An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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Direct programming of the Elcom DFS synthesiser

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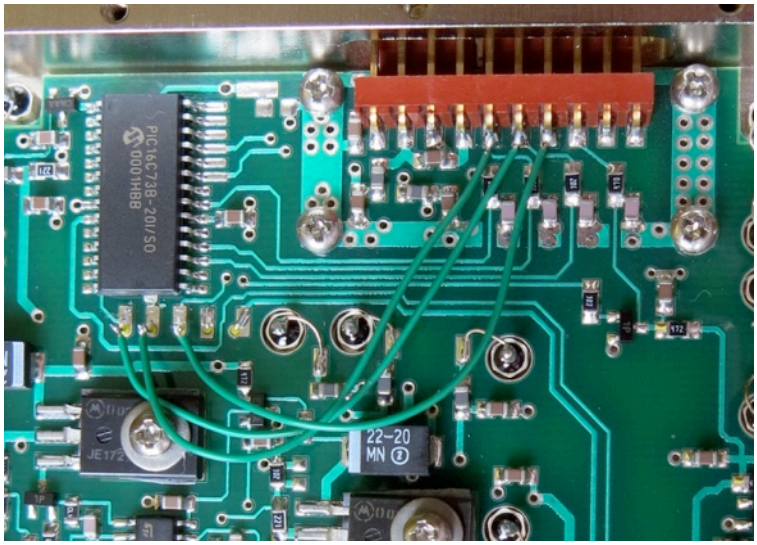
By Barry Chambers, G8AGN and Rob Swinbank, M0DTS



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Loan Equipment

Don't forget, UKμG has loan kit in the form of portable transceivers available to members for use on the following bands:

5.7GHz 10GHz 76GHz

Contact John G4BAO for more information.

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 the Yahoo group 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 Chip Bank – A free service for members

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

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.

Minimum quantity of small components supplied is 10. Some people have ordered a single smd resistor!

The service may be withdrawn at the discretion of the committee if abuse such as reselling of components is suspected.

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. G4HUP's Inductance/ capacitance meter with SM probes is ideal for this (Unsolicited testimonial!)

Don't forget it is completely free, you don't even have to pay postage!

I have just updated the Inductor file and the ATC file in the chipbank catalogue on the website to reflect some acquisitions at Finningley, and to make a few corrections and clarifications.

Mike G3LYP

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.comThe current list is available at

www.microwavers.org/tech-support.htm

80m UK Microwavers net – Tuesdays 08:30 local on 3626 kHz (+/- QRM)

73 Martyn Vincent G3UKV

Chairman's thoughts

My XYL and I recently returned from EME2016, which was held in Treviso, close to Venice (but cheaper!). This bi-annual conference is attended by EME enthusiasts from across the globe, with attendees from the UK, Australia, USA, Japan, Brazil, South Africa, Mexico, Europe, Russia and more, all present.

EME2016 was a great opportunity to hear directly about developments in the art and science of moonbounce communications. Of particular interest was the presentation by Joe Taylor, K1JT, about the eminent release of WSJT-X1.7. This new release is potentially very important to microwave enthusiasts because it includes the new weak signal mode of QRA64 as well as several updates to existing modes and the new 'fast' scatter mode of MSK144.

QRA64 uses several new techniques and has a new patent-free decoder, freeing us from the constraints of the Kotter Vardy decoder used in JT65. An improvement of up to about 3dB in sensitivity and better tolerance of propagation path distortions should mean that more microwavers will be able to give EME a try, using existing terrestrial equipments, rather than having to effectively start again on a separate EME optimised system. Similarly, as JT65 gives way to QRA65, so too will FSK441 and JTMS give way to MSK144 and from what I was hearing it will make aircraft scatter QSOs easier without the constraints of 30 second overs. Very quick transmit/ receive turn-round times will be possible, better even than using SSB!

WSJT-1.7 candidate release 1 includes PC control for a large number of modern rigs. Even the new IC7300 is included. Why is this important? Firstly because it provides automatic doppler tracking control for EME and other doppler-affected modes and if you haven't tried this yet, you will find it really useful on the higher EME bands. Also, as the faster modes start to catch on, the ability to track fast doppler changes from meteors, spacecraft, aircraft and maybe even things we haven't thought possible to track will increase the possibilities to work distances we previously though impossible on 'our' bands.

Another interesting talk, from our own G3WDG, suggested that on 10GHz there was significant polarisation reversal (apart from the expected 180 degrees) when signals were reflected from the surface of the moon and this could point to a form of diversity where the typical circular polarisation arrangement could give way to diversity reception using both the transmit and receive feed ports to give a signal to noise improvement. The possibility that this might also apply on the lower EME bands such as 23 and 13cm is quite intriguing.

The effort that goes into preparing this conference should not be underestimated. That there are also annual 'regional' EME Conferences held in Japan and Scandinavia as well as EME subjects in various VHF and Microwave 'terrestrial' events shows the current high level of interest in EME.

I hope to see many of you at Crawley in a few weeks.

73 de Sam, G4DDK

Acting Chairman, UKuG

Beacons

Murray Niman G6JYB

Just the brief news that the following applications have just gone to Ofcom for clearance

GB3KEU	5.7GHz	Finningley (moved from Sheffield)
GB3RPE	10GHz	Camarthen
GB3KBQ	10GHz	Corfe
GB3LPC	3.4GHz	Bampton

I suspect they may take a while.… (even though the first three are existing systems)

Crawley Microwave Round Table Program

Sunday 18th September 2016

Again this year following we will be holding a heat for the UK Microwave Group annual Project contest for the G3VVB trophy. Please do bring along your constructed equipment or project and enter. Entries do not necessarily need to have been finished during the last year.

Please note that the contest will also accept software entries as well as hardware. The winner of this round will go on to be considered, together with entries from all the other round tables over a year both before and after this event.

The morning will feature the usual 'bring and buy' sale, so if you have something to sell then please bring it along. The Crawley club also intend to sell the majority of the late Derek G3GRO's microwave equipment at this event, although no details of the contents are currently available.

Mike G3LYP will be happy to bring any chip components from the UKuW Group chipbank to you at the meeting. If you have a forthcoming project then why not contact Mike beforehand to place your orders, which are free for UKuW group members.

The program this year as ever offers the microwaver something different – come along and have a good chat, support the construction contest heat and hear the talks.

Below is the finalised timetable:

10:00 Venue opens
12:00 UKuW Group Project contest round judging commences
12:30 Lunch (hot dogs and burger rolls etc and tea/coffee available)
13:30 Opening remarks by Chris G0FDZ and the results of the Project contest heat
13:45 My new Microwave Manager's role – Barry G4SJH
14:15 A bodger's guide to building 24 GHz beacons - John G4BAO
15:00 A 'slab' type mixer for 122 GHz – Chris G0FDZ
15:30 Break (tea and coffee available)
15:45 10GHz portable beacons – Andy G4JNT
16:30 End of meeting

The venue is the Crawley Amateur Radio Club's hut and directions can be found at:

www.carc.org.uk/find_us/directions.shtml

Please contact Chris G0FDZ for more info on chris@g0fdz.com

BATC 2016 Convention for Amateur TV (CAT 16)

The BATC has run a number of highly successful rallies and conventions known as CAT (Convention for Amateur Television) at locations around the UK.

The 2016 Convention for Amateur TV will be held at the **RAF Museum Cosford** on **24 and 25 September** 2016.

The Events will start at around 1:00 pm on the Saturday, and conclude with the Biennial General Meeting early afternoon on the Sunday. Attendees will be free to wander around the Museum at no extra charge; we hope to arrange some guided tours. Arrangements are also being made for an informal dinner at a Hotel in Telford on the Saturday evening.

Latest news and discussion about the Convention can be found on the **BATC Forum**.

Previous events have been recorded and are available online:

- The recording from the 2015 and previous years conventions are now available on the BATC Online Youtube channel - **Click here for more details.**
- Some rare black and white footage from **CAT70** is available here.

Direct programming of the Elcom DFS synthesiser

Barry Chambers, G8AGN and Rob Swinbank, M0DTS

During discussions at the recent Finningley Microwave Round Table, Rob M0DTS revealed that he had successfully modified an Elcom ILCDFSL1201 synthesiser to enable direct programming of its ADF4252 PLL and to thereby reduce the default frequency step size. Further details are given at http://www.m0dts.co.uk/?tag=24GHz.

Many of the Elcoms which have been made available during the past few years, however, are older models such as the DFS1101, DFS1201 and DFS1301. Their internal architecture is different to that of the later ILCDFSL models and they also use a different PLL, the Siemens PMB2.2 2306T. Hence the purpose of this article is to show how to modify the DFS models for direct PLL programming, describe a suitable programmer based on an Arduino Nano, and finally to discuss how the PLL is programmed.

1 Modification of the Elcom unit

First, the unit cover which displays the identification label should be removed. This will reveal a circuit board holding the synthesiser logic circuits, the internal PIC (16C738) and the pins of the 10 pin connector, as shown in Photo 1.

Close to the PIC will be found five pads which are connected via Teflon sleeved wires passing through the PCB to the PLL chip mounted on the RF side of the synthesiser. The three left-hand-most wires carry the CLK, DATA and EN signals between the synthesiser's internal PIC and the PLL. These connections must be broken and rerouted to pins 6, 5 and 7 of the synthesiser's 10 pin connector, as shown in Photo 1.

The simplest way to do this is to lift the three wires away from the pads by unsoldering and carefully bending the ends of the wires up so that they are perpendicular to the PCB. Lengths of (preferably) Teflon coated wire can then be used to make the new connections between the PLL and the 10 pin connector, as shown by the green wires in Photo 1. It would be prudent at this stage to use a magnifier to check that the new connections are insulated from the PIC pads.

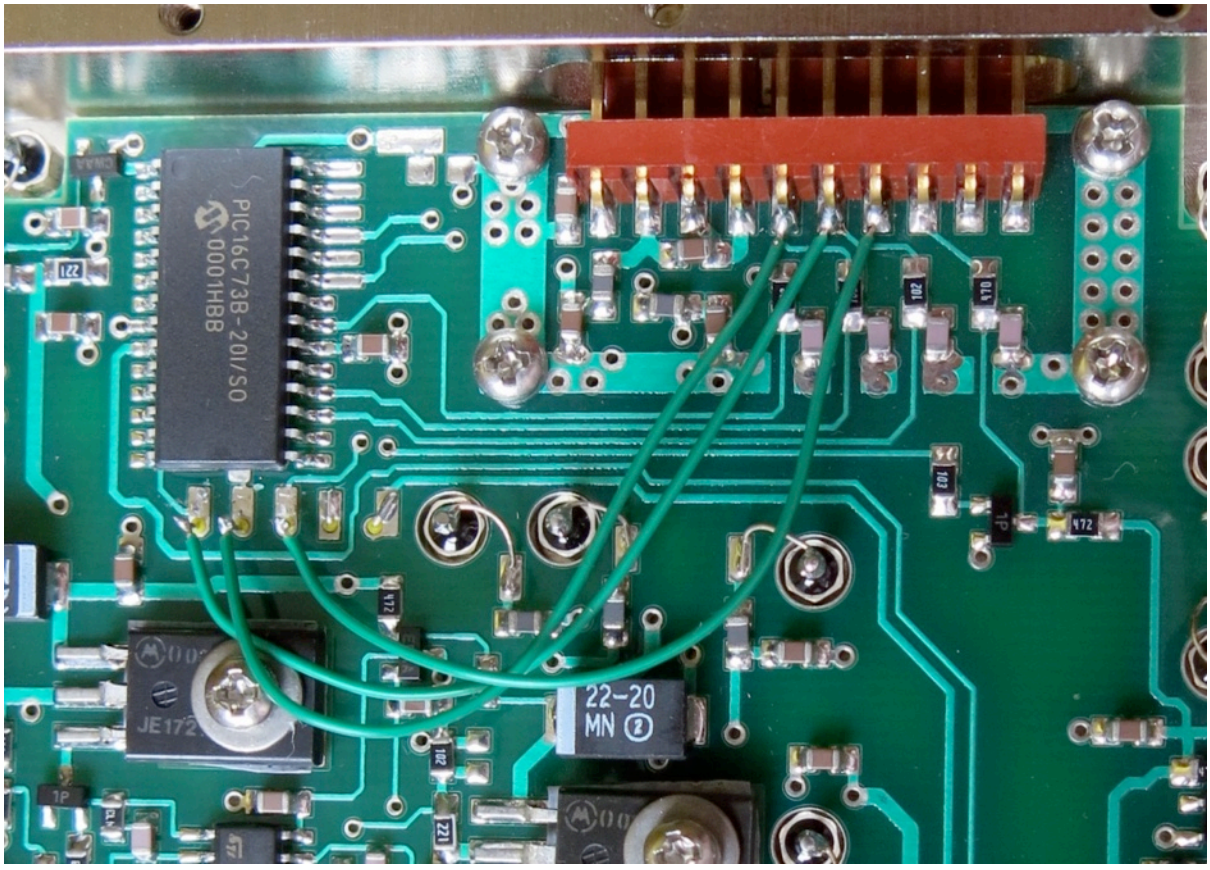


Photo 1 Close-up view of modifications to Elcom DFS synthesiser

2 The Arduino programmer

The PLL programmer is based on an Arduino Nano because of its small footprint. The circuit is shown in Fig 1 and Photo 2 shows a programmer constructed on a custom PCB. This plugs directly into the Elcom's 10 pin connector. The programmer circuit also incorporates a 6V or 8V regulator, a lock indicator LED and pins for connecting a push-to-make button switch for cycling through a list of stored frequencies.

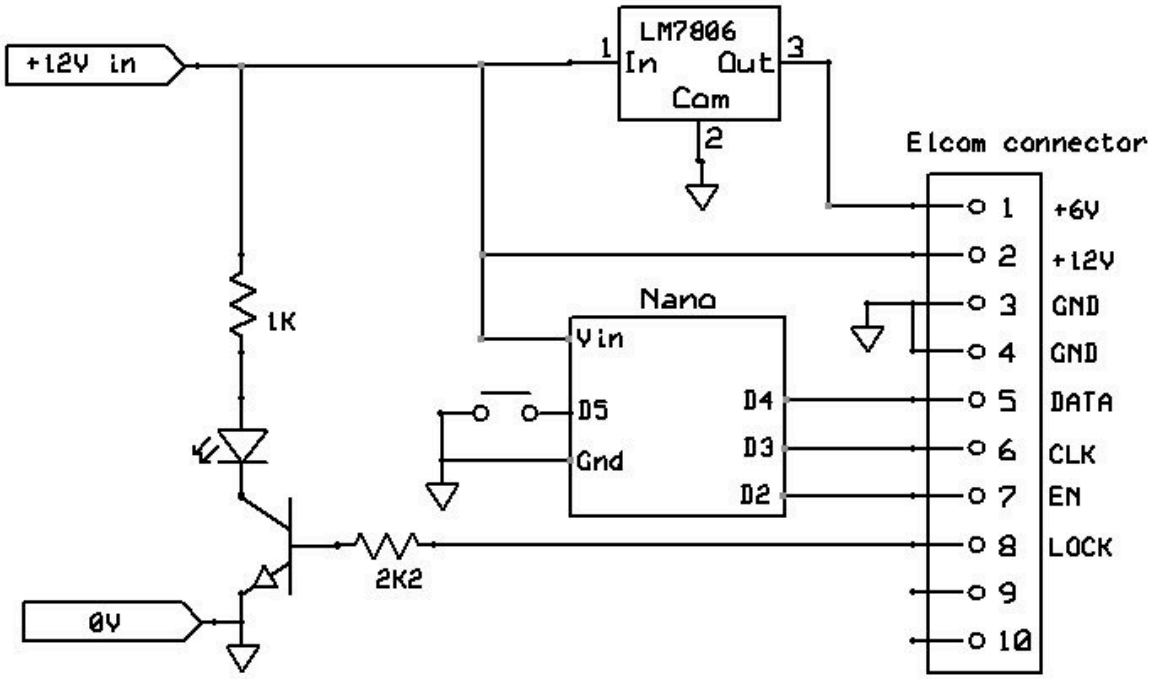


Fig 1 – PLL programmer for Elcom DFS synthesisers

3 Programming the PLL

To understand the programming procedure, it is first necessary to explain the architecture of the Elcom DFS synthesiser family. The most common units are the DFS1101, DFS1201 and DFS1301 but there is also a DFS1295. Giving a complete description is difficult since even individual units bearing the same model number may have been customised by the manufacturer!

The reference frequency in the DFS1201 and 1301 is 100MHz, whereas in the 1101 it is 92.5MHz. This frequency is multiplied by 9 and then by 3, resulting in a final frequency of either 2700MHz or 2497.5MHz. The VCO frequency is one-quarter of the desired output frequency; so for 12000MHz, the VCO frequency is 3000MHz. The multiplied reference and VCO frequencies are mixed together and the difference (I.F.) frequency selected using a filter. So

for a DFS1201 whose output frequency is set at 12000MHz, the corresponding I.F. frequency would be 3000 – 2700 = 300MHz. This signal is then divided down by a factor of (usually) 8 in a MC12026A prescalar before being input to the PLL. It is wise to check the actual division factor at this stage as it can be set to 8,9,16 or 17. If the prescalar circuitry is standard, no tracks in the vicinity of the chip (labelled 026A) should have been altered and the division ratio is 8. Photo 3 shows a synthesiser in which the division ratio has been set to 16 and the track alterations are obvious.

Photo 2 – PLL programmer for Elcom DFS synthesiser

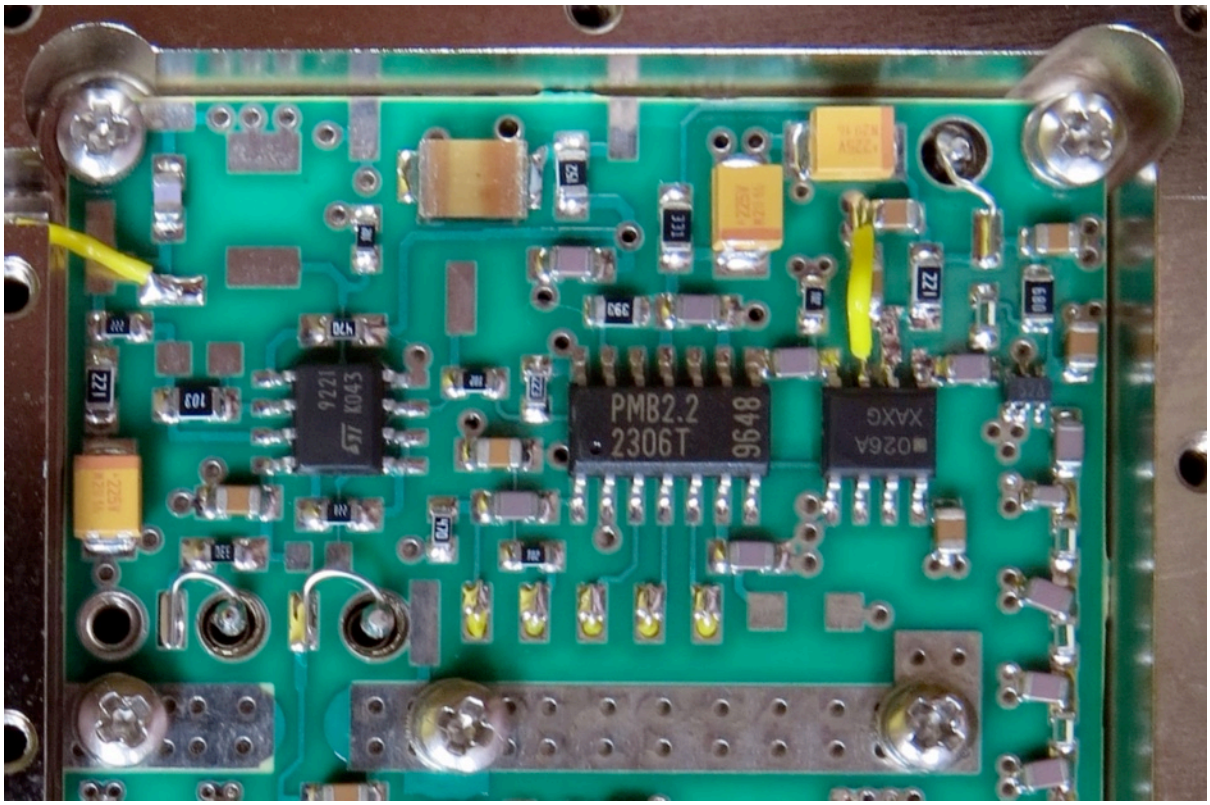


Photo 3 – Prescalar division ratio altered to 16 (see yellow wire at top-right)

The other input signal to the PLL is a divided version of the reference signal. For the DFS1101 this is equal to half the reference frequency, i.e. 46.25MHz, whereas for the DFS1201 and the DFS1301 it is one-tenth the reference frequency, i.e. 10MHz. This can be checked by looking at the signal on the right-hand-most of the five pads mentioned earlier in Section 1 and Photo 1.

Having determined the division ratios for the PLL inputs, the procedure for programming the PLL is as follows:

(a) Specify the output frequency and divide this number by four to give the required VCO frequency.

(b) Take the difference between the VCO frequency and the multiplied reference frequency. This gives the I.F. frequency

(c) The factors N, A and R are related by

$$I.F.frequency = \left[\left[Prescalar\ division\ ratio \times N\right] + A\right] \times \frac{f_{ref}}{R \times f_{ref}\ division\ ratio} \quad \text{.....(1)}$$

As an example, let's program a DFS1101 to 11000MHz. The prescalar division ratio is 8 and the reference frequency division ratio is 2. Also, from the previous discussion, the I.F. frequency is 2750 – 2497.5 = 252.5MHz. Then

$$252.5 = (8N + A) \times \frac{92.5}{2R} \quad \text{.....(2)}$$

The factor **92.5/2R** is one quarter of the frequency step size (since the VCO frequency is multiplied by 4 to give the synthesiser output frequency).

From the PMB2.2 2306T PLL data sheet, A, N and R may have values falling in the ranges of 0 to 127, 3 to 16380 and 3 to 65535, respectively. A somewhat tedious approach to finding appropriate values for A, N and R which satisfy Eq 2 would be to try all possible combinations but there is an easier way, as follows. Re-arranging Eq 2, we get

$$\frac{252.5 \times 2R}{92.5} = (8N + A) \quad \text{.....(3)}$$

For a valid solution to Eq 3, since A, N and R must be integers, then the left-hand side $\frac{252.5 \times 2R}{92.5}$ must also be an integer. One solution is R = 185; then the left-hand side of Eq 3 has a value of 1010. This must be equal to

8N + A; hence N = 126 and A = 2. This results in a frequency step size of 1MHz; so for 11000MHz, A = 2, N = 126, R = 185 and for 11001MHz, A = 3, N = 126, R = 185 etc.

Other possible values of R which satisfy Eq 3 are given in Table 1 and each one results in a different frequency step size.

A	N	R	Step size (MHz)
0	101	148	1.25
2	25	37	5.00
2	126	185	1.00
4	50	74	2.5

Table 1 – Possible data sets for programming a DFS1101 to 11000MHz

In practice, however, only smallish values of N and R lead to the PLL locking up. Other values lead to the situation where the synthesiser does not lock up but scans repeatedly across a small band of frequencies apparently centred on the desired frequency; this requires further investigation.

All the data sets shown in Table 1 were tested in practice and Photo 4 shows the resulting spectrum at 11000MHz with a spectrum analyser span of 5 MHz.

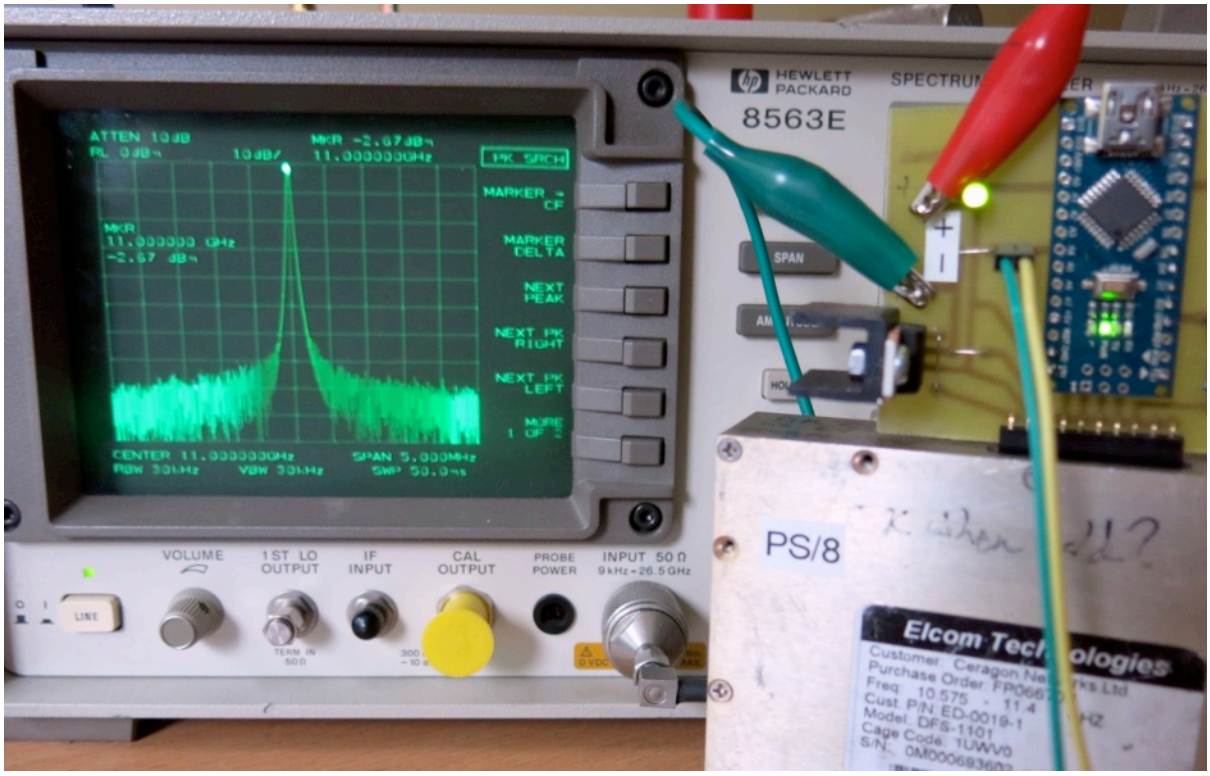


Photo 4 – Measured spectrum of DFS1101 at 11,000MHz

4 Arduino sketch

Having determined appropriate values of A, N and R for the required frequency or frequencies, these are incorporated into an Arduino sketch which is a modified version of one written by Rob, M0DTS. Many frequencies can be stored in the sketch and these may be cycled through using repeated button presses. Once a frequency has been selected, the Nano's on-board LED flashes to show which particular frequency in the stored list has been chosen; so one flash indicates frequency no 1, two flashes indicate frequency no 2 etc. Also, assurance that the PLL has locked is given by the lock LED on the programmer board remaining lit.

A copy of the sketch may be obtained on request via b.chambers@sheffield.ac.uk.

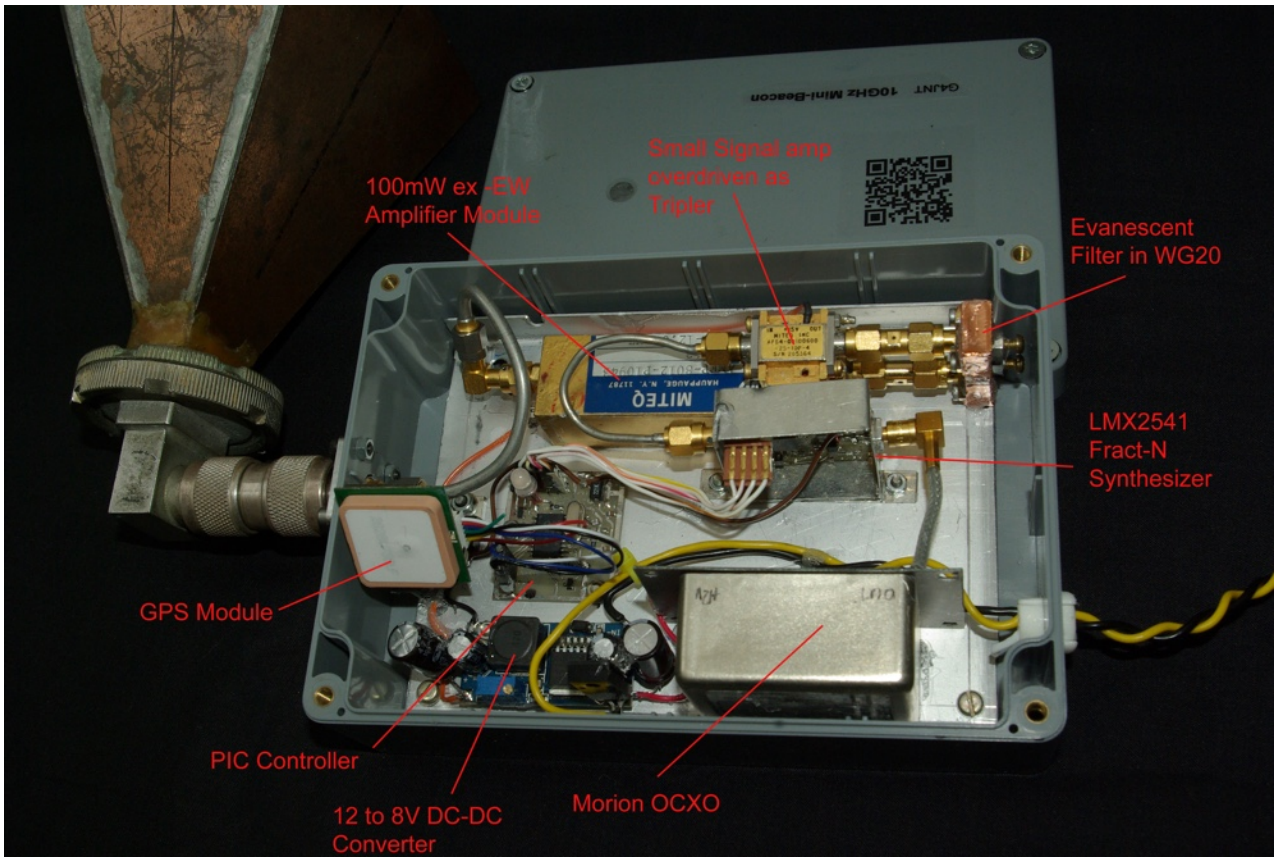
Further work on these synthesisers is on-going and will be reported in due course.

The 'PORTABEACON'

A self-contained 10GHz beacon for rapid deployment

Andy Talbot G4JNT, July 2016

The *PortaBeacon* is a 10GHz beacon with a difference. The aim was to have a self contained, portable, 10GHz test source that could be taken to a site and rapidly deployed with a minimum of setting up. As I wanted a design that transmitted its IARU locator as part of the message, that would normally require the message be pre-programme beforehand, knowing the intended location. It would also preclude changing the location as circumstance required. This unit overcomes that problem by using the lat/long supplied from an integral GPS receiver to generate the locator itself. When using WSJT modes, the GPS receiver also supplies the necessary timing.



RF Hardware

The innards can be seen in Photo 1 with the constituent parts labelled. The RF is generated at 3.4GHz by an LMX2541 Fractional-N synthesizer [1]. This is applied to an overdriven amplifier stage that generates a substantial amount of third harmonic at 10368MHz. The amplifier shown in the photo is an old commercial unit that provides around 30dB of gain over the 2 – 4GHz region. It has vastly reduced gain at 10GHz, but does still generate a significant amount of third harmonic. Its performance is very similar to a pair of ERA-1 or possibly GALI-1 modamps cascaded. In fact a single ERA-1 was originally used as a multiplier during testing, but it didn't provide quite enough output to fully drive the amplifier. So rather than re-build as a double stage of ERA-1 modamps, it was easier to use the commercial unit that was languishing on the shelf. The unit is deliberately run at a reduced supply voltage of 8V compared with the value of 15V, as written on the casing. This enhances the non-linearity and harmonic generation, and also helps reliability and reduces power dissipation. The same argument applies to ERA-1 devices used as multipliers.

The third harmonic is filtered out with two element evanescent filter built in WG20. The frequency response is shown here, and full details of the filter can be found at [2].

The output level from the filter at 10.4GHz is around -1dBm, typical of the level of drive suited to a number of 10GHz amplifier designs. The one used here was a surplus 8- 12GHz 100mW job originally from the EW arena, and is being run appreciably overdriven with this input level. Many other amateur or surplus amplifiers could be used here. Interestingly, this amplifier module is also specified for +15V operation, but testing it showed full performance right down to 8.3V on the supply pin, so it clearly has an internal voltage regulator; as to why 15V was specified for normal operation – who knows. It certainly leads to higher dissipation.

The reference for the synthesizer is a Morion ovenned oscillator. This has a quick warm up – typically less than 5 minutes, runs directly from a 12V input (and functions perfectly well down to 10V) and maintains its 10MHz output to an accuracy of a few parts per billion. This means the 10GHz output is within no more than a couple of tens of Hz of where it should be. Well within the capability of the WSJT decoding software to find it.

Controller, GPS and PSU

A 16F628 PIC microcontroller reads timing and lat/long information from an integral GPS module. The location data is used to generate a 10 character locator (approximately 19 metre linear resolution). The generated locator, along with any prestored callsign information is combined into a message and encoded into a set of JT4 message symbols . In fact the system in use actually generates two different JT4 messages. One transmitted on the even minutes contains callsign and a fixed string to pad out the space. The message on the odd minutes contains the full resolution locator , and a repeat of the minutes unit digit. Of course, any other combination of message format could be chosen by changing the PIC code slightly.

The pre-generated symbols are delivered to the Fract-N synthesizer under timing control derived from the GPS module , generating the four frequencies corresponding to the four tones in the JT4G message.

A typical transmission as received using the WSJT-X software (starting from home and driving out to a remote location) :

```
1149 -16  0.7  789 $* IO90IV58AL--9          f
1150 -16  0.7  773 $* G4JNT/P 10GHZ          f
1208 -18  0.7  787 $* G4JNT/P 10GHZ          f
1209 -18  0.7  782 $* IO90KU27ET--9          f
1210 -17  0.7  778 $* G4JNT/P 10GHZ          f
1211 -17  0.7  793 $* IO90KU27ET--1          f
```

A U-BLOX GPS module with integral antenna delivers NMEA data at 9600 baud to the PIC. The module is mounted at 45 degrees in one corner of the box so whatever orientation the finished unit ends up, it will always be pointing at some sky. These modern third-generation GPS receivers are very sensitive, so a clear view is not essential, and operation indoors usually quite reliable.

All modules apart from the OCXO run from 8.3V or less and as operation is intended from batteries, this is just asking for a switch mode controller. A simple switcher step-down regulator using an LM2596 drops an input in the range 10 to 14V (limited by the OCXO requirements) down to a regulated 8.6V. Complete PSU modules using this device are cheaper to buy from Ebay, ready built, than it is to build one from scratch. They do need additional input and output capacitors though, as well as some decent EMC filtering. The extra components can be seen in the photo. A linear regulator is used to supply 5V for the GPS module and the PIC controller, and also gives a pre-regulated supply for the synthesizer which has its own on-board lower voltage one.

Conclusions and Scope for Changes

This project was put together in the way it was, because I could. I already had a location beacon sending high resolution GPS data in a compressed form and the idea of generating the locator on the fly was an insight that just popped up. Although the version shown here runs at 10GHz, the LMX2541 will generate directly any frequency down to 35MHz, so exactly the same source could be used down to VHF. Code also exists for generating JT9 instead of JT4, so by adding an additional divider, even lower frequency operation is possible.

For those who still want carrier and CW, there 'may' be enough room in the PIC to reinstate the CW message, and of course this can be generated on the fly, too, from the same Locator generated for the WSJT.

References

1. LMX2541 Fractional-N Synthesizer http://www.g4jnt.com/LMX2541_Synth_Module.pdf
2. Evanescent Filters http://www.g4jnt.com/EVANFILT.pdf

Heelweg 2017

HEELWEG MICROWAVE MEETING 2017

SATURDAY JANUARY 14th 2017

LOCATION:

KULTURHUS "DE VOS"
HALSEWEG 2
7054 BH WESTENDORP

INFO@PAMICROWAVES.NL

PE1FOT/PA7JB/PA3CEG/PA0BAT

http://www.pamicrowaves.nl/website/

Timelapse Part I 2016 made by PA3FXB
https://youtu.be/dEmRo0xHCko

Sales & Wants

Wants

I am looking for a big dish aerial. Preferably with mounts. I wish to use it for EME and satellite in particular the AMSAT P4-A due to be launched next year. I can collect up to about 5m dia in one piece with my own transport.

I have space for an even bigger dish if it can be broken down or transported. I am happy to dismantle if required.

What have you or what do you know of?

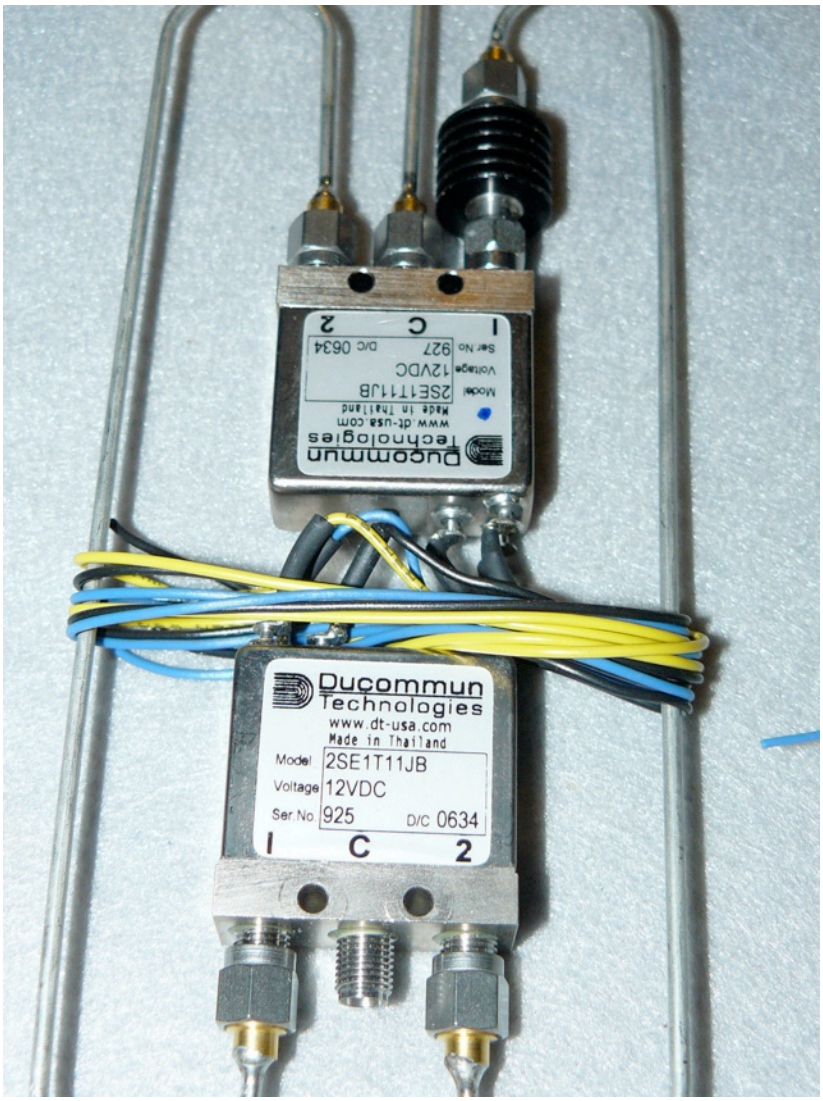
Paul Nickalls, G8AQA

paulnick@btinternet.com

01694 771 441 **07967 272 185**

Sales

I have found a source of SMA relays which may be of use to club members. They are from the USA and comprise two latching SPDT RF relays, either a 14dB or 20dB SMA attenuator (you can choose) and various hard lines with SMA connectors and a BMA socket; please see attached picture.



I paid around £50 for TWO sets of these including shipping to the UK; the parts appear to be new. The seller accepts PayPal and if any members are interested, please contact me at simon@m5poo.co.uk and I'll pass on the seller's details. I'm doing it this way to keep the seller's details out of the public domain as he also sells them for more on eBay.

Simon Robinson M5POO

simon@m5poo.co.uk

17th International EME Conference 2016

Neil Underwood, G4LDR

The biannual international EME conference took place near Venice Italy between the 19th and 21st August. The venue was just outside the town of Treviso about half an hour's drive from the city of Venice. This year accommodation and conference facilities were co-located at the Treviso Best Western Hotel.

The organisers laid on a varied programme of lectures as well as a collateral programme which included a trip to Venice City for all delegates and partners as well interesting trips/visits for partners not(!) interested in EME.

In total there were 143 delegates plus partners from 19 countries. The UK was well represented by 12 delegates most of who are active EME operators.

In addition to the main conference presentations there well test facilities set up, an EME station operating on 2m, table top presentations and demonstrations together with an area for small traders and an area where the conference sponsors displayed their equipment.

The programme of lectures covered a wide range of subjects. These included signal polarity in the V/UHF bands by IK1UVL and IK3XTV, where spatial offset (a function of distance and direction between two stations) as well as ionospheric effects (mainly Faraday rotation) need to be taken into account. For microwave EME operators Faraday rotation is far less than at VHF frequencies, meaning far less fading of signals. On the subject of polarisation, Charlie Suckling, G3WDG, gave a detailed account of his investigation into whether circular polarisation (CP) is better than linear polarisation (LP) at 10GHz. His conclusions were that CP to CP performs somewhat worse than LP to LP; CP to LP only has 2dB loss; CP signal widths are the same as with LP and that for tests under marginal conditions LP to LP with allowance for spatial off set is best.

Sam Jewell, G4DDK presented the results of his attempts to blow up FETs during his investigation into EME LNA safe operating levels and whether leaving the LNA powered on during transmit periods makes them more vulnerable. Sam also investigated the case where devices still appear to operate but with reduced performance (increased noise figure (NF)). Sam used his VLNA23 pre-amplifier as the testbed. He found that the VLNA23 could tolerate a higher input level than expected, up to +15dBm. Above +20dBm failure of the input device usually occurred. In a reasonable number of cases between +15dBm and +20dBm degradation in NF was observed. It appeared to make little difference whether the device was powered on or off. Sam recommends keeping the maximum power on the input to the LNA below 0dBm (this may require two isolation relays for very high powered systems) and that at least 100ms (longer for older relays) is allowed for the sequence of switching between receive and transmit.

There were several presentations of dish construction ranging from a 10m parabolic antenna by VK5MC partly made with parts available on his farm, to a light weight inexpensive stress offset dish by K2UYH. I0NAA described his 5m diameter stealth dish which could be easily lowered onto its back when not in use to hide it from the neighbours, in a video he showed how quick and easy it was to raise to the operating position. Dave Powis G4HUP described the progress he has made in designing and constructing an azimuth drive system for small dishes.

There were of course a number of presentations on digital techniques that has enabled many small antenna and low power stations to make successful EME qso's in recent years. DJ5HG gave a detailed talk on the theoretical and practical limits of digital QSOs. Joe Taylor K1JT gave an interesting and informative presentation on new codes, modes and tools for weak-signal communication included in the latest WSJT-X software suite.

EME operation was also covered with OK1DFC describing portable operation on 9, 6 and 3cms and with F2CT covering operation using the 13m dish at "Parc du Radôme" in Pleumeur-Bodou (location of the EME 2014). PA3FXB and the team at PI9CAM (the 25m dish at Dwingeloo) have been doing something difference to EME. They have been experimenting with satellite bounce, not just with the ISS but with smaller orbiting objects as well.

EME 2016 was a great success and all credit to the organisers. It is no mean task to organise a high quality international event as the UK team that organised the 2012 event will know.

All of the audio visual files used for the presentations are available in the 'download' section of the EME 2016 website (www.eme2016.org/). An electronic version of the conference proceedings can also be downloaded. If

you want to watch some or all of the presentations (that were streamed live), the recordings have been uploaded to YouTube and are accessible via the EME 2016 home page.

The 18th International EME conference will be held at Hotel Zuiderduin in Egmond aan Zee (the Netherlands). Dates will be 16th to the 19th August 2018. Included will be a visit the 25m dish at Dwingeloo.

EME 2016 delegates.

Post script

The conference is in the past now, but, for those of you that were not able to be there or follow the live streaming, I've uploaded the recording of the sessions on Youtube.

For an easy search, go to www.eme2016.org

I've embedded them on the home page.

Thanks to all the participants. It has been an unforgettable experience.

73 de Giulio IW3HVB & EME 2016 Staff

Giulio Pico IW3HVB **iw3hvb@eme2016.org**
Organizing Committee
XVII International EME Conference 2016
Venice Italy
Via Umberto Saba, 13/B
30038 Spinea Venice
Italy

www.eme2016.org

EME2018

Jan van Muijlwijk, PA3FXB

Hi all,

The wonderful EME 2016 conference is still very much on our minds.

That motivated us to move fast for EME 2018.

We can tell you that the EME 2018 conference will take place at Hotel Zuiderduin in Egmond aan Zee (the Netherlands).

Dates will be August 16, 17, 18 and 19.

Preliminary program:

Thursday August 16:

Excursion by bus: Dutch waterworks.

This trip will be interesting for all as there is quite some technique involved in keeping our country dry and those waterworks are both impressive as well as beautiful!

Friday August 17:

- Excursion by bus: to PI9CAM

We will visit the 25m Dwingeloo dish (PI9CAM) but also the 14 dishes (25 m too) of the Westerbork array.

This trip will be interesting for all too, because this trip will be organised in such a way that:

1. interested EME-ers have time to spend time at the big dish of PI9CAM and the 14 dishes of the Westerbork array;
2. for partners (who are invited as well!) the visit at the dishes will be shorter and on both locations there will be time to visit other things.

Saturday August 18:

- For the EME-ers: in the morning and afternoon: Lectures
- For partners: Excursion by bus ?Typical Dutch?
- For all: Closing dinner in the beach-pavilion on the beach!

Sunday August 19:

- For the EME-ers: in the morning: Lectures
- For partners: Trip in and around Egmond aan Zee.
- For all (around noon): Goodbye Lunch - an extended lunch for all to say our goodbyes.

Looking forward to see many of you in the Netherlands and at PI9CAM in 2018!

73!

Jan PA3FXB (team PI9CAM)

Contest Results

John G3XDY, UKuG Contest Manager

I realised very late in the day that I missed one of the entries for the July mmwave contest. The results and the mm championship table will be in the next issue.

July 10GHz Contest 2016

Conditions were rather uninspiring for the most part, although Neil G4LDR did manage a good DX contact with DF0MU at 626km, which cemented first place in the Open section for him. Runner up was the Telford group, with 3 more QSOs but lower points per contact.

In the Restricted section, the father and son team of Stewart G0LGS/P and Matt 2E0MDJ/P had a substantial lead over the Combe Gibberlets group M0HNA/P

Open Section						
Pos	**Callsign**	**Locator**	**QSOs**	**Score**	**ODX Call**	**ODX km**
1	G4LDR	IO91EC	14	2906	DF0MU	626
2	G3ZME/P	IO82QL	17	2326	G4ALY	248
3	G0EHV/P	IO94MJ	9	2011	G4EML/P	391
4	GW3TKH/P	IO81LS	9	1083	G4EML/P	205
5	G3VKV	IO81XV	7	805	M0DTS/P	288
Restricted Section						
Pos	**Callsign**	**Locator**	**QSOs**	**Score**	**ODX Call**	**ODX km**
1=	2E0MDJ/P	IO81XW	12	1478	G0EHV/P	283
1=	G0LGS/P	IO81XW	12	1478	M0DTS/P	283
3	M0HNA/P	IO91GI	9	890	G4ALY	216
4	G0PEB/P	IO90JO	7	806	G4ALY	213
5	GW4HQX/P	IO81LS	5	418	M0HNA/P	119
6	G3YJR	IO93FJ	3	318	G0EHV/P	118

August 5.7GHz Contest 2016

Activity continues to struggle on 5.7GHz. Most entrants commented on the lack of stations to work. Winners were G3ZME/P (Telford group), with M0HNA/P (Combe Gibberlets group) as runners up.

Ralph G4ALY was best DX for all but one of the entrants, and could have been at the top of the table if he had entered.

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX Kms
1	G3ZME/P	IO82QL	7	968	G4ALY	248
2	M0HNA/P	IO91GI	6	650	G4ALY	216
3=	GW3TKH/P	IO81LS	4	440	G4ALY	166
3=	GW4HQX/P	IO81LS	4	440	G4ALY	166
5	G4LDR	IO91EC	4	410	G4ALY	195
6	G3VKV	IO81XV	3	219	G3ZME/P	77

High band Champions

Positions after two events, the best three count to the overall total

5.7GHz							
Pos	Callsign	5/29/15	6/26/15	7/31/15	8/28/15	9/25/15	**TOTAL**
1	G(P)3ZME/P	1000	1000	1000			3000
2	GW3TKH/P	827	0	455			1282
2	GW4HQX/P	827	0	455			1282
4	M0HNA/P	0	408	671			1079
5	G4BRK	406	406	0			812
6	G4LDR	0	333	424			757
7	M0GHZ	471	0	0			471
8	G3VKV	156	0	226			382
10GHz Open							
Pos	Callsign	5/29/15	6/26/15	7/31/15	8/28/15	9/25/15	TOTAL
1	G(P)3ZME/P	1000	1000	800			2800
2	G4LDR	0	630	1000			1630
3	G4KUX	466	850	0			1316
4	GW3TKH/P	530	0	373			903
5	G0EHV/P	0	0	692			692
6	G4BAO	271	202	0			473
7	M0DTS/P	424	0	0			424
8	G3VKV	99	0	277			376
9	G8GTZ/P	250	0	0			250
10	G4GSB/P	163	0	0			163
10GHz Restricted							
Pos	Callsign	5/29/15	6/26/15	7/31/15	8/28/15	9/25/15	TOTAL
1	G0LGS/P	1000	1000	1000			3000
2	2E0MDJ/P	1000	529	1000			2529
3	M0HNA/P	0	708	602			1310
4	G0PEB/P	487	0	545			1032
5	GW4HQX/P	549	0	283			832
6	M0GHZ	498	0	0			498
7	G3YJR	0	0	215			215
8	G1DFL/P	54	23	0			77

Activity News : August 2016

By Neil Underwood G4LDR

Please send your activity news to:

scatterpoint@microwavers.org

Introduction

Thank you to those who sent in activity reports. August seems to have been a quite month judging by the lack of activity reports received despite some periods of reasonable tropo and rainscatter propagation.

Activity on the cm bands

From John G4BAO, JO02

In August during the 23cm UKAC, QSOs with OZ1FF on the West coast of Jutland 59 on SSB tropo - quite a surprise, OZ9KY over on the East side of Jutland by AS CW. I also worked my first "MK" station MK0VRL, plus AS QSOs with DF9IC and DL3IAS.

From John G3XDY, JO02

There have been a few notable contacts this month, with some tropo around to help.

I came on briefly on the 6th August on 23cm and worked F6KFH in JN39OC in the French contest that weekend.

Conditions for the 1.3GHz UKAC on August 16th were slightly up, with OZ1FF putting in a good tropo signal, although the other 3 OZs I worked were a lot weaker and generally seemed to be arriving by aircraft scatter.

The following evening conditions were still enhanced, with ON7FLY (JO10) worked on both 23 and 3cm, with fully quietening FM signals on 3cm.

I managed to work F6DRO/P on 5.7GHz on 24th August from IN98SP, without much help from conditions, but we didn't make it on 10GHz.

Conditions over the North Sea were strongly enhanced for several days in late August but generally didn't extend far inland, and activity seemed quite low.

The 28th August was the UKuG 5.7/10GHz contest date and also the French Journee d'activitee (JA) and their F8TD contest. I made an effort to get up early as the F5LEN tropo map predicted the best conditions would be early in the morning. I could hear the beacons in JN06 on 23/13cm, but not many stations were on at 0500z! I was around until about 1400z, by which time the beacons had faded out, then had to QRT. Contacts made included:

1.3GHz

F1AZJ/P JN28OK; F1AFZ JN17AV; F6APE IN96PI; F1YJ JN17ET; F1PYR/P JN19BC; F6DKW JN18CS; F1NPX/P JN19PG; F8DLS JN19SE; F5KMB/P JN19GK; F6CIS IN94WL 849km (aircraft scatter); F5AYE/P JN35BS 786km (aircraft scatter) - new square.

2.3GHz

F1AZJ/P JN28OK; F1AFZ JN17AV; F1PYR/P JN19BC; F1NPX/P JN19PG; F8DLS JN19SE; F5KMB/P JN19GK.

5.6GHz

F1AZJ/P JN28OK new square; F5KMB/P JN19GK; M0GHZ IO81VK; G3ZME/P IO82QL; M0HNA/P IO91GI.

10GHz

F6DKW JN18CS; F8DLS JN19SE; F5KMB/P JN19GK; DF0MU JO32PC rain scatter; G4KUX IO94BP; G3ZME/P IO82QL; M0HNA/P IO91GI; G0LGS/P IO81XW.

From Pete G1DFL/P IO91

Pete sent a link to his blog entitled '*A Happy Hour at Lacey Green*',

http://g1dfl.blogspot.co.uk/2016/08/a-happy-hour-at-lacey-green.html

He operated from IO91OQ on the Chiltern Ridge.

Conditions seemed to be average with no rain scatter enhancement. With just the DB6NT G2's circa 150-200mW and the 60cm offset dish, I completed 4 QSO's which is a record number for me - usually its just 1 or 2! Today proved to be my busiest 10GHz session so far in the SHF UKAC's and UKuG contests, a really pleasing result.

Stations worked were G3ZME/P IO82QL, Brown Clee Shropshire for best DX to date at 154km, G0LGS/P and 2E0MDJ/P IO81XW Cleeve Hill Gloucestershire, and G8GTZ/P near Basingstoke. An attempt with M0HNA/P IO91GI, Walbury near Hungerford failed due to a very obstructed path. Likewise an attempt with G3WJG at Chorleywood also failed.

EME

Last month I wrongly credited the report on the tests of the refurbished dish at the Flight Refuelling ARS to John, G7JTT, it should have been John, G0API; apologies to both.

From John G4BAO, JO02.

On EME I worked a new Continent on 23cms JT65c. ZS6EME, better known as Alex, HB9DRI who now lives in South Africa.

From Neil G4LDR, IO91.

Having attended EME 2016 (see my report on page 15) I have been inspired to get on and set up the 1.8m diameter dish that I have recently acquired, especially seeing what John, G4BAO and others are achieving with small dishes even on 1296MHz.

… and finally

The deadline for activity news for the next edition of Scatterpoint is Saturday 1st October.

AMSAT News – 5 & 10GHz

Trevor M5AKA

AMSAT-NA plan 5 GHz to 10 GHz Lunar Transponder Mission for September 2018

https://amsat-uk.org/2016/09/07/5-ghz-to-10-ghz-lunar-transponder-mission/

AMSAT-NA have already announced plans to launch a 5 GHz to 10 GHz amateur transponder payload into a Geosynchronous orbit https://amsat-uk.org/satellites/geosynchronous/na-gso-sat/

In addition they now plan to launch a 5 GHz to 10 GHz transponder satellite Heimdallr into Lunar orbit in September 2018.

Details at http://www.amsatuk.me.uk/iaru/formal_detail.php?serialnum=522

AMSAT-UK http://amsat-uk.org/

Twitter https://twitter.com/AmsatUK

Facebook https://facebook.com/AmsatUK

YouTube https://youtube.com/AmsatUK

UKµG Microwave Contest Calendar 2016

Dates	Time UTC	Contest name	Certificates
6-Mar	1000 - 1600	1st Low band 1.3/2.3/3.4GHz	F, P,L
10-Apr	1000 - 1600	2nd Low band 1.3/2.3/3.4GHz	F, P,L
8-May	0800 - 1400	3rd Low band 1.3/2.3/3.4GHz	F, P,L
29-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
29-May	0600 - 1800	1st 10GHz Contest	F, P,L
5-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
19-Jun	0900 - 1700	1st 24GHz Contest	
19-Jun	0900 – 1700	1st 47GHz Contest	
19-Jun	0900 – 1700	1st 76GHz Contest	
26-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
26-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
17 -Jul	0900 - 1700	24GHz Trophy / 47 / 76/122-248 GHz	
31 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
31 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
14- Aug	0900 - 1700	3rd 24GHz Contest	
14- Aug	0900 - 1700	3rd 47GHz Contest	
14- Aug	0900 – 1700	3rd 76GHz Contest	
28 -Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
28 -Aug	0600 - 1800	4th 10GHz Contest	F, P,L
11 -Sep	0900 - 1700	4th 24GHz Contest	
11 -Sep	0900 - 1700	4th 47GHz Contest	
11 -Sep	0900 – 1700	4th 76GHz Contest	
25 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
25 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
13 -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)

Contest results are also published online – please follow the link from the UKuG Contests page at:

www.microwavers.org/?contesting.htm

73
John Quarmby G3XDY

Microwave activity days in France. Journeés d'Activité

September WE 24 & 25 October WE 29 & 30

73 Jean Paul F5AYE

Events calendar

2016

Jan 23	Heelweg	www.pamicrowaves.nl/
Feb 13	Tagung Dorsten	www.ghz-tagung.de/
Apr 9	CJ-2016, Seigy	cj.ref-union.org/
Apr 16–17	Martlesham Microwave Round Table & UKμG AGM	http://mmrt.homedns.org
Apr 16–17	IARU-R1, Vienna	
Apr 16–17	EUCARA (European Conference on Amateur Radio Astronomy)	https://www.eucara.nl
Apr 23	RSGB AGM, Scotland	rsgb.org/agm
May 20 – 22	Hamvention, Dayton	www.hamvention.org/
May 22	BroadBand HamNet (BBHN) Meeting, Crawley ARC	BBHN.Event.2016@gmail.com
Jun 24 – 26	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
July 9–10	Finningley Round Table	www.g0ghk.com/events/round-table/
Jul 29 – 31	Amsat-UK Colloquium, Holiday Inn, Guildford	www.amsat-uk.org/colloquium/
Aug 19–21	EME2016, Venice	www.eme2016.org/
Sept 9–11	61.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 18	Crawley Round Table	www.microwavers.org/cra-prog.htm
Sept 24 –25	BATC Convention, RAF Museum Cosford	www.batc.org.uk/convention.html
Sept 30–Oct 1	National Hamfest	www.nationalhamfest.org.uk/
Oct 3 – 7	European Microwave Week, London	www.eumweek.com/
Oct 7 – 9	RSGB Convention	rsgb.org/convention/
Oct 13–15	Microwave Update, Saint Louis, Missouri	www.microwaveupdate.org/
Nov 12	Scottish Round Table	www.gmroundtable.org.uk/

2017

Jan 14	Heelweg, Westendorp NL	www.pamicrowaves.nl/
Feb 11	Tagung Dorsten	www.ghz-tagung.de/
Apr 7	CJ-2017, Seigy	cj.ref-union.org/
Apr 8–9	**Martlesham Microwave Round Table & UKμG AGM**	http://mmrt.homedns.org
Apr 22	RSGB AGM	http://rsgb.org/agm
May 19–21	Hamvention, Dayton	www.hamvention.org/
July 14 – 16	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
Oct 6 – 8	RSGB Convention	rsgb.org/convention/
Oct 8 – 13	European Microwave Week, Nurembourg	www.eumweek.com/

2018

June 22–24	Ham Radio, Friedrichshafen EME2018	http://www.hamradio-friedrichshafen.de/
Sept 23–28	European Microwave Week, Madrid	http://www.eumweek.com/

NB Some of the 2017/18 event links may not be working yet.

Dropbox links for Scatterpoint

Having read the instructions, the links should now download the files without further intervention.

73

Martin G8BHC