An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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In This Issue

122GHz World Record 139km K6ML and KB6BA

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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.

Roger G8CUB

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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.

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

UKµG Chip Bank – A free service for members

By Mike Scott, G3LYP

Non-members can join the UKµG 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 components on the site will not be a guarantee of availability of that component.

The service is run as a free benefit to all members of the UK Microwave Group. The service may be withdrawn at the discretion of the committee if abused. Such as reselling of components.

There is an order form on the website with an address label which will make processing the orders slightly easier.

Minimum quantity of small components is 10.

These will be sent out in a small jiffy back using a second class large letter stamp. The group is currently covering this cost.

As many components are from unknown sources. It is suggested values are checked before they are used in construction. The UKµG can have no responsibility in this respect.

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

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Loan Equipment

Don't forget, UKuG has loan kit in the form of portable transceivers available to members for use on the following bands: **Contact John G4BAO for more information**

5.7GHz 10GHz 24GHz 47GHz 76GHz

Manual Control for the ADF5355 Synthesizer

G4JNT March 2020

Photo 1 ADF5355 Controller Display

Introduction

In the September 2018 Scatterpoint I described a control interface and software for driving the ADF5355 synthesizer via a serial port from a PC. This carries things on to the next stage and describes how the synthesizer module can be controlled seamlessly over its complete tuning range of 54 to 13600MHz using a rotary control plus pushbuttons as well as a keypad for direct frequency entry. Various Ebay supplier do offer various modules that do a similar task, using touch screens etc. as integrated units, but there is no flexibility with those and no opportunity for individualisation. You've got what you have, take it or leave it.

The calculations and programming structure for the ADF5355 were described in detail in the previous article so will only be briefly summarised here. It may be helpful to have that and also the chip datasheet to hand.

Output frequency $\mathbf{F_{OUT} = F_{COMP} * (N + (F1 + F2/D2) / 2^{24}) / OP_{DIVIDER}}$

F_{COMP} is the comparator frequency, equal to the reference input multiplied by 2 if the reference doubler if used, and divided by the R divider. Unless there's a good reason to do otherwise, set this register value to 1 for the highest possible F_{COMP}. N is the integer divider and F1, F2 the fractional registers that do the fine frequency setting. D2 is the second fractional denominator, the first one being fixed at 2^{24}. So very fine frequency setting resolution is possible, to within $F_{COMP} / (D2 * 2^{24})$

Hardware

The main controller consists of a 16F628A PIC with rotary encoder, two pushbuttons and a Liquid Crystal Display. A two line by 16 character LCD will suffice, but a four line one has certain advantages, especially when it comes to customising your own PIC code. The circuit diagram is shown in **Figure 1**.

A keypad, (for example Farnell ECO Keypad, Order code 113-0805) is interfaced to the main controller using a two wire interface. The keypad requires its own controller, based around a 16F688 PIC device. The same keypad hardware, although with different PIC code, appears in these projects http://g4jnt.com/FT817_Keypad.pdf and http://g4jnt.com/FDM-DUO_Keypad.pdf The * key functions as a decimal point and the # key as 'enter' or [rtn]. Frequencies are entered as MHz followed by [rtn]. The circuit for this is shown in **Figure 2**.

Communication with the ADF5355 module is via a three wire SPI interface. As the synthesizer runs at 3.3V and the PIC at 5V, dictated by the LCD, each of these three interfaces needs potting down by 1.6k and 3.3K resistors. I built these onto a header that plugs into the 5x2 way connector on the synthesizer module.

Please note, the four way connector shown as 'In Circuit Programming' on both diagrams is my own interface standard and is not compatible with the PICKIT programmer connections. A long story, a legacy thing, don't ask.

Functionality

The rotary encoder increments or decrements decimal digits on the display, the digit being altered indicated by a caret, ' ^ ' under it. The digit selection is obtained by repeatedly pressing the [S]tep button to cycle through from 100MHz to 10Hz. Pressing and holding this button until the display shows 'Saved' stores the displayed frequency in the current memory position. That also saves the caret position ready for next time the unit is turned on.
Twenty memories are available, cycled in turn from 1 to 20 by pressing the [M]emory button. Pressing and holding this button saves the current memory to be called up next time the unit is turned on.
Frequency can also be entered directly from the keypad by entering, for example, '*2320*4506#*' for 2320.4506MHz. (A bit of white paint and black marker on the two keypad buttons helps!)

PIC Code and Firmware Customisation

As the PIC code is written in assembler for speed, effortlessness (on my part) and efficiency, floating point arithmetic is not a sensible solution. All you PIC C-code programmers may well gloat, but you'll struggle to get the tuning resolution and speed without using a fast processor and double precision variables. So all the arithmetic within the firmware is done using integers. What follows may look complicated but it isn't. The arithmetic for the entire calculation for each tuning step consists of an addition, BCD conversion, binary scaling and test (a shift register), a single 32 bit integer division then a 32 bit multiplication followed by some logic to split and move registers around.
The desired frequency, set the from rotary encoder or keypad, is stored as a value in 10Hz steps. A 32 bit integer allows frequencies up to 42.9GHz stored in registers Freq3 to Freq0. The rotary encoder increments or decrements this value by an amount equal to the digit indicated. After 4ms of encoder inactivity all calculations are performed and the synthesizer updated. This allows a moderate rate of turn to appear as continuous tuning, but if turned too fast, prevents race conditions where the updating can't keep-up.
For situations where the synthesizer unit is used as an LO, an optional IF offset is stored as a constant in the firmware. This is a signed 32 bit value corresponding to the IF in units of 10Hz. For normal operation set it to zero. The IF offset is added to the value in Freq3/0, which is then converted to BCD and shown on the display.
The next stage is to calculate the Fractional-N values; the integer divider N, fractional dividers F1, F2 and the output divider. A copy of the required Freq value is made in the V3 – V0 registers. This is tested against the minimum internal VCO frequency (VCOMIN), 3.4GHz for the ADF5355. The value of V3/0 then being shifted (multiplied by 2) repeatedly until it falls into the range covered by the VCO, 3.4 to 6.8GHz. If the frequency starts out already above VCOMAX, V3/0 is set to half the required value and a flag set to enable the RF doubler on the ADF5355. The V3/0 registers now contain the value of F_{VCO} in units of 10Hz.
The integer divider, **N** is obtained directly by integer dividing V by the comparison frequency ie.
N = INT (F_{VCO} / F_{COMP}) which leaves a remainder **R** from this division, an integer specifying units of 10Hz which has to be manipulated to give the two fractional values. That requires a bit of skulduggery. We rewrite the original equation as:

$$F_{VCO} = F_{COMP} * N + (F1 * D2 + F2) * F_{COMP} / (2^{24} * D2)$$

This has been done intentionally, for two reasons. Firstly the residual **R**, after **N** has been calculated, is all that to the right of the addition sign. So $R = (F1 * D2 + F2) * F_{COMP} / (2^{24} * D2)$. Also note that the right hand part, after the second multiplication, is a constant since we have defined the second Fract-N denominator **D2** as a fixed value.
Rewrite as $R = (F1 * D2 + F2) / K$ where $K = 2^{24} * D2 / F_{COMP}$
By rearranging we now get $(F1 * D2 + F2) = R * K$
R is our residual after the single 32 bit division that generates **N** , while **K** is a constant we specify and don't have to calculate each time. All that remains is to get, separately, **F1** and **F2** and now we get crafty. We can define **D2** as any value we like up to 16383, so let's make it the largest power of two we're allowed, in this case 8192 or 2^{13}.
By doing this we can concatenate the two values for $F2 * 2^{13} + F2$ as a single 37 bit value, the result of multiplying two numbers, one our residual and the other a constant. Being a long binary number we can easily separate out the two values for **F1** and **F2** merely by choosing where in the pattern of '1's and '0's to break into two parts - that's just logic manipulation. One final twist is to scale **K** to get the highest value we can reasonably work with, so the rounding errors inherent to integer arithmetic lead to a minimal final frequency setting error. A scaling factor of 2^{16} is applied so $K = 2^{53} / F_{COMP}$. This is recovered by then just throwing away the lowest two bytes of the final multiplication.
The remaining tasks are administrative. The values in N and F1/F2 have to be placed in the correct position in the words to be sent to the ADF5355 chip. The best way to see this is to examine the source code – look in the routine labelled *ProgSynth*. A few other registers need to be updated based on requested frequency output; those containing the output divider setting, output doubler and output switching. The rest of the registers are fixed in value and will have to have been determined off line, either using AD's design tools or the utility in http://g4jnt.com/ADF5355_Synthesizer_Control.pdf . They are stored as constants in the PIC firmware.

The PIC firmware needs to be customised for any particular hardware configuration with values both for F_{COMP} and $2^{53} / F_{COMP}$, the frequency being specified in units of 10Hz in each case. For 80MHz (reference in = 40MHz with the reference doubler activated) FREF = 8000000 and KCONST = 1125899907 (They have these specific names in the listing. FREF ought really to have a different name as it is NOT necessarily the same as the reference input). While the PIC assembler software can do calculations on the fly to get constants, the results are only to 32 bit integer precision, so cannot be used here. Bothe FREF and KCONST have to be stored, with the latter derived off line using a calculator.

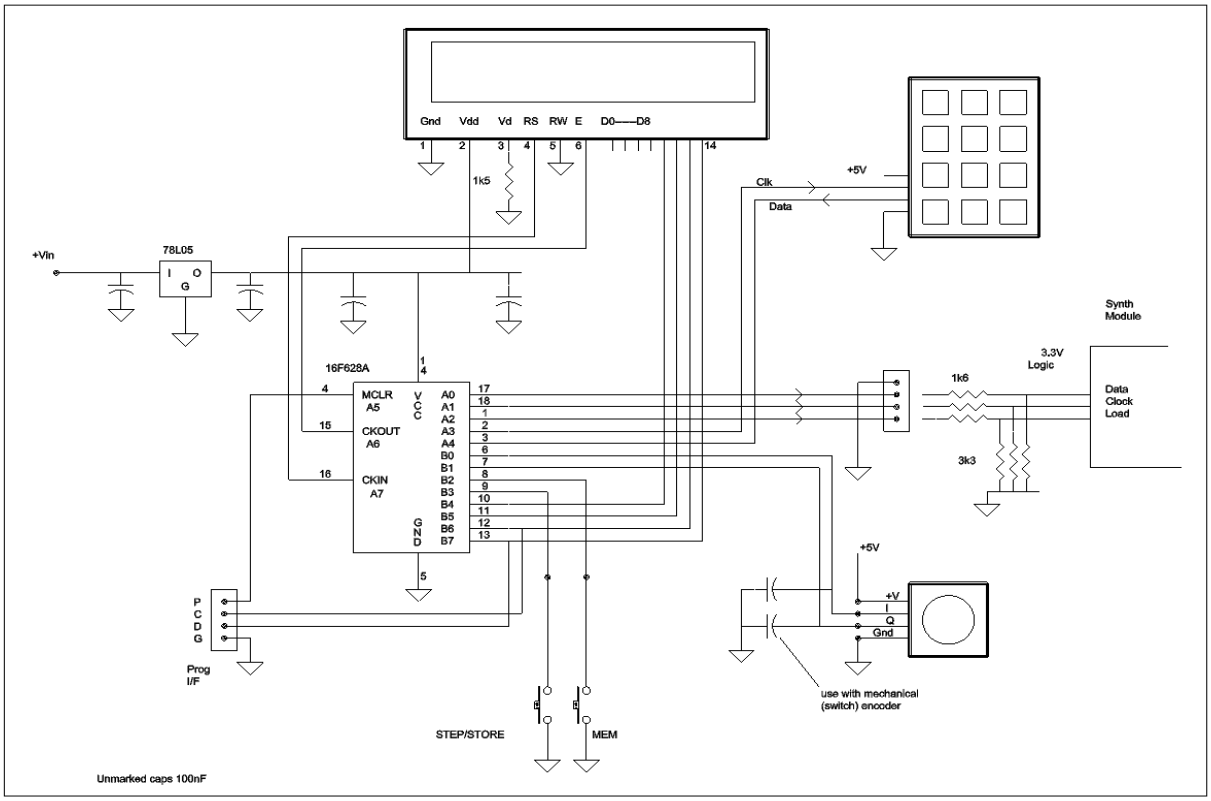

Figure 1, Circuit of main controller

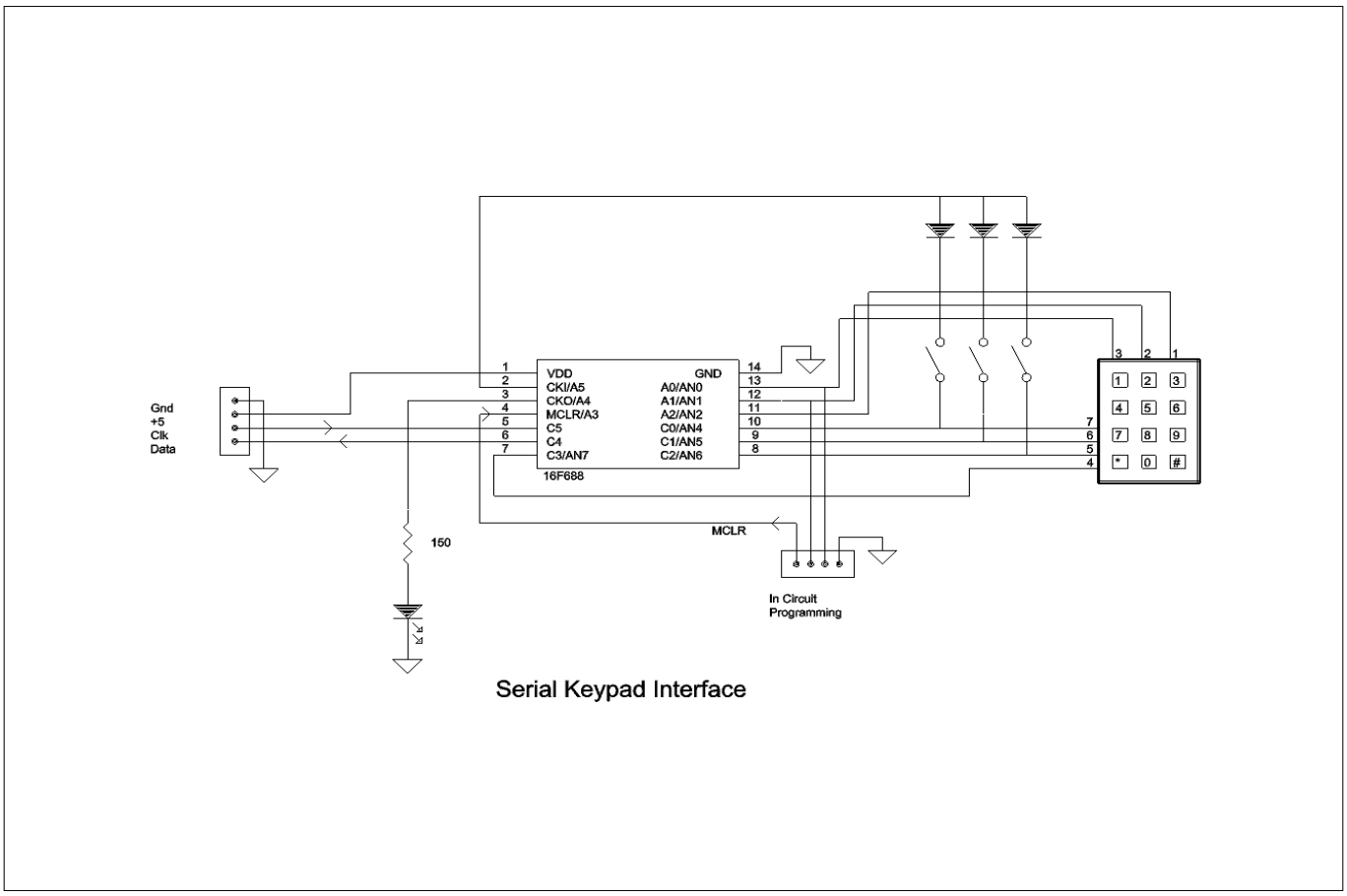

Figure 2 , Circuit of Keypad controller

Odds and Ends

The method of calculation used means there is an inherent uncertainty in the frequency setting due to integer rounding; this is no more than 0.005Hz and has been kept down by the 16 bit prescaling applied to K.

If you want 1Hz steps instead of 10Hz, it will require more than 32 bit resolution, so everything will have to be modified, including all the maths routines – it's really not worth it – I did contemplate the idea, briefly!

When playing with the PIC code, if a 4 line display is used then register values can optionally be displayed. At the beginning of the listing there are two flags, DebugFractN and DebugReg. If the first one is set (= 1, then the code is reassembled) the values for N, OPDIV, F1 and F2 are displayed on lines 3 and 4 of the display. If The second flag is set, the hex values for the Reg6, Reg2, Reg1 and Reg0 are given. These are the ones that are updated as part of the frequency setting, the rest are fixed as pre-stored values. Don't set both debug flags at the same time – the result is a mess.

There is currently no checking for tuning outside the allowed frequency range – it wasn't worth the effort with a 54 – 13600MHz valid range.

Frequencies above 6.8GHz, where the O/P doubler is used, actually jump in 20Hz steps although the display doesn't reflect this. Only even multiples of 10Hz are accurate. I may get round to fixing it one day, it doesn't seem too important.

This is a copy of the opening section of the source code for my specific case (80MHz F_{COMP}), showing the constants used.

```
VCOMIN      =   d'340000000'      ; 10Hz units
VCOMAX      =   d'680000000'
FMIN        =   d'5400000'        ;Min allowed Freq in 10Hz units
FMAX        =   d'1360000000'     ;Max  "      "    "
DEFAULTFREQ =   d'50000000'       ;Something to fill the EE with before saving real freqs
FREF        =   d'8000000'        ;Fcomp in units of 10Hz
KCONST      =   d'1125899907'     ;2^53 / FREF  (calculate off line,  needs > 32 bit arithmetic)
FIF         =   d'0000000'        ;IF Offset, units of 10Hz. Add to display frequency (can be -Ve)
NMEMS       =   d'20'             ;Number of memories
```

```
;Synth specific constants.  Frequencies and fixed register masks

RegC            =       0x0001041C      ;Get from Design software or data sheet
RegB            =       0x0061300B
RegA            =       0x00C0193A      ;Some Values here depend on Fref
Reg9            =       0x2221BCC9
Reg8            =       0x102D0428
Reg7            =       0x120000E7
Reg6            =       0x3503C076      ;Odiv goes in here bits 21-23
Reg5            =       0x00800025
Reg4            =       0x34009584      ;Ref doubler in here at bit 26 (0x34.. or 0x30..)
Reg3            =       0x00000003
                                        ;Registers  2 - 0 are constructed from first principles

DebugFractN     =       0               ;Display N, F1, F2, Odiv on LCD lines 3/4
DebugReg        =       0               ;Display Synth registers 0,1,2, 6 on LCD lines ¾
```

The PIC source code for both controllers as well as .HEX files (specifically for 40MHz reference input) can be found at http://g4jnt.com/adf5355_rot.zip

Editors Comments

Thanks to all contributors this month. Going forward we are likely to see many changes in our daily lives, certainly in the short term. Constructing and operating on the microwave bands, could help stop us going stir crazy.

UKµG AGM - postponed

Notice is hereby given that the 2020 Annual General Meeting of the UK Microwave Group that would have been held at 10:00am on Sunday, 19 April 2020 as part of the Martlesham Microwave Round Table has been postponed because of the Coronavirus pandemic.
At this stage the existing committee will continue in their current roles until a rescheduled AGM takes place. No new date/venue has been set so far, this will be kept under regular review.

If you have any queries over the AGM decision then please contact the UKµG Secretary, John Quarmby G3XDY, email: secretary@microwavers.org

Martlesham Microwave Round Table – Cancelled

The organising committee for the Martlesham Microwave Round Table regret to announce that the event due to take place on April 18/19 has been cancelled due to the Coronavirus pandemic. We have reluctantly taken this decision in light of the potential impact on the health of our visitors.
We will keep the situation under review and may reschedule the event in the Autumn if the outlook improves.
Those of you that have already paid for the Saturday dinner will be contacted by email with information about refunds.
73
John G3XDY

“The Full Monty”

Or….Getting everything from an Elcom synthesiser

John Worsnop G4BAO

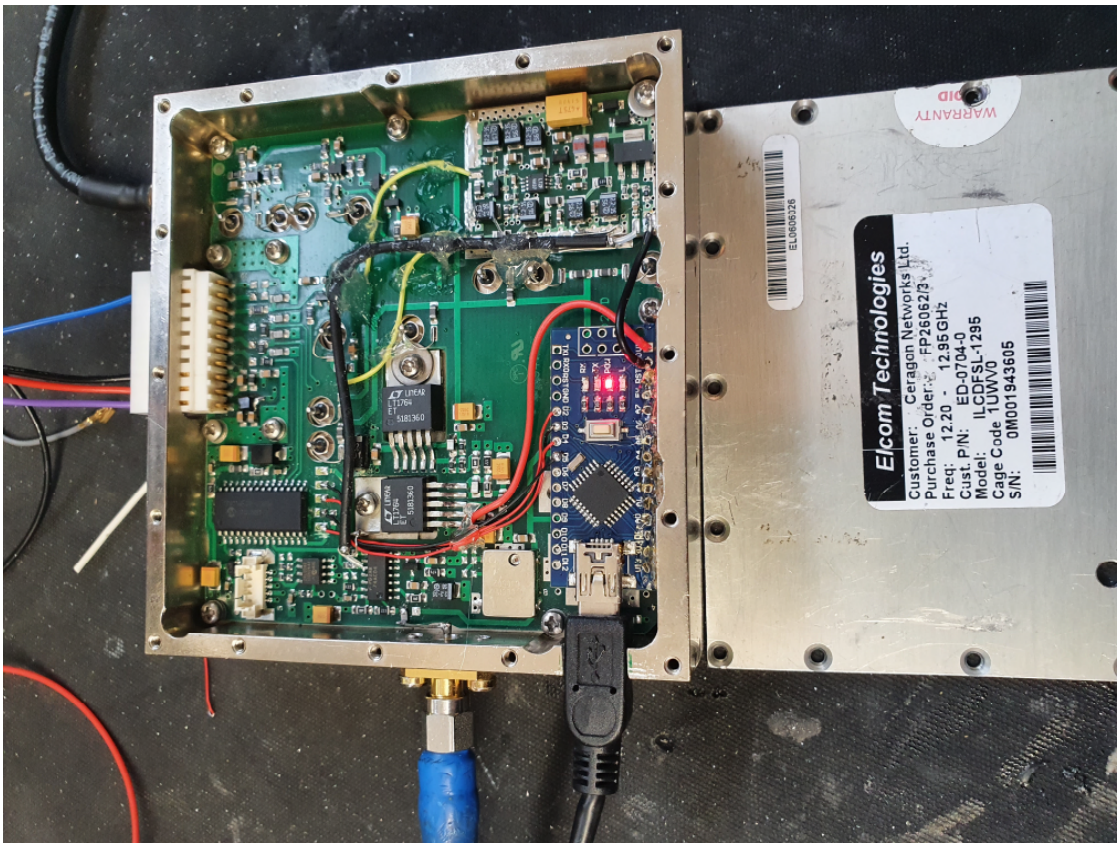

Photo 1 General view of the modified Elcom

Introduction

Much has been said and written over the years about using the Elcom range of GHz synthesisers for Amateur equipment. Most notable is the original programming work done by Dave, G4FRE/WW2R. (1). Roger, G8CUB showed us how to lock it to an external 10MHz source (2) and Rob M0DTS (3) worked out how to directly programme the later model, containing the ADF4252B synthesiser to allow it to produce a much wider range of frequencies.

While many others have contributed, these three articles formed the basis of what I’ve done here. There is little original in this article, apart from a beautifully tacky bodge to the internal VCO, cutting a hole with a file, and some hot-melt glue, but it presents what I’ve done, and I hope brings together everything that can be done to make these units useful.

Why “The Full Monty?”

G4FRE’s original work (1) used an external PIC controller to throw commands at the Elcom’s internal PIC controller to allow it to be re-programmed to generate a limited range of frequencies in 10 or 3 MHz steps. While this is the most generic method and works with most of the quite bewildering range of variants of the Elcom, it does limit the number of useful frequencies for GHz band Amateur use.

What I have produced is a unit which combines all three sets of work. My unit now has a built- in Arduino controller and USB port, for easy re-programming. External locking to 10MHz and is programmable with M0DTS’s original firmware (3).

My contribution is a simple hardware modification to allow my 12.2-12.95GHz unit that uses an ADF4252B synthesiser, to be programmed to cover 11.65 – 12.5GHz. This range makes it useful for making a low side LO for 144, 432 and 1296 IFs for the 24GHz band, and a 432MHz IF for the 47GHz band. I’ll let you do the sums as to what other bands and IFs are possible with this LO frequency range.

No more “high side IF”, “backwards tuning” for me!

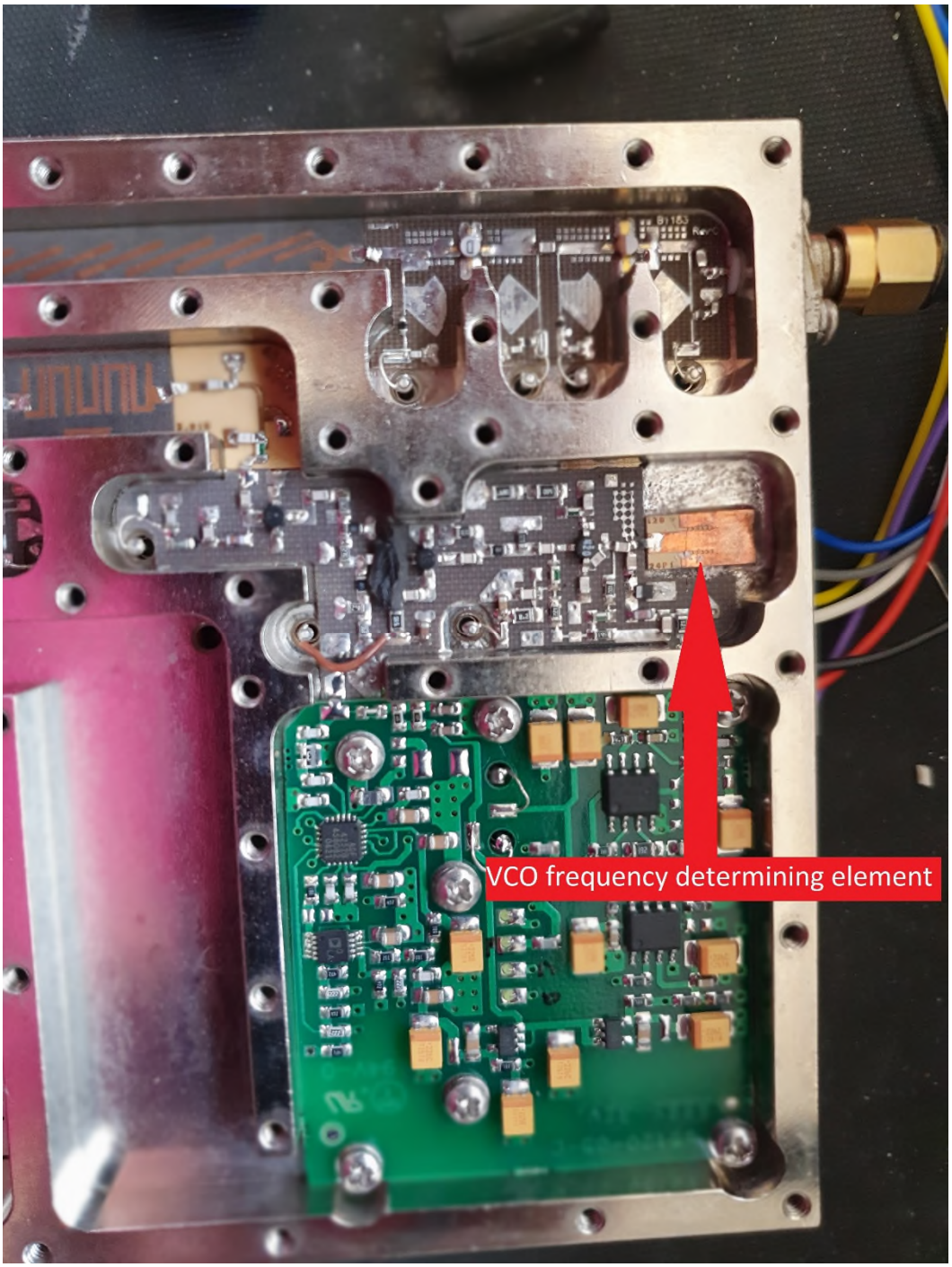

Photo 2 the location of the VCO frequency determining element

The Full Monty Mods

This project started with me needing an 11952MHz local oscillator source for a 24GHz /144 IF transverter for EME. I had a couple of Elcom units and looking at (1) and (2) I quickly realised that with G4FRE's controller, neither of them could produce anything even close to the frequency I needed. An internet search quickly threw up a reference to M0DTS's work (3). In this, Rob bypasses the internal PIC in an 11.2 to 12GHz DFS1201 and programs the internal synthesiser directly using an outboard Arduino Nano. He also found that he could program it above 12GHz, allowing him to generate the exact frequency to drive a doubler for a 24048.8 MHz beacon.

I thought I had "the same" 11.2- 12GHz "DFS1201" that Rob had used but on opening the RF side of mine up (42 screws!) I immediately saw that my unit didn't have an ADF4252B synthesiser in it, but a PMB2306T and external prescaler. A completely different synthesiser arrangement. Looking at mine and Rob's numbers again I noticed that his was an ILCDFSL-1201, whereas mine was just a DFS-1201.
My second Elcom, an ILCDFSL-1295 covered 12.2 to 12.95GHz, not my desired 11.952GHz but on opening it up, up it did have the ADF4252B synthesiser in it, so, game on!

Photo 2 the location of the VCO frequency determining element

Programming

The Elcom contains an internal x5 multiplier, so to produce 11952MHz the synth needs to be programmed to 2390.4MHz
The Fractional N synthesiser calculates its output frequency as

Fout = (INT+(FRAC/MOD)) x PFD

So (119+13/25) x 20MHz = 2390.4MHz would do it.

I don't plan to go into any of the programming details here, suffice to say "we have an App for that" (4) that allows you to enter a desired VCO frequency and a few other things to generate the required numbers for M0DTS's Arduino Sketch, which is well annotated and easy to work out what it does.

To set the frequency to 11.952GHz, the Analogue Devices app told me to use R=1, Prescaler=1, Doubler=1, MOD=25, FRAC=13, INT=119 in the sketch. I left everything else in Rob's code unchanged.

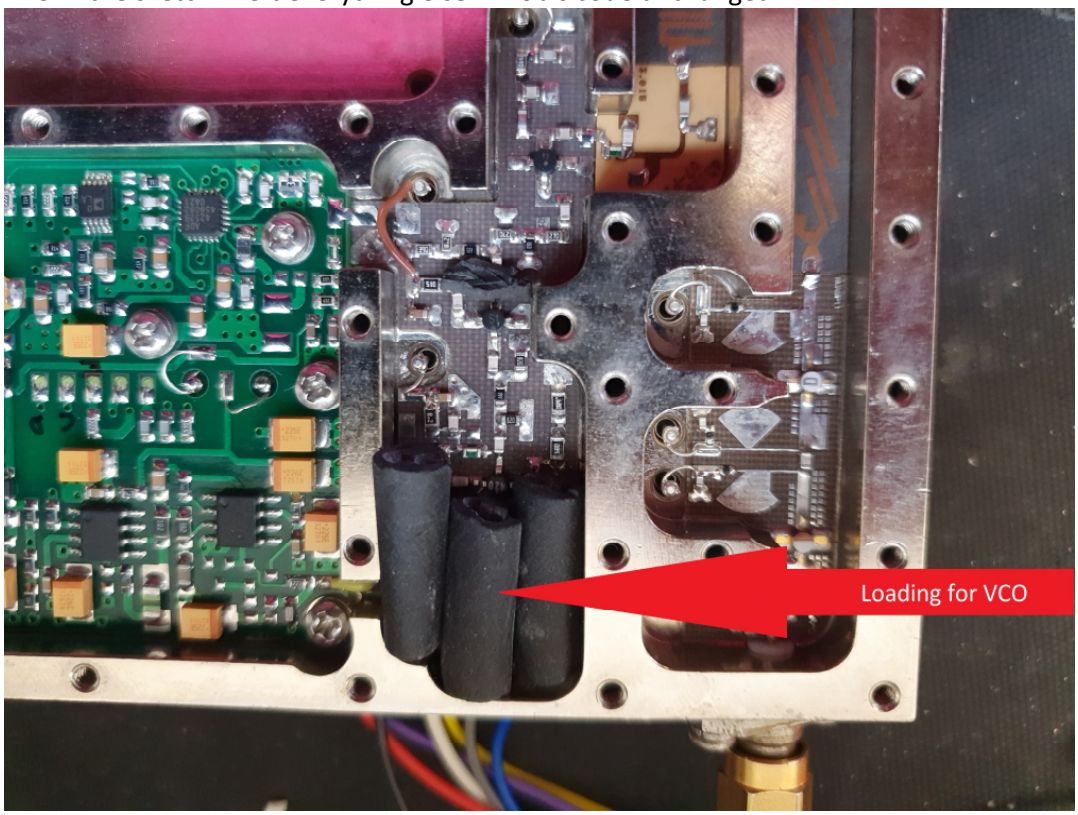

Photo 3 Loading the VCO with rubber

Shifting the VCO range

Having successfully programmed the unit it still would not lock to 11952MHz, as the VCO was outside its designed operating range. A little finger poking around the VCO frequency determining element (Photo 2) and I could make it lock with my finger over it. To replace my finger (not practical for long term use!) I tried a number of things on top of the element, such as Kapton tape, CMOS packaging foam, microwave absorber and the rubber cap from an SMA socket. The latter worked, but not consistently, so "more rubber needed." I then got three short lengths of rubber insulation (NOT CONTAINING THE WIRES) from a pond pump mains lead and stuffed them over the element. See Photo 3 for details. The lid of the box, when screwed on, held them in place and the unit locked consistently at 11952MHz.

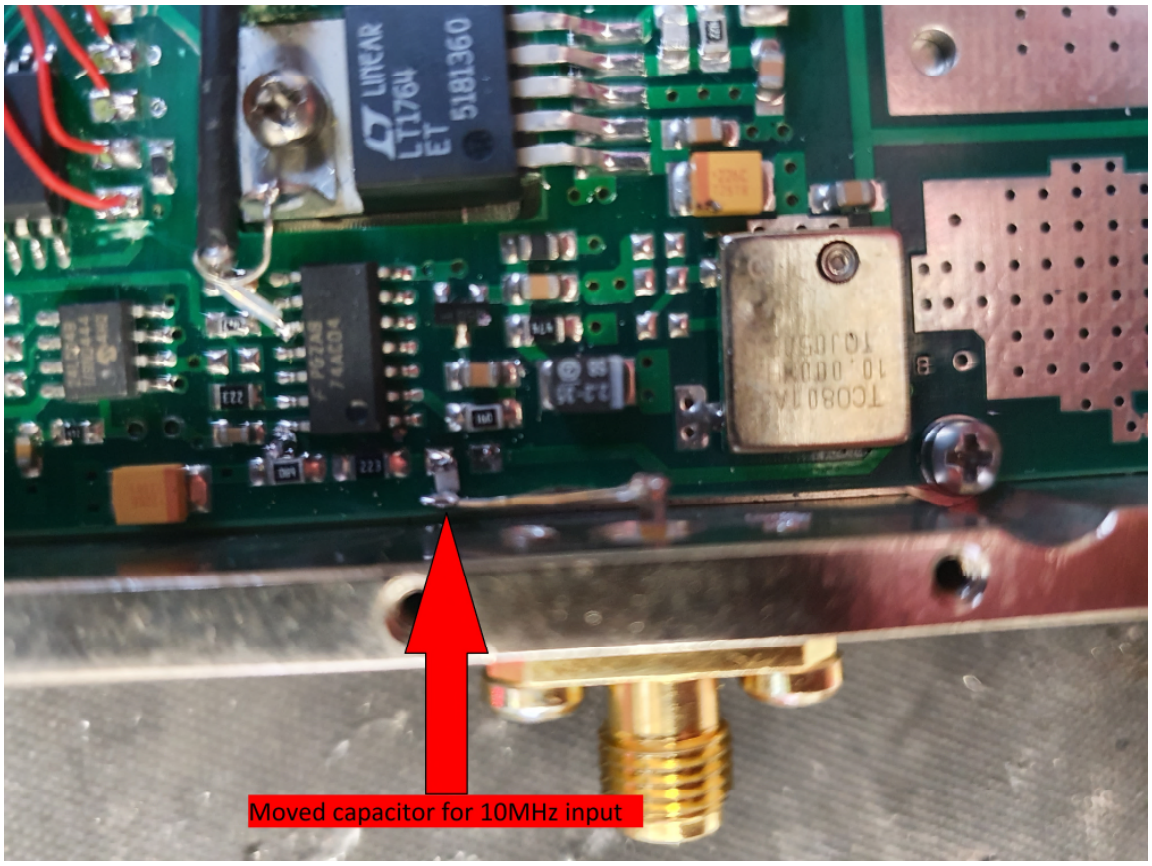

Photo 4 the 10MHz input

Locking to 10MHz

Locking to 10MHz was easy. As per G8CUB's article I just lifted and rotated the capacitor from the feed from the VCO and connected it to an SMS connector on the side (Photo 4)

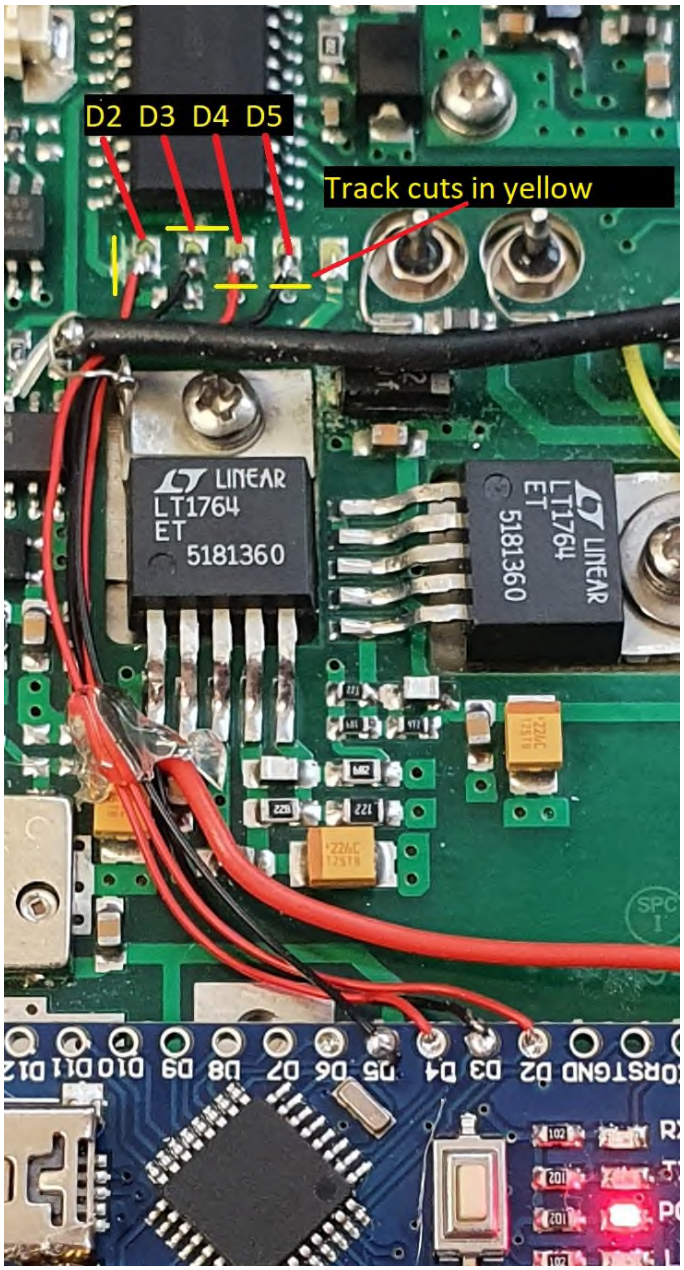

Photo 5 Track cuts on the Elcom and connections to the Arduino

Incorporating the Arduino inside the box

The Arduino is small enough to fit inside the box, and by cutting a slot in the box wall (Photo 1) you can get a small USB plug in to it from the outside. The Arduino PCB is held in position by hot-melt glue underneath it, and along the box wall. The 12Volt supply for the Arduino (thick red wire in Photo 1) can be picked up from the output of the LT1764 12V regulator. Ground can be picked up from any convenient point close to the board (thick black wire in Photo 1)

M0DTS's web site (3) describes the track cuts needed on the Elcom PCB and connections between the synthesiser and the external Arduino and these same cuts are shown for my internal one for clarity in Photo 5. The only connections now needed to the Elcom's main connector are +12V, +6V (note the CDFSL versions require +8V) and Ground.

References

1. G4FRE's page on the Elcom: - http://g4fre.com/dfs1201.htm
2. G8CUB's page on the Elcom: - https://bit.ly/2TERpWC
3. M0DTS's page and Arduino sketch: - http://www.m0dts.co.uk/?tag=24GHz
4. Analogue Devices ADF4252 Software: - https://bit.ly/39GzGDG

By John G4BAO

Please send your activity news to: scatterpoint@microwavers.org

Scatterpoint activity report

No news of recent UK activity received.

139 km on 122 GHz a new world record

17 Feb 2020

139 km on 122 GHz (a new world record for this band) QSOs between

Mike, K6ML, on Mt Vaca (CM88WJ75ON, 835m ASL) and

Oliver, KB6BA, (at 1225) & Jim, N9JIM, (at 1250), both on Mt Umunhum (CM97BD18VJ, 1016m ASL)

WX: Dew Point -11C, Air Temp +15C, path loss ~ 225 dB, atmospheric loss ~0.35 dB/km

CW was used, 122 GHz signals were very weak (7 dB above the noise in 22 Hz; -13 in 2500 Hz equivalent) with QSB down to the noise floor. Dishes were aligned on 24 GHz (71 dB above the noise) prior to QSY to 122 GHz; we heard signals right away on 122 GHz.

We used dual band radios designed by Mike (using 122 and 24 GHz Silicon Radar sensor chips and 60 cm satellite TV dishes) with somewhat less than half a milliwatt of output power on 122 GHz. Mike & Oliver focused and aligned the radios in previous field tests from 15 to 80 km. Jim suggested the 139 km path from Mt Umunhum ("the resting place of the hummingbird" in the Ohlone language) to Mt Vaca ("cow" in Spanish) and also taught us the weak signal EME CW exchange technique.

We spent several days on a 15 km path focusing and lining up the 122 and 24 GHz feeds, much as you would sight a riflescope (did that, too :).

That investment paid off in out 25, 40, 80 and 139 km QSOs. In each case, we found each other on 24 with 60+ dB SNRs and 1.25 degree beam widths (easy peasy!) and when we switched to 122, the dishes were pretty much on target, albeit the signals much weaker. Sometimes a nudge of a tenth of a degree or two helped, but usually the QSB

was greater than any possible pointing improvement, so it's hard to say.

I was inspired by the operational virtues of the AD6FP/AD6IW 10/24 dual band feed, which works so well.

Mike Lavelle K6ML
https://www.youtube.com/playlist?list=PLzE9yPoTsDEF1axUeOiZll3es8s91V1jo

JA1WQF successfully decoded W5LUA on 47088.1MHz EME (source W5LUA Moon-Net)

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JA1WQF Mitsuo was able to successfully decode W5LUA's 47088.1 MHz QRA-64D
signal today Feb 10, 2020. These were one way tests with only me
transmitting. At the moment Mitsuo is only running 1 watt but is actively
working on a 10 watt amplifier. I run a 30 watt TWT which produces about 25
watts at the feed. The tube is a Hughes 932H driven by a Varian VPW2931
power supply modified for a second suppressed collector of the Hughes TWT.
Both stations are running 2.4m offset fed dishes. My system noise figure is
4 dB and about 2.5 dB at JA1WQF. Both stations are using the "Constant
Frequency on Moon" (CFOM) technique of frequency control which allows you to
hear/see the other station and your echoes on the same frequency. I started
out by sending single tones to Mitsuo which he copied well and then sent
several sequences of calls and grid. Mitsuo was able to decode calls and my
grid at 1146Z and 1234Z. Signal levels were -23dB and -25 dB. DTs were spot
on and frequency was within 13 Hz.
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Weatherbox Update from Barry G8AGN

WeatherBox v 1.04 now has updated hardware and software.
The hardware has been enhanced by the addition of a SD card reader/writer and this enables logging of weather and RF system data at user-specified time intervals. This data can subsequently be plotted using Excel so that the influence of weather conditions on a given path can be correlated with contact reports over a period of time or on several days. Ideally both stations working a given path should be using WeatherBox for this to be of most value.
The software has been enhanced to support SD card operation, the ability to store data for different paths and stations in EEPROM which is retained on power-down and the display of weather and RF system data while waiting for a valid GPS fix. The help screen can be shown by pressing * (star)
SD card connections are given in v 1.04 of the software which is available on request from Barry, G8AGN

VK 122GHz Project

Production of boards has been badly hit by the Coronavirus in China.

Bare PCBs are now expected in the UK by the end of March. Assembled production boards are expected by mid-April. With uncertainty about whether UK Microwave events and Rallies happen or not. Once boards are received, I will contact purchasers about sending by post or other carrier.
It is highly likely that there will be import charges. So please be mindful that you will have to pay an additional amount. Again, I will contact purchasers once I have more information.

Roger G8CUB

UKuG MICROWAVE CONTEST / ACTIVITY WEEKEND CALENDAR 2020

Dates, 2020	Time UTC	Contest name	Certificates
8-Mar	1000 - 1600	1st Low band 1.3/2.3/3.4GHz	F, P,L
28-29 Mar		Activity Weekend	
5-Apr	1000 - 1600	2nd Low band 1.3/2.3/3.4GHz	F, P,L
3-May	0800 - 1400	3rd Low band 1.3/2.3/3.4GHz	F, P,L
17-May	0900 – 1700	1st 24GHz Contest	
17-May	0900 – 1700	1st 47GHz Contest	
17-May	0900 – 1700	1st 76GHz Contest	
30-31 May		Activity Weekend	
31-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
31-May	0600 - 1800	1st 10GHz Contest	F, P,L
7-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
21-Jun	0900 - 1700	24/47GHz Trophy / 76/122-248 GHz	
27-28 Jun		Activity Weekend	
28-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
28-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
25-26 Jul		Activity Weekend	
26 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
26 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
29-30 Aug		Activity Weekend	
30-Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
30-Aug	0600 - 1800	4th 10GHz Contest	F, P,L
13-Sep	0900 - 1700	3rd 24GHz Contest	
13-Sep	0900 - 1700	3rd 47GHz Contest	
13-Sep	0900 – 1700	3rd 76GHz Contest	
26-27 Sep		Activity Weekend	
27 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
27 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
18 -Oct	0900 - 1700	4th 24GHz Contest	
18 -Oct	0900 - 1700	4th 47GHz Contest	
18 -Oct	0900 – 1700	4th 76GHz Contest	
24-25 Oct		Activity Weekend	
15 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz	F, P,L
28-29 Nov		Activity Weekend	
26-27 Dec		Activity Weekend	

Key:	F	Fixed / home station	
	P	Portable	L
	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)		

2020

Events may be subject to cancellation due to the Coronavirus
For latest information consult https://microwavers.org

March 31	Millimetre & Terahertz Colloquium – *postponed until 2021*	https://events.theiet.org/
April 4	CJ-2020, Seigy - *postponed until 2021*	http://cj.r-e-f.org
April 18-19	Martlesham Roundtable & AGM- *postponed until autumn*	**http://mmrt.homedns.org/**
May 15-17	Hamvention, Dayton	www.hamvention.org/
June 21	RAL Roundtable	
June 26-28	Ham Radio Friedrichshafen	http://www.hamradio-friedrichshafen.de/
June 27-28	Finningley Roundtable	http://www.g0ghk.com/
August 20-23	EME 2020 Prague	www.eme2020.cz
September 11-13	65.UKW Tagung Weinheim	http://www.ukw-tagung.de/
September 13-18	European Microwave Week, Utrecht	www.eumweek.com/
September 20	Crawley Roundtable	
September 25-26	National Hamfest	http://www.nationalhamfest.org.uk/
October 9-11	RSGB Convention & Amsat-UK Colloquium	**http://rsgb.org/convention/**
October15-18	Microwave Update, Sterling, Virginia	www.microwaveupdate.org
October 10-16	IARU-R1 General Conference, Novi Sad	www.iaru2020.org
October 24-25	BATC Convention, Coventry	https://batc.org.uk/events/
November 7	Scottish Round Table	www.gmroundtable.org.uk/

80m UK Microwavers net

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

73 Martyn Vincent G3UKV