MICROWAVE NEWSLETTER

An Amateur Radio publication for the Microwave enthusiast, published by the Radio Society of Great Britain and edited by G3PHO and G8AGN

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

FROM THE EDITORS

May 1994

Many thanks to all our contribuors this month.At the time of writing this page the sun is shining and the temperatures are climbing....ideal /portable weather! Let us hope the rest of the season continues like this (or do you really want lots of rain scatter?).

ROUND TABLES and OTHER EVENTS

SOUTHERN MICROWAVE GROUP:

The next meeting of this group will be on **Sunday, 19th June, 1994** at the Crawley Amateur Radio Club premises, Pease Pottage, near Crawley, West Sussex. The meeting will start at 10am and follow the format of previous meetings of the group. Further details can be obtained from Mike Scott, G3LYP, tel. 0494 881298 or write to him, QTHR, enclosing an SAE of course.

THE NORDIC VHF/UHF/SHF MEETING

OZ9RU and the Danish microwavers extends an invitation to all readers of the Newsletter to the Nordic meeting to be held on **10th to 12th June 1994 at Hadsten, Denmark.**

The meeting will be hosted by the Technical College of Jutland, set in excellent surroundings for both accommodation and social activities (eg swimming, sauna, table tennis, dining, etc) at no extra cost! The will be a full programme of technical lectures on VHF and above, plus TX/RX measurements and antenna measuring site. A lot of space is available for the "flea market" so bring all your spare "bits" for sale!

Full catering facilities are available and an excellent canteen sells all meals. In addition there are very good camping facilities for those who do not wish to use the hotel or hostel facilities.

This looks to be a great event to attend! Full details, together with registration forms can be obtained from OZ9RU, Kurt Findorf, Vermundsvej 49, 8370 HADSTEN, Denmark, or telephone +45 86 981449 or FAX +45 86 915240 with your fax clearly marked ATT: Kurt Findorf. Finally you can try packet OZ9RU @ OZ8PAC

NORTHERN LIGHTS VHF/UHF CONVENTION

This event will be held on the **9th and 10th July 1994** at Reasenheath College, Nantwich, Cheshire, CW5 6DF. The Saturday is reserved for the lecture programme which includes a microwave one by G4DDK (A Year on 3cm) as well as lectures on 6 metres, (by G3WOS), computerised optimised yagis and practical 70cm EME systems, (by G3SEK), sporadic E observations, (by Jim Bacon G3YLA) and, finally, a talk on operating while holding down a 70 hour week job!! (G4PIQ). A dinner will be held in the evening.

The Sunday will consist of a visit to Jodrell Bank, including a tour and lecture.

(continued page 2.....)

The usual trade stands and computer software demonstrations will be present. There's a fully licenced bar and catering facilities.

The cost of the weekend:

Day visitor £3.00
Bed and Breakfast £15.00
Saturday dinner £12.50 *
Jodrell Bank trip £6.00 *

* **book early for these as numbers are limited!**

For further details please contact Tony, G4APA on 0270 761805 or make an advanced booking through Bob Harrison, G4UJS, Green Lane House, Whixall, Shropshire, SY13 2PT.....full payment or £10 deposit, cheques payable to "The Northern Lights".

COMPONENT NEWS

Philips (Microwave division) provide a very interesting shortform catalogue of their millimetre wave devices, including GaAs Mott mixer diodes, GaAs PINs, GaAs High Q varactors and multiplier varactors, GaAs power pHEMT devices and GaAs MMICs. The CL8990 24GHz doppler module is available, using an in-line approach with Gunn diode and mixer. They are available pre-tuned to either 24.125GHz or 24.200GHz at approximately £50.00 each +VAT. Output is between 3 and 5mW. They also sell a K-band gunn diode at £20 approx. (+VAT) in small quantities. A minimum order of £150 applies to anything bought direct from them.

Contact D.P Dalgliesh, Sales and Marketing Manager, Philips Microwave, Bramhall Moor Lane, Hazel Grove, STOCKPORT, Cheshire, SK7 5BJ, or tel. 061 483 0011 or FAX on 061 483 0014

USA 10GHz OVERLAND RECORD SMASHED!

The March 1994 edition of QST includes a two page spread on the efforts of the San Bernardino Microwave Society to break the overland 3cm record. It all began on 18 July last year when, after three years of trial and error and months of planning, two-way CW exchanges were made between W6HCC (Mt. Ashland, CN82pb) and WA6EXV and WA6OWD (Mt. Pinos, DM04kt). The qrb of 864.7km was almost 100km better than the previous overland record. This was soon to be eclipsed however when, in the August 22nd 1993 ARRL 10GHz Cumulative Contest, WA6CNR worked XE2/N6XQ in Mexico over a 1019km path!!

A number of amateurs took part in the July effort which is well documented in the QST article. These included (with their equipment, all home brew unless stated):

W6HCC: 15 watts o/p + 4 foot dish
WA6EXV: 40 watts + 4 foot dish
WA6OWD: 10 watts + 4 foot dish
WB6CWN: "White Box"+ 10watt TWT and 4 foot dish
W6ASL: "White Box", 200mW into a 30 inch dish
K6GZA: 400mW into a 3 foot dish
WA6CDR: 10watts + 4 foot dish

High, mountain top portable sites were used of course. The last four in the list above were each on mountains in between the two extremities of the path. Mt. Ashland is just inside Oregon, while Mt. Pinos is inland from Santa Barbara in southern California.

We in the UK can only read and drool about this kind of DX from portable sites. Anyone for Ben Nevis to Snowdon?! Can anyone claim the longest overland path in the UK? Is it the G3JVL to GM3YGF path of the 1970s or what? Let the Editors know!

REJUVENATING TRAVELLING WAVE TUBES

- by Mike Walters, G3JVL

The majority of TWT's finding their way into the amateur's shack have already had an extensive service life. As a result a variety of FACTORS by which they have been defined as END of LIFE devices apply.

The major one being reduction of Heater/Cathode emission.
This shows up in several ways - Helix Current too HIGH (will prevent use)
Collector Current LOW
Reduction in GAIN
Only the first mentioned actually prevents the TWT being pressed into use as a PA on 10GHz. The other two are tolerable.

In practice I have found that there are TWO methods of reclaiming some service life in Intermittent Amateur Service applications.
The first is by increasing the Heater voltage, the exception being the earlier WG17 type W3MC/3F which I will deal with separately.
The second is by Magnetic adjustment. These two methods are often interdependent.

HEATER/CATHODE EMISSION IMPROVEMENTS

This always increases the Collector Current and to an extent reduces the Helix Current. It is worth mentioning that in most cases the AEG type YH1193 responds with rather more Helix current reduction related to the heater voltage changes than the ITT W3MC/11F.
In cases where the Cathode current is 30 to 40mA but the Helix is very high and trips the supply with the heater supply at the nominal 6.3v AC or DC it may only be necessary to re-focus the beam as in the next section. When the helix current is high and the cathode current is low say 20mA or less then increase the heaters to between 6.7 & 7v and make no attempt to re-focus initially. After this initial adjustment recheck the currents. In most cases magnetic re-focusing will be beneficial. Further inceases of heater supply will be required over a long period but just a little at a time is recommended.
TWT's treated in the fashion discussed here should NOT be run for long periods (beacon fashion) as the service life will be limited. Used in the normal SSB/CW QSO manner ie short TX compared to RX periods, a long service life is likely. Some have already clocked up 100000hrs!

MAGNETIC ADJUSTMENTS (W3MC/11A & YH1193)

Generally when attempting to re-focusing the BEAM, only the INPUT connector end of the helix assembly need be attended to as this is where the beam is formed.

This is achieved by the use of small pieces of "Rare Earth Magnets" their very strong field does the refocusing very well. Lesser strength magnets help but you may need many more and may not achieve such good reduction in helix current.
However use what you have or can obtain.
Please note that in some cases it is essential that the Anode Voltage be reduced in order that the PSU will remain operating and not be tripped by the Helix current protection circuitry.
The Helix voltage should be set to that which gives Maximum Output whatever the power.

ADDING THE MAGNETS

PLEASE NOTE - that these magnets will also INCREASE the current to trip level whilst experimenting if held in the wrong position for longer than the trip circuit delay.
Whilst observing the Helix Current, without RF drive, a small magnet is held in the vacinity of the INPUT connector just above the surface and positioned for minimum current. It will soon become obvious that the field direction is also very important. Having determined an initial position, the magnet may be placed

on the surface and again carefully positioned for minimum current. Once the best position has been determined mark this on the TWT's case so that the magnet may be removed to allow the application of Super Glue. Further magnets should be tried until the further reduction is minimal.
If the Anode Voltage had been reduced as mentioned earlier then increase to a value giving 30 to 40mA's or as high as possible for Cathode current or to the maximum possible within the Helix current limit. (The aim is a maximum of 1mA)
At this stage apply RF drive & readjust the Helix Voltage for maximum output.
Some times application of further magnets may be found to increase the RF Output with little or no change in Helix Current. (The driven Helix current may be around 2mA and the trip level about 3mA)

W3MC/3F WG17 Input & Output type TWT

TAKE CARE DURING THIS FOLLOWING OPERATION AS THE HIGH VOLTAGE POINTS ARE NOT TOO WELL PROTECTED dont touch!

Many of these have been recovered to give up to 20w output.
Unlike the previously described TWT's the increasing the heater voltage has only a very minor effect and therefore is probably best left alone.
Small pieces of mild steel are all that are needed to readjust the magnetic field on these older type of TWT.
Start by removing the end plate at the input end (not Collector Fins end) and slide out the 3 side panels.
At this stage you will see some pieces of mild steel covered in Silicon Rubber sealant that were place there at the manufacturers final test stage. I suggest these are removed one at a time - replace if the Helix current rises. New pieces are secured in places that are determined by searching for reduction in Helix current. The grooves between the magnets are the main point but also try the sides (the underside has the bottom of the WG launch block in a similar position) where the gun assembly is supported.
In all cases the end result was an undriven Helix current of 1mA or less with a cathode current of around 35mA The Helix current may reach 2mA when driven to saturation i.e. peak output.
The only partial failure experienced on this type of TWT was self-oscillation quite strongly ie a few watts.
Even so the output when driven to saturation was quite high. In this case FM or other continuous carrier operation ie TV would be ok as the output was only at the wanted frequency when driven due either to the oscillation stopping or being "locked" by the input.

OPERATION from a generator when portable may be troublesome if the COLLECTOR VOLTAGE is allowed to fall below the MINIMUM value for the TWT the beam will not be cleanly accelarated toward the collector and high Helix current will trip the PSU despited all that has been previously discussed.
It may be possible to appear to cure this problem by reducing the Anode voltage which reduces the Cathode/Collector current and thus raises the Collector Voltage a small amount. When the Anode voltage is raised slowly the helix current should also rise slowly, this would not be so in the case just discussed.
I have experienced this effect due to a PSU fault that turned out to be a resistor in the collector chain going high resistance above a certain current, thus appearing as a RUN-AWAY Helix current which tripped the supply.

As a final comment - some TWT's are rejected before the expected life time has elapsed due to faults. In a few cases NO treatment would cure the problem. The emission is good but internal arcing or something similar prohibits their use.
The tube I have used for quite some time was rejected very early in its life due to rising Helix current which trips the PSU after about 15 or 20mins but recovers after a brief rest, making it useless for the intended purpose but fine for amateur purposes.

SWR Meter/Indicator

-by GW4JJW

The SWR meter to be described is intended to be capable of covering all the bands up into the lower Gigahertz region, although it will be built and calibrated for one particular band. Four such instruments have been in use by the author for a couple of years without problems. The meters have not been directly calibrated in SWR because all that is normally necessary in the amateur environment is a measure of goodness - which in this case will be given by a high reading on the forward power meter and a very low reading on the reverse power meter.

The instrument has been built around an aluminium box designated AB10, available from Maplin. The size of this box is 133 x 102 x 38mm, although the design could easily be amended to accommodate other box sizes. Figure 1 shows the details of the metalwork with a choice of three slot sizes in the 15mm copper tube. The higher the frequency and the higher the power the shorter the slot size can be. For example the smallest coil is used for 25 Watts at 70cms and the middle one for 25 Watts at 2M. The slot length should not begin to approach half a wavelength. If it does, the slot will radiate causing an internal mismatch and the instrument will produce inaccurate results.

Constructional details

A 15mm wide slot with a circular bottom, is filed in both sides and the rear surrounds of the aluminium box to permit a 15mm diameter copper tube to be lowered into the box - see figure 1. The copper tube is then cut to length so that it is an exact fit between the **OUTER** edges of the box. Two narrow slots are cut in the copper pipe to take the PCB search coils - see figure 1. These slots are created by first drilling out the centre of the slot and then using a hacksaw blade which has been ground down to a point, to cut **each side of the slot**, being careful to leave the inner strip of copper so formed intact. These 4 strips, formed from making the two slots, are then bent up vertically and will be used to support the PCB search coils.

A small section of copper must now be removed from each end of the pipe to give access to the inner of the coax so that it can be

soldered to the N type connectors. The size of this section depends on your soldering iron, but it is best minimised. Perfectionists may wish to retain the removed section of copper for re-fitting later.

Next the inner of the coax which is made out of 5.9mm diameter brass rod, is cut slightly over length and two holes are drilled axially at each end to take the inner of the N connectors. The two N connectors, coax inner and coax outer are then assembled and the length of the inner conductor adjusted if necessary. The whole assembly is then clamped by carefully applying pressure to the top of the N connectors and the orientation of the slots with respect to the fixing holes in the N connectors is checked. The assembly is then soldered on both inner and outer N connector conductors. The preparation of the rigid coax is now complete and the access holes at the ends of the copper tube can be closed if so desired.

The search coils are fabricated on single sided PCB material and each of the two assemblies contains a 51 Ohm (or 2 x 100 Ohm in parallel) chip resistor, a Schottky diode and a chip capacitor. The PCB layouts, showing components also, are given in figure 2. The tracks on the sides of the PCB are intended to be soldered to the two upturned copper strips. The boards are temporarily soldered into position such that the lower "pick up track" is just inside the copper pipe. The RF assembly is then bolted into the box using the fixing holes in the N type sockets. The potentiometer and meters are then wired up according to figure 3.

Calibrating

A good 50 Ohm load is connected to the output side of the instrument and a transmitter to the input side. The potentiometer is set to a suitable position, maybe half way. Power is applied and the deflection of the "forward meter" is noted. The position of the forward search coil is adjusted and the measurement repeated until a full scale deflection is achieved.

The 50 Ohm load and transmitter are then swapped to the opposite ends of the instrument taking care not to alter the setting of the potentiometer. The reverse search coil assembly is then adjusted until the reverse meter gives a full scale deflection with the same amount of power from the signal source. When calibrated the search coils can be permanently soldered in position and the calibration re-checked.

Components

Box type AB10 (Maplin)
135mm of 5.9mm brass rod
135mm of 15mm copper water pipe
2 x 50uA meters (Marco Trading)
2 x 5082-2835 Schottky diodes
4 x 1206 100 ohm chip resistors (or 1 x 51 Ohm)
2 x 100pf chip capacitors
1 x dual ganged 47K potentiometer
2 x N type connectors

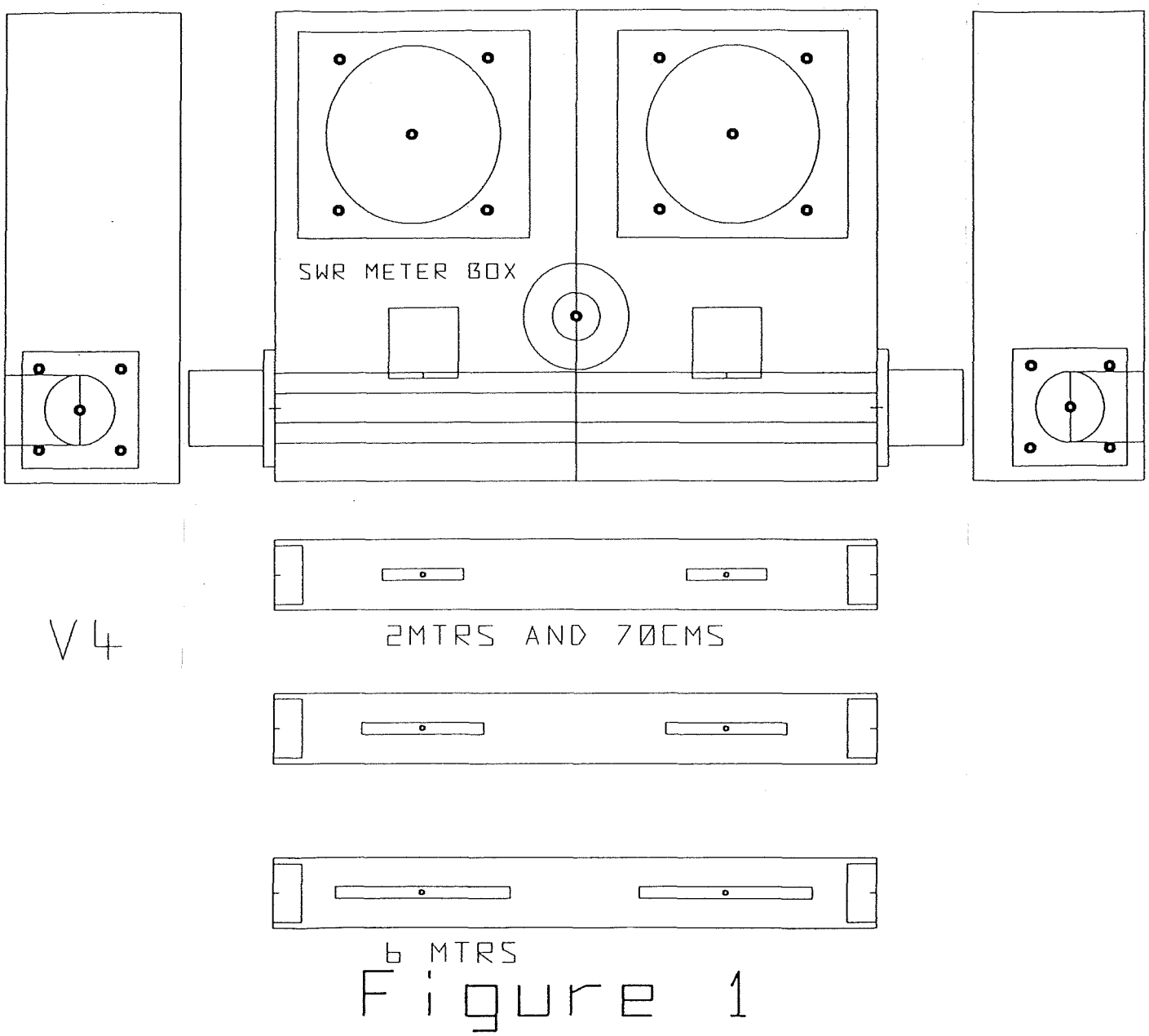
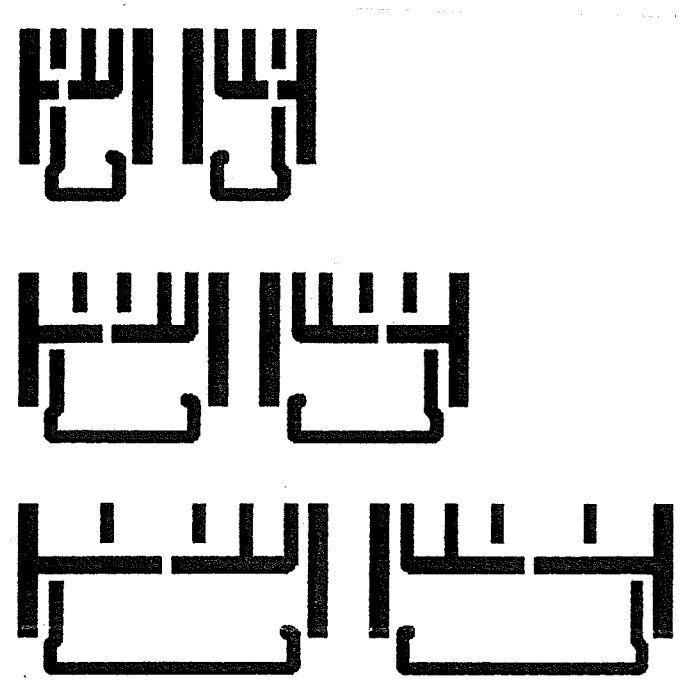


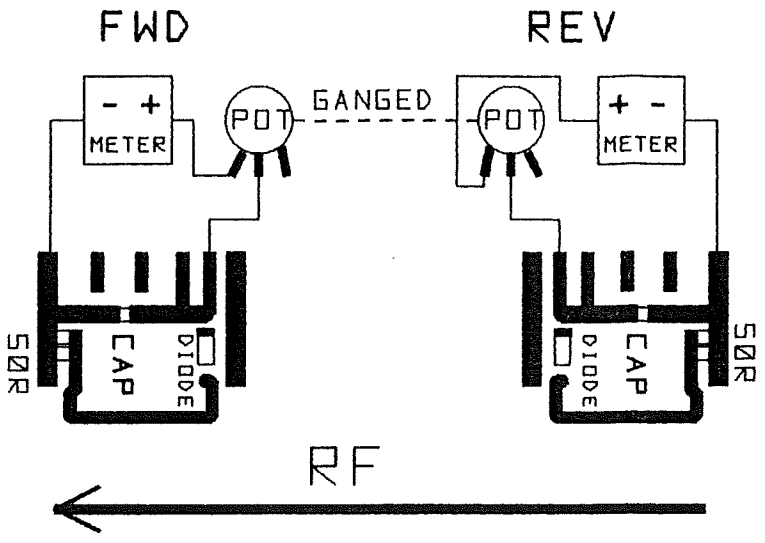
Figure 1



REDUCE TO 3 INCHES

FIGURE 2

FIGURE 3



BANDPLANNING ON THE 5.6 and 24GHz BANDS

-a paper by Arie, PA0EZ, previously published in the January 1994 IARU VHF Newsletter

The IARU Region 1 conference 1993 in Belgium has again discussed the choice of the narrow-band segments in the 5.6 and 24 GHz bands. At an earlier conference a decision was made to recommend 5668-5670 MHz and 24048-24050 MHz.
In practice, however, almost none of the microwave amateurs followed the recommendation and everybody continued using only 5760-5762 MHz and 24192-24194 MHz.
After much discussion the conference decided that not only 5668/70 MHz should be recommended as narrow-band DX segment, but in addition the "old" and much used 5760/62 MHz segment. But it was strongly recommended that all 5.6 GHz stations should construct their stations in such a way that both NB-segments could be used. For the 24 GHz band the existing recommendation was reconfirmed.

It seems, however, that several microwave amateurs are not aware of the necessity to change to the "new" dx-segments and all VHF/Microwave managers are requested to discuss the matter with the microwave amateurs in their country.

Why is this matter important ? In case the amateur allocations in a country allow amateurs to use either segment, it is natural that amateurs do not like to change their working frequencies, requiring much effort in many stations. They need to understand the reason for a change.

Why then does IARU recommend a change from the traditional band-segments?

The 24 GHz band

The ITU Frequency Table shows an EXCLUSIVE amateur/amateur-satellite allocation from 24.00-24.05 GHz. In addition a SECONDARY allocation to the amateur service exists from 24.05-24.25 GHz where ISM interference has to be accepted as well. In several Region 1 countries this secondary segment has not been allocated to amateurs or has been allocated with restrictions (e.g. UK, Italy.....).
The IARU Region 1 conference, therefore, had to come to the conclusion that recommending the use of the 24192/94 segment for international amateur activities not only would be rather silly as the segment was not available to amateurs in several countries, but would be silly as well as amateurs would not use the segment EXCLUSIVELY allocated to them but a segment shared with other services instead. Moreover the possibility exists that in the future the 24.05-24.25 GHz segment would be lost in more countries and, although currently the 24 GHz amateur activity is growing fast, a later change would be more difficult as a very large number of stations would be involved.
Amateur societies can be very active in promoting the recommended narrow-band segment, in particular by only supporting beacon licenses in the 24048 MHz band.

The 5.7 GHz band

Here the situation is rather complex. The ITU allocation to the amateurs is on a secondary basis, the primary user being radar below 5725 MHz and satellite down-links above that frequency.
In fact there is no common segment available to all amateurs in Region 1. In Italy in practice only the segment 5760-5770 Mhz segment is available, in Poland , Lithuania and probably other central-european countries only the 5650-5670 MHz segment is available. In some countries difficulties are encountered for beacon licenses in the 5760/62 MHz band while less difficulties are expected for the 5668/70 MHz band.
A recommendation from the CEPT ERO to the CEPT frequency management groups exists which asks the administrations to allocate to their amateurs at least the 5660-5670 MHz segment (where also amateur satellites can operate) .
The only segment common to the majority of the countries, with the exception of Italy, is this CEPT ERO recommended band. In practice administrations appear to keep the segments allocated to the amateur satellite service (such as the 5660-5670 MHZ segment) free from other services, even services with a primary status.
In the future we can expect that CEPT will recommend the member administrations to make at least the 5660/70 MHz segment available to their amateurs and that may in some countries imply the loss of the band above 5725 MHz.

In this situation IARU Region 1 continues to recommend the 5668/70 MHz segment for DX-work, but -in order to take care of the problems in Italy - in ADDITION the segment 5760/62 MHz is recommended.

All microwave amateurs are requested to design their stations in such a way that both segments can be covered. That will avoid problems in case we will be urged by outside forces to leave the 5760/62 MHz segment completely.
In practice, as most stations currently QRV on the band use heterodyne/SSB stations, the first will be not to use 145 MHz as the first if, but to choose a higher frequency. Then filters can be used with a passband 5668-5762 MHz and a simple switching of the xtal-oscillator will give access to both bandsegments. Well designed amplifiers will easily cover a relative bandwidth of less than 2%.

All VHF- and Microwave managers are requested to distribute this text to the microwave amateurs in their countries. Following IARU Region 1 recommendations sometimes requires more effort from the National Society than simply publishing a note !

A NOTE FROM THE EDITORS

This paper from Arie, PA0EZ, raises a number of important issues to which all microwave enthusiasts should take note. We now follow up Arie's statement with an answer from the RSGB Microwave Manager, Mike Dixon, G3PFR. His comments are on pages 11 and 12. We invite readers' comments also. Please address them to the Newsletter editor:

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

COMMENT ON PA0EZ's PAPER "Bandplanning in the 5.6 and 24GHz bands"

FROM THE RSGB MICROWAVE MANAGER, MIKE DIXON, G3PFR

All the microwave bands from 3.4GHz to 105GHz were the subject of a CEPT DSI (Detailed Spectrum Investigation) during 1993, just before the IARU Region 1 Conference to which Arie's paper refers.

Arie is absolutely right in his interpretation of both the DSI and the Committee C5 (VHF/UHF and microwave) discussions. Although the DSI bandplans ("Table of Allocations and Usage") are, at the moment, proposals, it is likely that they will be adopted with, perhaps, some modifications for implementation by the year 2008. The UK is amongst the signatories to the CEPT which represents some 34 countries mainly in Western Europe.

It is my opinion that we (the Amateur and Amateur Satellite Services) must "get our act together" and take a considered and unified view of what we can realistically expect to achieve in the next few years, in the run-up to implementation of this plan (or something very close to it).

First, I believe we must grasp the recommendations made in the DSI for the "set-aside" of various 10MHz-wide "key sub-bands" as shown later and, if possible, work towards consolidating and upgrading these rather special bands to Amateur Primary (or, better still, Amateur Exclusive) status. To do this will mean accepting change in exchange for better protection of what we consider to be the essential minimum to ensure future amateur developments: we presently share almost all of our allocations on a Secondary basis. Surely it must make sense to forego the convenience of some of the present usage for better, longer-term security?

This does not, in my book, mean lying down and accepting all the changes suggested in the DSI, least of all surrendering all of the present Secondary Shared allocations. However, I must say that the changes proposed in the 5.6/5.8 and 24GHz bands, when analysed in a detached way, are logical and eminently sensible in the longer term, even though they might at the moment seem "inconvenient" to some operators.

The pressure for change from professional, Primary users is not going to go away, nor is it going to diminish. Having said that, we must still defend and justify our occupation and use of the wider, shared allocations.

To the critics of the use of 5668 - 5670MHz and 24.00 - 24.05GHz, I would simply say "read the small print" in either the current ITU Frequency Tables or the more recent CEPT/DSI "Table of Allocations and Usage".

In the "6cm" band, 5650 - 5725MHz is allocated to the Amateur Service on a Secondary basis and to the Amateur Satellite Service on a Secondary and non-interference basis. 5725 -5850MHz is allocated to the Amateur Satellite Service only on a Secondary and non-interference basis.

Earlier I mentioned "set-aside" whereby CEPT administrations were requested to leave certain "Key sub-bands" free from allocations to allow amateur communications using weak-signal modes (described as "amateur emissions with minimal power flux densities" - meaning weak

signal, narrowband DX!). In the 6cm band, the "Key sub-bands" are as follows:

Amateur Service (terrestrial)	5660 - 5670MHz
Amateur Satellite Service (earth to space)	5650 - 5670MHz
Amateur Satellite Service (space to earth)	5830 - 5850MHz

It follows from this that 5668 - 5670MHz must soon become the "preferred" key sub-band serving both Amateur Services. 5760MHz has not been allocated on a key sub-band basis to either the Amateur Service or the Amateur Satellite Service. Hence Arie's comments and the IARU Region 1 recommendations that, interim, operators are advised to be able to use either segment. With modern PCB-based techniques this is not difficult, just inconvenient (to some users!).

Similar comments apply to the 24GHz band: here, however, the bottom 50MHz of the band have not just been "set aside", but have, for years, been allocated on an Amateur Primary basis. I wouldn't use Arie's word "silly" - I'd have put it much more strongly and said "downright stupid" not to take advantage of this status!

Most of the argument for perpetuating the use of 5760MHz and 24,192MHz is based on their harmonic relationship to 1152MHz and the use of passive multipliers and harmonics as frequency sources. In this day and age, using modern technology and active devices, amateurs really cannot (in my view) credibly justify sustaining these relationships "at all costs", especially when the relationships have already disappeared elsewhere (for example, 2304MHz and 3456MHz)!

We've already demonstrated what can be done at 10GHz using common frequencies and modern (mixing) techniques - can we not now agree frequencies in these other bands, update our equipment using similar techniques and really show what can be done here as well? If advance means change, so be it!

Incidentally, as a last thought, one change which Arie didn't mention was the omission of 10.000 - 10.300GHz (60% of the present band) from the CEPT bandplans. I reckon that is far more serious to more operators than quibbling about a few tens of operators shifting frequency in two of the other bands...before it is too late...think about it!

de G3PFR

REMEMBER -- USE IT OR LOSE IT!

ACTIVITY NEWS
NEWS AND VIEWS FROM THE WORLD ABOVE 1000MHz

We must first correct a misleading statement made in last month's Activity News, regarding the Operating Ladder. From what we said then it sounds as if fixed and portable calls count separately for the "stations worked" column. **THIS IS NOT SO!** Only different **PREFIXES** count separately. To clarify then.....

GW3PHO is a different callsign to G3PHO, even though it is the same operator, but G3PHO/P is NOT different to G3PHO (home station).

We really meant to say that you can enter the Ladder in two separate categories, fixed and portable, if you so wish. Please score your 1994 entries as per these rules. The same also applies to the All Time Ladder.

The first of the Summer 10GHz Cumulatives has come and gone. Few reports have come into your scribe's tray as he assembles this edition of the Newsletter over the May Bank Holiday weekend. **Please remember that the closing date for all items for the newsletter is the LAST FRIDAY OF THE MONTH.**

G3PHO (Sheffield) thought he would try narrowband from an old wideband site, Alport Height near Matlock. A fortnight earlier, he had cleared up some nasty "crud" coming from a 12 to 20 volt step-up psu in the 10GHz portable system. This was modulating the local oscillator causing "sprogs" to appear 10kHz either side of the actual TX frequency and another 10kHz after that and so on up and down the band! Said crud removed, the day out on Alport proved somewhat disasterous as the receiver appeared to be mightily deaf! The first stage of the GaAsFET preamp was u/s, probably due to a spike produced when he was going around the psu with a large electrolytic trying to suppress the noises!!! Everything appeared to be OK during a pre-contest, bench test with a shack "beacon" but the portable site proved otherwise. After five difficult contacts he retired "hors de combat" during mid afternoon and went home to replace the blown device and to set up the RX to something like its former self.

Steve, G4KNZ (Bracknell) during the first Summer Cumulative, worked 18 stations on 10GHz, all 2-way, from his site in the middle of a housing estate, with many trees and buildings around....a good effort! He found activity to be high, with lots of portables on the band.

Derek, G3GRO (Crawley), has had forty-seven 10GHz contacts so far this year, some of which were one-way, his signals being heard on 10GHz. Of those 47, some 33 were made during the last of the Winter and the first of the Summer Cumulatives. The best DX this year is with G3GNR (Devon) over 277km. A substantial improvement is therefore made to the 1994 Operating Ladder score! Derek will have, by the time you read this, updated his system with a G3WDG HEMT preamp, elevation tilt mechanism (with digital readout), improved LO stability and a better rotator (with variable speed and digital readout) ***(WE WOULD VERY MUCH LIKE TO HAVE DETAILS OF THE DIG-READOUT DISPLAY, ETC, FOR THE NEWSLETTER READERS DEREK!...editors)***

It's nice to hear from **Martin, G4XUM (Shavington, Cheshire)** for the first time. He supplies us with details of the VHF/UHF Convention (see page 1) and has been building up a 10GHz narrowband system, hoping to be QRV by May or June contest days. His home location is **IO83SB**. He should also be active on **24GHz** wideband this summer (G4KNZ take note!). Martin is always pleased to make qsos on 23, 13 and 9cm by the way. See him at the Northern Lights event in July.

Our correspondent in the deep South West, **Bob, G3GNR, (Highampton, Devon)** remarks on his 1959 (yes, fifty-nine) 3cm contact with G3JHM in the Worthing area. The duo used 723a/b klystrons.....

(You younger microwavers with post G3 callsigns won't know what klystrons are.....only kidding...no nasty letters please!). Recently Bob went out with G6XM onto Exmoor to work G3FYX/P on 24GHz, Roy being on Cleeve Common, a good 143km away (the best 24GHz DX of 1994 in the UK, so far!). 10GHz rainscatter has netted 400km qsos with G4FUF and G4EZP, as well as G4CBW (Newcastle, Staffs) at 280km, plus a first with G3UKV (Telford, Salop). The latter contact has come after many attempts. As Bob says, it is always worth digging down into the noise and being sure of dish headings and frequencies. Finally Bob has made a G4JNT noise box and hopes to do some tests checking up on Sun noise.

ALLTIME SQUARES/DX LADDER
(ALL CONTACTS MUST BE MADE FROM THE SAME QTH)

POSITION	CALLSIGN	LOCATOR	SQUARES	BEST DX (km)
1	G3WDG	IO92RG	30	1008
2	G4KGC	IO92RG	21	793
3	G4DDK	JO02PA	20	684
4	G3BNL	IO92KA	17	1027
5	G4FCD #	IO91KX	17	802
6	G8KQW/P	IO91GA	15	390
7	G8LSD/P	IO90TV	15	304
8	G3JMB/P	IO90TV	14	304
9	G4RFR/P	IO80UU	14	414
=10	G3PHO/P	IO93EH	12	330
=10	G8AGN/P	IO93EH	12	330
12	G3JMY	IO81RM	12	278
13	G4FCD @	IO91JV	11	1039
14	G8APZ	JO01DO	11	1026
15	G4JNT	IO90IV	11	334
16	GW4MAP/P	IO82JG	11	311
17	G8DKK	IO91VX	11	275
18	G4LDR	IO91EC	10	775
19	G4PMK	IO93GT	10	739
20	G3NWU	IO94JQ	10	433
21	G3ZME/P	IO82QL	10	270
22	G4BRK/P	IO91FN	10	234
23	GOAPI	IO80XS	9	405
24	G4KNZ	IO91PJ	9	247
25	G0API/P	IO80UU	8	277
26	G3UKV	IO82RR	8	242
27	G3JMB	IO91WA	4	48
28	G3NWU/P	IO94MJ	3	290

= NEW QTH
@= OLD QTH

Bryan, G8DDK (Letchworth), has a new neighbour in the form of **Peter, G3PYB**, who lives about 400m away. Bryan netted 14 contacts on 10GHz through rainscatter and the Winter Cumulatives. G4UVZ at 229km was also a new square for the all-time list above. He is now using a 40cm dish, with about 5dB increase over the old 25cm one. GB3CMS is now heard consistently during rain and GB3SEE occasionally during rain showers. GB3SWH is always +10 to +15dBn. (***Nice to have three beacons to listen to!...eds)***.

Another letter from **Steve, G4KNZ,** reports 24GHz contacts in the April Cumulative with G3FYX/P and G3PPF/P (both at 53km on Walbury Hill) and with G4BCH/P (Ventnor, IOW, at 44km). Stve was /P on Butser Hill for all these contacts.

1994 OPERATING LADDER
(Ranked on multiplied scores)

BAND GHz	POS	CALLSIGN	STATIONS WORKED	BEST DX (km)	MULTIPLIED SCORE
10	1	G3GRO	21	277	5817
	2	G3GNR	19	296	5624
	3	G3JMY	19	290	5510
	4	G3UKV	14	311	4354
	5	G4KNZ	21	168	3528
	6	G4LDR	14	242	3388
	7	G8DKK	14	229	3206
	8	G4BRK	15	156	2340
	9	G3PHO/P	4	123	492
	10	G8KMH	1	135	135
24	1	G4KNZ/P	7	126	882
	2	G3GNR/P	1	143	143
	3	G8KMH/P	1	126	126

From **Neil, G4LDR (Salisbury),** we have an update for the Ladders and comments on the good conditions of 27.3.94 when enhanced propagation on 10GHz occured during the last of the Winter Cumulatives. He has now just about worked everybody he thinks he can work in the South (using his 100mW) so he is expecting a whole swag of new callsigns when he gets his newly-acquired TWT going on the 3cm band in the coming weeks!

John, G4BYV, Dereham, Norfolk, took his 3cm tower down in January as the weather has been very bad in the East. By the time you read this Newsletter, however, he should be back on again working the DX. He notes that Farnell stock the BFS17 smd transistor used in G4DDK's new oscillator board. You can buy them at £3.10 for 10 or at £1.70 for ten if you buy a thousand!!

A handy tip from John regarding measuring chip caps with a meter is to use a strip of pcb fixed across the meter terminals and cut a thin slot through the copper foil, just wide enough to lay the chip cap across, ready for measurement. The pcb strip need only be just wide enough and long enough to straddle the meter terminals of course. Neat eh?

Lehane, G8KMH, has moved QTH. He is now at 18 Hale Road, Farnham, Surrey GU9 9QH. (Tel. 9252 712866), NGR SU847474. QTHLOC: IO91OF52. **Please update your Microwave Directory and site database accordingly.**

ALL ARTICLES AND NEWS FOR THE MICROWAVE NEWSLETTER SHOULD BE SENT, BY THE LAST FRIDAY OF THE MONTH, TO EITHER:

Peter, G3PHO, 146 Springvale Road, Sheffield S6 3NU (tel. 0742 681216)

OR

Barry, G8AGN, 345 Redmires Road, Sheffield, S10 4LD (tel. 0742 304888)

THE G4FRE CORNER

This time some short notes that may be of interest:-

1. If you are building a mode S converter the necessary conversion crystal (94MHz) is available off the shelf from a number of sources as it is also used in 144/50MHz transverter.

2. Inspired by someone's recent comment about how useful modellers fairs are I decided to examine what the local model shop had, during vacant time during a trip to Birmingham, and made the following discoveries.

If you have trouble cutting WG20 squarely obtain a modelmakers mitre block (e.g. humbrol # h5330). Plastic ones are around £1.50, however they are easily lacerated, so metal ones are around £8.50 may be a better investment . To cut thin slots use a modelers knife such as the Humbrol number 5 knife (about £3.60 Humbrol part number H2050) which has about a thin 1" wide blade making it ideal for use with the mitre block. This combination has produced good results with some 24192MHz bandpass filters recently.

3. During recent 24GHz /p expeditions the usual problem of frequency variation due to changing car battery volts was more annoying than at 10GHz. A low volt drop regulator was needed but I had not got enough space for the old discrete design to be used. Looking through the Farnell catalog I spotted a 10Volt 0.5A low volt drop regulator in a TO220 package, L4710CV about £2.50. It has the same pinouts as the usual 7805 series regulators and only needs 0.2 to 0.6Volts dropped across it depending on load current. By removing the 78L09 in the G4DDK004 source and replacing it with a wire link the whole of the source can be run off the regulator, which is mounted on the side of the tinplate box near the input feed through. Power output seems unaffected one 004 produced -1dBm less than before modification, one produced 1dBm more. Although the oscillator bias components are calculated for 8 volts it does not seem necessary to change them or any others although I am sure the purists will do dissipation calculations and come up with new values. This change proved so successful in the field that all my 8 DDK004 sources have now been modified.

4. Having got over the voltage dependency of transverters, the next problem to solve is the temperature stability. Having my 10G transverter permanently mounted in virtual free space (on a 2" pole) outdoors has shown, by using a remote temperature gauge, prolonged periods where the posistor is unable to cope, adversely effecting frequency resetting (offsets at 2a.m.of upto 30kHz have been found which disappear by midday when the sun gets on the transverter). Looks like a more involved environmental control circuit is needed probably for the whole oscillator not just the xtal and even more polystyrene foam.

5. In sams write up on his 009 be warned that not all microwave Phase locked oscillator sources run off +ve volts. Sam reports that all the ones he has got in the UK run off positive supplies, however, all the ones I have obtained in the UK and USA run off -ve supply volts.

6. Whilst talking off PLL bricks if you have one labelled 28 Volts and you need to run it off 20volts (for regulation purposes) look inside. Chances are that there are two off 3volt(ish) fat zeners in series with the supply. Removing these and supplying 20V gives correct operation, typically maintaining +11dBm at 12GHz.

Dave