



An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

Published by the UK Microwave Group

2007 MARCH



This month's front page photo shows David Hall, G8VZT, opening up attendees' minds to the wonders of amateur microwave television at the recent Telford Microwave Beginners' Workshop ...

(See detailed report inside)



In this issue ...

- 5th UKuG Microwave Workshop
- Just a thought... by G3PYB
- Repairing a faulty mm-TECH 24GHz 2 WATT PA
- 10GHz Waterpipe filter
- Telford Beginners' Workshop Report
- Torbay Microwave ATV and NB beacons now operational
- Take Care! 24GHz PAs need special treatment.
- First 10GHz portable digital ATV contact?
- Activity News and other events

Latest News ...

- G3PYB/P makes a possible "first" digital ATV contact from a portable location
- Telford Workshop a great success.. half the attendees join UKuG!

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

UK Microwave Group Contact Information

| | | | |
|---|--|---|--|
| Chairman: G4NNS Brian Coleman Email: brian-coleman@tiscali.co.uk Located: NearAndover (IO91FF) Address: Woodlands, Redenham, Andover, Hants., SP11 9AN Home Tel: - | Secretary: G8KQW Ian Lamb Email: ianlamb@btconnect.com Located: Hindhead, Surrey Address: Little Court, Churt Road, Hind- head, Surrey GU26 6PD, United Kingdom Home Tel: ++ 44 (0)1428 608844 | Treasurer: G4KNZ Steve Davies Email: steve.davies@nokia.com Located: Bracknell (IO91PJ) Address: 17 Haywood, Haversham Park., BRACK- NELL, RG12 7WG, United Kingdom Home Tel: ++44 (0)1344- 484744 | Scatterpoint Editor: G3PHO, Peter Day Email: microwaves@blueyonder.co.uk Located: Sheffield (IO93GJ) Address: 146 Springvale Road, Sheffield, S6 3NU, United Kingdom Home Tel: ++44 (0)114 2816701 (after 6pm) |
|---|--|---|--|

From the Editor's Desk



By the time you read this, the UKuG Microwave Round Table at RAL should have come and gone. I hope you all had a really enjoyable day. A full report will appear in next month's Scatterpoint.

This issue nearly didn't happen! Apart from a handful of activity reports, I had an empty file of material by the usual deadline for March edition. Only a massive trawl around the internet (and some "begging") got what you read within these pages today. We all know that magazines and newsletters like this depend entirely on readers supplying material so it would be great if more of you would consider writing some for next time! The editor edits ... he does not expect to have to write articles for the whole 20 pages!

Those of you who subscribe to the North Texas Microwave Society's newsletter will recognise our largest article this month. Many thanks to NTMS and to ZL2RST for saving the day! There is obviously always some element of cross fertilisation from one group's newsletter to another and from the various internet reflectors. This can't be avoided as many people are only too happy to share their experiences via the internet. If we see it posted and it looks interesting then we reprint the information here in Scatterpoint. In any case, not all of our readers actually subscribe to the internet reflector

73 from Peter, G3PHO, Editor



G3PHO: microwaves@blueyonder.co.uk



G3PHO: Peter Day ++44 (0)114 2816701



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

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

LAST MONTH'S GREMLIN'S



1) Typo in **Brian** (not Bryan) Coleman's name in the box on p2 - I must try to always get the Boss right in future!

2) Re the Scatterpoint archive mentioned on page 2: It should read **www.scatterpoint.org** and not the FTP address as published



Thanks to our eagle-eyed Murray, G6JYB, for pointing these out Editor

SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO THE UKuG GROUP SECRETARY AT THE ADDRESS SHOWN AT THE TOP OF THIS PAGE AND NOT TO THE EDITOR OF SCATTERPOINT

UK Microwave Group

Beginners Workshop 5

Date: Saturday 9th June 2007

Venue: Abbrook Park Sports & Social Club
Kingsteignton
Newton Abbot
Devon

Time: 1000 – 1630BST

Admission Free Of Charge

The Torbay Amateur Television and Microwave Group will be hosting the fifth in a series of workshops being held throughout the UK on Saturday 9th June 2007. The event is suitable for all newcomers / anyone interested in the microwave bands and the workshop is specifically aimed at those who have no experience.

The day will be structured around a series of introductory talks and practical demonstrations of microwave stations and operation. There will be a number of experienced microwave operators present during the day so that all your questions can be answered.

If you are

- Interested in trying out the microwave bands but haven't done so yet or
- Are just getting set up for the bands

then this event will be a great opportunity to kick start your activities.

Each attendee will receive, among other information, a useful CD containing all the day's presentations and a wealth of useful software.

Ken Harper, G0EKH is managing the event and anyone wishing to attend this workshop should contact Ken to reserve a place via e-mail to norstech@blueyonder.co.uk or via telephone on 01626 202 925.

The workshop will be an **introduction** to amateur microwaves.

Please note that it is NOT intended for those already experienced in this part of the spectrum.

Food and drink will be available for purchase throughout the day, pub style.

It will also be possible to park caravans overnight if attending the workshop by prior arrangement with the Event Manager Ken G0EKH.

Just a thought: No.1

by Peter Blakeborough, G3PYB

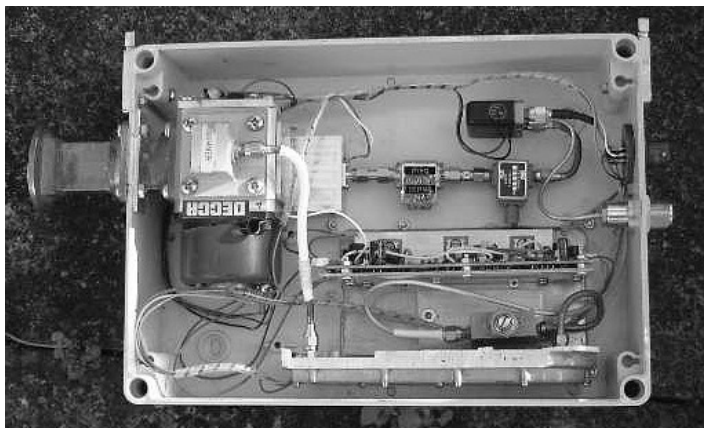
I needed a mast head pre-amp and power amp for 10GHz on the house. I have very short feeders as my driver equipment is in the loft.

I would like to have just one 10GHz feeder run but this means a second relay in the mast head box and a "sure fire" system to ensure the pre-amp is not destroyed if the change over system fails.

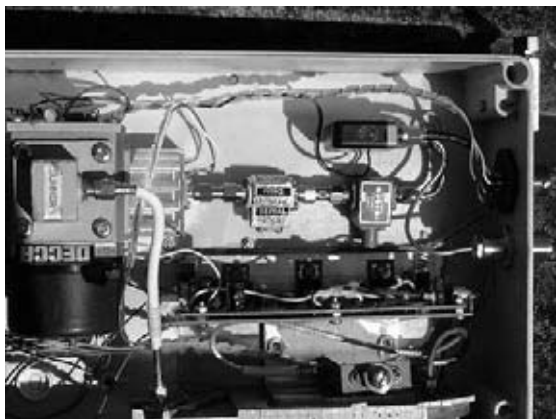
I have excess gain in the 10GHz preamp and more than enough drive for the mast head PA, even when the connecting feeder is taken into account. If I place **two surplus sma circulators in series** on the output side of the 10GHz preamp feeding the second c/o relay, the reverse isolation is more than 40dB. Additional losses are about 2/3dB which will be added to the single drive cable ... but I had plenty in hand.

With this arrangement, if the fail safe changeover fails and I send all my drive (which is about 200mW) up the pre amp line, I still only hit the pre amp with 20 to 30 microwatts.

The photo below shows whole mast head box with WG c/o and Pre amp under and Qualcomm 1W PA at the bottom with PSU.



The final photo, on the next page, shows a close up of the isolators/circulators between pre amp and the drive relay.



I tried the arrangement and it works fine."Just a thought"

REPAIRING A FAULTY mm TECH 24GHz 2 WATT PA

.. by Keld, OZ1FF

Last year during the July Field Day, my 2W 24 GHz PA failed. The reason for the failure was a 1uF tantalum decoupling capacitor, on the negative gate bias for the final transistors, making a short to ground. I did not expect the transistors surviving 0V bias and 4A drain current, so the PA was put into the drawer. After a rest ,the capacitor has begun healing by itself. With now - 0.3V gate bias the idle current was 1.5A. After replacing the capacitor the gate bias is 0.75V and the idle current 0.6A as originally. For safety reasons I have replaced all the gate bias decoupling capacitors. Have a look on:

<http://www.oz1ff.dk/Pages/Station/24%20GHz%20PA%20repair.htm>

The transverter box is now ready for being put into the tower again:

PreAmp: 1,4 dB NF

PA: 2W

Antenna: 65cm offset

dish with 10/24 GHz

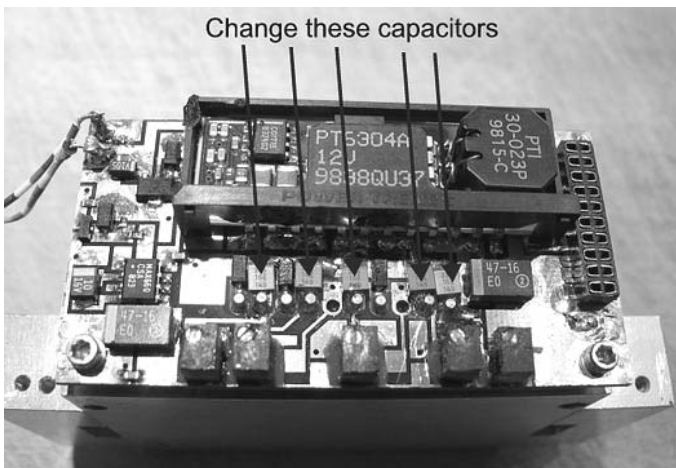
dualband feed, 26 mASL

1 km from the North Sea

in JO45BO58

I'm looking forward to the next TR/sea-duct.

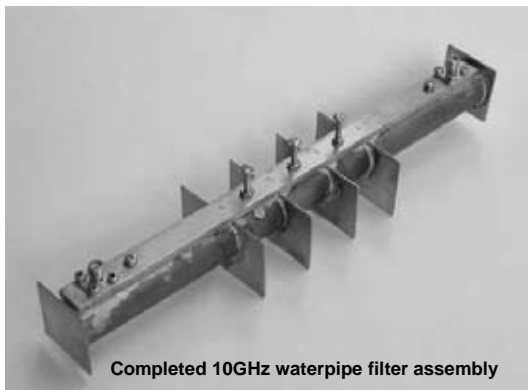
73 from Keld, OZ1FF



10 GHz Water Pipe Filter

The generation and reception of amateur signals on the 3cm band typically make use of a 2 metre or 70 centimetre transceiver to provide a tuneable intermediate frequency (IF). Transverters of this kind often have poor rejection of the local oscillator and image. Unless aiming for the best weak signal performance this is unlikely to be a problem for reception, but it is usually necessary to provide supplementary filtering on the transmit side to meet the ETS 600 684 requirements of our licences.

Here is a way of making a transmit filter from readily available materials in the home workshop. The design has a low insertion loss and provides more than 45dB rejection of the local oscillator (LO) and 65dB for the image for a system using the 10.368MHz weak signal sub-band with a 2m IF and low-side LO injection.



Filter description

The body of the filter is formed from a length of 20mm copper water pipe that acts as a circular waveguide. Using water pipe gets around the availability problems associated with the rectangular waveguide used in nearly all published designs of this type, and is the distinguishing feature of the filter. The pipe I had on-hand averaged 18.9mm ID. This internal dimension will support propagation down to 9.6GHz and the target frequency of 10.368GHz lies sufficiently well clear of this transition. To the middle of this length are added three resonant cavities formed with brass partitions fitted to slots cut at right angles to the pipe and soldered into place. Coupling across the partitions is via drilled holes, removing the variable that often makes other filters difficult to replicate. Signals are introduced to the filter via $\frac{1}{4}$ launchers formed from off-the-shelf SMA connectors. A brass strap is secured along the length of the filter with silver-solder. It serves to hold the parts of the filter in place during subsequent assembly with low-temperature solder, and is drilled and tapped for mounting the launchers and tuning screws. Soldered brass sheet end caps complete the construction. The finished filter is pictured above.

Construction

Start by cutting a 241mm length of the water pipe as detailed in the drawing. Try to keep the ends reasonably square. A plumber's tubing cutter is helpful, but hacksaw cuts tidied with a file are suitable if applied carefully. Scribe the position of the slots for the four partitions right around the circumference keeping to the dimensions given to within half a millimetre.

Cut the four cavity partitions and two end plates from 20 gauge (0.9mm) brass sheet. Size and shape is not critical provided enough excess material is available for grasping with pliers when soldering: the minimum recommended dimensions are given in the drawings. If you are following these exactly then cut the 12.7mm x 3.15mm ($\frac{1}{2}$ " by $\frac{1}{8}$ ") brass bar to length to form the top rib. Practically any small profile brass bar stock with these minimum dimensions can be used however, as long as the length of dielectric material on your SMA connectors is sufficient to pass through the combined width of the rib and pipe wall.

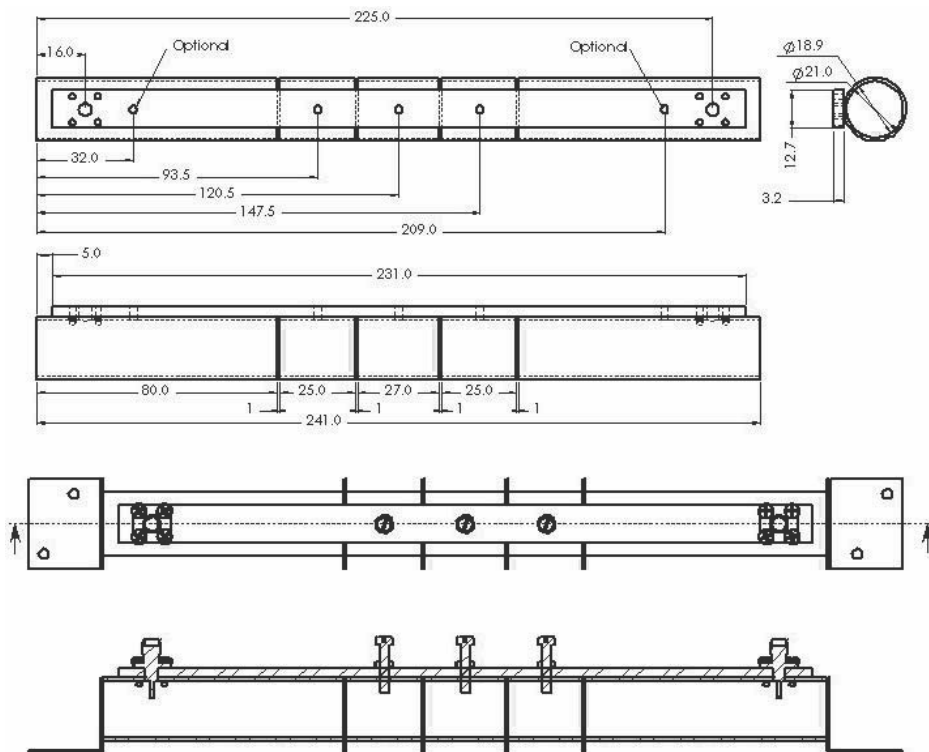
Bond the rib to the pipe with silver solder in the position pictured. Best results require clean surfaces and the appropriate flux. A propane torch is suitable as long as the head fitted is of a size that will allow sufficient heat to be applied to the work. Alternatively your local plumber may be able to assist with this part of the assembly for a small charge which may work out cheaper than buying all the bits for what may be a one-off job. Slight warping of the work can be expected from the dissimilar expansion coefficients of the two materials, but this appeared to have little effect on the finished filter performance and to an extent can be removed later in the construction. A word of warning is definitely in order here; stick with a high-percentage silver solder and do not even entertain the idea of using the plumbers flux-less copper/phosphorous blends. Experience (not my own fortunately!) shows that the surface residue this leaves will take you hours to remove, whereas the silver solder flux can be removed in water with a light scrubbing. With the rib secured add the four slots for the partitions. Hacksaw cuts tidied up with sandpaper run close to 1mm wide. Grip the filter in the vice using the brass rib. Use a fine-toothed blade as the annealed copper will now be very soft and the tube prone to deformation. Take these cuts right down through the tube to the brass rib, taking care to keep the cuts perpendicular to the axis of the filter. Gouges where the hacksaw temporarily went astray can be filled with solder later, but the internal beading of solder that often results can compromise the filter's stopband performance. Cut slowly and carefully, keeping a regular eye on what the hacksaw blade is up to on the far side of the work.

Having completed the cuts, a fine grade of sandpaper backed by a thin steel rule is used to widen them, checking each slot repeatedly for snugness of fit as you work, and that the partitions can be positioned hard down against the brass rib. The process of widening the slots may be used to a limited extent to square up any slots that have ended up off-line and remove the warping referred to above. While each partition is held in place use the inside of the pipe as a guide to scribe a circle and so locate the central position for adding the coupling holes. Drill these to the dimensions in the diagram. Lightly file and sand off any edges formed from the drilling in the plane of each sheet keeping any chamfering to a minimum. Chamfering and/or a different partition thickness from the 0.9mm specified may change the coupling between the cavities and consequently the filter's response. Read the comments at the end of the article and decide whether you will require matching screws. The remainder of the article assumes that these will not be fitted. Mark the locations for the SMA connectors and the tuning screws along the top of the filter rib. Drill and tap for the M3 tuning screws. Use a 4.2mm drill bit for the launcher holes or a 4mm bit and then open out the holes to size with a needle file. It would be wise to start with a smaller diameter pilot hole for these. Then using a connector flange as a template, locate the position for the mounting screws holes; mark, drill, and tap these for M2.5 threads. Give the entire work a thorough de-burring at this stage, removing any sharp external edges formed from the machining so far. Use a fine grade of wet & dry sandpaper rolled around a dowel former to give the inside surface of the waveguide a good clean-out and polish.

Making the waveguide launchers

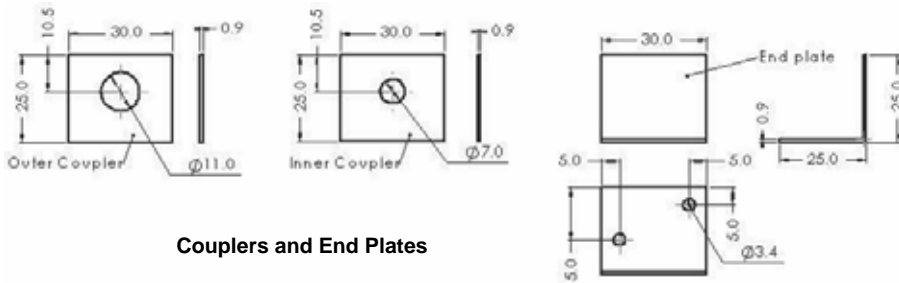
Either two-hole (Connex 132-147 or equivalent) or four-hole (Connex 132-146 or equivalent) bulk-head connectors may be used - interchangeably using the same mounting hole positions if necessary. If re-using parts there needs to be sufficient length of dielectric remaining to pass through the rib and pipe wall. The launchers and how to make them are as described in the 10GHz Dish & Feed article in Q-BIT several issues back and the follow-up article a month later and the relevant information is repeated here.

The SMA connector can now be modified to make a 10.368GHz quarter wave launcher by shortening the length of both the dielectric material and the centre conductor. The accuracy of these cuts has a large influence on the match of the feed. First up you need to trim the length of the dielectric material to match the thickness of the hole through the brass rib and pipe wall. The length is determined in-situ by marking up while the connector is held in position. There is no

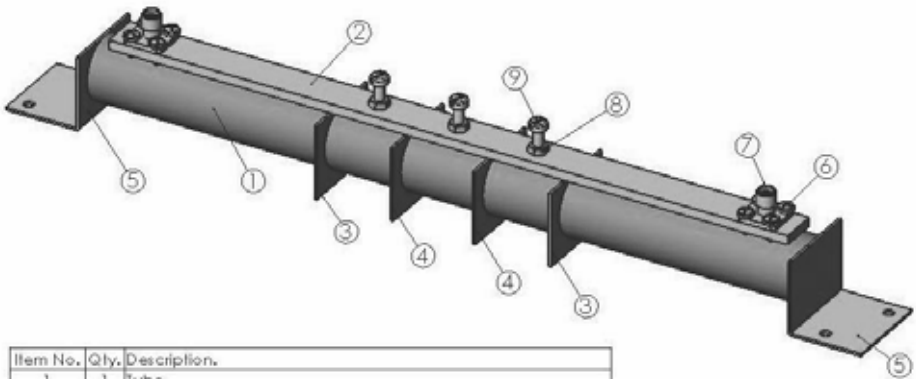


10GHz waterpipe filter—main drawing

need to profile this cut to match the internal curvature of the pipe; the prototypes were cut square which left the dielectric material flush on the outside edges and slightly proud of the internal wall down the centreline. Cutting with a craft knife while rolling the dielectric along the edge of the workbench works well. Score the dielectric lightly at first until sure that the cut is concentric and the ends of the cut meet. Then complete by cutting through to the centre conductor. Slide the surplus dielectric off and discard. The second step is to trim the exposed centre conductor so it will extend 5.4mm beyond the end of the dielectric into the cavity (note: this length is slightly longer than that used for the modified dish feed). Measure out a little excess initially and cut with wire-cutters, then lightly file or sand this to length using vernier callipers to regularly check your progress. If it is necessary to extend the centre conductor of surplus items then 3/32" brass or copper



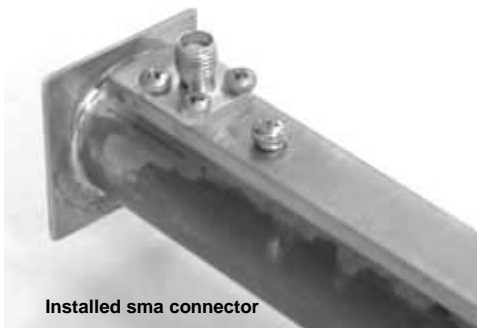
Couplers and End Plates



| Item No. | Qty. | Description. |
|----------|------|--|
| 1 | 1 | Tube |
| 2 | 1 | Brass Top Rib |
| 3 | 2 | Outer Coupler |
| 4 | 2 | Inner Coupler |
| 5 | 2 | End Plate |
| 6 | 8 | Pan Head Screw M2.5x6 SS |
| 7 | 2 | Connector SMA 12.7 sq 4 Hole Flange Receptacle |
| 8 | 3 | M3 Nut SS or Brass |
| 9 | 3 | Slotted Head Screw M3x16 Brass |

tube of the type commonly available from model shops can be used for this. Slide a 6-7mm cut length over the centre pin after first filing the cuts square and de-burring. Position it hard down against the trimmed end of the dielectric material and solder in place. The well formed by the inside of the tube may be completely filled with solder. The launcher should then be carefully filed down to a 5.2mm finished length.

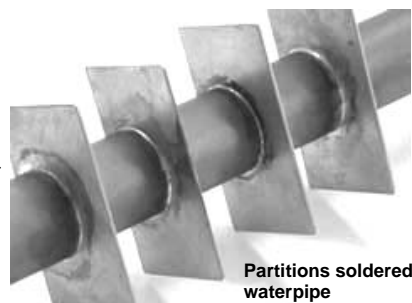
Tim's note: the prototype was slightly asymmetric in response; return loss could not be replicated if the launchers were swapped. Best return loss for 3/32" could have launchers as short as 5.0mm....was tempted to change this to 5.1mm-5.2mm, but worse case would be a 25dB RL degrading to 15dB and IL increasing from 0.7 to 0.8dB....not a lot.



Installed sma connector

Final Assembly

Now assemble the filter by soldering the cavity partitions in place; the larger diameter coupling holes on the outside, the smaller holes in the middle. Light application of a gas torch may be used alone or in combination with a soldering iron. Alternatively a portable electric hotplate with a solid heating sur-



Partitions soldered to waterpipe

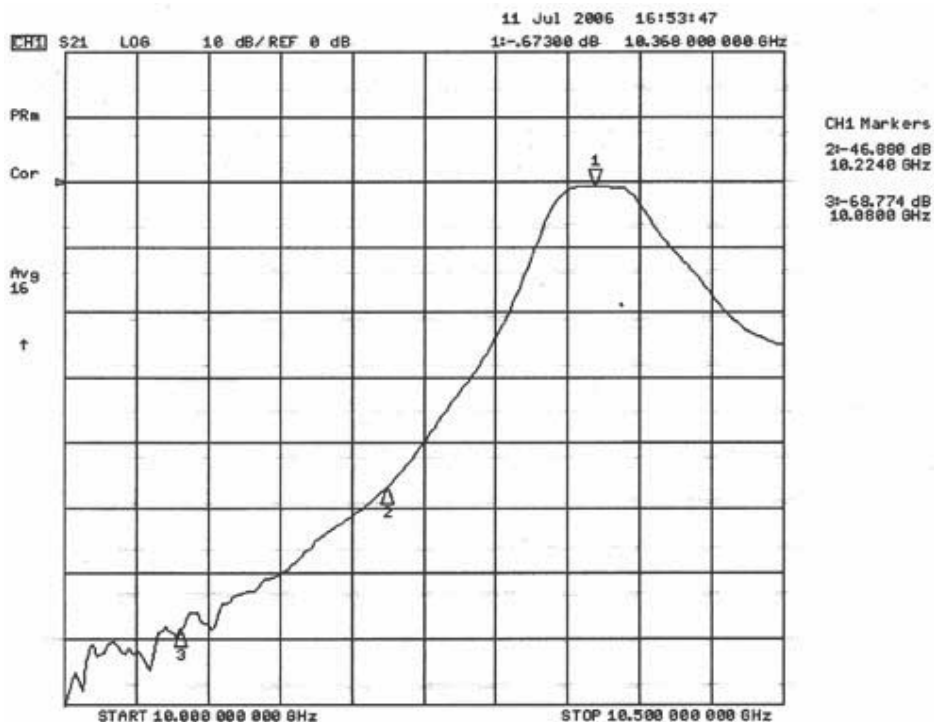
face is perfect; I found that when set to maximum it held the entire work placed on it at a suitable temperature for the use of electrical solder. Tin all the mating surfaces first and then remove any surplus solder. The internal surfaces of the brass rib may be tinned by sliding solder-loaded solder wick through the slots. Locate the partitions with reference to the coupling holes which should be concentric with the filter body. Off-centre holes will alter the coupling and change the filter response. Secure these with the minimum solder required to form a complete fillet around the available circumference and so reduce the possibility of any excess solder pooling within the cavities. The use of additional resin flux of the type available in syringe form can greatly assist in keeping the solder work tidy and forming a RF-tight seal and will also assist the solder to wick along the hidden internal joints with the brass rib. With all four partitions in place, follow a similar process to secure the brass end plates. Once the soldering is completed, give the filter a good clean inside and out to hopefully remove all traces of flux using the drilled holes to introduce and drain the cleaning solvent. Finish the assembly by securing the launchers with M2.5 x 6mm machine screws; any longer and you run the risk of these protruding into the cavity and affecting performance whereas vacant holes of this size in the tubing wall seem to have little effect on the filter's behaviour. The tuning screws (and those for the launcher matching if used) are M3x16mm brass machine screws. Stainless steel can be used if slightly greater insertion loss is acceptable. Each screw requires a matching M3 locking nut.

Aligning the filter

The completed filter can now be tuned. For this you require a 10.368GHz source such as a transverter and a suitable power meter or detector. Connect the power detector to the signal source along with the cabling to be used and take a base reading to confirm the test setup is operational. Break the connection and insert the filter. Begin the adjustment by having all screws turned fully out. With this setting the cavities are resonant above the band and inserting the respective screws progressively lowers the frequency of each. The target is to maximise detected power by adjusting for minimum insertion loss. With this goal in mind start by winding in the centre tuning screw to peak the power reading. The response at this stage will be very sharp and can easily be passed without being noticed. However, if no output is detected wind in both of the adjacent tuning screws in small and equal increments while moving the centre screw through its range until a peak is detected. Once on scale it should be fairly straightforward to optimise all three adjustments. Lock your setting in place with the locking nuts, noting that lowest loss and maximum reading requires a tight lock on all three screws and that the process of tightening the locking nuts almost always influences the tuning and this will need to be anticipated. Note also that if a transverter is used as a source then both images and the local oscillator may be present in the output. It may be possible to tune the filter to any of the three, so choose the highest frequency response - the one resulting from minimum tuning screw engagement.

Filter performance

A typical response plot is reproduced opposite. The -1dB bandwidth is approximately 40MHz with an insertion loss of 0.7dB when fitted with brass tuning screws, and 1.1dB for stainless steel. The stopband performance is not influenced by the tuning screw material and will reject the local oscillator by typically 46dB. The response is asymmetrical and is really only suitable for transverters where the local oscillator frequency is below that of the frequency of operation. Significantly higher levels of attenuation are available for the unwanted responses generated with a 70cm IF, although it is likely that a simpler filter than this design would be used in those situations. The return loss was always observed as greater than 20dB (1.2:1 VSWR) at both ports when the prototype filters had been tuned for minimum insertion loss. Filter response with the frequencies of both images and the local oscillator marked (50MHz per horizontal division).



Filter response with the frequencies of both images and the LO marked.
 Horizontal scale = 50MHz per division

Are matching screws required ?

The end matching screws become useful for variations on this design where the cavities are optimally or slightly over-coupled. In this situation the through-response and return loss at both ports may be optimised over a 100MHz bandwidth or even wider by using these adjustments in combination with the tuning screws. This kind of adjustment is probably best left to the experimenter with access to either a Network Analyser or Spectrum Analyser with Tracking Generator.

With the coupling hole dimensions given the filter is intentionally slightly under-coupled to give a rounded passband response where only one combination of tuning screw positions is possible for minimum insertion loss. This is the way it needs to be for the home constructor who will set up the filter with only a power detector. To save you contacting me about the response type of the filter; the coupling was adjusted experimentally on all the prototype filters so I'm afraid I can't tell you. If you stick with all the dimensions given the filter should tune up just fine and you will not require the matching screws.

References

1. G3JVL filter presented by K6UQH, The ARRL UHF/Microwave Experimenter's Manual.
2. Circular waveguide made from copper pipe for the 3cm band, H.-Joachim Woelky DK2UO, Dubus, January 1986.
3. A simple and effective filter for the 3cm band, Glenn Elmore N6GN, QEX, July 1987.
4. Multiple-cavity Iris-coupled waveguide filters for X-band, Bob Atkins KA1GT, QST March 1984.

73 from Tim Goode, ZL2RST

The Telford Microwave Workshop for Beginners

.. a report by Martyn Vincent, G3UKV

We had a great Microwave Beginners' Workshop on the 3rd March 2007. There were **27 attendees**, plus the Telford Club crew doing the welcome, the catering and the furniture moving. Having several rooms and plenty of chairs was very useful from the organisers' point of view.

Each of the 4 main presentations took quite a long time to assemble and disassemble afterwards, but as it was a very full day, it meant there was no lost time as one speaker followed the next. I suspect the visitors also appreciated stretching their legs between presentations, especially as two of the rooms were upstairs, and they passed the coffee bar each time en route.

The introductory session (given by Martyn G3UKV) turned out to be longer than planned, but the audience remained attentive throughout. It gave a broad overall perspective about microwave activities from 1296 MHz to 75GHz. This was followed by **Dave's G8VZT talk and demo of amateur TV on 10GHz**, and already one or two of the attendees are planning cross-town ATV. After lunch, **Mike G3PFR gave some valuable tips about obtaining useful parts for our bands**, and had me drooling over a directional coupler covering 1 to 12 GHz for which he had paid the grand sum of £2 at a junk sale!

Richard, G8JVM, gave the last presentation covering conversion of ex-commercial gear, focusing on the 6 and 9cm bands. He had some terrific tips about things like snow-flaking and removing static-sensitive devices from PCBs. The last half hour was a **Q/A session**, and 4:30pm soon came and the final clear-up took place.

Thanks to the Sheffield CD, and some other material that came via Peter G3PHO, the Power-Point framework was very useful indeed, and each visitor took away plenty of paperwork, plus a CD (only finished the previous night!) Additions to the original excellent Sheffield CD included the 1986 Dubus and follow-up scaled designs for dual band horns (covering 23/13,

13/9, 9/6 and 6/3 cm), the G8MWR 'Microwave Society 10 GHz DataPack' (WBFM & ATV), the G3JVL Loop Yagi dimensions (for 23, 13, 9 and 6 cm) and the G3UKV and G3PFR presentations, plus further input on antennas and much more provided by G3PHO. Some of this will be added to the **Telford & DARS Website**, **www.TDARS.org**, in due course, and perhaps to Peter's website too? Historic items, such as the G8MWR, G3JVL and Dubus/G4FUF articles are well worth preserving for reference purposes.

One happy person from Cheshire went away with a 7 watt 10GHz TWT, which was donated by Dave G8VZT. All those visitors who joined the UK Microwave group on the day, and there were 13 new subscribers, had their application forms placed in a motor cycle helmet at the end of the day, and Mike G3PFR pulled out the lucky winner.

Thanks to everyone who attended and helped with the organisation, and especially Richard M1RKH who handled the overall logistics for the day, Derek G0EYX and his wife Anne who prepared the excellent plated lunch, plus Dave G8VZT, Richard G8JVM and Mike G3PFR for their presentations, not forgetting Peter G3PHO for his advice, and I believe the inventor of the Beginners' Microwave Workshop concept in about 2004! (*please spare my blushes... ed. !*)

UKuG shows the way!

A recent notice on the USA Microwave Reflector reads:

The 33rd Annual Eastern VHF/UHF Conference to be held April 20, 21 & 22, 2007 once again at the Crowne Plaza Hotel in Enfield, CT. This year we will sponsor a Saturday afternoon Microwave Workshop - mini conference, in addition to our regular 3 day conference activities.

The Microwave Workshop will be patterned after the UK Microwave Group's "Microwave Radio Workshop for Beginners". This event is suitable for all newcomers to the microwave bands, with no previous experience necessary. Paul Wade, W1GHZ world renowned microwaver and editor of QST's Microwavelengths column is coordinating the event.



Above: An attentive audience



Right:
G3PFR
shows everyone what to
look for at
the rallies

Right: Richard, G8JVM, passes along tips on
converting surplus microwave equipment to
the amateur bands



Left and below: Mike, G3PFR, draws the lucky dip
(UKuG application form!) for the 7 watt 10GHz TWT
amplifier. Does anyone recognize the winner?



Torbay Amateur Television & Microwave Group Beacons

by Alec, G8GON

Alec, G8GON, published this article in the February 2007 edition of the Torbay groups Newsletter

I have just finished installing the 2 x 10 GHz beacons at my home QTH here in Exmouth.

For those wanting to do path calculations:

**Locator: IO80HP, Lat: 50:38:18N
(50.6383) Lon: 3:23:14W (-3.3872) all at
250ft asl**

There is an **ATV beacon** (currently relaying video from **GB3TB**, as received here, on the plate antenna below, *a bit sparkly at times*), on our Group's agreed common frequency **10.450GHz**. This runs 15mW to a omni directional 24 slot waveguide antenna (*left hand white "stick" on picture above right*).. There is also a **Narrow band beacon** about **10.368945GHz** (*If you are local, please check the frequency with Bob, **G3GNR**, who has a better calibrated receiver than me*), 12mw to an omni directional 32slot waveguide antenna. The Morse id is G8GON. The antenna is the right hand box and stick on picture above.



I have a completely clear path to the coast from Dawlish to Start Point, so anyone near the coast who can see Exmouth has a line of sight path to me.

There is also a **13cms ATV beacon** currently relaying video from **GB3TB**, as received here. The frequency is **2414MHz** and it's running 500mW to a 10dB antenna wide bandwidth pointing at Torbay. It's receivable at all line of sight paths along the coast from Starcross to Start Point

I hope the beacons are useful resources and will help to promote experiments. I would really appreciate any reports from Group Members across the Bay. G4ONN has apparently heard the narrow band beacon at Paignton.

You can assume that the beacons will be on 24/7 (subject to the new licence conditions of course).

If you need any more info, any comments or want to arrange a sked with more erp across the bay please e-mail me alec@g8gon.com or on 01395 264872

73 and good viewing, Alec, G8GON

TAKE CARE!

Endwave 24GHz TX/RX Modules SDH Transceiver WARNING!! Do not remove waveguide covers!

From: WB6DJI, Michael Aust

<ava622@verizon.net>

Date: 26 Feb 2007 20:54:45 (PST)

IMPORTANT to Microwave 24GHz users of this surplus SDH Transceiver on Ebay:

Do not take off the waveguide covers off the module. if you take the Philip heads screws out and full the covers off, **YOU WILL BREAK THE WIRE BONDS** from the GREEN I.F. BOARD to the Integrated Circuit Modules. There are no tuneable parts and only I.Cs with bond wires.

For me to manually repair these, takes over an hour and at \$19.95 per module, my time is not worth repairing these for the ham community.

If you resell these, place a tamper proof label along both outer Tx and Rx waveguide modules!!

Warn all your end users not to open these for if you do, you will damage the unit. Unless you work in a semiconductor facility like me, you will have 24GHz paper weights to look at!

These units have 2 x 1 watt output MMIC Tx PA chips in parallel, so one can get a fair amount of power at 24GHz!

73 Mike WB6DJI

SCATTERPOINT MICROWAVE BEGINNER'S COLUMN ...

As a follow up to the very successful workshops held over the past year, a request has been made for Scatterpoint to carry a regular beginners' page or column. We would be **very** happy indeed to do just that. However we would need **your** help!

A full page can easily be allocated, if required, each month (even more if the material warrants it). All we need is someone to take on the responsibility of writing the column. This would entail the collection of material and writing it up in a suitable format for the editor to paste it into Scatterpoint. Suggested formats are Word.doc or even plain *.txt files. Photos and diagrams should NOT be embedded in the article but should be kept as separate graphic files.

If you are interested in becoming the first independent Scatterpoint Columnist then please contact the editor (details on page 2).

Peter, G3PHO

SCATTERPOINT BACK UP

Any computer user will tell you that you must back up all your data each day if you are avoid losing it all in a computer crash. Your editor is feeling (and fearing) the same about Scatterpoint! Each month, for the past twenty two years (including the time when it was known as the RSGB Microwave Newsletter), he's been putting an edition together and fortunately meeting the deadline each time. However, the years have rolled on and your scribe is beginning to feel a little vulnerable to the possibility of him not being able to meet a deadline one of these days.

This year sees him enter the "twilight zone" of real old age when anything could happen! So, to ensure a continuum of Scatterpoints, he, with the aid of the UKuG Committee has decided to create a backup in the form of an assistant editor, **Robin, G8APZ**, who will, from time to time, produce a whole issue and who will be available for those occasions when G3PHO is unable to do the job.

UKuG are considering purchasing the DTP software to make Robin's output compatible with Peter's. At the moment, Robin is on the steep learning curve of finding out how things "tick" and is producing some test material. So far things are looking good watch this space!

IS THIS A FIRST?

By David Mann, G8ADM

I recently had a unique digital ATV contact on 10GHz with Peter, G3PYB. Peter suggested that I send these pictures to Scatterpoint in the hope they may be of interest to others contemplating going digital on 10GHz! All three photos are of the signals received from G3PYB/P and taken off screen at my QTH.

(The black and white shown here does not do justice to the excellent colour originals provided... editor)

The contact was over a 30 mile range. Peter was on the Hoggs Back near Guildford in Surrey. I was at home in Stanmore, NW London. Peter sent 0.3W of analogue and digital ATV into a 60cm offset fed dish

I sent 1W of analogue ATV into a 20dB horn at 60ft agl. We exchanged P5 pictures Peters digital pictures were remarkably good with a bit error rate of only 1 in 10 Million.

This must be one of the first portable digital transmissions on 10GHz.

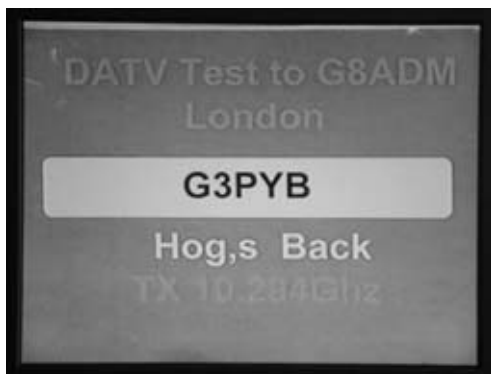
73 from Dave G8ADM

Editor's Comments:

As many readers will already know, Peter Blakeborough, G3PYB, is President of the British Amateur Television Club (BATC). He is very keen to see a move over from amateur analogue to digital TV transmissions and is certainly leading by example. As demands on our spectrum get more and more intensive, we are going to have to come to terms with narrower allocations of frequencies in the microwave region. Wideband users such as the ATVers will need to "bite the bullet" if they are to continue to enjoy their special interests, particularly on the 23cm band.

Scatterpoint is always very happy to publish information such as this and we would also be pleased to have technical articles from ATV enthusiasts. UKuG is NOT a narrowband club! There are hundreds of microwave ATV people out there who we never hear from but whom we certainly welcome as fellow microwavers.

Many thanks to Dave, G8ADM, for bringing this video QSO to our notice.



Do you plan to be in Italy this May?

If so you might like to visit the Italian Microwave Meeting run by CRBR, the **CENTRO RADIOASTRONOMICO BAGNARA DI ROMAGNA**

We will be holding a three day amateur microwave conference on the 25-26-27 May 2007

The 25th will including access to RF test equipment and microwave antennas test range, etc. All bands 1296MHz to 24GHz will be covered.

Please visit our website for further details:

www.crbr.it

73 from Roberto IW5BSF



ACTIVITY NEWS FROM THE WORLD ABOVE 1000MHz

Once again we are extremely short of activity news this month. Much of what follows in this column is stuff gleaned from the various internal newsgroups and reflectors, particularly the UK Microwave Reflector. If you have already seen this information please be understanding as there are many Scatterpoint subscribers who do not read the UKuG reflector.

24GHz

This band is apparently seeing a surge in interest with several new stations due to come operative in the next few weeks. **Sam, G4DDK (JO02PA)** writes as follows: 9 Mar 2007: The initial version of the GB3MHK hardware is currently temporarily installed inside the SHF room at Martlesham and is being operated as an attended beacon by G7OCD. It is on 24048.050MHz with a rather warbly note.

It will only be on until about 17:00 today. So far the 1/4W is LOUD here even with the temporary 15dBi gain horn beaming away from me towards the north. It may be illuminating either Mendlesham at 15km or more likely I am getting scatter from the local police comms tower at Martlesham! G3LQR is going to have a listen a little later. Hopefully he will get a good signal near Framlingham. So far this looks encouraging for the new beacon, once the licence comes through.

My own new 24048MHz system has one of Michael's coax preamps (can't remember the number) with 1.9dB NF. I was most careful to ensure the lowest losses I could achieve both before and after the preamp so that second stage contributions would be low as well as the losses ahead of the preamp. I also decided against an offset dish as this would have inevitably meant a length of flexible waveguide with its attendant losses (which often get worse with time (moisture?)), preferring instead to use a smaller dish but one which could be 'integrated' with the transverter so as to use minimal waveguide and put least mechanical stress on the transverter housing (ABS Plastic). This is strengthened with aluminium angle pieces, for additional rigidity. Hanging a heavy transverter from the arm of a Sky 60cm offset dish will probably result in dish distortion with time. The portable guys don't

know how lucky they are to only have to build portable gear. Easy.....!!

I now measure (HP8970A and HP346C NF head) my system NF at 2.5dB. Low system noise figure is always good on the higher bands, but since sky 'brightness' on the horizon will be higher on 24GHz and above than on the 'microwave' bands (i.e. inside the low noise microwave window) due to absorption losses (absorption also means radiation) there is slightly less advantage to achieving very low noise figures. That is a qualified statement and depends on your viewpoint, of course. I think that 2dB is satisfactory and 1dB outstanding. I can live with 2.5dB as the alternative is more reconstruction delays and disruption as well as an inevitable reduction in receiver dynamic range if I add the second preamp.

The 'new OCXO' is behaving itself very well. I measure about 20Hz pk-pk spread on the LO+ Test signal, using Spectran. I can live with that amount. Any more offends my sensibilities!

A DFS 124.5 is not difficult to build. You don't need to go to 123MHz. I have half finished mine already.

So, I am ready to test with anyone who wants to try. G3LQR reports my signal as about 15dB stronger than with the old 24192MHz system.

I tried to get Charlie, G3WDG, interested in 24GHz again but was unsuccessful

From Dave, G0RRJ (Andover, IO91FE) comes news of his 24GHz activities: Brian G4NNS and I have both been building 24GHz systems for tropo use. Brian has given me a lot of help with this project & my 24GHz system would not be where it is today without Brian's assistance. I hope to have my system up on the mast at the home QTH some point soon. Recently Brian, G4NNS, & Mike, G0MJW, went up to Chute Causeway (IO91FO north of Andover) and John, G8ACE, & I went to Lane End (IO91JA east of Winchester). We all made 24GHz SSB & FM qsos over a 69Km path.

Here's a picture of my 24GHz system is (the G8ACE oscillator & FT290 are out of shot). The whole thing still needs to go into a box though:



LOWBAND CONTEST : 4 March 2007

Bad weather plagued this contest. Rain and strong winds prevented any portable activity and home station operators found themselves with few others to talk to. It was nice to see some Continental activity though. A few reports appeared on the UK Microwave Reflector and are posted here for those who don't look at that, as well as for the historical record.

**From: David Ackrill <dave.g0dja@tiscali.co.uk>
IO93IF. Date: Sun, 04 Mar 2007**

Well, although I only made one contact between 10:00 and 15:00, I did complete two contacts and had a 1 way on CW, so I'm quite pleased with progress so far. The 1st contact, at 08:28, was with Gordon, G0EWN, near Sheffield. Then, at 10:55, I worked Peter, G3LRP. Both contacts were on SSB. After the end of the activity period, at about 15:55, I had a 1 way CW contact with Sam, G4DDK, but conditions were so poor and my low power wouldn't quite make the distance. We didn't complete the contact.

I did hear GB3MHL in the morning, but by the afternoon, with all the rain about, it had slid back into the noise. ... Room for improvement but at least I'm on the 23cm band now.

On 7 Mar 2007, I had my 1st 2 way CW contact on 23cm thanks to Ray, GM4CXM. He was a good signal down here in Bolsover (IO93IF), at about 316km. That's also my furthest contact on the band, 1st contact with another country and 1st contact with a station in Scotland. As Ray was saying, these paths are possible; it's just a case of beaming North/North Westwards occasionally. **Dave GODJA**

**From: ROGER KENDALL, G0UPU, IO91AX
<Roger.Kendall@BTInternet.com>**

I don't have KST in the shack so I have to use 144.175MHz. If you only use KST then you won't work me anyway.

On Sunday I listened (and put out some CQs on 144.175 and on 23cm) but did not hear anyone during the contest. Conditions here were very poor though. I did not listen continuously as I was also on the 2m and 70cm contests. (Well its better than sitting all day hearing nothing!) After the contest had finished I did work G3VKV and G4MAP on 23cm and the three of us listened around for beacons on 3cm. I found that these were down in strength despite the rain and very directional. Usually rainscatter makes them much less directional here.

I was surprised that the contest ended at 15.00. If you could not get on in the morning then it does not leave much contest left. **73 from Roger, G0UPU.**

**From: Dave, G0RRJ, IO91FE
<g0rrj@btopenworld.com>**

I operated in the low band microwave contest on the 4th of March to give a few points away. I worked ON4SHF/P in JO20KW at 449Km on 1.3GHz (419/559)

& 2.3GHz (319/519). I then worked PA6NL in JO21BX at 400Km on 1.3GHz (52/52) & on 2.3GHz (419/539). We tried on 9cm and heard each other but were unable to complete a QSO. However, what was most unexpected, I tried with PA6NL on 5.7GHz and we exchanged 559/559 reports. We then tried on 10GHz where we exchanged 519/519 reports so that was most pleasing & beyond my expectations in what seemed at best normal conditions.

I then worked G4BRK on both 2.3GHz & 3.4GHz Both QSOs were via strong rain scatter, Neil was 58S in SSB on 2.3GHz & 56S in SSB on 3.4GHz. I could beam 40 degrees off of the direct heading and still get a strong signal from Neil. These were the strongest

rain scatter signals I have ever heard on 13cm & 9cm, the distance between us being approximately 50km.

I tried with Ralph G4ALY in Cornwall on 2.3GHz

but the signals were to weak. However, we had a successful QSO on 10GHz, exchanging 55s/559 signal reports over the 209km path over Dartmoor.

My equipment is as follows:-

1296MHz: an SSB transverter driving a pair of 3CX100A5 (100 watts into the antenna) and a 55 element Tonna yagi

2320MHz: a loft mounted DB6NT transverter system 19 watts into a 45 element loop yagi

3400MHz: a loft mounted DB6NT transverter system with Ionica PA 12watts into a 45 element home made loop yagi

5760MHz: a mast mounted DB6NT transverter system with a 7 watts output into a 36cm offset dish

10368MHz: a mast mounted DB6NT transverter system with a 3 watts output into a 60cm prime focus dish with a penny feed.

**From: G3XDY, JO02OB
<g3xdy@btinternet.com>**

Thanks to everyone for the QSOs in the contest on Sunday. Despite the poor weather and tropo conditions, aircraft scatter was good on 23cm with several DX QSOs into DL from here, best of which was DR6A in JN59 at 689km, plus of course, Ray GM4CXM and Ralph G4ALY, within the UK. The aircraft peaks were generally too short lived on 13cm to make complete QSOs in a reasonable time with the more distant stations, apart from with DF9IC. 9cm suffered from lack of portable activity but did display signs of RS enhancement on some paths. **73 John G3XDY**



From: Neil, G4BRK <neil@g4brk.net>

It was nice to have some activity on Sunday 4 March, despite the poor conditions. There was no trace either way with ON4SHF/P on 13cm, normally a path which goes well ... and this despite me putting up the 1.5m dish for the day. There was no real DX here, best being DJ5BV at 595km on 23cm. Only 2 G's were worked before the continental contest finished at 14.00. Then I found 4 more but missed out on G3YJR, G4DDK, G0DJA. There was no sign of any portables ... hardly surprising given the weather!

I had some very good RS in a 13cm QSO with G0RRJ, strongest I've heard on the band. I only heard 1 station on 144.175MHz talkback and that was a continental station doing the 2m contest.

73. See you all next time ... Neil G4BRK

From: Jules, G0NZO <jules@g0nzo.co.uk>

We ran G4RFR from the FRARS clubhouse in IO80. The wind and other antennas on the masts prevented us from cranking up the towers but, even so, that is still not a bad site for the lower bands.

The conditions were absolutely atrocious! The beams seemed to be well down on their normal levels, even the 2m talkback was hard work on what should have been easy paths. This was probably due to the low pressure front moving over us and travelling east. We had out share of other issues too. 9cm was S9 with WiMax (or some other wide data) which was not there when we tested the system last week and we lost the PSU on the masthead 13cm system half way through the event. Oh well, better luck (and WX) next month!

73 from Jules

From: Graham Murchie, G4FSG, JO02, <graham.murchie@btinternet.com>

I sent an e-mail to the Scatterpoint editor in January saying that my New Year's Resolution was to make a contact on a band above 23cm! You will all be pleased to hear that I made 2 contacts on 9cm in the contest today! Taking G3PHO's bedroom window DXing as an inspiration, I had a small horn inside my loft where I have the shack and worked John G3XDY and Sam G4DDK at 7 and 9 km! I was out until 2pm so only had an hour and the weather was pretty awful so don't think I would have worked anyone else.....other than possibly Simon (G3LQR) at 15km. I have a 112 element QLY kit which arrived from the USA last week so I hope to get that (and a 13cm aerial) up in the next few weeks. I know that 9cm is not the most logical next band but I have always been awkward! Maybe the next objective for the remainder of the year should be to work G3PHO(/P)??? **73 from Graham, G4FSG**

From: Ray, GM4CXM, IO75TW <gm4cxm@yahoo.co.uk>

Despite the rain and wind, conditions didn't appear too bad on 23cm from north west of the Pennines, Cumbrian Mountains and Scottish Southern Uplands. Running an FT736, 10w output and 4x44 + SP23MK2

LNA, I worked:

G4BRK IO91 516km
G3YJR IO93 336km (7w & 1x44)
G4EAT JO01 571km
PI4Z JO11 731km
MOGHZ IO81 520km
G0JBA JO01 635km (Kent, new contact)
PA6NL JO21 708km
G3XDY JO02 564km
GW8ASD IO83 332km

It was good to work the Netherlands from the west coast of Scotland and the first contact with Phil, G0JBA, in deepest Kent was a pleasant surprise. I hope more who would like to try a contact up here will appear on the ON4KST system in the future to arrange a schedule as hours of cq calls to the south and south east met without any joy. Despite many calls on 144.175, nothing was heard. **73 Ray GM4CXM**

GENERAL NEWS:

From: Mike Parkin, G0JMI (IO90):

I have been "around and about" over the winter months. I have finally put an Rx pre-amp into my 24GHz system, I have had the Rx amp for ages and just not got around to "plumbing" it in! This seems to have raised the sensitivity of the system somewhat!

I have also been working on a receiver for 10, 24, 76, 142 and 246 ... but in terms of 10s of kHz rather than GHz! I acquired an LW/MW receiver dating from around 1933 which I have restored into working order (including needing to build the HT and LT supplies). It's a Marconiphone Model 255mc, which is a six valve portable superhet for LW and MW (about the size of a small suit case!). It didn't have any valves in it when it was given to me and I was lucky because Gerry at Crowthorne Valve Supplies was able to help me out.

The Marconiphone receiver works really well and we used it to listen to the Queen's speech at Christmas (seemed the right equipment to listen to this with!). I keep expecting to hear the BBC Home Service!

Inspired by this, I then constructed a 1920's two valve MW Rx from FJ Camm's Practical Wireless Circuits collection. I was staggered at how good this receiver works compared to transistor radios of today. Even with only two valves it is just able to power a loud-speaker. **73 from Mike, G0JMI**

That's all for this month folks. Please send in your news, views and articles for the April issue by the 5th of that month.
