The British Amateur Television Club

CQ-TV

No. 258 – Winter 2017

5.6Ghz ATV from Cumbria

9cm LNB Mounting

GB3FB - A 9cm Digital ATV Repeater

BATC report to the RSGB Spectrum Forum

A LED power output indicator

GB3TZ 5.6GHz input

5.6 GHz WB ATV Tx

Portsdown Update

Portsdown Signal Generator

Using old laptop screens for ATV

Miniaturised Pulsed Relay Driver for 28V Microwave Relays

Converting an old Satellite dish to a 23cm dish antenna

Using the Tarot 5.6GHz ATV Modules

... and all the regular features

The BATC Shop

https://batc.org.uk/shop/

BATC DTX1 Digital TV Transmitter

MPEG-2 encoder and DVB-S modulator

- Self contained unit - computer not required.
- Composite and S-video input
- 2 audio channels
- Single PCB design
- Plug in option for 2nd video & audio channels
- Size: 165mm wide; 120mm deep; 55mm high
- Tunes the 70cm and 23cm bands. Tuning range from 150Mhz - 2Ghz
- -5 dBm output
- Power 500mA at 12 volts
- LCD front panel and keypad control
- RS232 control port
- Includes TS Dock PCB free of charge!

Specification subject to change without notice

Available from BATC shop

- DTX1 DATV transmitter PCB complete with case and front panel
  £459 *including postage*

- The Portsdown Project
  - Filter Modulator - Blank PCB and ready Built
  - Preprogrammed SD card
  - Local oscillator filter - blank PCB
  - 4-Band decode - blank PCB
  - GPIO breakout board - blank PCB
- MiniTiouner USB receiver
- Blank PCBs for BATC projects
- Hard to get components at cost plus prices
- Programmed USB modules
- 70cms upconverters

... plus: Renew Membership and Badges & Sundries

https://batc.org.uk/shop/

CQ-TV 258

Contents:

BATC Online

Website: http://www.batc.org.uk
BATC Wiki: https://wiki.batc.tv
Forum: http://www.batc.org.uk/forum/
Stream: http://www.batc.tv
Dxspot: https://www.dxspot.tv/

Printed in Great Britain. ISSN 1466-6790

Contributions

The preferred method of communication is by email, all email addresses are shown above.

Alternatively you can write to us at:
BATC, Silverwood, South View Road, Pinner, HA5 3YA, United Kingdom

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 November 30th

Please send your contributions in as soon as you can prior to this date. Don't wait for the deadline if you have something to publish as the longer we have your article, the easier it is for us to prepare the page layouts. If you have pictures that you want including in your article, please send them, in the highest possible quality, as separate files. Pictures already embedded in a page are difficult to extract at high quality but if you want to demonstrate your preferred layout, a sample of your finished work with pictures in place is welcomed. Please note the implications of submitting an article which are detailed on the contents page.

From the Chairman...

Noel Matthews – G8GTZ

I'm writing this as I take a break from putting up Christmas lights at home and reflecting what a good year 2017 has been for Amateur Television!

It's hard to think that it is only one year ago that we launched the Portsdown DATV project – the take up has been phenomenal with over 225 people worldwide buying parts - it just proves there is still a desire to build and make things. A significant factor in the success of the project has been the hands on support provided by the community of Portsdown builders on the BATC forum but especially the dedication of Dave G8GKQ who has driven the project and deserves full credit for its success.

We've also seen a return to popularity in analogue ATV with the adoption of the 5.6GHz FPV modules – a number of groups around the country are now experimenting with these units, the Furness radio club has adopted them as a club project and is featured in this edition and GB3TZ has now got a 5.6 GHz input. The price and performance of these units make them a great way to introduce ATV to beginners and we would encourage you to take some along to your local radio club and show them how easy it is to get going on the Microwave bands.

All of this activity means the BATC is thriving and we've seen a significant increase in members over the last 12 months and I believe some of this renewed interest in ATV is because BATC takes an active role in driving the hobby forward rather than just passively reporting on activities.

For example, in this edition of CQ-TV there is a copy of the spectrum report that we presented to RSGB spectrum forum – members of the BATC committee spend time and effort to take an active role on the forum, both protecting our existing spectrum and pushing for new bands. Through this work we have seen the release of an additional 1 MHz at 71 MHz, which the RSGB freely admits would not have happened without the work BATC and its members did in raising the profile of the potential of RB-TV at 146MHz. In particular the experimentation with 1920*1080 HD in 500 KHz has become very high profile within Ofcom due to the support BATC has given to several meetings between RSGB and Ofcom.

And thanks to the Portsdown Project, Amateur Television has never had so much publicity. There have been a number of Radcom articles, Txfactor episode 15 was dedicated almost entirely to ATV and BATC has also had a much higher profile at various events, in particular at National Hamfest and RSGB convention where the Portsdown project has attracted a significant number of newcomers / returners.

All of this takes time and effort and it would be good to see a few more members take an active role in running the club. In particular we are looking for someone to take over the contest co-ordination role. You may have seen it incorrectly reported elsewhere that the RSGB has an appointed ATV manager who co-ordinates the IARU contests. This is incorrect and in fact the BATC contest manager liaises directly with IARU and the RSGB spectrum managers to ensure the voice of UK ATVers is heard. Dave G8GKQ has done this role for many years, and was in fact appointed to that role by the previous BATC chairman, but he now feels it is time to step to one side and concentrate on Portsdown support. The role involves co-ordinating the UK entries for the IARU ATV contest in June and some occasional liaison during year – as such is not very time consuming and if you feel this is something you can do to support the UK ATV community, please contact myself or Dave G8GKQ directly.

As we look forward to 2018, we need to start planning where we will hold CAT18 and our BGM when you will have the opportunity to elect your new committee and there will be a change of Chair! So let us have your ideas on where you would like to see your club hold the meeting and also give some thought as to whether you could help run the club by standing for election to the committee.

I hope you enjoy this packed issue of CQ-TV and on behalf of the BATC committee I would like to wish all our members a have very happy Christmas and prosperous New Year.

British Amateur Television Club

Contest and Activity Weekend News

Dave Crump – G8GKQ

October

Very poor weather on the Saturday of the October activity weekend kept everyone at home and, it seemed, out of the Shack. A few stations received HamTV from the ISS during the day.

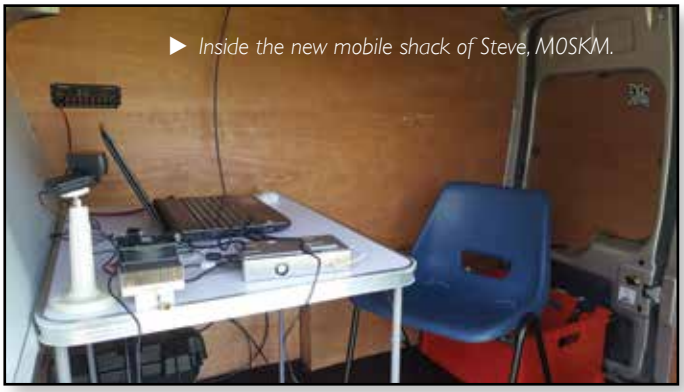
On the Sunday, there was some 5.6 GHz activity in the South and South West, with myself, Noel G8GTZ and Adrian G4UVZ active from portable locations.

November

Again, no activity on the Saturday of the Activity Weekend, but crisp clear weather encouraged a number of stations out on the Sunday. Bands in use included 2 m, 23 cm, 9 cm and 6 cm. G8GTZ and G8GKQ tried 9 cm for the first time from portable locations. Signal strength was high, but contact was only possible using a symbol rate of 4MS due to poor phase noise on the receive LNB.

▶ *Pictured is Steve M0SKM inside his new mobile shack as received by Arthur G4CPE.*

▶ *Noel also managed some 24 GHz narrow band activity, although it required some roof-climbing to make the 69 km contact to G4SJH.*



▶ *Inside the new mobile shack of Steve, M0SKM.*

Name	Call	Location	Locator
Rob	M0DTS/P	North Yorkshire Moors	IO94MJ
Ken	G8VDP	Barnsley	IO93GM
Gary	M1EGI	Barnsley	IO93GL
Clive	G4FVP	Darlington	IO94FM
Noel	G8GTZ/P	Walbury Hill	IO91GI
Dave	G8GKQ/P	The Ridgeway near Harwell	IO91IN
Steve	M0SKM/P	Dunstable Downs	IO91RU
Phil	G8XTW	Leighton Buzzard	IO91PW
Arthur	G4CPE	Upper Sundon, Beds	IO91SW
Mike	G0MJW	Harwell	IO91IO

Future Activity Weekends

Please remember that there is an Activity Weekend every month now – dates below. You don't have to go out portable – just try to get on the air from home or anywhere. Take a look at the Forum to see who else is likely to be on, and then post details of what you achieved. News of activity breeds activity!

Contest and Activity Day Manager Position

I'm still looking for someone to take over as the Contest and Activity Day Manager so that I can spend more time on the Portsdown project. Please let me know if you are interested in helping out.

Contest and Activity Weekend Calendar

1200 UTC 13 January 2018 – 1800 UTC 14 January 2018:	ATV Activity Weekend
1200 UTC 10 February 2018 – 1800 UTC 11 February 2018:	ATV Activity Weekend
1200 UTC 10 March 2018 – 1800 UTC 11 March 2018:	ATV Activity Weekend
1200 UTC 7 April 2018 - 1800 UTC 8 April 2018 -	ATV Activity Weekend
1200 UTC 5 May 2018 - 1800 UTC 6 May 2018 -	ATV Activity Weekend
1200 UTC 9 June 2018 - 1800 UTC 10 June 2018 -	IARU ATV Contest
1200 UTC 14 July 2018 – 1800 UTC 15 July 2018:	ATV Activity Weekend
1200 UTC 11 August 2018 - 1800 UTC 12 August 2018 -	ATV Activity Weekend
1200 UTC 8 September 2018 – 1200 UTC 9 September 2018:	ATV Activity Weekend
1200 UTC 20 October 2018 – 1800 UTC 21 October 2018:	ATV Activity Weekend
1200 UTC 17 November 2018 – 1800 UTC 18 November 2018:	ATV Activity Weekend
1200 UTC 8 December 2018 – 1800 UTC 9 December 2018:	ATV Activity Weekend

Here and there...

▶ *At The Kempton Park Rally in November, John G7JTT was presented with awards for the best 1-way and 2-way DX contacts using a Portsdown transmitter during the IARU ATV Contest.*

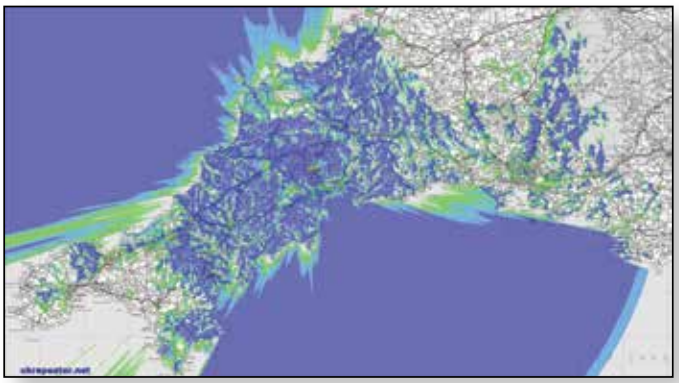
▶ *Roland, F8CHK built this "open" Portsdown and labelled it for a demo at his local club. He soldered the filter-modulator board himself.*

▶ ***Left:*** *Graham, G3VZV, presents Mike, G0MJW and Noel, G8GTZ with the award for the first RB-TV contact over 250kms.*

▶ ***Right:*** *Judging of the construction contest at the RSGB Convention in Milton Keynes in October 2017, with Dave, G8GKQ looking on nervously. … And the subsequent presentation of the G3VA trophy to Dave for his Portsdown transmitter construction.*

Members News

Dave Mann – G8ADM



Martin, G8LCE, from Falmouth, Cornwall is working on his 70cm and 23cm equipment using a DTX1 and a Portsdown system. These are controlled by separate 7-inch touchscreens, see picture. On 70cm he will be using a 60W brick both from home and when portable. On 23cm he will be running 150 W on from home and 18 W when out portable. His first experiments will be through the Cornwall repeater, GB3NQ, just 32Km away on very high ground near St Austell. Martin hopes to encourage more activity through this repeater. He can also receive ATV on 1316MHz, 5.665GHz and soon 437MHz all with the antennas beaming NE towards the rest of England. These receivers may be viewed on his website: ***www.g8lce.com***

Repeaters

Phil, G8XTW reports that GB3TZ near Dunstable has had some maintenance, after some antenna storm damage. It now uses single antenna working on the 13cm band with 71MHz transmit/receive separation. The PA and isolator have been repaired and the receiver confirmed to be in good order. TZ also has inputs on 437MHz Digital DVB-S 2MSym and 5665MHz analogue FM.

More information on the current details of our repeaters may be viewed on the BATC Forum: ***http://www.batc.org.uk/forum/*** Anyone can read the forum but if you wish to add any comments then you will need to log in. Repeater Keepers, please update this forum whenever you make any changes, thanks.

Europe

We see very little ATV news from Germany. AGAF do have a web site: ***http://agaf-ev.org/index.php/tv-amateur***. If you have any information on German ATV repeaters it would be useful to add them to our activity website, ***https://www.dxspot.tv/***. This contains much information from France, Holland, Belgium and the UK etc.

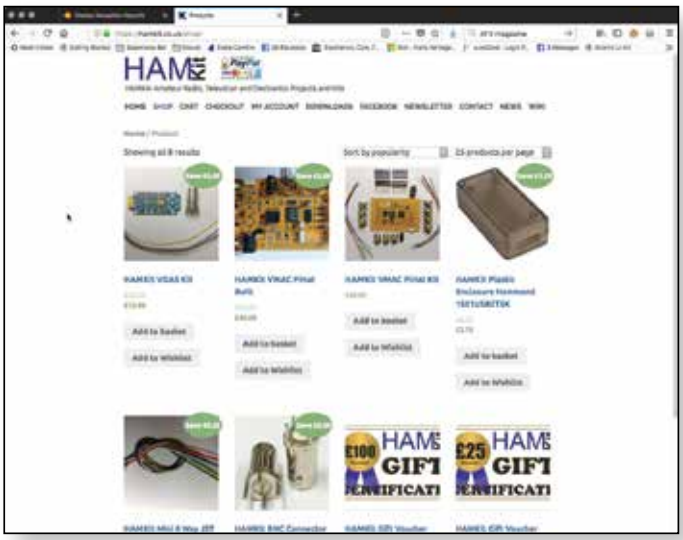
USA

The only American ATV magazine, ATV Quarterly has recently been sold to a new owner. It would be very useful to see this develop to enable all of us to keep up with ATV activities in the USA.

Website: ***http://www.atvquarterly.com/***

Kits

Dave G8PUO has just launched some kits for very useful ATV equipment suitable for home and repeater use - there will be more details in CQ-TV 259. See: ***https://hamkit.co.uk/***



New and renewing members

Rob Burn, Membership Secretary – G8NXG

As reported in CQ-TV 257, the monthly membership of the club has tended to run in excess of 1,000 and this trend appears set to continue; thank you to all those who continue to support the Club.

In this issue of CQ-TV the new and renewing membership list covers the period September to the end of November. If you renewed towards the end of November your renewal date may have slipped into December, so do not be too concerned if your details have not appeared yet. I have to declare an error in the introduction to the previous list; this covered the period June to end August – not September!

The intention is that the listing period follows the quarterly deadlines published in each issue of CQ-TV, which it normally does.

This version of the list is intended to be of greater use for members by being presented in country and post-town order. Besides being of general interest, members will be able to determine the possibility of making local contacts.

As noted before in previous issues the list is manually created so mistakes can occur; if you spot one please get in touch. Similarly, get in touch if you renewed during the period and expected to see your name here.

Australia		
Sakari Mattila	VK2XIN	Bruce Act
Terry Manley	VK2JY	Chipping Norton
Peter Dodd	VK7KPC	Evandale
Andrew Burns	VK4YMB	Glenwood
Alan Hart	VK4FREQ	Goondiwindi
Roy Xanthos	VK4TRX	Gracemere
Neil Muscat	VK3BCU	Melbourne
William Maxwell	VK7MX	Perth
John O'Shea	VK2ATU	Revesby
Justin Giles-Clark	VK7TW	South Hobart, Tasmania
Reastinc Giles-Clark	VK7OTC	South Hobart, Tasmania
Graham Wiseman	VK5EU	Two Wells
John Bramham	VK3WWW	Vermont, Victoria
Roger Jordan	VK5YYY	Whyalla
Bevan Daniel	VK5BD	Whyalla Norrie East
Singapore		
Haoyuan Chu	9V1HY	Singapore
Japan		
Akira Kaneko	JA1OGZ	Ageo
Hiroshi Matsumoto	JA1SYK	Takasaki
Katsumi Morita	JA3RVS	Wakayama
Belgium		
Patrick Hernaelsteen	ON5AV	Brussels
Rene Van de Wiele	ON6VI	Dendermonde
Arthur Lambriex	ON4FIN	Dilbeek
Bernard Baekelant	ON4KBF	Naast
Stefan-Konstantin Dimitrov		Sofia
Charles Verstappen	ON8YY	Waterloo
Finland		
Jouni Anttila	OH1CO	Littoinen
France		
Fabrice Faure	F4HHV	Boissieres
Jean Dentroux	F5CFN	Crolles
Jouan François	F1CHF	Franconville
Guy Gounel	F1BFZ	Grambois
Henry Kirchner	F4WBG	Gueugnon
Gilbert Feraud	F5CAU	La Gaude
Franck Dubuis	F1SSF	La Tuiliére
Pierre Roussiere	F1FCO	Nimes
Morata Gilbert	F1FWX	Nimes
Boucher Jean	F6ESU	Ognes
Roland Etienne	F8CHK	Pabu
Christophe Rouviere	F5IWN	Rueil-Malmaison
Alain Brellier		St Laurent en Gatines
Koeger Camille	F6CMB	Strasbourg
Camille Farrougia	F4IBA	Villeneuve Loubet
Germany		
Thomas Bäker	DL5BCA	Brake
Matthias Bopp	DD1US	Emmendingen
Thorsten Siemer	DL1OA	Goettingen
Ireland		
Dermot Madsen	EI4ESB	Dublin
Seamus Mccague	EI8BP	Dublin

Italy		
Cristian Sandri	IW3IAA	Belluno
Stefano Vannucci	IW5BT	Momigno
Malta		
Mansueto Grech	9H1GB	Mqabba
Netherlands		
Randy Ten have	PH4X	Amersfoort
Oebele Lijzenga	PA3BJC	Damwald
Herman Blom	PB0AHX	Delft
Henri Van der Heijden	PE1PYC	Den Bosch
Herman Ten Grotenhuis	PA0TEN	Eefde
Henry Paulissen	PD0OM	Montfoort
Martin Groos	PD0RJI	Numansdorp
Hendrik Ten boom	PE1HTB	Ouwsternijega
Jaap Zondervan	PA0OLD	Sint Annaparochie
Frank Marx	PA2MRX	Uden
Norway		
Ivar Rognstad		Oslo
Portugal		
Carlos Pinho	CT2GAM	Marinha Grande
Spain		
Joaquim Fabregas Rius	EA3ANS	Barcelona
Alberto Martinez Salcedo	EA9AN	Melilla
Switzerland		
Olivier Noverraz	HB9BBN	Morges
Peter Wagner	HB9TOP	Ostermundigen
Willi Vollenweider	HB9AMC	Zug
United Kingdom		
Bill Cardno	GM0NRT	Aberdeen
Ian Gall	GM8BNH	Aberdeen
Ron Mount	G7DOE	Abingdon
Paul Kerry	G6LSD	Alfreton
Peter Harston	GW4JQP	Ammanford
Seamus Import	G7ITT	Appleby-in-Westmorland
Garry Hope	2E0YQC	Ashford
Bryan Steele	G0BDK	Bedford
Norman Hunter	G8DQN	Billericay
Gail Spencer	G4XCP	Birkenhead
Alan McDowell	G0KOO	Boston
Petrie Owen	GW0KAX	Bridgend
Darren Hobbs	G8PVG	Bridgewater
Ivor Green	G1IXF	Bristol
Shaun O'Sullivan	G8VPG	Bristol
Andy Jenner	G7KNA	Bristol
Brian Golding	G6AUR	Bristol
John Hislop	G7OHO	Broadstairs
John Marsden	G8PEF	Bury
Graham Hares	G6IXM	Camberley
David Leary	G8JKV	Cambridge
Geoff Wilkin	G0DDX	Cambridge
John Worsnop	G4BAO	Cambridge
Barry Cope	G7EKI	Canterbury
Gary Franklin	G4GHD	Canvey Island
Geoffrey Pike	GI0GDP	Carrickfergus
Nick Gilbey		Charmouth
Peter Whitford	G3MME	Chesterfield
Andy Carlile	G0MNI	Cleethorpes
Roger Gregory	G4OCO	Cornwall
Alan Taylor	G1MSA	Coventry
Clive Davies	G4FVP	Darlington
Peter Hull	G4DCP	Denmead
David Pickford	G8TNE	Derby
Mel Jackson	G8EOP	Dewsbury
Peter Biggadike	G8JAN	Downham Market
Don Saunders	G0WFT	Dunstable
Steve Marshall	M0SKM	Dunstable
Malcolm Bay	M0MBO	Dunstable
Peter Lewis		East Cowes
Andrew Britton	MM0MGB	Edinburgh
Peter Green	G0ABI	Eggesford
Dave Williams	G7GQW	Ellesmere port
Peter Carliell		Ewell
David Woodhouse	G6ORL	Fareham
Bob Fisk	G7AVU	Gainsborough
Neil Smith	G4DBN	Goole
Steve Barrett	G4HTZ	Great Wakering
Adrian Patton	G1BRB	Grimsby
Laurence Stant		Guildford
David Brazier	G8RZJ	Havant
Nigel Nash	M0NGL	Hemel Hempstead
Don Roomes	G0RQL	Holsworthy
Raymond Newsome	G1MSD	Huddersfield
Lyndon Reynolds	M0LDR	Hull
Chas Broughton	G1RSK	Immingham
Peter Stonebridge	G8ZQA	Ipswich
Nigel Crisp		Ipswich
Malcolm Grant	G7HPE	Kettering
Stephen Norman	2E0WZV	Leicester

Brian Greenaway	G3THQ	London
Nick Moldon	G1BVI	Maidenbower
Patrick Shephard	G7ZZZ	Maidstone
Andy Rutter	G8HCK	Malton
Jeremy Powell	M0JLP	Malton
Terry Bailey	G6CRF	Manchester
Mark Bryant	M0UFC	Manchester
Paul Newman	G8UDI	Market Rasen
Ian Shepherd	G4EVK	Melton Mowbray
Stephen Drury	G6ALU	Milton Keynes
Liiam Clancy		New Malvern
Anthony Horsfall	G4CBW	Newcastle-Under-Lyme
Mike Busson	GW8MER	Newport
John Grant	GI7UGV	Newtownards
Robert Clayton	G8SDU	Norwich
Bill Boyd	G4BID	Norwich
Ian Brothwell	G4EAN	Nottingham
Alan Bolton	G1EAB	Nottingham
Malcolm Johnson	G0UHY	Paignton
Nik Roe	G4ACW	Petersfield
Michael North		Polegate
Colin Redwood	G6MXL	Poole
Christine Cotton	M6UBI	Portsmouth
Frank Cotton	G0LFI	Portsmouth
Richard Horton	G4AOJ	Purley
Malcolm Stanbridge	G8NT	Radstock
Thomas Grady	G6IGA	Reading
Eric March	G8EOJ	Redditch
Carl Schofield	M0ICS	Rochdale
Peter Johnson	G4LXC	Royal Tunbridge Wells
Peter Scovell	G1PRX	Sandford
Angus Young	M0IKB	Scarborough
Nigel Smith	G4EQD	Scunthorpe
Mark Kent	G8PHM	Sevenoaks
Barry Chambers	G8AGN	Sheffield
Derek Latham	G6HXL	Skelmersdale
Martin Ehrenfried	G8JNJ	Stoke-Sub-Hamdon
Adrian Whatmore	G4UVZ	Taunton
Richard Wilkinson	G0VXG	Telford
Ray Benitez	M0DHP	Thames Ditton
Stephanie Foster		Torquay
Richard Burrows	G8BYI	Trowbridge
Granville Cooper		Uxbridge
Ciaran Morgan	M0XTD	Warwick
Julia Tribe	G0IUY	Waterlooville
Simon Tribe	G0IEY	Waterlooville
Dave Remnant	M0SAT	Watford
Edward Harland	G3VPF	Weymouth
Nicholas Grundy	G4NKV	Whitby
Antony Mark Tilt	G1JMX	Willenhall
Robert Hammond	G4FKR	Winchester
Graham Le Good	G4GUN	Witney
Dave Cash	G7MEG	Wolverhampton
David Holman	M0YDH	Wolverhampton
Peter Lyall	G8FRH	Woodford Green
Rob Johnston	G7MHF	Wrexham
Canada		
Peter Jago	VA3PJ	Stittsville
United States		
Rodger Southworth	WB8NZU	Beavercreek
Carlos Picoto	AD7NP	Bellevue
Gary Oaks	KB9VGD	Burlington
Wayne Strickland	W9BBB	Chicago
Mike Bagstad	KB0OZN	Coulmbia Heights
Keith Pugh	W5IU	Fort Worth
Michael Lodico	K1EG	Glasgow
Ronald Fredricks	K8DMR	Jenison
Ronald Simpson	N6GKJ	Lodi
Thomas Stevens Jr	WB2AZQ	Long Branch, NJ
David Bush	KC5UOZ	Mcgregor
Rod Fritz	WB9KMO	Mesa
Omission from CQ-TV 257:		
Fred Coe	WB6ASU	Acampo, CA
Argentina		
Antonio Capoccetti	LU7DTS	Buenos Aires
Chile		
Patricio Lancellotti	CE3BSK	Santiago

► *Treasurer Brian ready to welcome new members at the Kempton Park rally in November 2017*

5.6Ghz ATV from Cumbria

Chris M0KPW and Nick G0HIK

Following a short article in the September 2017 edition of RadCom that stated 5.6Ghz ATV could be achieved by using cheap 'First Person Video' (FPV) transmitter and receiver units, Chris M0KPW thought this would make an interesting project members of Furness Amateur Radio Society might like to get involved in.

After some more information was sought from BATC Chris ordered some suitable units from China (via eBay) to create 2 transmit / receiver stations. A few weeks later club member Nick G0HIK made a start on one of the stations.

In early October, Chris and Nick gave a presentation to members of the club to find out what interest there was. The presentation gave a background of what had been learnt so far and ended by encouraging other club members to get involved in the project. Be it constructing suitable antennas/dishes, fabricating brackets for attaching dishes to tripods, building relays and a host of other jobs to make the project succeed. The plan is to get the two stations operational and transmitting and receiving over a short distance – across a room or short open space - ultimately building up to working over a distance of many miles in the Cumbrian hills and beyond.

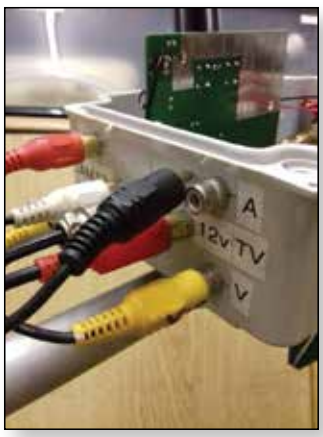
▶ *Chris M0KPW and Nick G0HIK and the Furness Amateur Radio Society*

Nick G0HIK had already taken the 'bull by the horns' and made a start on one of the stations. Using a surplus SATV dish Nick installed the FPV modules in a box and mounted it in the old LNB position. Also contained in the "transceiver" is an SMA antenna relay, a relay for the 12 volt supplies and 28v relay driver. Initially cheap Chinese voltage boost modules were tried for this job, but both units that were supplied failed on power-up. So after a message to the Yahoo microwave group a simple circuit to create the initial boost to drive the relay was built on Vero board.

It was found that the transmitter module gets very hot after a few minutes of operation, in order to help a small heat sink was glued to the module and a fan installed which runs on TX.

Antenna wise, it was decided to try a log periodic printed circuit board antenna (WA5VLB 2 – 11 G LPY) and this was installed to feed the dish. These are great value at around £5.00. A steady hand is required to solder the braid of the coax the entire length of the PCB.

A 'beacon' was built so a signal could be used with the receive station for initial testing.

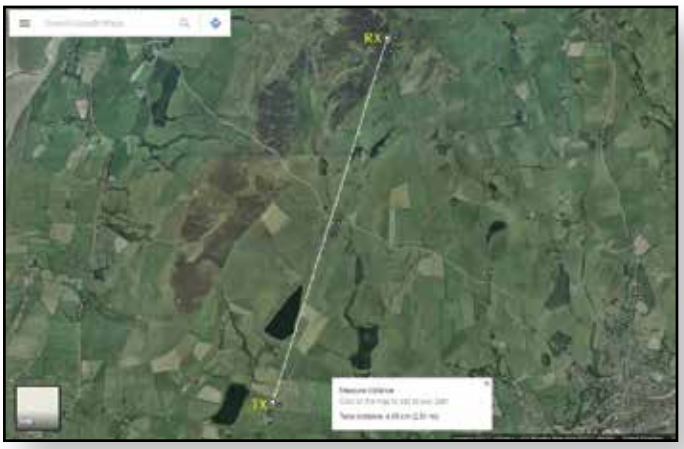


At this point it was a Heath Robinson affair of wires consisting TX unit (Micro TS5828 TS5828L 5.8G 600mW 40CH 190mA/12V Mini FPV Transmitter RP-SMA), a camera, the standard antenna and 12v supply.

The first field test

Thursday 2 November was the perfect day for a test, with glorious sunshine and little breeze. The beacon was set to transmit and placed carefully on a wall with the camera pointing at the local countryside (you can see the wire from battery in the camera view). Not knowing what sort of distance to expect at this point we knew there was line of sight 1 mile away, so we headed off to a suitable place to set up the dish in the hope of receiving a signal. We were happy to see the signal full strength on the screen and were enthused to try a little further afield.

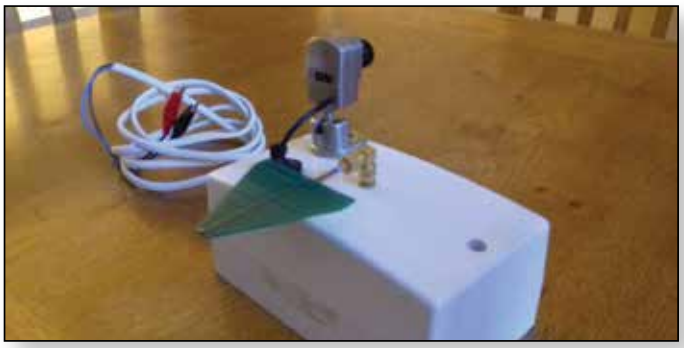
The sensible option was to head up a local hill which we knew was accessible via car (a portable location used for both HF and VHF). Unfortunately there was no line of sight from the car park, so we headed off on foot over another hill to get a clear line of sight. Once the dish and receive station were set up and pointing in the general direction of the beacon we were again greeted with a perfect picture on the screen – we reckoned the distance was between 2 and 3 miles, and once back at the home QTH's Chris plotted it to be 2.5 miles (as shown in the map).



Some refinements were made to the system. The external LPY aerial was beginning to suffer from being transported as it was mounted on rigid coax. The final straw came when a gust of wind blew the whole lot over when conducting a test from Nicks home QTH. It was decided to use flexible coax for this purpose and a piece of stiff copper wire used to hold the LPY in place.

The beacon was boxed and the addition of a log periodic PCB antenna helped boost the beacons signal for future testing.

A short distance test (less than a mile) was carried out to ensure everything was still operational before trying a 2nd field test.



The second field test

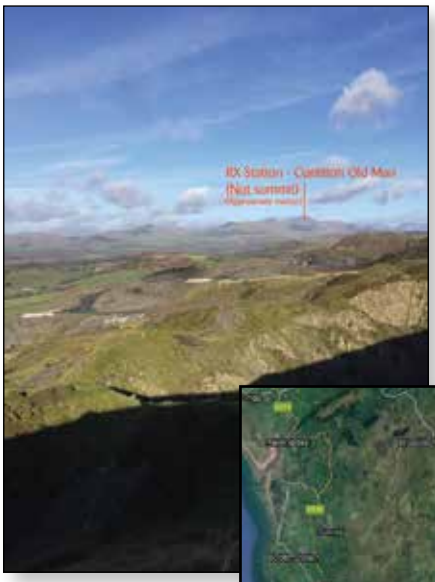
Saturday 11 November was another perfect day for a field test – this time a little more adventurous in distance and hills involved. Nick would head to Coniston Old Man whilst Chris would head to Kirkby Moor (near his home QTH). Line of sight had been plotted and we were hopeful of good signals.

After a couple of false starts and given the fact that 2m FM comms wasn't possible we knew we didn't have the required line of sight. So Chris went to a higher point on the moor to clear some smaller hills. When 59 was received on 2m we knew we were in with a better chance. Once the beacon was switched on and pointed in the general direction of Coniston Old Man it didn't take long to receive word via 2m that the ATV signal was being received perfect signal. This gave us a distance of just under 9 miles – not bad for 2nd time out without fully finished stations.

On this field test we learned a lot about alignment, finding that it is far more crucial in azimuth than in the elevation and as the distance increases so does the accuracy of aiming. We guess there is a lot to learn especially as the distances increase. Also in poor visibility we will need to be able to align using a compass. It was found that the K7FRY web site would be handy for plotting the bearings in future.

We also learned that using a path prediction map is not always to be relied upon. The path from Kirkby Moor to Coniston Old Man appeared promising, but was not in practice – at least not until Chris had tried a few different locations to get a true line of sight.

The beacon is now going to be further improved by adding connectors to allow different cameras to be used and eventually test card generators which will improve on the current method of adding a hand written callsign caption card to stay within licence conditions.



Future field tests will include using different cameras on the beacon to test camera panning and zooming, transmit and receive of audio from a camera, transmit of signal from Nick's system to a RX beacon, ultimately leading to two way ATV transmissions between 2 completed stations.

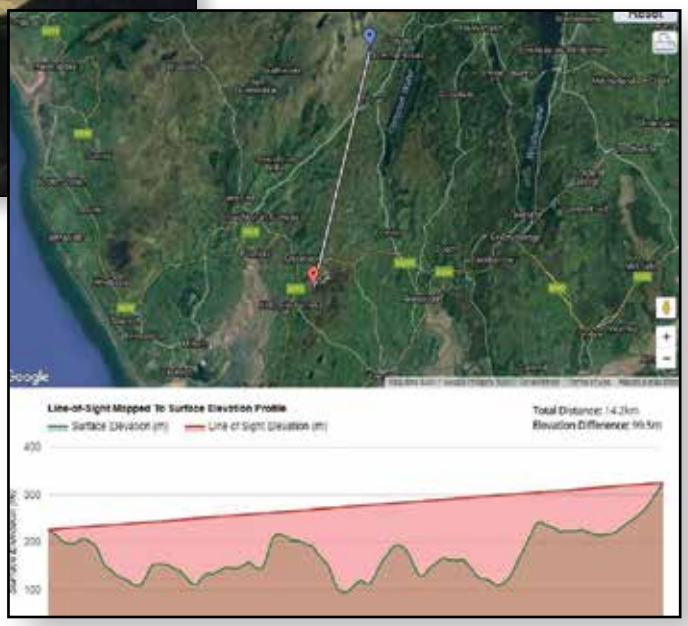
Chris is also at work building a station, but is a few weeks behind due to waiting for kit to arrive from China. This station is an intentionally different set up from Nick's so we can compare the differences.

Chris' system will use 5 GHz panel antennas (and possibly some other options as the project progresses) instead of a dish, and will use separate antennas for TX and RX to eliminate the need for a relay. The RX and TX units are the same which are fed into a camera and TV monitor respectively. A 12v junction box has been built allowing power for all of the system to come from one 12v source.

In addition an old Camlink Vision 500 Video Titler and processor is being used to generate the call sign on the TX signal and other text as required.

It is hoped that by the time you read this, Chris system will have been field tested.

The whole idea was conceived as a club project that we knew would interest a few – and other members from Furness Amateur Radio Society are also working on the project, including building another TX / RX station and members working on Raspberry Pi Test Cards and various other aspects.



Thanks to the ATV community who have expressed interest in our activities and offered assistance and suggestions along the way. There has already been requests to set up QSOs from other parts of the country that have a clear line of sight to us and we look forward to trying these as soon as possible.

Watch this space as work continues… or more importantly watch out on 5665MHz from South Cumbria! Contact Chris ***furnessamateurradio@outlook.com*** to arrange a sked!

9cm LNB Mounting

Ray - M0DHP

I bought a Titanium LNB to receive GB3HV on 3.4GHz with my newly completed MiniTiouner.
On my first outing, I managed good reception at about 10km but failed at 25km. So decided to try Noel's suggestion on the forum of using a satellite dish with the LNB.
http://www.batc.org.uk/forum/viewtopic.php?f=2&t=4545&hilit=satellite+dish

The dish is a Technomate 65cm offset dish. The Titanium LNB does not fit a standard 40mm diameter LNB mount, so had to build a replacement. I wanted to be able to shift the LNB forwards and backwards, since I'm not sure where the LNB should be with respect to the focal point. The mount won't be installed outside permanently, so did not have to be weatherproof.

I measured the dish to work out the angle between the arm and the centreline of the supplied LNB holder. and designed two parts to be made out of wood: an

extension to the arm that is angled to be parallel to the LNB centreline; and a mount for the Titanium LNB that fits on the extension. The mount is attached with a 6mm bolt that runs in a slot – this allows for experimenting with LNB positioning. The extension is made from three pieces of plywood cut to shape on my CNC router and glued side by side. With a bit of chamfering, the short end is a good push fit into the end of the arm.

The slot was also cut on the router. The mount is a piece of plywood with two saddles fitted to support the LNB. Each of these are 3mm birch ply cut on the CNC router. Using cable ties to hold the LNB seems to work well enough, and allows extra focal point adjustment in addition to the slot.

I am happy to supply CAD drawings (FreeCAD) and gcode files – contact me on ***m0dhp@outlook.com***.

GB3FB - A 9cm Digital ATV Repeater

for the Fylde Coast and surrounding areas

Tim Forrester, G4WIM

Introduction

The following is an update on the progress of a digital ATV repeater for the Fylde coast, the original article covering GB3FT was first published in CQ-DATV earlier this year.

Since the original publication there have been a number of changes, most important of which is the successful application for GB3FB operating on 9cm tx and 13cm rx. Thanks to help from the BATC and Noel G8GTZ in particular it only took just over one month from application to having the GB3FB NoV in our hands.

Incidentally the 'FB' stands for 'First Bispham' which is the name of the Scout Group associated with Steve G3WGU, the repeater keeper. Whereas the 'FT' stands for 'Fylde Television'. The Fylde coast is the area from Fleetwood (North of Blackpool) to Lytham in the South. The terrain is mostly flat but with a small ridge running East/West just North of Blackpool.

GB3FB/FT are located on this ridge (at the QTH of G3WGU) and this same ridge is what largely blocks the 10GHz ATV signals from GB3FY to the southern part of the Fylde coast.

Given there is a cluster of 10GHz ATV activity associated with GB3FY it seemed sensible to build on this by adding both 1.3 and 3.4GHz DATV repeaters. To date the plan seems to be working with an uptake in the construction of Portsdown transmitters and related DATV equipment.

Hopefully once GB3FT and FB are both fully operational there will be additional activity.

Background history

I've had an interest in ATV since the late 60's when a local amateur (Brian Seedle G3UIT) showed me his entirely home brew station for 70cms – he even built his own solid state camera (except for the vidicon tube), quite an achievement at the time.

I was originally licensed as G8GIW in 1972 but it wasn't until the late 80's that my interest in ATV was rekindled, ultimately resulting in the building of GB3MV during the early 90's. I understand it is still in operation in the Northampton area and still using the original Sinclair Spectrum caption generator.

ATV has moved on in leaps and bounds since those early analogue days and now due to the availability of digital hardware and the efforts of the BATC as a whole it is much easier to assemble a working DATV station. That said, given the digital modulation employed (QPSK and variants thereof), it does make the transmit chain more demanding in terms of linearity and signal bandwidth filtering. However the increased spectral efficiency is well worth it – often resulting in a D5 (P5) picture which would only be a P1 or P2 when using legacy analogue techniques.

Fortunately with the availability of integrated IQ modulator IC's combined with ready made DATV Express/Pluto/Portsdown modulators much of the 'hard work' is already done.

The following pages offer a brief summary of the technical side of GB3FT; how it inter-operates with the newly licensed GB3FB; problems encountered along the way; and future plans.

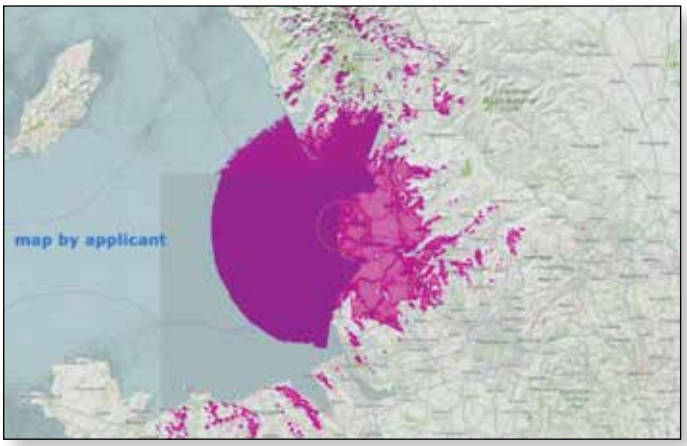
GB3FB/GB3FT Status and Coverage

The license approval for GB3FT is still pending with no indication as to when it might be approved – but since GB3FB has been approved the hardware for GB3FT has been adapted to support GB3FB. In the meantime GB3FT continues to be tested under 'clause 10' - personal beacon - at the location of G3WGU.

Steve G3WGU has kindly agreed to be repeater keeper and to have GB3FT and GB3FB installed at his QTH which happens to be one of the highest points on the relatively flat Fylde coast. The repeater is located in his attic with a very short run of low loss coax to the chimney mounted Alford slot for 23cms (tx and rx) and a 16 slot wave guide antenna for 9cms transmit only.

The 13cm 2440MHz rx antenna will be loft mounted while a 4 ele 146.5MHz yagi is chimney mounted for 333ksps reception, beaming roughly SSE. There is also a vertical dipole for 144.750MHz with DTMF commands controlling both GB3FT and FB.

For license reasons, Steve has final manual override on transmitter operation. Initial tests indicate coverage is very similar to that predicted, see coverage map overleaf.



GB3FT Hardware

The picture below shows the GB3FT transmitter sat on top of its receiver and command section. The front panel has various controls and indicators to aid operation and maintenance.

The transmitter and receiver have recently been adapted to operate at 2Msps rx and tx . The input and output freqs remain the same (1249/1315MHz). Previously the symbol rate was set to 4Msps, but as the NoV for GB3FB requires a 2Msps setting, the entire system has been changed to 2Msps – on the plus side this reduction in symbol rate in theory at least should result in a further 3dB path loss capability.

There is also a 146.5MHz 333ksps receiver (more about that later) along with analogue receivers on 1249MHz and 2440MHz – although the latter is a 'work-in-progress'.

As mentioned above GB3FT transmit frequency remains at 1315MHz, but there is now an external additional transmit up converter and PA such that the GB3FB transmitter operates on 3404MHz.

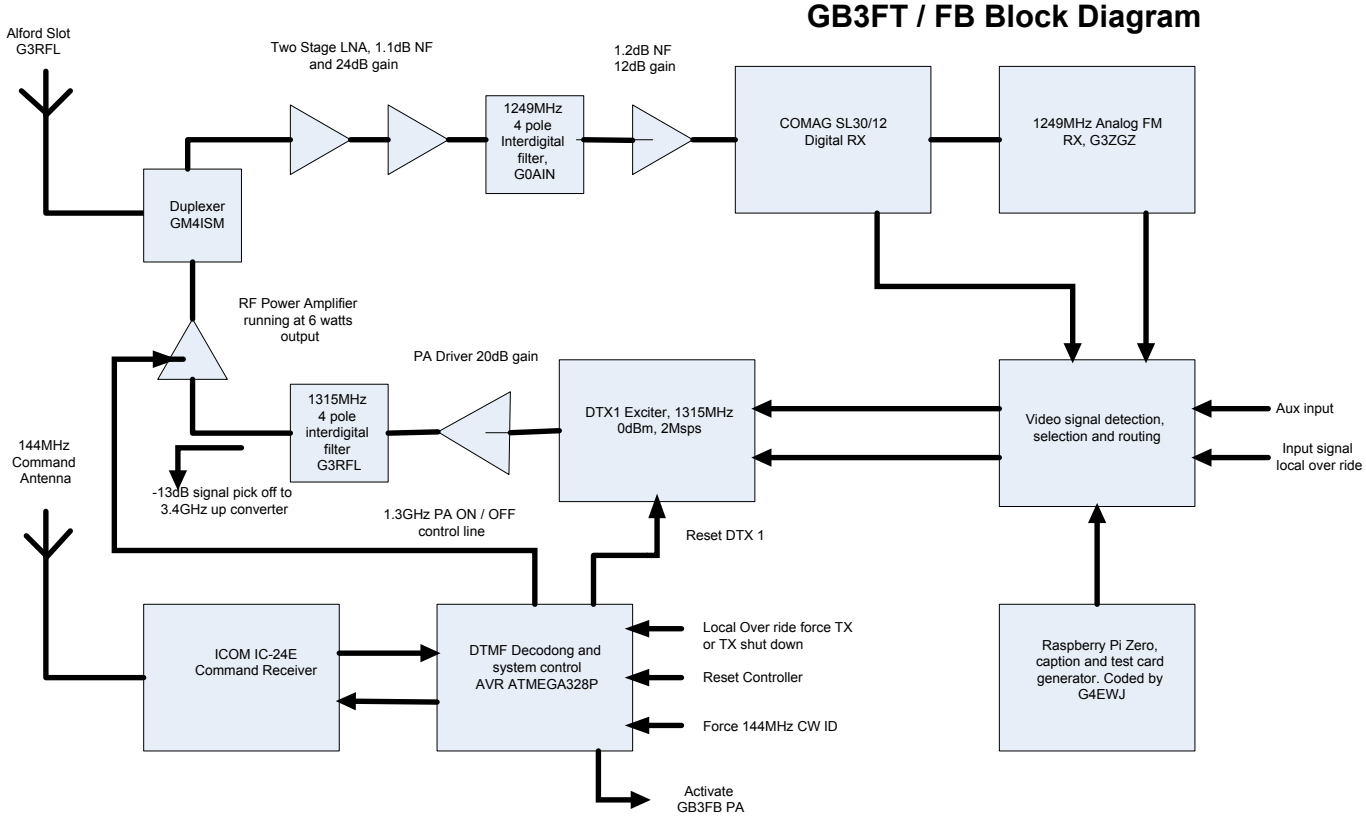
▶ *Another view from the top showing heat sink and cooling fan for the power amplifier.*

Given it's eventual location, keeping the PA cool is essential hence the over size heat sink and fan. The heatsink is 300mm x 300mm x 35mm.

▶ *Rear View – showing connections for the command receiver.*

▶ *GB3FT in operation showing my callsign signal being relayed.*

GB3FT / FB Block Diagram



The following paragraphs go into some detail as to how the repeater was built. This is a simplified block diagram, now showing the extra signal paths for GB3FB.

The hardware is relatively straight forward with contributions from a number of local (and not so local) amateurs, as per the block diagram.

There is also a command receiver listening on 144.750MHz. See the GB3FT qrz.com page to see how this is used.

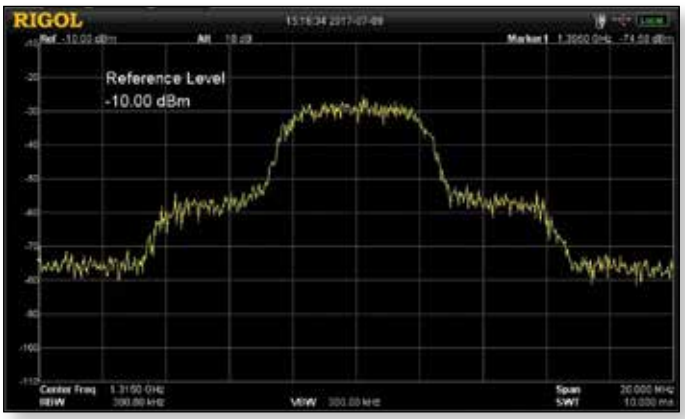
1315MHz Transmitter Section

Below is a picture of the transmit section with the PA and heat sink removed.

It shows the internals of the transmitter. Lower right is the DTX1 with the 1315MHz filter just showing above it and the Raspberry Pi Zero next to it for test card generation.

The duplexer is on the left – it has an insertion loss of 0.37dB at 1315MHz and and 0.7dB at 1249MHz. Thanks Mark GM4ISM for providing this key item free of charge.

The 1315MHz transmitter runs at 5 watts output after duplexer loss and has a reasonably clean spectrum as show below. This picture was taken prior to changing the symbol rate to 2Msps.



Receiver and Command Section

The picture below shows the internals of the receiver die cast box.

There is a PCB from a Comag SL30/12 digital rx on the right and analogue receiver from G3ZGZ on the left. In the middle is a small veroboard circuit containing the lock detection circuits and signal routing.

The 4 pole inter-digital filter and signal amplifier are attached to the lid of the box. The signal from the LNA connects to the inter-digital filter at top right.

The rotary switch at bottom middle selects system off, automatic relay, force digital mode, force analog mode or force auxiliary input. Normally it would be left in automatic relay mode.

A tight squeeze but everything fits – just!

The 1249MHz digital receiver produces a D5 picture down to -102dBm, whereas the analogue is a P3 at -100dBm.

These figures could be improved a little bit as could the antenna gain by moving from an Alford slot to a slotted wave guide – something to be considered for the future. There is no detectable receiver de-sense when the transmitter is in operation.

The picture below shows the 144.750MHz command radio and processor. The radio is a rather elderly Icom IC24 which is interfaced to an Atmel ATMEGA 328p which runs the DTMF control code. There are DTMF codes to control the 1.3 and 3.4GHz PA's and to reset the DTX1 exciter should the need arise.

GB3FB Trials and tribulations

As with all projects there's been a number of problems/ issues to resolve and no doubt there will be more to come as time passes. The following are just a few of the more major issues which were discovered and how they were resolved.

DTX1 'crashing'

Very infrequently the DTX1 would lock up with only a reset being able to make it recover. To address this problem, a DTMF command can be sent which resets the DTX1. Also to save power the whole system gets powered down from midnight to 9am – thus causing a full reboot, but as we discovered this was not without its own problems.

144.750MHz rx going off frequency and other issues.

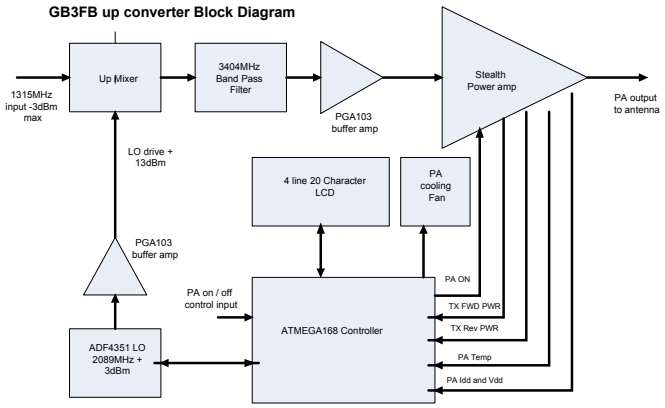
We discovered that when the system was powered down between midnight and 9am that on restoration of power the 144.750MHz radio was now on 145.000MHz due to its internal backup battery having failed after over 30 years of life. Fitting a new battery has hopefully fixed that problem.

Additionally we found that some users had trouble making the DTMF control work. As the radio is a 25kHz channel spacing type it needs a 'loud' DTMF signal to operate. This is often not the case with 12.5kHz radios, thus the audio level had to be carefully adjusted to accommodate both 12.5 and 25kHz sets.

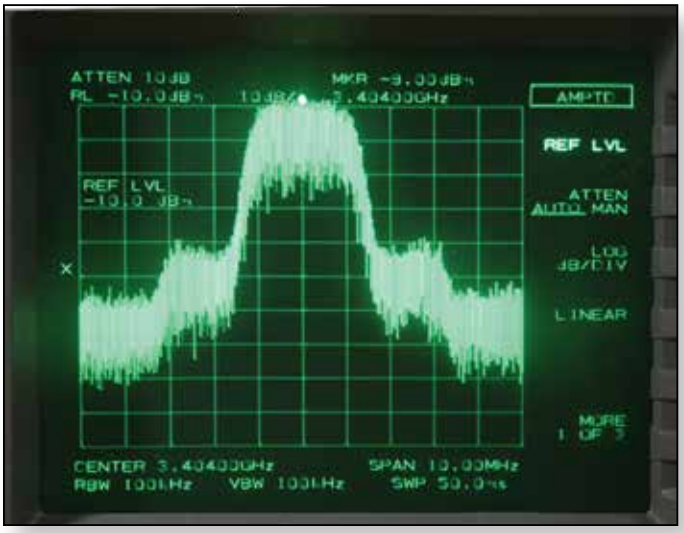
1315MHz to 3404MHz upconverter

The 23cm to 9cm transmit up-converter is the only significant addition to GB3FT (apart from the 2440MHz rx) which needed designing and building, but as can be seen from the block diagram below it is fairly trivial – due in no small part to the availability of key components such as the LO, mixer, filter and amplifier chain.

Below is a block diagram of how it works

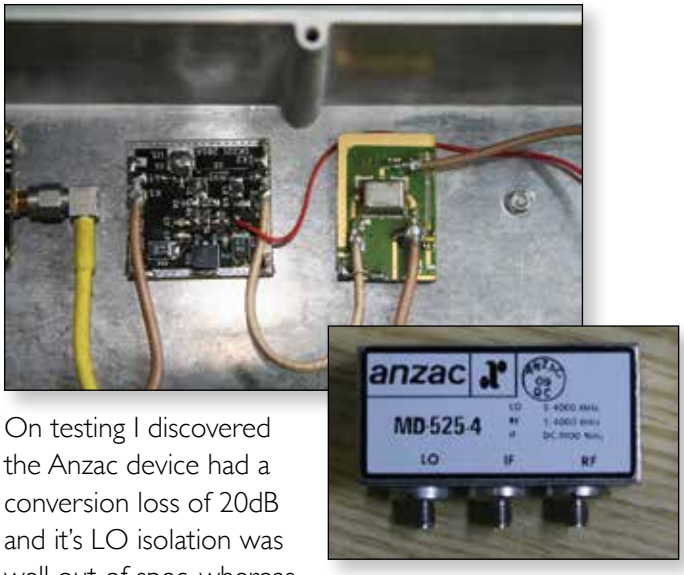


The picture below shows the close in spectrum at 10 watts output.



The mixer

I managed to source two mixers, one removed from an Ionica unit courtesy of David GM6BIG and another connectorized mixer made by Anzac.

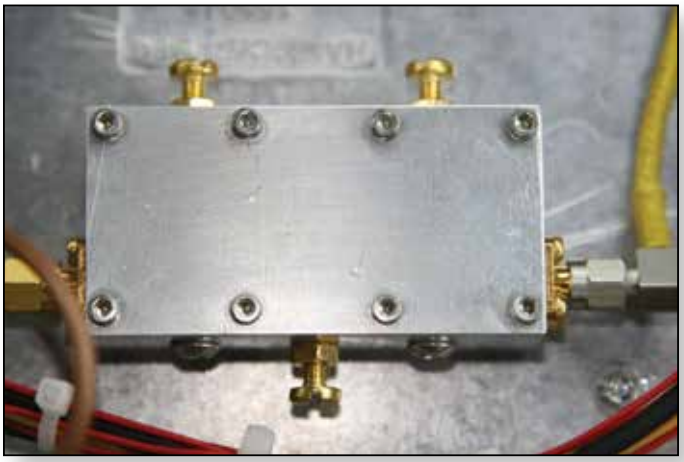


On testing I discovered the Anzac device had a conversion loss of 20dB and it's LO isolation was well out of spec, whereas the module from the Ionica worked to spec and was thus selected for the upconverter. Picture above shows the selected mixer cabled up to LO buffer amplifier.

It might not look as 'pretty' but it works !

3404MHz interdigital filter

After the mixer a filter was needed to reduce the level of unwanted mixer products – fortunately another local ham (Steve G0AIN) came to the rescue and produced a very nice 3.404GHz band pass filter. *(We'll have a full article in the next edition of CQ-TV all about this filter - Ed)*



The PA driver

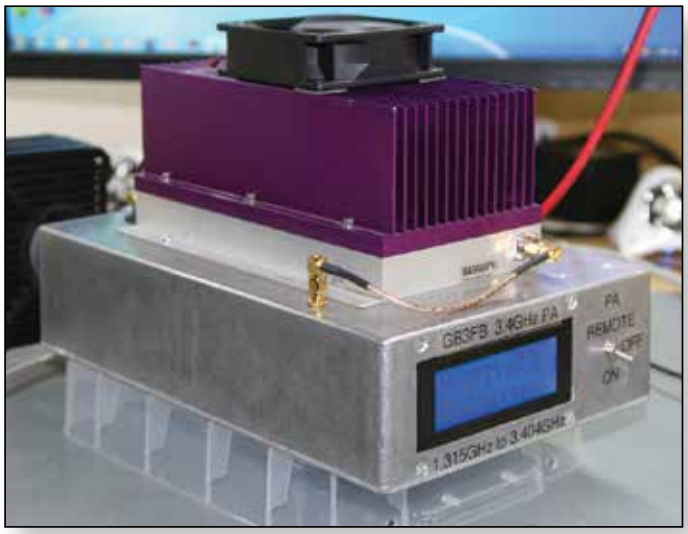
Given that the mixer could only handle -3dBm maximum at 1315Mhz, combined with the mixer and filter loss meant that a driver stage would be required. A PGA103 was pushed into service and provided 7dB of gain which is just enough to drive the pA to a nice linear 10 watts output with shoulders at -50dBc.

In practice the PA will be run at less than this level to be compliant with the NoV ERP.

The PA Stealth Microwave SM3437-43

This amplifier is rated at 20 watts output, but I have measured and tested it to 1dB gain compression at 30 watts output. Clearly not recommended for any length of time and was just curious as to its limitations. I also calibrated what the RF output detectors produce for a range of RF powers. This data is hard coded into a look table for use by the ATMEGA to display power levels.

This amplifier and 16 slot wave guide antenna was kindly supplied by Brian G4EWJ so completing the RF up converter and PA chain.



The switch on the front allows the PA to be turned on/off remotely by a DTMF command or disabled completely or turned on locally. Under normal operation the PA would be under remote control – but by using this switch Steve G3WGU does have the ability to disable the PA completely.

Upconverter Local Oscillator

This uses the ubiquitous ADF4351 module controlled by an Atmel ATMEGA 168p controller. This same controller also monitors and controls the PA.

The output of the ADF4351 was programmed to 2089MHz (2089 + 1315 = 3404MHz) at a level of +3dBm. As the mixer needs +13dBm of LO drive a PGA103 was used to boost the LO signal.

PA controller

As mentioned above the ADF4351 is programmed by an Atmel controller – this same controller is used to monitor the PLL lock line, forward and reverse output power, PA temperature and supply voltage. It also drives an 4x20 LCD to show PA status and controls the cooling fan.

The PA is only turned on when commanded to do so and if the PLL is locked, the PA temp is cool enough and the supply voltage within limits. The cooling fan can be off, low, medium and full depending on heatsink temperature. The code is written using C.

Details of this controller may make the basis for a follow up article at some point.

146.5MHz Receiver performance

On the bench the 146.5MHz receiver appeared to perform very well and indeed from my QTH which is semi rural – it worked very well on air.

The receiver comprises a LNA (G=13dB and <1dB NF) followed by a 3 stage helical filter running into a Minitiouner V2 rx and the appropriate program running on a PC. However when on site at G3WGU I could not access it even with 50 watts ERP from about 8 miles away.

Steve G3WGU did some checks and discovered it was being de-sensed by his solar panel inverters. Fortunately Steve was able to filter them to fix the problem. See appendix B for details.

I can now access with 150mW ERP.

Related to this issue another operator in the same area noticed significant de-sense to his 146.5MHz rx as well, but in his case the problem is not easy to fix as it is coming from a red anti collision light on top of a local crane mast !

Accessing GB3FT/FB

There are a number of receivers available, with the possibility of more to come.

1. Analogue FM on 1249MHz
2. Digital 2Msps on 1249MHz
3. Digital 333ksps on 146.5MHz
4. Analogue (and possibly digital) on 2440MHz – this rx is still undergoing test.

5. Receiving GB3FT and FB

There are a number of ways FT and FB can be received.

1. Traditionally on 1315MHz direct using a suitable digital receiver

▶ *Picture below shows status with PA turned off*

▶ *Picture below shows PA status when active, notice how Vdd drops slightly and the 0.2 watts of reflected tx power.*

2. Traditionally on 3404MHz using a down converter (a C1W-PLL from ebay works well and only costs £30) with the IF tuned to 1746MHz (5150-3404=1746MHz)
3. Viewing the output 1315MHz signal as a video stream on BATC.tv website
4. Viewing the output of the 146.5MHz RBW signal on the vivadatv.org monitor website.

Timescales

Depending on weather and time it is hoped that GB3FB can be on the air by the end of the year.

Future plans

More receivers

There is some talk of adding yet more rx's e.g. for 10GHz (GB3FY link) and 5665MHz, but given that antenna space is limited at G3WGU we have to think very carefully about this to determine if there's enough users to justify it and if there's even space available in Steve's attic !

Remote web features

At some point it may make sense to add a web interface to allow video streaming to/from the web – a bit like echolink but for ATV repeaters. The intent being to consolidate and share activity.

Clearly doing this raises a number of technical, security and license issues.

Conclusion

The hope is that GB3FB will foster more ATV activity generally on Fylde coast and surrounding areas and ultimately provide a link to/from GB3FY which is on 10GHz but whose signal is blocked to the South by the higher ground where GB3FT/FB are located.

Finally I'd like to say thank you to all the people who have been kind enough to donate their time/equipment to make this possible.

Not least to Steve G3WGU for hosting GB3FT/FB and Steve G0AIN for the hours he's spent machining filters for 23cms and now 9cms !

G3SMU silent key

Darren Storer G7LWT

Sad news to report that Brian G3SMU fell silent key on Thursday 26th of October 2017, after being admitted to hospital. Brian was first licensed in 1963 and was active on one band or another (top band to 10 GHz) almost every day until he passed.

Brian's professional broadcast TV background naturally led to an avid interest in ATV; an opportunity for early retirement in the '90s saw his transition to "professional radio amateur", giving him more time to assist local and DX stations with technical ATV issues. Living in a QTH located 850 feet ASL, on the side of Winter Hill Lancashire, provided a wonderful take off for the higher bands, even yielding a 3 cm FM ATV link to EI2DJ in Dublin somewhat earlier than recorded by the official list of "firsts".

Brian's video signals were received across the UK and parts of Europe with an early adoption of GMSK and later QPSK DATV too. Only a slight enhancement was required for Brian to receive GB3HV (DATV in very early 2008) and the IoW repeater and his transmissions were also seen via many popular repeaters around the country.

More recently Brian's eyesight failed which cruelly prevented him pursuing his passion for all forms of ATV. Local ATVers G1LWX and 2E0SAF kindly spent many visits implementing HF antenna systems, which rekindled Brian's interest in top band and 40 metres - eliminating QRM was the new challenge. The vertical that Mike and Sean installed all but silenced the local QRM much to Brian's delight.

Brian's funeral was very well attended with mixture of family, friends and OM from across the North West, Wales, Shropshire and The Potteries. It was definitely a first to see PM5544 adorning a coffin but Brian's test card brought a smile of recognition and delight to friends and ATV aficionados alike.

RIP Brian - here's hoping for GD DX up there!

BATC report to the RSGB Spectrum Forum – October 2017

Every year the BATC makes a report to the RSGB spectrum committee to highlight activities and concerns - the ATV community are seen as one of the few groups driving initiatives and our activities are regularly reported to Ofcom to show real innovation by Radio Amateurs.

Interest in Amateur Television continues to grow as shown by a 25% increase in the membership of the British Amateur Television Club (BATC) during the past 4 years with the Portsdown DATV system proving to be a popular route back in to the hobby for many.

Reduced Bandwidth, RB-TV, digital television transmissions continue to evolve with stations active on bands from 50MHz to 10GHz. Digital modulation tests continue to indicate that DVB-S2 provides about a 2dB improvement over DVB-S for the same bandwidth and stations are now experimenting with the new H265 codec. Reports of these initiatives have been fed back to Ofcom as important examples of continued innovation in Amateur Radio.

Analogue FM is still considered an important mode with a low barrier to entry and is used on the bands above 1.2GHz including the 24GHz and 134GHz bands. The use of low cost Drone video downlink equipment provides an easy route on to 5.6GHz and a significant number of stations are experimenting with wide band FM and ATV on that band.

The Bands

50 MHz

There has been a limited amount of RB-TV testing at the top end of the existing band. BATC has supported the IARU region 1 team initiative to gain an additional 2 MHz at WARC 2019 by carrying out interference testing on AM TV. If this initiative is successful it is envisaged there will be more RB-TV activity on the band.

71 MHz

This new band is available by special request and the application system has recently been streamlined by the RSGB team. This has prompted several ATV operators to apply for permits and we expect RB-TV tests and QSOs on the band to commence before the end of the year.

144-147 MHz

The recently licensed top end of the 2mt band is regularly used for RB-TV. Even though the maximum transmit power is limited above 146 MHz to 50 watts erp, ATV QSOs using 500KHz over 200Km are now happening regularly with the current record standing at 280Km.

430-440 MHz

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

1.3 GHz

26 repeaters are currently licensed for this band and it continues to be very popular for analogue and digital transmission. Simplex, non repeater, operation is also popular in the band.

2.3 GHz

There are still 2 repeaters licensed for this band and even though we lost 40MHz of the band in the PSSR process there is a small amount of simplex operation.

In addition to the terrestrial activity, the HamTV downlink from ISS is being increasingly used during Schools Contacts with the International Space Station. To further enhance the capability of this system, BATC members have developed a unique system for merging the digital transport streams arriving from up to eight different ground stations in real time. This enables full video coverage for the duration of contact, sometimes exceeding the duration of the VHF contact.

3.4 GHz

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

Due to bandwidth limitations there is little simplex operation on this band although 2 stations are known to have conducted DATV tests on 3402MHz.

5.6GHz

With the availability of the low cost (<£20) FPV equipment we are seeing a significant increase in the number of ATV and WBFM stations using the 5.6 GHz band. There are 2 repeaters with inputs on 5665MHz and and we believe this will become an important band for newcomers to ATV and microwaves.

10 GHz

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

There is still FM activity on the band and the low cost HB100 Doppler module is being tested with a view to providing a low cost alternative to the now obsolete Solfan heads. Several stations are experimenting with DATV on the band using standard narrow band transverters from144 / 432 MHz to generate DATV signals on the band. Distances over 100Km have been worked easily .

Higher Bands

There is limited ATV activity on the bands above 10GHz although several stations are known to be building ATV equipment for 24GHz and M0DTS has successfully transmitted video on 134 GHz. We will see more of these bands in use as the higher power GASFET transistors become available.

TV Repeaters

Overall we currently have 37 TV repeaters licensed and 4 new repeater NoV have been requested. The repeaters are using the 1.3 GHz, 2.4GHz, 3.4GHz and 10GHz bands with a mixture of analogue and digital transmission outputs.

The long delay in getting new repeaters licensed has improved slightly during the year however the situation of 23cms is completely unacceptable with the GB3EY application now over 3.5 years old, despite CAA giving frequency clearance over 2 years ago.

The BATC

The BATC continues to support and drive these initiatives with a program of awards and grants and the use of the BATC shop to purchase and stock otherwise difficult to source components.

In order to further increase operator numbers, BATC has awarded a number of prizes for contest winners and have introduced a monthly activity weekend timed to coincide with activity weekends in neighboring IARU countries. Activity continues to increase as evidenced by 30 UK stations active for the recent IARU ATV contest.

Kempton Park Rally - 5th November 2017

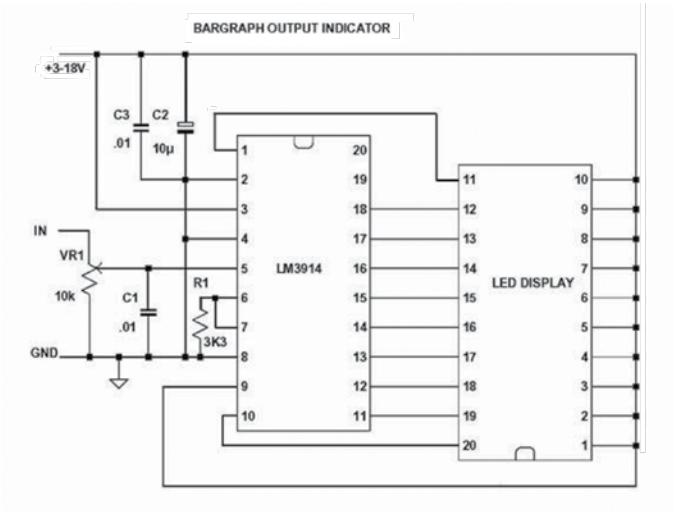
Come and visit the BATC stand at the next Kempton Park Rallies in 2018:
Sunday 15th April and Sunday 4th November

A LED power output indicator

Dave Robinson G4FRE

It is always nice to get some visual feedback that one is actually generating RF when transmitting. At home, in the shack, seeing the power output level on a calibrated Power meter is always comforting. However when out portable a more robust and compact technique is necessary. Absolute accuracy is not a necessity, just a relative indication. Previous attempts with plastic cased analogue meters connected to a detector diode show that they do not survive long in portable operation. My 3456 and 5760MHz Transverters got through 3 plastic covers between them before an alternative solution was considered and many Portsdown builders probably have similar issues.

Thoughts turned to LED indicators, in particular 10 LED bar displays, which are very robust. I remembered an IC that could drive the displays directly, the LM3914 and found I still had some in the junk box from using them as part of the G3WCY SSTV converter many years ago.



The final circuit is shown in Figure 1, with the component values in Table 1. The LM3914 takes a DC voltage input and turns on up to a total of ten LED segments. Alternatively, if current consumption is an issue, it is possible to only light up one segment of the ten available corresponding to the input voltage. This is achieved by disconnecting pin 9 from positive Volts and leaving it floating

R1 sets the current through each LED in the display, the current being set by the formula:-

I (mA) = 12.5 /R1

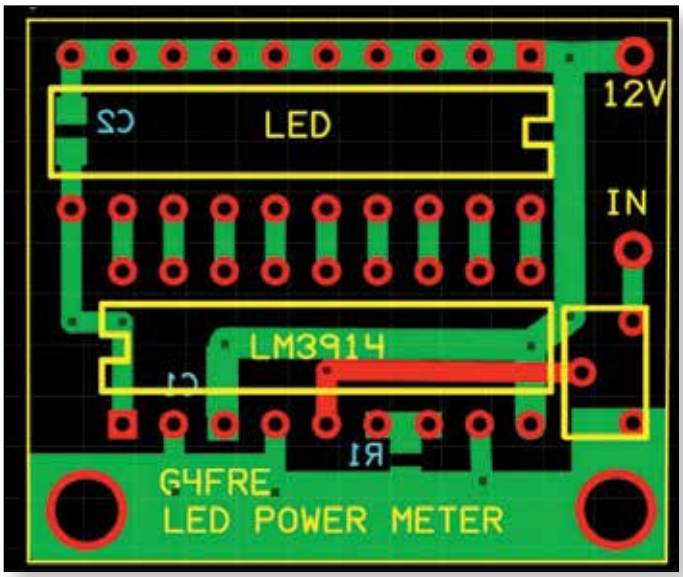
This enables the display brightness to be adjusted to suit individual preferences.

Component	Value
IC1	LM3914 DIL package
VR1	10k vertical mount preset
R1	3k3 0805 SMT
BAR1	10 LED bar display
C1, C3	0.01u ceramic 0805 SMT
C2	10uF 25V electrolytic

▶ *Table 1. Components for display*

Construction

A small PCB was designed as shown in Fig 2 and will be available from the BATC shop; the component overlay is shown in Fig 3. VR1, C1, C2 and C3 are mounted on the track side of the board. IC1, BAR1 are mounted on the opposite, component side of the board. The board has two 3mm holes for mounting on a panel.



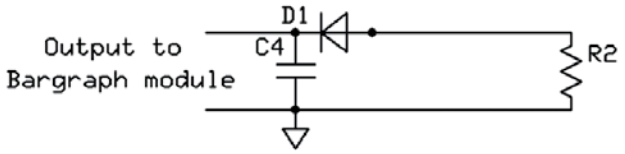
Testing

VR1 should be adjusted so the wiper is connected to ground. 12V should be applied to the module, then VR1 should be turned gradually applying a voltage to the input and increasing the number of segments illuminated. As a check all segments should be lit with a voltage of around 1.25V on pin 5

Interfacing to an amplifier.

Some amplifiers have a suitable power detector built onto the PCB so are easy to connect to the RF indicator. Other

amplifiers will need an RF detector implementing. The following method is the way I have done it on a number of amplifiers from 50MHz to 6GHz. The only components required are a diode, leaded resistor and a leaded ceramic capacitor.



Solid state Amplifiers often have an output PCB track which normally radiate, whether you want it to or not!. So if a wire is placed above this track connected to a diode a rectified DC voltage is available. The final circuit is shown in Figure 4, with the component values in Table 2. The 1N5711 diode was chosen for its high sensitivity from HF to microwave frequencies. An example of the detector construction is shown in Figure 5. This shows how I implemented the detector for detecting the output power of the 7 watt PA module in my G4DDK Anglian 144MHz Transverter. Note this is one occasion where one does not strive for shortest possible lead length. The arrangement allows the components to be moved to get the required voltage to feed the Bargraph

Component	Value
C4	1000pf leaded ceramic
D1	1N5711
R2	1k 0.25W leaded resistor

▶ *Table 2. Components for RF detector*

GB3TZ 5.6GHz input

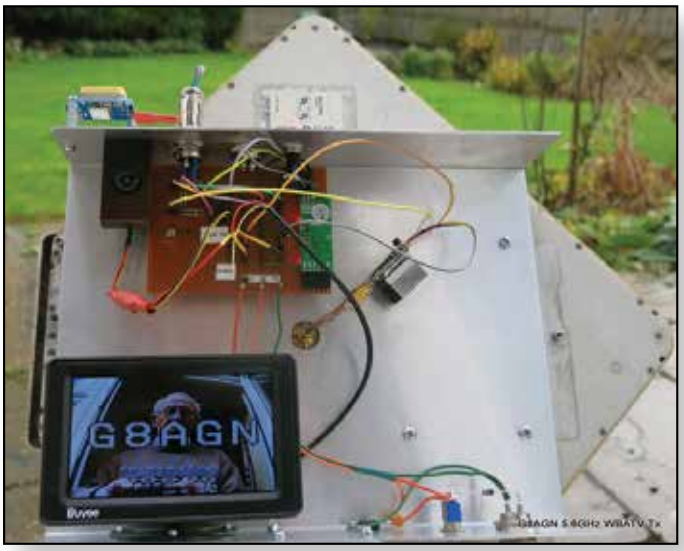
Arthur G4CPE and the GB3TZ team report that they have installed a RX system on site which does work but we are experiencing interference on the 5665MHz input which is preventing weak signals from being relayed by the repeater. Plans are afoot to try and resite the aerial on the opposite side of the tower to try and reduce the interference. We are not sure where the interference is coming from, it may be weather Radar from Chenies but it does not bother signals received at ground level so we will be wandering around the tower with the RX setup on a pole to try and find a better position for the aerial.

5.6 GHz WB ATV Tx

based on the helicopter modules.

Barry - G8AGN

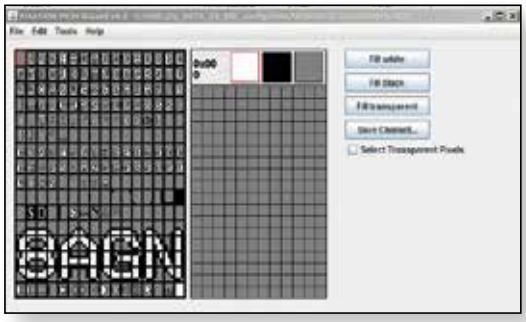
I do plan to make my rig Tx / Rx eventually but have opted to make separates to start with. I have a 2.5w PA for the Tx (usual eBay one) but will keep that in reserve until after my initial testing over short distances.



At top left is a GPS module for position finding. Below that is a camera which is backward looking - hence the selfie! The LCD screen is monitoring what the camera sees and what is being transmitted.

On the RHS at the top is a minimOSD board which is basically an Arduino with an onboard video character generator for inserting captions onto the video (this is a modified version of what the helicopter people use). The actual Tx (again helicopter) is the tiny cube near the centre of the chassis - about 200mw synth source on 5.6GHz. The antenna is a flat plate - about 20dBi gain (from Kevin at Finningley 2 years ago).

The large figs/letters shown in the picture below are 4 times larger than the standard ones in the minimOSD MAX7456 character set. So each large character is made up of 16 of the standard character "tiles". A bit tedious to code up but worth it.



The GPS serial output stream (NEMA) is fed into the Atmel328 serial pin and decoded using the TinyGPS++ library.
The Atmel328 then checks for a valid GPS fix, reads the lat/long and does the conversion to 8fig Maidenhead.

The Arduino sketch uses the minimOSD board serial Rx pin for the GPS input and I switch captions using a wire soldered directly onto the A1 input on the OSD Atmel328 chip. This is normally held high with 10K to +5v and set low using a toggle switch to ground.

I have had the system working across the garden so far just using a whip antenna on the Rx but am now working on the Rx antenna - another flat plate so hope to be in a position to do a proper test soon.

The two photos show different captions on the video. The first has extra large letters/figs for weak signal tune up. The second one has a much smaller callsign so you can see the video picture better.

If anyone wants a copy of my Arduino sketch and further details of the minimOSD mods, I can be reached at ***b.chambers@sheffield.ac.uk***

Portsdown Update

Dave Crump - G8GKQ

It is almost exactly a year since we started working on the Portsdown project. It has exceeded all of our expectations with over 220 enthusiasts worldwide building DATV transmitters based on Evariste's original idea. Thanks go to all who have contributed whether it be hardware designs, prototypes, software code, testing, bug reports or new ideas. There is a list of the major contributors on this Wiki page.
https://wiki.batc.tv/Portsdown_community

The team welcome new ideas and questions. Bug reports are especially welcome as they keep us on our toes and help maintain the software quality. However, please post ideas, questions and bug reports on the BATC Forum, not on Facebook or Twitter. Let's keep social media for success stories, equipment pictures and news of activity.

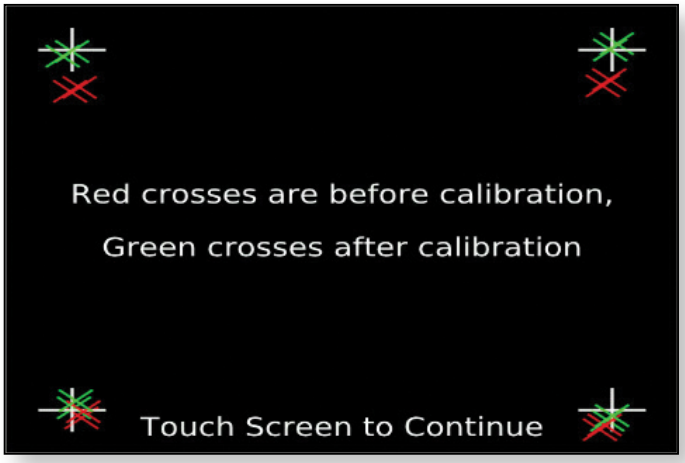
Recently Added Features

Here is a quick recap of the new facilities that have been added to the project in the last few months. To take advantage of them, please update your software to the latest version.

- Analogue Video output to drive analogue TV transmitters with the Pi Camera and static and moving test cards https://wiki.batc.tv/Analog_Video_Output
- MPEG-2 static test card with call sign. (on Menu 2)

- *The MPEG-2 Static Test Card with callsign overlay*
- 720p MPEG-2 transmissions from the Pi Camera (on Menu 2)

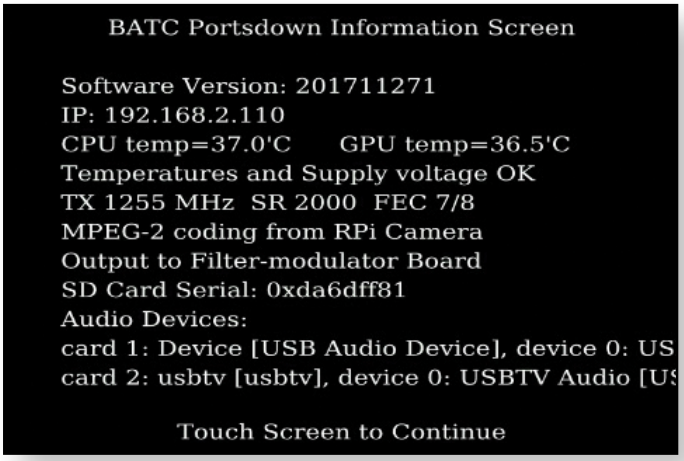
- *720p Widescreen Image from the Portsdown Software with DATV Express*
- Two frames per second display of the analogue video input on the touchscreen (not during transmit) ***https://wiki.batc.tv/Still_Capture_from_Composite_Video_Input***
- Capture and display of stills from the analogue video input. ***https://wiki.batc.tv/Still_Capture_from_Composite_Video_Input***
- Touchscreen calibration facility ***https://wiki.batc.tv/Calibrating_the_TouchScreen_Alignment***



- *The Touchscreen Calibration Results Screen]*
- Signal Generator functionality ***https://wiki.batc.tv/Portsdown_Signal_Generator***
- RTL-TCP Server functionality (on Menu 3)

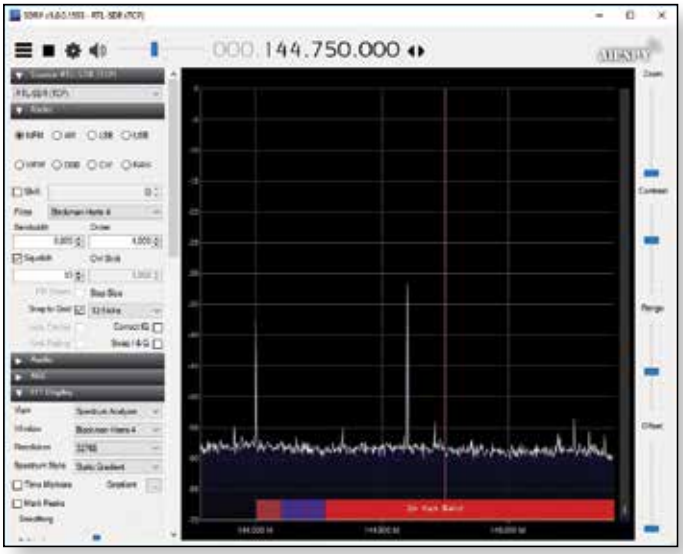
▶ *The RTL-TCP Server Message*

▶ Configuration information screen (on Menu 3)



▶ *The information Screen*

▶ Direct NBFM Reception on 144.75 (on Menu 3)



▶ *SDR# Software running on a PC with Portsdown doing the Receiving*

Forthcoming features

We hope to introduce the following new features during the next few months.

- Extension of the signal generator to control a switched attenuator
- Extension of the Signal generator to:
  - Control an ADF 5355 up to 13.8 GHz
  - Control a DATV Express over USB
  - Provide output below 35 MHz using RPiTX
  - Provide an audio output
- Ease-of-use improvements to the analogue video output feature
- More flexible NBFM receive capability
- Locator range and bearing calculator
- Revised touchscreen layouts to simplify operation
- Update of OS to Raspbian Stretch

Aspirational Features

These features are on the to-do list, but are either too big to attempt at the moment, or we don't quite know if they are possible. Any help would be appreciated!

- Add audio to H264 transmissions
- Add more 720p modes
- Display analogue video input during video transmissions
- SpyServer capability using RTL-SDR
- Display (receive from) BATC Streamer on Touchscreen
- DHCP server with WiFi access point
- Spectrum Display from the RTL-SDR
- RF Sweep Generator and Analyser
- Improved receive performance when using LeanDVB
- HD HDMI input from LKV373A

▶ *The LKV-373A HDMI Capture Device*

Operating System Upgrade

The upgrade of the Linux operating system from Raspbian Jessie to Raspbian Stretch is a complex task that needs doing in the near future because there is a risk that some of the software packages that we use may not continue to be supported. This does not mean that your Portsdown will stop working – it simply means that the Portsdown team will be unable to provide you with further capability upgrades. The upgrade to the operating system will require the SD Card to be rebuilt from scratch. We will try to make the process as painless as possible and will provide support.

The choice will be simple – stick with the functionality you have and don't upgrade, or rebuild the SD Card with the new operating system and take advantage of future new features. Unfortunately it will be a one-or-the-other choice, there is no middle ground.

Call for Ideas and Help

The Portsdown team would welcome new ideas for additional features. They should be ATV-related and be able to be integrated with the existing Portsdown software.

But most of all, we need help implementing new features. If you can manage to get something working on the Portsdown platform, the team will integrate it with the Console menus and touchscreen for you and include it in a new release.

Portsdown Signal Generator

Dave Crump - G8GKQ

The basic hardware configuration for the Portsdown DATV Transmitter includes all the components required for a simple but very capable signal generator. It is possible to use the transmitter controls to make the hardware act as a signal generator, but the user interface is far from ideal.

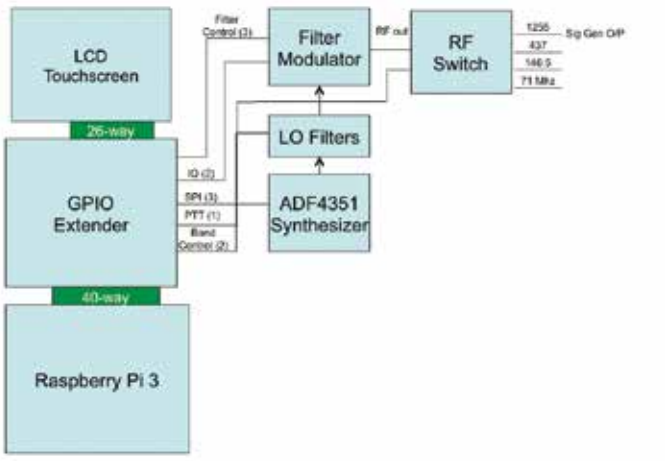
To improve matters, 2 extra control screens have been written for the signal generator, one to set its configuration, and the other to control the frequency and output level.

Basic Capability

The basic components of the simple signal generator (that uses only the existing Portsdown hardware configuration) are shown below.

The existing touchscreen controller is used to select frequency and the RPi sends the appropriate commands to the ADF4351 synthesizer. The Portsdown filter-modulator board provides some amplification over the frequency range of 50 - 1500 MHz. The output is routed through the 23cm output port on the RF switch board (if fitted).

In this configuration, the filter-modulator board limits the output frequency range. Below 50 MHz and above 1500 MHz the output level is unpredictable, and attempts to drive the board at above 2000 MHz can result in oscillation at about 750 MHz. The output level has been measured on a number of units and the results used to write a calibration file. This data is used to enable the predicted output level to be displayed on the touchscreen. The calibration assumes that an RF output switch board is in-circuit.



The Portsdown Signal Generator - Basic

Control

Selection of the Signal Generator (currently from Menu 3 of the Portsdown software) brings up the configuration screen, with the saved frequency and level displayed.

The ON button enables the RF output. The OFF button stops the RF output. The EXIT button terminates the Signal Generator and restarts the Portsdown DATV Transmitter. The Freq button switches to the frequency screen (see below).

The next line shows the demanded frequency, and the following line the approximate output level. The Atten button and the Mod button are not yet used. The Save P button sets up the software to save the current configuration in one of the 4 presets (P1 - P4) on the next line. On pressing Save P, the button is highlighted until one of the presets is pressed; then the preset is over-written with the current configuration and the highlight is removed. Pressing any of the preset buttons simply recalls the appropriate stored preset.

The remaining buttons set the output device to be used. Without modification, the only output available is the Portsdown filter-modulator board. However, a second output is available on most ADF4351 synthesizer boards and this can be selected with the ADF4351 button. All that is required is an SMA extension lead to bring the output to the front or back panel.

The Frequency Screen

The top 4 buttons on the frequency screen have similar functions to those on the Configuration Screen.

The second row shows the current demanded frequency on Hz. Depending on the available frequency range of the selected output, blue buttons above and below each digit enable the frequency to be adjusted. This adjustment is limited to the valid frequency range for the selected output and any buttons that are not required are hidden.

The small size of the buttons has highlighted some issues in registration between touchscreens and displays. This can be corrected by the use of the Touch Calibration facility in the Portsdown DATV software.

The frequency displayed on the touchscreen is the "demanded frequency". Due to limitations in the Analog Devices ADF4351 software driver being used, the generated frequency will step at intervals of about 1/500,000th of the selected frequency. For example, the step at 1240 MHz is about 3 KHz.

The third row shows the current estimated output level. The level is calculated from a calibration table which is pre-populated with the best available data. This table is located at in the file /home/pi/rpidatv/src/siggen/siggencal.txt and can be amended by users if they wish. Any amendments will be preserved during subsequent software upgrades. If the output level can be adjusted, blue buttons will appear above and below the digits. Note that the level steps will not be regular - pressing the button simply selects the next available output level in the direction requested.

The Save button saves the current settings for use as the default configuration. It is this saved setting that will be used when the Signal Generator is next started, not the last setting used before shutdown. The Mod button is planned to have the same functionality as the Mod button on the Configuration Screen but is not yet functional.

"Portsdown" Output

When selected, this output sets the band switching of the Portsdown so that the VCO filter is switched out of circuit and (if an RF output switch is in use) the output is switched to the 1255 MHz output socket. Additionally, the IQ filter is set to 125 KS and the I and Q lines are set to 0v. The VCO level is always set to maximum to maximize the final output level. The displayed output level is calibrated for a typical Portsdown filter-modulator board without the RF output switch board in-circuit. The RF output switching board induces losses of about 1.2 dB at 50 MHz, 1.6 db at 146 MHz, 1.9 dB at 437 MHz and 3.0 dB at 1255 MHz.

ADF4351 Output

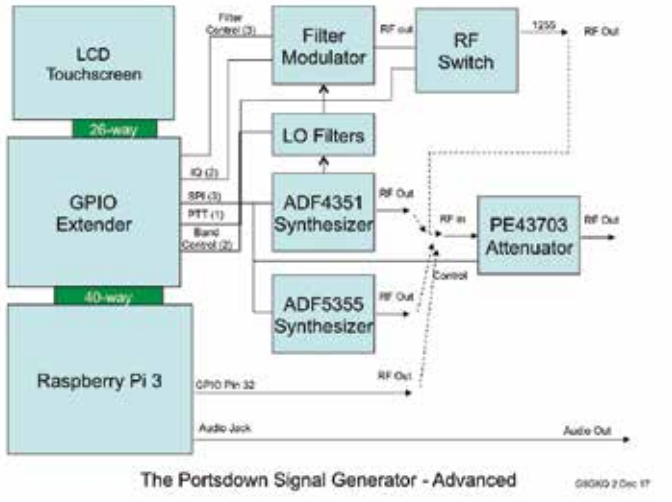
The ADF4351's second output can provide a CW signal in the range 35 MHz to 4.29 GHz. The upper limit is currently 4.29 GHz because of limitations in the 3rd party software driver used by the ADF4351 (which can reach 4.4 GHz). The level is typically between -8 dBm and +4 dBm and is adjustable in 4 steps of approx 3 dB. The exact output level varies (plus or minus 2 dB or so) depending on the termination of the other ADF4351 output port.

The displayed output level is unable to take account of this variation. The ADF4351 reference frequency used for the Portsdown and ADF4351 outputs is taken from the configuration file used for the Portsdown ATV Transmitter (rpidatvconfig.txt), so no new user setup is required.

Note that, below 2.2GHz, the output of the ADF4351 is a square wave and so will have a high 3rd harmonic content. If the filter modulator board is still powered up, it will continue to provide output on the ADF4351's frequency at a higher level. In some cases, when being driven by signals over 2 GHz at the highest ADF4351 output level, the filter-modulator board will oscillate in the 750 MHz region.

Further Development

With the addition of extra modules and the completion of the software, the range of the signal generator has the potential to be expanded from audio to 13.6 GHz. The expanded hardware configuration is shown below.



Future Capabilities – Level control

The attenuator button is to allow for the future use of an external software-controlled attenuator of the PE43703 or PE4302 type available from eBay. The specific type of attenuator is set in the siggencal.txt file. If selected, the displayed output level will take account of the attenuator being in-circuit for the Portsdown, ADF4315 and ADF5355 outputs, allowing the level to be adjusted in increments of 0.25 dB.

Future Capabilities – Modulation

When the switchable attenuator and modulation options are implemented, this mode is also intended to be used to adjust the Portsdown transmitter to the correct level for driving a PA without distortion. The modulation (only available in "Portsdown" output mode) will be 333KS, allowing the transmitted spectrum to be viewed on an RTL-SDR and PC for adjustment.

Future Capabilities – DATV Express Output

This output is not implemented yet, but the intention is that the Portsdown Signal Generator will be able to control a DATV Express board (connected by USB) to act as a signal generator covering 70 MHz to 2450 MHz with selectable output levels in the approximate range -30 dBm to +10 dBm.

Future Capabilities – ADF5355

In future, the signal generator will be able to control an external ADF5355 VCO (as available on eBay) to generate signals at up to 13.6 GHz. The ADF5355 reference frequency is stored in the siggenconfig.txt file and may need to be manually edited.

Future Capabilities – Audio

The signal generator could command the Raspberry Pi to output an audio sine wave at the selected frequency from the audio jack.

Future Capabilities – Pi RF

The Raspberry Pi should be able to generate a signal below 35 MHz on a GPIO pin in a similar manner to the QPSKRF (ugly) DATV mode. This capability will use F5OEO's RPiTX software.

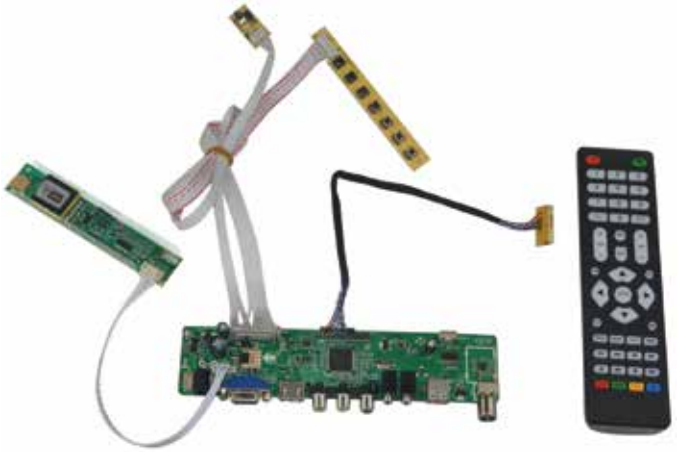
Conclusion

There is great potential in this Signal Generator project, but it does need further work to develop the software. If you are able to provide assistance, say by developing the Audio, Pi RF or ADF5355 driver code (in c or bash), please contact me and we would be able to deliver these capabilities sooner.

Using old laptop screens for ATV

John – G7JTT

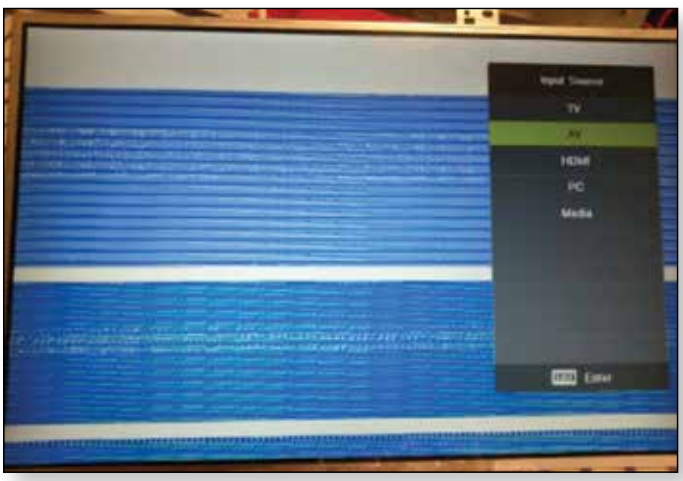
With the new found interest in analogue ATV on 5.6Ghz using the FPV modules from eBay, I thought I would look into what options are available for an composite input video monitor. One option seemed to be using a LCD screen from an old/broken laptop using one of the universal LCD controller boards available from China.



So I looked on freecycle.org (other sites are available) and found an old Dell laptop that was available. So after dismantling the laptop the screen was removed and identified as a sharp LQ154M1lw02.

A quick search on eBay and I found various controller boards available but only the LA.MV56U.A had composite video input - this board only seems to be available on ebay USA and not ebay UK.

So an order was placed and around 10 days later a registered parcel arrived from China. I connected everything up and the screen flashed into life, plugged in a video source and then hit an issue as the video did not display correctly.



So I contacted the seller and was sent a different flash file to try. To flash the board is quite simple you put the LAMV56.bin file on a USB pen, plug it into the USB socket on the controller board and it will update automatically. One word of caution and make sure the power supply is not interrupted during this process or you will brick the board, I know this because I did! But even then, not all is lost as you can remove the SPI bios chip and re-flash it with the original ROM file (see below for more details).

Once this had been done and the bios re-soldered back on, to my delight the screen now worked.

As can be seen in the second image you can turn the blue screen off great for looking for those weak 5.6Ghz signals! One other advantage of this board is it has an analogue TV tuner that will tune to 70cm so also doubles up as a 70cm analogue TV RX. Next is to box it all up but for now I've just hot glued the boards to the back of the screen.

In summary, this is a cheap way to get a non blue screen monitor for monitoring ATV signals but you must make sure you get the correct controller board for your screen and also that the menu will enable you to turn off the blue screen squelch.

Reflashing the ROM file

I opted for one of the cheap CH341A USB programmers from eBay, the one I got has a known design issue so you need to mod it for it to work correctly. See this link and post #94 for details.

https://www.win-raid.com/t796f16-Guide-Using-CH-A-based-programmer-to-flash-SPI-EEPROM-6.html

The original ROM dump file can be found at the bottom of this page along with a whole wealth of info.

https://sites.google.com/site/lcd4hobby/6-lcd-as-pc-vga-hdmi-av-tv-display-tsumv59

Miniaturised Pulsed Relay Driver for 28V Microwave Relays

Andy Talbot - G4JNT

First published in 'Scatterpoint'.
Reprinted with permission

Circuit arrangements abound for driving relays with 28V coils from a nominal 12V supply. The Nov/December 2017 QEX [page 12] has a whole article dedicated to the subject, written by Joseph Haas, KE0FF. A minimum component-count solution is to give the relay an initial kick from a capacitor of a few 100uF that has been pre-charged from the supply voltage, and connected in series with the supply to the relay. This delivers an initial pulse of about twice that of the supply rail to start the pull in process. Once the relay coil has started its travel, a lower holding voltage, the nominal 12V supply, is more than adequate to hold it on. This is described fully in KE0FF's article.

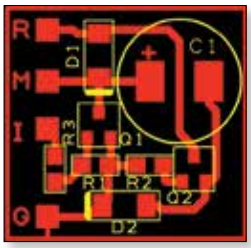
One of the neatest arrangements I've seen is that on GM3SEK's website ***https://gm3sek.com/*** that can be connected in series with the relay, (the circuitry doesn't need the +V supply going to the board) and provides its kick using what amounts to a [minus] -12V pulse on the bottom of the relay coil. It "…seems to have originated from K1KP and K6XX"

Ian's designs are targeted at big chunky VHF high power relays so he uses appropriately rated components. For lower power microwave use, smaller components can be used, for example a 2N7002 MOSFET for the main switch and MBT2222 type for the auxiliary dump switch. Figure 1 below shows my implementation.

External connection nomenclature : [R]elay, [M]onitor [I]nput, [G]round. R1 is there to stop the input floating if left unconnected. R3 - just in case it may be needed. (It costs nothing to provide PCB pads and link them if unwanted but more effort to cut tracks and add them later). The value of R2 is not critical, D1 and D2 were just what I had available.

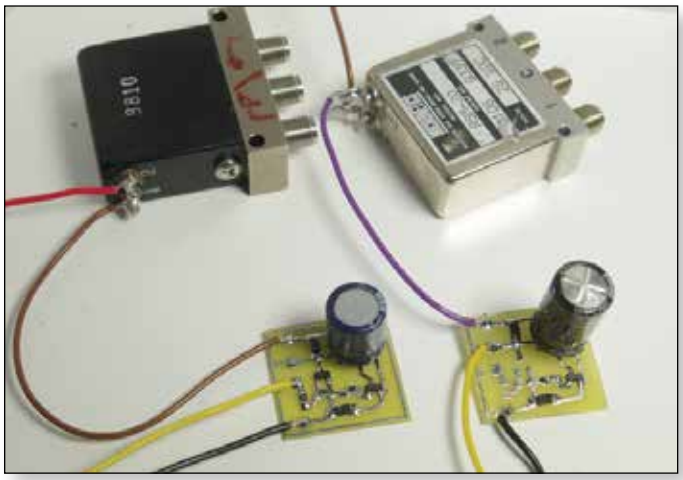
The design has the option for logic level drive (+5V Tx / 0V Rx) to the 'I' terminal or an external switch that may already be available can be connected to the 'M' terminal.

All the components fit easily onto a PCB of about 21mm square, with the layout shown. This is small enough to glue onto the side of a typical Transco type SMA relay, or can be squeezed in somewhere.



Mirror imaged 1:1 PCB layout for home constructors. A higher resolution version in .PDF format can be found at.

http://www.g4jnt.com/DownLoad/PulsedRelayDriverPCB_Mirrored.pdf



Two boards made up and connected to their respective relays. The one on the left is a Dynatech relay with a coil resistance of 180Ω . Although rated at 28V, it appears to pull-in at 14V and drops out at around 7V. In the doubling circuit here it works from a supply as low as 9V

The one on the right, configured for an external switch (Q1 etc. missing) is a Micronetics relay with a coil resistance of 180Ω which, although also rated for 28V, appears to pull in at the ridiculously low value of 9V and drop out around 5V. It pulls-in here from a supply as low as 6.5V.

C1 Recharge Monitor.

As a nice touch that can add higher reliability to a system, the voltage on C1 can be monitored during its recharge cycle, just after the transition from Tx to Rx. If Tx/Rx switching is done too rapidly, C1 may not recharge enough to pull-in some relays when operating from a lowered supply. Just after the Tx to Rx transition, the voltage on the M pad rises from about 0.7V towards the supply as C1 charges. The time is determined by the value of C1 and the relay coil resistance, and typically should be complete in 100 to 300ms.

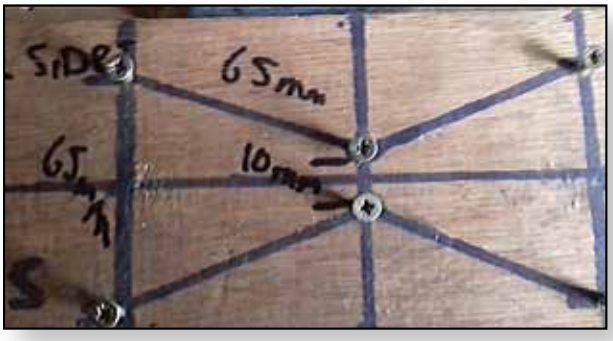
If a microcontroller such as a PIC or Arduino etc with A/D inputs is already in use for Tx/Rx sequence control – for example it also monitors RF levels or supply current – it is little effort to include an additional A/D channel from this point. Then the control software reads the capacitor voltage, and safely inhibits the sequence to Tx until the voltage is sufficient. Belt-and-braces, but worth adding if a spare A/D channel exists.

Converting an old Satellite dish to a 23cm dish antenna

Kevin Knights - G7VNP

This is how I converted an old sky digital dish to work on 23cm as a TX and RX dish antenna.

First strip the dish down remove the feed arm. Drill a 19mm hole in the centre to fit a straight toilet cistern overflow pipe then cut it to 110mm from dish.
Cut across in the end to fit a quad made from 6mm brake pipe flattened in a vice. The quad is 65mm each side with a 10mm gap in the centre .



I used one metre of RG58 to match this and hold the quad in place. A small piece of pipe needs to be cut to make a joiner - you will need 500mm of 6mm brake pipe; one old sky digital dish; one metre of rg58 and an 'N' type socket. This will work on transmit and receive.

Arthur C. Clarke, C.B.E., B.Sc., F.R.S.A., F.R.A.S., F.B.I.S.

Born 16th December 1917

Graham Shirville - G3VZV

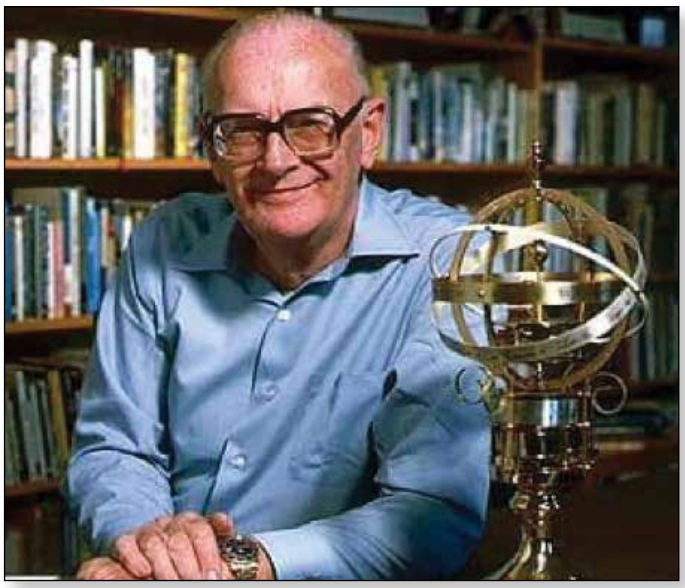


Photo credit ITV/Rex Pictures

Arthur C. Clarke, although not a radio amateur, was actually President of the British Amateur Television Club from 1991 through 2000. He was a world-famous science fiction novelist and he also wrote scientific papers. One of the first of these was a proposal describing the possibility of geo-synchronous satellites for radio & television signals. In October 1945 the Wireless World magazine published "Extra-Terrestrial Relays" http://www.gr.ssr.upm.es/docencia/grado/csat/material/extraterrestrial-relays.pdf

This article is amazing in that it clearly showed the concept of geostationary tv transmitters, it even included a link budget which is pretty close to today's numbers (50 watts of RF at the antenna).

This was at a time when no one actually knew if microwave transmission could penetrate the ionosphere. The article goes on to suggest an experiment of bouncing signals back off the moon to prove it. The first mention of EME perhaps?

Solar cells did not exist in those days so his concept of a solar collector focusing the sun's rays onto a steam generator, whilst entirely theoretical, might have been a big problem in practise. Of course, at that time, before the invention of transistors, he would have expected the satellite to have been manned by a plethora of engineers ready to replace valves as they died in service.

He was born in Minehead Somerset, the eldest child of a farming family and became fascinated with science and astronomy at an early age, scanning the stars with a homemade telescope and filling his head with sci-fi tales from magazines like Astounding Stories. He left home in 1936 and moved to London where he worked as a civil servant but soon became a member of the British Interplanetary Society, which championed the notion of space travel long before it was considered plausible. He contributed articles to the group's newsletter and after the war served twice as Chairman of the Society. From 1941 to the war's end, he had been a radar specialist with the Royal Air Force and was involved in the early-warning radar defence system, which contributed to the RAF's success during the Battle of Britain. He spent most of his wartime service working on ground-controlled approach (GCA) radar.

In addition to his many fictional stories about space travel he also wrote a number of non-fiction books describing the technical details and the implications of rocketry and space flight.

He died in 2008, at the age of 90, and by then he had written nearly 100 books many of which had been made into films. He had also produced countless essays and short stories, and made immeasurable contributions to the field of space exploration and science.

As we are, hopefully, at the dawn of the age of geostationary transponders for amateur radio and television it's interesting to look back at one of the forebears of this technology. That the orbit of such spacecraft at 35,786 km is also known as the "Clarke Belt" is due recognition of his contribution.

▶ *There are rather more than three spacecraft in the Clarke Belt now*

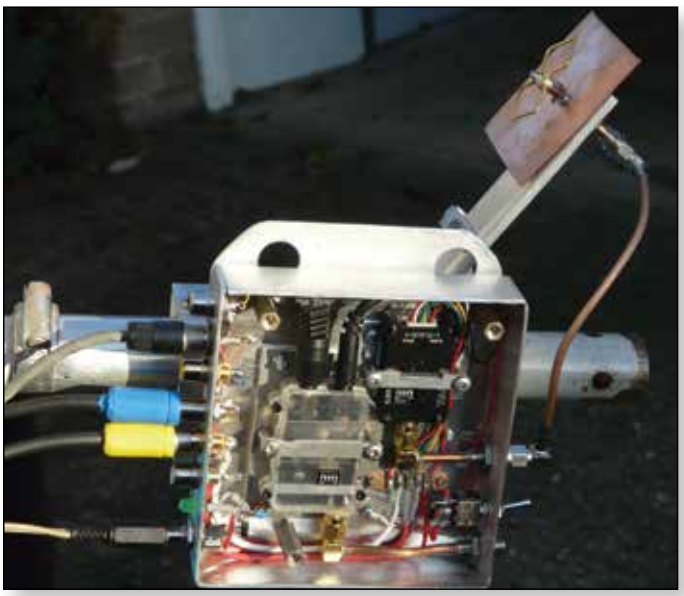
Using the Tarot 5.6 GHz ATV Modules

Ian Waters - G3KKD

As is now well known the Tarot microwave FM modules, marketed for use with drones, also provide an inexpensive and easy way to operate ATV on the 6 cm band. A very small transmitter, which fed with composite video and two audio channels, outputs 600 mW which may be set to the club's preferred frequency of 5665 MHz. A similar small receiver, with a claimed sensitivity of -85 dBm, delivers the video and audios.

First I made small bi-quad aerials and used the modules to try some local links. The picture quality was very satisfactory. In particular, while some of the FM transmitters previously sold for ATV had problems with pictures with large areas of black and white producing a poor LF response and loss of sync, these performed well with any pictures.

I then installed the 2 modules together with an aerial into a small box supported on the boom of an offset dish, previously used for 10 GHz. This created, in effect, a TV transceiver. Thinking that a fast send-receive changeover is not necessary in an ATV QSO, except for the 2m talkback, I dispensed with an expensive microwave relay and transferred the aerial feeder between two SMA sockets. Means are provided to adjust the position of the aerial with respect to the dish to optimise the signal as measured on a detector on the other side of the garden.



A switch, on the box, feeds power to the TX or RX. When switched to the TX the RX is also powered. Without an aerial its proximity to the TX enables it to feed demodulated video back to a monitor. This proves that the TX is working and acts as a viewfinder. A small shutter, that can cover either SMA and associated with the power switch, gives some protection against powering the TX without the aerial connected. The main TX and RX audio connections are routed to the control panel, while the other two are available on plugs in case of future need.

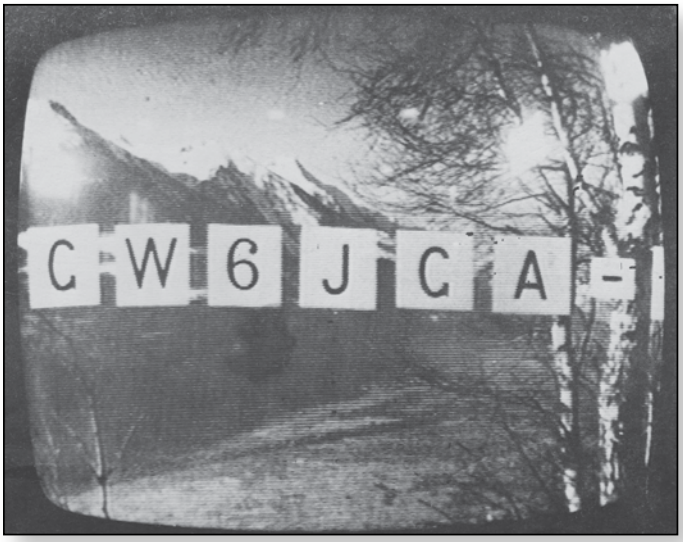
When portable, the system is controlled from a panel below a video monitor in the car. A photo shows this standing on the dash, but not when moving! A meter shows the battery voltage and individual switches turn on the camera, the monitor and the transceiver, enabling items not in use at any time to be turned off to the conserve the battery. Two further switches select either standby or operate. In standby the camera is connected to the monitor, while in operate the demodulated video feeds the monitor. A jack enables headphones to be connected across the received video. This is useful when aligning the dish by listening for a frame buzz. Provision is made, but not yet implemented, for a microphone and amplifier to feed one of the audio channels.

When portable the system is powered from a separate car battery, as I have no wish to be stranded on some hilltop! Batteries when unable to start a diesel on a cold morning are still satisfactory to feed radio equipment. Battery fitters are happy for one to keep their old battery and will usually give another if asked.

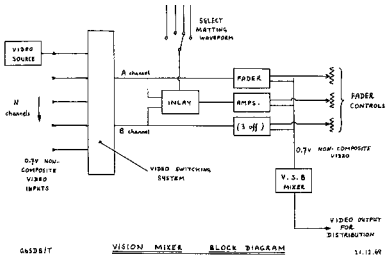
Turning Back the Pages

A dip into the archives of CQ-TV, looking at the issue 48 years ago. *Peter Delaney - G8KZG*

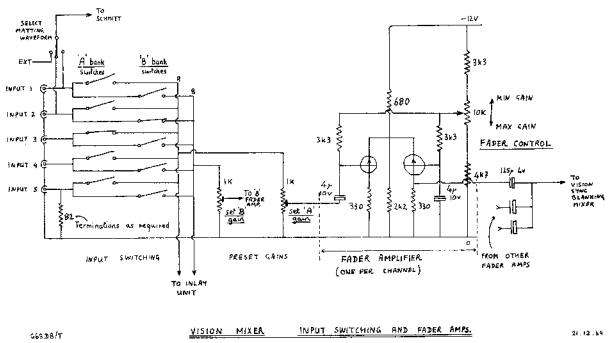
CQ-TV 70

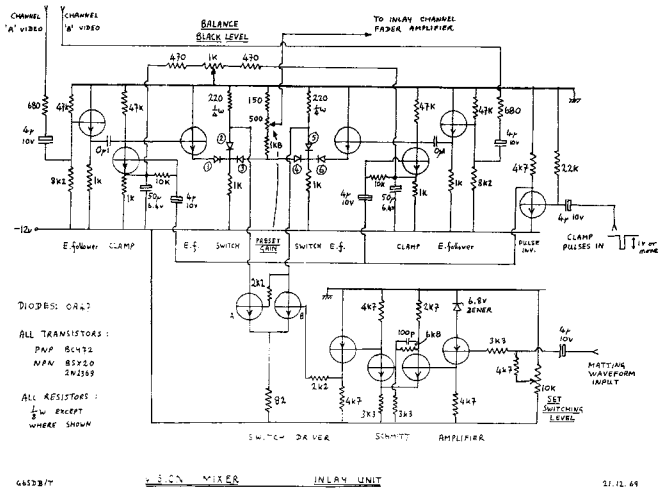


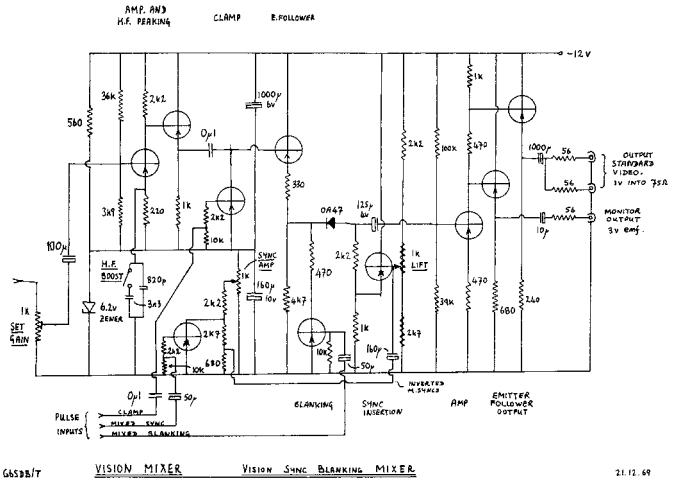
CQ-TV 70 - with a screen shot of the identification screen of John Lawrence on the front cover - was the first to appear under the editorship of Andy Hughes, who resumed the practice of including the publication date on the cover - in this case May 1970. His editorial column began "*Have you ever thought about writing for CQ-TV? About how you could let other members know about your projects and experiments. Everything in CQ-TV is written by members. So if you have found a particular article interesting, just remember that someone else is probably keen to see what you have done. Circuits, photographs, stories. If it's interesting we will print it!*" (Still very true today!)



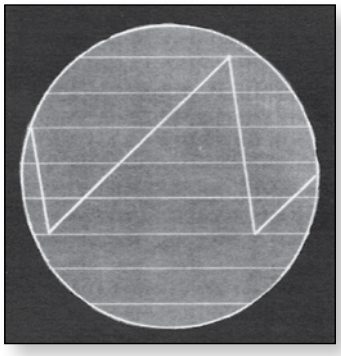
There were three technical articles - 2 of them by David Taylor. The first was for a 'modern vision mixer'. The general idea was shown in a block diagram.

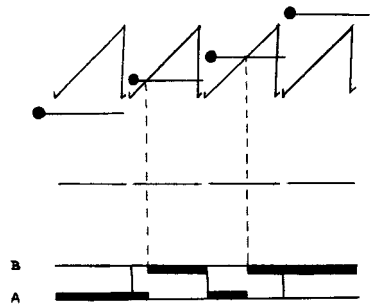


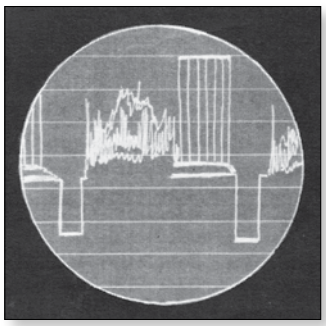




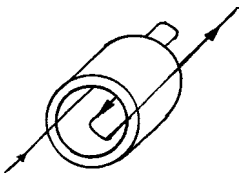
One of the 5 inputs could be selected by each of 2 banks of switches, to feed to a fader amplifier for each bank, which would enable simple cross fades. The selected input from each bank of switches could also be fed to an 'inlay unit'. Each input to this firstly clamped the signal to a fixed level, and then to its respective 'switch' transistor stage. These were driven by the transistors marked A and B, so that if A is on, B is off, and vice versa. The lower part of this circuit is fed with a 'matting waveform' - a sawtooth wave, as shown by the oscilloscope trace. If the switching point of the schmitt trigger circuit is varied, the point on the sawtooth where the schmitt circuit changes state is correspondingly varied from one end of the sawtooth ramp to the







other - and hence from left to right (or top to bottom) of the image. The resultant output is shown on the second oscilloscope trace, and fed through a similar fader amplifier to the direct inputs. The outputs from the fader amplifiers are then fed in parallel to a vision sync and blanking mixer, which again clamps the black level to a fixed voltage before the output is blanked between the active part of each line or frame, and then the synchronising pulses added before the emitter follower output stage to feed the signal to a 75Ω coax cable.



David's second article showed how to make 'cheap and cheerful' delay lines, using Mullard FX1115 ferrite beads. He found that 1½ turns (wound as shown in the diagram) made an inductor of 3 µH - with a 1000pF capacitor that would give about 60 nS of delay. By putting a number (N) of such filters in series, longer delays could be built up. For those wanting to experiment, several 'useful formulae' were included:-

Time delay per section = $\sqrt{LC}$

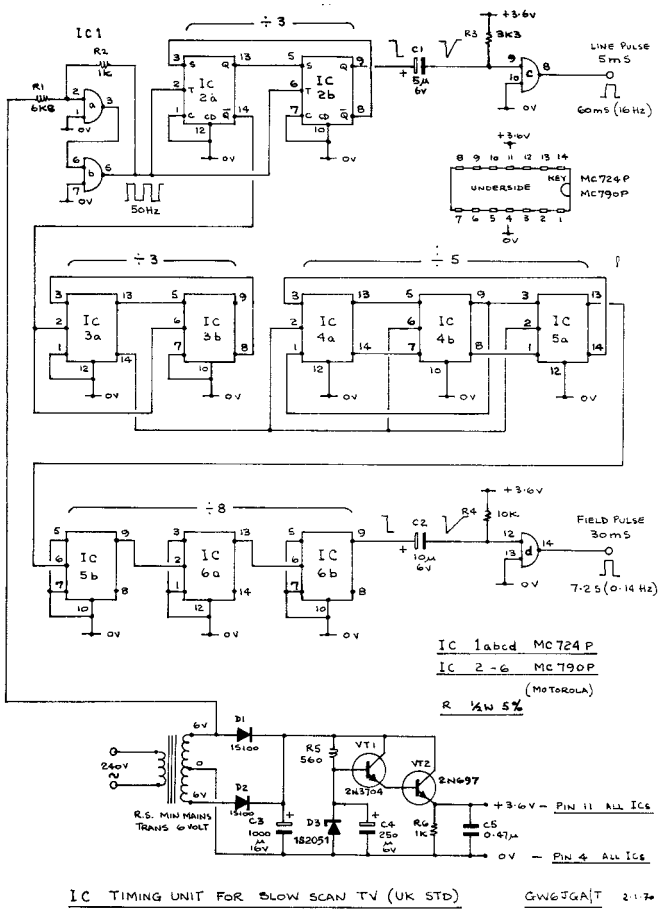
Total delay for line = $N\sqrt{LC}$

Characteristic impedance = $\sqrt{L/C}$

Cut-off frequency = $\pi \frac{1}{\sqrt{LC}}$

(In a follow-up note in the next issue David had measured the delay at the 50% points as 1.45 µs, and the risetime as 0.7 µs from 10%- 90%).

The remaining technical article was John Lawrence's Circuit Notebook, which used logic integrated circuits (then a fairly novel component for amateurs to use) to generate the timing pulses for a slow scan tv system. IC1 a and b formed a bistable to produce a 50Hz square wave from the mains. IC2 is a pair of J-K flip flops that generate a 16.6Hz line pulse. ICs 3,4, 5 and 6 acted as a divide by 120 chain to produce a 30 mS long pulse every 7.2 seconds. The output stages were formed from 2 further gates in IC1.



The 'Postbag' pages reported activities from members in Australia, Belgium, Germany, Italy and Tasmania, as well as across Britain. Alan Poore, in Wiltshire, was looking for someone able to transmit PAL colour signals, the Portsmouth Polytechnic (as it then was) Students' Union had recently joined BATC, and were using a college computer to design vestigial sideband filters, a sync pulse generator and camera, whilst P Marlow in Cheltenham was building a flying spot scanner - even though still at school at the time.

The British Amateur Television Club

The club provides the following for its members:

- A **colour magazine**, CQ-TV, produced for members in paper or .pdf (cyber membership) formats.
- **Web site** – where you can find our online shop stocking hard to get components, software downloads fo projects and much more.
- A **members forum** at www.batc.org.uk/forum/ for help, information and the interchange of ideas.
- A **video streaming** facility at www.batc.tv which enables repeaters and indivic seen worldwide.
- An **annual Convention** held in the UK where you can meet other members, visit demonstrations and listen to lectures.
- **Meet other club members** at the BATC stand at local rallies across the country.
- The **BATC Wiki** for all the details of systems and projects for all things ATV. https://wiki.batc.tv/

www.batc.org.uk

BATC

Out and About

Rallies and events with an BATC stand: (subject to change)
More will be added as they become known.

2018

29 April	NARS, Blackpool	***www.narsa.org.uk***
15 April	West London.	***www.radiofairs.co.uk***
24 June	Newbury.	***http://nadars.org.uk***
24 June	West of England.	***www.westrally.org.uk***
1–3 June	Friedrichshafen.	***www.hamradio-friedrichshafen.de***
15 July	McMichael Radio Rally.	***http://blog.radarc.org/***
?? August	Flight Refueling	***www.frars.org.uk***
?? September	National Hamfest.	***www.nationalhamfest.org.uk***
4 November	West London	***www.radiofairs.co.uk***

For a list of all rallies see: http://rsgb.org/main/news/rallies/

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