## FROM THE EDITORS

September 1992

This month's mailbag is bursting at the seams! Many thanks to all who have sent in material for publication. If your contribution does not appear in print this time then be patient for we just do not have enough room in this issue and it should appear next month. May this healthy state of affairs continue! So much has been received that we cannot acknowledge by letter. Articles have been received from: OZ9ZI, DJ5BV, G0CZD, G8MBU, G4PMK, GW4JJW, G4ELM, G3WDG , G6XM and G3SEK, as well as two dozen activity reports from far and wide. Again...many thanks!

Please keep the news and articles rolling in to either Peter or Barry at the following addresses. Please telephone after 6pm:

G3PHO, Peter Day, 146 Springvale Road, Sheffield S6 3NU , UK (Tel: 0742 681216)
G8AGN, Barry Chambers, 345 Redmires Road, Sheffield S10 4LD (Tel: 0742 304888)

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## NEWSLETTER TECHNICAL INDEX

For some now we have been working on a technical index for the newsletter. This has been a task to be done when spare time has been available. Just when all seemed to be gathering dust along came G0CZD with the very thing! Martyn has very kindly offered to provide this index to anyone who sends him an A5 SAE. The "hard copy" received by the editor runs to nine pages and covers the period 1986 to the present day. Martyn also offers the index in the form of a dBaseIV file for those with a PC. The entire database is available on receipt of a formatted 3.5" disk (0.72 or 1.44MB) and SAE. Please do not send 5.25" floppies.

Martyn's address: G0CZD, 12 Jessop Way, Haslington, Crewe, Cheshire, CW1 1FU, UK.

Many thanks indeed, Martyn, for the most useful offer.

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## FOR SALE & WANTED

**G3GNR, Bob Short,** is looking for a 24GHz Gunn Module type GDHM32, 3 and 6dB 'N' type fixed attenuators (good at 10GHz), a couple of 1N26 diodes and any other bits 'n pieces to build up his microwave stock from scratch!

He has for disposal plenty of used, but good, FHJ2-50 (or CU2Y) 0.5 inch foam coax feeder at cheap prices. He has no connectors however.

Please telephone Bob on 040 923301 (West Devon)

**G4JNT, Andy Talbot,** has a number of BFR53 surface mount transistors for sale. They come in standard SOT23 packages and are 2GHz $F_t$ devices that can be used in place of the BFY90, with improved performance. He has used them very successfully in the G4DDK oscillator. The price is ridiculously cheap at £3.00 for 10 transistors, including a data sheet. Ring Andy on 0489 787424 or write to G4JNT, 15 Noble Road, Hedge End, Southampton SO3 4PH.

**G0CZD, Martyn Kinder,** is anxious to buy WG16/sma transitions, a WG16 detector head/cavity and WG16 attenuators, all with ROUND flanges. Please write to him at the address shown above (Newsletter index article) or ring him on 0270 505930.

**G3JMB, Jack Booker,** wants to buy RAM cards RC-4 and /or RC-2 for the Personal Computer Casio FX-720P. Please 'phone him on 0444 413889 or write to Jack at 8 Barrowfield, Cuckfield, Haywards Heath, West Sussex, RH17 5ER.

**G8CHW, Chris Treadwell,** has the following items FOR SALE:

13cm Transverter --0.5 watt o/p from 10 to 20mW of 144MHz input. Complete working order in LT23s box. Price £175 o.n.o.
9cm Tripler -- metalwork as per G3KFD/G8GDZ, with information, price £30 o.n.o.
9cm TX module mixer (metalwork) as per VHF Comms 1/84 DC9XG. Price £30 o.n.o.
Assorted JVL Quadloops -- 1 x 23cm 48 ele. Needs new elements. Price £5 o.n.o.
1 x 13cm 44 ele. New. Price £25 o.n.o.
1 x 13cm 44 ele. Needs new elements. Price £5 o.n.o.
1 x 9cm 66 ele. Needs cleaning! Price £10 o.n.o.
Power transistors type ACR 3001: two available, 1 watt at 3 GHz. Complete with data sheets. £10 o.n.o.
One CFY17 transistor at £10 o.n.o.
One 0-10dB attenuator, switched in 1dB steps. 0.5 watt to 1500MHz. Offers?
One 0-70dB attenuator, switched in 10dB steps. Rating as above. Offers?
One partly built G4DDK001. Offers invited. One Partly built G4DDK002, without TR3. The stripline on the pcb is for 400mW output only. Offers?
Assorted metal and PVC boxes.
ALL THIS EQUIPMENT MUST GO! ALL REASONABLE OFFERS CONSIDERED.
Please write to Bob at 39 Station Road, Kings Heath, Birmingham B14 7SS or telephone him on 021 624 7650.
Bob is trying to start up a business selling ICs and transistors, from audio to microwave, at competitive prices. The firm is Integrated Circuits and Semiconductor Specialists. The funds from the above amateur sales will help start up this endeavour. Good luck Bob.

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## TECHNICAL SECTION

We have a number of interesting technical articles for this month. The first is a summary of a talk given by WA7CJO on Optimisation of TWT amplifiers. This talk was presented at the recent moonbounce conference in the Netherlands and Jim has kindly given permission, via Ian, G3SEK, for us to reproduce it in the Newsletter. The potential for increasing output power is very exciting, as is also the potential for using 12-18GHz tubes to generate significant power at 24GHz. To illustrate what can be done, the story of Jim's 10GHz TWT is that he literally dug it out of the mud in a scrapyard where it had been run over by heavy vehicles. The rest of Jim's 10GHz setup is described in the ARRL UHF/Microwave Handbook.

We are indebted to Ian, G3SEK for the "hard copy" that follows and for the anecdote just related!

The second article is, coincidentally, written by Ian's good friend and partner-in-radio Roger, G4PMK. Home station operation with microwave dish antennae presents an immediate rotation problem, if any real accuracy is to be achieved. Roger's elegant solution looks to be "just what the doctor ordered", being easy to apply to rotor controllers with minimum disturbance to existing circuitry.

# OPTIMIZING TRAVELING-WAVE TUBE AMPLIFIERS

by Jim Vogler, WA7CJO

5th International EME conference, Thorn (NL), 31 July - 2 August 1992

**Introduction**

During operation of a TWT, a focused stream of electrons is accelerated in the direction of the anode or 'collector', passing through the so-called RF 'slow-wave structure' comprising the helix and magnetic focusing. The objective of the slow-wave structure is to match the phase velocity of the RF wave (nearly the free-space velocity of light) to the velocity of the electron beam. When this is properly achieved, energy from the electron beam is transferred to the RF wave and amplification takes place.

The RF power output curve tends to show a maximum when the phase velocities are properly matched. Although the RF wave velocity is primarily dictated by the physical dimensions of the tube's structure and generally cannot be varied, the phase velocity of the electron beam can be adjusted over a reasonable range by varying the helix and/or the collector potential. You can also change the focusing of the beam to some extent. By optimizing these variables you can increase the power output of commercial TWTAs and in some cases change the operating frequency. The penalty is a reduced bandwidth, but that isn't a problem for amateur applications.

**Reactivating a used TWT**

When reactivating a TWT that has been out of service for more than several months, it is sometimes necessary to 'burn it in' by running the filament for an extended period of time in order to remove any gas accumulation in the tube. The actual burn-in time required depends on the length of time the tube has been out of service, the power level and, to some extent, the frequency range of the TWT. Typical burn-in times range from a matter of hours for 10-20 watt tubes to several days for higher power tubes. When the other electrode voltages are applied, rapid instantaneous changes in the helix and body current indicate the presence of gas molecules in the tube which are randomly deflecting the electron beam.

**Optimization**

The first step of the optimization process is to provide a means of determining the power output of the tube, either by terminating the output of the TWTA in a power attenuator and using a thermistor power meter to measure the attenuated power, or by using a directional coupler in conjunction with a dummy load to attenuate the signal. Additionally, it is important to observe the harmonic content of the output of the amplifier, since TWTs can be inadvertently adjusted to become efficient frequency multipliers. A simple alternative is to insert a bandpass filter between the attenuated output of the TWTA and the power meter sensor. Filtering should generally not be used directly on the output of the amplifier since TWTAs and other microwave tubes and solid state devices are sensitive to reflected power (fundamental as well as harmonic). The use of an isolator directly on the output of the amplifier is also highly recommended - I have direct experience of the benefits of isolators in saving TWTs from disaster! It should be noted, however, that the response of isolators to harmonic energy is not altogether predictable and is seldom specified by the manufacturer.

Increase the signal level to the input of the TWT amplifier until the maximum saturated power output is obtained. Incipient saturation can be identified when the output power does not increase at the same rate as the input power is increased. Saturation is reached when no further increase in power output is obtained from increasing the input power. Power fold-back is the condition reached when the power output actually decreases with increased input power. All of these conditions cause an increase in helix current over the quiescent current condition, with the fold-back condition causing the largest current increase. Although most TWT power supplies include overcurrent protection for the helix of the tube it is extremely important to insure that the helix current does not exceed the manufacturer's maximum rating during any of these adjustments. Failure to remove the helix voltage within approximately 100ms of an overload condition usually results in catastrophic tube failure.

While observing the output power, adjust the helix voltage to obtain a power output increase. Increase the RF input power to re-establish a saturated power output condition and readjust the helix voltage to peak the output power. When no further output power is obtained or maximum permissible helix current is reached using this procedure, further increases in power output and lower helix current can sometimes be achieved by perturbing or refocusing the magnetic field around the helix. This can be accomplished by installing permanent magnets on the outside of the tube body.

Use small bar or 'refrigerator-door' type magnets - a big magnet will divert the whole electron beam and burn out the helix faster than the trip could cope. Initially place the magnets close to the tube and adjust their position to obtain lower helix current coincident with an increase in power output. When no further increase in RF power can be obtained with the aid of magnets, readjust the RF drive level and helix voltage as per the previous procedure. Additional magnets may now be needed to further increase output power and lower the helix current. Eventually, no further significant increase in output power will be obtained and the magnets should be secured in place with adhesive.

**Results**

It is quite common to obtain from 50% to 100% more power from a 10-20W rated tube using these techniques. As much as 65W has been obtained from 20W rated tubes at both 13cm and 3cm. Note that helix voltage can be extremely critical - the 100W rated tube that I use for 10GHz EME peaked up to almost 300W output with only a 20V change!

Optimizing for increased output power is beneficial to the tube because TWTAs are 'class A' devices, in that the DC power input remains essentially constant at all drive and output levels. Provided that you stay within the manufacturer's DC limits - especially on helix current - then the more RF output you can achieve for a particular set of DC conditions, the more efficient the amplifier will be and the lower the heat dissipation in the collector and the helix.

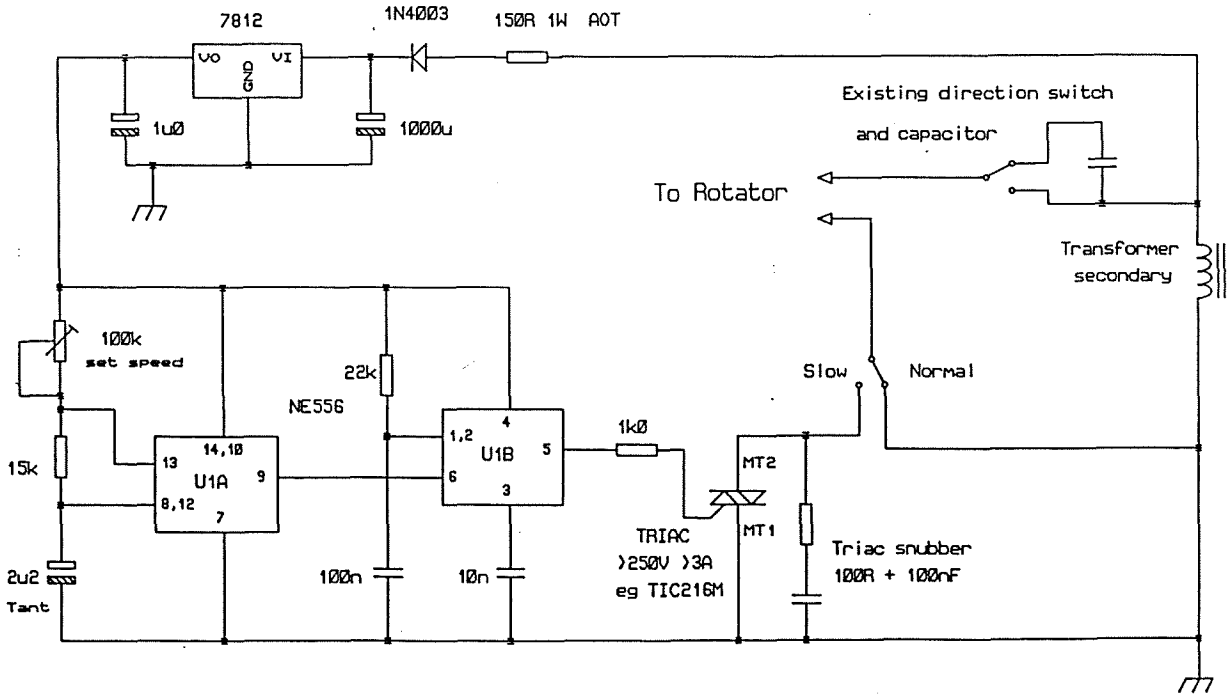
As well as increasing the power level, these optimization techniques often allow you to change the operating frequency. Many 12-18GHz tubes can be re-optimized for either 10GHz or 24GHz. To lower the frequency to 10GHz you need to reduce the beam voltages to slow down the electron beam, while the reverse applies for 24GHz. It is better to use the TWT as a straight 24GHz amplifier than as a frequency doubler. 12-18GHz tubes with SMA terminations will perform quite well at 24GHz, though the waveguide types are obviously more difficult to match.

# ROTATOR SPEED REDUCER FOR MICROWAVE USE

Soon after getting going on 10GHz from home I realised just how difficult getting my antenna (a 0.6m dish) 'spot on' the other station was. My rotator takes about a minute to turn through 360°, which is 6 degrees every second and with an antenna beamwidth of about 4° it is almost impossible stop the rotator in time. This leads to frustration and all too quickly to a damaged rotator from excessive back and forth searching. I have overcome this problem by fitting a speed reducter to my Yaseu K-400 rotator's control box.

The adapter can be used with just about any rotator that uses the usual split-phase AC motor arrangement. Normal speed operation can be resumed by the flick of a switch. Full details of the controller board are shown on the circuit diagram. The principle of the controller is quite simple. A triac is inserted in the 'return' lead from the motor to the transformer secondary. This is turned on and off by an oscillator and monostable combination formed from two halved of a NE556. This reduces the mean speed of the motor, and hence the rotator, as the motor is effectively running in short bursts. The prototype was built on a small PC board, fitted inside the control box. The speed switch was mounted on the front panel of the controller next to the power switch. The set speed preset can be adjusted to suit your own preference. The prototype was set to give a rotation speed of about 0.75° per second or 8 minutes for the whole 360°.

Happy Rotating! Roger G4PMK




Rotator speed reducer G4PMK

# Technical Update on G3WDG 10GHz modules - August 1992

Judging from the number of phone calls and discussions at Round Tables etc, most constructors seem to be able to get the units working with little or no trouble. Just occasionally people do have troubles, and the purpose of this note is to share a few experiences since the last update in January.

One change we have made which affects most of the modules is to have the shoulder removed from the top of the filter cavities. This has cured the problem of the silver plated tuning screws supplied being occasionally too short to resonate the filters properly. On the subject of filter tuning, one or two people have been able to resonate the cavities at the trird harmonic of 2556 ie around 7.5GHz, leading to later problems in tuning up! If this is suspected, check the length of the tuning screw protruding below the locknut by carefully unscrewing both together from the cavity. The correct length of protruding screw is around 7.5mm. If the length is considerably more than this, then the cavity is probably tuned to the wrong frequency.

Another general point concerns the G4DDK004 local oscillator. A few constructors have managed to tune the output filter to 1278 instead of 2556MHz and then had trouble getting the 10GHz modules to work. This is easily done if you do not have access to a wavemeter or spectrum analyser. The correct tuning point for the trimmers is with the vanes almost fully unmeshed. The 1278MHz tuning point is with the vanes more than half meshed, so it is quite easy to check this visually.

Some recent work on a non-functional G3WDG002 receive converter revealed an unexpected consequence of using an incorrect component. The constructor had used different type of gate bias pot from that recommended in the instructions (a fully moulded item, black in colour and possibly from Maplins). This type also has much longer leads than the recommended miniature skeleton types, and this seemed to cause instability possibly as a result of coupling between the pots at RF. Although the pots are connected to nominally decoupled points on the pcb, there must still be some RF radiated from the leads. Replacing the pots with the normal type made the unit much more stable. A further recommendation is to cut the leads off the pot where they are welded to the thicker metal tabs which connect to the working parts of the component. The pot is then located a few mm from the pcb with minimum lead lengths.

The revised tuning up instructions for the G3WDG002 (November 1991 Microwave Newsletter) have been used by a number of constructors and are now the recommended method. The tuning up instructions in the booklet will be modified when the current stock runs out. One minor change which may help if any oscillations are encountered during the tune-up process, is to modify the new step 3 (in the November update) to read "Set RV2 to give full -ve gate bias to F2 and RV3 to 0V gate bias". This biases off the first LNA stage and causes the second stage only to be biased up as the test noise generator. This should guarantee that the LNA does not oscillate even if no antenna or load is connected to the first stage.

More experience with the G3WDG003 transmit converter has shown that in some cases the mixer stage can be made to oscillate with VR3 set near the fully clockwise position. This should be looked out for during tuning up. The correct position for optimum operation of this stage is with the pot somewhere between fully anticlockwise and the halfway position, where oscillation does not occur. While on the subject of mixer bias, it is worth re-emphasising that the settings of VR2 and VR3 are quite critical for best output power. Some experimentation is required and it will be found that the two adjustments interact to some extent. It is also possible to find false optimums so it is worth trying the controls over wide ranges to check that the best settings really have been found. The new tuneup procedure (Jan 92 Microwave Newsletter) helps in this respect, as some output power can be seen even when the mixer bias adjustments are not optimum.

The final point concerns mounting lossy rubber. This material is designed to operate next to a groundplane and should be well bonded for best results. I have found Evostick to be a very effective glue. It works best when both the rubber and the lid are coated with a thin smear of adhesive and left to dry for 10-15 minutes or until dry to the touch. A very strong bond is formed when the two pieces are brought together.

## ACTIVITY NEWS ## NEWS AND VIEWS FROM THE WORLD ABOVE 1000MHz ##

A tremendous input of news from readers this month means we have to be brief with each letter. First of all we'll deal with our overseas friends:

### DANISH ACTIVITY WEEK AND A NEW 47GHz EUROPEAN DX RECORD

**OZ9ZI, Steen,** sends an 8 page report on the OZ GHz Activity week held between June 13 and 19. Conditions were not as good as the previous week or two but results were still very satisfying. The activities centres around the Kattegat, the area of water between Jutland and Sweden so that sea ducts might be exploited. There was no sign of activity from LA or SM this year (or G for that matter) so a group of OZs(1GPI, 1HRP and 4PV) went to Verdens ende in Sweden (JO59FE) while OZ1UM & OZ8AO set up at Spodsbjerg in Denmark (JO55WX) to try to break the 24GHz world record of 279km. Unfortunately this did not succeed but OZ1UM did have a remarkable **47GHz SSB/CW** contact with DB6NT, DF9LN and DF2CA. This took place on 13 June 92 at 1550z on 47.088,100GHz. The reports on ssb were 5/5 to the OZ and 4/1 to the German stations. The same path was worked just two minutes earlier on 24GHz and of course on 10GHz a litle earlier than that! The German stations were located in JO56GC. The path length is 90km, only 14km short of the world record for 47GHz so hearty congratulations are due to all concerned! By the way, 24GHz **SSB** was used for talkback! During the same activity week a number of Belgian stations, also made contacts with OZ1UM on 10GHz -- ON6UG, ON4QQ , ON4AOD and ON4AWV on 13 June and in some cases repeated them in the following two days. ON1BTH in JO57HR also made it during the evening of 16 June. Steen also sent along a number of excellent photographs of the OZ1UM 10, 24 and 47GHz stations, all shown to have separate tripods with transverters mounted immediately behind the dishes. These looked to be very compact rigs. A panel of solar cells is also very much in evidence! Many thanks indeed Steen for the fascinating report. We will keep it on file here for our annual activity maps to be published in early 1993.

### HIGH ACTIVITY FROM GERMANY!

From **Gerd, DJ5BV,** we have received a 22 page document detailing general activity on 10GHz in Germany and a copy of a paper he gave to the meeting in Weinham in September '91. This interesting paper, in German, details the 'raison d'etre' of 10GHz operating, outlining personal attitudes, operational skills and activity patterns. Gerd has offered to rewrite it in English and perhaps we could then publish it in serial form. He also enclosed a list for our Microwave Directory, which Steve, G4KNZ is presently compiling for subsequent publication as one issue of the Newsletter. Gerd's list contains HUNDREDS of active 10GHz stations from many European countries and is a tremendous contribution. Many thanks OM! Incorporated in this information is a locator squares map of western Europe upon which he has plotted the distribution of known active 10GHz operators. JO31 has 20 stations listed, JO30 has 19 while JN48 lists 11 and so on! We will try to make room in the Newsletter in a future issue for this map! Gerd himself has listed 400 different stations over a three year period and has had more than **1000** contacts on 10GHz with some 88 different stations, all from the home station! This certainly makes one's mouth water....

### NEWS FROM 'DOWN UNDER'

Our old friends **Des, VK5ZO** and **Lyle, VK2ALU,** both send welcome reports this month. Des and Lyle keep in touch on 14112kHz ssb and Keith, VK6XH (ex Merseyside Microwave Group) also joins in on occasions. Apparently WB6IGP is marketing 10GHz beacon antennas in Australia (via Keith). According to Des these antennas are tuned a little below the 10GHz band and Des had to mill off 2.5mm from the waveguide above the last slot. Des has just finished a set and a half of the WDG module kits and has not had any real problems with them. he is hoping to try ATV with the system. He is very pleased with the RSGB Microwave Manuals and is spreading the word about them around VK...many thanks OM! The present VK/G money exchange rate is not very favourable however and both manuals and kits are expensive out there. Des is now coming up to 50 years RSGB membership in August next year. He was the pioneer of the 10GHz band when he was over here in Britain many years ago.

Lyle, VK2ALU, has unfortunately been hindered with eyesight problems over the past months. This has severely curtailed his microwave construction programme of course. He is undergoing treatment and this is at last paying of somewhat. He managed to finish a second WDG003 transmit converter for 10GHz and is getting 50mW out of it. He also has a WDG006 module working. Activity in his area is extremely low but some Sydney stations are at least trying to get 10GHz narrowband gear going but are using USA designs that employ expensive transistors and have already blown quite a few! They are not taking Lyle's advice to use cheap red and black spot types from Johnny Birkett...more fool them! VK2AXA has some WDG modules partly working. VK2FZ has a SSB Products transverter and 40 watt TWT to a 10 foot dish but seems to be only interested in EME with it! Apparently ZL1UJG is putting up a 10GHz beacon on the west coast of new Zealand, looking across the Tasman Sea to Australia. Maybe we shall eventually see a new world record come of all this antipodean activity?

## SCOTTISH HAPPENINGS

We have a couple of reports of activity North of the border. **Dave, GM3WIL,** continues to keep the flag flying from the Ayrshire side of the country, mainly working across to GI8GJX. He pleas for more of us Sassenachs to look for him on the 2m talkback link and may try to use sites in the Southern Uplands to try to make contacts into the Midlands, at least. Further GM news comes via **Chris, G8BKE,** who used to live up there. He reports GM8BJF and GM4ISM as having recently made a 10GHz narrowband contact across Edinburgh. GM4DIJ is operative from Edinburgh with a JVL system (1mW o/p) into a 20dB horn, while GM4JJJ in Fife is getting interested in 10GHz after a 12 year lapse. This is all good news indeed. We need a lot more activity, with reasonable power levels and dishes, if we are to see contacts between Scotland and England develop to any great extent. We also have Scottish news from **Mark, GM4ISM,** who reports the BLACKHILL BEACON to be operational on 10368.050MHz. At present it runs only 6mW out at the antenna due to coax feeder losses. The antenna is an omni waveguide type. Its location is IO85BU, ngr NS828647 and it is presently running as a GM4ISM personal beacon with almost 24 hour operation. Final unattended beacon status is expected soon and Mark has plans to raise the power level.

## ENGLISH ENDEAVOURS

The 'Big Man' himself, **Ian, G8KQW,** sends in his first report of the year with a fine collection of contacts made over the cumulatives so far. All contacts have been made from the portable site at Walbury Hill (IO91GI), the best Cumulative day being the July event when F6DKW (home station , Paris) was worked over 390km, G3NWU/P at 371km and G4EQD at 252km. For this event Ian had 50 watts output to a four foot dish which, as he modestly puts it, "helped a bit". He will not be QRV again until the IARU contest in October and will then be on with 70cm to 24GHz inclusive, with additional talkback on 144.175MHz. His team will only be operational during the RSGB microwave cumulative over the same weekend until 1400GMT on the Sunday as they will have been active for the previous 24 hours. Their location for this event will be the Isle of Sheppey. Ian updates his Operating Ladder score with 56 stations worked in 15 squares on 10Ghz. He reckons there is scope to work around 80 to 90 stations if one set one's mind to it.

**Ted, G3JMY,** was washed out in the July Cumulative (weren't we all??) and had no contacts from the Charterhouse portable location. During the afternoon he operated from his home station in Bristol and was rewarded with six contacts. He also updates his Ladder score and mentions 2-way ATV contacts on 10GHz, employing fast-scan colour. He provides ATV information for a new category in the Operating Ladder! How about others sending in their telly tallies? Many thanks Ted.

**Neil, G4BRK,** continues to operate portable from White Horse Hill in South Oxfordshire during the 3cm contests. During the July cumulative event he worked your scribe, G3PHO, over the 195km to Houndkirk Moor (IO93EH) and had 200km+ contacts into east Anglia with G3LQR and G4DDK although signals were not as good over this direction as the North/South contacts. New calls worked that day included G4CBW (home station at Newcastle-u-Lyme), G3JMY (home at Bristol), G3UKV (home at Telford), G0OLX/P (Ashdown Forest), G4JNT (home in Southampton) and G4MAP (Birmingham) who was using a 23dB horn from home, for a 1 way. Neil has some strong comments to make regarding the use of high power 2 metre SSB for talkback. he makes a plea for users of QRO on this band to make sure the amplifier is truly linear and that the signal occupies the minimum amount of the 2m band. He has found two metres virtually unusable at times due to wide stations.

From **Steve, G4KNZ,** we hear of more 24GHz activity. Steve is making a special effort on this band this year. He has travelled far and wide to make wideband contacts on 24GHz, both in and outside the contest periods. These 'jaunts' include a special trip to Devon to catch Bill, G6XM/P and Bob, G3GNR/P. Bill's mobile set-up impressed Steve....it is an interchangeable rear shelf for a Vauxhall Astra. The equipment is fixed to the shelf and the whole thing is just swapped over for portable operation. During the August contest, Steve operated from Sutton Common (near Macclesfield, Cheshire) working G3PHO/P and G3FNQ/P both on Winter Hill, North of Bolton, Lancs. G3ZME/P (Long Mynd) and G8AYY/P (Merryton Low, Staffs) were also worked. The 90km contact with ZME took over an hour to complete, signals being very weak. Steve then moved down to the Clent hills to work G3UYM/P on Broadway at 45km, bring the total for the day to five stations. He reminds your scribe to mention the 24GHz Activity Day, so here goes:

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**24 GHz ACTIVITY DAY -- SUNDAY, 25th. OCTOBER 1992 -- 0930GMT ONWARDS**

Ring G3PHO with your site details by the PREVIOUS Sunday evening (18th October). This information can then be accessed from G3PHO any evening during the following week. To start the ball rolling G3PHO will be active from Merryton Low, Staffordshire, IO93AD, ngr SK028595.

You can make local arrangements with other 24GHz operators and let Peter know so that details can be passed on.

If the weather is unsuitable on the 25th we suggest the following Sunday is used as a back-up. If you decide not to go out then ring Peter on Saturday night, at a reasonably early hour so that he can alert the others!

THIS IS NOT A CONTEST! HAVE A LEISURELY DAY OUT....GO FOR THE 150km AWARD!!

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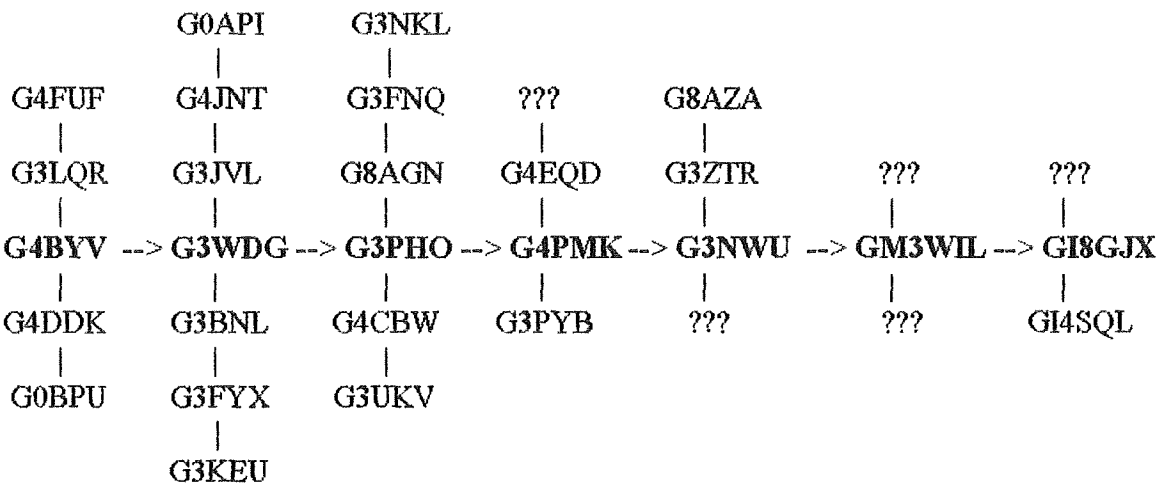
A short note from **Dave, G3ZTR,** outlines his /P work from a site on the Yorkshire Wolds during the August contest. Located near Pocklington he worked (on 10GHz narrowband) G3NEO/P (Carr Hill, near Sheffield) at 84km. Philip was using a barefoot JVL rig (200uW output!), G3BNL at 214km), G3KEU/P and G3FYX/P at 287km and finally G3NWU/P (Trimden, Co. Durham) over a very obstructed 100km path. G0DJA/P was heard on 24GHz from a site near Wakefield but ZTR's signals did not make the grade in DJA's receiver.

Ladder updates have been received from **G3FNQ, G4BYV and G3BNL.**

**Paul, G8AYY,** sent us two letters since the last Newsletter. During the July contest he used 24GHz from Merryton Low Triangle and worked G4KNZ/P at 12km (Sutton Common). On 19 August he worked G8HMV/P on Titterstone Clee, also on 24GHz wideband , from a site on Barr Beacon, a pathlength of 50km. Paul is very concerned that cumulative contests seem to clash with the popular mobile rallies in the Midlands region. He makes a plea to the Microwave Committee to avoid fixing a contest for 13 June 1993 as that is the date for the Elvaston Castle rally. The problem is the same which ever date we choose Paul as there is something else taking place most Sundays in some part of the country or other. We can please some people some of the time but cannot please everyone all of the time! Another problem facing Paul and other Midlands microwavers is that of trees on the top of the most popular sites. This necessitates him travelling further afield than many, often to Merryton Low, a 96 km car journey from his Birmingham home. His 24GHz transceiver uses a Mutek 'back end' board whioch has been modified as per the Newsletter August 1990. The Gunn diode supply can be suitably adjusted to give a minimum of 3.5v in spite of the board being designed for use with 10GHz Gunns. Thus a standard +5 volt Gunn at 24GHz can be accommodated. He passes along the tip that the SL6270 Vogad circuit used on both this board and in the 24GHz nb transceiver described in the Microwave Handbook Vol.3 can give better results if the gain of IC6 (see fig. 19.47 in the Handbook) is reduced by connecting a 680R resistor between pins 7 and 8 and replacing the potentiometer with a resistor to the 0v rail.

**Charlie, G3WDG,** found conditions very good again at the end of July when he worked (from him home station) G8APZ in JO0DO for callsign number 44 and PA0BAT on the evening of 30 July at 232oz. Reports of 53/56 were exchanged, the PA0 running 600mW. At 2358z he worked DC6UW again (JO44) at 58/59 and at 0022 on the 31st July Charlie netted PA0WWM in JO22 at 51/57 with deep QSB. GB3MHX (Martlesham Beacon) was heard during the lift, peaking 20dBn at 0742 on the 31st. GB3SEE was also heard at 15dBn at the same time. Charlie agrees with us that there is a need for a telephone 10GHz DX Warning network. Your scribe suggests a chain is something along the following lines:




The idea is that the stations in bold type form the main channel to the North of England. If G4BYV hears Continentals on 3cm then he 'phones G3WDG immediately, who then rings G3PHO and so on up the country to GI8GJX. After ringing the next BOLD TYPE callsign that person then rings "sideways" in the network so set up other links....eg G3WDG would call G3BNL and G3JVL immediately after G3PHO. Such calls should be very brief and to the point. 'BNL would then call G3FYX and so on. If there was no response to a 'phone call then the next station along the network is called until a response is obtained and the message can be relayed forward. Other interested stations can tag themselves to those shown in regular type. These have at present only one onward call to make and should not be expected to make more than three. If G3WDG could not raise G3PHO he would call EITHER G8AGN or G4CBW and one of these would assume G3PHO's role in the net for that occasion, passing the message onto G4PMK, etc. Likewise if G4PMK was the first to hear the DX he would pass it up and down the main line. Simple! Or is it? All comments to G3PHO please. THIS IS ONLY A SUGGESTED SCHEME. It is designed to cut the phone bills down to a minimum! If favourable comments are received then we will compile a sheet showing the network and telephone numbers. You can then pin it up near your telephone. You would have to educate other persons in your household of course! The alternative is a linear chain but this might take longer to operate...comments???

**G3GNR, Bob,** writes from sunny Devon. He has caught the microwave "bug" again after many years inactivity on these bands. This is all due to Arnold, G3HBW, who met him and discussed his 47GHz gear. Bob has now been busy and has made up a 24GHz wideband rig. With this he has worked Bill, G6XM, over 150 yards! He has bought WDG boards and a DDK004 to get on 10GHz SSB but then luckily picked up a "White Box" at the Longleat Rally! (We hear that these were sold at a third of their usual price!). Bob is aiming to operate from his home station, which is in a good location at 484 feet asl.

A short note from **Andy, G4JNT,** updates the Operating Ladder. he bagged 5 new calls during the July contest. Andy is also working on gear for 3.4GHz and hopes to have this ready for the October contest. He has found a source of motorised WG16 switches but they need 110v at 400Hz, taking several seconds to go over. If he can modify them to operate quickly he will pass along further details to the rest of us. Many thanks OM.

A letter from **Ray, G3NKL**, mentions a successful construction of the WDG equipment. He has one system running 300mW for portable operation and a DDK/WDG001 + WDG006 (300mW PA) as a home beacon. This beacon is on 10368.175MHz with a 20dB horn beaming due South. It is heard at any time by G4CBW (Newcastle under Lyme) and on a regular basis by G3UKV (Telford), this latter path being 130km. Ray reminds us of the G3FNQ attended beacon some 60kHz above Ray's. Such home station beacons are proving invaluable propagation indicators and we heartily encourage other amateurs to build theirs!

**Jack, G3JMB**, made a solo trip to Chanctonbury for the August cumulative and made 12 succesful contacts on 10GHz (10 of them on narrowband - only one of them being in excess of 100km however). Six unsuccessful attempts were made, some of them being workable under more normal conditions. Despite a late start he had a good day. The July event was a washout, the weather preventing access to the site.

From **Bob, G8MBU**, we hear of a successful construction of the DC0DA "Simple Portable" 10GHz transverter as outlined in the Newsletter about three years ago. Since the RX is a FET mixer only the noise performance is only 10dB NF at 15 dB gain. Bob send us a useful article on employing the cheap Birketts "3 for £1.99" GaAsFETs in a 10GHz amplifier. This will be published very shortly within these pages. Bob recommissioned the Isle of Wight beacon in January this year and is very pleased with the results, reports having being sent in from the Netherlands and other areas. He would very much appreciate reception reports of GB3IOW (23cm and 3cm beacons). Bob is QTHR .

**Theo, PA3FPS**, is working on a power supply for his 10GHz TWT and hopes to get at least 4 watts out from the amplifier. At the moment he is in the throes of moving house but hopes to be active again in time for the October IARU Contest (3/4th Oct.).

**Dave, G0DJA**, is keen on 24GHz and is interested in the Cirkit 24GHz gunn module. If anyone has used this device they might share their experiences with Dave (and with the Newsletter of course). He hopes to put up a personal beacon for that band, using a GDO33 module. However his FRE keyer is short of a fully programmed EPROM and he would appreciate any help on getting one blown.

**John, G0API**, has been very busy with VHFNFD and Hamfest activities but has nevertheless extended his best DX on 10GHz to 340km with a contact between himself and G3NKL/P on Fairsnape fell, John being on Bell Hill, Dorset at the time. He has almost finalised his portable station which now consists of an 8ft section of lattice tower mounted on the top of a 16 ft power boat trailer!! The mast is winched up, complete with 1.6m dish (offset fed but positioned 'on its side', ie rotated through 90° so as to eliminate the problem of accurately setting the tilt angle). He has some interesting things to say about accurate rotation of the "beast" which we will have to relate when we have more space next month! During the August Cumulative he operated from home and was amazed to work ten stations, the best being G4MAP/P on Titterstone Clee at 184km. He is fully QRV from home at Wimborne, Dorset (IO80XS77) and can be telephoned on 0202 691649 for skeds. Look for him under the call G4RFR/P during the IARU 432MHz-24GHz contest in early October. He reports excellent results from the GB3SCX 10GHz beacon with reports from as far afield as GU8IRF (St. Peter Port) and G0BPU (Ipswich). It has also been heard on Mersyside and in most of the Midlands! John's wife Sue is now G7MHO...they have 4 operators from his QTH! John reminds us of the Southern Round Table:

**THE SOUTHERN MICROWAVE ROUNDTABLE WILL BE HELD AT THE FLIGHT REFUELLING CENTRE, WIMBORNE ON SUNDAY 18TH OCTOBER FROM 1000-1700. CONTACT JOHN ON THE PHONE NUMBER ABOVE FOR FURTHER DETAILS.**

A long, newsy letter arrived from **Roy, G3FYX**, of Bristol. During the August contest he and "cobber" G3KEU activated Walbury Hill and were visited by Ian, G8KQW, who was on a courtesy call only, minus his own gear. (Your scribe still managed to have a word with the Big Fella over Roy's gear!). Good results were obtained and included a 10GHz narrowband contact with G3ZTR/P (Garriby Hill, Yorkshire) and a one way into F6DKW, South West of Paris. This was at 398km, the Frenchman's 10GHz signal being just unreadable, Roy's high power getting through the other way. All in all some 28 contacts were made during the day. Roy wants the talkback frequency clarified. Well it is nominally 144.175kHz$^{+/-}$ 5kHz. He would also like to know what happened to the results of the WINTER CUMULATIVES having sent in his logs to the Contest Manager (who should please take note!).

Sunny Devon saw **Bill, G6XM,** inactive for the July contest but out for the August event. He teamed up with local friend G3GNR but found activity and conditions down. (I heard you loud and clear on 2 metres from my Winter Hill portable site Bill.....editor) However he did manage to work six stations, the best DX being G4FUF(Benfleet) at 330km and with G3JVL at Hayling Island. He and Bob have been trying out 24GHz (see Bob's earlier report) and after a visit by G4KNZ the two Devonshire men have rebuilt their 24GHz receivers, Bill's Microwave Society 10.7MHz IF being discarded in favour of an old transistor radio IF strip with the "fron end" removed. Bill has also acquired a SUUNTO M3D compass at £16.50. This has the facility of a separate dial which allows correction for magnetic deviation. Bill is contemplated going xtal controlled on 24GHz but would not expect to find many others on that band ( you might be surprised one day, Bill!) Finally he reports reading about, and then purchasing, a "Frequency Finder" made by Opto-Electronics of Fort Lauderdale, USA. This item is advertised in Practical Wireless and is rated up to 2.4GHz. Bill has successfully used it to read G4DDK source oscillators at 2.554GHz. It is a hand-held unit and is very useful. The cost is £150.

**Harold, G3UYM,** was on Broadway Hill for the August Cumulative and was pleased to work seven new callsigns for this year, the best DX being 188km. The highlight of the day was on 24GHz however, where he worked G4KNZ/P (Clent Hills, SO960787) for a 45km contact, his best DX so far on the band) Harold has recently priced a 60cm satellite dish (less LNB) from a local SAT-Tv shop for £39. Your scribe managed to knock the price down at his local shop to £30. These are brand new Amstrad perforated types, complete with all mounting kit and arm for the horn feed. At G3PHO the feedhorn is an unmodified "Bluecap" horn from a defunct Amstrad LNB, cut off so that a simple flange can be fashioned out of the LNB backplate and then bolted directly onto a standard square WG16 flange/bend, a length of flexiguide then connecting the antenna to the TX/RX. The Amstrad horn has a circular aperture at its flange. This is carefully filed into an elongated aperture to "flare" into the rectangular WG16 flange. Matching screws were found to be necessary in the WG16 section.

**Martyn, G3UKV,** was copying the G3NKL personal 10GHz beacon at 121km when he wrote his letter. It needs rainscatter enhancement or a tropo lift (the former being much more common). Martyn hears the G3FNQ beacon almost all the time and is most grateful to all those amateurs who have taken the time and effort to install such personal beacons at the homes. He made 20 QSOs during the August Cumulative, nine of them with fixed stations. The best were across to East Anglia, G4DDK, G0BPU and G3LQR being worked at around 29okm. His site was the Long Mynd. Martyn, like us, likes the idea of a 10368.100MHz calling frequency. A number of amateurs now put out CQs on that frequency so perhaps the idea will catch on, particularly during contests.

A very detailed list of stations worked has been received from **John, G3NWU,** of Hartlepool. He has operated from the North York Moors (June) and from the Trimden Hills, Co. Durham (July and August). These sites are a long way North of the main activity and operators would do well to look out for John as they could make some very long distance contacts for themselves. As examples we can quote from John's June log (Loose Howe, IO94MJ): GW4MAP/P and GW8RDX/P at 290km, with G3BNL at 264km. The July log saw a 372 contact from the Trimden site to G8KQW/P Walbury location.

Finally, your scribe, **G3PHO,** tried a location on Winter Hill, north of Bolton, Lancs, for the August cumulative. I could not get to the summit of the hill as there are now several police notices warning off drivers. nevertheless a roadside site was found that overlooked the Lancashire and Cheshire Plain to the South. Fourteen stations were worked on 10GHz SSB/CW, the best including G3FYX/P and G3KEU/P on Walbury Hill (both at 260km). They were RS59 and were worked directly on the band after FYX "tail ended" a QSO I was finishing with G3UYM/P on Broadway (181km). G3BNL was worked at 198km aas was G4BRK/P (White Horse Hill, Oxon.) at 240km. The final QSO was at 330km with G3JVL (Hayling Island, IO90MS). I was also very pleased to work 24GHz wideband with G3FNQ/P at 17km and G4KNZ/P (Sutton Common) over 53km. It appears that contacts into East Anglia from this site are very difficult, even two metres being poor. Rainscatter, while in evidence for the earlier part of the day, was soon to disappear as the day brightened. The highlight of the whole day however was to "eyeball" G3FNQ and G4CBW who paid us a visit, the former not letting on who he was until I started to explain was amateur radio microwaves were all about! G4CBW brought his 10GHz ATV receiver and demonstrated the excellent signals he could receive from a personal beacon at over 60km away. ALL SPACE GONE NOW! NO ROOM FOR LADDERS AND TABLES THIS MONTH...SRI! 73 AND CU NEXT MONTH.....Peter, G3PHO