The British Amateur Television Club

CQ-TV

No. 273 – Autumn 2021

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CAT21 delegates at the East Midlands Air Museum

… and much more inside!

CQ-TV 273

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Contributions

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

Alternatively you can write to us at:
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Contributing authors should note that we aim to publish CQ-TV quarterly in March, June, September and December.

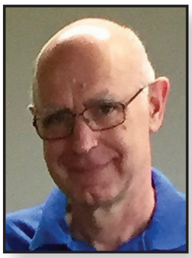
The deadlines for each issue are:
Spring - Please submit by February 28th
Summer - Please submit by May 31st
Autumn - Please submit by August 31st
Winter - Please submit by November 30th

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.

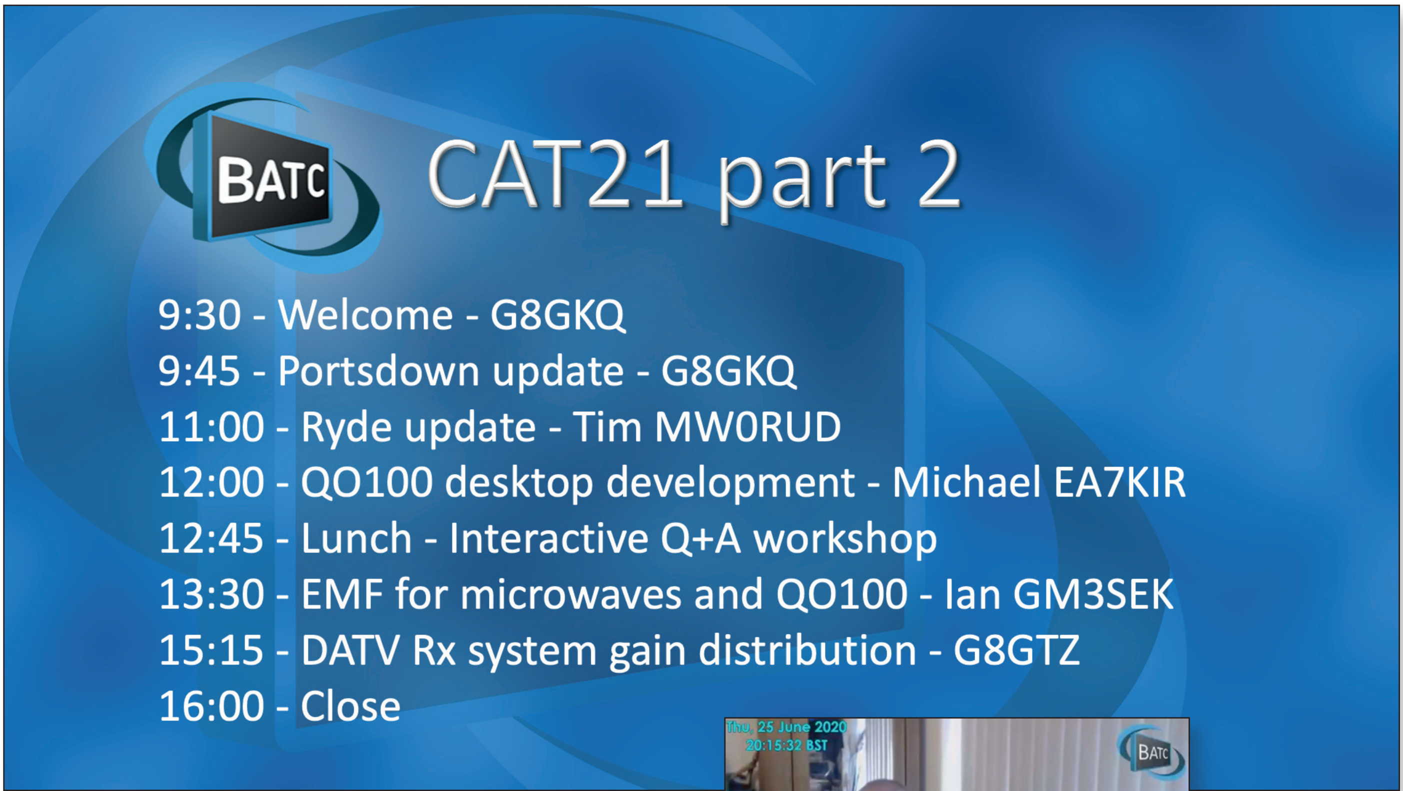
Please note the implications of submitting an article detailed in the 'Legal Niceties'

Printed in Great Britain. ISSN 1466-6790



From the Chairman...

Dave Crump G8GKQ



It was great to meet so many members at the first part of CAT 21 in Coventry last month. I was particularly impressed to see so many home constructed projects and to hear the enthusiasm for building more.

Part two of CAT 21, which will be held online on 16 October, should provide some useful information on EMC and receiver design – both new subjects. In addition we will be providing updates on the Portsdown and the Ryde projects.

The Thursday night QO-100 net continues to provide a community focus for amateur television in the UK. To overcome the fear factor or stage-fright, we now encourage first-timers to join us on the first Thursday of each month. So if you are active on QO-100, please do not hesitate to join us. Even if you do not have QO-100 equipment, you can keep up to date as the proceedings are streamed on the BATC streamer and, thanks to Tim MW0RUD, are recorded and posted on YouTube after the net.

Looking ahead to next year, we hope to hold an in-person general meeting, where there are likely to be a number of vacancies for committee members and posts. Please consider whether you would be able to volunteer some of your time to shape the future of the BATC.

▶ *Some of the stations on the QO-100 net*

The Listing

new and renewing members

Rob Burn G8NXG

Another edition of CQ-TV has come around and before I add further comments I must offer an apology to those members in France listed in the previous edition of CQ-TV, 272. I was somewhat mortified to be advised just after the edition was published that the listing had all the French members listed under Denmark! Once I looked at the list in the magazine, realization dawned – the all important sub-heading 'France' was missing!

I had missed the fact that the sub-heading was missing from the proof before it went to press! Sorry!

As to the current listing, provided that I have not made any similar mistakes it should be correct. As regular readers will know, the list relates to those members who have signed up or renewed memberships during the three months to 31st August; accordingly once joined you only see your details again when you renew your subscription.

You might consider this as being of limited use. However, if nothing else it confirms your membership and over time builds up a list of who might be in contact distance. As I only include a short version of a members address, do contact me should you need clarification. Similarly, if you wish to contact a member local to you, just send me the details so I may be able to organise an introduction. My contact details are on the inside cover of the magazine.

That's it; many thanks to all new members and also to those who continue to support the club.

Australia		
Denis Pittaway	VK3YLH	Belgrave Heights
Bob Reid	VK3BVR	Box Hill North
Mark Stephenson	VK3PI	Bundoora
David Hopkins	VK4ZF	Capalaba
Tony Falla	VK3KKP	Castlemaine
Richard Searles	VK3VRS	Fountain Gate
Robert Hensel	VK3EHT	Geelong
Graeme Parr		Melbourne
Peter Fauth	VK4NBL	Murray Bridge
Nick Tebneff	VK5NT	Pages Flat
David Carwana	VK5DMC	Port Pirie
Robert Williams	VK3IE	St Albans
John Munro	VK3JMC	Wangaratta
Bevan Daniel	VK5BD	Whyalla Playford
Austria		
Peter Stiassny	OE1PYW	Pressbaum
Werfried Kuneth	OE8FNK	Villach
Kurt Baumann	OE1KBC	Wien
Belgium		
Albert Buysse	ON1CGB	Deinze
Eric Sierjacobs	ON5NU	Gent
Edward Vrolix	ON7VR	Kalmthout (Dorp)
Gabriel Libeer	ON5FH	Oostakker
Rudy Pycke	ON6PY	Oudenaarde
Lucien Brouckaert	ON7TU	Pittem
Luc van Achte	ON4AOL	Stekene

Canada		
Terry Moorby	VE3DIJ	Ottawa
Denmark		
John Lund	OZ2JY	Aalborg O
Peter Bystrup Jensen	OZ1PBJ	Aalestrup
France		
Grillere Jean-pierre	F6BIG	Annecy
Andre Ledentu	F1JNZ	Besançon
Francis Sarot	F6AWS	Carvin
Jerome Alus	F4ANJ	Creon
Jouan Francois	F1CHF	Franconville
Crouzy Bernard	F1CYK	L'Union
Rolf Collette	F9ZG	Saint Gilles
Wittmer André	F1FDB	Sarrewerden
Combe Mathieu	F4FEH	Villeneuve les Bouloc
Germany		
Gerd Kellner	DB9PQ	Bell
Hans Haller	DD5KP	Berlin
Jörg Hedtmann	DF3EI	Blankenfelde
Thomas Bäker	DL5BCA	Brake
Frank Kremer	DL3DCW	Ennepetal
Michael Purkert	DH6MEG	Gilching
Sven Strößner	DH8NAS	Helmbrechts
Helmut Volpp	DL9SDL	Mainhardt
Walter Jonat	DK1ZA	Molfsee
Rolf-Dieter Klein	DM7RDK	Munich
Wilfried Ornowski	DL9YDC	Raesfeld

Claus Prantner	DK6TE	Reutlingen
Andreas Lock	DG8AL	Wannweil
Ireland		
Don Kelly	EI8DJ	Crosshaven
Martin Evans	EI2KZ	Waterford
Italy		
Renato Campo		Paceco
Giovanni Paolo Paleari	IW2NSA	Cabiate
Mariano Mezzetti	IW0DVV	Civitavecchia
Roberto Mascitti	I6JEH	San Benedetto Del Tronto
Netherlands		
Rob Derlagen	PA1EMT	Alkmaar
R Verkerk	PH0RVK	Almere
Alle de Jong	PE0AJF	Den Hoorn
Robert Kardol	PA1RK	Ede
Remco Andriessen	PE1RBU	Hilversum
Randall Tamminga	PE1SDE	Lelystad
Hans Den Bode	PA3ETK	Lopik
Hans Holtkamp	PA3CGN	Losser
Peter Bakker	PA0CDY	Noordwijkerhout
Jaap Zondervan	PA0OLD	Sint Annaparochie
Joris Vrehen	PE1GLX	Waalre
Ruud Pels	PA7RP	Zoetermeer
New Zealand		
Tony Reynoldd	ZL4TAO	Albert Town Wanaka
Michael Sheffield	ZL1ABS	Auckland 0629
Keith McRoberts	ZL2TKM	Nelson
Norway		
Hans-Petter Falao	LA9UI	Tromsø
Arvid Andreassen	LA7QM	Tromsø
Poland		
Slawomir Szymanowski	SQ3OOK	Ostrów Wielkopolski
South Africa		
Cor Rademeyer	ZS6CR	Secunda
Spain		
Antonio Navarro	EA3CNO	Barcelona
Alberto Martinez Salcedo	EA9AN	Melilla
Juan Piqueras	EA3TA	Sabadell
Planas Jaume	EA3NE	Terrassa
Sweden		
Jörgen Overgaard	SM4WWG	Fjugesta
Ulf Hansson	SM7EGM	Ystad
UK		
Bill Cardno	GM0NRT	Aberdeen
Pawel Markiewicz	M7TSA	Abram, Wigan
Graham Felton	GW0FEM	Amlwch
Ralph Moyle	G0UWB	Banbury
John Manley	M1CNJ	Banbury
Roland Rodgerson	G0OUC	Barnsley
Barrie Ford	G0EYF	Barnstaple
Robin Vince	G8DRK	Bath
David Cromie	GI0WCE	Belfast
Peter Morys	G4HQX	Berkeley
Tony Walker	2E1TBW	Birmingham
Nick Isherwood	M0NJI	Blackburn
Steve WIlliamson	G3WGU	Blackpool
David Philip	M1ALX	Bodmin
Russell Tribe	G4SAQ	Botley
Clive Greenwood	M0HHF	Boughton
Viv Green	G1IXE	Bristol
James Colwill	G0DQH	Chandlers Ford
Peter Townrow	G6LTB	Cheltenham
Graham Jones	G3VKV	Cheltenham
Stuart Withnall	M0GPC	Cheltenham
Chris Grohmann	G4SDG	Cople
Barry Sankey	G7RWY	Coventry
James Welsh	G4YLB	Darwen
Kenneth Aspden	G8WZW	Darwen
Peter Hull	G4DCP	Denmead
Clive Graham	G3XIG	Dorchester
Kevin Wheatley	M0KHZ	Egremont
Alec Jefford	G8GON	Exmouth
Jason Flynn	G7OCD	Felixstowe
Keith Parker	G8SYA	Gillingham
Gordon Findlay	GM7VYR	Glasgow
Michael Rainbow	G6OTP	Gloucester
Matthew Miller	M0DQW	Great Missenden
Stephen Hedicker	G8XJO	Greatham
David Pykett	G0IIQ	Grimsby
Peter Kozlowski	M6LFP	Grimsby
Simon Kennedy	G0FCU	Guildford
David Warwick	G4EEV	Harrogate
Raymond Gifford	G7SGM	Hemel Hempstead
Fraser Stuart	G8FEZ	Herne Bay
Simon Lloyd		Hersham
Michael Scott	G3LYP	High Wycombe
Nigel Finnis		Horsham
Joe Francis	2E0LEM	Horsham

Robin Gape	G8DQX	Ipswich
Mike Bues	G8AAI	Ipswich
David Richards	2E0KSF	Kings Lynn
Stephen Craig	GI8WHP	Larne
Peter Brindle	M3PMQ	Leeds
Paul Elliott	G4MQS	Leicester
Dave Davy	G6EWP	Lincoln
Tony Morris	G0UOZ	Lincoln
David Houghton	G0MXW	Liverpool
Adrian Hodgson	G8UGD	Lower Darwen
David Chislett	G8XCK	Maidenhead
Joan Easdown	2E0HIZ	Maidstone
Ed Payne	G6HZW	Maldon
Paul Entwistle	G8AFC	Manchester
Frank Beesley	G8CZE	Manchester
Graham Turner	M1DHV	Market Rasen
Ian E Shepherd	G4EVK	Melton Mowbray
Mike Edwards	G8CPF	Minehead.
Andrew Garratt	M0NRD	Newark-on-Trent
Michael Featherstone		Newcastle on Tyne
Paul Bowen	M0PNN	Newport
John Tomkiss	M0JGQ	Northampton
Steve Sorockyj	G0LCG	Nottingham
Gwilym Jones	GW6PVK	Nr Wrexham
Anthony Free	G4EYE	Nr. Harwich
Darren Rainer	G4VTQ	Ottery St. Mary
Steve Humberstone	G0ORK	Paignton
Julian Smith	G0NZO	Poole
Andrew Plant	G0MBL	Ramsgate
Simon Watson	M0ZSU	Reading
Alison Johnston	G8ROG	Reading
Phil Hayes	M0PIT	Roade
Geoff Boyce	M1AHN	Ross-on-Wye
David Carter	G8PGO	Sapcote
Sam Whitehead	M0SJW	Sidcup
Steve Porter	G4NHP	Sidcup
Richard Horton	G4AOJ	Solihull
John Mccarthy	G7JTT	Southampton
Mark Johnson	G4ZRT	Southampton
Geo Chaplin		Southampton
Albert Allen	G4DHO	Stoke-on-Trent
Alan Mayhew	G8TQK	Sutton
Dennis Fitch	G8IMN	Sutton Coldfield
John Smith	G3JZF	Sutton Coldfield
Phil Bourke	M0IMA	Swanscombe
Andrew Smith	G7OKE	Tamworth
Derek Blight	G0PGL	Taunton
Ted Bottomley	G4MXR	Thornton-Cleveleys
Andrew Amos	M0VVA	Waltham Cross
Stuart Le Poer Trench-Brown	G7DTG	Warminster
Mike Isherwood	G4VSS	Warrington
Alan Maunder	G7IWA	Waterlooville
John Pryke	G8BXH	Watford
John Marlow	G1ORP	Welshpool
Gary Heald	G0VLJ	Weymouth
Paul Marsh	M0EYT	Wimborne
Martin Dixey	G4OSU	Wolverhampton
Alan Gladding		Woodham Ferrers, Chelmsford
James Johnson	MW6EAO	Wrexham
Pieter Smit	G0LIY	York
US		
Roger Paskvan	WA0IUJ	Bemidji
Richard Peterson	WA6NUT	Buena Vista
Larry Westmoreland	K5PHD	Fort Worth
Charlie Short	K9BIF	Goshen, In
Ronald Fredricks	K8DMR	Jenison
Michael McClanahan		Moore
Jeff Davis	KE9V	Muncie
Paul Fredette	K1YBE	Portsmouth
Stanley Salek	NJ6E	Sonoma
Jim Nagle	KF4OD	West Palm Beach

▶ *Attendees at CAT21 - see the full story and more pictures on page 11*

The Portsdown Newsletter

Dave Crump, G8GKQ

Since the last Portsdown newsletter I have been releasing Portsdown 4 updates every two to four weeks. These have mainly been bug fixes and minor improvements, but the RF power meter (described elsewhere in this issue) is a major new capability.

In support of Noel G8GTZ and Ian G8XZDs' efforts to make Portsdown information easier to find on the wiki, I have been trying to announce updates on the forum, and then provide detailed descriptions of the capabilities on the wiki.

Thanks to Noel and Ian for taking on this task. Please search the wiki before asking your questions on the forum – many of the answers are there.

Portsdown 2020 updates have been limited to bugfixes. Some of the Portsdown 4 new capabilities will migrate to the Portsdown 2020 in time but, while the Portsdown 2020 will continue to be supported, the more powerful processor and single supported large screen on the Portsdown 4 mean that most of the effort will be concentrated on that version in the future.

Transmit video sources and formats

Many of the input modes now work in 16:9 as well as 4:3. This includes the EasyCap composite video input -the widescreen mode is also available for streaming to the BATC streamer.

The Pi Cam image can be inverted for H264 transmissions using the LimeSDR – this allows the integrated cases such as the SmartiPi Touch Pro to be used, where the camera is mounted upside down.

Select the function from Menu three, system config. Note that it is not possible to electronically rotate the transmitted image by 90 degrees (as would be required by some of the other SmartiPi cases).

▶ *The SmartiPi Touch Pro case*

One problem with the SmartiPi cases and other similar plastic ones is that they do not provide shielding from RF "hash" generated by the Raspberry Pi and screen.

They are good for transmitters, but less good for receivers, particularly in portable situations where the aerial is likely to be unshielded from the Pi. In these situations, metal cases are preferred.

I recently found that there were actually three different versions of the Logitech C920 webcam – all externally identical but with different electronics. All three are now supported by the Portsdown 4.

The Logitech C930e, C525 and C170 webcams have some functionality with Portsdown, but do not work seamlessly, so do not buy one expecting it to work. The only recommended webcam is the C920.

Transmit band switching and transverters

When a transverter is selected (from the Band/Tvtr button on the main menu), frequencies are now entered and amended as the IF frequency, not the final transmit frequency.

Although this initially seems counter-intuitive, it is far easier to work with when switching between multiple microwave transverters that are usually used for narrow band operation. Both frequencies are displayed on the frequency button on Menu one as a cross-check. Remember that you set the correct local oscillator frequency for each transverter band from the "set band details" button on menu three.

There are now four band switching logic lines on a Portsdown 4 (as described on the wiki – search "Portsdown 4 GPIO" giving 16 possible combinations. You can now set the integer (in the 0–15 range) corresponding to the band switching output that you want for each band. Again, this is set from the "set band details" button.

Receiver enhancements – search, scan and time-out

There have been some major improvements to the receiver, mainly driven by findings from the IARU ATV Contest in June.

There is a new mode, "DVB-S2 no-scan". If you know the exact frequency of the signal that you are looking for (within 10% of the SR), the receiver will lock quickly to very weak (on the MER limit for the transmitted FEC) DVB-S2 signals without hunting around.

If a signal is received, but VLC locks up or crashes (normally indicated by a blank screen and no signs of activity) due to corrupt demodulated data, you can restart VLC without restarting the receiver. You do this by touching the top left of the screen. This only works in the "receive" and "DVB-S2 no-scan" modes.

You can now set (in the receiver config menu) the width of the frequency scan/search for the "receive" mode as a percentage of the SR.

The default is 50% of the SR which is optimum for most of the time – much better than the wider scan that was originally implemented.

The tuner was set to time-out and reset its search if it did not achieve a lock within five seconds (QO-100) or 10 seconds (terrestrial). This parameter can now be set in the receiver config menu. If it is set to -1, then the timeout is disabled; this is the new default setting.

Receiver volume control

The original Portsdown hardware design included a physical volume control for the audio. The Langstone hardware design does not include this and uses a software-driven volume control.

A software volume control has now been added to the Portsdown receiver in VLC modes. The default volume is "50%" and it can be raised or lowered in 10% steps by touching the right hand side of the screen as seen below. The new volume is stored on the SD Card and remembered between restarts.

Receiver RF input level

The MiniTiouner needs a reasonable input level to operate correctly; the RF input level is now displayed on the parameter overlay.

This is an indication of how much RF power is being sensed by the tuner in a 10 MHz bandwidth around the current selected frequency. As such, it is useless for peaking RB-TV signals, but provides a very good indication of whether the MiniTiouner is operating with the optimum input signal level.

The indication should be above -70 dB and below -35 dB for optimum results. Input levels of below -70 dB are displayed in red to indicate that there might be a problem.

Test equipment menu

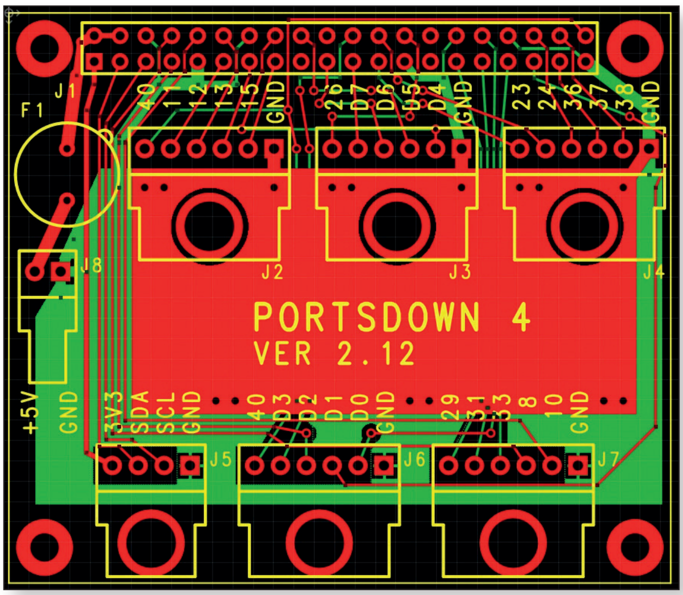
In anticipation of more new features in the future, I have added a test equipment menu, accessed from menu two.

This currently provides easy access to the signal generator, power meter and band viewer. I have also pre-loaded the optimised calculation information for band viewer in new builds, so that the 80 second wait on first ever selection is not required; thanks to Phil M0DNY for helping with that.

Hardware and fault-tolerance

John, our hardware designer, has been working with Colin G4KLB to design a new GPIO Interface board specifically for the Portsdown 4. This enables the Raspberry Pi 4 to be powered from the GPIO connector and provides access to all the commonly-used GPIO pins.

When using the board, care must be exercised to allow sufficient ventilation space between the Raspberry Pi 4 (and any heatsink) and the PCB, as the RPi 4 runs significantly hotter than the Raspberry Pi 3. Stacked extra-tall headers might be a good idea. The PCB will be stocked in the BATC shop when supplies arrive.



Very occasional corruptions of the configuration files used by the Portsdown have had a few users puzzled. I have now added some diagnostic code that prompts the user to do a factory reset if the files do not pass basic checks.

Looking ahead

I do have further enhancements planned, and will continue to support both the Portsdown 2020 hardware and the Portsdown 4. The Raspberry Pi operating system is due to be upgraded soon from Buster to Bullseye. Although this is a familiar process (we have already upgraded the Portsdown from Jessie to Stretch, and then from Stretch to Buster) it will require a new card build for both the Portsdown 2020 and the Portsdown 4. I will take the opportunity at that time to rename the Portsdown 2020 as the Portsdown 3, as the old name is somewhat "dated".

The other major change in the new Bullseye build will be that I will cease using OMXPlayer as it has not been supported by its original author for some time. This will mean that some receive modes and the stream player will need to be rewritten. This is all "housekeeping" which may delay major enhancements until complete.

Throughout and beyond this, older versions will continue to function, but only those built on the latest version of operating system will be capable of being upgraded with any new features.

Please don't forget that I would welcome anyone else to contribute code to add facilities to Portsdown; all the current code is on GitHub and I'm happy to try to integrate well thought out contributions.

Reliability improvement for the Portsdown eight-way RF switch ... or "Remember Ariane 5"

At least two Portsdown users recently reported failures of their eight-way RF switches. In both cases, the switching IC had died soon after assembling their LimeSDR-based Portsdowns.

The eight-way RF switch was designed by John, our excellent designer, for use with the Portsdown filter-modulator board which had a maximum output of about 5 mW (+7 dBm) at 437 MHz. I had developed a frequency-dependent attenuator for the input, which ensured that the maximum output from the on-board MMIC into the switch IC was 50 mW (+17 dBm), well within its absolute maximum rating of 100 mW (+20 dBm).

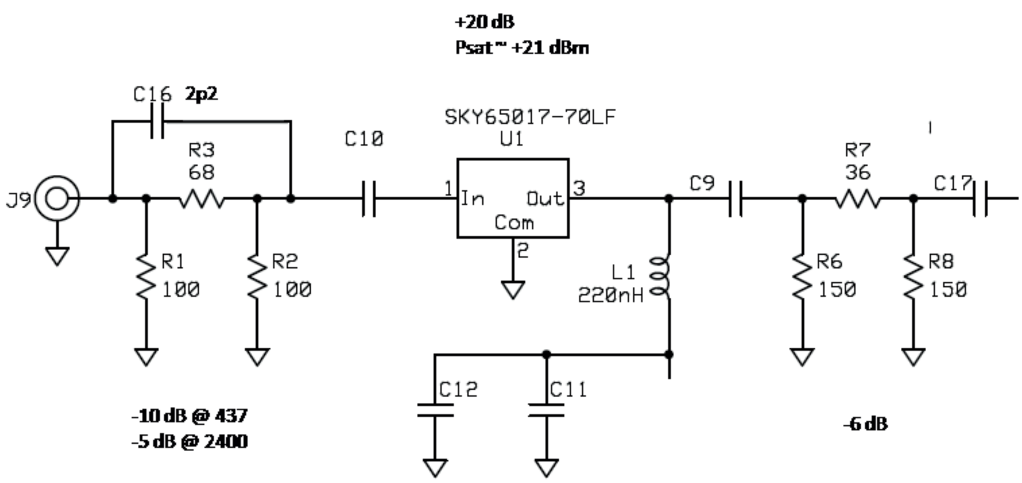
One major problem with using the LimeSDR is that it emits a calibration spike of RF before starting to transmit. It is not worth amending the software to prevent this, as without calibration the SDR will then transmit a distorted waveform which is more difficult for receivers to resolve.

The calibration spike amplitude depends on frequency and gain setting, but in typical usage at 437 MHz can be 20 mW (+13 dBm). Even after the input attenuator on the eight-way RF switch PCB, this is enough to drive the MMIC into saturation with an output power of 120 mW (+21 dBm), above the absolute maximum rating for the RF switch input.

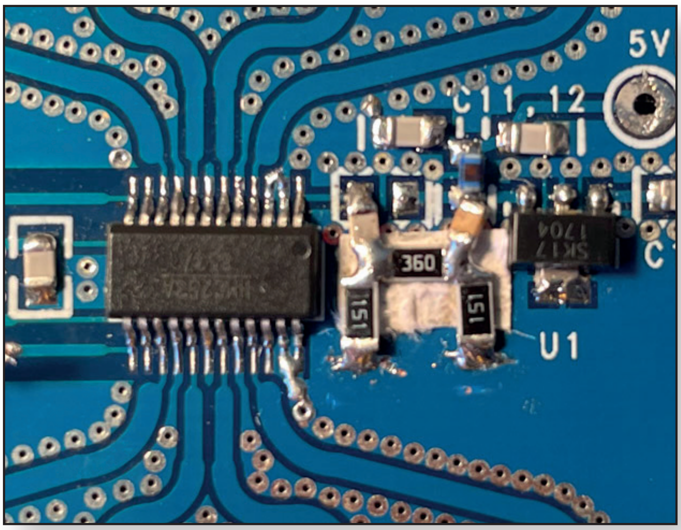
I believe that it was this calibration spike that caused the destruction of the RF switch ICs.

I have designed a modification to the eight-way switch PCB to prevent this happening again. The major change is the introduction of a 6 dB attenuator between the MMIC and the RF switch. This means that, even at saturation, the maximum power delivered to the RF switch is 31 mW (+15 dBm), well within its normal operating range. I have reduced the input attenuation to compensate, so that overall the board has about 3 dB of gain, rising to 5 dB of gain at 2.4 GHz.

▶ *Revised circuit diagram*



The modification can be applied to existing PCBs by removing one coupling capacitor and building a "surface mount" attenuator with DC blocking capacitors between the MMIC and the RF switch. This is shown here.



A new PCB, including this circuitry, has been designed and may be available in the BATC shop.

The performance of the modified board is tabulated below.

The maximum output of the LimeSDR Mini was measured at each frequency, and then the Lime gain was set to a typical operating level of 90. The input and output level were then compared to assess the gain of the PCB. I also checked the typical output of the Pluto at level zero to make sure that it would not cause any problems.

The original Portsdown four-way RF switch does not have any amplification, so does not require modification.

A lesson for me in checking all parts of the system before blindly upgrading hardware.

Ariane 5?

The Ariane 5 rocket was developed from the Ariane 4, which was smaller and less powerful. The designers decided to use the proven and reliable flight control software from the Ariane 4 in the Ariane 5.

However, the first launch of Ariane 5 failed because the designers had not checked the maximum horizontal bias that the super-reliable software from Ariane 4 could calculate, and it turned out that as the Ariane 5 accelerated too fast, the flight control software crashed as the value went over the limit (which was physically impossible with Ariane 4's smaller engines).

Self-destruction was triggered as the rocket deviated from its planned flightpath.

▶ *The failed Ariane 5 Lauch. Photo Credit ESA.*

Freq	LG 100 8W RF Level	LG 90 8W RF Level	LG 90 RF Level	8W PCB Gain	Pluto Level 0 for ref
71	+13.8 dBm	+10.6 dBm	+7.2 dBm	+3.4 dB	-3.8 dBm
146	+13.8 dBm	+10.1 dBm	+7.0 dBm	+3.1 dB	-0.6 dBm
437	+13.4 dBm	+9.8 dBm	+5.6 dBm	+4.2 dB	+1.6 dBm
1255	+10.8 dBm	+7.4 dBm	+4.4 dBm	+3.0 dB	-0.5 dBm
1561	+5.4 dBm	-1.0 dBm	-4.5 dBm	+3.5 dB	-1.6 dBm
2400	+6.2 dBm	-0.8 dBm	-6.0 dBm	+5.2 dB	-5.0 dBm

CAT 21 part one – a report

Rob Burn G8NXG

It was with much concern for members' safety that CAT 21 came together, the idea was first considered by the committee early in the new year and only came to fruition in the days before the event.

Early in 2021 a clear path with regard to Covid and lock-downs was not evident, so the committee shelved the idea of CAT 21 until later in the year. Once it became clear that CAT 21 could be possible in a safe environment the decision was made to go ahead, although the final vote was not made until the Monday before the event.

A few weeks before that, Noel G8GTZ had conducted an on-line survey and it was clear that some members were still not comfortable with attending an in-person event.

Although the BATC constitution called for a formal general meeting, the committee decided that it would not be democratic to hold one when some members would not be able to attend due to COVID factors. It was therefore decided to delay the general meeting by up to one year, so that a more representative one could be held.

That decision paved the way for reserving an appropriate venue and one that came to mind was one of the hangars at the Midlands Air Museum near to Coventry. Since this is a spacious area with a very high ceiling one of the tenets of holding CAT 21 was met and by limiting the number of members who could attend, coupled with an insistence of wearing a face mask, the committee considered that CAT 21 could be held with minimal risk to attendees.

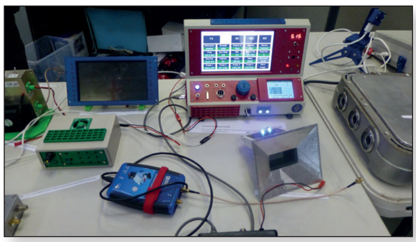
On the day

In order to make as much of the day as possible the plan was to include as many of the traditional BATC CAT attractions as possible. With that in mind, areas had been set aside to provide a number of attractions for ATVers:

QO-100 demonstration - Jen G4HIZ and XYL Joan 2E0HIZ put on a very professional working display of a complete QO-100 system plus a static display of additional transmit/receive equipment.

Portsdown Clinic – hosted by Mr Portsdown himself, Dave G8GKQ who was fairly busy resolving problems or explaining various aspects of the Portsdown DATV system.

Test and Fix – hosted by Clive, G3GJA and Lyndon M0LDR. Inevitably, there was some cross-fertilisation between this and the Portsdown Clinic, particularly as these were adjacent.



Members' show-and-tell: Noel G8GTZ and Gareth G4XAT brought along their Langstone - Portsdown implementations together with a number of 3D printed items from Gareth.

MCR21 – a table was set aside for Brian G8GQS to display artefacts about the 1960s mobile TV van, MCR21, which is currently under refurbishment – or rather a rebuild.

BATC shop – although surrounded by other exhibits, the BATC Shop took up a corner position and provided the opportunity for members to take advantage of rally prices for parts.

Members' bring and buy – about eight tables had been put into use for members to offer goodies to purchase.

Certificates for second and third were awarded to Ian G8XZD and Clive G3JGA. The UK winner's certificate for the June IARU ATV Contest was presented to Noel G8GTZ with second and third places going to Dave G8GKQ and Dave G4FRE. A certificate for the highest-placed fixed station was presented to Malcolm, G0UHY.

At this point, as he had the attention of all visitors, everyone was invited outside for a group photo to be taken and everyone behaved and placed themselves outside near the wing of one of the museum aircraft. (See cover photograph!)

Finally, Dave announced that our president, David Mann G8ADM had been awarded honorary membership in recognition of his outstanding long-term contribution and support of the BATC.

The main dinner event was held at the Old Mill, Baginton, the hotel where most members were staying. As a pub-restaurant, food was slanted toward pub fare and reasonably priced.

At 12 noon, our chairman Dave G8GKQ conducted the awards ceremony and presented the prizes to the winners of various contests during the past year.

A £100 Cheque was presented to the Severnside ATV Repeater Group as a prize for the 2020 Christmas Repeater Contest; this was collected by Shaun G8VPG who also won the Christmas Cumulative contest.

Although attendee numbers were limited, part one of CAT 21 provided a way of meeting up with old friends and ATV acquaintances and a gentle return to a rally, which would have been the first for many for about two years.

▶ *Clive presenting Dave G4FRE with his certificate*

Thanks to all who supported CAT 21 by attending and thanks to those who set up and provided all of the various displays. We are already looking forward to the next one.

▶ *Dave presenting Shaun from Severnside Group with their cheque!*

▶ *Clive presenting Noel G8GTZ with his certificate*

My Station…

Roger Meakins G8HKN

My name is Roger and my callsign, dating from 1973, is G8HKN. I have been a very inactive member of the BATC since 1976.

When I heard there was a chance of receiving DATV from about a third of the world by satellite I was interested again.

On 1 February 2019 my one-metre receive dish, with an Octagon PLL LNB, was installed on the utility room wall of our bungalow and aligned using BBC Arabic on BADR4, which I was watching using Minitiouner while waiting for Es'Hail-2 to come on-air

On the 14th February the QO100 transponder was switched on and I have been watching ever since.

Transmitting took a lot longer.

My 1.2m transmitting dish is positioned between the summer house and the old blue shed using a POTY antenna.. It was aligned by using a cheap LNB to receive the beacon before changing to the POTY.

The PA is one from Jim, G7NTG, and is in the summer house along with the power supply, supplied by James G0GQH and is remotely switched on.

The big orange light is to remind me to turn it off.

Cabling is about 35m of Ecoflex 10 and a two- core PTT cable from the shack to the summer house.

I started off using Portsdown with a Lime Mini then changed to OBS and Pluto.

Power and PTT switching is done in one box.

I can also transmit to GB3HV on 437MHz from an aerial in the loft.

▶ *An essential requirement - weather proofing the LNB!*

Dishes and their feeds

Chris van den Berg PA3CRX

Parabolic dishes are popular within the ATV community as a relative easy way to achieve a lot of gain. It is possible to use the dish for more then one band (even at the same time) so the number of antennas could be reduced.

Gain and reproducibility of a dish is much better than a yagi with an easily-reached gain of of 21 dBi on 23 cm on a 1.2m dish or 27.7 dBi on 13 cm.

Will a random feed placed in the focus of a dish work? The answer is yes. But will it perform efficiently? Probably not, in most cases improvement could be done.

With an amateur friend I once made a large two-metre dish, it contained 16 spokes and aluminium mosquito mesh intended to be used for 11 GHz.

Despite our effort it turned to be out the result was about the same as a 1.2 mtr polyester dish…

▶ *Two-metre diameter dish for 11 GHz made by PA3CWS and PA3CRX*

When the first DBS transmissions via satellite started, we received these signals with the lid of a casserole as a dish although the shape of the lid is not even parabolic.

These examples shows that even a bad antenna is better then no antenna. Properly thinking ahead and understanding the basic principles could even result in a good antenna.

Antenna gain

The total gain of a dish is defined by the effective size of the reflecting surface and the efficiency. An efficiency of 50 to 60% is rather normal with parabolic dishes.

If the dish will be rather small compared to the wavelength a large part of it will likely be blocked by the feed. This reduces the effective size of the reflecting surface of the dish. If this is the case, the feed could be kept out of the beam of the dish by using an offset dish instead of a prime focus dish. In fact, an offset dish is just a part of the prime focus dish.

General rules of thumb which define the efficiency:

- Shape accuracy of the reflecting surface (should be <1/10 wavelength compared to the shape of an ideal parabola)
- Openings in the reflecting surface (should be <1/10 wavelength)
- Equal illumination with the beam (from the focus point) of the total surface of the dish (normally dropping to the edges to -10dB, for EME to -20dB). Spill-over or over-illumination means a part of the signal is lost over the edges; under-illumination means you are not using the whole surface of the dish

As can be seen, 'wavelength' shows up a few times meaning efficiency will drop at a certain frequency.

On the other hand; a dish that is designed for usage in the 13 cm band will still give a lot of gain in the 9 cm band because of its size despite eventual loss in efficiency.

If efficiency drops, for example from 50 to 25%, it looks a lot but is it is only 3dB.

It is often taken for granted that the position of the feed is in the focus point. Or at least we think that if we make the position of the feed adjustable, we will be able to adjust to the highest gain. This implies it is the position also determents the efficiency, not only the gain but also the radiation pattern.

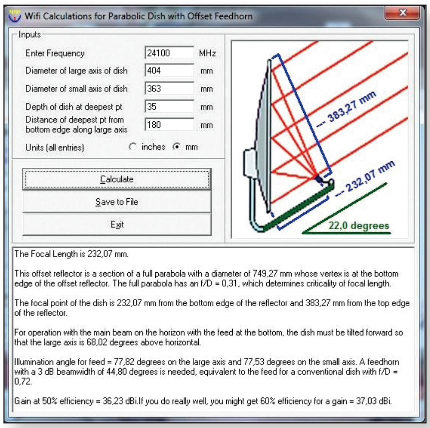
Position of the feed is more critical in case of deep dishes (low f/D) compared to flat dishes (higher f/D).

Adjusting of the position could also compensate for over- or under illumination, without being aware of this. For example, if the angle of the beam is to small to illuminate the dish properly will it illuminate the dish more if it is positioned farther from the dish. However, then is it no longer in the focus point.

If the feed is much to close or to far from the focus point, you will even notice that the physical pointed direction of the dish does not match with the direction of the highest gain. When rotating the antenna, you will notice that two side lobes in the radiation pattern have arisen instead of the one you would expect in the centre.

▶ *Radiation pattern of a misplaced feed, from the presentation by W1GHZ.*

If the feed is displaced out of centre (in another direction), it will influence the direction of the main beam. With a prime focus dish the centre could be measured easily, with an offset dish a bit harder. In most cases the original feed holder could be used as a reference; assuming you know the exact position of the phase centre of the original feed horn. If you are not sure, you can determine the correct position by doing some dimensional measurements on the dish and use the program Parabola.exe. (This program runs under Windows without installing it).



▶ *Parabola will provide a lot of information after entering some mechanical dimensions, for example my 24 GHz dish*

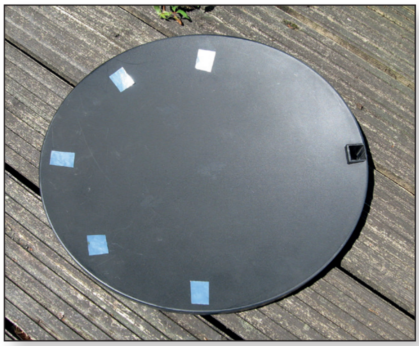
Focus point related to offset dishes

If you are not exactly in the correct position with an offset dish, you probably do not notice it because you just compensate by tilting the dish more or less. The good news is that especially with an offset dish; this does not reduce the optimum gain dramatically.

If you try to find the optimum position of the feed by sliding the feed in the feed holder; you slide it over the wrong axis. You will notice that changes will also change the take off angle so you have to find the optimum tilt position after every change too.

Remember the offset dish is a part of the prime focus dish so in fact you should slide the feed over the imaginary axis to/from the centre of the (imaginary) prime focus dish. Meanwhile, keeping the feed pointing to the centre of the dish - not easy so in fact; consider the original or calculated focus point as the correct position.

If you like; you could play with some pieces of aluminium foil. Just lick them (yes, really) and place them on several positions on the dish. Tape a piece of paper at the position you expect the focus point. While pointing the dish to the sun, reflection spots could be seen on the paper. When these spots fall together; you know that you are likely to be correct.



▶ *Offset dish with some pieces of aluminium foil.*

Selecting the parabolic dish

Many builders start with designing and building a dish and later find out they need another shape or another 'focus to diameter' (f/D) for the feed that will be used.

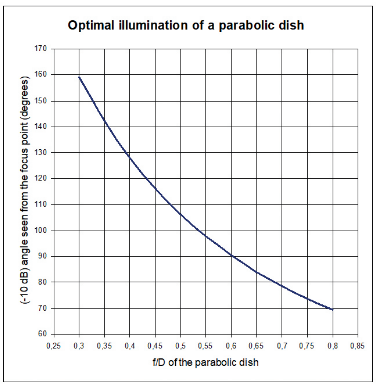
Better to start the way around; wherefore will the dish be used? What gain is needed? For what bands? One cable for each band or a single cable for all bands? What power should it be able to handle? What space is in the mast? What about wind load?

Then look for a feed that fits to the needs; then the needed dish. A bit 'chicken or egg' dilemma?

Illumination

It is fact that the needed illumination, seen from the focus point, will vary with f/D. With the same diameter dish the -10dB radiation angle should be much larger if the feed is close to the dish (small f/D) compared to a larger distance (large f/D).

After some calculations I made a graph showing this.



▶ *Graph f/D versus illumination angle*

Keep in mind; for a round prime-focus dish (same as oval for an offset dish) the illumination angle in the vertical and horizontal plane must be identical.

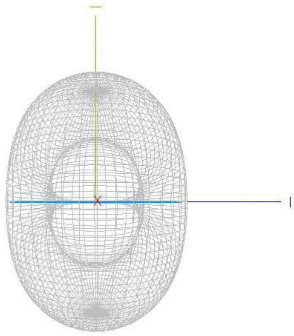
These angles of specific feeds are difficult to measure; however; simulation by free software like MMANA is a possibility. I did this for several designs.

For the higher frequencies feeds are often cylindrical (can-feed) or square (horn feed). For the lower frequencies dipole or quad elements are more common. In this article I will focus on the feeds for lower frequencies.

Simple dipole and reflector

This feed is often used in the commercial so called WiFi grid antennas. Simulation shows why this dish is not round but rectangle and why it is deep. The radiation angle of this feed is horizontally 127 degrees (-10dB) and in vertical direction a -10dB point is not even present in forward direction. In accordance with the graph the optimum f/D in horizontal direction should be 0.4 but then a lot of spill-over in the vertical direction will occur. An f/D of 0.25 would be likely the optimum for the vertical angle. So compared to a round dish with f/D 0.25; both sides could be 'chopped off' since these parts are almost not illuminated. This results in the shape that is offered on the market.

The benefit of this kind of feed is that it is easy to make, it is small and therefore it does not block the signal much.



▶ *Front view of radiation angle of a single dipole with reflector*

Multiband version of this

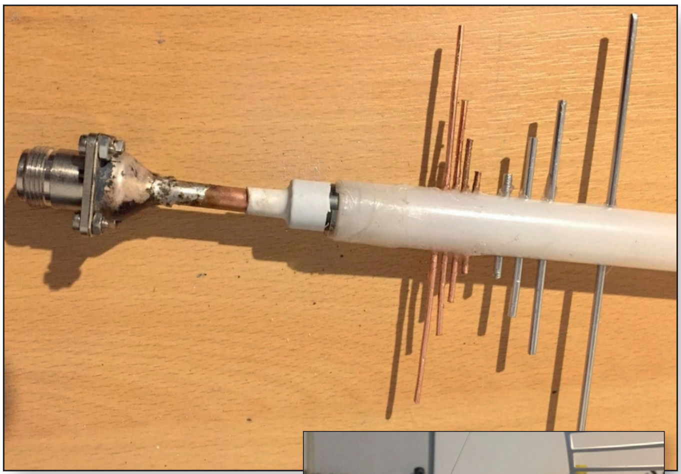
By connecting dipoles in parallel for every individual band and adding reflectors, a multiband version could be made, fed with one cable. This is developed by René, HB9MPU.

As a replacement for the mono-band feed in a rectangular commercial WiFi grid antenna this works very good. Of course also such shape dish is possible to make yourself.

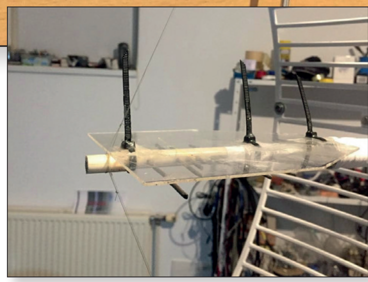
Building this feed is sometimes a real head breaker; two made the same way resulted in one good working feed for all bands and the other one only worked in one band

To prevent water ingress in case of rain, a plastic case or top plate is a must (with some provision birds will not land on it).

By the way; looking at such a grid reflector shows that the reflecting surface could have larger openings then 1/10 wavelength, depending on the direction! For a horizontal polarized feed, it is allowed to have horizontal openings in the reflector. If the grid is mounted 90 degrees rotated the signal will not completely be reflected (besides that the dish is also not properly illuminated).



▶ *HB9MPU multiband feed*

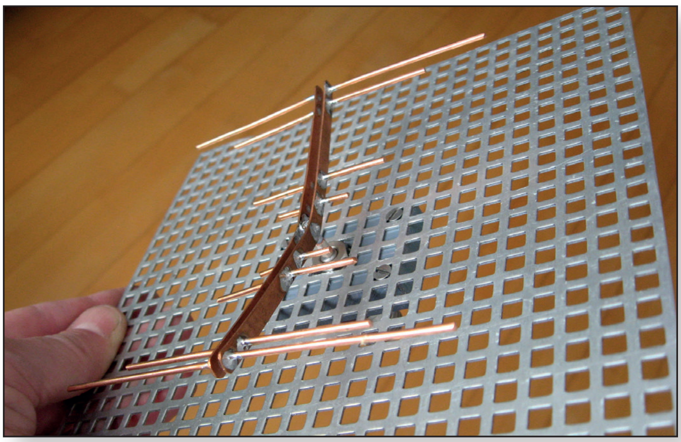


▶ *HB9MPU in the grid antenna of PA3CWS*

Stacked dipoles to narrow the vertical angle?

If the vertical radiation angle needs to be made narrower, stacking of dipoles could do the job. With a stacking distance of 0.42 wavelength of the HB9MPU design; simulation showed a pattern that has a horizontal angle of 128 degrees and vertical of 129 degrees. Excellent for a round dish with an f/D of 0.4. How to manage this in practice and is it possible to have the multiband version?

In Germany a feed based on this principle is developed; not with rod reflectors but with a reflector plate. Again more bands with one cable; 23; 13; 9 and 6 cm.



▶ *Stacked dipoles; four bands feed.*

As can be seen, the construction is rather complicated and the reflector plate will be a large signal blocker depending on the size of the dish. It could also be seen that the dipoles for 13 and 23 cm are close to each other.

I have been told that the individual dipoles are more or less defined by trial and error, to have the impedance also matched.

The one in the picture is made by me. Impedance match was poor; it gave a big improvement when I placed a piece of Teflon between the 'feed line'. To prevent ingress of water I wrapped it up like an Egyptian mummy with some PTFE plumber tape. The idea of this design is good; practical implementation a bit critical. Signal blockage of the reflector plate is a point of consideration.

Ring-feed or loop-feed

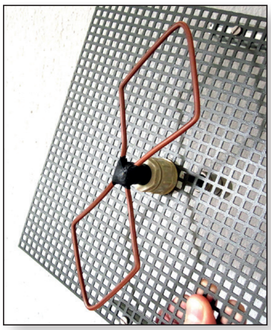
In fact this is (for every band) a full wavelength loop at a distance of 1/8 wavelength to a reflector plate of ½ wavelength diameter. The vertical and horizontal angle is not equal but illumination for commonly used f/D 0.36 to 0.42 dishes looks acceptable. (Maybe bending the loop more to elliptical could reduce the vertical angle a bit more). This feed is used by many stations with several loops nested, for every band one. So also every band with just one coax cable. Or you need to do a lot of switching and/or mount pre-amps en amplifiers behind the feed. Depending on your station, this could be an advantage or a disadvantage.

Often forgotten: the loops influence each other. If the impedance for the individual loops are optimised for the band of usage; it could change when the other loops will be connected to their cables. Usage of band filters is advised to prevent overloading equipment while transmitting; the other loops will pick up a lot of power.

▶ *Nested ring feeds by Renny PE1ASH*

Doppelquad or bi-quad

In fact this is a combination of two quad elements (square or round) above each other; fed in the centre. The vertical angle is therefore reduced and in fact it will illuminate a round dish very well. A rather large (perforated) plate acts as a reflector. This reflector plate will block the signal; especially with smaller dishes this could make the (negative) difference.



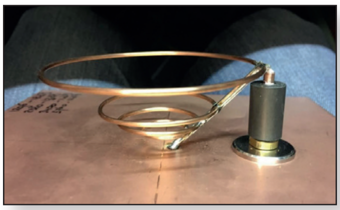
▶ *Double quad (DL7KM) or Bi-quad*

Also, this is a single band construction and one of the benefits of a dish reflector is that it could be used for several bands. We leave this feed out of consideration, until someone develops a multiband version.

Stacked loops

The idea for this feed is a combination of the just mentioned stacked dipoles and the ring feed. Hans PE1CKK developed the stacked loops resulting in an excellent working setup. He described this in the Dutch HAM magazine Electron of December 2018.

A symmetrical ¼ wavelength (at 23 cm) 50 ohm stub runs from the centre of the reflector plate to the feed point of the 23 cm loop. This loop is 1/8 wavelength from the reflector plate. The stub slopes towards this. Both ends of the loops are soldered to both ends of the stub; the other side of the stub is shorted. The loops for the other bands are all soldered to the stub at ¼ wavelengths from the short circuit. Automatically they are therefore 1/8 wavelength in front of the reflector plate. The antenna is fed at the open end of the stub where the 23 cm loop is attached. For the higher bands, the stub is at first a piece of feed line to the relevant loop, then it is a ¼ wave stub that has no influence anymore.



▶ *Side view of the stacked ring feed developed by PE1CKK*

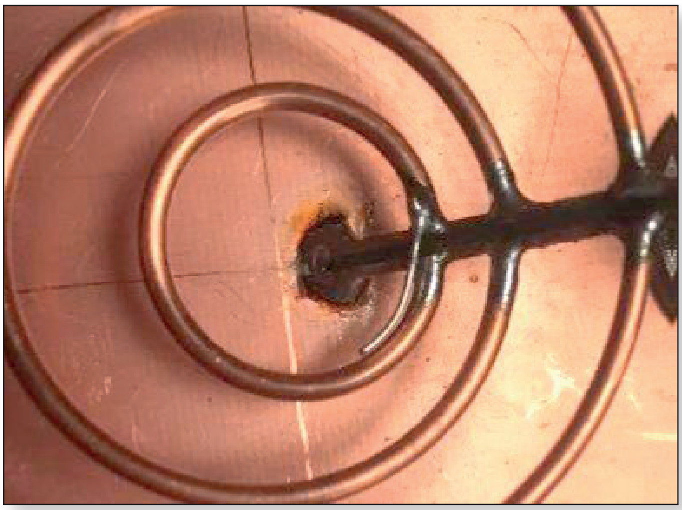
So much for the theory. In practice, there are still some issues to solve. The most important is that we want the rings to be as concentric as possible. The ¼ wavelength stub must then be 46 mm long! In air, however, ¼ wavelengths at 23 cm is 58 mm. So we have to shorten! By making the stub of a strip RT- duroid PCB of 0.787 mm thick we are getting pretty close. A piece of 3.65 mm semi-rigid coax is soldered to the feed point, which goes back through the reflector.

The reflector plate is made of 1.6mm epoxy PCB with copper on both sides.

Stub is 0.787 mm RT-Duroid with copper on both sides, L=42 mm W=2.4 mm; a 1 mm copper wire is soldered on both sides of the stub for mechanical stability.

A ferrite core has been slid around the feed line to adjust the coax to symmetrical line.

The length of the rings is a theoretical whole wavelength minus 2mm. These rings are made of 2.5 mm2 installation wire. (d = 1.7mm). The 6 cm ring is optimized with an extra wire (6 mm).



▶ *Top view of the stacked ring feed with the additional tuning thread.*

The feed of this construction remains intact at 100 watts at 13 cm. The reflection coefficient for this made sample is between -18dB to -11dB, depending on the band. You may be able to improve a bit by adjusting the lengths. It is experienced this design performs much better then the HB9MPU feed in a round dish with an f/D of 0.5.

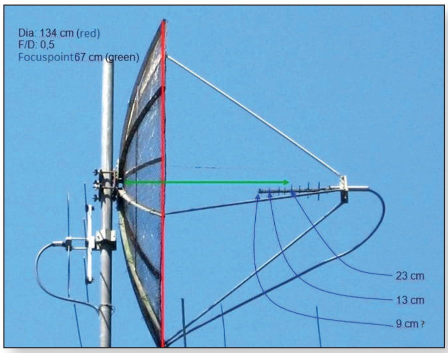
Log Periodical Array, known as LPA

In CQ-TV286 Noel G8GTZ described the use of a WA5VJB wideband log periodic array as a feed for his 80cms offset dish. The length of this PCB antenna is 142 mm, including the connector. So assume the array itself is about 13 cm long (looking at the picture). Claimed covered frequency is 900 MHz to 6 GHz, meaning 33 cm to 5 cm. It is easy to imagine that if the longest elements are in the focus point, the elements for the highest frequency are at least two wavelengths out of focus. If the smallest elements are placed in the focus point, the elements for the lowest frequency are only about 1/3 wavelength displaced. Much less out of focus. Something to keep in mind when positioning: short LPAs have a rather wide vertical angle.

The LPA I used many years is originally designed by PA0HVA (Electron Jan. 1973). It is a broadband array containing several dipoles fed by an open line. The higher the frequency; the smaller the diameter and length of the elements. Only a few elements of the array are operational for a specific frequency. This is also the disadvantage; not all frequencies are coming from the 'same point' as is needed to have the phase centre in the focus point of the dish.

However; as described above; if the highest frequency is positioned at the focus point; in wavelength the position error for the lowest band is acceptable.

▶ *1.3 mtr dish with PA0HVA LPA in operation by PA3CRX. A thin dyneema wire above the LPA prevents usage by birds (they bend elements and peel off the tape).*



An advantage is that the dish could also be used for other experiments since it covers a large spectrum. At the same time this could be seen as a disadvantage despite the strong commercial signals that will also be passed to the receiver.

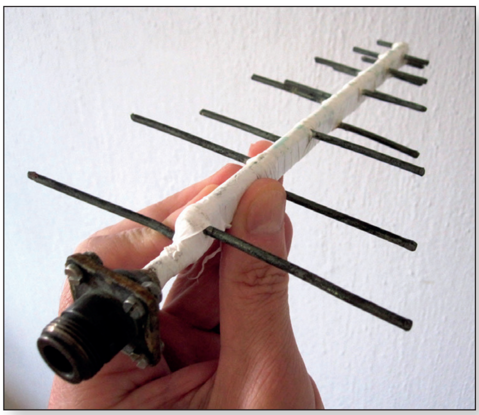
For the 23 cm band the horizontal and vertical radiation angles are about equal and give a rather good coverage of a dish with an f/D of 0.45. For the 13 cm band a bit deeper dish would be better.

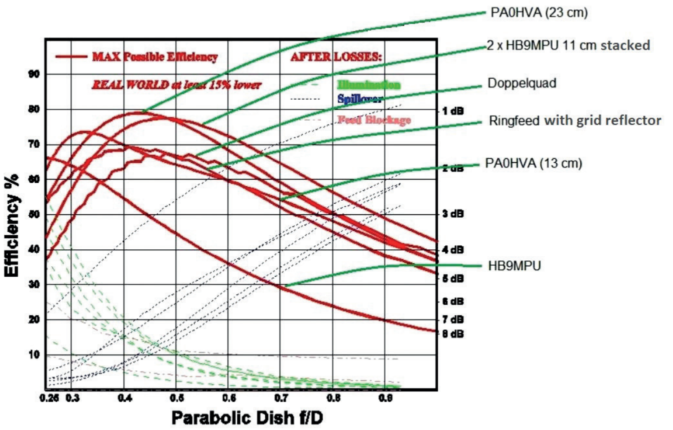
To prevent water ingress between the 'open line'; PTFE tape is used and covered with a layer of vulcanize tape. Of course you can design a LPA with PTFE as dielectric between square booms. This is done by PA3CWS and water ingress is no longer an issue.

I used this setup also for 9 and 6 cm, while the LPA is not even in resonance on these bands. Even with the smallest elements several wavelengths from the focus point I made several ATV contacts. It should be kept in mind that the antenna pointing for 23 cm is not equal as on 6 cm (two peaks) because of this displacement.

To include the 9 cm band, I also build a design made by DC8CE, described in DUBUS (2/83). All elements are the same diameter (3 mm) and are made from copper wire. The booms are 6 mm outer diameter. The SWR measured of this one swings over the covered frequency span between 1:1 and 1:3. The bands we would like to use are unfortunately not in the low area. I once replaced the PA0HVA design for this one in my dish and did not notice any difference in practise on 13 and 23 cm (at that time I had no 9 cm band equipment).

▶ *LPA design by DC8CE, also covered with Teflon tape to prevent ingress of water.*





▶ *Comparison of the above mentioned designs resulted in a graph coming from software that is developed by Paul W1GHZ. Input for this graph is manually handwork by simulation in MMANA.*

Helical antenna

If you want to have circular polarization, a popular solution is the helical. Easy to calculate and make with a predictable performance.

Be aware that the reflection against the dish inverts the direction of polarization. So LHCP becomes RHCP and vice-versa.

The number of windings define the gain and related beam angle. As mentioned above: -10 dB points of the angle is what we want, more gain from the helix will reduce the gain because of under-illumination. It looks obvious to start with a helix with too many windings and cut off one by one to find the number that fits the used dish most. However, this will also influence the position of the phase centre so then the position of the Helical also needs to be corrected after every cut. Likely better to check out the figures in the antenna book of W1GHZ to define the optimum dimensions since it is not only the number of windings that will give the best illumination. The helix is very interesting for all kind of dishes. It is even possible to have the beam in the opposite direction so the coax could be connected on the dish side ('Backfire Helix feed').

POTY (Patchfeed of the Year)

At this moment a very popular combination of two feeds: a linear polarisation on 10 GHz and a circular polarization on 2.4 GHz. Developed by M0EYT, PA3FYM and G0MJW.

For 10 GHz the feed is in fact open tube of 22 mm (outside diameter), like open waveguide. The beam angle of this kind of feeds is for deeper dishes. However, to narrow the angle (and not block the signal for 2.4 GHz by a horn) some shape of dielectric is placed in the opening; called a dielectric lens. The shape and sort material defines the final angle.

For 2.4 GHz a patch antenna is used, is generates circular polarization. Specified 105 degrees (-10 dB) meaning it is ideal for a dish with an f/D of 0.5.

The beam angle has some squint, should be no problem if you keep it in mind. If this feed is used with a dish with an f/D 0.5, it means on one side the dish is over-illuminated, at the other side under-illuminated. This could be corrected by mechanical adjustment by tilting the feed. However, in that case the 10 GHz feed will not point to the optimum direction. Depending where you need the gain, it could be worthwhile to find the optimum in your own application. If your dish is f/D 0.6, you have already over illumination so likely you do not even notice the squint.

The widely usage of this dual feed shows that it functions, even if it means the dish is not illuminated in an optimum way.

I found a report with measurements of the POTY but it does not include the method and who performed the measurements. You can find it in the links below.

▶ *POTY with creative cover in operation by PA0ABY*

Free on-line antenna book by Paul W1GHZ

A lot of explanation, theory, practice and considerations are documented in an on-line antenna book. If you want to read more about feeds and dishes it is highly recommended! (Link below).

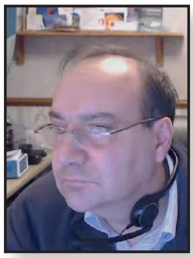
Hopefully I gave you some ideas that you could consider; optimize your own situation and experiment with it!

Links:

- Antenna handbook of Paul W1GHZ: http://www.w1ghz.org/antbook/contents.htm
- Presentation by W1GHZ: http://www.ntms.org/eme/presentations/w5lua/W1GHZ_Dish_Focus_EME2010.pdf
- Parabola.exe, program to calculate dishes; https://mscir.tripod.com/parabola/
- Multiband feed HB9MPU; https://bergtag.de/technik_9.html and http://www.bergtag.de/technik_28.html and http://www.ok2kkw.com/00003016/ozarovac/ozarovac_dj6ep.htm
- Multiband feed with stacked dipoles; https://dl0kb.wordpress.com/2013/07/24/mehrbanderreger-fur-13-bis-6-cm-nach-dj5ap/
- Description of the POTY dual feed; http://www.hybridpretender.nl/patch.pdf
- Measurements of POTY; https://www.passion-radio.com/index.php?controller=attachment&id_attachment=471

Setting up OBS for DATV

Mike Willis G0MJW



Like a lot of things, OBS is very straightforward to use once you are familiar with it and whilst there is a lot of information available via Google it can still be a steep learning curve. This article aims to flatten that curve…

▶ *OBS Logo*

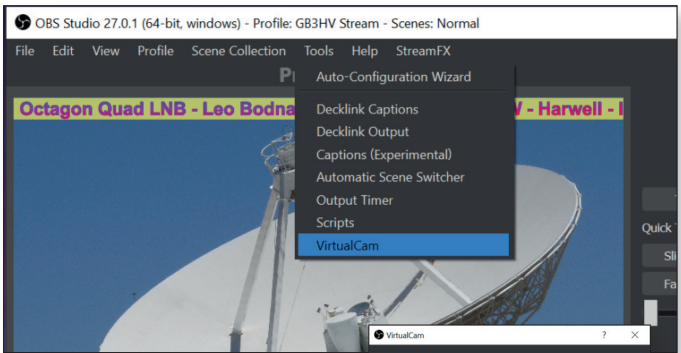
OBS (Open Broadcaster Software) is a free and open source software package for video recording and live streaming. It is well suited to generating digital television allowing the selection, mixing and manipulation of audio and video sources, playing back of video etc.

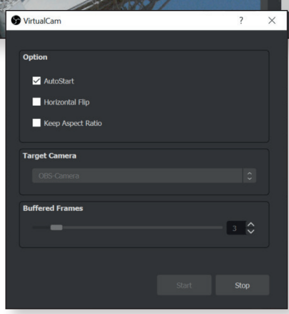
This article will cover setting up OBS for generating a DATV transport stream. Installing and learning how to use OBS is outside the scope – see *https://obsproject.com/* and watch/read the many online tutorials, use OBS Forums and Google appropriately for help.

There are some pre-requisites. It is assumed Windows 10 is being used. While OBS is cross platform, if you use any other OS you are on your own. The pre-requisite is that you install a plugin, OBS-Virtualcam (*https://obsproject.com/forum/resources/obs-virtualcam.949/*). This plugin makes the output of OBS appear as a virtual webcam device. Simply download the plugin, run the executable and restart OBS.

I can't say this enough times: you have to install the plug in. Later versions of OBS have a similarly named virtual webcam function built in, but it does not provide audio.

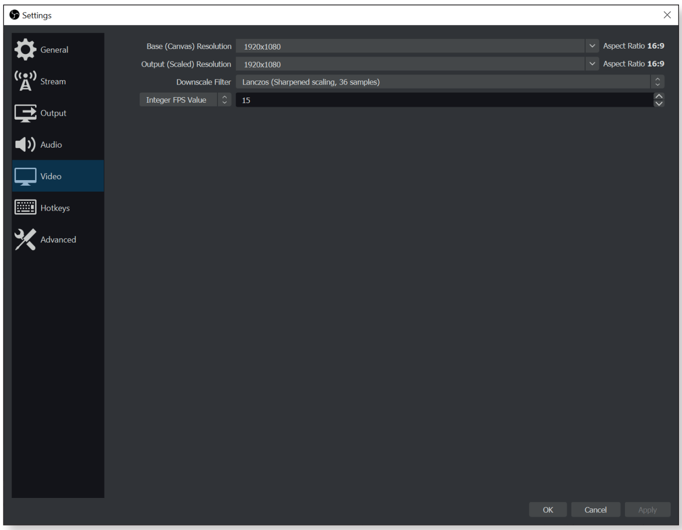
With the plugin installed, start OBS, the plugin from the Tools menu. Tick the box to autostart the plugin.



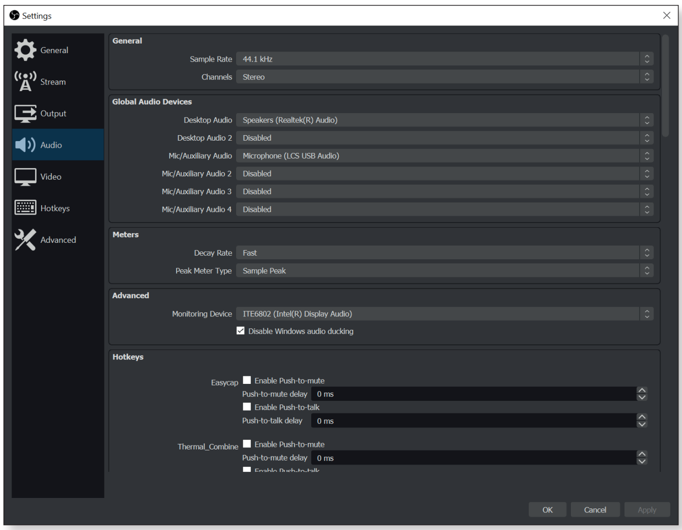


You can check it is working, as you would with any other webcam - using Zoom for example. After playing with it for a while, stop the virtual camera to allow settings to be adjusted.

Under the main settings menu (File->Settings) select the Video option. The Output (Scaled) Resolution and FPS (Frames per second) values need to be set. I set mine to 1920x1080 and 15 FPS. The resolution will be downscaled later in ffmpeg, so set these to the maximum you are likely to need. The reason for setting 15 FPS is to make it easier to encode low symbol rates.



Select the Audio tab and set the audio sample rate to 44.1kHz Stereo. Set the Mic to your microphone device. Set Desktop Audio to your audio output device.



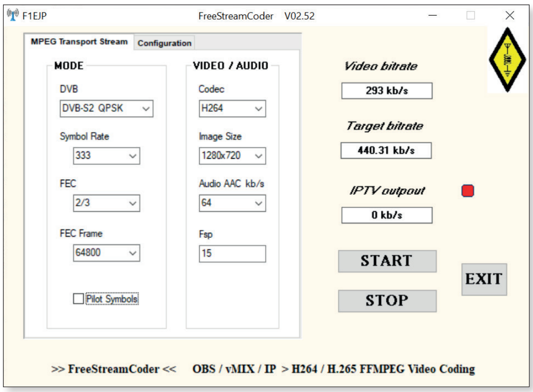
That's it with respect to configuring OBS.

Whatever is in the OBS output should be replicated in the virtual webcam. There is no need to select stream or record or mess with any other settings. You can of course set OBS up for streaming or recording, but it is not required.

Many people have issues setting up the audio. OBS has a facility to advance or delay the audio, I find I need to use a sync offset of 300mS for my audio sources to get it in sync. These settings are available on under Advanced Audio Properties which you can find under the settings icon for each audio source.

I described some ffmpeg scripts in a previous CQ-TV; since then Dominique, F1EJP has developed his FreeStreamCoder Software to Generate Mpeg-TS Streams. This provides an easy to use graphical interface to the encoders.
Links to the latest versions are in the forum *https://forum.batc.org.uk/viewtopic.php?f=15&t=7438* and *http://www.vivadatv.org/viewtopic.php?f=78&t=859&start=10* along with instructions in English and French that should get it working and are the first place to look.

On running the executable for the first time it will install itself and open a window that will look something like this:



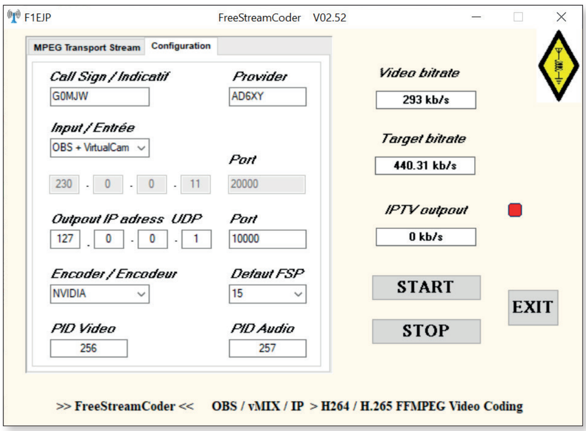
The drop-down menus can be used to set up the transport stream audio and video settings and the transmission mode as required. Most of these settings are intuitive. In the above I have set up for the BATC net with H264. These are not the best settings but are likely to work. You can experiment with the codec, resolution, audio rate and frames per second.

Common sense is also needed, if the resolution is set too high for the bandwidth, it will probably look awful, especially in H264. H265 is best but more temperamental in setting up and image content.

What works well with a talking head might fall over with significant movement. FSP – relates to the frame rate. As in OBS, I normally set this to 15 for lower SRs. Keeping both the same avoids interpolation which can make videos jerky, especially when panning.

Take note of the settings for DVB mode, symbol rate and FEC because when you set up the Pluto or Portsdown, these need to match, otherwise it will not work properly.

The settings on the configuration tab are specific to your set up. The example shows I am using OBS with the virtual camera, the IP address and port for testing with VLC, I am



using an Nvidia card etc. You can also specify an IP input if you wish, for example from a streamer device.

This can be tested without transmitting using VLC. Simply configure as above to send the transport stream to the local loopback IP address 127.0.0.1 on port 10000 and receive with VLC. In VLC Media->OpenNetworkStream and enter the URL *udp://@:10000* – this can be set up as a shortcut which is handy for testing. The Portsdown also allows IPTS monitoring, but only for H264 encoding.

When started via the start button, the there should be a green indication and the bit rate of the transport stream is displayed. VLC will show the video.

If you have a Pluto with F5OEO firmware plugged in to the USB port, and want to stream to it directly (without using a Portsdown) it will probably be on IP address 192.168.2.1, port 8282.

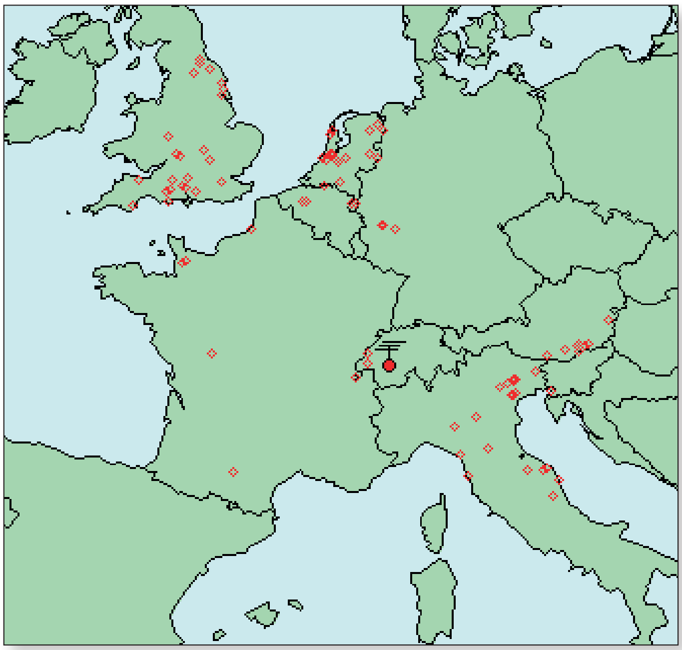
If you are using the IPTS in facility of a Portsdown the IP address will need to match the IP address of the Portsdown and port 10000. There is more detail in the FreeStreamCoder manual.

Here is proof it works for me, if it doesn't work for you, find out why by simplifying the set up as much as possible. Is OBS virtual camera running? Does your PC support the encoder, is there a firewall or some other software running that is conflicting?

IARU Region 1 ATV contest 2021 results

Dave Crump G8GKQ

The IARU Region 1 ATV contest was held on 12/13 June 2021. Due to travel restrictions in some countries caused by the COVID 19 pandemic, the main scoring tables have again been split into two sections. Section one for entrants who only operated from their home station address, whereas those operating from alternative addresses or portable locations entered section two. There were 85 entrants from eight countries competing, using all bands from 432 MHz to 76 GHz.



▶ *Participants in the IARU ATV Contest June 2021*

The overall winner of section one for fixed stations was Guido IW6ATU, while Noel G8GTZ won section two and had the highest overall score. Propagation conditions appeared to be good on the lower bands with a 630 km contact from France to Switzerland and a 418 km contact in the UK.

The full results can be found on the BATC Wiki at *https://wiki.batc.org.uk/IARU_ATV_contest_2021_International_Results*

Please don't forget next year's IARU ATV Contest on 11/12 June 2022.

Overall Rankings – Section 1

Pos	Call	Score	Locator
1	IW6ATU	15389	JN63QN
2	PA0BOJ	13513	JO21ON
3	PE2TV	7771	JO32GH
4	PA1RHQ	7514	JO22MD
5	PA3CWS	6543	JO22RE
6	PE1ASH	5191	JO22KF
7	F9ZG	5124	IN99KC
8	PA3FXB	5026	JO33KC
9	PE1MPZ	4980	JO22NB
10	PA3DLJ	4684	JO20VW
11	F5AGO	4602	JN06DP
12	IK4ADE	4506	JN54OE
13	PA2TG	4446	JO22FE
14	F4BNF	3736	IN99IA
15	IW4CPP	3488	JN44XT
16	IW2MBA	3464	JN55JC
17	PE1IWT	3459	JO32KF
18	ON7MOR	3233	JO21GK
19	PA1AS	2365	JO20XW
20	G0UHY	2297	IO80EK
21	PE1CVJ	2284	JO22KG
22	HB9IAM	2093	JO36BF
23	DC8UG	1911	JO30UG
24	HB9AFO	1561	JO36GN
25	IK6EFN	1548	JN63VF
26	PA0JCA	1342	JO22JG
27	F1CSY	1326	JN03SK
28	IW3ROW	1251	JN65VP
29	PA0RWE	1159	JO22HC
30	G3GJA	964	IO93TR
31	F6BGR	918	JO00SC
32	G4YTV	860	IO93UU
33	PE1JXI	798	JO20VX
34	IZ5ILX	612	JN54BB
35	M0SKM	578	IO91RV
36	IZ3ALW	369	JN65EP
37	PA3GNZ	310	JO22NB
38	G0AZQ	247	IO94TA
39	M0PIT	220	IO92ND
40	PA1EBM	185	JO20XW
41	PA3BYV	184	JO32NX
42	IK3HHG	168	JN65DO
43	IK3UVC	140	JN65CP
44	PA3AOD	107	JO32GW
45=	ON7ASN	60	JO10TX
45=	ON7ARQ	60	JO10VX
47	IZ6PNK	56	JN63OM
48	PE1CRW	32	JO22JW

Overall Rankings – Section 2

Pos	Call	Score	Locator
1	G8GTZ/P	25574	IO81FD IO91GI
2	G8GKQ/P	18660	IO80WP IO80UV
3	OE8FNK/P	14367	JN66UO JN87DK
4	G4FRE/P	14159	IO81XW IO91BV
5	OE6RKE/P	12546	JN76LP JN76MU JN76OT JN76QU
6	OE8EGK/P	11599	JN76FR JN76LT
7	IQ3ZB	11004	JN65AW
8	IU3OGL	8834	JN65AW
9	IV3CVN	8261	JN66OF
10	HB9TV/P	8218	JN36GU
11	OE6PJF/P	7232	JN76LP
12	G4LDR/P	6374	IO91EC IO91GC
13	M0DTS/P	5349	IO94LI IO94DF
14	I3FIW	4982	JN66EA
15	I3NGL/3	4715	JN55VU
16	I3SWR	4702	JN66EA
17	OE8YCK/P	4496	JN66UO
18	IW3HYS	3423	JN66DA
19	G4KLB/P	3355	IO80WP IO80WX
20	G4XAT/P	3330	JO01AI IO90LX
21	DK7UP	3185	JO30NI JO30MJ
22	IZ3XHV	2981	JN66DA
23	IW3GOA	2414	JN66DB
24	IU3KKY	2402	JN65AW
25=	OE8III/P	2290	JN87DK
25=	OE1BES/P	2290	JN87DK
27	G4FVP/P	2011	IO94FM IO94FO
28	IU3KMM	1992	JN65AW
29	IZ3LSZ	1866	JN66DB
30	PA0T/P	1790	JO22IT
31	IZ5TEP	1446	JN53EL
32	M0YDH	1091	IO82RJ
33	IW6CHN	960	JN62ST
34	I3QAE	564	JN66EA
35	IZ3PWF	476	JN55VU
36	IW6DCN	244	JN63HM
37	G4BVK	96	IO81WG

Band Winners:

Band	Entries	Winner	Score
70 cm	43	F9ZG	4914
23 cm	77	IW6ATU	12064
13 cm	45	OE8EGK	6595
9 cm	19	G8GTZ	4465
6 cm	23	G8GTZ	4435
3 cm	35	G8GTZ	5260
1.2 cm	7	G8GTZ	1410
0.6 cm	2	G4LDR & G8GTZ	280
0.4 cm	2	G4LDR & G8GTZ	280

Country Winners:

Nation	Entries	Winner	Score
Austria	7	OE8FNK	14367
Belgium	3	ON7MOR	3233
France	5	F9ZG	5124
Germany	2	DK7UP	3185
Italy	28	IW6ATU	15389
Netherlands	21	PA0BOJ	13513
Switzerland	3	HB9TV	8218
UK	16	G8GTZ	25574

Best DX:

Band	Best DX from	To	Dist km
70 cm	F4BNF	HB9TV/P	630
23 cm	IV3CVN	IK6EFN	336
13 cm	IW6ATU	IV3CVN	297
9 cm	G8GTZ/P	G4FRE/P	136
6 cm	G8GTZ/P	G4FRE/P	136
3 cm	IU3OGL	S58RU	150
1.2 cm	G8GTZ/P	G4FRE/P	136
0.6 cm	G8GTZ/P	G4LDR/P	28
0.4 cm	G8GTZ/P	G4LDR/P	28

2m Results (not included in IARU Contest Scores)

Nr	Call	QRA	Q	Pt	ODX	At	Km
1	M0YDH	IO82RJ	1	130	G3VKV	IO81XV	65
2=	G4KLB	IO80WP	1	60	G8GKQ/P	IO80UV	30
2=	G8GKQ	IO80UV	1	60	G4KLB/P	IO80WP	30
4	G4XAT	JO01AI	1	24	G4FKK	IO91WI	12

4m Results (not included in IARU Contest Scores)

Nr	Call	QRA	QSOs	Pts	ODX	At	Km
1	G4XAT	JO01AI	1	12	G4FKK	IO91WI	12

Portsdown 4 peripheral interface

Dave Crump G8GKQ

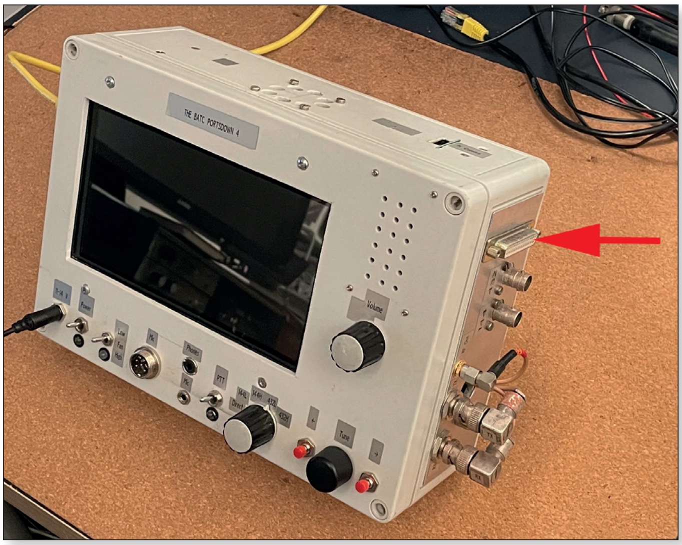
There are a number of external modules that can be controlled by the Portsdown software. Many of these need to be connected to the GPIO on the Pi to receive (and sometimes send) SPI commands or other signals.

These interfaces currently include:

- PTT signal
- Band switching
- External attenuator Control
- Streaming indication and control
- ADF4351 control for signal generator
- ADF5355 Control for signal generator
- Elcom or SLO microwave source control
- Power meter
- Noise source switching (future capability)
- Ramp generator (future capability)

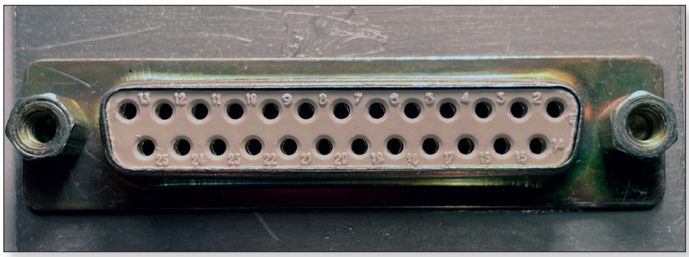
Standard Connector

On my Portsdowns, I use a female 25-way D-Type chassis mount socket to bring the required connections out to a mechanically and electrically stable interface. An example is shown below.



The pin functions have evolved over time, but I thought that it would be useful to share my final solution. The connections are listed in the table below.

The exact function of pins three, four and five varies. In one Portsdown, I have used it to expose the video and



audio signals from the RPi jack. The analogue ground (pin one) is used with these signals to reduce the effect of power supply and digital noise that would be apparent if the digital and power ground (pin 13) was used.

There was a change in two of the GPIO pin designations between the Portsdown 2020 (RPi 3) and the Portsdown 4 (RPi 4). The table below lists the Portsdown 4 connections with notes about the Portsdown 2020 (RPi3) connections.

Signal conditioning and protection

The high speed data signals (particularly the SPI clock and SPI data signals) have very high speed switching edges and can cause ringing (overshoot) in wiring longer than a few cm. This can cause data errors. I overcame this problem by fitting a series 220 ohm resistor in all the fast-switching lines (pins eight – 12, 22, 24 and 25).

I did not fit any specific protection for the Raspberry Pi inputs or outputs. This does leave them susceptible to static and over-voltage, but they are reasonably tolerant. Remember that any inputs use 3.3v logic, not 5v.

Example Usage

The availability of both 12v and 5v power supplies on the connector enable small external modules to be easily constructed which take their power from the same supply as the Portsdown. The best example is the Power Sensor described elsewhere in this CQ-TV, but I have also built an ADF4351-based signal source, and an ADF5355-based signal source (which works up to 13.6 GHz).

A switched power supply for a noise source has also been constructed to enable development of a noise figure indicator (to be described in a future CQ-TV).

D-type Pin	GPIO Pin	Primary function	Notes
1	-	Analog ground	To reduce noise on audio
2	-	+12v (input or output)	Can be +13.8v
3	-	Optional left audio out	
4	-	Optional right audio out	
5	-	Optional RPi 3 video out	
6	-	+5v (output)	
7	26	Noise source switch	Future capability
8	29	SPI clock out	
9	31	SPI data out	
10	5	MCP3002 LE	
11	3	MCP3002 data in to RPi	
12	8	ADF5355/ Elcom/SLO LE	
13	-	Digital and power ground	

D-type Pin	GPIO Pin	Primary function	Notes
14	7	Band D2	
15	12	Transmit/ streaming demand	
16	13	RPi active LED	Use with shutdown button
17	15	Shutdown button	
18	32	Band D0	RPi 3 pin 28
19	35	Band D1	
20	36	SR select D0	
21	37	SR select D1	
22	38	SR select D2 or DAC LE	DAC LE is future capability
23	40	TX indication (PTT out)	Includes delay
24	10	Attenuator LE	
25	33	ADF4351 LE	RPi 3 pin 27

It's that time of year to check your Oscar 100 dish

Noel Matthews G8GTZ

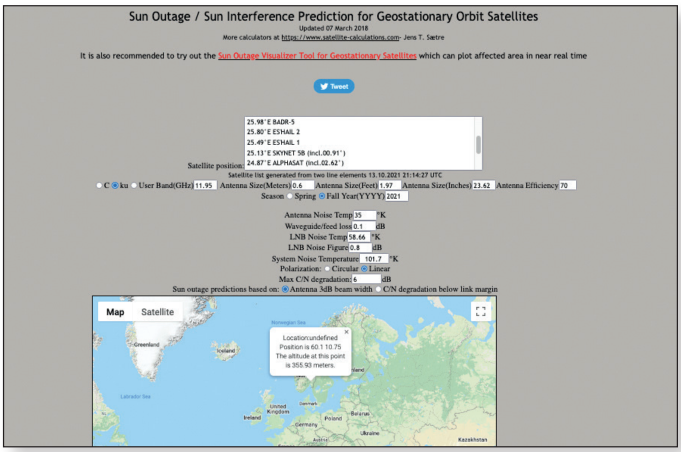
***Editors Note:** Unfortunately due to bereavement in the Editor's family, this edition of CQ-TV is late. This article was intended to be published before the 7th Oct (the autumn equinox) however the information will be useful next spring!*

Every year around the spring and autumn equinox, the sun passes through the same position in the sky as Eshail-2, the Oscar 100 host satellite.

This has two effects, firstly it causes your receiver (and the Goonhilly web monitor) to be blinded by the sun and all signals will drop down in level or disappear altogether. The second more positive effect is that it you will be able to see where to place your dish by seeing where there is direct sunlight and if you already have a dish installed you can check that the neighbour's pesky trees have not grown up and blocked your path. The signal loss will occur even if it is cloudy but you do need a sunny day to check your dish position.

Using this website *https://www.satellite-calculations.com/Satellite/suninterference.php* you can calculate when the sun will be behind Eshail 2 at your QTH.

Normal precautions should be taken when observing the sun – it has been known to damage plastic LNBs at the focus point of a dish and you should never, ever look directly at it with the naked eye.



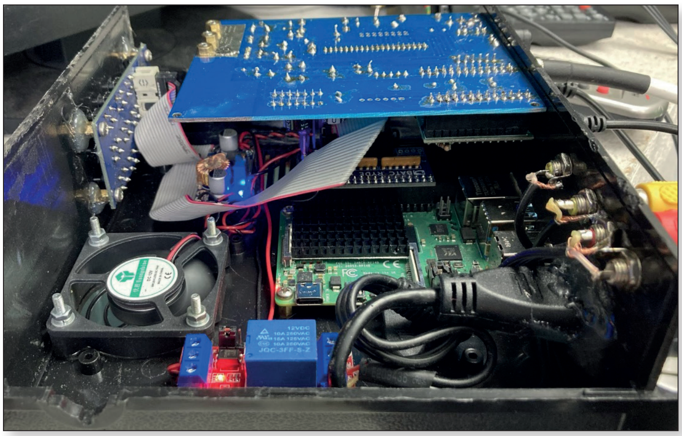
A Ryde receiver for GB3EN

Duncan Rossiter G7VVF

A while back I installed a converted cheap eBay satellite receiver at GB3EN, it was capable of receiving 1mS/s MPEG2 and H264 transmissions at 1249MHz. Apart from myself, I only knew of one other user, and that was Justin G8YTZ.

I decide to construct a Ryde to give more flexibility with transmission standards and to offer a lower symbol rate to encourage users from further away.

I placed the Ryde and the MiniTiouner hardware all in one box with separate power supplies for each part. I added analogue video and audio output sockets to the case and a fan to keep it cool.



GB3EN has an analogue sync detection video switcher so I needed a relay to switch the video in once when a locked signal was received. I bought a 12V opto-coupler isolated relay module from eBay. This is driven from GPIO pin 7 on the Pi and works very well. Both switched and non-switched video is available on sockets on the rear of the case.

From the Ryde menus I implemented the twice daily restart to reset the Ryde should a "Longmynd not loaded" situation arise. I also enabled the composite video output and set the dB MER value to always be displayed.

GB3EN receives on 1249 MHz and after the antenna there is a filter, preamp then a satellite splitter, this distributes the signal into the analogue receiver and into the Ryde, both receivers output video to the sync detection switcher, there is a priority order which is analogue first then digital.

I set four symbol rates to cater for a range of user's equipment: 333kS/s, 1MS/s, 2MS/s and 4MS/s.
It cycles through these presets, it may take up to 20 secs to start receiving the video, so you need to be patient when expecting to see your signal repeated.

The old DATV RX had an occasional audio fault this turned out to be a problem with the relay on the sync detection switcher, the relay was in an IC socket and the pins had oxidised causing intermittent connections this was fixed by soldering the relay in to the board.

The GB3EN site co-shares with GB3LV 70cm voice and GB3NL 2m voice repeaters. When GB3NL transmits it appears to reduce the received dB MER of an incoming signal by about 10, if the signal in is below about 10 then it will get interrupted, we aim to fix this with a low pass filter on GB3NL's output, however GB3NL isn't used that much these days so it's really only a problem when it briefly transmits its callsign every 10 minutes. GB3LV causes no problems with the Ryde.

The Ryde seems to work every time I have accessed it with no problems, so no sign of lockups.

So, if you have 23cm DATV capability, point your aerial to Enfield in north London and have a go.

You can watch GB3EN on the BATC streamer 24/7 and don't forget the HTML5 stream may add another 50 secs delay so it may well be over a minute before you see your signal repeated. If you are in GB3EN's coverage area then you can also receive its analogue 23cm FM signal on 1312MHz

Portsdown 4 power meter

Dave Crump G8GKQ

There are a number of relatively cheap modules on eBay that use an Analog Devices IC to convert RF input powers over a large dynamic range (>50 dB) and a wide frequency range (>6 GHz) to a DC voltage. A number of designs have been published using similar devices, including a digital power meter by Heather M0HMO.

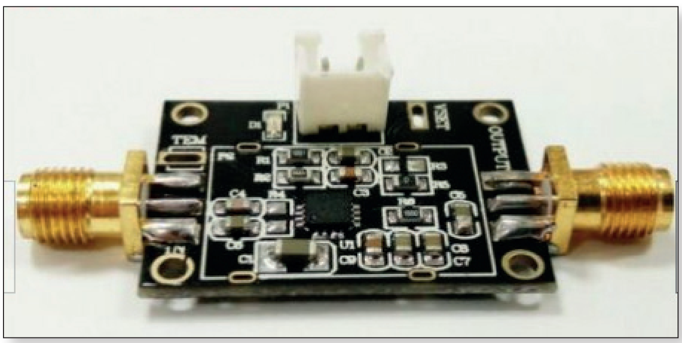
It is quite possible to use a voltmeter on the output of these devices to get an indication of the input power. Cross-checking with the manufacturer's data sheet would allow you to estimate the measured input power. However this is not very convenient, especially if corrections have to be applied for system imperfections.

It is easily possible to use an analog-to-digital (A-D) converter to measure this voltage, apply it to a look-up table and then display the estimated power in dBm and/or mW.

This article describes a simple-to-construct add-on to the Portsdown 4 that can provide an indication of power using one of the cheaper modules available from eBay. The measurement range is typically from -65 dBm (less than a nanowatt) to +3 dBm (2 mW)

Choice of power sensor

For optimum performance across a wide frequency range (above 5 GHz), the power sensing IC needs to be mounted on special PCB material (not the usual FR4) with very careful design of the input circuitry. Pre-constructed modules of this standard have been available in the past for more than £100. The opposite approach has been taken in this design, using a "cheap and cheerful" pre-built AD8318 module available on eBay for under £15. This module claims a frequency response to 8 GHz, but I do not believe it!



▶ *The AD8318 Module*

There are numerous other power sensors available on eBay, just search on "logarithmic detector". However, the Portsdown power meter is only currently "calibrated" for the AD8318.

Analog to digital conversion

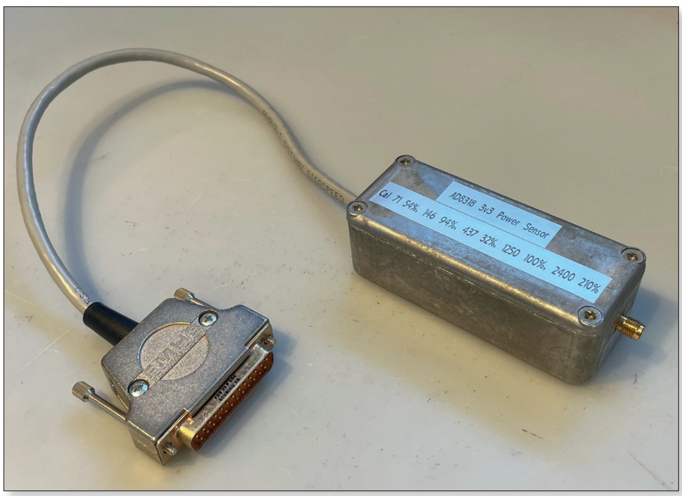
The AD8318 outputs a voltage between about 2.0v and 0.5v which reduces as more power is input. I chose to measure this voltage using an MCP3002, which is a cheap analog to digital chip which converts the input voltage to a digital value between 0 and 1023. Zero for no input voltage, and 1023 for an input at the same level as its supply voltage.

The Portsdown receives these values using the SPI (serial peripheral interface) protocol and looks up the power corresponding to the voltage, and then displays it.

Construction

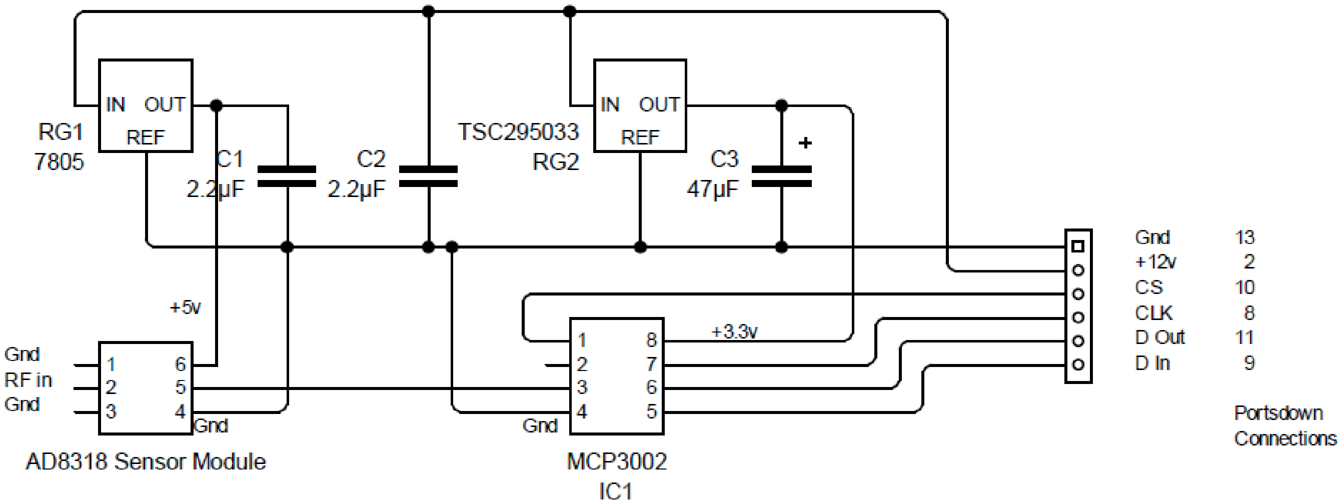
I used a small surplus die-cast box (92 mm long, 38 mm wide and 31 mm high) to mount the power sensor and A-D converter. The power sensor needed to be mounted vertically to fit in the box, and the A-D converter was mounted on Veroboard.

A 5v regulator was bolted to the side of the box to supply the AD8318 module from the Portsdown's 12v supply. A short captive cable was connected to a male 25-way D-type connector which plugs into the Portsdown Interface described elsewhere in this issue of CQ-TV.



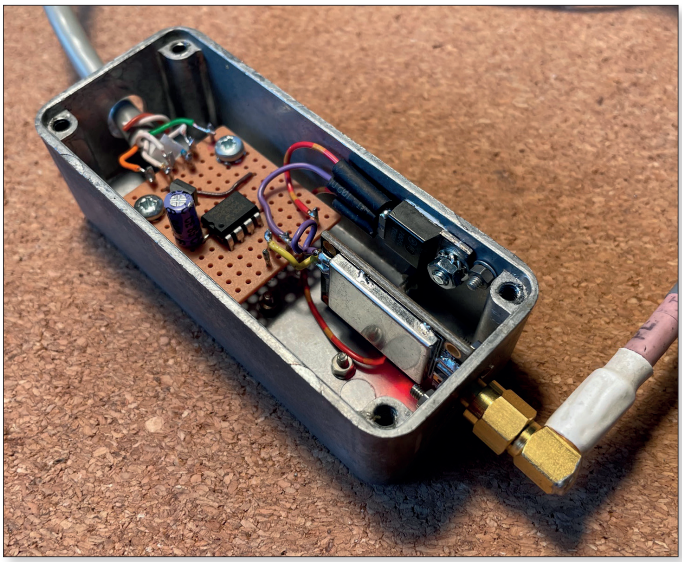
▶ *The constructed Unit*

A hole was drilled then filed into a small tinplate square (about 16mm x 16 mm) so that it just fitted over the



▶ *Power sensor circuit diagram*

SMA connector on the input of the sensor module. Two 2mm fixing holes were then drilled in the plate before it was soldered to the SMA connector as close to the PCB as possible.



Another hole was drilled and filed into the front of the diecast box so that the SMA connector would key into it. Countersunk 2mm fixing holes were then drilled to match those in the tinplate. This allowed the sensor module to be bolted to the front of the box with no additional SMA connectors. Note that, because the sides of the box are not vertical, the module is not horizontal in the box; this does not matter.

I removed the output SMA from the sensor module and used very short wires to connect it to the Veroboard.

Sources of Inaccuracy

This power meter will not tell you whether it has an input of exactly 0.1 mW (-10 dBm) or exactly 0.15 mW (- 8 dBm). However, it will tell you that the input is around 0.1mW, and if a system tweak then makes it indicate 0.15 mW, you know that you have made an improvement of about 2 dB to the system. The sources of inaccuracy include:

1. The calibration table is specific to the module that I have calibrated. Other modules will have different integrated circuit or component tolerances.
2. The quality of the PCB around the input connector (and hence the losses) will vary between modules. This will be frequency-dependent adding another variable.
3. The MCP3002 module measures voltage with respect to its supply voltage. Temperature and production variations of the regulator IC will change the calibration.
4. The frequency response of the sensor IC as mounted on the eBay modules is not very flat.

Professional power meters have long used a calibration chart for correcting sensitivity variations with frequency. For my sensor the calibration figures were:

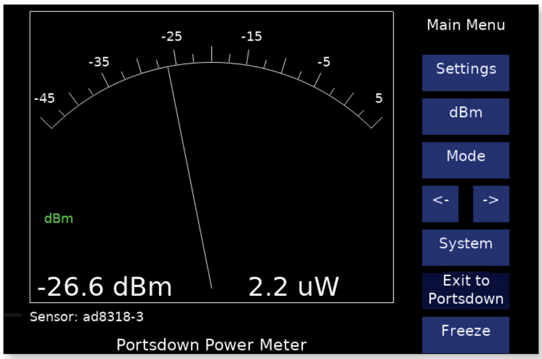
Frequency	Calibration factor
71 MHz	54%
146 MHz	94%
437 MHz	32%
1250 MHz	100%
2400 MHz	210%

These calibration factors can be entered from the settings menu in the software.

Software

The power meter is accessed from the "test equipment" button on the Portsdown's Menu two.

Once selected it shows the meter face and the last selected range and measurement settings.



Touching the "dBm" button changes the meter to read in mW; touching again goes back to dBm. The green characters show the current displayed unit. The left and right arrows increase or decrease the measurement range. Under-range or Over-range is displayed if the input level is outside the sensor measuring range.

The settings menu allows you to add-in an external attenuator to the calculations, so that you can read higher powers directly. Note that most of the power sensor modules will be damaged by any more than 10 mW input, so check your attenuator carefully

You can also enter the frequency-dependent calibration factor from this menu, and make more advanced adjustments to the displayed range.

The default sensor is an AD8318 with an A-D converter running from 3.3v. Hence the name ad8318-3. It is also possible to select an AD8318 with the A-D converter running from 5v (ad8318-5). This needs different sensor hardware, but enables faster A-D conversions which can allow time-dependent plots of input power to be displayed. You can also select to display the A-D input voltage (which assumes a 3.3v supply), or the raw A-D output value.

The mode button enables selection of an X-Y display, or a free-running plot of the input power. However, these both require the A-D converter to be supplied with 5v and will not work with the sensor circuit described above.

The other buttons are self-explanatory: "exit to Portsdown" requires to be pressed twice, because it was all too easy to touch this button unintentionally.

Calibration look-up table

For those of you who want to calibrate other sensors, the look-up table can be found in the file /home/pi/rpidatv/src/power_meter/power_meter.h The software will need to be recompiled after any amendments.

Conclusion

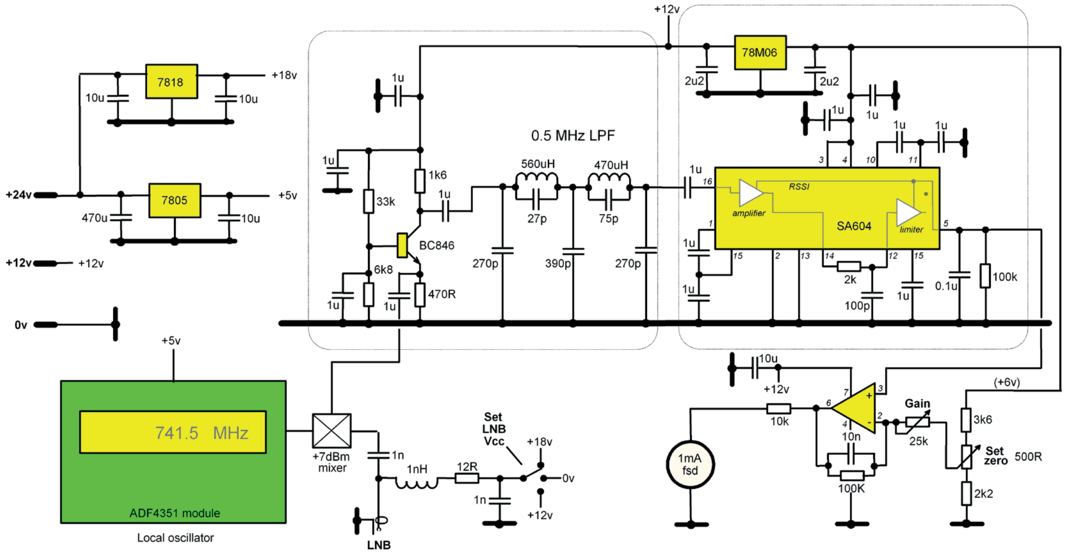
This easy-to-build project adds the capability to indicate approximate power levels to the Portsdown 4. There will be other additional capabilities added to the Portsdown 4 over time as the Raspberry Pi 4 and the seven-inch screen have proven to be a very versatile combination.

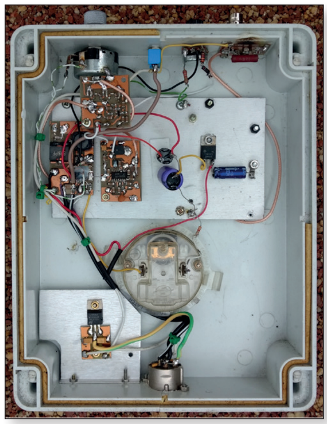
A retro high-resolution dish alignment meter for the digitally-challenged

Bernie G4HJW

More to be regarded as a 'Technical Topics' piece than a definitive full-detail offering, this article describes an analogue, fast-responding, high-resolution signal strength meter which is ideal for aligning relatively large diameter dishes typically in use for QO-100 reception at 3cm.

It uses the RSSI output of a common limiting FM amplifier/quadrature IC fed by a mixer operating in direct conversion mode, connected to the system LNB. Admittedly, it is rather extravagant in its use of both a packaged double balanced diode mixer and Chinese ADF4351 synthesized signal source, but it results in a unit that is a joy to use just when you need it most, ie, during those final finicky dish adjustments. In addition to its excellent resolution, the RSSI's log characteristic results in a meter sensitivity that is essentially constant over a very wide range of input level, so whatever the IF gain of the particular system LNB in use happens to be, the only thing that really needs to be adjusted is the alignment meter 'set zero' pot.





The near-instantaneous meter response to level changes during dish adjustment makes a very welcome change from the delay found in many digital equivalents.

QO-100 usage

The low pass filter values shown in the circuit diagram are optimised for alignment using the QO-100 wideband beacon at 10,491.5 MHz. Assuming the system LNB LO is running at 9,750 MHz, the result will be an IF centred at 741.5 MHz, and this is also the frequency that the ADF4351 is set to, so that the output from the alignment meter mixer will include two components superimposed on each other, 600 kHz or so wide, with their lower edge extending down to DC.

For our purposes it doesn't matter that these sit on top of each other since they are effectively pseudo-random and will combine to produce an increased signal level. The low pass filter has a corner frequency that is set to slightly less than 600 kHz, so that LO frequency error in both the LNB and ADF4351 module becomes a little less critical. It provides the selectivity necessary to reject other signals in the band, though the meter will inevitably remain sensitive to transmitter ALC changes caused by variable receiver loading at the satellite.

In general

Pretty much any +7 dBm LO level double balanced diode mixer rated to 1 GHz should work in this circuit, since the ADF4351 output level will be at least +4dBm and given the high LNB gain, at this low LO level any increased mixer loss would not be of any importance in this application.

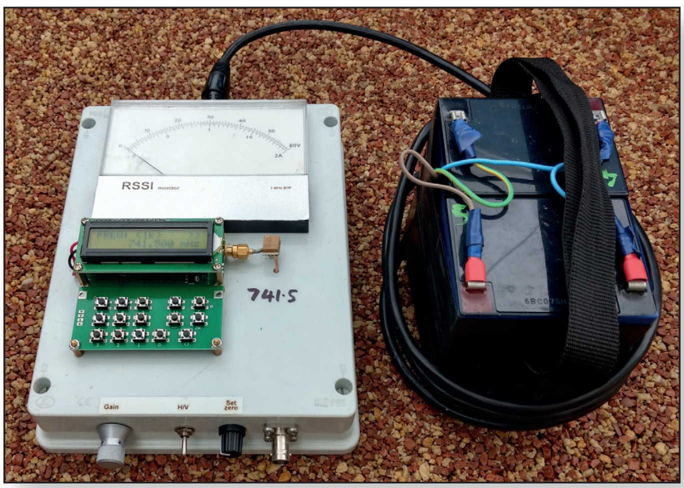
Likewise, any op-amp with an input and output range that includes its negative supply rail will work in this circuit. One section of an LM324, for example, would fit the bill nicely.

Component values shown either side of the 'set zero' pot reduces its range somewhat, but does result in a nice silky feel to the pot adjustment. A more forgiving arrangement would be to use a higher value pot – say 5k, and pad it later to reduce the range down to a comfortable level.

Linear regulators were eventually used because standard low cost Chinese step up and step down assemblies proved to be far too noisy.

When setting up antennas, it is interesting to note that the 10,491.5 MHz allocation is also used by several other satellites, so despite the good selectivity of this alignment meter, on initial dish adjustment, expect to suffer an amount of confusion before the correct signal is found.

Its high sensitivity also makes this meter a good demonstrator of warm ground/cold sky noise difference when fed by an LNB, which might be educationally useful on occasion.



Reflections from Mont Blanc

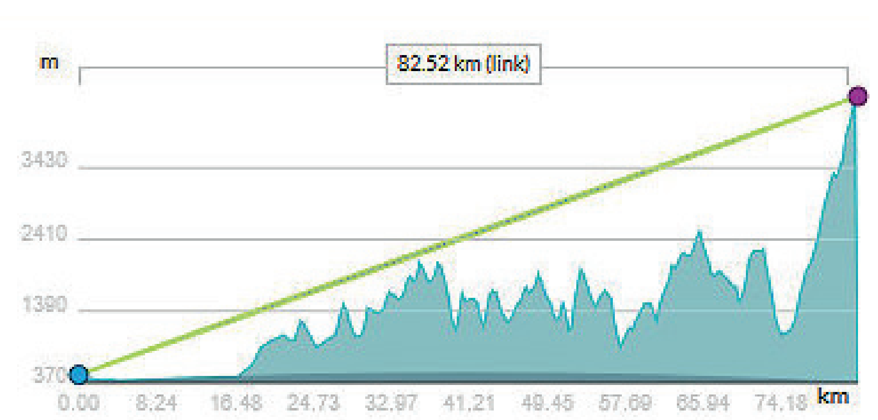
Reported by Dave Crump, G8GKQ

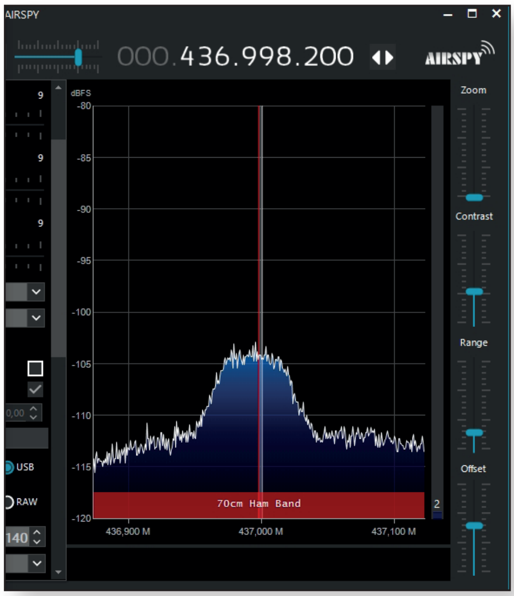
Michel, HB9AFO, reports that on 3 August he achieved a 10 GHz 66 kS DVB-S2 contact with F9ZG/P using a passive reflection from Mont Blanc.

Michel's QTH is 83 km from Mont Blanc over an unobstructed path as shown in the path plot below.

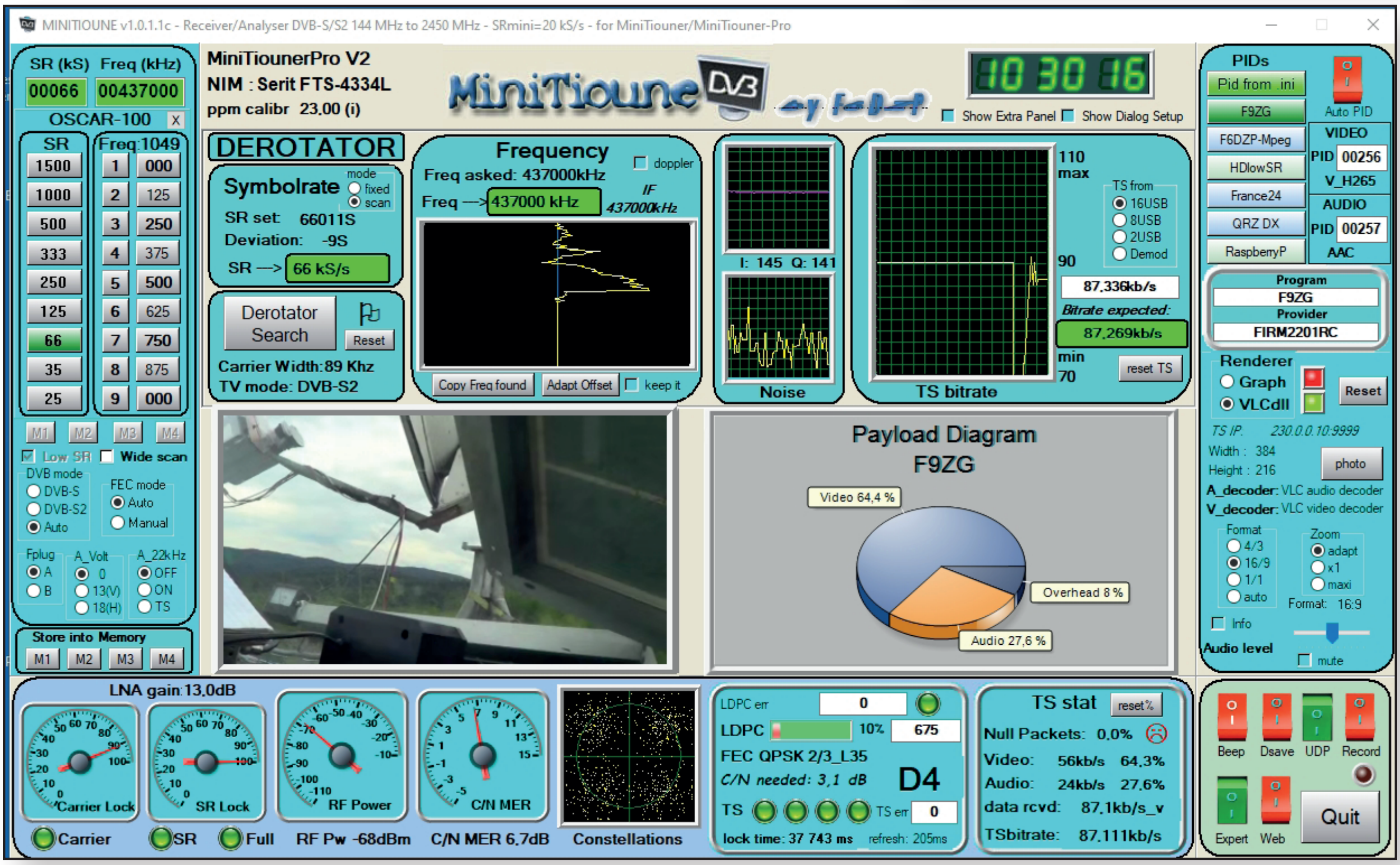
Rolf, F9ZG, was at Plateau de La Verrerie in JN16VB, 239 km from the mountain and was running 5W to a 120 cm dish.

The received signal can be seen below – very impressive for a 322 km total path length.





Thanks to Michel for the information.
More details at *https://www.hb9afo.ch/articles/Mont-Blanc/default.htm*



It will come in useful one day...

Gareth G4XAT

The annual BATC CAT (much-missed last year) is a veritable treasure trove of bargain bits.

This piece was built into an 'Antenna Specialities' diplexer originally for mobile phone base station use and came with three top quality silver-plated PTFE insulated N-sockets, which I removed and saved for amplifier upgrades (I have already used one on the output of my Nokia UMTS 13cm amp).

It is based on an idea published by Jim, G7NTG, and uses a small mosfet brick amp (MHPA21010) designed for use on 2.1-2.2GHz (*https://www.nxp.com/docs/en/data-sheet/MHPA21010.pdf*).

Jim found that it worked well on 2.4GHz too and offered 22dB of gain and a decent 12+ Watts out for 100mW of drive.

In my QO-100 station I use the AMSAT pre-driver with built in SAW filter, but this isn't any use down at the narrowband end of 13cms.

It is specified for 28 Volt operation, so a suitable five-Amp up-converter was sourced from eBay. Bias was needed so a 7805 was included, along with switches for 'DC' and 'bias on', both with LED indicators. Some SMA-ended coax flying leads were retrieved from stock (CAT again) and some stress-relief plastic parts were designed and printed to re-use the old N-type fixing holes and screws.

Power in is supplied via a silicon insulated JST lead, via a five-Amp Polyfuse. Part of the old diplexer filter PCB was salvaged as a ground plane that I could solder to and two tiny islands of very thin glass fibre pcb were added as isolation for the bias and positive feeds, secured by the ceramic bypass capacitors to the ground plane.

Like most mosfet things, before adding the device, always check that the bias control is at 0V. With power supplied, I wound up the bias while looking at the current draw. All the way to five volts, and no change? Had I been sold a dud I wondered?

A quick email to Jim solved the problem, they need 7-8 Volts to be biased on.

Phew, panic over.

Not having any 7809 regulators to hand, I added a 6.2V zener in the ground lead of the 7805, reset the precision pot to less than 5 volts and started again.

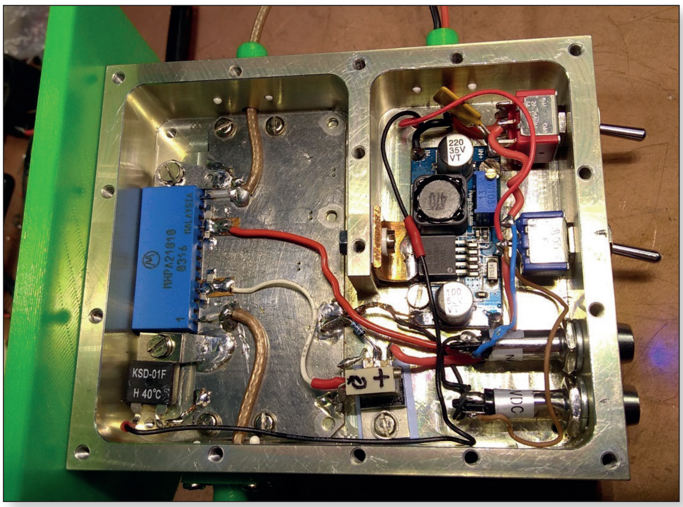
This time it biased up as expected, needing 7.1 volts to set the idle current at 450mA. Although mounted in a big chunk of aluminium, in testing the block was getting too warm. A rummage in the 'fans and heatsinks' box produced a perfect solution, probably culled from an old Pentium 2 size computer many years ago.

Four holes were drilled and tapped to secure this and a 40°C TO220-style thermal switch was added internally (under one of the module fixing screws) in the fan power lead.

This means it works when needed, but not when cool. With portable ops in mind, every little bit of power saved helps – I'm not forsaking the LEDs though – it's nice to know it's still alive.

The only purchase to complete this project was the little brick module. I bought a pair for £36 as soon as I saw the project, knowing that they would indeed 'come in useful one day' and promptly go up in price. They are now around that price for just one, but still good gain and power per pound.

Ideal for use on the narrowband segment of Oscar Q100 and probably a reasonable level for terrestrial NB work. How much easier it is these days compared to 'pioneer' days of the 1980s when Bernard, G8TB, first ventured onto 13cm using I think a 2C39-based amp. I have the 'brass curtain rail' Yagis he made for the band in the late 1980s and hope to use them as intended in 2021.



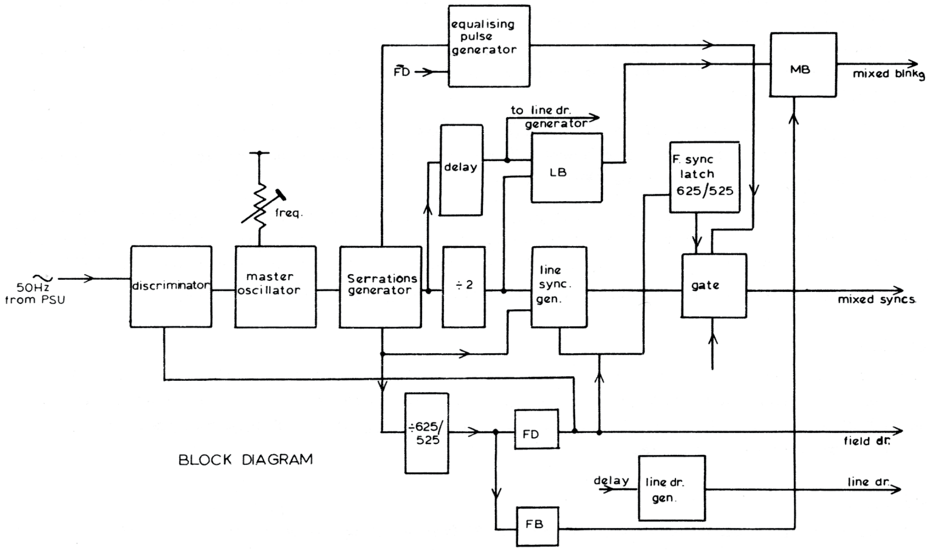
Turning Back the Pages

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

Peter Delaney - G8KZG

CQ-TV 84

The heart of any television system is the sync pulse generator, producing all the timing pulses needed to control the picture sources, vision mixers and so on. CQTV 84, which arrived with members in December 1973, included a new design by Peter Sharp built around the 7400 series of TTL logic circuits,that created the relevant signals to the international CCIR standards.



BLOCK DIAGRAM

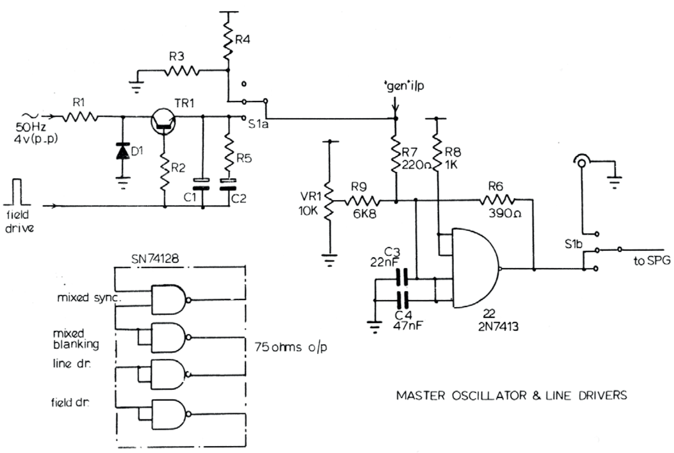
The block diagram showed the concept, whilst an accompanying table listed the parameters of the various pulse outputs for each line standard.

A further table gave the component values for the timing resistors and capacitors used by the monostable circuits that generated the pulses of the required length.

SIGNAL	SYSTEM M (525)		SYSTEM D K K1 (625)	
LINE PERIOD	63.5uS	RISE TIMES	64uS	RISE TIMES
LINE BLANKING	(10.2-11.4) - 10.8	300nS ± 100nS	(11.8-12.3) -12.05	300nS ± 100nS
LINE SYNC. PULSE	(4.19 - 5.7) - 4.95	250nS ± 100nS	(4.5-4.9) -4.75	225nS ± 75nS
FRONT PORCH	(1.27-2.54) - 1.9		(1.3-1.8) -1.55	
FIELD BLANKING	(19-21 HO - 20H	300nS ± 100nS	(2.5H)(1.6mS)-25H	300nS ± 100nS
1ST EQUAL SERIES	3H		2.5 or 3H	
2ND EQUAL SERIES	3H		2.5 or 3H	
F. SYNC.	3H		2.5 or 3H	
EQUAL PULSES	(2.29-2.54) - 2.42		(2.25-2.45)-2.35	
F. SYNC. DURATION	(26.4-28) - 27.2	300nS ± 100nS	(2.5H) -160.0	300nS ± 100nS
F. SERRATIONS WIDTH	(3.8-5.6 -4.7	300nS ± 100nS	(4.5-4.9) -4.7	300nS ± 100nS
LINE DRIVE	-5.8	300nS ± 100nS	-6.6	300nS ± 100nS
FIELD DRIVE	(9H) -571.5	300nS ± 100nS	(7.5H) -480.0	300nS ± 100nS
OUTPUTS MB	4v p-p negative	into 75		
MS	4v p-p negative	into 75		
LD	4v p-p negative	into 75		
FD	4v p-p negative	into 75		

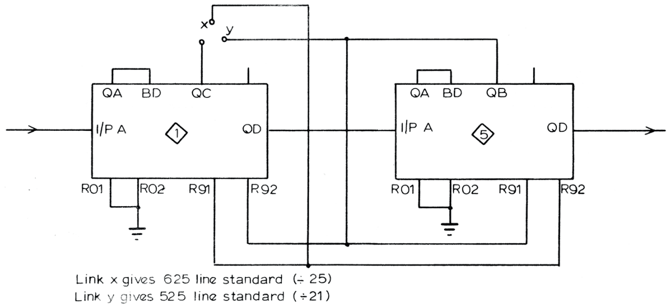
NOTE: All Times in uS except where stated.

The master oscillator could be locked to the local mains supply, or another source of pulses (the 'gen i/p'), and was set to run at twice the line frequency.



MASTER OSCILLATOR & LINE DRIVERS

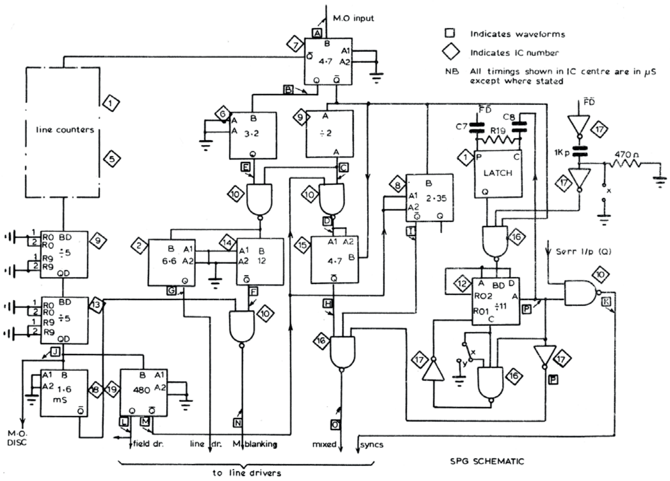
The main difference between the 625 and 525 line systems was in the counter chain. For the former there were 4 divide by 5 stages one after the other, whereas for the latter stages that counted by 7, 3, 5, and 5 were needed, and this was done by altering the connections around the first pair of counter stages.



MODIFICATION OF FIRST TWO LINE DIVIDE COUNTERS FOR 525/625 STANDARD

The main circuit diagram showed the logic arrangement (the letters in boxes corresponded to a full set of waveform diagrams, whilst the figures in diamonds were a reference to the integrated circuits used).The output stages (shown on the master oscillator diagram) used NAND gates in the 74128 device, which was specifically designed to drive a 75 Ω line.

At that time, most television amateurs who wanted to use a camera as a picture source had to build their own. Although data on the working of amplifying valves and transistors was readily available, the operation of television imaging devices was much harder to find. The situation was not helped by the fact that there was not a standard nomenclature used by the manufacturers for the various electrodes, so John Lawrence's circuit notebook on camera tubes and their power supplies was particularly useful.



The imaging devices that amateurs could use at that time were all based on thermionic valve technology. The most popular was the vidicon tube. These had a mesh inside the tube, just behind the photo-sensitive layer (made of antimony tri-sulphide, and known as the target). In some cases this was connected internally to another electrode (known as the wall anode or grid 3), but an improved definition could be achieved by having a separate connection to this mesh, and applying a higher voltage to it. The vidicons in most common use were either 1" or 2/3" in diameter. They could have either magnetic or electrostatic scanning, and either method for focussing - the most common was the magnetically scanned and focussed tube. Starting to become available at that time was a similar device using a lead oxide photo-sensitive layer - commonly known as a plumbicon (although that was Philips registered trade mark for the type of tube). Its main advantages over the vidicon were improved definition and the absence of 'lag' (ie a ghost image that was particularly noticeable when panning). The tubes available at that time were larger than standard vidicons, being 30mm diameter, and so needed more scanning power.

To show the working of the vidicon tube, John showed the power supplies for a simple camera, and the various controls. The 9677 and 9728 were magnetically scanned and focussed 1" types (differing in their heater currents). The 10667 was an integral mesh 1" tube.

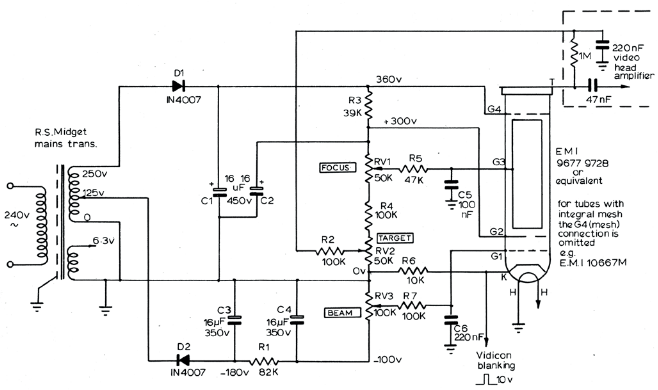


Fig. 2. Vidicon tube supplies for a simple camera

However, by using a stabilised power supply, and providing a much higher voltage to the mesh, the performance of separate mesh tubes could be appreciably improved.

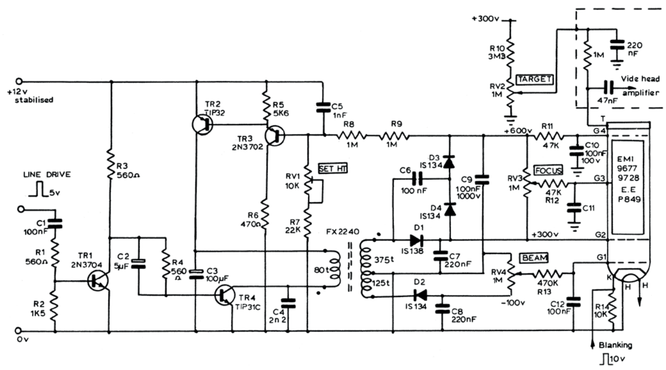
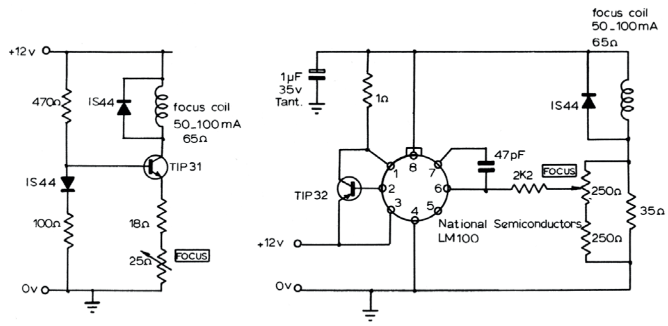


Fig 3. DC-DC convertor: stabilised H.T. supply for vidicon operating in high voltage mode

With either type of circuit, it was preferable to regulate the focus current (which created a magnetic field to focus the electron beam on the back of the target).



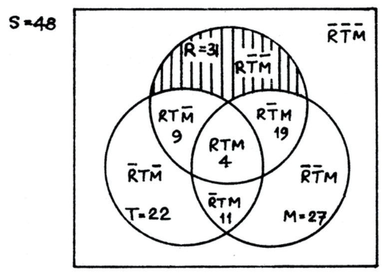
Simple focus current regulator

Precision focus current regulator

Although the simple version (left) would give a reasonably stable supply, the precision version (right) would generate a constant current for even better performance.

Arthur Critchley's integrated circuit series commented that "now that digital integrated circuits are commonplace, it is frequently the case that logic circuit descriptions include such expressions as AND, OR, 0, 1 A$\overline{B}$ and so on". This - the last in the series on TTL logic - looked at various ways to represent those logic systems. Fundamental to understanding these was a knowledge of the binary system of numbers, and the principle that "a thing either is or is not".

One way to represent a logic problem was to draw a Venn diagram. Arthur gave an example - "A company with three divisions, radio, television and motors, and 48 salesmen. In a year 31 sold their quota of radios, 22 their TVs and 27 their motors, 9 both radios and TVs, 11 both TVs and motors and 19 sold radios and motors, whilst 4 sold all 3.



How many sold only radios, and how many should be sacked?" he asked! The Venn dagram represented the various conditions - the rectangle represents the number of salesmen, one circle those who sold radios, another those selling TVs, and the third motor salesmen. The circles overlap because some sold more than one product (and where all three circles overlap is where they sold all 3 devices), whilst the area inside the rectangle but outside all 3 circles are those who sold nothing.

The problem could also be represented using Boolean algebra - which used just 3 operators - AND, OR and NOT, and in essence was a way to represent the Venn diagram logic as an equation rather than as a diagram. TTL logic gates were made that performed these functions, and also combined them (so the AND operation together with the NOT operation became NAND). Logic gate makers usually represented the function by means of a Truth Table - inputs could be either 'on' (1) or 'off' (0), and the resulting output for the varying input conditions was similarly shown. For example

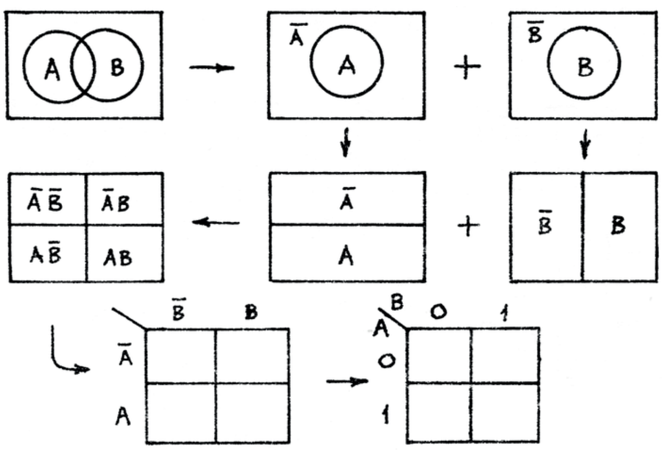
AND	A B	Y
A.B	0 0	0.0=0
	0 1	0.1=0
	1 0	1.0=0
	1 1	1.1=1

OR	A B	Y
A + B	0 0	0 + 0=0
	0 1	0 + 1=1
	1 0	1 + 0=1
	1 1	1 + 1=1

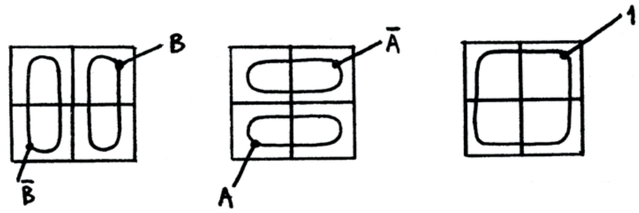
NAND	A B	Y
$\overline{A.B}$	0 0	1
	0 1	1
	1 0	1
	1 1	0

On the left is an AND gate - the output (Y) is only 'on' (1) if both input A AND input B are both 'on'. In the middle is an OR gate - the output (Y) is 'on' (1) if either input A OR input B, (or both of them), are 'on'. On the right is a NAND gate (or NOT AND) - the output (Y) is 'off' (0) if both input A AND input B are both 'on' (ie it is the inverse output of an AND gate).

These charts and tables worked well for simple logic systems, but for a logic system with more than three variables a Karnaugh Map was more effective. For the two variable situation, it was rather like a rectangular form of Venn diagram.



Areas of the map equated to basic logic expressions, which could be ringed around with loops (each loop had to be rectangular or square, with a binary number (1, 2, 4, etc) of squares to each side).



Arthur went on to show diagrams for 4 or more variables, and how by using such mapping, the overall logic of a system could be reduced to simplify the circuitry needed to achieve the same end result.

(Such logic diagrams were a new concept for many engineers at the time, although the Venn diagram was then starting to be taught in schools. Arthur gave several pages of examples of the Karnaugh map, including how to create colour bars in proper phase sequence).

THE SPACEMARK SSM-1

SLOW SCAN TV MONITOR

From those wanting something more 'ready-made' for their atv station, the back cover had an advert for a slow scan monitor. This was a solid state (apart from the crt) design, and cost £143, but was also available as a kit of parts, without the case) for £82.(Equivalent to £1600 or £950 today).

The British Amateur Television Club

Out and About

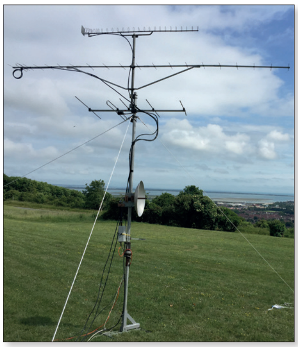
Rallies and events with a BATC stand: (subject to change)

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

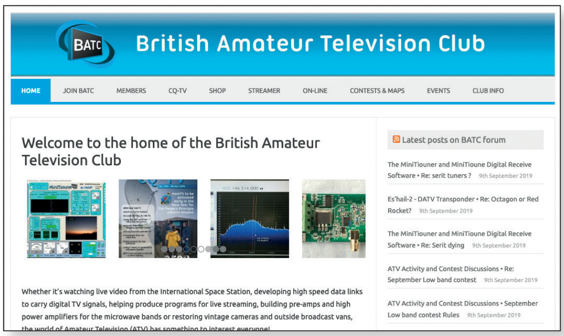


2021 Activity Days:

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



batc.org.uk