An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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We say goodbye to a dear friend and a true gentleman ....

Mike Dixon, G3PFR passed away unexpectedly on March 17th. To his family and his many, many friends, the UK Microwave Group sends its most sincere condolences and pays tribute to one of the 'giants' of UK and European amateur microwaves.

In this issue ...

Latest News ...

- **G3PFR now Silent Key**
- **EIs set to share 2300MHz band with more non amateur users**
- **Reverse DDS improves several UK microwave beacons**
- **UK microwave activity still in the winter doldrums!**

MANY THANKS TO ALL OUR CONTRIBUTORS THIS MONTH ... WITHOUT YOU THERE WOULD BE NO SCATTERPOINT!

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From the Editor's Desk

The sad news of the passing of Mike Dixon, G3PFR, overshadows much of the past month. Tributes to Mike have poured in to the editorial desk and we can only publish the barebones of many of them here in Scatterpoint. On a personal note, I have Mike to thank for my present position within UKuG as it was he who encouraged me to apply for a position on the former RSGB Microwave Committee back in 1984-5, to become the RSGB Microwave Newsletter editor and I'm still here, although metamorphosed as Scatterpoint editor!

Many thanks to our contributors this month … G8CUB, W3HMS, GI0GDP and M0ELS. Their articles make very interesting reading. I am constantly amazed that somehow, each month, material like this finds its way to my desk. If it didn't there would be many blank pages in your Scatterpoint! However it's the Activity news that needs your urgent support.

Please send Robin, G8APZ, news of what you have been doing. You may not think it's worth much or interesting to others but you would be surprised!

By now, the RAL Microwave Round Table will have come and gone and I will have had the pleasure of personal conversations with many of you. Your next opportunity to meet your like minded friends is over the weekend of 10-11th July when the South Yorkshire Microwave Round Table and Beginners' Workshop takes place at the Finningley Amateur Radio Club HQ near Doncaster. The registration website is now open at: **http://www.g0ghk.co.uk/tble.php** Please register as soon as you can.

73 from Peter, G3PHO
Editor

News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown above. **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.

FROM THE RSGB MICROWAVE MANAGER

It is important that any EIs on 13cm and any nearby or visiting amateurs (eg Gs/GIs) with an interest in the 2.3GHz band take note of the following IRTS news item below and respond if necessary ...

(IARU, RSGB, IRTS and UKuG are aware of the release programme which is mainly above 2330)

Information Request Relating to the 2300-2400 MHz Band

We have been asked by ComReg to notify you that a letter in the following terms will be issuing to all radio amateurs shortly. This is simply a survey in the context of the release of spectrum in this band to assist in a spectrum monitoring exercise as a preparation for licensing following the recent consultation on this matter.

The Commission for Communications Regulation (ComReg) is preparing to open the 2300 – 2400MHz Band for the provision of additional licensed services on a nationwide basis. Radio Amateur users have designated use of the 2300 – 2400MHz band on a secondary basis and there is currently no plan to alter this allocation. Further information on ComReg's plans is available on our website.

As part of the preparation for the licensing of the 2300 – 2400MHz band, ComReg is conducting a spectrum monitoring campaign. In order not to inadvertently affect the legitimate operations of Radio Amateurs, ComReg is seeking a once-off notification of the use of transmitter equipment in this band.

Equipment operating in any part of the band may be notified by filling in the enclosed form and sending it back to ComReg at Patrick Mulvey, ComReg, Abbey Court, Irish Life Centre, Lower Abbey Street, Dublin 1, or, alternatively the form can be downloaded from the 2.3GHz Website1

Your assistance in this matter is appreciated and if you have any queries please do not hesitate to email at 2.3ghzinfo@comreg.ie

A copy of the above is also on:

http://www.southgatearc.org/news/april2010/irts_2300mhz.htm

UK MICROWAVE GROUP SUBSCRIPTION INFORMATION

The following subscription rates now apply. **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!

Your personal renewal date is shown at the foot of your address label if you receive Scatterpoint in paper format. If you are an email subscriber then you will have to make a quick check with the membership secretary if you have forgotten the renewal date. From now 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 (the editor suggests having it tattooed on your forearm!).
Please also note the payment methods and be meticulous with Paypal and cheque details.

Renewal of subscriptions requiring a **paper copy** of Scatterpoint are as follows:

Delivery to:	**UK £**	**US $**	**Eur €**
UK	14.00	-	-
Europe	18.00	36.00	26.00
Rest of World	24.00	48.00	36.00

Payment can be made by:

*** Paypal to ukug@microwavers.org**

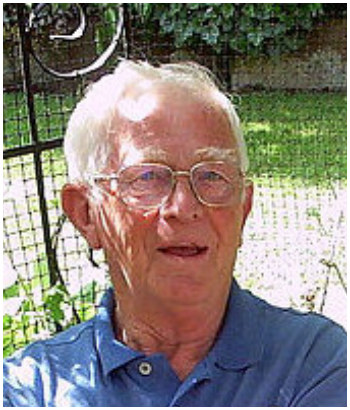
or

*** 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!)

The standard membership rate for 2010 is:

UK	**£6.00**
US	**$12.00**
Europe	**€10.00**

This basic sum is for **UKuG membership.** For this you receive Scatterpoint for FREE by email. If you want a paper copy **then the higher rates apply.**



DR. MICHAEL W DIXON
G3PFR : A TRIBUTE

UK Microwaves and amateur radio as a whole lost one its most respected members on 17th March 2010 when Mike Dixon, G3PFR, unexpectedly passed away to an unforeseen embolism. Scatterpoint's editor, Peter Day G3PHO, learned the sad news the following morning and passed to the rest of the amateur radio world. Tributes then began to pour in at a rapid rate because Mike was no ordinary radio amateur … he was one of those personalities that can only be called great. He had recently retired from the world of amateur radio "politics" having given three decades of service to UK microwaves and to amateur radio in both this country and abroad. To the detriment of his own operating and constructional activities, he had worked tirelessly and unselfishly on our behalf for this long period, through the Radio Society of Great Britain and IARU Region 1. His wealth of negotiating experience at the highest levels earned him widespread respect both here and overseas. It's true to say that many of the privileges we now enjoy on our microwave bands were, to a large measure, the work of G3PFR working in the roles of Chairman of the RSGB Microwave Committee, RSGB Microwave Manager, a job he carried on in the newly formed Spectrum Forum some six years ago. In addition to these roles, he was, for a time, the Microwave columnist in Radcom, bringing the world of amateur microwaves to the general amateur readership. Over the years, alongside well known microwavers G3RPE, G3WDG, G3YGF and our present Microwave Manager G6JYB, Mike worked hard to secure band allocations, beacon rights and countless other privileges that few of us are aware of. In the course of his dealings with the Radio Authority (later Ofcom) and at important conferences such as WARC and IARU meetings, Mike gained the respect of the professionals.

In the early 1980s he edited the now invaluable and well known three volumes of the RSGB Microwave Handbook. This was no mean task and it took several years of hard work.

By profession he was as a chemist working with a well known company in the North West. After retirement from full time work, we all expected him to become more active on the air but, in true G3PFR spirit, he ploughed himself into local club activities, attended and gave presentations at beginners' microwave workshops and was on hand as an experienced advisor and aid to the new Microwave Manager.

Mike spent his younger days in Cumbria where he developed a love of the the mountains which later became locations for his early amateur radio and microwave operating.

In 2006 Mike Dixon was awarded Life Vice Presidency of the RSGB in recognition of his work. He will be sadly missed. A full tribute to Mike will be published in the May 2010 edition of RadCom.

Mike's funeral, or should we say the Celebration of his Life, took place at Warrington on Tuesday 30th March. So numerous were the attendees that there was standing room only at the crematorium and at the 'wake' that followed. People from all facets of Mike's life were there to say goodbye to not only a respected colleague but to a very dear friend. Both RSGB and the UK Microwave Group were represented at committee and Board level.

To his wife Pat and to his family, all UK microwavers extend their heartfelt condolences and, at the same time, thank them for supporting Mike in the service he gave to us.

A selection of the tributes received appear on the following pages …..

Murray Niman G6JYB, who took over from Mike as RSGB Microwave Manager, writes: Mike was a great gentleman and one of immense experience whom the hobby will miss but not forget. He was an inspiring and difficult act to follow when I took on the Microwave Manager role from him in January 2007, nor will I forget his impassioned speech at the Marlesham Roundtable in 2003 which set the stage for the resurgence of the hobby and the seeds of current strategy.

For his immense contributions, Mike was also made a RSGB Life Vice President - a title I know he very was honoured to receive.

Keith Bainbridge VK6RK / VK6EME (formerly VK6XH) writes: Mike gave me one of my first 10GHz contacts back in 1983/4 and we corresponded regularly back then. He will be missed, mainly for the way he pushed the GHz activity in the early days. My condolences to all who knew him.

Vale and 73 Keith, Ex G6HHV, G1GHZ

Peter Day G3PHO, wishes to thank Mike for over thirty years of friendship. He first met Mike during the early 1970s, on the well known Merryton Low, a hill-top in the Peak District. In those days Mike was a keen 10GHz wideband FM portable operator, using a well engineering homemade system based around a circulator and Gunn diode local oscillator. As we all moved onto narrowband in the 1990s, Mike made a G3WDG system but then sadly became inactive on the portable scene as he was working hard for us all at committee and international conference level. I was very sorry to see Mike have to chose between his own radio activities and those which were for the good of us all as I knew he really missed those days out on the hills.

Mike seem to think I could be of use to the RSGB Microwave Committee so, in 1985, he invited me down to a meeting and I became the newsletter editor and then secretary of that auspicious group of microwavers which included the likes of G8AGN, G4FSG, G3RPE, G3WDG, G3JVL, G4KNZ, G3YGF, G4FRE … good old days indeed! Thanks Mike!

I have many treasured memories of him, one being the day when he and his charming wife Pat entertained us one afternoon at their lovely home in the Delamere Forest, near Chester. My wife and I were on a cycling holiday in that county and a chance to put up one's feet in their beautiful garden was not to be missed! The front page photo was taken that day. The other occasion was when I, as Chairman of UKuG, had the privilege of presenting him with the UK Microwave Group's Life Time Achievement Award (see photo above). 73 Mike… it was really good to know you and have your friendship. I'll never forget you. **Peter G3PHO.**

More tributes can be found on the next page…..

From: Conrad Farlow G0RUZ:
A very sad day indeed. Mike sent me a number of bits and even made me some waveguide transitions out of the goodness of his heart. He was a true gentleman, always with a measured and intelligent response to any situation. A true pioneer. Rest in peace Mike.

From Ralph Bird, G4ALY:
I am indeed deeply sorry and saddened to receive this news this evening. My first knowledge of Mike was reading his articles in Radcom and also the fine instructive sections in the set of 3 Microwave Handbooks. That is where my interest was first awakened in this branch of our hobby.

If you 'Google' for his callsign you'll find page after page of remarks from around the world on the subjects he wrote about. He was held in very high esteem.

Sam Jewell, G4DDK writes: I just returned home after attending Mike's funeral service at Warrington, yesterday. It was a moving occasion with so many mourners at the service that there was standing room only at the rear of the crematorium service room. The service lasted nearly 1 hour; twice the normal time.

As well as family members and many of his colleagues from work and from his various sports clubs (rugby, golf, etc) there was a really good turn out of radio amateurs from the world of microwave, from his radio club (MID Cars) as well as the President of the RSGB, General Manager and others from HQ. I think that the RSGB did Mike proud, as befits a Honorary Life Vice President of the Society.

Mike's widow Pat expressed pleasure at so many amateurs attending and was so very pleased to see HQ representatives.

I believe that two tributes, early in the service, helped ensure everyone present realised just how important Mike was to us all and what a great role he played in amateur microwave radio in the UK. He will be sadly missed.

From Richard, G3CWI: I too am sorry to hear this. Mike helped me out when I was starting on 10G and he will certainly be missed.

From the Chairman of UKuG. John Warsnop, G4BAO: I only knew Mike as the name on the front of the RSGB Microwave Handbooks. I was not fortunate enough to meet him in person or on the air, but I gathered from other people's comments over the years, and reference to history will show, that Mike was a true microwave "legend". I know I tend to use that description a lot, usually with tongue in cheek, but I think Mike was one of the few who really earned that accolade. My condolences to Mike's family.

Graham Murchie, G4FSG writes: I, too, am really sad to hear that Mike is no longer with us. I first encountered Mike in the 1980's when I was Chairman of the RSGB Microwave Committee. Mike was a really supportive committee member and took on the massive challenge of editing the 3 volumes of the Microwave Handbook—no mean feat at the time!

When the time came to hand over the Chairmanship of the Committee then Mike was the obvious candidate. Together with his role of Microwave Manager, Mike has contributed a huge amount to Microwaves.

I will personally miss his wit and 'to the point' remarks particularly related to those with whom we both came into contact in relation to some of the early beacon activity!!!

Maybe it is appropriate to repeat the accolade that was made when the UKuG presented him with a lifetime achievement award: "Mike dedicated himself entirely and unselfishly over [three decades] to promoting the interests of all UK microwave operators, often to the detriment of his own spare time pursuits."
RIP Mike.

From Russ, G4PBP: I am very saddened and shocked to hear of Mike's passing. We were good friends for many years and had more in common than just radio: we were both based in the fine chemicals / pharmaceutical industry and had many interesting discussions related to both fields. I will miss his lively whit, his kindness and his analytical mind. My condolences to Mike's family and other friends.

Dennis G6YBC writes: It is with sadness that I hear of Mike's passing. If it was not for him coming to our radio club and giving a lecture "How to Get Started on 10 GHz", then I, like a lot of others, would not have got involved in Microwaves. Even a couple of days ago, I noticed he was offering to scan articles and send them tp people. It seemed nothing was to much to help somebody. We truly have lost a gentleman of radio.

From Gordon, G0EWN: This is very sad news indeed. Mike was a giant of the microwave/ radio scene but more than that--he was one of those very rare people, a thoroughly nice, friendly person who brimmed with enthusiasm and knowledge. He will be deeply missed. Sincere condolences to Mike's family and friends.

Elcom CDFSL Synthesisers
by Roger Ray G8CUB

Local Oscillators for 10GHz upwards
9936 MHz, 10224 MHz, 12240 MHz, etc.

I purchased a pair of Elcom ILCDFSL-1295 synthesisers from 'art-in-part' on ebay. These were intended for a millimetre band project. However once I started looking at them, there potential use for 10 & 24GHz became apparent. They use just a 12 and 8V supply, have a 10MHz reference and can be set to any frequency that is a multiple of 10/3MHz. The ones purchased were described as new, they certainly had seals intact, and included a test report. On connecting the 12 & 8V supplies, the first unit came up on 12.6GHz. The second unit for some reason was damp, when trying it, the supply currents fluctuated wildly, and there was no output. It was for this reason I unscrewed the multiple cover screws and dried it out. This was to prove the key to its use at 10GHz because, while I was checking its operation, I discovered that the VCO was running at one fifth of the output frequency.

The normal output frequency range was 12.2 – 12.95GHz. Would it be possible to use it on 4/5 frequency? A check with a calculator, showed that the sums worked. If set to 12420MHz, 4/5 frequency is 9936MHz (10368-432), if set to 12780MHz 4/5 frequency is 10224MHz (10368-144). Initially I had not tried programming the unit, so I used the default 12.600GHz, and looked to see if I could get output at 10.080GHz. Internally there is some serious filtering to select the 5th harmonic of the VCO, so this would need re-tuning.

I tried the piece of ceramic 'trick' that I used on the Ceragon modules for 5.7GHz. With a little bit of size trimming, it worked more or less straight away!

The idea of using these modules came from the excellent article by Dave, G4FRE/WW2R. Dave had done the hard part in working out the programming and then writing a PIC program that allows the frequency to be set.

I must admit, I struggle with the digital stuff. This was one of the reasons that I was keen on the Alcatel synthesisers that did not need any programming! My initial attempts to program a PIC went down the usual course for me, of being a failure. I bought a cheap JDM programmer from eBay. I then found that I could not use it with an USB / RS232 adaptor. When I eventually got an old PC with dedicated RS232 working, I found that the software did not work either. With advice from Dave, I got hold of a PIC Start + programmer, but that needed upgrading to work with the 12F675 PIC.

So, what finally worked for me was the JDM programmer, a 1:1 RS232 lead, win pic programmer software, and MPLAB_IDE software to compile the hex code (both free on the web). Although later on I found the upgraded Pic Start + easier.

Now I could look at setting the frequency that I wanted. Following Dave's article, I set the frequency to 12.420GHz. I edited the .asm program using Word Pad, putting in 37 260 (12,420 x 3). Programming the PIC gave the correct output frequency, then dropping on the pieces of ceramic, and moving them around with a trimming tool, I had 9936MHz at +12dBm output. The plots below show that both the close in and wideband spurious were very good.

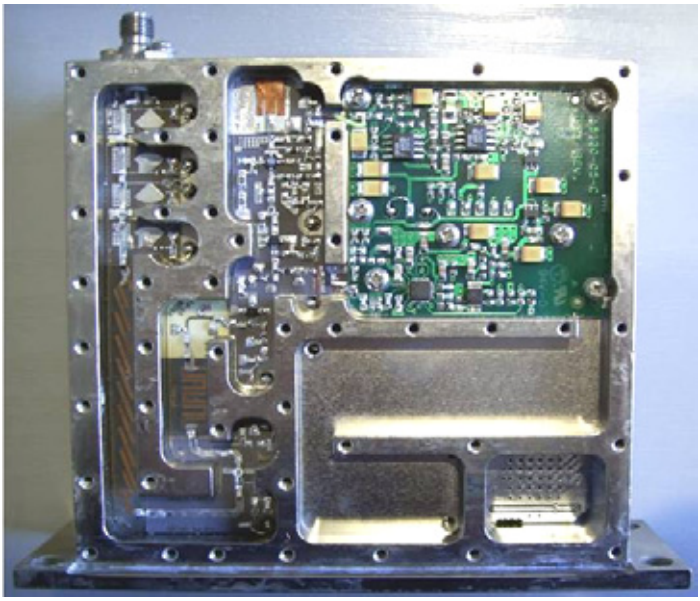
Using the KE5FX software to make a phase noise plot gave an excellent result, some 20dB better than the original Alcatel synthesiser, when compared at final frequency. The result of 81.6dB at 1kHz offset, would require >122dB at around 100MHz in a oscillator multiplier combination (phase noise increases 20dB/decade). The plot was taken using the internal 10MHz reference. Surprisingly this reference looks adequate for 10GHz use, once set on frequency! Although this was tricky, as it really needs a small square trimming tool. Frequency shift against time was measured as 1.2kHz for the first 30 minutes, and less than 100Hz over the next 2 hours. The addition of a miniature relay driven from one of the unused connector pins, would make a neat system to later add an external 10MHz / GPS locked reference if desired.

Supply requirements:

+8V	260mA typ.	(+7V min.)
+12V	120mA typ.	(+11V min. although works down to <9V)

Pin-out is as per the references - 8 way in line Molex connector, or 15 pin D-type

Photo right:
RF side of the synthesiser showing the hairpin and stripline filters at the bottom left.



Some useful frequencies CDFSL-1201 (11.2 – 12.0GHz)

Frequency	Freq. set		Modify	Code (fx3) Use
11880MHz	11 880		35 640	47088+432 / 4

Some useful frequencies CDFSL-1295 (12.2 – 12.95GHz)

12240MHz	12 240		36 720	24048+432 / 2
9936MHz	12 420	x	37 260	10368 - 432
10224MHz	12 780	x	38 340	10368 - 144

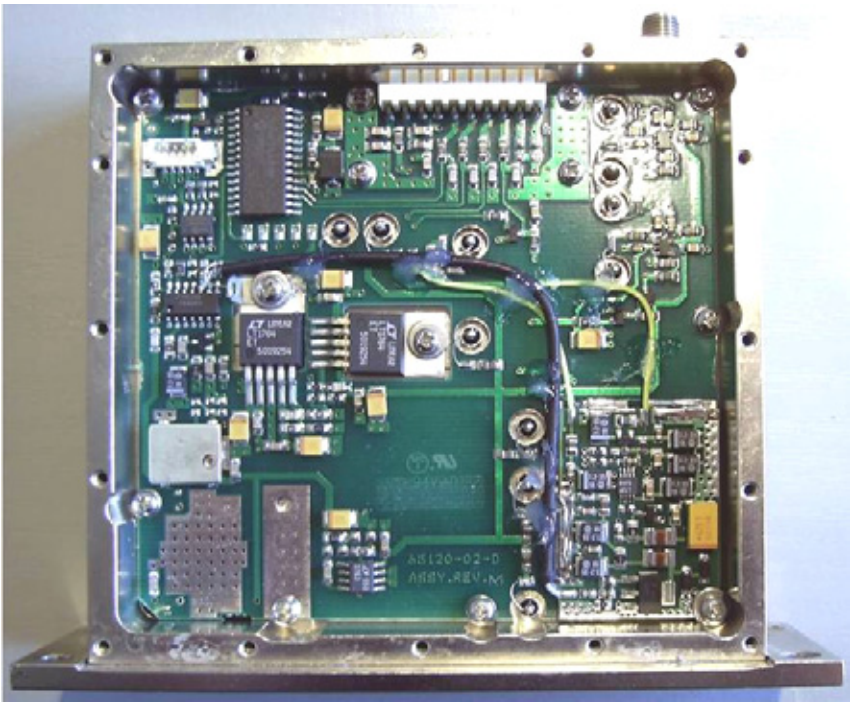
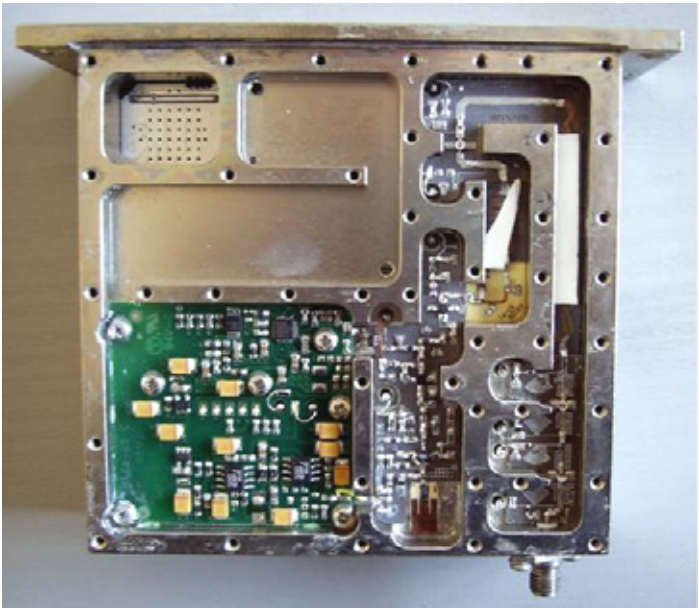


Photo above:

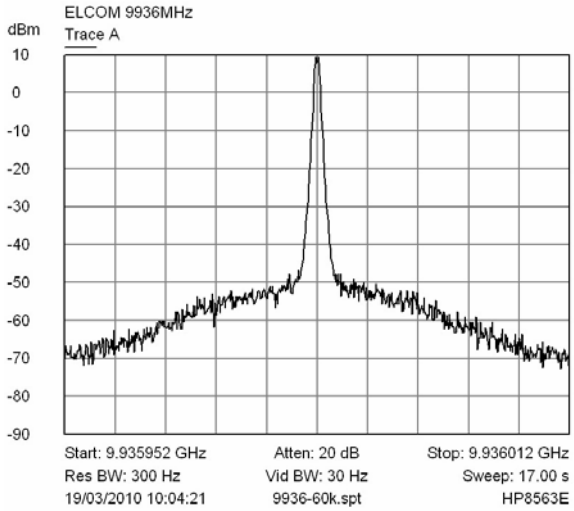
Reference / DC side of the synthesiser. The track at the extreme left of the reference TCXO upward carries the 10MHz signal. Connect into the capacitor at the top of the track when using an external 10MHz reference. Removing the +5V supply to the internal TCXO at the same time is probably a good move.

Photo below:

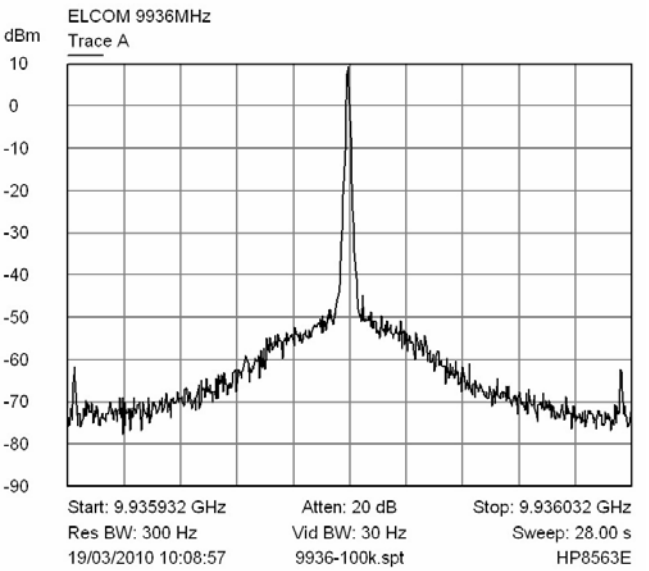
Modified RF side – ceramic in place on the filters. After this picture was taken, the ceramic was glued in place with araldite.



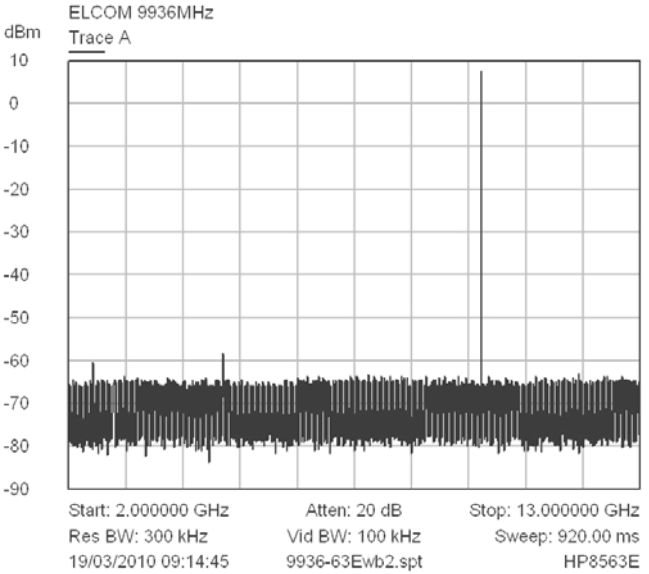
Spectrum Plot with 60kHz Span



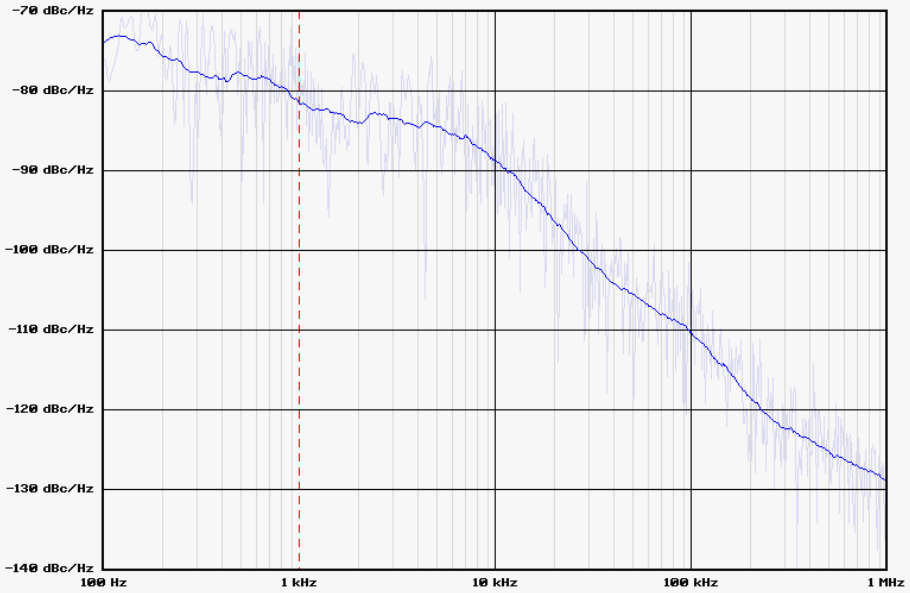
Spectrum Plot with 100kHz Span



Wideband spectrum plot 2 – 13GHz



Phase Noise plot using KE5FX program



Trace	Carrier Hz	Carrier dBm	dBc/Hz at 1000 Hz	RF Atten dB	Instrument
ELcom 9936MHz	9 936 003 900	10.00	-81.6	10	HP8563E

References:
http://g4fre.com/dfs1201.htm

http://www.icwic.com/icwic/data/pdf/cd/cd021/a/604213.pdf

Who says it's warm in Texas? Here's the scene that greeted me at the start of day 2 of the Dubus 3.4G EME contest!

I'll will be visiting UK at end of April to bring Meg her K3 and try out the new DEMI 70MHz transverter.

Unfortunately the American Airlines EU fare sale didn't happen in time to come to RAL.

73 Dave, WW2R/G4FRE
Texas, USA

A 3 Watt driver for 1296 MHz using a BFQ136
.. by Geoff Pike GI0GDP

A recent discussion elsewhere highlighted the need for a driver amp to go between the latest DB6NT 23cm transverters with 4-500mW out and the LDMOS amps from Bert PE1RKI and John G4BAO.

I had made the assertion that a BFQ136, 2 quarter wave lines and 4 variable caps would do the job. The purpose of this article is to use Puff to detail the design. It will be of no surprise that 1/4λ lines weren't used.

The design data for the BFQ136 was taken from Philips product specification sheet. However, they where in chart form rather than a S parameter listing and some error in reading the smith charts will have occurred.

However, this is what I have obtained from the reflection coefficients:-

S11: 4 +j 12.5Ω
S22: 12.5+ j 9.0Ω

Puff is a simple device that gives good starting values for the matching networks. It also should be pointed out that S12 has not been considered.

The reactive part +j12.5Ω of S11 is cancelled with a 4p7 chip capacitor and a trimmer of 5pf. This trimmer really needs to be of the best quality but a Murata blue will do.

The first plot shows the line length needed to transform the new complex impedance to 50Ω, this will be inductive and a trimmer will be needed to added at the end of the line to tune it by cancelling the inductive part.

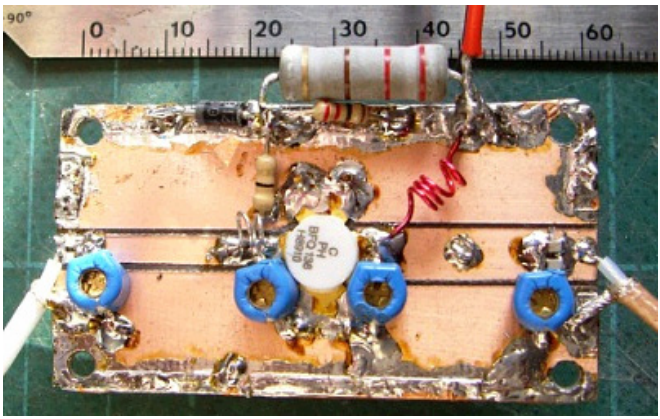
The line was arbitrarily set at 50Ω and the dimensions given by Puff for 1.6mm thick FR4 type pcb.

This same procedure was done for the output and a 30Ω line was selected to achieve a convenient length of 50°, the line can be lengthened to 70° and then the output trimmer can be dispensed with.

Bias for the device is a simple diode affair and could be improved upon, Icq is set for about 60 mA with R1, at full power of 3 watts the collector current is at max of 600mA. The device seems quite robust.

A supply of 13.8v is needed, when these devices were used in the LTS23cm transverters a supply of 14.5v was needed for full output power.

The prototypes have been built on 1.6mm FR4 double sided pcb with the edges wrapped with copper foil from H100 type coax. It is also a good idea to put a vero pin through the pcb at the earthy ends of the trimmers to ensure a good grounding.



I have some of theses devices for those who wish to build the amp, these are ex G0RRJ devices and brand new, so there is a minimal charge for them.

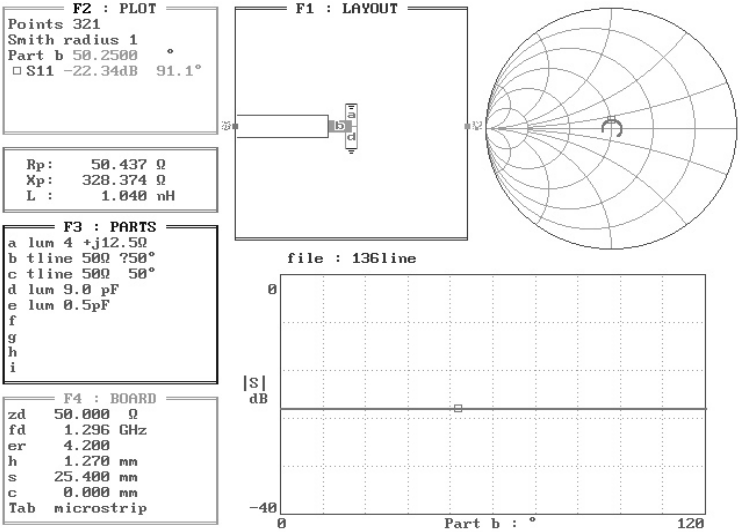


Fig.1 (right):

Puff plot to obtain the transmission line length in degrees to move the new impedance to 50Ω (and becomes inductive in nature).

My puff is slightly corrupted in moving to XP so in F1 layout the ports 1 and 2 are not clearly marked. Port 1 is input and port 2 is output.

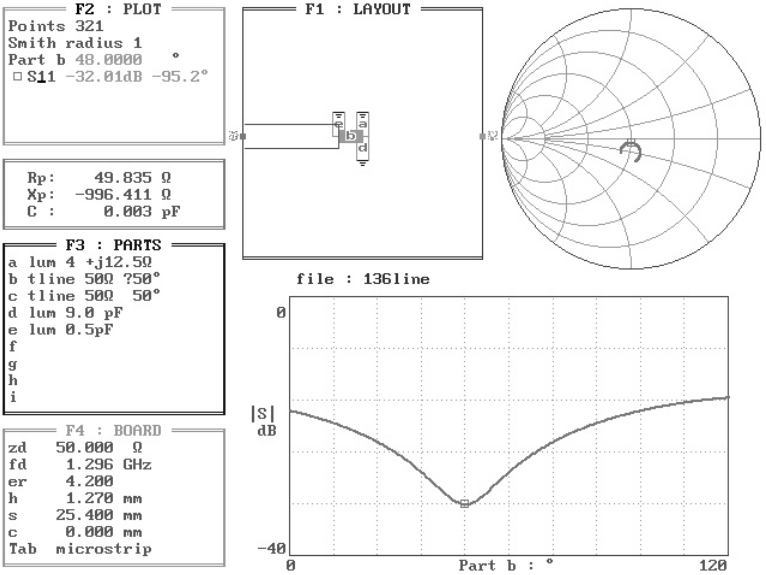


Fig.2 (left):

Puff plot with capacitance on the end of the line to make it 50Ω and not reactive.
This is a small value of 0.5 pf.

Fig. 3 (right):

Puff plot with the line dimensions for 1.6mm FR4 type board.

Eagle eyed persons will spot that the input is slightly capacitive (square on Smith chart at 50Ω is below the line).

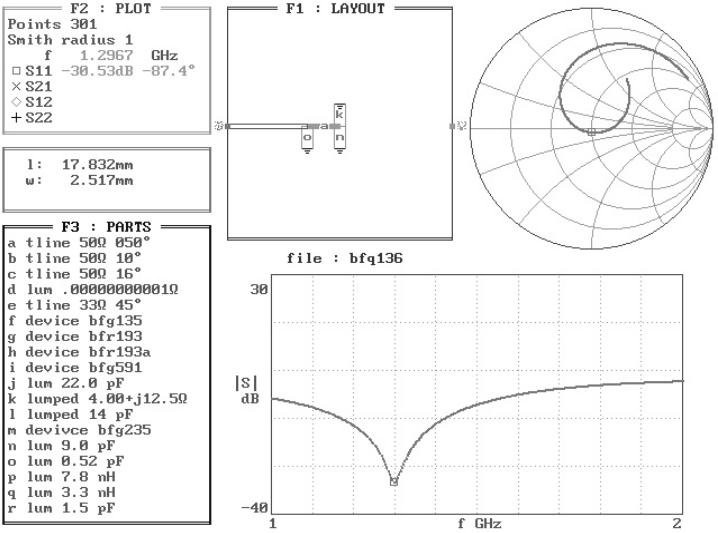
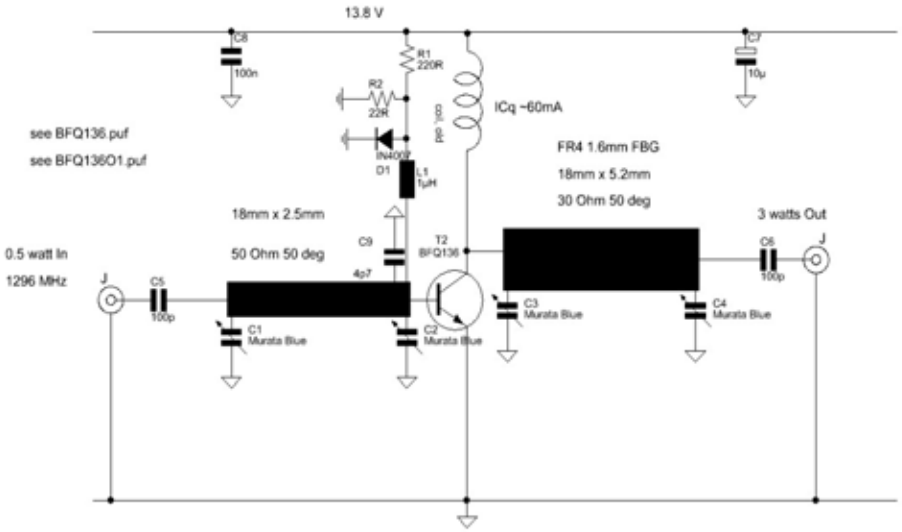


Fig. 4 (below): Circuit diagram for 3 watt 1296 MHz driver PA.



Note: C9, the 4p7 smd chip cap, may not always be needed

By Robin Lucas, G8APZ

CONTEST and ACTIVITY REMINDER

April

11-Apr 0900 - 2000 Low band 1.3/2.3/3.4GHz
20-Apr 1900 - 2130 1.3/2.3GHz Activity Contest
Arranged by VHFCC (RSGB Contest)
25-Apr 0900 - 2000 All-band Activity Day
Non competitive (**Last Sunday in month**)

May

1/2-May 1400 -1400 432MHz & up
Arranged by VHFCC (RSGB Contest)
2-May 0900 - 1700 24/47/76 GHz Cumulative
18-May 1900 - 2130 1.3/2.3GHz Activity Contest
Arranged by VHFCC (RSGB Contest)
30-May 0900 - 2000 1st 5.7GHz Cumulative
30-May 0900 - 2000 1st 10GHz Cumulative
30-May 0900 - 2000 1st 24GHz Cumulative

Jun

15-Jun 1900 - 2130 1.3/2.3GHz Activity Contest
Arranged by VHFCC (RSGB Contest)
27-Jun 0900 - 2000 2nd 5.7GHz Cumulative
27-Jun 0900 - 2000 2nd 10GHz Cumulative
27-Jun 0900 - 2000 2nd 24GHz Cumulative

FRENCH JOURNEES d'ACTIVITE (JA)

24/25-Apr Activity weekend - 25th matches UKuG
29/30-May Activity weekend - 30th matches UKuG
19/20-Jun Activity weekend
24/25-Jul Activity weekend - 25th matches UKuG
28/29-Aug Activity weekend
25/26-Sep Activity weekend - 26th matches UKuG
30/31-Oct Activity weekend - 31st matches UKuG

Duration of all JA is 1700 Saturday - 1700 Sunday

BEACONS

A batch of the Reverse DDS systems were deployed on UK beacons on Saturday 20th March. The first was at **GB3LEX** by Geoff **G3TQF**. Although this was successful, the **GB3LEX** signal is reported to have some hum on it, but is likely to be cured soon.

Brian, **G4NNS** installed two others for the **5.7GHz** and **24GHz** beacons at **GB3FNM** in Farnham. However, this had to be abandoned when severe hash was noted on the signals.

This only occurred on final assembly of the units into the cabinet with the switched mode PSU and it appears to be a classic earth loop problem. As a result, the beacon PSU/IDU for the three **GB3FNM** beacons was removed for bench testing, and was returned to service on 27th March.

A very minor modification completely cured the problem, and it is thought that this will also cure the hum on **GB3LEX**.

Brian says that **GB3FNM 5.7GHz** and **24GHz** are both working well. They are locked to the station **5MHz** reference and are approximately 200Hz and 800Hz high respectively but appear very stable and with an improved note - less jitter than the free running cheap and cheerful crystal OCXO without locking.

Other UK beacons are to be fitted with the RDDS units later in the year. Sam, **G4DDK** is working on the **3cm GB3MHX** rebuild which will incorporate one, and another unit is destined for **GB3KEU**.

The final kit from the first batch of fifteen has gone to Geoff Pike **GI0GDP** for the **GB3NGI 3cm** beacon which is currently under construction.

The RDDS units enable far better control of the output frequency and whilst not as accurate as GPS locked units, all six of the above mentioned RDDS units will improve beacon stability and accuracy, and have been funded by the UK Microwave Group.

David Wrigley, **G6GXK** reports that due to a mechanical problem with loose Rawlplug fixings on the mast support bracket, the Manchester **24GHz** beacon **GB3MAN** has been removed whilst repairs take place.

CONTESTS

Ray James, **GM4CXM**, Glasgow, **IO75TW** runs 150w on **23cm** with 4x44ele Tonnas and a masthead LNA.

In the UKuG March Low Bands contest, Ray worked 19 stations, eleven of them on CW, and the first two stations in the log were both in excess of 700km! These were **PA6NL**, JO21BX with 529 reports both ways (709km), and **PI4GN**, JO33II (768km) for Ray's ODX in this contest.

Five of the stations in Ray's log were **GM** stations, which shows a very encouraging and welcome increase in **23cm** activity in Scotland. The following stations were all in excess of 500km: **G4DDK** 572km, **G3XDY** 565km, **G4RGK** 541km, **2E0NEY** and **M0GHZ** both at 520km, **G4BRK** 517km and **G4BAO** at 506km.

The March UKAC proved to be very busy too, right to the final minute. Whilst conditions seemed pretty average, some difficult contacts were completed, and Ray ran out of time to catch everyone who was "workable".

IO91 generated almost a third of all contacts which helped to boost the points/QSO figure, and there was also increased **GM** activity. Three GM stations were out portable despite the cold weather, **GM3SBC/P**, **GM0USI/P**, and Robert **GM4GUF/P** who had to climb over 2,000' and carry his station with him.

GM4CXM's log gained a total of 17 stations in this contest, with eight of them over 500km, and the ODX was Kjeld **OZ1FF** (JO45) at 782km using aircraft scatter for a quick QSO.

Ray comments that it is good to see stations moving up to **23cm** from 2m/70cm, and he is looking forward to the next **23cm**/**13cm** UKAC.

EME ON 9cm AND 3cm

From: Brian Coleman, G4NNS, IO91FF

The **3.4GHz** EME activity session/Dubus contest on the 20th/21st March was well supported. I managed 13 QSOs with 3 new initials taking my total to 15 on that band.

The **10GHz** EME Dubus contest on 27th/28th March was also quite busy and although I had limited time due to other commitments I managed 8 QSOs including one new initial, **G3WDG** taking my total to 38 on **3cm**. It's good to have Charlie back on the band.

EME UK 9cm FIRSTS HB, LZ, S5

From: Peter Blair, G3LTF, IO91GG

On March 20th, with cloud, rain and high winds enough to move the dish off the moon, signals seemed down, as were my echoes.

On 20th I worked **OK1KIR**, **OH2DG**,**OK1CA**, **OK1DFC** #29, **VK3NX**, **DL4MEA**, **PA0BAT**, **HB9JAW** #30, **DL1YMK**, **OZ60L**, **G3LQR**, **K5GW**, **VE6TA**, **G4NNS**, **K2UYH**, and **WW2R** (# means an initial contact).

On 21st I found the feed to the 6m dish slightly off centre, and slightly resetting it brought signals and echoes up.

I added **LX1DB** (also on ssb) and then a second QSO with **G3LQR**, but heard no more new ones. I had to quit before the US window.

During the following week, on the 22nd March, **LZ1DX**,#31 and **S59DCD**,#32 were added. The QSOs with **HB**, **LZ** and **S5** are the first **9cm** contacts with these countries from **G.**

My system on **9cm** uses a circular **VE4MA** type feed and septum polariser. The LNA is a **W5LUA** design using an ATF36077. The HB transverter and PA, which is a pair of Ionica tx modules combined giving 30W, is mounted at the feedpoint. The LO, a **G8ACE** TCXO, and 144MHz tx/rx are fed up through a single coax.

... AND FINALLY

The summer is rapidly approaching. The next issue of Scatterpoint will be with you mid May, and by then, some of the usual annual events will be behind us.

We will have had the Roundtable at RAL near Didcot, and on the same weekend the Seigy meeting in the Loire valley, France.

During April, we will hopefully have had some extensive rainscatter events into mainland Europe, if things run to form.

Also behind us will be the May IARU contest, (the DC to Daylight contest!), so if you have not already done so, get the microwave gear out, check it over, and catch or create some activity!

73, Robin Lucas, G8APZ

Please send your activity news for this column to:

scatterpoint@microwavers.org

Parabolic Antenna Calculations

by John Jaminet, W3HMS and Curt Wann, K4ITO
9 March 2010

The charts in the ARRL Handbook, the ARRL Antenna Handbook, and the F4DAY Website have the calculations for common size dishes and the formulas. The modern EXCEL spreadsheet just cries out to be used so that a microwaver or EME operator can determine gain and ERP for various dish sizes and ERP power levels. This is very helpful for planning your station. It could also be helpful, after some modification, to permit economic analysis of the best tradeoffs/costs in additional dish size and/or power. We did not do the economic analysis here but we mention the idea as food for thought for downstream use by someone, please.

The following explains how to use the spreadsheet ….

Use 1: Print completely and use as a printed document.

Use 2: Bring up this EXCEL and change the frequency, dish size in feet, or value of RF power at the feed. You can also change k for different feed efficiencies to see what the effect is with a different dish-feed. These actions may answer the question of what will be the ERP with say 250 watts and a dish increase of 1 foot/meter?

The informal conclusion that one-half foot increase equals ½ dB increase is a simple "rule of thumb", at least on 23 cm. We note, as all will recognize, that a power increase does not increase the gain on receive so a dish size increase may have more value than a power increase. Please note that we have addressed only round dish sizes often used by a ham. Others are invited to do the same for offset dishes, please!

The EXCEL is based on the dish size in feet but this can be adjusted on any line by "cut and try" to yield a desired metric size, example 3.8 meters.

This EXCEL was developed using the following formulas obtained from the Paul Wade, W1GHZ, Online Microwave Antenna Book, Section 4. The authors would like to express their appreciation to Paul, W1GHZ and to Rex, VK7MO, for their helpful suggestions for both this article and the Excel which have been incorporated.

The referenced EXCEL is obtainable by an EMAIL to W3HMS@aol.com asking that it be attached.

Assumptions used:

1. Antenna efficiency, k, is the standard 55%
2. Frequency is 1296.050 MHz.
3. Dish in meters is feet times 12 inches divided by 39.37 inches/meter, rounded to one decimal place.
4. Wavelength in meters is 300 divided by the frequency in MHz.
5. ERP is CW key down with stated watts at feed.
6. SWR and reflected power loss occurs before the stated power, e.g. 100 watts at the antenna feed point.
7. That all round dishes should be 10 Lambda (wavelengths) or more for the calculations to be valid. Paul nicely added a column to the Excel to show that anything less than this will show in red in both the printed and the on screen versions. Note, for example, that 7.5 ft is 9.7 Lambda.
1. That this Excel shows only the far-field ERP. Rex, VK7MO kindly observed that it should therefore not be used for near-field calculations to meet EMR requirements.

Formula to calculate dBi gain, G_{dbi} :

where:

$$G_{dbi} = 10\log_{10}\left(\frac{k(2\pi r)^2}{\lambda^2}\right)$$

Formula to calculate dBd gain, G_{dBd}:

$$G_{dBd} = G_{dbi} - 2.1$$

where: $k = efficiency$

$r = parabola\ dish\ radius\ in\ meters$

$$\lambda = \frac{speed\ of\ light\ in\ meters}{frequency\ in\ Hz} = \frac{3\times10^{8}}{F_{Hz}} = \frac{300}{F_{MHz}}$$

Formula to calculate dBd gain, G_{dBd} : $G_{dBd} = G_{dbi} - 2.1$

Formula to calculate power gain factor, P : $P = 10^{\frac{GdBd}{10}}$

Formula to calculate ERP : $ERP = kwP$

Where:

$k = efficiency$

$w = power\ in\ watts$

$P = power\ gain\ factor$

Example: Parabola dish is 10 feet in diameter (radius r = 1.5 meters), power is 100 watts at the feed, and frequency is 1296.05MHz.

$$G_{dbi} = 10\log_{10}\left(\frac{k(2\pi r)^2}{\lambda^2}\right) = 10\log_{10}\left(\frac{0.55\times(2\times3.14\times1.5)^2}{\left(\frac{300}{1296.05}\right)^2}\right) = 29.6dbi$$

$$G_{dBd} = G_{dbi} - 2.1 = 27.5dBd$$

$$ERP = kwP = 0.55\times100\times10^{27.5\div10} = 55\times10^{2.75} = 30890.7\ watts$$

Sources for formulas:

http://www.sengpielaudio.com/calculatorVoltagePower.htm
- site provides a calculator to convert DB to watts

http://www.mogami.com/e/cad/db.html
- site shows formulas to covert DB back to watts

Dish feed and spillover at 1296MHz

by John Randall M0ELS
<m0els@yahoo.co.uk>

As some of you know, I have a 2m diameter rfhamdesign, mesh dish in the garden. It was acquired for use at 23cm tropo as well as EME. The feed is a dual 13/23cm ring feed and I have often wondered if there was any over illumination of the dish using it. Not having any test equipment as such, I placed a Nikkai RP80 3 GHz freq counter on my desk and found an indicated signal of about 7 bars, when I transmitted with 150w. The dish is about 3m above ground level and, at the time of this measurement, was facing at a 130 degree angle from my shack. I was quite shocked at the amount of RF that was obviously spilling over the dish.

I decided to try a quick fix of placing a choke ring in the form of a round cake tin, over the feed, so that it was approx 1" below the rim of the feed as per photo left.

The cake tin had to be coerced into the correct size and shape with a pair of tin cutters.

I did the frequency counter test again and found that the signal level had dropped to only 1 bar, indicating less spillover … I hoped! I was eager to do a test with Marcel F5DQK and his reports on ssb showed that the dish was performing better with the choke ring than without.

Of course, the weather has taken its toll on the said cake tin and it will have to be replaced with an aluminium one. I would love to get some decent measurements made but ,with no equipment, it's 'mission impossible'.

I will also redo the test with Marcel this spring.
Has anyone else with this dish and feed done similar tests I wonder.

73 from John

TERRAIN ANALYSIS SOFTWARE

The following link provides a very useful item of software for the amateur microwaver:

http://freegeographytools.com/2007/mapping-radio-coverage-and-viewing-it-in-google-earth