screwfix (always worth comparing) and some M4 and M5 brass screws.

My first cap (28mm) tuned to 3.4GHz and 2.4GHz and using the SATSAGEN analyser/generator showed minimal insertion loss.

Inspired by this, I tried a 22mm cap and found it could be tuned to 5.66GHz. At this point a 'bag of goodies' from eBay arrived, containing what I thought was three types of high quality Piston trimmers.

One third of the bag turned out to be finely adjustable piston assemblies, perfect to building pipe-cap filters. These worked just as well so I wondered what effect adding a 'head' to the end would have.

This greatly dropped the lowest frequency attainable, to around 1.05GHz. All in a 28mm pipe-cap. Insertion losses remained very low (I don't have precision gear) but it does allow for some very tight filtering on either pre-drivers or receiver front ends.

Probe length does, as the article suggests, alter the rejection and bandwidth, so start long and trim short, or use SMA sockets with long centre pins. They can also be made with hard-line coax feeds. Using some double sided FR4 allows careful soldering inside the cavity and outside where a substantial fillet can be formed.

Picture shows sundry parts including wipe-on silver plating and the modified 'piston' trimmers. The big clip is enough to quickly secure the cap the baseboard for experimental tuning.

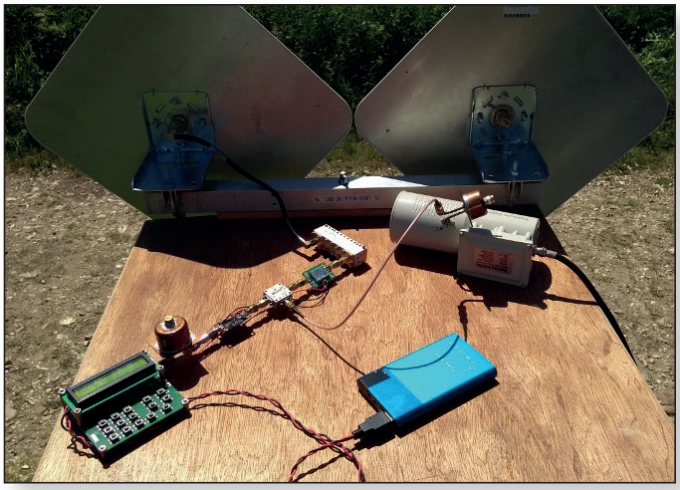
A quick approach to receiving DATV on 5.66GHz.

Having developed a portable solution to sending and receiving FM TV on 5.66GHz, I started exploring if I could do DATV too.

Wonderful as the Portsdown4 is, the Pluto stops at around 4.3GHz due to 'something in the code'. However, using Express DVB Transmitter software from Charles G4GUO all seems well and I was able to decode what I was sending using a second Pluto and SDRAngel/AmsatDVBS-GUI.

So how to get it down to the range of a Minitiouner, preferably with some gain en-route?

I have a C-band Titanium LNB for receiving on 3.4GHz, so I hatched a plan.



Why not use the LNB as a gain and filtering stage whilst also down-converting to something Minitiouner could cope with?

But how to feed the signal into the LNB?

I tried making a 'cantenna' (to designs found on the www) that fitted into the end of the LNB. It worked, sort of, but I think there were all sorts of strange reflections going on. Next I tried adding the quarter-wave probe I made for the cantenna to the LNB, spaced the same as the two existing H & V probes.

It worked, but how did I get the 5.75GHz down to 3.4GHz? By using a microwave mixer (MO44P in this case) and an eBay 3.5-4.4GHz DDS as the LO.

This proved the concept worked so it was just down to a bit of refining really. I suspected that my LO drive was a bit low, so using a SPF5189Z amplifier board from eBay, and a switched attenuator, I tried different drive levels.

This netted me a further 1.5dB MER improvement. From the same vendor, it listed 5-6000MHz amps too, so feeling more than a little hopeful, I ordered one of those too.

When it arrived I took the tin-plate lid off and found a 12GHz rated device (well the part number checked out as a 12GHz device).

This was fitted between the little LPY I was using for tests and a bandpass filter. This gave me a very useful +5dB MER.

At this point I had the Pluto power right at the bottom of the slider, so I was pleased with this. Further refinements were added in the form of pipe-cap filters fitted at the LO output (2360MHz) and also at the input to the LNB probe (3.4GHz).

Other than the maths involved, it works very well and I think won't be short of gain. For the TX chain I was lucky to find one of the 10W Ferranti International amps which go well with the WB FM gear too.

Field action should prove it, as indeed it did, with a successful two-way with Dave G8GKQ on the Sunday of the IARU contest, when I was able to reduce the power to a quarter of what I started with.

The flat plate antenna worked very well, proving much wider than a dish with 22.7dBi of gain - according to the label.

Out and About...

▶ G8GTZ

▶ G4XAT

▶ G4XAT

▶ G4FRE (above and left)

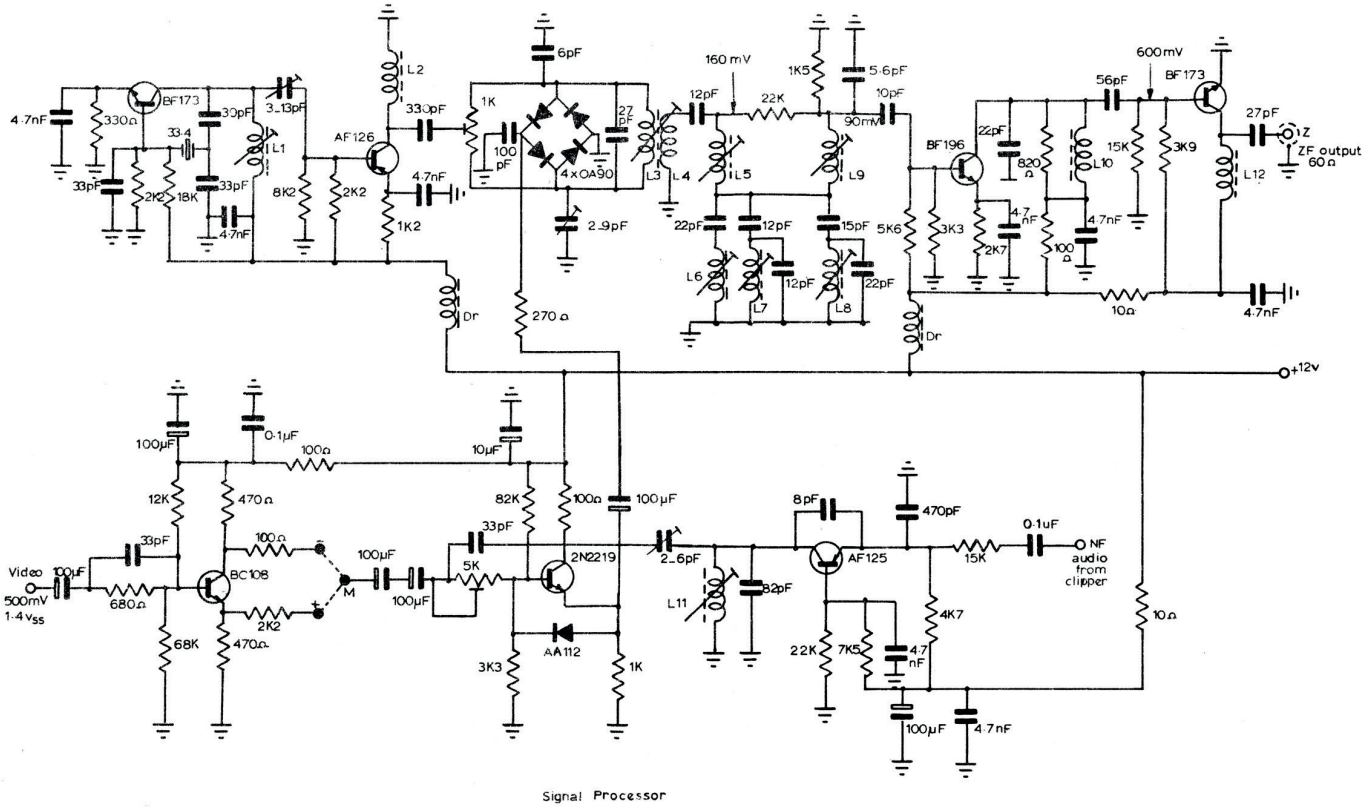
▶ G4KLB

Turning Back the Pages

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

Peter Delaney - G8KZG

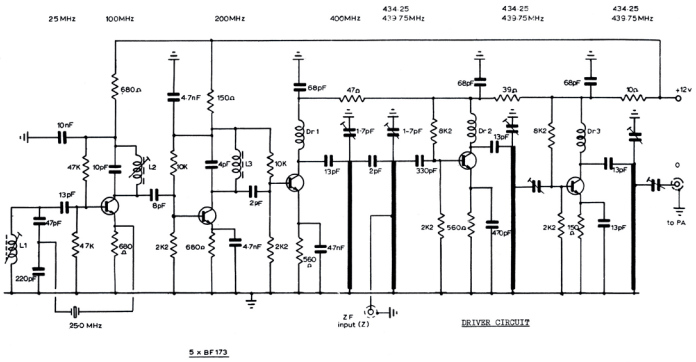
CQ-TV 83



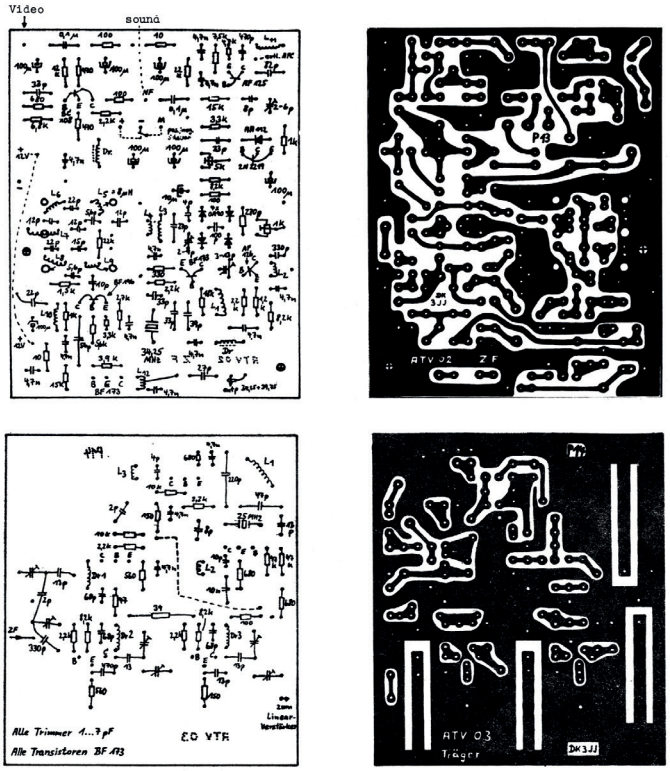
CQTV 83 appeared in September 1973, and reported that the BATC equipment register had been operating as a service for members for a year. The idea was that a filing system recorded members' 'wants' and their 'surplus items', putting members in contact when a match was found. A note was added to say "don't worry if your request seems to be for the most unlikely piece of gear, it may still be possible to find it". The BATC on-line forum, where 'sales and 'wants' can be listed, did not exist then, of course. The main technical article was for a 70cm television transmitter. There were 3 main sections.

The signal processing board accepted a standard video signal, fed to the BC108 (lower left), which could supply inverted or non-inverted video to the next stage, (to give a choice of either positive or negative modulation) whilst the audio input was used frequency modulate the AF125 oscillator (lower right). The video and fm audio signal were combined at the base of the 2N2219 (lower middle), and passed to the ring modulator based around the 4 diodes above it. The other input to the ring modulator was from the crystal oscillator (top left), and the resultant modulated IF signal then had two stages of amplification before passing to the next board.

This comprised a crystal oscillator (left), which was multiplied in the following two frequency doubler stages to 400MHz. The tuned circuits for the following stages were all made by tuned lines etched on the circuit board. Onto one of these was injected the IF signal from the signal processor board, the 4th transistor acting as a mixer stage, and a following amplifier stage gave around 7mW for the PA. (The frequencies shown at the top of the diagram represent the carrier for video and audio - the 5.5MHz difference is due to the audio subcarrier produced by the AF125 stage - the design originated in Germany, where that was 'standard', but 6MHz was normal in Britain).



Circuit boards were made available - the signal processor one is shown top, and the rf driver board below.



The third part of the design was for a PA stage. It was designed around a 2C29A triode valve, which was chosen as it was 'available', but that did limit the types of video signal that could be sent.

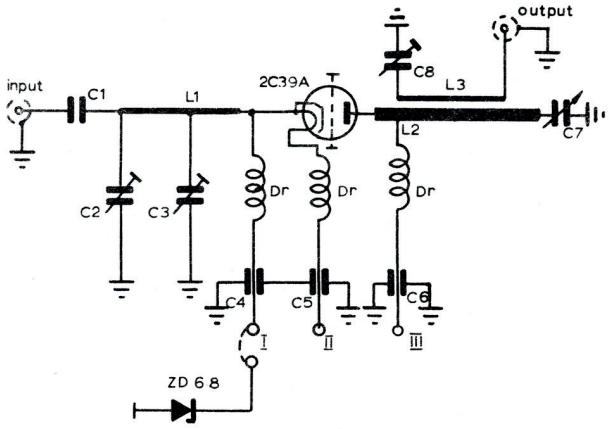


Fig. 1. 70 cm_PA.

Details were given of the arrangement of the parts for this, the dimensions of the various sheet brass parts also being shown.

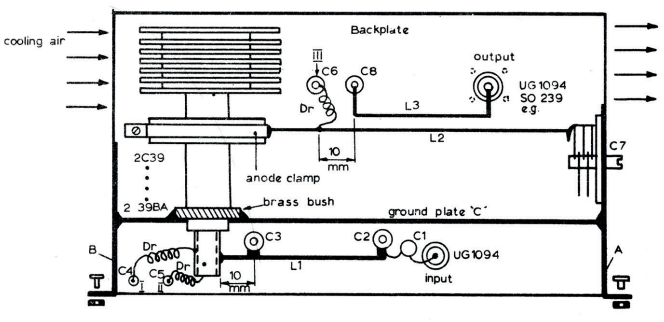


Fig.2 Construction and assembly of parts

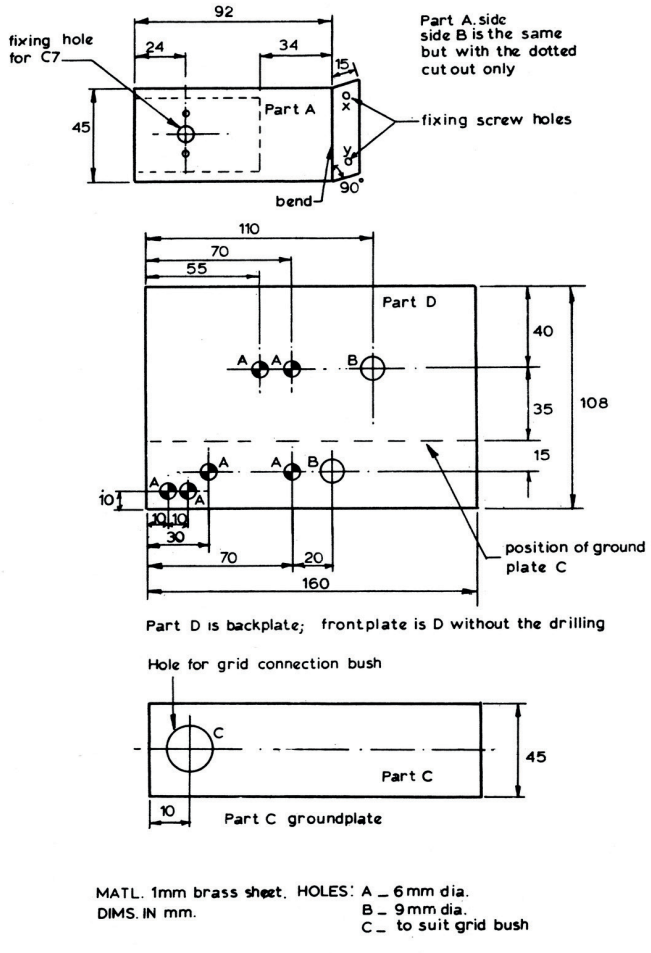


Fig.3. Details of metalwork

It is of course essential to be able to check the output of any transmitter, and John Lawrence's Circuit Notebook included a design for an absorption wavemeter for use on the 70cm band. To create a suitable tuning capacitor, a standard Jackson unit was modified by removing all except one rotor vane and a pair of the stator vanes.

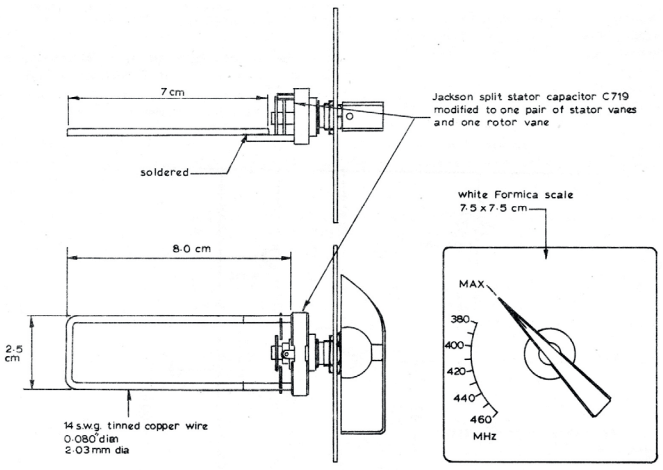


Fig. 2 70 cm ABSORPTION WAVEMETER

John also showed a circuit to drive the field scan coils in a camera, typically providing a peak - peak scan current of 30 - 40 mA - the circuit values being designed to give

the best linearity for the required output swing. The timing capacitors C1 and C2 were charged through R3 and R4, being discharged by the field drive signal switching Tr1 (and thus locking the oscillator to the station timing pulses).

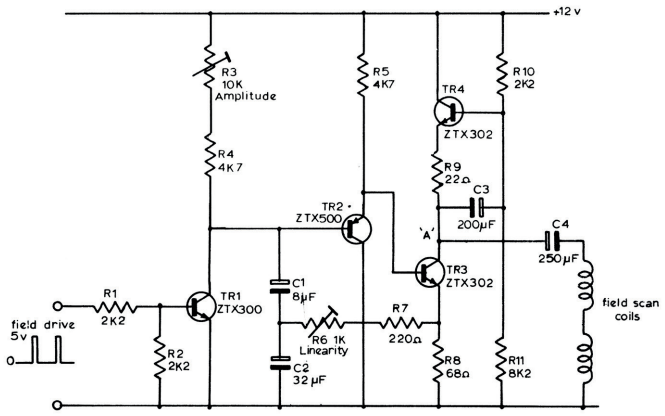


Fig. 1

Arthur Critchley was coming towards the end of his series on TTL logic circuits. This time he considered the bistable circuit - or rather circuits, the from the basic set - reset (R-S) type, through master-slave versions, to the D type latch, which could be used as a temporary data store. By linking bistable circuits together, shift registers or counters (not limited to a binary ratio) could be created. Arthur showed the pulse trains to be expected at each stage - it seemed a 'different world' to what had gone before. The circuit ideas would have many applications for amateur television - in particular for sync pulse and test pattern generators, but also, for example, to store the 'last button pressed' data on vision switchers.

Arthur had been one of those who took equipment to display on the BATC stand at the RSGB's VHF Convention, including a circuit to display seven segment number on a monitor screen. Malcolm Sparrow had an off-air receiver on display, and showed video tapes of atv pictures he had received, both at his home station and at the CAT70 event in Cambridge, whilst Dave Lawton exhibited his call sign generator, a sync pulse generator, and test pattern generators. The advantage of members having used the same club standard for inputs and outputs meant that the various pieces of "equipment worked well together".

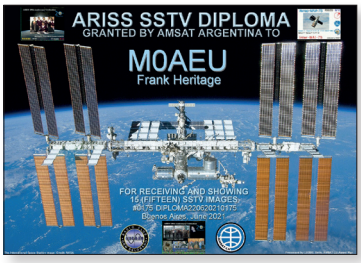
The members' postbag column included a report from Doug Laver, VK4ZDL, in Queensland, Australia, who had managed to transmit stable, if somewhat snowy, pictures over a 20 mile path using just a 5W output. On a different mode, there was a plea from G3WW, Richard Thurlow, in Cambridgeshire for more activity to take place using slow scan television on the 40m band. He was aware of some SSTV work taking place on the 2m band, using single sideband. *(ED - and it still does today, although using FM - see the pictures from the ISS below!)*

The editor also made a plea to the members - "You must have realised by now that almost all the articles we publish are written by the same old names. And very good they are too! But don't you think that a few new names should appear to augment the old ones? Some of you members must be doing something that everyone else is just dying to hear about. Perhaps you organised a portable expedition, or have designed a new type of camera, or some new gadget which everyone should have. Then write it up! Send it to the editor! We need your penmanship more than you realise". The types of gadget, the technology used, and modes of operation may have changed, but the message is as relevant now as it was then!

Slowscan TV from the ISS

Frank, M0AEU

Periodically the ISS transmits a series of sstv images - sometimes for just a few hours, and occasionally for several days. From the 21-27 June one such series of 12 images was transmitted. The format is PD120 and there is a gap of approximately 2-3 minutes between images, so it's only possible to receive one or two complete images on a pass. Here are a few of the images received by Frank, M0AEU.



Several organisations also produce online certificates on evidence of receiving reasonable quality images.

The British Amateur Television Club

Out and About

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

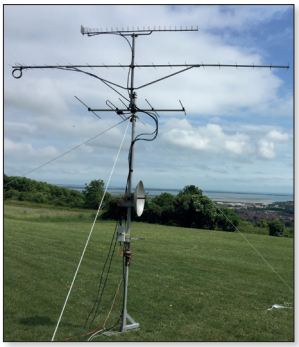
BATC CAT 21 *21/22 August* *Midland Air Museum Coventry*

Many amateur radio rallies have been postponed or cancelled.
We will show any that will be running in the next issue.

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

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

Activity Weekends & Contests



2021 Activity Days:

July 10/11	*Low Bands Activity*
There are no Activity Weekends in August due to the CAT	
September 11th - 12th	*50 MHz to 1255 MHz BATC Contest.*
	Please check Forum for details.
October 2nd and 3rd	*2.4 GHz to 76 GHz Activity Weekend*
November 6/7	*All Bands Activity Weekend*
Dec 24 - Jan 3 2022	*Christmas Activity Ladder*
	and the Repeater Activity Contest

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