An Amateur Radio publication for the Microwave enthusiast

MICROWAVE NEWSLETTER

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

FROM THE EDITOR

2001 – JUNE

We have had to really "dig deep" this month for material to put in this issue. It seems to us that the UK microwave scene is in semi-hibernation in so far as experimentation and construction are concerned! Surely there are some of you out there who have recently made something or tried out some technique or other? If so you might let us know about it so that your trials and tribulations can be shared by others. Do not be shy! What may be "small beer" for you might be just what another reader was looking for. We are particularly in need of short technical articles with a practical bias.

The influx, into the UK, of over 30 half watt Milliwave power amplifiers for the 24GHz band in January promised exciting times on that band this year. Sadly this has not been the case so far and we are now into the middle of the year and only half a dozen or so PAs seem to be "on the air". It always amazes your editor how some folk can spend a £100 or so on microwave bits and just let them gather dust on the shack shelf! But then again the editor is a Yorkshireman!

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

GET ON THE MILLIMETRIC BANDS THIS YEAR ....

HSCH-9251 Diodes have arrived!

1 off £35, 2 off £31 each, 3 off £28 each, 4 off £25 each and 5 or more £23 each. All price inc UK P&P

Please forward orders to:

Paul Longstaff, G6UAJ,
39 Ermin Street
Blunsdon
Wiltshire
SN26 8AA
tel: 07887 868070

FOR SALE

5.7 GHz 10 W amplifiers ... Mint!

Solid state 10 W amplifiers tuned to 5.7 GHz band in mint quality for sale. Gain > 40 dB. Power supply required: +11 V 8 amps and -9.5 V @ 300 mA. Same factory as the well known 10 GHz amps : MIKOM.
Please email all enquiries to:
Jochen Zilg <mmwave.zilg@t-online.de>

WANTED

2-4GHz sweeper plug in for either the HP8960A or the HP8620A mainframe. Email to **100633.1656@compuserve.com** or phone **01264 738251.**
Peter G3LTF.

3400 MHz Power Amplifiers

A note from Mark, GM4ISM ....
<gm4ism@bigfoot.com>

For those who have had the 3.4GHz PA modules from me, I now have full CCT diagrams and details of how to use the 'on board' bias setting circuitry.

Details will be published on my website
http://www.dc2light.co.uk
I still have some of these power amps available at £75 + carriage(= approx $US 150 shipped).

They are capable of 20W saturated o/p (measured on professional test gear) for 5mW in. Minimal modification is required to run them up. They were designed to run continuously at up to +40dBm (digital wideband data).
No retune is required for operation on 3400MHz/ 3456MHz. The original band was 3476 to 3492 MHz.

USEFUL WEB RESOURCES

Readers may find the following websites of use:

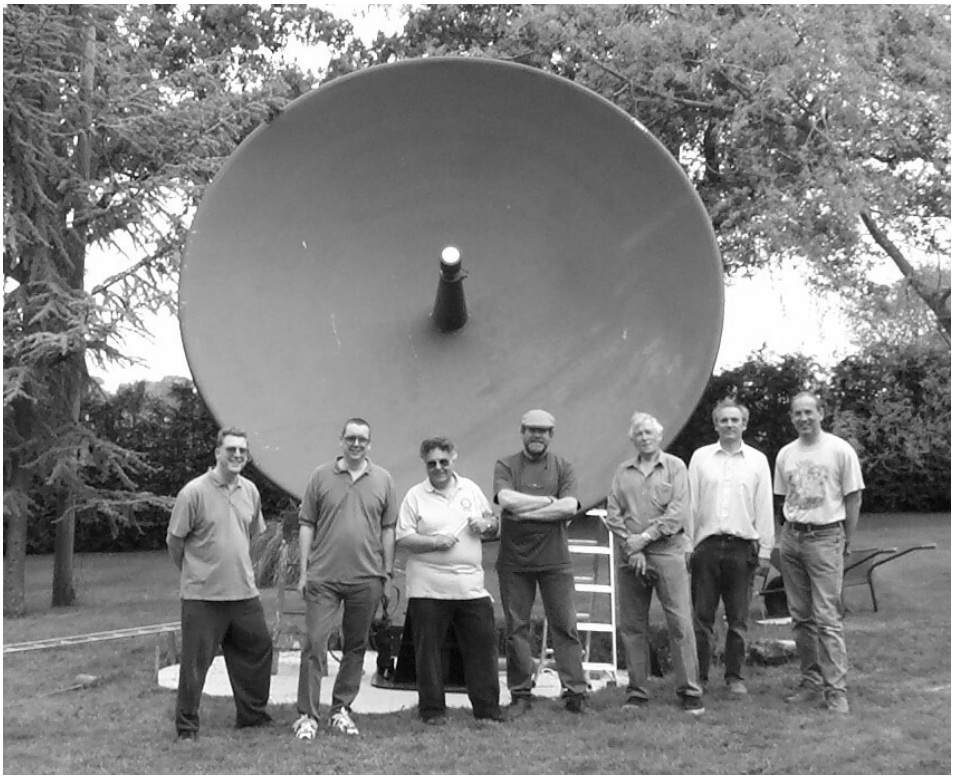
Alex's Electronic Resource Library:
http://www.iserve.net/~alexx/lib/tutorial.htm
This is a veritable "goldmine" of electronics information!

Switch Mode Power Supplies Website:
http://www.smpstech.com/

Free PCB Design Software:
http://www.expresspcb.com/

The free ExpressPCB software is a 3.6MB download but at least it is free!

NOW THAT'S A REAL ANTENNA!

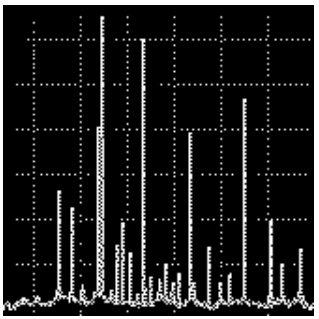


This large, 3.7 metre diameter, dish was installed at the home location of Brian Coleman, G4NNS, during early June this year. It is one of three dishes originally used by satellite TV "guru" Steve Birkhill at his business premises in the Derbyshire Peak District and very generously offered "gratis" (complete with mount and rotation gear) to the microwave fraternity last year. Brian was quick off the mark to obtain the larger dish for his microwave EME experiments.

The helpers pictured above were various local microwavers and members of the Andover Radio Amateurs Club from left to right: Julian G4UET, Peter G0WQS , Rick G8NDN, Garry G4UED, Del G1JRU, Andy G6JRS and Neil G4LDR.

Brian hopes to hear his 10GHz echoes off the Moon in due time and Newsletter readers will certainly be looking forward to reading about his future exploits and DX contacts.

Congratulations to Brian and the team of helpers.



VERSATILE MICROWAVE MARKER GENERATOR

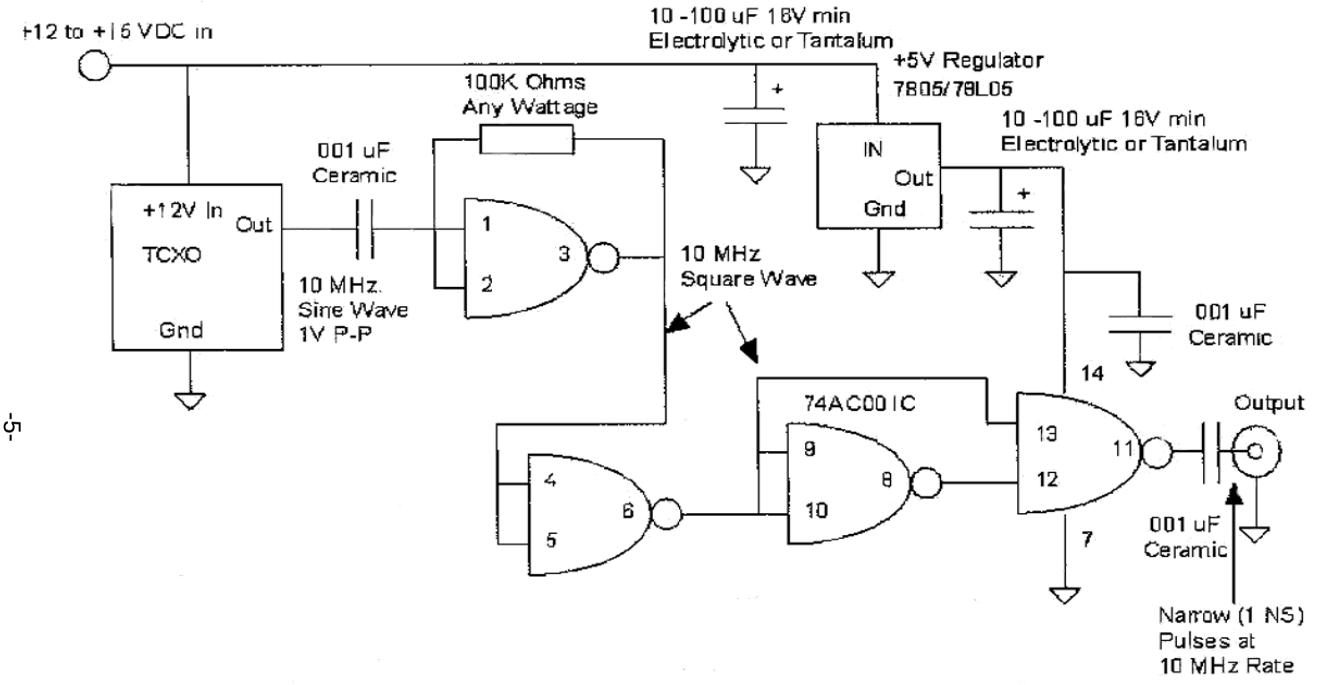
The circuit shown on the opposite page was designed by Kerry Banks, K6IZW, and previously published in the San Bernardino Microwave Society newsletter, which we gratefully acknowledge as the source of information. It is a very simple comb generator that produces low level marker signals every 10MHz, from VHF through microwave frequencies. It could be useful for experimenting and when testing equipment, providing reference points at regular intervals and at a rate more frequent than the normal references which are often based on a starter frequency of 1152MHz.

The 10MHz TCXO in the original design was a surplus Qualcomm item. These devices are available at low cost from Chuck Houghton, WB6IGB (who has supplied many UK operators with 1 watt Qualcomm 10GHz amplifiers) by emailing him at: **clhough@pacbell.net**

The TCXO drives the circuit, producing 1 nanosecond pulses at 10MHz intervals. If the output is amplified in a simple external broadband MMIC amplifier, you could observe a "comb" of signals with a spectrum analyser. Pass this spectrum through a filter and observe the output on the analyser to assess the filter's passband.

In the circuit shown please note the following:

- The Qualcomm TCXO requires +12V but may be substituted with a lower stability TTL Clock Oscillator if the supply voltage is run off +5V.
- The logic IC 74AC00 must be used as other CMOS logic families are too slow.
- * the .001uF capacitor on pin 1`4 of the 74AC00 to ground must have the shortest leads possible.
- The output can be connected to coax or a small piece of wire as an "antenna".
- Changing the output capacitor to a small value such as 1pF reduces low frequency harmonics.


+12 to +16 VDC in
10 -100 uF 16V min
Electrolytic or Tantalum
+5V Regulator
7805/78L05
100K Ohms
Any Wattage
10 -100 uF 16V min
Electrolytic or Tantalum
001 uF
Ceramic
+12V In
Out
TCXO
Gnd
10 MHz.
Sine Wave
1V P-P
IN
Out
Gnd
10 MHz
Square Wave
001 uF
Ceramic
14
74AC00 IC
Output
001 uF
Ceramic
Narrow (1 NS)
Pulses at
10 MHz Rate

CIRCULAR WAVEGUIDE ~ the truth!

~ by Dick Nadle, K2RIW

Editor's comment: This article was written in 1999 after a series of practical experiments undertaken by Dick and his friends on Long Island. It appeared in print in the North Texas Microwave Society newsletter "Feed Point" in August 1999 and was also disseminated among those subscribing to WA1MBA's internet microwave reflector. Our thanks go to Dick for giving us permission to reprint this most interesting information. The 3/4" pipe Dick used in these experiments is available over here as 22mm (19mm internal diameter) copper pipe.

1. INTRODUCTION -- I've received 8 e-mails, with some nice words of encouragement, about circular waveguide. There seems to be a thirst for knowledge on this subject -- the "poor man's" high performance WG. Some people wanted the extra decimal places and some wanted more description of the 10GHz 3/4" copper pipe experiments of "The Ten-X Group" on Long Island. In 1997 we burned a lot of "midnight oil" at the QTHs of N2LIV (Bruce, the president) and N2NKJ (Ron) while performing the pipe WG experiments. On the fourth night in three weeks, we again ended our experiments (with blood shot eyes!) as the sun was rising; we then knew we were pretty serious, or a little crazy, and that circular waveguide was great stuff.

It was the Shepherd's Crook Dish Feed assembly of the San Bernardino Microwave Society (WA6EXV design, I believe) that got us started in the experiments. At first, there were a few East Coast microwaver's who thought the 3/4" copper pipe WG feed assembly, with four elbows, would have high loss .... we found that it actually has about as low a loss as you can get.

2. CIRCULAR WG FREQUENCIES -- If a 3/4" water pipe had exactly 0.7500 inch inside diameter, it would support the TE11 circular mode (the dominant mode) between the absolute min/max frequencies of 9.225 GHz and 12.045 GHz. *(The UK's 19 mm ID pipe will have cut off frequencies of 9.25 and 12.08 GHz .... editor*)

Here are the first 6 cut-off, "absolute" frequencies (no guard bands) for 0.7500" ID pipe:

Frequency (GHz)	**Mode(s), Circular**
9.225 to 12.045	TE11
12.045 to 15.301	TM01
15.301 to 19.192	TE21
19.192 to 21.053	TE01 & TM11
21.053 to 28.002	TE31
Above 28.002	TM21

Some day I'll explain where all the extra digits are coming from. We've devised a way of getting Bessel functions to 12 decimal places; I was on a project that needed that.

3. FREQUENCY SCALING -- Once you know the ID of your "pipe", you can scale all these frequencies. So-called 3/4" water pipe comes in K, L, and M styles where each has a different wall thickness and slightly different ID. There are also multiple kinds of soft copper pipe, as well as some corrugated pipes, that will make great "semi-rigid" waveguide that can be bent around corners. You can measure the exact ID of your pipe with calipers and inversely scale all the above frequencies accordingly (bigger diameter is a lower frequency for each mode). If you intentionally deform the soft copper pipe with a good roller mechanism, you will make "poor man's Ellipto-flex". Ellipto-flex has a very slight loss increase (for the same circumference) but it forces a particular polarization, and has a slightly wider frequency range for the dominant mode .... more on ellipto-flex at another time.

The mathematics called Bessel functions predict FM modulation and circular WG characteristics. Most of the books on circular WG are not very clear. One kind of Bessel function, of multiple sets, predicts the TM circular modes and the other kind of derivative Bessel, of multiple sets, predicts the TE circular modes. There's got to be a better way that "they" (or we) can explain all this.

4A. BOOK #1 -- The best reference I've found on the subject (I had to read the circular WG section ~ 10 times) is Theodore Moreno's "Microwave Transmission Design Data", Dover Publications, 1948 (original), 1958 reprint, available for $8.00 at ABEbooks.com.

4B. BOOK #2 -- Concerning WG components, here's THE BOOK: George Southworth, "Principles and Applications of Waveguide Transmission", D. Van Nostrand Co., 1950; 689 pages (an oldy but goody). It contains some of the best PICTURES of how rectangular and circular WG really works with lots of performance curves (you won't need the math to understand the pictures (pages 166 & 169), it's almost an animation) -- amazing stuff for 1950. Page 121 (A & B) has pictures are 21 of the circular WG modes (with the relative sizes of pipe shown, same frequency) made with an "RF absorbing camera".

The book shows some great transition devices, hybrids, mode killing devices & devices for launching higher modes (pages 354 to 362), round WG components (pages 269, 327 & 328), circular guide fin line (page 133), a great section explaining choke flanges (page 201), a circular pipe polarization rotating device that's "home brewable" (page 207), the shapes of circular and rectangular WG (of constant periphery) that give minimum loss (page 193)(the popular ones are not optimum), "skeleton WG" (page 175), about 15 kinds of WG irises (page 246 & 255), circular WG filters (page 307), the Qualcomm duplexing filter explained (page 309); linear, binomial, gaussian, and exponential WG impedance stepping functions for broadband impedance matching (pages 269 to 276), 14 designs for dummy loads (pages 368 to 371), about 25 attenuator designs, rotary vane phase shifter (page 333), rotary vane attenuators defined (page 375), a way of designing a variable conductance dissipative film (page 377), 33 pages of horn data (only portions have appeared in other WG or antenna books), 8 kinds of "backfire" feeds including the Cutler (pages 448 to 454), eight types of WG slot antennas (pages 425 & 430), five kinds of corner reflectors, waveguide lens antennas, some TWT and magnetron info, etc. The picture on page 186 shows me how

I could make S-band waveguide out of rain gutter down spout tubing. Let a microwaver stand in a good hardware store with that book in hand and I think he'll get some great and crafty microwave ideas!

5. SAME WAVEGUIDE MODES -- It is interesting to note that the main pipe WG mode, TE11 circular, and the main rectangular WG mode, TE10 rectangular, are the exact same mode. They use a different definition of the subscripts for circular and rectangular that makes them look different but they're not. Once we realize this it becomes easy to construct (HOME BREW!) devices that transition from rectangular to circular. We of the Long Island "Ten-X Group" of microwavers did a fair number of experiments in this area a few ago. Here are some of the results.

6. RECTANGULAR TO CIRCULAR TRANSITIONS -- Our "Elegant Transition" was a carefully constructed slow transition (over a 1 foot length) from rectangular to circular. It had an S11 of -35 dB (VSWR = 1.04). A "sloppy transition" was made by crushing one end of a 3/4" copper pipe in a vise and forcing it into a WR-90 WG flange *(WG16 flange in the UK ..editor).* It had an S11 of -23 dB (VSWR = 1.15). To make these measurements we used a Super WR-90 (UK WG16) 20 dB coupler (50 dB of directivity)

7. DUMMY LOADS -- In circular WG, these are quite easy to construct. Simply sharpen a 3/4" broom stick handle and force it into the 3/4" copper pipe. About 3" of taper and 2" of non-taper is fine. The usual moisture in the wood makes a great "slow absorber", which makes it more forgiving of errors. The main difference between a -35 dB S11 dummy load (VSWR = 1.04, [sharp tip]) and a -20 dB S11 (VSWR = 1.22) seems to be how sharp the point was at the tip of the broom stick handle and was the taper too abrupt (too short). There may be some variations caused by knots in the wood, but we didn't seem to have that problem.

The completed circular WG dummy load consists of a ~ 7" piece of 3/4" pipe with the tapered broom stick handle (absorber) in it plus a copper pipe coupler at the open end. Some of the broom stick absorber can stick out the pipe far end, if you prefer. It is easy to place this load on any other piece of circular WG, while running component tests. These pipe couplers really are "sexless" connectors. For experienced rectangular WG users, it will feel strange to make connections in 2 seconds and not worry about screwing down the flanges to get a good VSWR!

8. LAUNCHERS -- A circular WG to SMA launcher consisted of a 3/4" copper pipe end cap, soldered onto ~ 1.5" length of 3/4" copper pipe and an SMA Female to Female (bullet) is fed through a hole in the side of the end cap plus pipe, ~ 1/4 wave away from the closed end (it is either threaded into the end cap and use a nut, or simply solder it). A ~ 1/4 wave long wire probe inside does the launching. A pipe coupler is slipped over the 1.5" length of pipe that protrudes. The completed launcher can be placed on any piece of circular WG in 2 seconds by the "sexless" connector (pipe coupling) method.

Proper adjustment of the position, tilt (forward and aft), and length of the probe wire is a bit tedious. Place a circular WG load on the launcher output and measure the VSWR at the SMA connector to find the proper probe length; it's an

unambiguous operation. Once you get the hang of it you will make quite a number of launchers at once. The one component of the launcher that costs anything is the SMA bullet.

9. PADS -- We never did this but it would be easy to design circular WG fixed attenuators by decreasing the length of broom stick absorber and tapering both ends to have a good impedance match from either direction. In this case I would recommend painting the absorber to keep the moisture content (absorption) constant.

If it is found that the loss is too great for a convenient length of tapered wood absorber, consider making the absorber out of six “splines” by using thin sheets of wood, or out of balsa wood. These low density materials (with tapered ends) will allow a lower insertion loss to be constructed from a longer length of wood absorber. Also, the slower loss characteristic will cause a lower VSWR for a particular taper rate.

10. COUPLER (SEXLESS CONNECTOR) -- There is a kind of copper pipe coupler that has no internal ridges or dimples. These will allow the 3/4" pipes to directly touch (butt against each other inside the coupler) without any gap. A gap will have a larger inside diameter, within the coupler. Even with a gap, the VSWR impact was very small. If these couplers are unavailable, a purist can remove the ridges or dimples with a round file or an adjustable reaming tool. However, you will find that the molded copper fittings are hardened and the reaming/filing operation is a quite difficult.

11. OTHER COMPONENTS -- We discovered that many of the hardware store 3/4" plumbing fittings were almost "designed" for us microwavers. A 45 degree elbow and a 90 degree elbow gave us VSWR's of ~ 1.3 and 1.4, as I remember. The copper pipe "coupler" makes a great trombone and polarization twister. The end caps are a great way of constructing 3/4" circular WG to SMA launchers. When the circular WG components are properly plugged together with these "sexless" connectors, we haven't found any fittings that change significantly in VSWR as you do or do not solder them. Test everything by plugging them together, solder them later. Soldering seems to only be required for mechanical reasons.

You will find that many circular WG components are **VSWR sensitive to rotation** (at the sexless connectors). Many circular WG objects can create elliptical polarization. Southworth's book covers this subject on page 206. A liberal sprinkling of septums within launchers, horns, etc. will force a linear polarization at the output point (usually without loss) and they insure that the elbows and other non-symmetric components don't create elliptical polarization. A septum consists of a thin sheet of metal soldered across the diameter of the circular WG at right angles to the desired polarization.

A screw protruding into the guide makes a great way of correcting VSWR; however, depending on its polarization, it could also create some elliptical polarization -- so use a septum in the vicinity of the circular WG output. Find the best location for the screw by using a steel BB inside the WG and positioning it with a magnet on the outside.

Copper transitions from 3/4" to 1" and 3/4" to 1.5" make nice feed horns. A 3/4" soldered-pipe to threaded-pipe adapter makes a convenient flange for the center

of a dish antenna. That's where you feed the Shepherd's Crook 3/4" circular WG through the dish. Two large washers and a large nut can hold this assembly in the dish center. It is also possible to mount a copper 4 hole flange to the back of the dish center and feed the round WG through it. In each of these cases it will be necessary to ream out the shoulder within the fitting to allow the 3/4" pipe to pass through the fitting. We purchased a mechanically adjustable ream to accomplish this. The operation was quite difficult because of the hardening of the molded fittings. With a lathe this operation was a lot easier, when there was enough metal to mount in the lathe chuck.

12. WG POLARIZATION -- I must give you a warning! If you are using a long length of pipe as WG up your tower (K2TXB and W2DRZ did this), the ellipticity of the pipe (the "run out") could cause a horizontal polarization, launched at the bottom, to become a vertical polarization at the top of the tower (the polarization can rotate). By simply rotating the launchers at the top and bottom of the WG, you will find the lowest loss combination for that "pipe WG"

There is also this added danger ... when you are in your Home Depot Hardware Store, with your calipers, while buying 10' lengths of pipe that have no run out, you will find the following: (1) one pipe in 3 has almost no run out, that's the ones you want to buy; (2) The Plumbing Department Foreman will watch you during this process and he will say, "Oh no, another one of those crazy engineers who's doing a precision plumbing job in his house!" You will have to suffer some ridicule in the pursuit of your art. You probably will not succeed in explaining what you are really doing, just remember -- you're tough and can take this ridicule, you are pursuing a far off goal, that great 3cm DX!

13. CIRCULAR WG DISH FEEDS -- For a 0.6 F/D dish, the W2IMU Dick Turrin dual mode horn intentionally launches the TE11 and TM11 circular modes at just the right amplitude ratio and relative phase. That's what gives it such a beautiful pattern ... no edge currents, no sidelobes and great control of the electronic phase center versus azimuth, elevation, or diagonal scans. Any shift in the electronic phase center of a horn versus observation angle creates the same antenna pattern degradation as if you had the same amount of error (like a big dent) in that area of the parabolic reflector it is illuminating. With this understanding, it becomes more obvious why this horn achieves higher dish efficiency. For deeper dishes (~ 0.3 F/D) the Scalar feed (the one with the multiple rings) does almost the same job.

But, be careful. The W2IMU multi-mode circular horn can get a microwaver involved in an altercation or a law suit. I constructed my 2287.5 MHz W2IMU horn from food cans for Apollo 15 and 16 reception "Houston This is Apollo" (QST June 1972) and "A 12 Foot Stressed Parabolic Dish Antenna" (QST August 1972). I measured the diameter of all the food cans in the local super market. The store manager became alarmed. and asked me to leave. He thought I was a Ralph Nader advocate and was about to start a litigation (I had to endure ridicule way back then too). I settled on Scotts Oatmeal cans, purchased from a Foods of All Nations Store; they had the correct diameter for the launcher and RHC polarization section.

14. CONCLUSION -- I hope you all enjoy the above info. There are a few more

10.368 GHz 3/4" copper pipe experiments to be described later. Please feel free to correct the errors or add to the info.

73 and good SHF Dx, from Dick, K2R1W, FN30HT84DC27
< rknadle@suffolk.lib.ny.us >

NEWS FROM THE WORLD OF COMMERCIAL MICROWAVES

APPCAD

Those of you who design and test your own microwave equipment may already be familiar with Hewlett Packard's Appcad software. Originally published as a DOS-based suite of programs, it is now freely available in Windows 95 and later PC-based operating systems by going to the following: **http://www.hp.woodshot.com**. Appcad is very useful in the design and analysis of microwave RF circuitry that uses Agilent (HP) Technologies' silicon and Gallium arsenide ICs and discrete semiconductors. The latest version of the user-friendly software provides a wide range of facilities that should gladden the heart of any microwave experimenter.

WWW.EG3.COM is a dedicated electronics Internet search engine. It indexes a variety of interesting engineering resources. For example, by just typing in a keyword (eg DSP for digital signal processor) up will come a range of links to relevant sites. This search engine provides access to a plethora of hardware, free software, papers, application notes books and the like.

ADS is the abbreviated name of the **ACTIVE DENIAL SYSTEM**, a new, non-lethal, radiation-based crowd control weapon! The May 2001 issue of Electronic Engineering has a page of interesting information, with pictures, of this literally 'mindblowing' equipment. The basic idea is to target two second bursts of high intensity 95GHz microwave radiation at the human recipient. The equipment has already been tested on adults and animals by the US Marine Corps and it is claimed to have only a temporary effect on the persons at whom the radiation is aimed! The 95GHz energy heats the human skin to a depth of 1/64th of an inch and to a temperature of 130 degrees Fahrenheit. The person then experiences a burnng sensation which supposedly encourages them to retreat! It is claimed the equipment has a 700 yard range. Experiments have been carried out using a fixed antenna but the aim is to use mobile systems consisting of a vehicle carrying a roof mounted, offset fed reflector. The computer diagrams of the antenna give one the impressiion that the reflector is either a flat plate or, at the most, a very shallow parabola. The future is now .....!

(Many thanks to Steve, G4KNZ, for these interesting news items ...editor)

David, GM4JJJ, very pleased to work G3PHO/P on 3cm during the May 10GHZ cumulative. David was not fully equipped to make a 2-way out it but nevertheless found it nice to hear over that distance. He writes:
I remember the 70s when we (a GM wideband 10GHz group) broke the European distance record with a contact of 322Km (using 10mW WBFM and super-refraction) and I never dreamed that we could do that over land from the home station. I have given up on going portable on 3cm ... too much effort putting a decent VHF/UHF talkback portable station as well as 10GHz. I had plenty of that in

WHERE ARE THEY NOW?

Microwavers come and go but lately it seems that more have gone than have come! The following list started out as one containing over 200 callsigns which the writer had either heard or worked on microwaves since 1981. The list is now, after some research, about half of that but it still represents an alarming commentary on the way microwave activity has declined over recent years. The excess of output over input is too great. A visit to any large gathering of amateur microwavers leaves one with the feeling that we are a dying breed! Grey hair, white hair or no hair and conversations about retirement and old men's problems are all there at such meetings! With all due respect to the few 'youths' like G4JNT, where are the young microwavers these days? A look through the writer's bound volumes of RadCom 1975-79 brings forth photographs of keen young, bright-eyed versions of folk such as G8ACE, G3YGF, G3WDG, and the like. These worthy gentlemen are, thankfully, still with us today but have they been followed by the keen young microwavers of the 21st century ...certainly not!

We need everyone, presently engaged in amateur microwaves, to spread the gospel far and wide that microwaves are FUN and worth getting involved with. Dispel the myth that you need a PhD in electronics to make and operate microwave gear. Go out to your local clubs and show them how to get onto microwaves with simple gear. Cast aside the aloof attitude that pervaded the formative years of 10GHz narrowband ... the attitude that narrowband is the ONLY way to go. **You** know it isn't the easiest way to get operational on microwaves so why not say so to beginners?

Much of the following list includes microwavers who fell by the wayside when the rest of us went narrowband. In many cases they felt we had deserted them because their simple wideband gear was kids' stuff. We lost a lot of keen people in the late 80s and early 90s. If you know of the whereabouts of some of those listed, please inform the Newsletter. Even better, if you are in contact with them, ask them to return to the microwave fold.... we need them and they are welcome, wideband gear and all!

WHERE ARE YOU NOW? ....

G0DJA, G0BTA, G0ERK, G0BPU
G1GHZ, G1HWJ, G1AEF, G1DRC, G1MPW, G1IMY, G1MUW, G1RLR, G1BHQ
G2DSP
G3MZU, G3OXL, G3ZFP, G3WFK, G3NKL, G3AYJ, GW3IDZ, GM3WIL, G3MWN, G3NNQ, G3RSD, G3CU, G3XJY, G3KPT, G3ZIV, G3MWQ
G4XDM, G4GMV, G4OIG, GI4SQL, G4UQI, G4IEV, G4AGE, G4APV, G4FHQ, G4FPV, G4ANP, G4UXF, GI4WWZ, G4IHZ, G4LQL, G4KXV, G4KZP, G4EQD, GW4JJW, G4LXO, G4LOJ, G4PCS, G4OIH, G4TXG, G4UFS, G4LWK, G4OLO, G4ELM, G4EML
G6HZJ, G6ZBV, G6NVS, G6BFV, G6UED, G6CJW, G6FIO, G6CMS, G6YBC, G6LIC, G6CSD, G6NBY, G6DQO, G6IRJ, G6EWZ, G6ZGP, G6MEN, G6HHV, G6ZFZ, GW6NVC, G6WOK, G6URP, G6IGM
G7ANA
GW8AGG, G8KQW, G8HMV, G8SWZ, G8MWR, G8GUH, G8CZE, G8CXK, G8AZA, G8UGL, G8ALS, G8EBM, G8NXV, G8RSZ, GI8AYZ, G8RDX, G8FWA, G8PX, G8AFC, G8PNL
2E1AIZ, 2E1AJE

OF COURSE, WE ALREADY KNOW THE WHEREABOUTS OF G3PFR, G3YGF, G8AGN, G8KMH, ... !

ACTIVITY NEWS FROM THE WORLD ABOVE 1000MHz

the 70s and would like to try and exploit the other opportunities afforded with higher power and narrow band modes from a home station. Actually when I think of it, we didn't have any talkback when we made that 322Km QSO !!

There have been a few stations on in GM over the years. I think from this QTH, since 1995, I have worked GM4ISM, 4PLM, 8BJF, 4DIJ, 4OGI.

For my home 3cm station I propose to put a 60cm offset dish with feed mounted Solid State PA and Preamp (This will need a strong support arm and 2 extra struts to support the weight of the box). The dish will use a Sat TV Horizon-to - Horizon rotor for azimuth (180 degree travel). It will be mounted on a pole offset from the head unit of the tower.

Elevation will be a very small Sat TV actuator arm mounted so that it can push the bottom of the dish out a little. I hope that transverter will be mounted inside the garage and only 144MHz being fed from the shack in house. Plenty of drive power available will allow H103 coax to be used to feed 10G up to dish from transverter.

Things may change ... I may opt for a rear fed dish if the offset idea proves troublesome or ungainly.

The tower will luff over at the rear of the garage (I have to check clearance from my main tower). All this is very tight and also one has to get clearance from the "management" !

Up here in Scotland there has been a slight revival of interest with both GM4OGI and myself (GM4JJJ) getting their gear for 10GHz going again. During the lift of Mid May, Nick GM4OGI worked into OZ with his 250mW SSB on
3cm. Unfortunately GM4JJJ missed out because of work commitments just at the time the band opened! In any case, the 3cm gear was not working as well as it could be since the lead acid batteries were U/S, again. I am in the process
of rebuilding the gear to incorporate a 3.5 watt PA and also hope to improve the LO stability.

Nick, GM4OGI, has an excellent take off to the East up the Forth valley to OZ/SM and has 1296MHz talkback. Unfortunately I don't have the same sea path take off and have only 144MHz QRO talk back and 432MHz to a limited extent.

We plan to build a beacon for 10GHz to beam at OZ/SM for studies of the sea path ... Probably 200mW to a horn.

Brian, G4NNS (Andover) didn't think activity was too bad for the May cumulative contest considering the on-going restrictions. He had 18 and a half QSO's which is not bad from his far from ideal home location.

The following weekend the Brian and his wife visited friends Christian, F1DLT, and his XYL Josiane, near Besancon in JN27. On Sunday, 3rd June, they went to Christian's radio site at the Roche of Morey in JN27UR. Activity was low on 2m but they could hear the HB9G beacon from JN36BK on 10368.884 at 59+ and the Dijon beacon F1XAU on 10368.825 from JN27IH at 57. After a few calls F1ANH Jean-Pierre came back from IN88MR at a distance of 650Km. Brian was struggling with the 2m talk back as they only had 150W and no Pre Amp but they heard Jean Pierre's signals briefly on 3cm and even managed to make a short recording of them. Jean Pierre was running about 10 watts to a 3m dish so they were not too disappointed when they did not complete a contact with their 800mW and 40cm dish. The propagation mode appeared to be aircraft-assisted tropo with some
doppler shift evident.

Later they contacted Arnold HB9AMH who was at his home location (JN37QD). Arnold suggested they try reflection from the Jung Frau at JN36XM, 215Km from Brian and Co, and 82Km from him. Reports were exchanged and another recording made. They also tried a QSO with Ferdinand HB9MIO, again by reflection ... signals were exchanged in both directions but

reports were only exchanged in one direction as conditions seemed to fade and they ran out of time.

Christian also mentioned that there is a high power beacon from JN09WI running 200W ERPI on a frequency of 10368.842.

Finally, Brtian would like to add his voice to the call for earlier starts for contests as we are missing out on early morning conditions to the continent and on their activity patterns which is typically much earlier than ours. Says Brian, "I know the problems that this causes /P stations but perhaps their hours could stay unchanged."

From: Neil, G4LDR, in IO91EC, [g4ldr@btinternet.com]

Firstly the **May 10 GHz contest:** Conditions to the north seemed very poor but above average to the south into France. Best DX of the twenty stations worked was F5HRY in JN18, the distance being 393km with 52 reports each way. (F5HRY was also worked on 6cm for the best DX on that band so far this year).

Secondly the **June 24GHz and up contest:** Progress has been slow in getting the 24 GHz system built. I now have both the half watt PA and a preamplifier but no way yet of remote switching between transmit and receive. With no local activity expected I opted to install the transverter with the preamplifier onto the 90 cm dish. An attempt to hear Peter, G3PHO/P over the 218km path from Alport failed. 3cm signals used for alignment were peaking 59 at the time. Following the attempt with Peter, Dell G1JRU called me. I soon found Dell's signal on 24GHz which was a steady 59. We then proceeded to have a duplex cross band contact for almost an hour, much of it using NBFM. Dell's output power was about 100 microwatts and the distance between the two home stations 36 km.

I am hoping to have the full 24GHz system, RX and TX working in time for the multi-band contest on the 24th June.

73 from Neil, G4LDR

From: G3XDY [g3xdy@btinternet.com]

Writes: Conditions here in East Anglia have been pretty good for quite a bit of the past month here.

I was only able to be on for part of the May UHF & up contest due to other commitments, but managed to work a few PA, ON and DL stations on **1296MHz,** best being DL0WR in JN39 at just over 500km. On **13cm** DJ6JJ in JO31 at just over 400km was the best DX, and on 3cm I made 9 QSOs, with the best being ON4CP in JO20 at 275km. Conditions were unexceptional.

Tropo was good on several occasions during May, starting from the 9th May with OZ1FF in JO45 putting in a good signal on **1296MHz.** G6DER was worked on **2320MHz** CW. On the 10th the **10GHz** path to OZ1FF opened (600km), and again the following day. LA6LCA was worked on **1296 and 2320MHz** on the 11th as well, but nothing was heard either way on **10GHz.**

On the 12th propagation moved around to give good QSOs in the morning with F6DKW near Paris on **1.3 and 10GHz**. The Netherlands had their Isselmeer Contest later that day but conditions across the North Sea were poor, resulting in scratchy QSOs on **10GHz** with PE1MMP and PE1PFW/P. By the evening tropo conditions had improved again to allow a **1.3GHz** QSO with GM4LBV by backscatter from the Dutch coast.

The 13th saw some rainscatter to the West, with G3UKV and G4PBP worked, whilst tropo continued to the East on **1.3GHz** with stations in JO44/JO45 worked.

It was nice to have **a first QSO on 10GHz** with John G4BYV by rainscatter on the 15th.

By the 22nd, tropo was building again, with Keith G6DER worked on **10GHz** for the first time.

On the 23rd DG1KJG (JO30) and PA0BAT (JO31) were worked on 10GHz. Beacons DB0JK, PA0TGA/A and ON4RUG were coming through well.

On the 24th ON1ALJ was worked on **10GHz** for his first UK QSO, and a test with DL3YEE in JO42 was successful on **2320MHz**. The evening was rounded off by SM6CEN on **1.3GHz.**

I was on holiday in France for the following week, **missing the first 10GHz Cumulative** as a result. It is a pity I did not have any gear with me as conditions in JN05 looked very good judging by the co-channel interference on the TV!

The first weekend in June was a field day event in France and a microwave contest in Germany but conditions were very average. Best contacts on **1.3GHz** were F6KCP/P in JN18 and DL0PVD in JN49. ON7WR (JO20) was worked on 3 bands.

I hope to be on for the **All Band and 10GHz Cumulative contest on the 24th June**, maybe see you all then on 1.3/10GHz.

73 de John G3XDY

From John, G4EAT, < g4eat@yahoo.co.uk> in Essex, comes this report:
May 10th: heard east coast locals working OZ1FF on **23cm** giving 5-9 but he was 21 with me.

Next day, 11th, Kjeld OZ1FF answered my CQ on **1296MHz.** 5-9 each way. Immediately went to **10368MHz** and 5-5 each way for my best DX of 656km. Signals peaked 59 and 10 minutes later back to noise.
OZ1FF is situated right on the coast and so a sea duct was the main propagation mode but I needed to also overcome 50km+ of terrain.
73 from John, G4EAT

Antenna request

I am looking for an omni directional 10GHz antenna for use in an occasional personal beacon. A six or seven (pair) waveguide slot would be ideal but I do not having the engineering facilities to make one.

It is intended that this beacon can be set running during activity days/ cumulatives from Portsdown Hill where I have full telecommand of it over a phone line until GB3SCX comes back on line. (Or until other powers-that-be put a stop to it !!)

The beacon will be running during the cumulatives but, initially, into a horn with about 35 degree beamwidth and pointing roughly North West from IO90KU56. Frequency (not checked yet) should be 10368.900, replacing the currently off air GB3SCX. The beacon is repeatedly keying : "G4JNT/P BCN IO90KU56 TEL 01489 787424"
Andy G4JNT, QTHR or email to: ACTALBOT@dera.gov.uk

Ralph, G4ALY (Cornwall, IO70UL) emails this report: I have now completed the 23cm station. It consists of a DB6NT transverter driven by a Yaesu FT290Mk1, a 50 watt solid state linear amplifier (see GH Engineering amplifiers), 2 X 27 element JVL loop yagis stacked vertically with an SSB masthead preamp and sequencer mounted 1 metre from the aerials. Heliax 450 feeder goes down to the shack on a 25 ft run. (The shack is upstairs and the mast is right outside the window, the coax being fed through an air vent). I do have a 67 el Wimo yagi which will find a home on a mast soon but it requires top of the mast fitting and that here is in short supply. On the 4th June I worked G4LDR and G0RRJ AT 206 Km. I can now hear the Martlesham beacon quite clearly most of the time and the Isle of White beacon all the time. St. Austell of course end stops.

The next project is 13cm. I have all the component parts including aerial and a 2w solid state brick. Also I have a pair of 2C39s for this band but not sure yet if this amplifier is still operational. I will have have the choice of either a 67el wimo or a 45 el JVL loop yagi for that band.
Talk back antennas are now in place ... 13el 2mtr with masthead preamp anda 21el 70cm with masthead preamp. I am able to hear Peter, G3PHO/P on 144MHz from my home when he runs 10w with a 3 el beam.

On June 16th, at 2018, I heard PA5DD at 1158km at RS51 with qsb. He heard me but I didn't get a report due to conditions. This was confirmed on DX Cluster on the Internet. Then G8TOK in JO01 heard me I gave him 5 and 1 with qsb too but never got a report back! There were pings and then gone again.

Finally all that is be left to do is get into gear and get the 3cm dish on the mast!

News from South Birmingham, via Ian G8IFT <g8ift@sbrs.org.uk>
Members of the club spent a large part of the May Bank Holiday weekend working on the GB3OHM beacon and the various club aerials. Access is difficult, hence a platform was hired for the long weekend.

GB3OHM: The slot antenna has been suspect for some time. This time a test range was set up in the car park and the slot antenna was adjusted for best gain, then match optimised. The measurements made seem to indicate a

significant increase in gain. Reports would be most welcome c/o g8ift@sbrs.org.uk

10 GHz: a 0.6m dish plus transverter (4 watts) has been installed so expect to hear G8OHM on during contests and during club activity nights of Mondays (that's a bit of luck!) and Fridays.

5.7 GHz: four horns have been installed, for a possible future beacon but, until then, operation will be possible using them. I have 15 watts available but notice is required for skeds as the club has no equipment

And to show it was not all microwave, we also re-installed the HF vertical for 14 to 28MHz and a Windom for 1.8 to 29 MHz.

Regards Ian G8IFT

David Wrigley, G6GXK (Rochdale) tells us that he has built up two receivers following Mike Scott's design in last month's Microwave Newsletter, one for Droitwich and one for MSF. They both work extremely well. Tuning caps need to be reduced significantly for Droitwich (David used 150pF, 220pF, 150pF and 220pF in that order).

Peter, G3PHO (Sheffield) found excellent microwave propagation on May 24th when interference to terrestrial TV alerted him to a fine tropo opening to the Continent. 23cm produced a number of German stations and beacons at good strength from 2000GMT on. DL5LF (JO54AF)was worked on 23cm and an attempt was made to work him on 10GHz but no signal was heard. Seconds after finishing with DL5 at 2032z, a VERY LOUD signal was heard on 10368.100MHz. This turned out to be DC6UW who was "end stopping" on Peter's IC202S I.F !! A 5/9+++ contact both ways ensued over the 748km path. Both stations marvelled at the strength of the signals, especially as Peter was using an indoor 60cm offset dish with his 5 watt transverter ! A return to 23cm produced DL8OBU (JO42XI, 777km), DL3YEE(JO42GE, 688km) and DG6JF/P (JO33QN, 587km). Peter looked for DL3YEE on 10GHz but nothing was heard. An early rise (0530z) the next day found Peter hearing 23cm beacons DB0VC, DB0IBB, DB0JO and PI7QHN all at good strength. OZ2LD (JO54TU, 869km) was worked at S8/9 both ways. PA0EZ and GB3MHL were also evident around 0700.

"Pour encourager les autres" Peter admits to running just 15 watts on 23cm to an indoor 23 ele yagi and 5 watts to an indoor 60cm dish on 3cm! He is a 99.9% portable operator, the home location being useless in every direction save East and thus he does not feel it worth the time and expense of installing home station microwave gear for a few contacts a year.

G3PHO/P was also out in the first 10GHz Cumulative of the year, held on 27 May. He found the grass layby at Merryton Low Triangle (IO93AD51) free of Foot and Mouth restrictions and so set up for the day. Of the 40 or so stations operational that day, he worked 25 of them, the best being G4ALY/P (Kit Hill, IO70UM). It was most gratifying to find G0EHV (Newcastle) and two Scottish stations active, GM4JJJ (IO86GB) and GM4OGI(IO85DX). GM4JJJ heard Peter's 10GHz signal and a one-way ensued but nothing came of an attempt with GM4OGI. Other nice contacts included GI8GJX (IO74AQ) who spends each cumulative listening but getting no results until Peter calls him around tea-time! Would the rest of you please look towards GI land from time to time? 10GHz operators in the following countries were active that day: G, GM, GI, GW, F, ON, PA0. It was great to work Chris Bartram, of Mutek fame, operating on 3cm portable from a site near Taunton.... Welcome back Chris!

Of the forty stations though to be active, ten were operating under portable conditions. It can be done, even under the Foot and Mouth cloud!

Peter has been going out to local Sheffield sites on Monday evenings, just for a couple of hours, to assess these locations for future contest use. Contacts have been made on 3cm with G4MAP, G4LDR, G4BRK, G3KEU, G3LQR and G3LRP.

The Millimetre Bands Contest of June 10th was very disappointing indeed. Only five of the operators of the 32 or so UK stations with 24GHz capability came on for the day: G3UYM/P, G4LDR and G3PHO/P. G3PHO/P operated from Alport Height (IO93FB44) and failed to work G3UYM/P (Thirfield, IO92XA) on 24GHz, even though both stations had their half watt PAs operational. A difficult path and rain are blamed for this. However, G4LDR had an interesting contact with G1JRU (see elsewhere in this column). **That's it for this month!**