An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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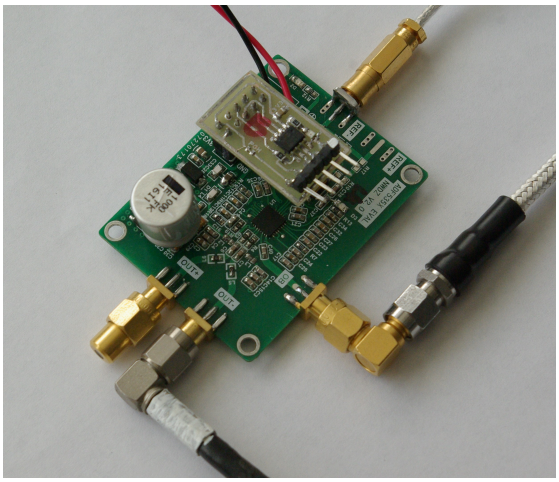
ADF5355 Synthesizer Control

Andy Talbot G4JNT Sept 2018



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UK Microwave Group Contact Information

Chairman: G4DDK
Sam Jewell
Email: chairman @microwavers.org
Located: Suffolk JO02pa
Address: Blenheim Cottage
Falkenham
IPSWICH
IP10 0QU
Home Tel: 01394 448495

General Secretary: G3XDY
John Quarmby
Email: secretary @microwavers.org
Located: Suffolk JO02ob
Address:
12 Chestnut Close,
Rushmere St Andrew
IPSWICH IP5 1ED
Home Tel: 01473 717830

Membership Secretary:
G8DKK Bryan Harber
Email: membership @microwavers.org
Located: Hertfordshire IO91vx
Address:
45 Brandles Road
Letchworth
Hertfordshire SG6 2JA
Home Tel: n/a

Treasurer: G4BAO
Dr. John C. Worsnop
Email: treasurer @microwavers.org
Located: Cambridgeshire JO02cg
Address: 20 Lode Avenue
Waterbeach
Cambs CB25 9PX
Home Tel: 01223 862480

Scatterpoint
Editor: G8BHC
Martin Richmond-Hardy
Email: editor @microwavers.org
Located: Suffolk JO02pa
Address:
45 Burnt House Lane
Kirton
Ipswich IP10 0PZ
NB editor & scatterpoint email addresses go to both Neil and myself.

Scatterpoint
Activity News: G4LDR
Neil Underwood
Email: scatterpoint @microwavers.org

NB editor & scatterpoint email addresses go to both Martin and myself.

Contest & Awards Manager: G3XDY
John Quarmby
Email: g3xdy @btinternet.com
Located: Suffolk (JO02OB)
Address:
12 Chestnut Close
Rushmere St. Andrew
Ipswich
Suffolk IP5 1ED
Home Tel: 01473 717830

Beacon Coordinator:
Denis Stanton G0OLX
Email: beacons @microwavers. org
Located:
Address: 122 Foxon Lane
Caterham CR3 5SD
Home Tel:

UK Regional Reps

Martin Hall	Scotland	GM8IEM	martinhall@gorrell.co.uk
Gordon Curry	Northern Ireland	GI6ATZ	gi6atz@qsl. net
Peter Harston	Wales	GW4JQP	pharston@theiet.org

Assistants

Murray Niman	Webmaster	G6JYB	g6jyb@microwavers. org
Kent Britain	USA	WA5VJB/G8EMY	wa5vjb@flash. net
Mike & Ann Stevens	Trophies	G8CUL & G8NVI	trophies@microwavers.org
Noel Matthews	ATV	G8GTZ	noel@noelandsally. net
Robin Lucas	https://www.beaconspot.uk	G8APZ	admin@beaconspot.uk
Barry Chambers	24GHz and up	G8AGN	b. chambers@sheffield. ac. uk
Mike Scott	Chip Bank	G3LYP	g3lyp@btinternet. com
Denis Stanton	Beacon Coordinator	G0OLX	beacons@microwavers. org
Roger Ray	Deputy Scatterpoint Editor	G8CUB	

UKµG WIKI https://wiki.microwavers.org.uk/

Subscription Information

The following subscription rates apply.
UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership**. For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via

https://groups.io/g/Scatterpoint/files and/or Dropbox. Also, **free access to the Chip Bank**.

Please make sure that you pay the stated amounts when you renew your subs next time. If the amount is not correct your subs will be allocated on a pro-rata basis and you could miss out on a newsletter or two!

You will have to make a quick check with the membership secretary if you have forgotten the renewal date. Please try to renew in good time so that continuity of newsletter issues is maintained. Put a **renewal date reminder** somewhere prominent in your shack.

Please also note the payment methods and be meticulous with PayPal and cheque details.

PLEASE QUOTE YOUR CALLSIGN!

Payment can be made by: PayPal to

ukug@microwavers.org

or a cheque (drawn on a UK bank) payable to 'UK Microwave Group' and sent to the membership secretary (or, as a last resort, by cash sent to the Treasurer!)

Articles for Scatterpoint

News, views and articles for this newsletter are always welcome.

Please send them to

editor@microwavers.org

The CLOSING date is
the FIRST day of the month

if you want your material to be published in the next issue.

Please submit your articles in any of the following formats:

Text: txt, rtf, rtfd, doc, docx, odt, Pages

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

I can extract text and pictures from pdf files but tables can be a bit of a problem so please send these as separate files in one of the above formats.

Thank you for you co-operation.

Martin G8BHC

Reproducing articles from Scatterpoint

If you plan to reproduce an article exactly as in Scatterpoint then please contact the Editor – otherwise you need to seek permission from the original source/author.

You may not reproduce articles for profit or other commercial purpose.

You may not publish Scatterpoint on a website or other document server.

UKµG Project support

The UK Microwave Group is pleased to encourage and support microwave projects such as Beacons, Synthesiser development, etc. Collectively UKuG has a considerable pool of knowledge and experience available, and now we can financially support worthy projects to a modest degree.

Note that this is essentially a small scale grant scheme, based on 'cash-on-results'. We are unable to provide ongoing financial support for running costs – it is important that such issues are understood at the early stages along with site clearances/licensing, etc.

The application form has a number of guidance tips on it – or just ask us if in doubt! In summary:-

- Please apply in advance of your project
- We effectively reimburse costs - cash on results (eg Beacon on air)
- We regret we are unable to support running costs

Application forms below should be submitted to the UKuG Secretary, after which they are reviewed/ agreed by the committee

www.microwavers. org/proj-support. htm

UKµG Technical support

One of the great things about our hobby is the idea that we give our time freely to help and encourage others, and within the UKuG there are a number of people who are prepared to (within sensible limits!) share their knowledge and, what is more important, test equipment. Our friends in America refer to such amateurs as “Elmers” but that term tends to remind me too much of that rather bumbling nemesis of Bugs Bunny, Elmer Fudd, so let’s call them Tech Support volunteers.

While this is described as a “service to members” it is not a “right of membership!”

Please understand that you, as a user of this service, must expect to fit in with the timetable and lives of the volunteers. Without a doubt, the best way to make people withdraw the service is to hassle them and complain if they cannot fit in with YOUR timetable!

Please remember that a service like our support people can provide would cost lots of money per hour professionally and it’s costing you nothing and will probably include tea and biscuits!

If anyone would like to step forward and volunteer, especially in the regions where we have no representative, please email john@g4bao.com

The current list is available at

www.microwavers. org/tech-support. htm

New Tech support needed in Wales as Chris (now G4DGU) has moved to Cornwall but has volunteered to be TS Elmer for Devon & Cornwall

UKµG Chip Bank – A free service for members

By Mike Scott, G3LYP

Non members can join the UKuG by following the non-members link on the same page and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of a component on the site will not be a guarantee of availability of that component.

The service is run as a free benefit to all members and the UK Microwave Group will pick up the cost of packaging and postage, that is, Jiffy bags, small plastic bags for individual component values, and Large letter 2nd class postage, currently 76p.

Minimum quantity of small components supplied is 10.

The service may be withdrawn at the discretion of the committee if abuse such as reselling of components is suspected. We have asked Mike to check with the Chairman (or designated officer) if any individual is making excessive requests, and we will ensure that the service is only available to members.

There is an order form on the website with an address label which will slightly reduce what I have to do in dealing with orders so please could you use it.

Also, as many of the components are from unknown sources, if you have the facility to check the value, particularly unmarked items such as capacitors, do so, and let me know if any items have been mislabelled.

The catalogue is on the UKµG web site at www.microwavers. org/chipbank. htm

Chairman's Thoughts - on the RSGB Conference

Sam Jewell G4DDK

With the RSGB Convention fast approaching your Committee has been making preparations to attend and to set up a UKuG stand. This is a serious and time-consuming activity for those who man the stand, so if you are going along to the Convention, please pop by and say hello.

We plan to have some equipment items on the stand to illustrate what we do. In previous years these items have been provided, in the main, by Committee members. This year we would like some of our members to bring along a microwave related item to show. If you can provide a few words to describe your equipment, that would also be appreciated. Our stand is manned throughout the event, so you don't need to be in attendance yourself! If you are entering the RSGB Construction Contest, we will be happy if you take the items away for judging and then bring it back afterwards.

Several Committee members are presenting at the Convention. Not all of us are covering our usual microwave subjects. This just shows the breadth of experience in your Committee.

We should not forget the RSGB member responsible for organising the Convention is our own Committee member, Graham, G4FSG. I know from almost weekly meetings with Graham, just how much work he has put into the programme. There are five lecture streams and some 53 talks.

Although Graham is no longer on the RSGB board, he agreed to arrange the programme again this year. That is real dedication to the RSGB and amateur radio. You should come along and support the event if you can. I hope to see you there.

RSGB Convention, Kents Hill Conference Centre, Milton Keynes.

Details on the RSGB web page. You don't need to be an RSGB member to attend.

See you there?

In the roll of honour in October RadCom for 60yrs as an RSGB Member:- Mr P K Blair G3LTF

This month I've been mostly…

Getting ready for becoming a fledgling EMEer, having been inspired by EME2018 – I was told I had to "get on the moon" to qualify for EME2020!

This has involved a lot of gardening (read "jungle removal") to establish a site for the dish. The 2.3m dish (a 1.9m RF HamDesign dish with 6mm mesh, extended to 2.3m) was recently owned by Graham G4DML ((and prior to that by the late G4BAH) who has decided that size is important and has upgraded to a 3m dish. Storms Ali and Bronagh brought a few challenges for us both in JO02 and delays (including emergency welding at G4DML's QTH).

Az/El Rotator is a SPID SPX-01 with controller and"Coffee can" feed to start me off.

Spent a day building a G4DDK VLNA only to discover that it's lain so long in the Future Projects box that the design has had umpteen updates. Oh well, it was good practice at SMD soldering.

I'm very grateful to Graham and Sam for advice and help with installation (and 'BAO for nagging me about lack of QRV)

Martin RH G8BHC

History Corner

Murray Niman G6JYB

UK Licensing History Online

The RSGB has recently released a Licensing History web page which amongst others things shows how the Microwave Frequency allocations have evolved considerably over time

https://rsgb.org/main/operating/licensing-novs-visitors/uk-licensing/licensing-history/

For example you may note that bands including 70cms and 23cms used to be wider, but others were quite different frequencies (or didn't exist). Anyone remember the 21 GHz band that was in the 1969 licence?

It is also opportune to thank John G4BAO who contributed much of the historic 50MHz material - very topical with WRC-19 in prospect.

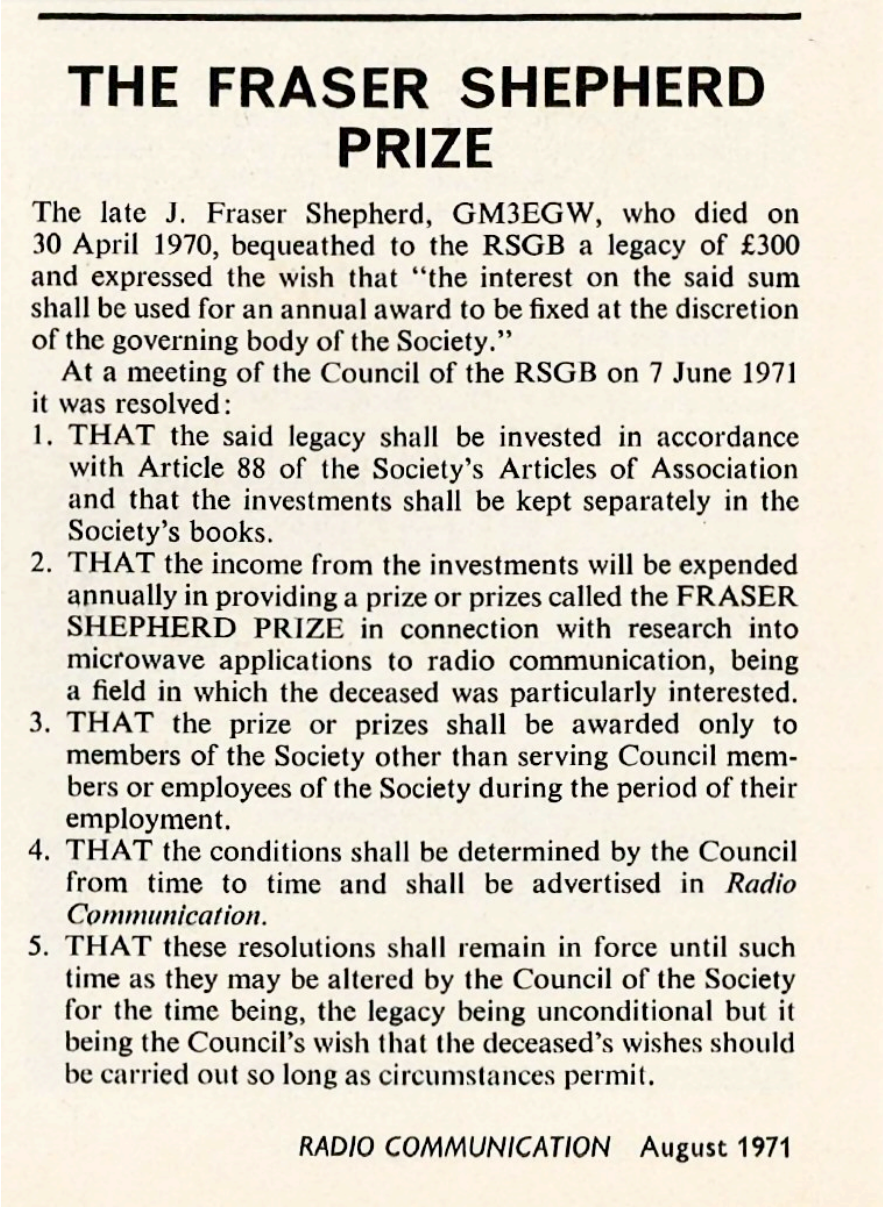
The first Scottish 432 MHz EME effort

There is also video of Fraser and the first Scottish 432 MHz EME effort on Youtube at:

https://www.youtube.com/watch?v=dqTLVLmz5ro

Yesteryear & Fraser Shepherd GM3EGW

Whilst doing research for the Licensing History feature, I also came across the original announcement for the Fraser Shepherd prize in August 1971



THE FRASER SHEPHERD PRIZE

The late J. Fraser Shepherd, GM3EGW, who died on 30 April 1970, bequeathed to the RSGB a legacy of £300 and expressed the wish that "the interest on the said sum shall be used for an annual award to be fixed at the discretion of the governing body of the Society."

At a meeting of the Council of the RSGB on 7 June 1971 it was resolved:

1. THAT the said legacy shall be invested in accordance with Article 88 of the Society's Articles of Association and that the investments shall be kept separately in the Society's books.
2. THAT the income from the investments will be expended annually in providing a prize or prizes called the FRASER SHEPHERD PRIZE in connection with research into microwave applications to radio communication, being a field in which the deceased was particularly interested.
3. THAT the prize or prizes shall be awarded only to members of the Society other than serving Council members or employees of the Society during the period of their employment.
4. THAT the conditions shall be determined by the Council from time to time and shall be advertised in *Radio Communication*.
5. THAT these resolutions shall remain in force until such time as they may be altered by the Council of the Society for the time being, the legacy being unconditional but it being the Council's wish that the deceased's wishes should be carried out so long as circumstances permit.

RADIO COMMUNICATION August 1971

Crawley Round Table

G3VVB Project Competition

Crawley Round

9/9/18

Judges

John G3XDY, Steve G1MPW, Allan G8LSD

Callsign	Name	Entry	Design	Novelty	Implementation	Total
G4JNT	A Talbot	144MHz measuring receiver	23	24	22	69
G0FDZ	C Whitmarsh	122/134GHz dish and feed	23	22	22	67
G4HIZ	J Easdown	DATV Transmitter to 2.3GHz	24	22	26	72
G3LYP	M Scott	10GHz Source	23	23	25	71
G3LYP	M Scott	35MHz - 4.4GHz signal generator	23	22	25	70
G3LYP	M Scott	ADF4531 Signal source	20	20	22	62

The winner was J Easdown G4HIZ with 72 points for his compact DATV transmitter.

Photos

GMRT 2018 Call for Presentations

Image source: www.gmroundtable.org.uk

The Scottish Round Table will be held on Saturday 3 November 2018.

Details of accommodation, transport and other activities can be found at www.gmroundtable.org.uk

As a departure from previous practice the organisers thought it would be good to have a call for presentations from attendees. In previous years the programme of talks has been assembled by the organisers and was restricted in scope by their knowledge of what people were working on. Do you have a project that would be of interest to the audience? If so why not do a talk about it!

Presentations generally last 30 to 40 minutes and typically would be accompanied by a set of Powerpoint slides. Topics can vary widely but should be microwave related. They could range cover a very wide range of topics such as a review of some commercial kit, modification of surplus gear, test gear, propagation, beacons, software for microwaves, microwave operating, microwave SDRs, antennas, how to get on a new band, microwave construction techniques. The list goes on.

If you are interested please email Brian Flynn, GM8BJF (brian dot flynn at tiscali dot co dot uk) with a title and a very brief outline of your topic.

European Conference on Amateur Radio Astronomy 2018

Source: https://astropeiler.de/european-conference-amateur-radio-astronomy-2018

Astropeiler Stockert hosted the 3rd EUCARA on September 15th and 16th, 2018. With 59 participants from eight countries it was the largest conference so far. Eleven talks were given by attendants, and the keynote speech was delivered by Prof. Michael Kramer, Director of the Max-Planck Institute for Radio Astronomy. Both mornings were devoted to these presentations.

In the afternoon of the 15th, a visit to the Effelsberg telescope was organized, and on the afternoon of the 16th various demonstrations were presented by the Astropeiler team on their telescopes. A special display was devoted to the various options to observe the spectrum of neutral Hydrogen in our galaxy.

Coffee breaks, lunch and the conference dinner gave opportunity to exchange views and experiences, to make new friends and meet old friends again.

The slides from the presentations are made available in the links below.

In the sequence as they were held:

- The Radio Meteor Zoo: involving citizen scientists in radio meteor research (17 MB)
  Stijn Calders
- Building the CAMRAS 'Meteor Scatter' webSDR (11 MB)
  Simon Bijlsma
- First results with the live CAMRAS meteor reception (10 MB)
  Frans de Jong
- Digital Sky Maps and Catalogues for Amateur Radio Astronomy (34 MB)
  Jürgen Starek
- We make a chart of the Milky Way (3 MB)
  Andries Boone
- Small Aperture, Low SNR Pulsar Detection (1 MB)
  Peter East
- Highlights from the observations at Astropeiler Stockert (4 MB)
- Wolfgang Herrmann
- DL0SHF station remote control with BeagleBone, Python and ZMQ (6 MB)
  Per Dudek and Martin Süfke
- Dwingeloo goes SDR (12 MB)
  Paul Boven
- Schumann Resonance, Barriers to Detection (4 MB)
  Norman Pomfret
- Hydrogen-line and pulsar observations with a small antenna (9 MB)
  Tadeja Saje and Matjaž Vidmar

The next conference is in 2020 and will probably be in The Netherlands.

ADF5355 Synthesizer Control

Andy Talbot G4JNT Sept 2018

Overview

The ADF5355 Synthesizer is a fractional-N unit with internal VCO and output doubler that can generate frequencies between 54MHz to 13.6GHz. The double-modulus Frac-N architecture means that even at the highest output frequencies a resolution of a small fraction of 1Hz can be achieved. The chip has recently become popular as an evaluation board available from several sellers. Note that additional decoupling of the regulated supply can help spurii and phase noise. Full details of the necessary modifications, written by Bryan Flynn GM8BJF, are in the December 2017 edition of Scatterpoint .

The control system is made up of two parts. A small PIC module drives the SPI lines of the chip. The register values are sent to this module on a serial RS232 type interface as hexadecimal values in an ASCII text based command structure. Any terminal programme such as Putty can be used to set the register values which can be stored to the PIC's internal EE storage for immediate boot up.

The ADF controller module has been designed as a postage-stamp sized PCB that plugs directly onto the 10-pin connector on the evaluation boards. The same module (with different PIC firmware) can used in the same way with the ADF4351 board that has a 5x2 way header; the connector pinout is the same.

Operating in conjunction with this module is a Windows programme that allows the wanted frequency and other user-settable parameters to be defined. The register values are calculated and can be sent to the PIC module, and optionally programmed into its non-volatile EE memory. The programme can be initialised from the EE contents to save having to completely set up if just small parameter changes are wanted. Major Settings are saved when the programme is closed. Alternatively, instead of direct control the register values can be exported in a format for copy-and-paste into PIC assembler for any other controller where the data is stored in individual byte format.

PIC Module

Figure 1 shows the circuit diagram for this and is identical to a version used for other synthesizer modules from the 'JNT stable. The basic design can be seen at http://g4jnt.com/Serial_SPI.pdf . A new PCB has been developed to allow direct plugging onto the ADF43xx and ADF53xx Evaluation Modules that have a ten way header organised as two rows of 5 pins. It automatically picks up its 3.3V supply from the board. The PCB fitted to one such synthesizer can be seen in Photo 1. For other versions of ADF5355 evaluation modules with different header pin layout, the original PCB can be used with the pins cross-linked.

Use a terminal programme such as Putty. When the module is first turned on a display such as that in Figure 2 will be seen, showing a brief help menu and the EEprom contents sent to the synthesizer chip at boot up.

Any register can be changed by entering R followed by the register contents as an eight digit hex number, followed by [rtn]. The last character of the eight is the register address so the complete value is always stored in the correct register. Typing **R56060002 [rtn**] Sets register 2 to hex 0x56060002. There is no echo-back of typed characters but the controller responds with an acknowledgement if the command is successful. To store this single register to EE non-volatile memory, enter **W [rtn]** after the response to the register write has appeared. The bottom of Figure 2 shows the successful execution of a couple of register updates and an EE write.

To start again, (for example if everything goes wrong), the chip can be reinitialised to the latest EEprom contents with the command INIT [rtn] . The response is the same as when first turned on.

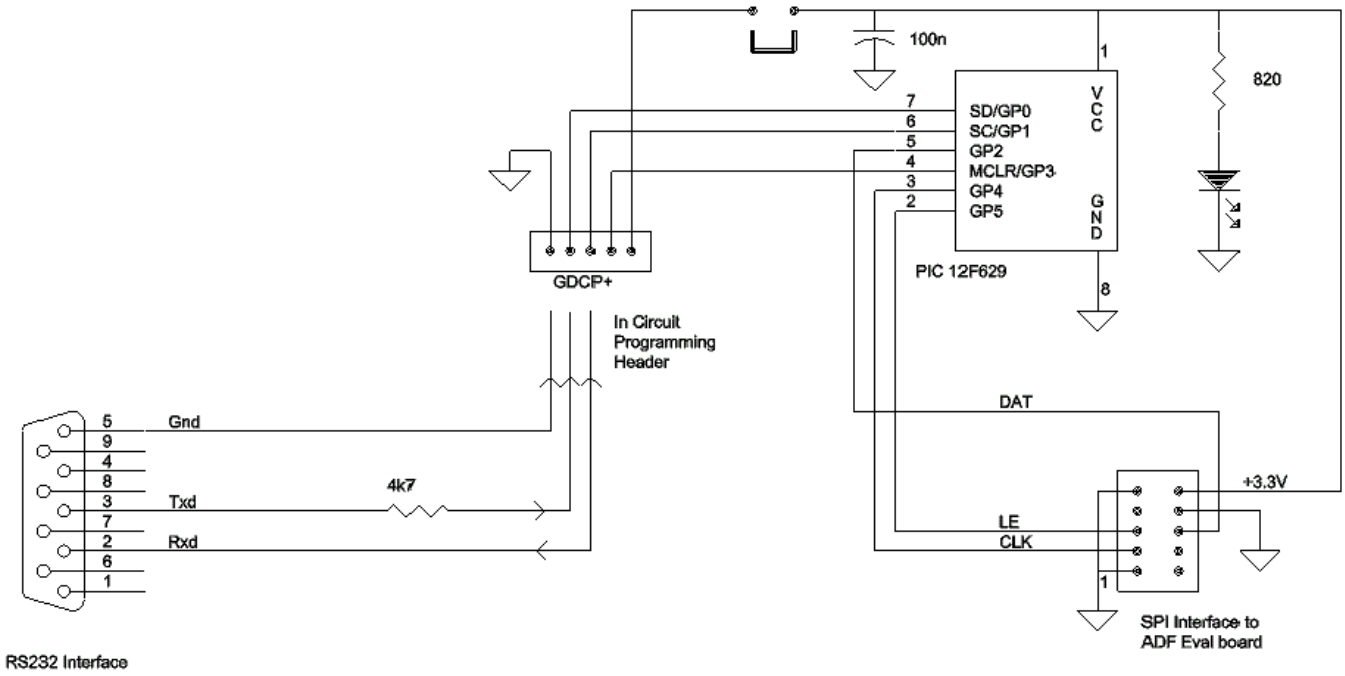


Figure 1 PIC module circuit diagram

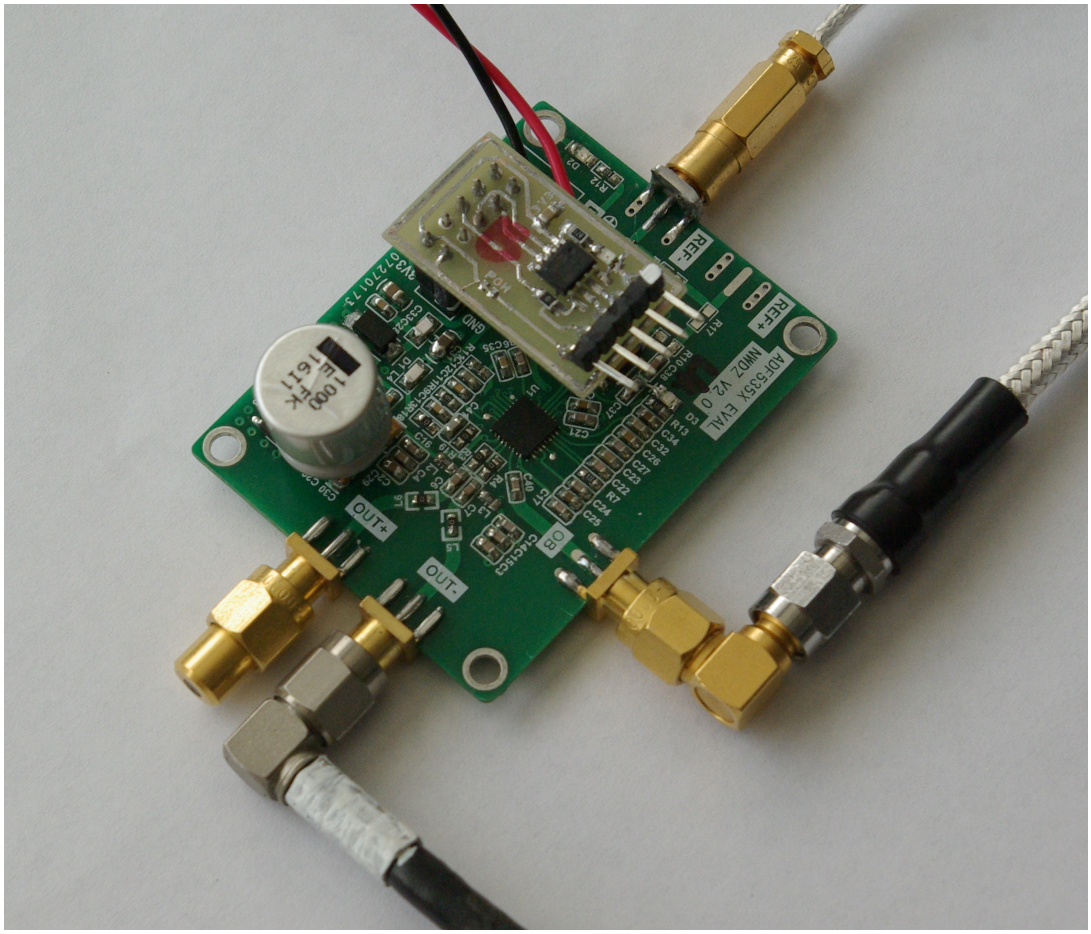
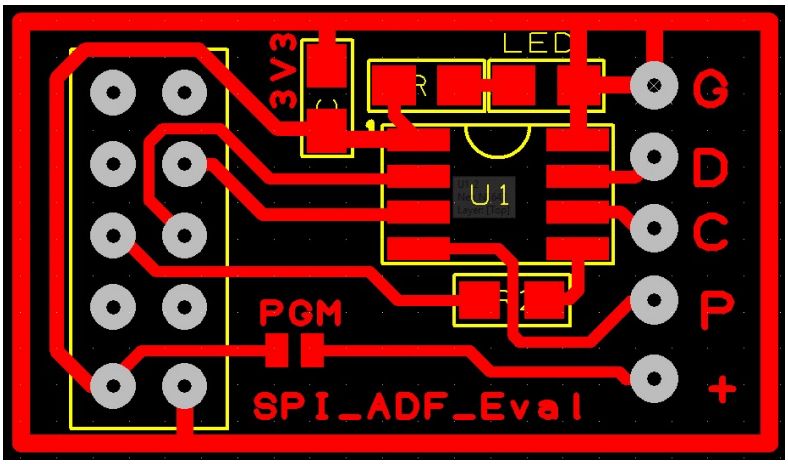
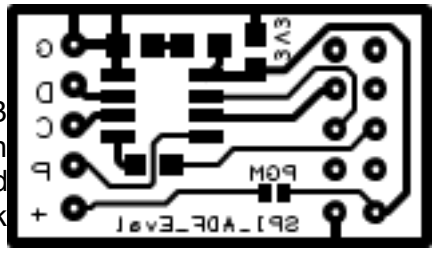


Photo 1 PIC + ADF5355 module



PCB Layout with 1:1 Mirrored artwork



COM1 - PuTTY

```
G4JNT
ADF5355 CTRL
Rxxxxxxxx [CR]
Sxxxxxxxx [CR]
[W]rite reg EE
[I]nit from EE

0000 0000 0000 0001 0000 0100 0001 1100   0x0001041C
0000 0000 0110 0001 0011 0000 0000 1011   0x0061300B
0000 0000 1100 0000 0001 1001 0011 1010   0x00C0193A
0010 0010 0010 0001 1011 1100 1100 1001   0x2221BCC9
0001 0000 0010 1101 0000 0100 0010 1000   0x102D0428
0001 0010 0000 0000 0000 0000 1110 0111   0x120000E7
0011 0101 0000 0011 1100 0000 0111 0110   0x3503C076
0000 0000 1000 0000 0000 0000 0010 0101   0x00800025
0011 0100 0000 0000 1001 0101 1000 0100   0x34009584
0000 0000 0000 0000 0000 0000 0000 0011   0x00000003
0011 1101 0111 0001 0000 0000 0000 0010   0x3D710002
0000 1100 1101 0101 1100 0010 1000 0001   0x0CD5C281
0000 0000 0010 0000 0000 0100 0000 0000   0x00200400

0000 0000 0110 0001 0011 0000 0001 1011   0x0061301B

0001 0010 0000 0000 0000 0000 1110 0111   0x120000E7

7-Written
```

Figure 2 Screen Dump from Putty

Control Software

For a complete understanding of how to use this synthesizer chip optimally, obtain a copy of the data sheet from http://www.analog.com/media/en/technical-documentation/data-sheets/ADF5355.pdf or the website of one of the suppliers.

To calculate register values for any output frequency, reference input and for setting most of the important parameters, the software **ADF5355_Calc.EXE** can be used in one of several ways. The main user screen can be seen in Figure 3. The user entries for frequency setting are into the windows at the top, with the figures in blue. The FINAL wanted output frequency is that after the output divider or doubler is applied. If the background to this window goes red then, depending on the frequency wanted, the doubler or output divider has to be changed to ensure the VCO operates in its correct range of 3.4 to 6.8GHz. The auto set

button, labelled '>>>>' , can be used to automatically generate the correct settings here. The output frequency window will change to a white background when set properly .

The reference frequency should be self- explanatory. As this Fractional-N engine can always generate tiny step sizes, far lower than usually needed, it is worth keeping the frequency into the phase-frequency detector, Fpfd, as high as possible to reduce phase noise. The frequency doubler *RefDbl* can help here and, unless there is a very good reason to do otherwise, set R, the reference divider, to 1. *RefDiv2* is rarely needed – see the data sheet for why the option is there.

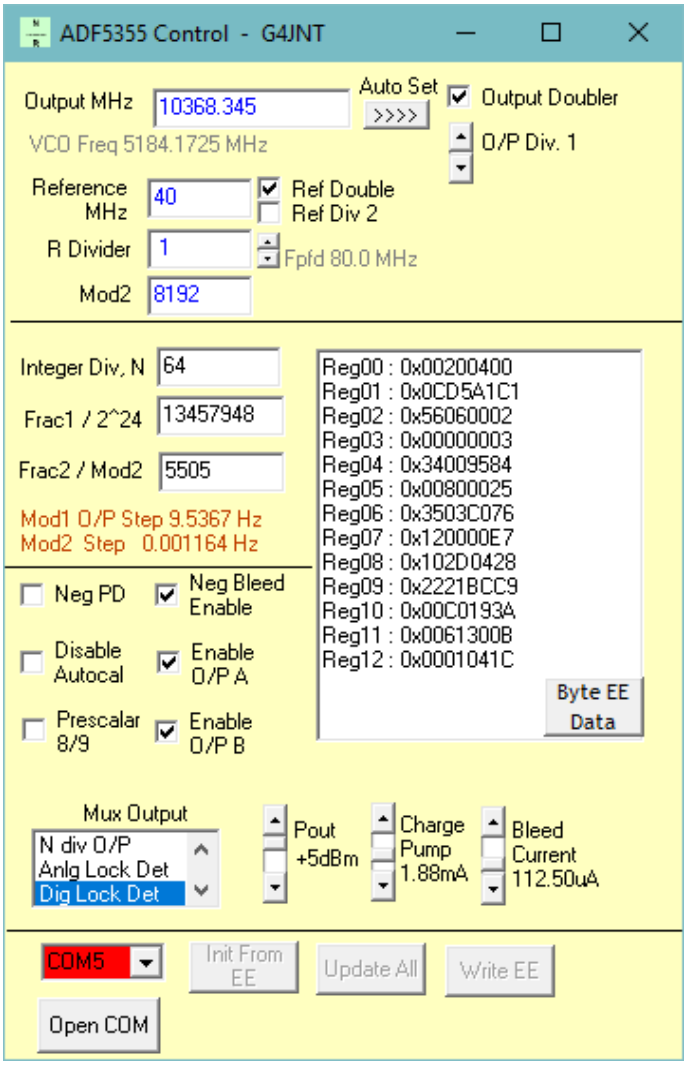
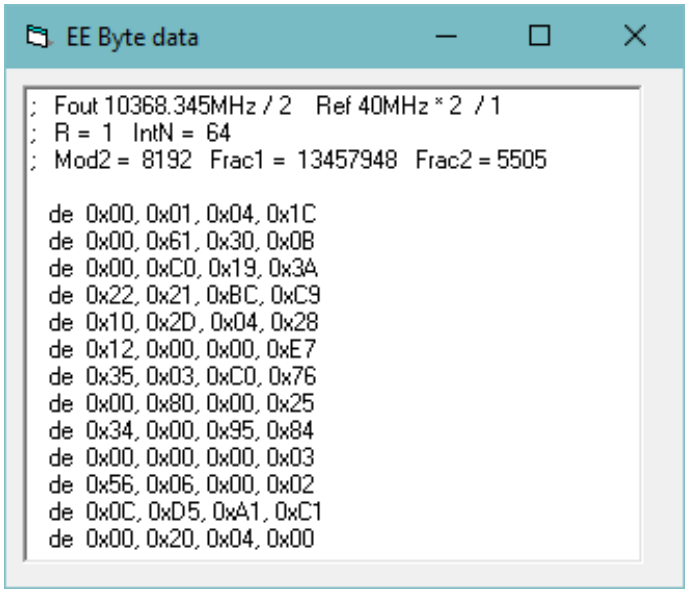


Figure 3 Screen Dump from ADF5355_CALC

Mod2 is the second modulus for fine-setting. Its precise value for most practical purposes does not matter much – anything up to 16383 can be selected. The calculated register values appear in the info box. The other settings, values, and tick boxes will often need to be changed to optimise various parameters like phase noise and spurii. Consult the data sheet to see how to set these.

For export to byte storage, click the 'Byte EE Data' button to get an output like that shown. The contents can be copied to the clipboard for pasting into any user code.

For communication with the PIC controller module use the selection box bottom left that initially appears with a red background. It will have been filled with all valid COM ports found. Select the one to be used and click the *'Open COM'* button. A message box will appear to show the COM port has been opened successfully and the three buttons at the bottom will then be exposed.



'Init from EE' issues an 'INIT' command to the controller that loads the registers from EE. The data fed back on the serial interface is decoded and the resulting frequencies, values and checkboxes updated. The state of the output doubler cannot be determined from the read-back data, so if this is used the box must be checked before initialising from EE

The values read back can form a good starting point for whatever subsequent changes are needed. When any new values have been entered, click the *'Update All'* button to send the complete register set to the synthesizer chip. The update will take a couple of seconds as the bidirectional serial communication cannot be hurried. When you are finally satisfied all is as it should be and the results can be saved, click the *'Write EE'* button – this also takes a few seconds to complete.

Closing the programme saves the entered values and some (but not all) of the check boxes to a file *ADF5355Ctl.ini* in the working directory. This is a plain text file that can be read and even edited if needed. The .INI file is recalled next time the software is run.

Calculating ADF5355 Register Values

The architectures used in the ADF5355 adopts a double modulus Fractional-N architecture that permits ultra-fine resolution to be achieved, but with a more complex programming process than earlier Fract-N devices. The output frequency is given by:

$F_{VCO} = F_{REF}/R' * (N + (F1+F2/D2)/2^{24})$ and $F_{OUT} = F_{VCO}/Odiv$ or $2*F_{VCO}$ at O/P B.

There are two modulus dividers, the first F1 works with a fixed modulus of 224, and the second F2 with the programmable D2. Rearranging the equation shows better how the ultrafine resolution is achieved. R' is the reference divider value, modified with Ref Double and/or Ref Div 2 blocks.

$F_{VCO} = F_{REF}/R' * (N+F1/2^{24} + F2/[D2 * 2^{24}])$

For a reference frequency of 40MHz, doubled to 80MHz, and an output from O/P B after the RF doubler of 10368.345MHz, the resulting FVCO = 5184.175MHz

F_{VCO} / 80MHz = 64.80215625

The Integer portion gives N = 64 to be put into the INT N register. Subtract this from the value calculated above, leaving a residue of 0.80215625.

Multiply the residue by 2^{24} , the fixed-value modulus of the first stage, to get the F1 value

$0.80215625 * 2^{24} = 13457948.672$

The integer portion of this is the F1 register, leaving a residue of 0.672

Choose a value for the second modulus D2. Maximum frequency resolution can be achieved by making this the highest allowed, 16383. Here we will [arbitrarily] use the nearest exact binary multiple below that, which is 8192. Multiply the final residue by D2 to get F2

0.672 * 8192 = 5505 discard any fractional part.

These register values can be seen in the screen dump.

$F_{VCO} = 80MHz * [64 + 13457948 / 2^{24} + 5505 / (8192 * 2^{24})]$

Ultimate frequency setting resolution is a function of F_{PFD} (the multiplied or divided F_{REF}) and the two modulus values. Resolution = $F_{PFD} / (2^{24} * D2)$ so for F_{PFD} = 80MHz and D2 = 8192, the VCO frequency step or resolution is around 0.00058Hz. This step is either doubled or divided by Odiv as appropriate.

When the device is used for real-time programming with frequencies calculated on the fly in a small microcontroller, it may be convenient to make D2 = 4096. Then the precise fractional frequency part is set by a continuous 36 bit word, the highest 24 bits forming F1 and the lower 12 bits F2. A value of 256 works even better , giving a 32 bit frequency word accessible as 3 + 1 bytes. Even here the resulting resolution will almost certainly be more than sufficient; 0.037Hz for the 10GHz example above.

All software with higher resolution copies of the diagrams can be found at www.g4jnt.com/ADF5355_CTL.zip

Registering MSCOMM32.OCX

If an error message appears that mentions this file when running **ADF5355_Calc.EXE** for the first time, it will be necessary to register this serial port driver. The registration will be needed if you have no already-installed Microsoft Visual software that uses the serial port

Copy the supplied file to any convenient folder / directory. In a Command screen, go to this folder and type **REGSVR32 MSCOMM32.OCX [rtn]** whereupon it will install for perpetuity.

There are other ways to install this file – a search engine will reveal alternative solutions.

Contest results

John Quarmby G3XDY, UKuG Contest Manager

August 5.7GHz Contest 2018

Well August was marginally better than July but the weather was still rather wet and activity poor. Congratulations to Neil G4LDR for winning this event.

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G4LDR	IO91EC	4	646	G3XDY	223
2	M0GHZ	IO81VK	3	396	G4ODA	206

August 10GHz Contest 2018

Despite a wet day entry levels recovered from the July low. Some good rainscatter was in evidence, but also some absorption effects. Congratulations go to Nick G4KUX as winner of the Open section, with Graham G8HAJ in runner up spot. In the restricted section Ken G3YKI takes the top spot.

Open Section						
Pos	**Callsign**	**Locator**	**QSOs**	**Score**	**ODX Call**	**ODX km**
1	G4KUX	IO94BP	13	3657	G0API	432
2	G8HAJ	JO01JR	16	3462	G4KUX	370
3	G4DBN	IO93NR	15	3038	G4ALY	428
4	G4LDR	IO91EC	12	2122	G4KUX	395
5	M0GHZ	IO81VK	11	1617	G4KUX	358
6	G3PHO	IO93GG	10	1447	G4LDR	242
7	G3VKV	IO81XV	9	1131	G4DBN	219
8	G3UVR	IO83KH	5	806	G4ODA	210
9	M0XIG/P	IO91JB	4	203	M0GHZ	82
Restricted Section						
Pos	**Callsign**	**Locator**	**QSOs**	**Score**	**ODX Call**	**ODX km**
1	G3YKI	IO92BD	7	1027	G4KUX	279
2	G1DFL/P	IO91MP	1	15	G4RGK	15

Highband Champs

5.7GHz

Pos	Callsign	27/05/18	24/06/18	29/07/18	26/08/18	30/09/18	TOTAL
1	G4LDR	330	824	1000	1000		2824
2=	G1EHF/P	1000					1000
2=	G3ZME/P		1000				1000
4	GW3TKH/P		779				779
5	M0GHZ				613		613
6=	2E0MDJ/P		204				204
6=	G0LGS/P		204				204
8	G1DFL/P	65	138				203
9=	M0ICR/P		138				138
9=	M0UGA/P		138				138

10GHz Open

Pos	Callsign	27/05/18	24/06/18	29/07/18	26/08/18	30/09/18	TOTAL
1	G8HAJ	298	872	1000	947		2819
2	G4KUX	1000	588		1000		2588
3	G4LDR	876	612	215	580		2068
4	G4DBN		559		831		1390
5	G3ZME/P		1000				1000
6	G3UVR	353	298	129	220		871
7	G3PHO		355		396		751
8	G3YJR	289	164	138			591
9	GW3TKH/P		574				574
10	G3VKV	208			309		517
11	M0GHZ				442		442
12	M0XIG/P				56		56

10GHz Restricted

Pos	Callsign	27/05/18	24/06/18	29/07/18	26/08/18	30/09/18	TOTAL
1=	G4SJH/P	1000					1000
1=	2E0MDJ/P		1000				1000
1=	G0LGS/P		1000				1000
4	G3YKI				1000		1000
5	G1DFL/P	86	453		15		539
6	G3WJG		282				282
7	M0ICR/P		135				135
8	M0UGA/P		121				121

UKµG Microwave Contest Calendar 2018

Dates 2018	Time UTC	Contest name	Certificates
16- Sep	0900 - 1700	3rd 24GHz Contest	
16- Sep	0900 - 1700	3rd 47GHz Contest	
16- Sep	0900 – 1700	3rd 76GHz Contest	
30 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
30 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
21 -Oct	0900 - 1700	4th 24GHz Contest	
21 -Oct	0900 - 1700	4th 47GHz Contest	
21 -Oct	0900 – 1700	4th 76GHz Contest	
18 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz	F, P,L
Key:	F	Fixed / home station	P Portable
	L	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)	

French microwave activity for 2018

Ralph G4ALY

September	WE 29 & 30	October	WE 27 & 28

80m UK Microwavers net

Tuesdays 08:30 local on 3626 kHz (+/- QRM)

73 Martyn Vincent G3UKV

Free Tripod

Height open 1 metre.

From Roy Smith, G0RRC QTHR (Ipswich), TEL 01473 652430 with call guard.

Free to a good home but pay any carriage charges.

UK Microwave Group 10GHz Loan Equipment DB6NT Unit

– Basic Description and Operating Instructions.

Introduction

As part of its membership benefits, the UKuG loans out items of GHz bands equipment for short periods, usually 6 months. This allows members to get an idea about operation on the various bands before committing time and money to their own equipment. The equipment represents the type of equipment that can be assembled from a combination of homebrew, surplus and commercial parts.

SYSTEM DESCRIPTION

Built by G4BAO, it consists of a DB6NT 10GHz – 144MHz transverter and a 2W PA in a weatherproof diecast box (1) All transmit receive switching is provided in the box, controlled by the external transceiver. It connects to a feedhorn on a 45cm Sky dish via a short SMA patch lead. It has a mounting bracket for an up to 2-inch pole and a lightweight tripod. Many people use an an FT817 as an IF rig, but other rigs can be used. If so, great care must be taken not to exceed the drive levels.

The Transverter produces approximately 2W on 10368MHz with a maximum 144MHz drive of 2 Watts.

UNDER NO CIRCUMSTANCES INCLUDING TRANSIENT, SHOULD THE DRIVE EXCEED THIS POWER so many rigs will need an attenuator.

This corresponds to the FT817 "two bar" power level with a 13.8V supply and it is strongly recommended that the **"one bar"** setting is used.

The transverter has the following, clearly marked, connectors and cables:

- Powerpoles for connection to the 12V supply
- N female for 144MHz IF input/output
- BNC female for 10MHz reference input
    - The transverter can be run with or without an external 10MHz reference but if run without, it will be unlocked and may be slightly “off frequency”
- SMA female for 10GHz in/out connection to feedhorn
- There is a red LED which lights when the transverter is locked to an external 10MHz source

BASIC OPERATION

Mount the dish on a vertical pole or the tripod with the feedhorn at the bottom. As the dish is an offset one, the dish face points downwards by about 24 degrees to beam at the horizon. This can be adjusted in the field on a suitable beacon by loosening (and re-tightening!) the two 10mm bolts behind the dish. Connect up 12V to the powerpoles and connect the SMA patch lead to the feed and transverter (Do not overtighten! Use fingers only unless you have the correct torque wrench for SMA connectors!)

PTT

To enable the transverter in transmit mode, PTT can only be provided by a current limited 12V supply down the centre of the coax.
Some 144MHz rigs provide this or can be modified to do so. **Notes 2,3 and 4 below show some common rigs, or you can Google “<insert your rig name here>12V down coax PTT mod” to see if yours is covered.**
Under no circumstances should you operate the transverter without the feed connected, there is no VSWR protection for the PA!

Notes

1. ***While the box is weatherproof, the connectors etc are not, so for any operation outdoors you are responsible for providing weather protection. For short portable operations, a plastic bag can be used to keep the rain off, but for more permanent installations, proper weatherproofing of all connectors and leads is the responsibility of the loanee.***

2. ***Mods to FT290R to provide 12v at antenna on PTT:- http://g4ddk.com/FT290R2.html***

3. ***Mods to IC202 for 12v at antenna on PTT:- https://shop.kuhne-electronic.de/kuhne/en/onlineshop/faq/***

4. ***Mods to FT817 for 12v at antenna on PTT:- https://shop.kuhne-electronic.de/kuhne/en/onlineshop/faq/***

G4BAO September 2018

Activity News : August 2018

By Neil Underwood G4LDR

Please send your activity news to:

scatterpoint@microwavers. org

Introduction

The weather for recent UKuW group contests has been very poor with heavy rain across much of the country which has deterred many portable stations venturing out and this has been reflected in the lower number of people sending in entries. Luckily the September mmWave contest coincided with very fine weather, at least in the south of the country, although the number of stations active were low.

It would be good to receive some activity news on any activity involving microwaves. I would be keen to hear from anyone who has borrowed the UKuW loan equipment to find out how it is performing and what the borrower has managed to work.

10GHz and up

From Roger G8CUB, with an account of his participation in the German DXpedition to counties around the Irish Sea

On Friday 9th August, I decided at the last minute to travel up towards Wigan. The intention to operate from IO83RO.

The idea was to try and work one or more of the groups of DL's, in Scotland, Wales IOM or Ireland.

It looked like a weather window on Saturday. However leaving it a bit later than intended to travel, with jams on the M1 & M6, it took seven hours from Essex!

I found a good looking location, on a public, but rough road at IO83RO66FW..

Setting up with KST, Saturday morning, I quickly worked Thomas MW/DC8TM, Horst MW/ DL4SBK and Martina MW/DF3TS on 10GHz. They were on the Great Orme IO83BH. We then proceeded through 24, 47, and 76GHz, all at 59+.

So some easy 92km contacts.

MM/DK5NJ called on 10GHz, from IO74TQ. That looked impossible with a large hill in the way only a few hundred metres distant. However we made contact on SSB 52/53.

After talking to a number of walkers, I drove further up the rough road, for a potentially better path to Scotland. Here I worked MM/DB6NT in IO74TQ, now 59+ on 10GHz, at 170km. We then worked on 24GHz 55/55 with QSB.

Trying on 47GHz, I quickly found Michael's signal, but we could not peak it up further. He could not hear me, but he had 1W, so not surprising. So just a one-way contact, but pleasing for a very non-LOS path. He was just 30 metres asl.

On the way back down, I worked Tony G4CBW on 24G, using a 20dB gain horn on the car roof. So, all in all a worthwhile trip. Unfortunately another 5 hours to get home.

https://www.youtube.com/watch?v=M5t8iPauXTo&t=2s

Report from the 10G cumulative on the 26th August:

Paul M0EYT and Alex M6NPC

The weather forecast for the Sunday was a little poor but it didn't stop my plans to get back out on 10GHz cumulatives. This was the first time I've been out for in excess of 10 years and I had with me my 16 y/o son Alex M6NPC. Arriving at Tyneham view point carpark in IO80WP, we could see horizontal rain and moderate winds. The set up of the dish and associated kit took about 20 mins from car stop until 10GHz TX so not bad. 7 beacons could be heard easily during the setup time. After a cuppa, we started in the contest, an initial one-way with John API just to test everything, followed by a 'random' contact with John M0XIG/P who was calling CQ on .100. We had attached our tripod to the ground using these screw in anchors, even with these tightly roped to the tripod, one tripod foot lifted an inch of the ground. The wind by 11am was so strong it was impossible to hear anything from the radio, and precise tweaking was not possible. I tried QSO's with G3XDY and G4DBN both of who I could see in the FFT easily. The visibility had reduced to 10-15M and the gusts of wind were rocking the car. We decided to pack up and return home, where I worked Ralph ALY via Rain Scatter. I'll be back out in September to try again! Attached is a pic showing my antenna setup, 1.05M offset dish, WG fed, with 10W transverter, WG switch and decant LNA, all GPS locked.

EME News

From Neil G4LDR IO91

As announced last month, operation from Goonhilly using the 32m dish took place on the 1st and 2nd of September. The hours of operation were somewhat limited to the 3 or 4 hours before moonset as it was not possible to gain access to the site before 08:00. This limited contacts to western European countries and the Americas. Over the two days about 16 stations were worked on both the 9cm and the 6cm bands using the call sign GB6GHY.

This was the last time that the 32m dish could be used for amateur EME before it is recommissioned and put back into commercial use as part of the deep space network. This may however not be the last time that EME operation takes place from Goonhilly, other options to use one of the other decommissioned large dishes is being explored, but it is likely to be some time before there is further EME activity from Goonhilly.

As I was unable to go to Goonhilly myself in September, I finally got round to building and erecting my 3m EME dish and getting operational on 9cm in less than one week. I heard GB6GHY and other stations at very good strength but when I connected up the power amplifier (PA) I could not hear any stations so no contact with Goonhilly took place. It took a couple of days of testing with Peter G3LTF to figure out that with the PA powered on all the time it was blocking the receive side due to insufficient isolation between the TX and RX ports of the feed horn. Once that problem was solved I had my first EME QSO on 9cm with G3LFT who has given me much help and encouragement. I have much more work to do to get properly operational on 23, 13 and 9cm EME.

Neil G4LDR (with helper! Rosie) and 3m dish just after first EME QSO on 9cm (with G3LTF)

Beacon News

From Neil, G4LDR, IO91

Whilst I was at the EME conference in the Netherlands in August I received an e-mail from Andy G4JNT saying that the landowner of the Bell Hill beacon site in Dorset was about to start reinstating a track that ran adjacent to the tower supporting the GB3SC* series of beacon. This meant that even if the tower and equipment building could remain the guy wires for the tower would have to be removed and the tower retracted so that it was only one section high.

On Saturday 22nd September a team comprising of Andy G4JNT, John G8ACE, Noel G8GTZ, Jules G0NZO, Julian G3YGF and Neil G4LDR spent a day in the pouring rain clearing bushes and other vegetation from around the tower and guys and successfully lowered the tower after removing the guy wires.

Bell Hill (GB3SC*) beacon mast in its new low position

It was intended to luff the tower over and fix the new 47GHz beacon built by G8ACE to the very top. Due to the heavy rain and the fact that everyone was either very wet or cold of both by mid-afternoon it was decided to leave the 47GHz for another day.

It would be really useful if reception reports could be spotted on BeaconSpot to see what difference lowering the mast has made.

Andy Talbot www.g4jnt.com

It has been necessary to permanently reduce the height of the mast for the Bell Hill beacons, GB3SC# in Dorset. A new owner purchased the land a few years ago and he is now building a farmhouse and outbuildings nearby site. The new track to serve them will be running alongside the old track / footpath we used to get access; he appears to actually be reinstating an old route that became disused.

The new track will run adjacent to the beacon mast and cabin, right where the guy ropes and stakes for the full height mast were placed. So the guys have been removed. As the Versatower with its considerable head load is unsafe when unguyed at full extension, it now sits at a single section height at about 5 metres above ground

Takeoff to the NW and West and SE and East is mostly unaffected as that is broadside to the ridge line the beacon sits on. But stations along the ridge line that runs roughly SW - NE will see signal reduction.

The work was done on Saturday 22 September and since then several reports and BeaconSpots appear to reinforce this change in coverage.

For some rather old pictures of the Bell Hill beacon site, see www.scrbg.org

Gordon GI6ATZ

GB3NGI is now operational on 23cms. The beacon was switched on Thursday 27th but we had to wait until Friday 28th to get the polarity of the antennas changed!

Beacon frequency is 1296.905 and runs 12 Watts to two Wimo PA23R flat panel antennas beaming 45 and 135 degrees. Mode is CW and JT4G on the even minute.

This was part of an upgrade of all of the hardware at the GB3NGI site and all the beacons are now using NGB hardware:– http://www.rudius.net/oz2m/ngnb/index.htm

I will at some stage update the GB3NGI webpages https://www.qsl.net/gb3ngi/ to include the 23cms beacon and all the other changes but web design and particularly CSS is not my thing so may take a while !

A huge thank you to the GB3NGI beacon team:- Geoff GI0GDP, Jim GI1CET and Gerry GI4MHD and also thanks to the UK Microwave Group for funding the 23cms beacon hardware.

As always if anyone would like to contribute towards the upkeep of the beacons there's a link on the webpage - it would be nice to get our funds back into the black!

…..and finally

The deadline for activity reports to be included in the next issue is Monday 1st October 2018.

Events calendar

2018

Sept 28–29	National Hamfest	www.nationalhamfest.org.uk/
Oct 11–14	Microwave Update, Fairborn, Ohio USA	www.microwaveupdate.org/
Oct 12–14	RSGB Convention & AMSAT Colloquium	http://rsgb.org/convention/
Nov 3	Scottish Round Table	www.gmroundtable.org.uk

2019

March 15	IET Colloquium on Millimetre-wave and Terahertz Engineering & Technology 2019	www.theiet.org/events/2019/248017.cfm
May 17–19	Hamvention, Dayton	www.hamvention.org/
June 21–23	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
Sept 15–20	European Microwave Week, Utrecht	www.eumweek.com/

2020

August	EME 2020 in Prague	domain www.eme2020.cz registered but currently not in use [*Googling EME2020 comes up with some unusual items! Ed.*]