An Amateur Radio publication for the Microwave enthusiast

MICROWAVE NEWSLETTER

Published by the Radio Society of Great Britain and edited by G3PHO and G8AGN.

Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE

FROM THE EDITOR

2002 – FEBRUARY

This issue contains details of a brand new event on the UK amateur radio calendar, the 6 metre to Microwave Convention. The event will be held in early April and virtually replaces the old Sandown VHF Convention. However, it is different in that it has been organised entirely by members of the major VHF/UHF/SHF groups and committees in the UK. Your support for this new venture is earnestly sought. Be quick! Accommodation at the event is limited, if you want to stay the night.

Our regular contributor Charlie Suckling, G3WDG, describes a most useful spreadsheet he has devised for use with the AO40 satellite. We often wonder just how many microwavers are making use of this 'repeater in space'. We'd like to hear much more from readers about their experiences with it.

A new contributor arrives on the Newsletter scene this month. David Johnstone, GM4EVS, provides circuitry and constructional notes for his version of the G4JNT MSF off-air frequency standard. We think you will find his modifications and improvements of great interest.

A call goes out to wideband operators this month. If you want a co-ordinated activity day then read page 12!

Heartiest congratulations go to G0HNW and G7MRF who set a new UK 76GHz DX record on the 31st of December, 2001. Read about this and more in the Activity News section.

In this issue ...

News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown below. The closing date is the Friday at the end of the first full week of the month if you want your material to be published in the next issue.

G3PHO: Peter Day 0114 2816701

G3PHO: Email: g3pho@geocities.com
or p.day@virgin.net

G3PHO, Peter Day,
146 Springvale Road,
Sheffield, S6 3NU, UK

SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO RSGB HEADQUARTERS AT THE ADDRESS SHOWN AT THE TOP OF THIS PAGE AND NOT TO THE EDITOR ..

Preliminary Notice:

Six Metre to Microwave Convention

A new event in the UK VHF/UHF and Microwave scene

Saturday 6 April, 2002

As the RSGB annual VHF Convention has been discontinued, individual Society committees have decided to organise their own events, if they wish to do so. This new event, aimed at all interested in the spectrum above 50MHz, is the result of recent joint meetings of representatives of the RSGB Microwave Committee , the UK 6 metre Group and the RSGB VHF Committee.

Venue: Rease Heath Agriculture College ... approximately 2 miles from Nantwich, Cheshire.

Features:

- The convention will be for a single day, Saturday, with on-site accommodation / meals and Bar available for both the Friday and Saturday nights.
- A Dinner on the Saturday night
- The UK 6 Metre Group AGM
- Combined awards (VHF and Microwave) presentations
- A Lecture stream - we estimate there will be 3 VHF lectures, 3 Six Metre lectures and at least 1 microwave lecture.
- Displays of equipment ... it is hoped to have working microwave equipment on several bands, including AO40 up/down links.
- Trading is to be restricted to ***specialist providers*** and not any of the main traders.
- The RSGB is to be invited to provide a book stand.
- **Microwaves** will be represented by the RSGB MIcrowave Committee and the UK Microwave Group.

Our estimate for the number of people attending is between 100 and 200.

An entrance fee of £5 will be charged to cover room fees and a contribution towards visiting lecturer expenses. **All food / refreshments and accommodation is to be in addition.**

The Saturday evening Dinner is likely to cost around £21.

Bed and Breakfast accommodation, in single rooms, is available on site at **£25 per person** per day. There are a limited number of double rooms

(The convention will close at 1200 hours on Sunday 7 April but no scheduled events will take place on Sunday)

Advanced package bookings for admission, DX dinner and bed and breakfast are being handled by RSGB. Day visitors for the convention only may pay at the door on the day although it is recommended that advance bookings are made to bypass the queues. Credit cards and cheques to be made payable to the RSGB.

See the RSGB web site http://www.rsgb.org for up-to-date details of lecture streams and booking information

Other attractions: There is a golf course and garden centre on-site along with the attraction of Nantwich town for XYLs who may come along. If there is enough demand, a coach into Chester could be arranged.

Directions: The venue is located just 5 miles from Junction 16 of the M6 motorway. The nearest railway station is at Crewe. Visitors from further afield may use Manchester airport, conveniently located 30 miles (40 minutes driving time) from Reaseheath College. Directions for Reaseheath College can also be found at **http://www.streetmap.co.uk** by entering the post code CW5 6DF.

Estimates as to who will be attending (and those needing accommodation) are now required. Final pricing for the meal and accommodation has some dependency on the numbers attending as Rease Heath are offering a package price rather than fixed pricing for rooms / lecture halls / meals and accommodation ... hence the requirement for an estimate of who would be attending.

Please email Simon Chettle, G3at@aol.com, as soon as possible with your intentions. The invitation is open to all interested in VHF and up. Overseas visitors are very welcome to attend. If flight times are notified in well in advance local members may be able to pick groups up from Manchester Airport.

For readers without email facilities you can telephone David Butler, G4ASR, (01873 860 679 - sensible times please) for further details.

Calculating AO-40 S-Band Beacon Strength and Transponder Noise

… by Charlie Suckling G3WDG

A spreadsheet has been developed to enable users to calculate the signal to noise ratio for the AO-40 S-Band beacon and the amount of transponder noise that may be expected.

The spreadsheet is based on signal to noise ratios measured off-air from AO-40 on 16 Dec at MA=101 with a squint angle of 15 degrees, using two dishes of 5ft and 10ft diameter. This data enabled an estimate to be made of the beacon eirp and also the eirp of the transponder noise (measured 10kHz below the beacon). It has been noted to me that transponder noise level may well vary somewhat according to the particular circumstances and so the predictions may only turn out to be a rough guide. As more data is collected, this should become clearer.

The spreadsheet allows users to do two things. Firstly, it is possible to calculate what level the beacon ought to be for given equipment, to check that everything is working properly. If the beacon turns out to be significantly weaker than expected, there may be something wrong with the equipment (see below). Secondly, it is possible to explore what would be the effect of changing equipment parameters (eg noise figure or dish size) on the performance of your system. This makes it possible to evaluate whether it is worth changing to a new downconverter, adding a preamp, or increasing the size of the antenna, with little effort and no expense!

One aspect of AO-40 receiver performance that does not seem to be well understood is that a pro-rata improvement with increasing dish size is not obtained. This is unlike "normal" operation where you would expect a doubling of the dish diameter to give a 6dB improvement in S/N, all other things (like feed efficiency etc) being equal. The reason for this is that the satellite transponder itself radiates noise power, as well as the wanted signals. Larger dishes pick up more of this noise, which adds to the receiver's own noise and causes a diminishing improvement in S/N as the dish gets larger. The diminishing return is greater for very low noise figure systems, with shorter satellite ranges and low squint angles, and these effects can all be analysed with the spreadsheet. However, the analysis shows that it is **always** worth increasing the dish size, and that this will be of most benefit at poor squint angles and longer ranges.

When measuring signal or noise levels, my preference is to use a calibrated S-meter. The S-meter on my IC735 was calibrated using an HP signal generator with known variable output level. This indicated approx 2-3dB per S-point, which may be typical of many modern radios. Measurements made using this method have been crosschecked using a spectrum analyser and good agreement was obtained. Alternative methods involving switched attenuators are being compared, and it is hoped to report more on this in the next issue of Oscar News, together with details of how to build a suitable attenuator.

The system gain should be such that the S-meter reads something off the end stop (eg S1-2) with no signal and the antenna pointed towards clear sky. [This also ensures that the system has enough gain to overcome the noise from the station receiver, and I believe is good practice for ultimate receiver sensitivity when dynamic range is not an issue, as with AO-40]. When measuring the satellite, it is best to choose a time when it is clear of local obstructions and at a reasonable elevation (20-30 deg), else noise contributions from external sources will be difficult to evaluate.

Assumptions in the spreadsheet are a) an antenna temperature of 20K (this can be changed), b) that loss due to squint follows Fig 7 of the paper by VK5HI on the AMSAT-NA website [**curve fit performed up to 35 degrees only**], c) dish aperture efficiency of 45%, and circular polarisation.

Until the spreadsheet has been tested more extensively, please do not rip your equipment apart if you do not achieve the kind of levels it predicts! Large discrepancies may indicate a system problem, but may also arise from inaccuracies in measurements, or the

spreadsheet. **Any feedback would be welcome!**

The spreadsheet can be downloaded from www.g3wdg.free-online.co.uk/ao-40_spreadsheet.htm [The file was scanned for viruses using Norton Anti-Virus software and signature file from 19 Dec 2001 and found to be free from viruses]. For safety, please re-scan the file before use with your own AV software. **Note: with some browsers, a right click may be needed on the link to have the option of saving the file to disk without running the spreadsheet**.

If you do not have access to the internet, I have used the spreadsheet to produce some graphs. **Figures 1 to 3** show the predicted signal to noise ratio of the beacon (above cold sky) and the expected S-meter increase from transponder noise versus dish size for three receiving systems with different sensitivities (0.7dB, 2.0dB and 3.9dB noise figure respectively).

Figure 4 shows more clearly the benefit to be gained in beacon S/N ratio by improving receiver noise figure. Note that at low noise figures the S/N ratio improves by more dB's than the change in noise figure! Unless you have a very low noise figure converter already, the addition of a 2.4GHz preamp is usually worthwhile!

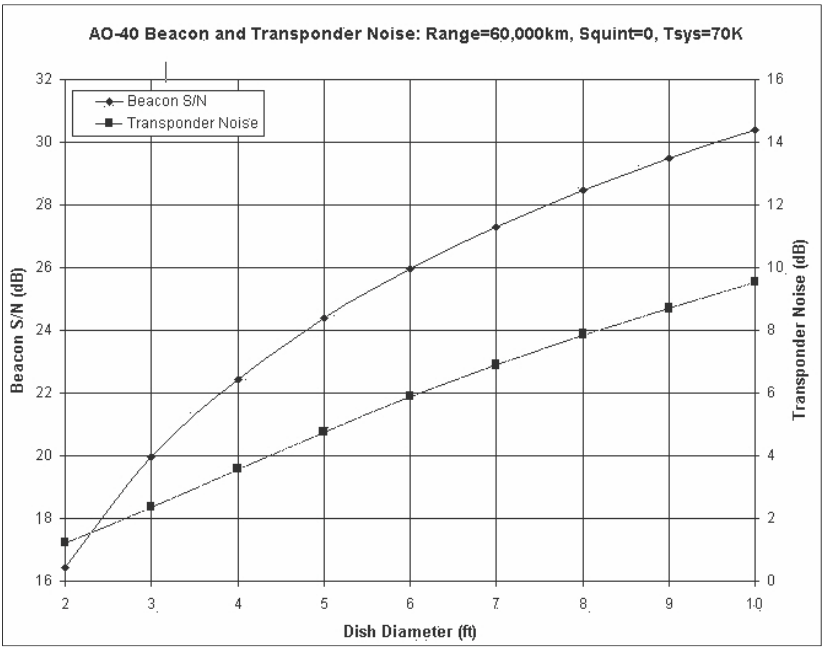
Figure 5 shows how the beacon signal falls off with increasing squint angle. The loss is not too drastic up to 20-25 deg squint, but increases quite fast thereafter. Stations with more sensitive receiving systems will be able to cope better with operation at larger squint angles.

Figure 6 shows the benefit to be gained by increasing dish size, for a medium sensitivity system, relative to a 2ft dish. This graph allows takes account of the contribution to the receiver noise level from a typical level of transponder noise. This clearly shows that even if you can detect transponder noise with your present system, worthwhile improvements can be achieved by increasing the dish size. The transponder noise does not begin to dominate the overall receiver noise until the dish is quite large.

Thanks to all those stations who supplied measurements of beacon level/transponder noise during the development of the spreadsheet.

Figure 1

©



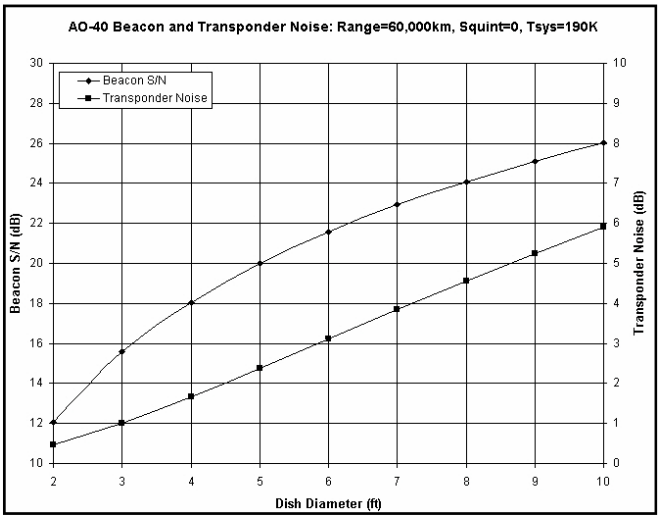


Figure 2

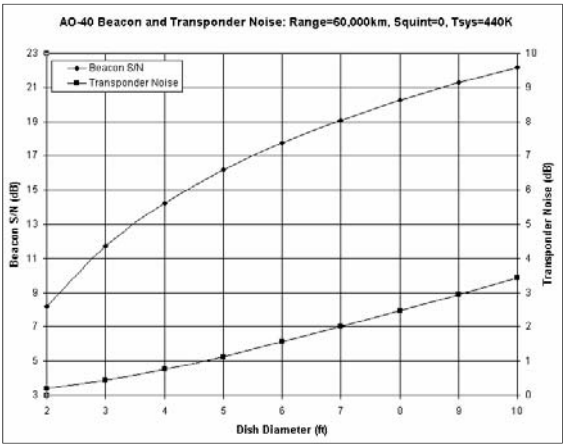


Figure 3

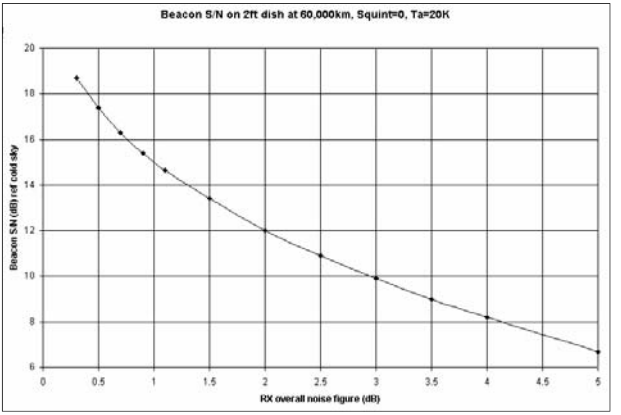


Figure 4

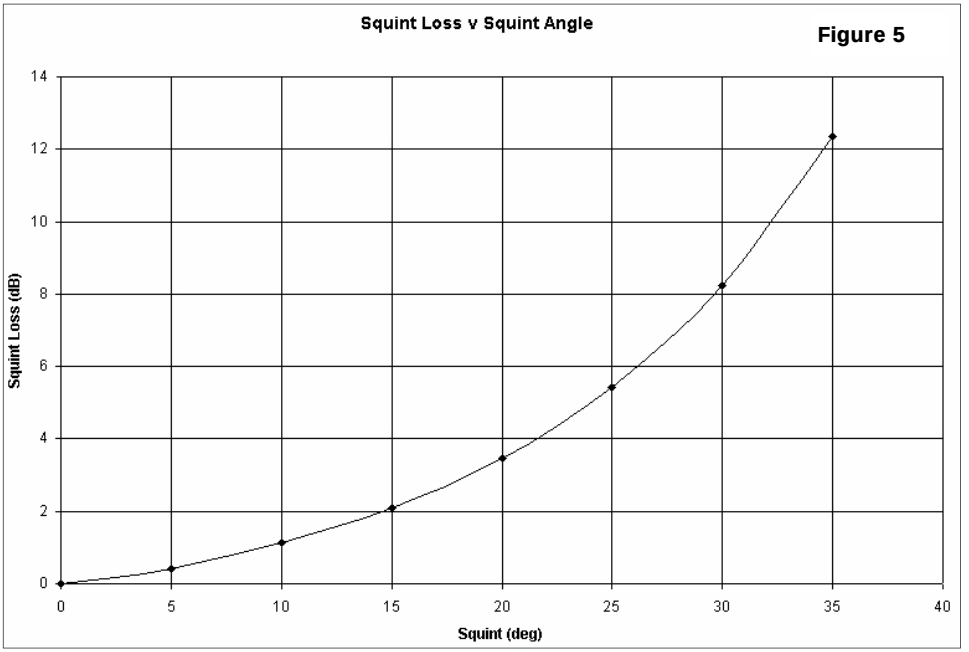
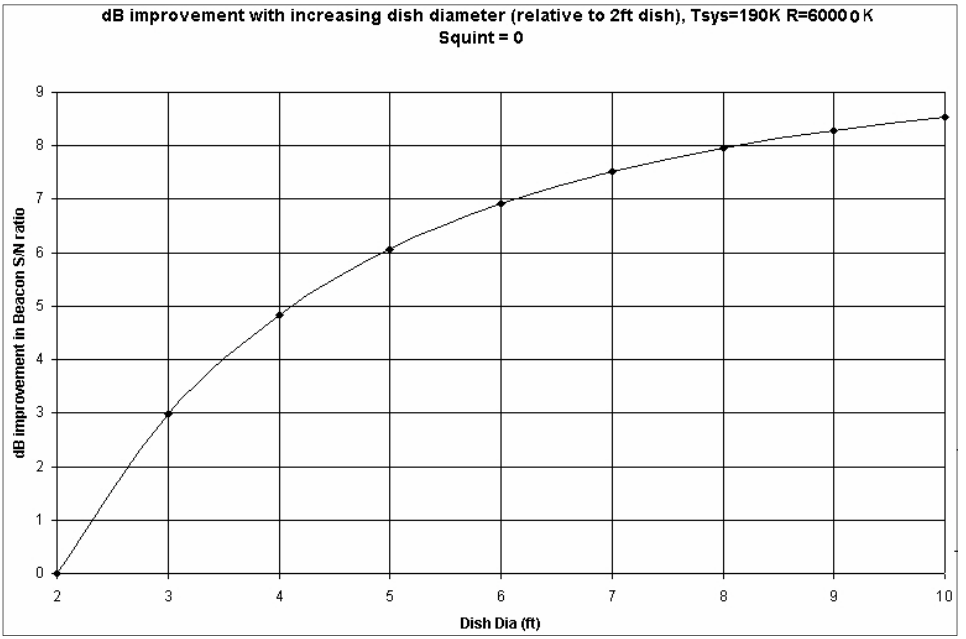


Figure 5

G3WDG January 2001

Figure 6



MSF OFF-AIR FREQUENCY STANDARD

... by David Johnstone, GM4EVS

Design notes

This design is based on the G4JNT Mk2 MSF Standard published in the RSGB Microwave Newsletter in April 1996. Changes have been made to the design of the MSF receiver and the 10MHz master oscillator.

MSF Receiver

Good receiver performance is one of the key components of a reliable off-air standard. This is especially true for users located 200 miles or more from the transmitter at Rugby.

Some have used directional frame aerials for MSF reception. Although cumbersome, these can provide an excellent signal. I was fortunate to have an 8in long x 0.5in diameter ferrite rod available. A winding of enamelled copper wire, 6.5in in length, gave an inductance of some 10mH. This was resonated at 60kHz with a combination of fixed and variable capacitors. This included an allowance of some 180pF for the 6 foot length of RG174 coax used connect the rod to the receiver.

A 12 inch length of 7/8 in OD plastic tubing was used to house the rod, together with a 250pF compression trimmer. The cork from a wine bottle was cut in half to provide a 'plug' for each end if the 12 in tube. One of the plugs was drilled to accommodate the RG174 cable.

The receiver itself was built on double-sided PCB, with the top-side acting as a ground-plane. This PCB was housed in a 4.5 x 2.5 x 1in aluminium diecast box. This receiver module was mounted within the main case used for the off-air standard. Good shielding ensures that the receiver amplifies only the off-air 60kHz signal, and not the nominal 60kHz signal generated by division of the 10MHz master oscillator.

The receiver circuit followed the ideas proposed by G3LYP to introduce additional LC tuned circuits to improve selectivity. Indeed, those of you with the last 32 years worth of RadCom in the loft, will know that the April 1970 issue provided the design for a Droitwich-locked (then 200kHz) standard by GM3TFY. The receiver used 4 cascaded NPN bipolar LC tuned amplifiers and employed an external antenna.

In addition to the LC filtering, the main FET RF amplifier was changed from an MPF102 to a J310. Biasing of the FET amp was adjusted to give a drain current of some 8mA. The LC tuned circuits were under-coupled to compensate for the greater gain of the J310. The net result was about the same gain but better selectivity and IMD performance.

During the design, a series LC circuit was included to allow notching-out of a chosen unwanted LW signal eg, Radio 4 on 198kHz. Use of this was found to be unnecessary in practice.

The biasing of the bipolar amplifier was changed to improve its temperature stability. The emitter voltage was made large relative to the nominal 0.6 volts V_{BE} of the transistor. So when the V_{BE} varies with temperature, the biasing of the transistor remains largely unaltered. Also, some emitter degeneration was used to control the gain of the stage.

The emitter follower design added a 220R series resistor in the base feed to pre-empt any tendency towards oscillation.

The aggregate performance of the revised receiver was confirmed using the ARRL Radio Designer CAD package.

In practice, at a distance of 300 miles, a clean 0.8v p-p output was obtained from the receiver. With this, the standard remains locked 24 hours per day despite propagation changes at dawn and dusk. As yet, the 10MHz output from the standard has not been multiplied up to check the jitter at 10GHz.

10 MHz Oscillator

Some pulling of the 10MHz oscillator was reported by G4JNT when using the 10MHz output from the Mk2 standard.

The oscillator design was revisited. Inspection of the master oscillator circuits for the TS930, TS940, TS850, TS570 and FT1000MP showed them to be all nominally the same. A Colpitts design was used employing a bipolar device having a high gain-bandwidth product. This choice ensures a low base-collector capacitance (C_{BC}) minimising the effect of temperature-driven C_{BC} changes on the frequency of oscillation.

A Colpitts oscillator was built using a 2N5179. This was lightly coupled to a bipolar emitter follower using a 2N2222. You may be inclined to choose an FET follower because of its high input impedance. But overall, the bipolar emitter follower is better-behaved.

The prototype oscillator was bread-boarded using a small piece of single-sided PCB, face-up, cut into small islands with a hacksaw. The prototype worked so well that it was used for production! The oscillator unit was housed in its own diecast box within the main unit.

While free-running on the bench, the 10MHz oscillator moved about 3Hz in the first 30 minutes from a cold-start. Thereafter, a variation of less that 1Hz per hour was observed during the day with the shack temperature remaining around 64-66F. The measurements were made using a Racal 9916 frequency counter with an OCXO reference that had been on for several weeks.

As the oscillator was operated at low power levels, the 10MHz output from the emitter follower was only 0.4 volts p-p. This level must be raised to 5 volts p-p to drive the 74HC390-based divider chain. This can be achieved cheaply and effectively by wiring a CD4046 as an amplifier – a technique used by Brooks Shera in his GPS-locked frequency standard (QST July 1998).

All sections of the 74HC390 divider were used to give 10MHz, 1MHz and 100kHz outputs. Thereafter the G4JNT Mk2 design was followed. A 3MHz signal was filtered out from the 1 MHz square wave, and divided by 50 to get a nominal 60kHz signal for phase comparison with the off-air 60kHz signal. A CD4046 phase comparator was used followed by an LF353 as a level shifter, to provide the drive to the varicap diode in the 10MHz oscillator.

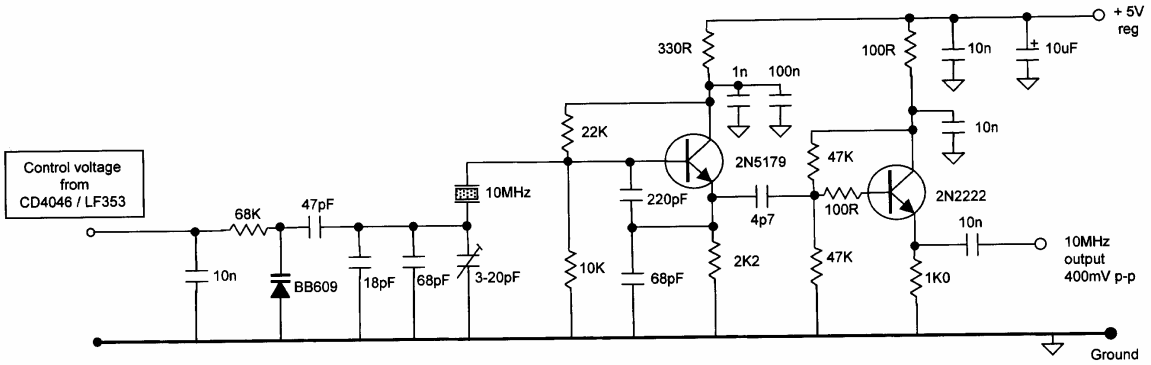
In all, four separate PCBs were used within the unit – MSF RX, 10MHz oscillator, 10MHz divider, and phase comparator / level shift. Apart from the MSF RX, the remaining 3 boards were each fitted with separate 78L05 voltage regulators and extensive decoupling capacitors. An external 13.8 volt supply is used to power the unit.

The unit has performed well and credit must go to Andy, G4JNT, for the robustness of his original design. If you won't always have access to a high-accuracy TV signal, or shy away from the complexity of a digital GPS-based solution, then an MSF-locked standard may well fit your requirements.

Finally, I have some people to thank. These include Dave, G4AON, for his help and inspiration. We started our MSF projects together, but he built the G4JNT Mk2 design in much less time than I took, and kept reminding me of this! Also, I am most grateful to Peter, G3PHO, and Mike, G3LYP, for the information and help they provided to make this project a success.

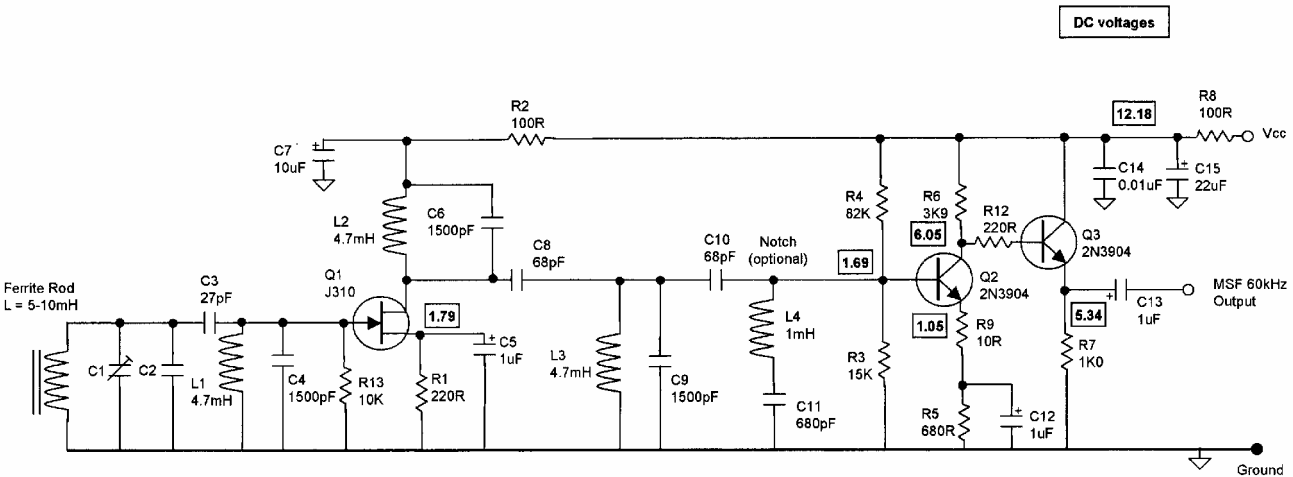
David Johnstone
GM4EVS

10MHz REFERENCE OSCILLATOR – GM4EVS



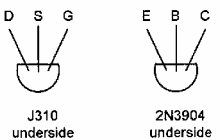
Title	10MHz Oscillator – GM4EVS
Author	David N Johnstone
Version	1.1 – as built
Date	30 January 2002

MSF 60kHz RECEIVER – GM4EVS



C1 and C2 are selected to resonate with the ferrite rod at f = 60kHz

L1, L2, L3 TOKO 4.7mH 10PA Series part no. CLNS-T1026Z
L4 TOKO 1.0mH 10PA Series part no. CLNS-T1018Z



Title	MSF Receiver – GM4EVS
Author	David N Johnstone
Version	1.3 – as built
Date	30 January 2002

FOR SALE & WANTED

Wanted
Ralph Bird, G4ALY (Cornwall) is still in the market for a waveguide multi-cavity image filter (eg ex Teletra "whitebox") for his 24GHz transverter and a 3dB splitter (also ex Teletra?) in waveguide 20. He also needs E or H plane 90 degree bends in WG20 (or even WG22). Please email Ralph, G4ALY, at:
Ralph.Bird@btinternet.com

Wanted
David Cox, G0RRJ (Hampshire) is in need of a single (or dual) cavity for 1296MHz which he can use as a test jig to check out valves for his EME23150 PA. He is also on the look out for 2C39A, 2C39BA, 7289 & 3CX100A valves. David can be contacted at this email address:
dave@andoverhampshire.freeserve.co.uk

GREMLIN CORNER

In spite of last month's attempt to correct the previous month's errors, there were still some mistakes! On page 3, G3LYP's 2.4GHz antenna details should read, in the right hand column: "The likely error may still be as high as 1dB".

Page 6 has the bottom line missing of G8DKK's article. It should read: "Fitting the ERA4 in place of the MAV11 seems to give a worthwhile, although not essential, improvement in the performance of the WDG012 module"

We offer our apologies to the authors of the respective articles for these omissions.

CHANGE OF EMAIL ADDRESS

Please note that my E-mail address has now changed to : **datter@btinternet.com**
73 to everyone for 2002,
Derek Atter, G3GRO

CALLING ALL WIDEBANDERS

Interest in wideband techniques on 10GHz seems to be on the increase. Letters and emails that have recently been received by the editor point to a significant number of operators who would like to see wideband FM being given a better "crack of the whip" than it has been given over the past couple of decades. Kent Britain's recent "Letter from America" (January 2002 Microwave Newsletter) has prompted a demand for a coordinated activity day (or days) sometime this summer. It has been suggested that they should run in parallel with one or more of the summer 10GHz cumulative contests. So how about it folks? Are any of you narrowbanders out there prepared to take out your old wideband gear (assuming you still have it) during one or more of the cumulatives? This editor will certainly be doing so!

There is, of course, a wideband section in the cumulative contest rules. In fact there are substantial bonus points available for working wideband stations cross mode and even more for making wideband-to-wideband contacts.

Before anyone "pooh-poohs" the idea, YOU don't have to join in if YOU don't want to! Just be willing to let the other chap have a try. There is a substantial pool of potential recruits to "mainstream" microwaves out there. They want to have a go but are put off by the high-tech nature of modern narrowband. Let us all encourage these people by welcoming back wideband as a viable mode for 10GHz activity days.

No one is suggesting a widebander will win a cumulative. These folk are looking for activity rather than competition. The idea of using a contest day is to be in the middle of an active period.

If anyone is interested in taking part, please contact the Newsletter editor who will attempt to co-ordinate things with activity lists, schedules, etc, during the weeks leading up to the chosen day(s). Please write/phone/email soon!

USING THE YAESU FT 817 IN A MICROWAVE SYSTEM .... Some notes gleaned from recent Internet discussions.

Tom Williams' (WA1MBA) internet microwave reflector is a most useful source of information. Just recently there has been much discussion of the value of the new FT817 QRP portable transceiver to the microwave operator. With our thanks to the various operators mentioned below, we publish a summary of this discussion in the hope that it might help those who are looking for a substitute for their IC202 microwave IF "prime mover or even very portable talkback equipment.

From: Ed Cole, AL7EB, [al7eb@ptialaska.net]
I have used the FT-817 with my DEM 10GHz transverter and 1w Qualcomm amp. I mounted everything in a U-shaped aluminium chassis which fits into a sturdy carrying case (Pelican-1520) making it handy for taking on-board an airplane when I travel. The case has room for my key, mic, a 12v gel-cell battery, 1.5 amp wall charger, a 17dBi horn and assorted cables.

Since most of the equipment is pre-mounted on the chassis, set up takes only about 3 minutes using the horn.

I use a DEM sequencer to control the xvtr and amp T/R as well as controlling mic PTT. I run the mic PTT line throough one of the sequencer relays to prevent transmitting before the T/R sequence is complete. The mic keys the control line of the sequencer. To break out the mic PTT line, I use a couple of RJ-45 wall jack modules and a RJ-45 jumper to the radio mic jack. For CW I chose manually switched T/R rather than break-in operation to keep it fool-proof and simple. The Qualcomm psu and sequencer are housed in a plastic box. I use the sma-relay supplied by DEM and have the 3w transceiver option for connecting the FT-817 antenna to the xvtr. I adjusted my xvtr drive level to use the FT-817 1w power level as this permits me to operate the FT-817 using the battery at lower current draw. Lower power is easy by switching the FT-817 to the 1/2w power level. I can take along a mobile mag-mount whip or use my Arrow (2m 3 elem/70cm 7-ele) yagi for liaison. The Arrow breaks down and fits into a 2-inch diameter by 25-inch long plastic drain tube, using plastic end-caps. It looks just like those carry-on fishing-pole tubes.

The equipment sits on the car seat very nicely for mobile operation (I use a cigarette-lighter power cord).

The FT817 will make a very nice IF unit for portable microwave operation, as long as you have adequate battery capacity. The only negative I see is the <relatively> high current draw in receive (~300 mA).

From: Peter Freeman, VK3KAI [peter.freeman@sci.monash.edu.au]
I have been using an FT817 as an IF box since October and it's an excellent box for the job! The biggest problem is remembering what the IF frequency should be - I have some transverters set up for 144MHz IF, some on 145MHz IF and 2403 set up for 147MHz IF ! During a Field Day, it is easy to NOT change to the appropriate IF.

I have built a **Bias_Tee** box that plugs into the RF connector on the rear of the unit and brings in the Tx GND connection from the ACC connector. The RF coax cable then goes to the IF interface board and controls the sequencing in the transverter.

Another useful item is the keyer ... hook up a switch to the keyer plug on the rear of the radio, switch to CW mode, set to Break-In operation and you have a beacon keyer running at 50% duty cycle!

From:WW2R (G4FRE) David Robinson [robinda@nortelnetworks.com]
I have been using one as a microwave IF on 10/24/47GHz since they dropped $100 off the price last year (August). I have been very pleased with it as an IF, especially with the extended frequency coverage, its quite fun as an hf rig as well! I built a bias box for the rear SO239 connector that plugs into the accessory socket and makes the 817 look like an FT290/ IC202. I learnt the hard way that you do not have a second chance if you short out the 13.8v output on the acc socket ...it is fed through a 10 ohm 1/16w 0604 chip resistor resistor that blows. From experience it is a devil to replace. I got over the small frequency etc display by installing FT 817 commander by HB9DRV that remotes everything onto a laptop.

ACTIVITY NEWS FROM THE WORLD ABOVE 1000MHz

UK 76GHz RECORD EXTENDED TO 58km ... at the very end of 2001!

2001 ended on a high note for a group of Northern England millimetre wave operators. On 31 December 2001, Paul Widger, G0HNW/P, located at Winter Hill, IO93RO94, north of Manchester, and Martin Farmer, G7MRF/P on Mow Cop, IO83VC47, made a two contact over the 57.8km path, a new UK record for the band. This comes only two months after the same group set up a new UK 47GHz record! The contact was the result of many months of painstaking construction and equipment alignment. G0HNW/P sent a report of RS42 on ssb and received a RS43 report from G7MRF/P. Equipment at both ends were DB6NT mixer transverters and 10 inch (15cm) diameter dishes.

After the ssb contact was established, Paul decided to try to feed the 3 foot diameter dish, used on 24/47GHz, with the 76GHz RF. For this he "poked" a short length of tubing inside the 47GHz feed tube and a useful improvement in 76GHz signals was obtained. Reports of RS54 were then exchanged using narrowband FM.

Paul expects a further improvement to be obtained when he can feed the 3 foot dish with a purpose-made 76GHz feed tube (circular waveguide) and a dual mode(W2IMU) feedhorn.

Dave, G0IVA/P, using an offset fed dish, was also present at the Mow Cop end of the path but could not find G0HNW/P's signal. Unfortunately, another member of this millimetre group, David Hall, M0VZT, was unable to take part in the tests as he was held up by snow around his home area of Telford.

CONGRATULATIONS TO ALL CONCERNED, ON YET ANOTHER FINE ACHIEVEMENT

MICROWAVE SATELLITE NEWS

Contrary to rumours going the rounds, the AO40 satellite has not been switched off for amateur use until April. Vigilant operators have been using the satellite over the past few weeks. Here are just two emails recently received (we would like to hear from others using the microwave links on this “bird”)..

From: G6LVB Howard Long:

I had some really easy QSOs from the UK into Europe and North America on AO-40 on Sunday 20 January 2002 between 10:15 and 11:20 GMT when the “bird” was just restarting its new orbit. South America was in view too but there's not much activity from there.

Despite the appalling squint, this was offset by the close range of the satellite. There was also some QSB which occurs at larger squints, either due to polarisation mismatch or because the motor nozzle gets in the way at higher squints [assuming there's still a nozzle there!) Similar conditions occur with AO-40 every four days, but 25 minutes earlier. For instance on 24 January 2002, at 09:50 or so the same conditions should have occured, assuming the spacecraft's ALON/ALAT had not changed significantly.

Catch the bird early in the orbit between MA's 9 and 30 and you should certainly have no problem hearing it, and you should be able to work it too even with the current ALON/ALAT of 300/-8!

Indeed, this situation is extremely reminiscent of QSO parties back in May 2001 when the transponder was first switched on and many of us were using helices and not dishes. At one point on Sunday, as an experiment, I pointed a 6" long 7 element yagi in the general direction of the window and was picking up Q5 SSB QSO's at a range of 17,000km. Of course, the timing of these conditions will vary widely depending on your location.

Charlie Suckling, G3WDG replies as follows:

I would like to echo Howard's comments regarding the current attitude being wonderful for simple systems.

I was receiving 100% CRC good **tlm** blocks on Sunday morning (20 January,2002) with an indoor 9-turn helix (pointing through a closed window) and 0.8dB NF downconverter. This system is marginal for solid **tlm** at apogee, and it shows just how good things are at the moment. Unfortunately many stations seem to be under the impression that AO-40 is shut down until April - far from it! Also, the short "low" squint slot encourages everyone to come on giving good concentrated activity "sessions".

At these squint angles, it is interesting to note the different fading characteristics of the downlink signals. With the squint around 20-25 degrees, using a Circular Polarised receiving system, the beacon level has barely noticeable spin fading. Likewise, both linear and CP uplinks on 1269 have little fading. 435MHz linearly polarised uplinks seem to suffer the most, while CP seems to be OK.

It is a shame, though, that at least one station is taking advantage of the "better" characteristics of the Mode-L uplink by running so much erp that he was consistently as loud as the MB, while demonstrating on air that he could not get such a good downlink with Mode U, as "Leila" kept biting! Perhaps it is time for the command stations to remind us again of good operating practice!

NEWS FROM AROUND THE UK ….

From Ralph, G4ALY [RalphBird@btinternet.com]
I hope at last this year to be on 3cm from home, here in South Cornwall. A mishap with handling a mast last summer stopped me from completing the station for home operation. **For 10GHz**, I have settled with a 6w DL2AM Amplifier with a DB6NT transverter, the MKU10G2, and a choice between a 60 or 80cm dish with dual mode horn (a G3PHO latest modified version). I appear to be able to hear the stations in the field on 2m from home quite well but I am going to put up a second 13 ele yagi so will have two yagis at 30ft with power splitter bayed and with a masthead preamp. So the talkback (200 watts) will be taken care of. The dish will sit just under the yagi aerials.

I also have all the units (DB6NT), plus a Milliwave half watt amplifier, for **24GHz,** ready to make into a complete transverter. I'm just waiting for availability of waveguide *(see want ads this month…editor).*

On **1296MHz** I have upgraded the TX side to 150 watts and have had good results from home so far, but to the east, over Dartmoor, it is a problem being heard by the DLs and PAs ...hence my latest power increase. On receive I am still using two stacked loop yagis with mast head preamp and a DB6NT transverter into the good old FT290. I hear the Martlesham beacon most days from IO70UL

My big problem is attracting the stations to beam this way!

From: G0RRJ, David Cox
[dave@andoverhampshire.freeserve.co.uk]
Over Christmas I built a dual cavity amplifier for 1296MHz, it was the EME23150. I am getting 100W O/P using a pair of 2C39A tubes.

On 10GHz so far this year, I have worked two new stations ... G4MAP(IO82) and G3YKI in IO92 on rain scatter for square number 15, I heard Ken's beacon on 10GHz, therefore it was a purely random contact without help from any other band. G3YKI used just 200mW. Later I worked G4BRK. During the January 27th Activity Day I managed G4NNS, G1JRU & M0JTT/P

I have a small problem with my 2320MHz preamp so that's the next job. I may even build a new one.

From:M0JTT/G7JTT John
[john@jmkl.freeserve.co.uk]
For the January 27th Activity Day the WX was not too kind, with heavy rain and very strong winds. It was a job to stand up right at times and I nearly lost the tripod more than once. Still, I did work some of the locals and met a new keen microwaver (WB only at the moment). I heard both G3PHO/P (JO03) and G4BRK on 10GHz but was unable to do raise them on 144MHz due to lack of RF at my end.

Peter, G3PHO/P (JO3AE) came on from this rare square for the afternoon of 27 January (after visiting the Horncastle rally in the morning) only to find he had left a vital piece of the dish mount at home! As a result, he could only use a dual mode feed horn "barefoot" (!) but nevertheless had two rainscatter contacts on cw: G4PBP and G3LRP. Apologies to the PA stations who were alerted to his presence via the DX Cluster ... he could not hear them on 144MHz and went QRT at 1500z due to bad weather.

From:G4NNS, Brian Coleman
[BrianColeman@compuserve.com]
Having got the 10GHz EME system to the point where I could reliably hear my own echoes, my first attempt at a QSO was on 12th Oct. 2001. I quickly realised I was right at the bottom of a very steep learning curve as far as operating was concerned and only completed with one station, Geert PA3CSG, out of 5 skeds. Problems included adjustment of polarisation (the mount is semi polar), calculating doppler shift and building confidence in the tracking, etc. Next day I was better prepared and worked Al W5LUA quite quickly and painlessly. On the 17th I worked Philippe F2TU. All reports were M or O. My next session was on Nov 10th, by which time I had got the polarisation problem cracked with remote control from the shack, thanks to help from Ian G8CPJ, and had become confident that the tracking system could be left to itself for an hour or more at a time so I could concentrate on the other aspects of eme operation. I completed with F6KSX (random), OK1UWA and AA5C. The December session added OH2AXH to the tally brining the total number of stations worked to 7.

The system is delivering 9 watts into the transition, and I see just over 2dB of moon noise. Geert, PA3CSG, reported a S+N/N ratio of about 3dB on my signals. The 3.7m antenna has an estimated 3dB beamwidth of 0.5 degrees and the more important 1dB width appears to

Microwave League 2001

Callsign	1.3G Wkd	1.3G Dx	1.3G Score	2.3G Wkd	2.3G Dx	2.3G Score	3.4G Wkd	3.4G Dx	3.4G Score	5.7G Wkg	5.7G Dx	5.7G Wkd	10G Wkd	10G Dx	10G Score	24G Wkd	24G Dx	24G Score	47G Wkd	47G Dx	47G Score	76G Wkd	76G DX	76G Score	Grand Total
G3XDY	182	1253	2842	53	1176	3545	18.5	506	1504				77.5	1012	2704										10595
G4BRK	112	1441	2011	37	857	1804	4	600	385	14.5	600	2243	46	836	1326	7	125	1328							9097
G3PHO(/P)	42	869	454							12	315	974	69.5	748	1792	11	149	2487							5707
G4LDR	51	940	597	17.5	498	495				14	393	1418	51	825	1451	2.5	62	235							4196
G8BKE(/P)				1	64	3				2	154	79	6	101	20	4	154	934	2	78	951	1	32	666	2653
G8ACE/P																3	78	355	2	78	951	2	32	1333	2639
G4KNZ/P																6	143	1302	2	90	1097				2399
G7JTT/P													21	335	242										242
GM4WLL/P	15	488	91																						91

BAND SCORING	**CALL SIGN**	5	4	2	4	6	6	3	2
AVERAGE DX		998	648	553	365	642	118	82	32
AVERAGE CALLS		80.4	27.1	11.3	10.6	45.2	5.6	2.0	1.5
TOTAL SCORING	**CALLSIGNS**	9							

BAND SCORE CALCULATED = $\frac{\text{No. OF STATIONS WORKED}}{\text{AVERAGE No. OF STATIONS WORKED}}$ **X** $\frac{\text{MAX. PERSONAL DX WORKED}}{\text{AVERAGE DX FOR THE BAND}}$ **X** 1000

FINAL POSITIONS 31 DEC 2001

See January 1999 Microwave Newsletter for Rules

Compiled by G3PHO