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NOVICE • PACKET • REVIEWS • PROJECTS • SATELLITES

HRT HAM RADIO TODAY

CONTENTS

VOLUME 11 NO 6 JULY 1992

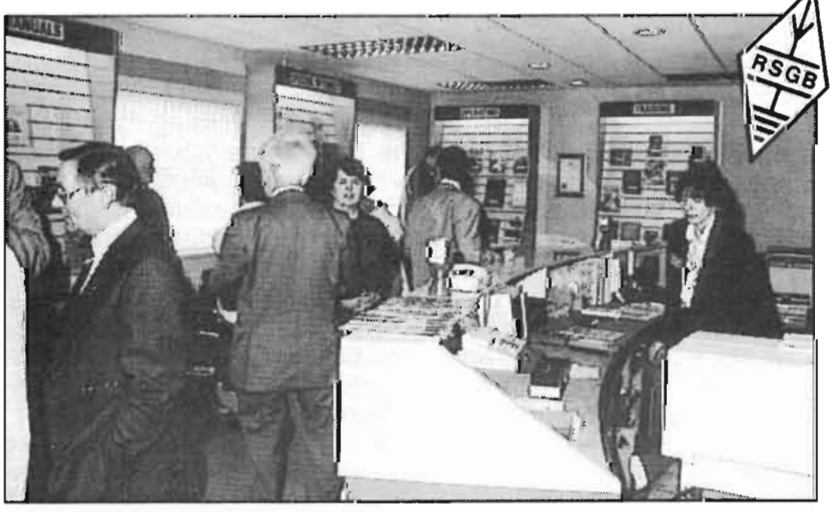
REGULAR COLUMNS

REVIEWS

FEATURES

PROJECTS

NEWS AND VIEWS



Left: **RSGB Open Day**

Right: **Yupiteru VF225 reviewed**

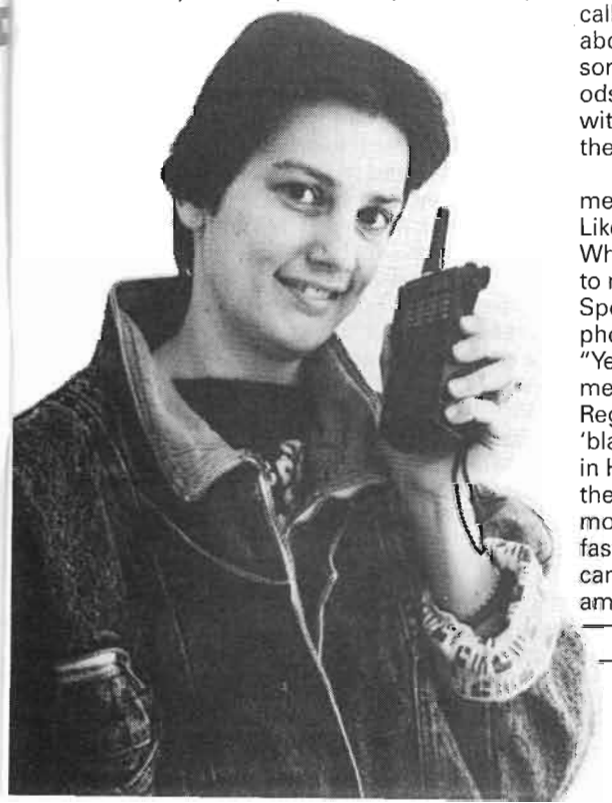
CQ de G8IYA

If you're buying a new rig, how do you choose nowadays?

Around ten or twenty years ago, you could wander around any large amateur radio rally or exhibition, happily searching out information to help you choose that new transceiver or receiver for your shack. Invariably the first thing you would do on going through the entrance doors was to get hold of a plastic carrier bag, either from one of the traders or out from your pocket if you'd come prepared. The reason? For all the glossy brochures of course! About half way through the day, you might have found the need to get another one to fit all the information, plus the inevitable logbook, callbook and the electronic 'bits and pieces' too tempting to resist.

On returning home, you'd spend some time looking through all the various features and specifications, eventually deciding upon your 'dream rig'. It may have been difficult to ask around your friends, or on the air (especially if you didn't have a transceiver), for ideas on a new rig because, quite simply, few amateurs had the very latest model, and if they did they probably wouldn't have had it long enough to have given it a thorough trial. So it was back to pouring over the 'glossies', then making a decision what to purchase, maybe at the next rally, or by mail order from the helpful chap behind one of the stands who patiently answered your questions.

Nowadays it's a little different. Many amateurs go to a rally with their minds already made up what they want to buy, often looking at the prices differences, if any, between the various traders. If the trader held the required boxes of 'add-on options' behind the counter as well, such as narrow filters etc., that could also be a deciding point on who to buy from on the day.



But how do amateurs decide which rig they want in the first place? One thing is for certain, you won't find many traders with piles of give-away leaflets and catalogues sitting on the front of their stand, with a 'help yourself' notice next to them! Yes I know, one or two do so, but they are in the minority. Leaflets and catalogues cost money. They may be 'free' to you, but they're not free to the trader. After waiting until a salesperson becomes free, you normally need to ask for a leaflet on the rig you're interested in, whereupon one would often magically appear from behind the counter. This of course means that you'd already have decided upon a 'shortlist', in other words you'd already have *some* information on the rig you're interested in. If you want a comprehensive catalogue, it's often a case of 'certainly sir, that'll be xx pounds please'.

Going to a rally costs the trader money also. Remember it's *your* leisure time at a weekend, but getting one's staff working on a Sunday, with long hours involved for travel and setting a stand up and taking it down, plus 'all-day' attendance, doesn't come cheap. Unless things are very quiet at a rally, many dealers just can't afford to spend an hour or so with you, discussing your 'general needs' in terms of a rig, for you to then go away and think about it while the chap standing next to you is itching to part with his money. Before I get endless angry phone calls from readers and traders alike, think about the economics. Yes, I *do* know some may be able to chat for long periods, especially the large national dealers with plenty of staff on hand, but again these are often in the minority.

So we come down to alternative methods to get towards your 'shortlist'. Like independent equipment reviews. While the HRT staff have been chatting to readers, either at rallies on our Argus Specialist Publications stand, or on the phone, we've come to hear the phase of "Yes, HRT, the reviews magazine" being mentioned on many, many occasions. Regular readers will know it's not only 'black box' transceivers that are featured in HRT reviews, for example this month there's a plug-in packet system, this mode of operation currently being the fastest growing branch of our hobby. We can't review every single new item of amateur equipment (there's a large pile here, just waiting!), but where a brand new type of rig or unit becomes available, we're in there straight away, I'm there with my rolling pin over the reviewer to make sure it's ready for publication as soon as possible.

My list of reviews that have been published in the mag makes me realise just how many we get through! Of course these go out of date rather quickly, as newer and newer sets become available, but it's useful to compare the measured technical figures between an earlier version (maybe the set you have now) and the latest model, to see exactly what improvement in DX capability or whatever you'll be getting out of it. In the same way as I published a list of PMR conversions in HRT a few issues ago, I hope to publish a list of these equipment reviews in a forthcoming issue, as many amateurs phone me up to ask which issue to obtain for such-and-such a review. More often than not, amateurs don't realise that a review of the rig they're interested in has even appeared in the mag, of which a list could provide a useful reference, all I need is the space to 'squeeze it in'!.

RA 'Open Ears'

I've been getting many favourable comments about how 'open' the Radiocommunications Agency are. They are very willing to listen to the views of amateurs where licensing matters are concerned. What's more it looks like they're doing something about what amateurs are telling them, rather than just all the letters ending up in a pile somewhere. We must of course remember that, like all agency departments with a given budget, they have a given amount of 'hours' per day, week, or year to devote to amateur radio matters, so please don't go flooding them with 'junk mail'. But they *do* listen to constructive communication, and from the chats we've had with them it's surprising how far back they've been listening. To take an example, some months ago one of their very senior members of staff mentioned how a certain amateur (he's well known amongst the packet fraternity) had been the original proposer of the Novice licence, prior to this coming from any organisation. Some of us will remember his early packet bulletins on the subject, and of course, we now have a Novice licence.

We're very pleased when we're invited to meet with the RA, to discuss our reader's ideas with them, and to publish the results of our meetings. For example, did *you* know you could legally run a simplex repeater from your shack, until it appeared in HRT following our last meeting? We've already got a review of one lined up!

LETTERS

Letter of the Month

Dear HRT,

It is most satisfying to read a live and vibrant magazine, being an ex-member of the RSGB. As a radio enthusiast for 38 years I do not consider I have entered our hobby lightly.

Regarding the fact that the RSGB fees were becoming a burden for the average amateur on a 'pay all at once' basis, some time ago I suggested on my local UHF repeater to an RSGB official that perhaps members could pay in two or more parts on a standing order/direct debit, making it easier for all financially, and possibly increasing the membership at a time when the RSGB were losing members hand over fist. His reply was simple, "Absolutely not! All radio amateurs could afford the fees without any trouble!". He then said he could not hold the transmission as my signal into the repeater was extremely weak, even though four other local amateurs listening to the QSO confirmed my signal was Q5.

The moral to this tale is simple, don't listen to your membership and you will lose your members. At HRT, you have obviously been listening to your readership!

At long last the amateur has a new voice; HRT. It is very gratifying to see the RA listening to a new voice and not the solus society who for so long has pretended it is the only voice of all radio amateurs in the United Kingdom.

Nigel R. Parr, G1OTJ

Editorial comment;

We listen, we listen! And we publish the uncensored views of our readers for others to listen to. We're not, however, trying to 'take over', only to provide a focal point for all amateurs to share their views. It's gratifying to see the RA have stated they will listen to the coordinated views of, and in the case of the Novice Licence the direct views of, all UK amateurs.

Dear HRT,

I feel I must write in defence of the RAE. What is hard about a multiple choice exam compared to the old written exam taken by many amateurs?

I think that the attitude the student takes into the lecture and the approach of the lecturer has a lot to do with whether or not they pass or fail the RAE. I was twenty five years old, with two children under five, running my own business as well as looking after my husband and home, in 1987, when we decided to attend our local course. It was, and still is, run by a local amateur, Mr. Derek Rogers. I had no knowledge or interest in electronics, I just enjoyed radio having been on CB for 6 years.

The students varied from fourteen to sixty five years of age with a mixture of males and females. There was a friendly social atmosphere, not one of lecturer and student. Everyone was encouraged to join in if they felt able. We were never bored in any way. Easy and fun ways were suggested to remember theories and calculations. As for operating procedures they were and are more or less common sense, but they always made good reading in the little room in our house where the RSGB booklet 'How to become a Radio Amateur' lived in those days.

Everyone that was on our course has now passed their RAE. I know there are many amateurs far and wide who owe thanks for Derek's time, patience, and hard work. I for one don't think I would be enjoying amateur radio if it was not for Derek's support and faith in his students.

Yours sincerely,
Helen Studdart, GW7AAU.

Editorial comment;

We can all do with some help when it comes to learning, and having a good tutor makes all the difference. The HRT Tech Ed taught himself from an RAE manual, having no local course to go to, and the HRT Ed was fortunate in being taught in a small private group by another amateur, again having no local RAE course to go to. We've now decided to 'do our bit' by starting up a Novice course, because guess what, that's right, there was no local course to go to.

Dear HRT,

When 6m is active, it has got to be one of the best bands for excitement. At the moment there is a discussion on the use of CW and 50.110MHz for calling DX. I think why not two calling frequencies, 50.110MHz to call east and 50.120MHz to call west. If this would be done worldwide the problem would be solved. I only work on 6m, but the times I have sat and listened to a DX station on 28.885MHz asking if he can be heard on 6m with no reply. Why not let Class B licensees use 28.880MHz to 28.890MHz 'not to chat' but to make contacts on 6m.

K. Brown

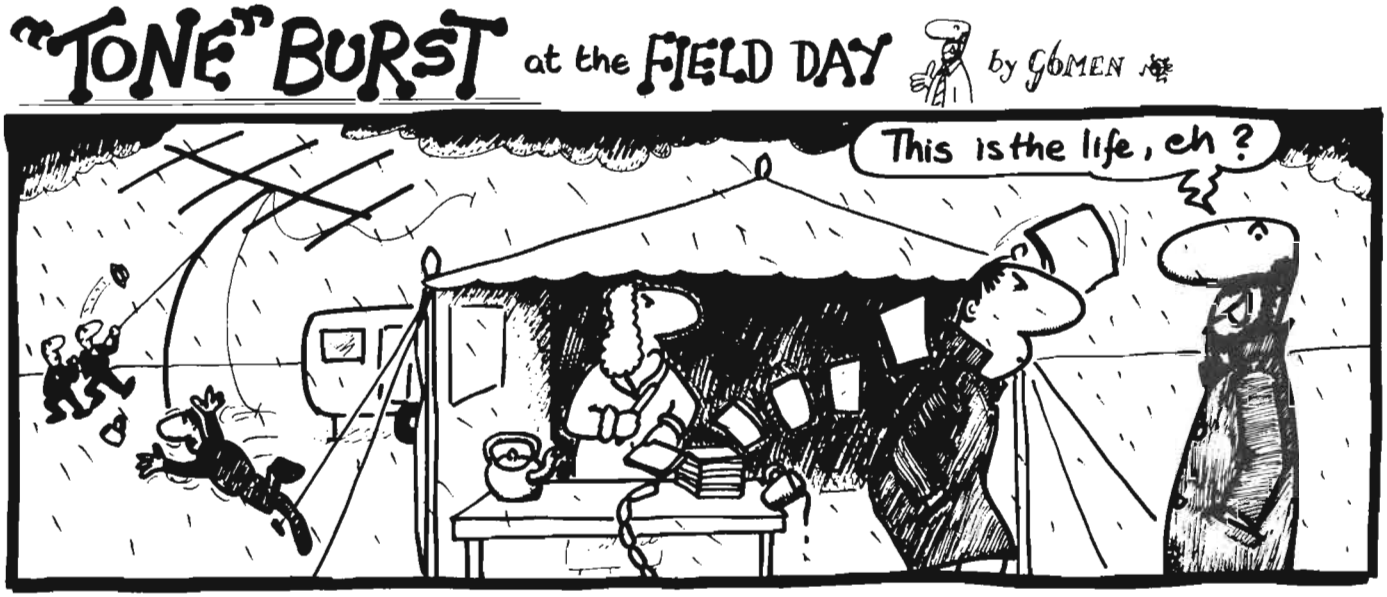
Editorial comment;

We've invited our 'VHF/UHF Message' contributor Geoff GJ4ICD to reply to this;

The UK Six Metre Group has also received a letter from Mr. K. Brown on the use of 50.110MHz, the Secretary Chris Gare G3WOS took the trouble to contact Kerry and explain the situation. The controversial subject was also answered in the group's edition of 'Six News' of which Mr. K. Brown is a member. Although 50.110MHz is the *intercontinental* calling frequency not many people sit on it apart from expeditions. For instance, during the last few weeks 'Six' has been open on a daily basis and the following noted; VK5BC (50.107), UL7GCC/P (50.118), VK6PA (50.130), KG6UH/DU1 (50.118), KG6DX (50.115), V85PB (50.115), JA4MBM (50.108), VS6WV (50.108), JH4IUO (50.116), 5B4YX (50.129), ZC4KS (50.120), PY0FF (50.103), 4X1IF

£10 for the Letter of the Month

Do you have something constructive to say on the state of amateur radio today? Perhaps you'd like to put your viewpoint to the readers, get some discussion going, or give an answer to one of the issues raised? We'll pay £10 for the best letter we publish each month. So write in with your views, to Letters Column, P.O. Box 73, Eastleigh, Hants SO5 5WG.



(50.107), OD5SK (50.102), P43FM (50.105), G4CVI worked lots of JAs on 50.101, the list goes on and on. I myself have worked very few stations on 50.110 after repeated calls, so Kerry I think it best maybe to *listen around 50.110* unless you have worked all the above! Regarding 28MHz, well maybe in years to come there may be different classes of licences which will allow you to operate on 28MHz, but that's not going to change overnight.

Geoff Brown, Chairman, UK Six Metre Group.

We've had several letters following our meeting with the RA, where the subject of 'HF licensing under review' was detailed in the May 1992 issue accompanying the Novice Licence conditions review. The RA want the views of us, the public, on this, and asked us to publicise this. As well as the direct input, here's the correspondence received here regarding this;

Dear HRT,

With reference to 'HF Licensing under Review' (May 92 issue). I think it would be a good idea to implement this, if it was only used on exclusive amateur bands, providing that Morse is not allowed on the HF bands until the test of 12WPM is passed.

W. Ashton, GW7KLC.

Dear HRT,

Regarding the article HF licensing under review, could you please pass on my views to the RA.

My constructive ideas include the existing amateur classes in the UK not forgetting the Novices. I have come up with the idea of four types of classes, they are as follows;

Class A — as it stands now.

Class B — all bands, all modes (CW with an operating knowledge at 8-10WPM if required), half of full legal power max.

Class C (Novice A) — operation on 28-30MHz HF band only, VHF/UHF bands, all mode (CW at 5WPM), 50W output power max.

Class D (Novice B) — VHF/UHF bands only, SSB, FM, Data modes only, 50W output power max.

To upgrade from class D to C a 5WPM CW test. From Class C to B a short RAE with the syllabus on operating practices and procedures, and transmitter interference. From B to A a 12WPM CW test, or either a knowledge of operating packet. I would appreciate any feedback from the RA, and your views from HRT, or anyone else's.

Steve, G7CGN.

Dear HRT,

In response to the request in the May 1992 issue of HRT regarding HF Licensing under Review, I feel I must write a few lines.

I have held a class B licence for 10 years, I am active on 6m, 2m, 70cm and 23cm, and now well into logbook number twelve. I enjoy DXing, contesting, and regular operating around the UK, all on SSB. I have no desire to use Morse, even if it brought me more distant DX, CW is just not my scene. For 6m I use an Icom 575, a 28MHz/50MHz transceiver, I can work the world on 50MHz, yet I cannot use 28MHz!

The Novice licence permits the use of the HF bands (with restrictions) and I feel that something must be done for class B amateurs. I would suggest that class B amateurs are allowed to use the HF bands with a power restriction of 100W, if they wish to use CW, then the Morse test should be passed. I have given a lot of thought to this subject, my first reaction was that Class B operators should provide some proof of SSB, DX operation experience on VHF to qualify for HF operation, but this idea was soon abandoned as I recognised that a Class A licence holder can be let loose on the HF bands without any experience whatsoever!

In conclusion I would add that my husband Roy, G3PMX has an HF station that I can use under his supervision, but if I am going to work the DX on these bands I wish it to be with my own callsign. I wish you success in the preparation of the paper to the RA and hope you receive a good response from your readers.

Ela B. Martyr, G6HKM

Dear HRT,

With reference to 'HF Licensing under review'. We have discussed this in some detail at the Finningley Amateur Radio Society. The general feeling amongst our club's members are that Class B licence holders should, at least, be allowed the same bands on HF as the Novice A licence holder. But most members, both A and B licence holders, with the club agree that the 12WPM CW requirement should be reviewed in favour of Class B holders, in order to allow access to SSB/CW/Data on the HF bands, but with a proviso that the Class B licence holder should have held his licence for at least two years.

V. Lowe G1IND, RAF Finningley Amateur Radio Society.

TurboLog Reviewed

Don Field G3XTT examines a combined logging and transceiver/packet control program

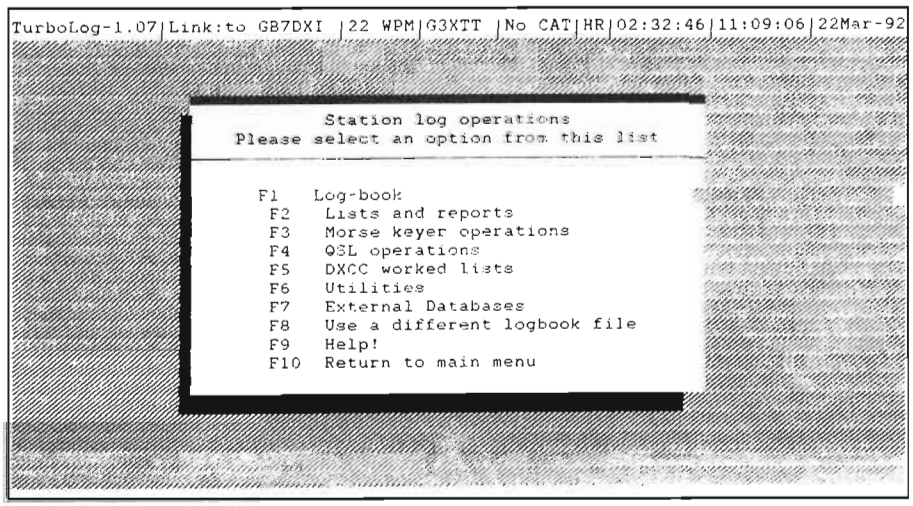
In the past I have reviewed a number of computer-based logging programs (see HRT, June 1991), none of which have persuaded me to abandon my paper log (other than for contests, where different criteria apply). *TurboLog* has changed all that by integrating logging with many other useful functions. You can enter contacts real-time or after the event, and in both cases there is a 'contest' option which keeps track of serial numbers. You can also use TurboLog to track progress towards DXCC and other awards, print QSL labels, generate statistics and reports to your own specifications, and access add-on databases (W6GO's QSL manager database and an Islands on the Air database are already available, others will follow).

TurboLog features CW from the keyboard, frequency control of your transceiver if it has an RS232 interface, and a terminal emulator for packet radio, this being tailored for use with PacketCluster.

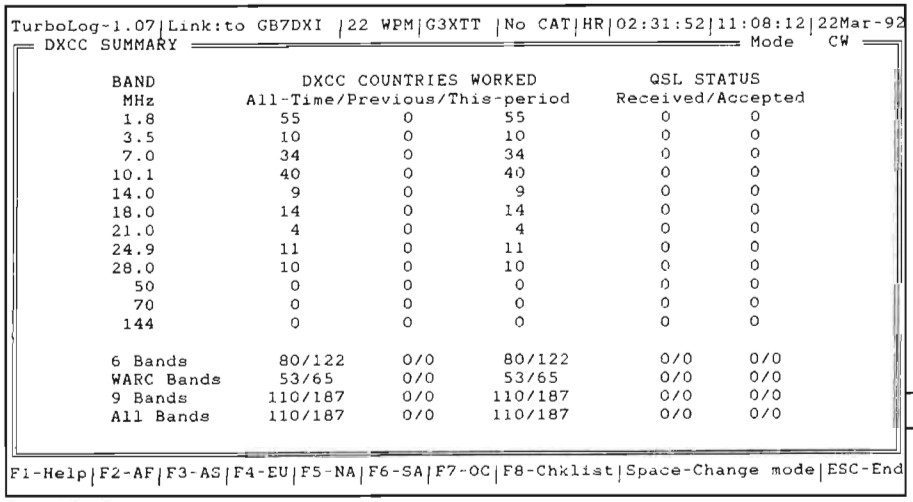
TurboLog offers easy import of your existing log files, both ASCII format and those produced by the popular K1EA and G3WGV contest logging programs. Canberra Communications also undertake, for a once-off fee, to import any other electronic log files you may have, as well as offering a transcription service for your paper logs, an option which I feel may prove quite popular.

The packet terminal side is based on *ClusTerm*, which was reviewed recently in HRT. TurboLog integrates all the ClusTerm facilities with the logging side so that, for example, DX spots received from your local PacketCluster will appear in a window on the logging screen, while other incoming messages will appear in separate pop-up windows, as well as being archived to disc. A text editor is included to enable you to type packet messages and upload them to PacketCluster or your local BBS.

I typed much of this review using TurboLog's editor while connected to the GB7DXI PacketCluster. This avoids missing any DX spots, and allows me to QSY my TS940S to the DX frequency using the radio interface capability, log the QSO (TurboLog 'grabs' the information from the PacketCluster spot, so I don't even have to type in the callsign), and get back to my typing! For the odd occasions when I want to do something else with the PC, I can exit TurboLog leaving it in TSR (Terminate Stay Resident) mode, which means it will buffer any incoming packet messages until I'm ready to go back.



Typical menu screen



A statistics screen

In use

TurboLog comes on a single floppy disc, along with a well produced 100-page manual and a handy summary card to keep alongside the PC.

TurboLog is easy to use, with pull-down menus and on-screen prompts. The screen layout is very friendly, resembling the familiar paper log book, but with pop-up windows for other information and on-line help always available.

Logging programs can be very slow. Searching a large database, for example to find previous QSOs with the same callsign, can be very time consuming. TurboLog uses a fully relational database written in Turbo Pascal which appears to give very fast search times. On my 80286 PC, searching for callsign matches in a 7,000 QSO log file was almost instantaneous.

Database integrity is preserved by logging every QSO to disc immediately, a hard disc is essential as your log file can soon grow to several megabytes. As with any computer-based system, regular back-ups to floppy disc are recommended. RA rules now allow you to maintain your log entirely in electronic form, but this must be on, say, a dedicated 'log disk' and not a hard disk which is also used for storing other things.

TurboLog has many nice touches such as a screen saver, printing of QSL labels ready sorted in callsign order for sending to the bureau, and prompts at crucial points to prevent you accidentally doing something unintentional. For VHF enthusiasts, if you enter an old-style QRA locator into the locator field, the program will automatically convert it to the correct Maidenhead equivalent.

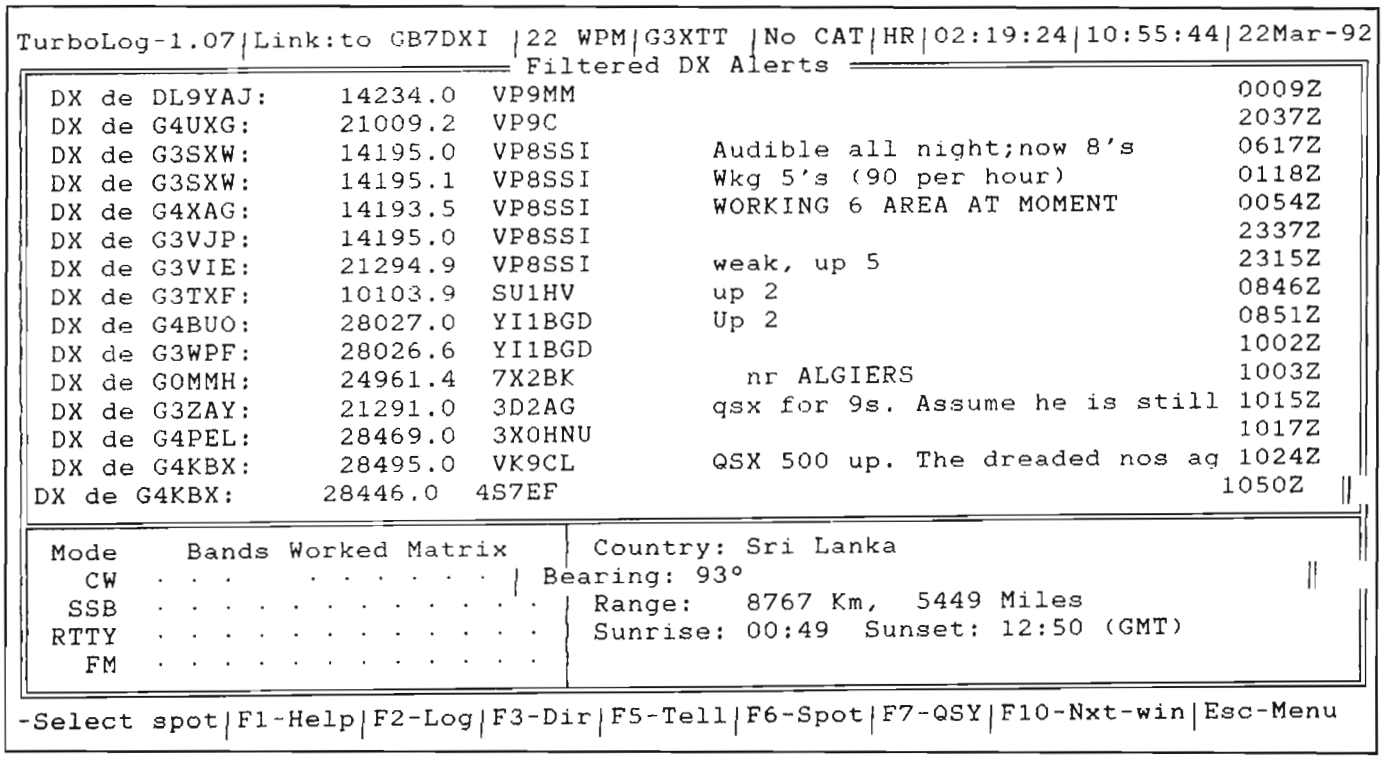
In a short review it is impossible to describe all the features of this very comprehensive program. However, I hope you are getting the idea. Gripes? Hardly any. TurboLog currently doesn't know about 'deleted' countries, this doesn't

matter if you're a new DXer but could be irritating if you've been around the HF bands for a long time. Also, jumping back to a particular date in the log is not as easy as it might be, though searching by country or callsign is simplicity itself.

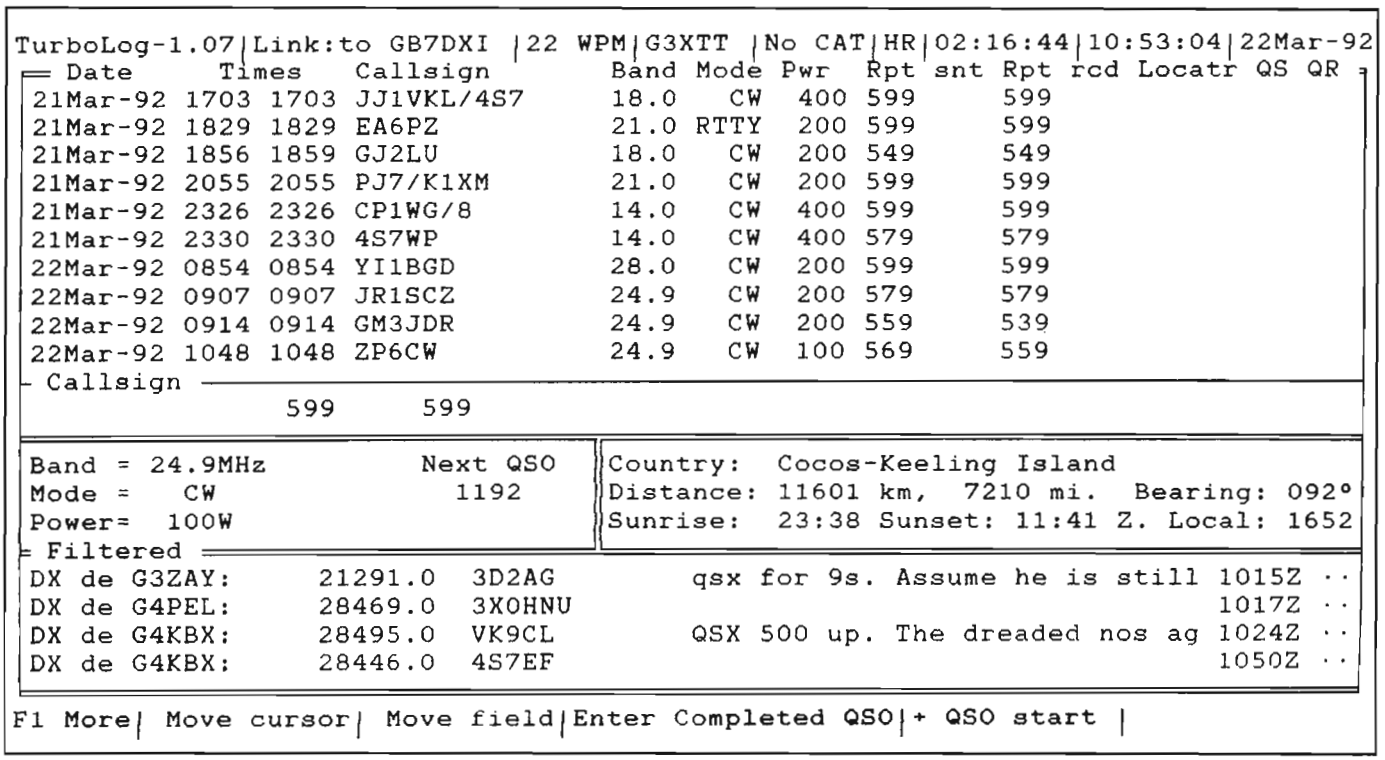
Could there be enhancements? Yes, of course. For example, I would like RTTY facilities in addition to packet. Some aerial rotators now include an RS232 interface, so one day TurboLog might not only QSY the radio but also turn the aerial for you.

You may be thinking that if you haven't got a radio with an RS232 interface and don't plan to use packet, then TurboLog isn't for you. It may seem like overkill, but TurboLog excels in basic station logging, and when eventually you *do* want these extra facilities you won't have to start learning a new program from scratch.

TurboLog costs £60 and is available from Canberra Communications, Canberra Lodge, Heath Ride, Finchampstead, Berkshire RG11 3QJ. Please mention HRT when inquiring.



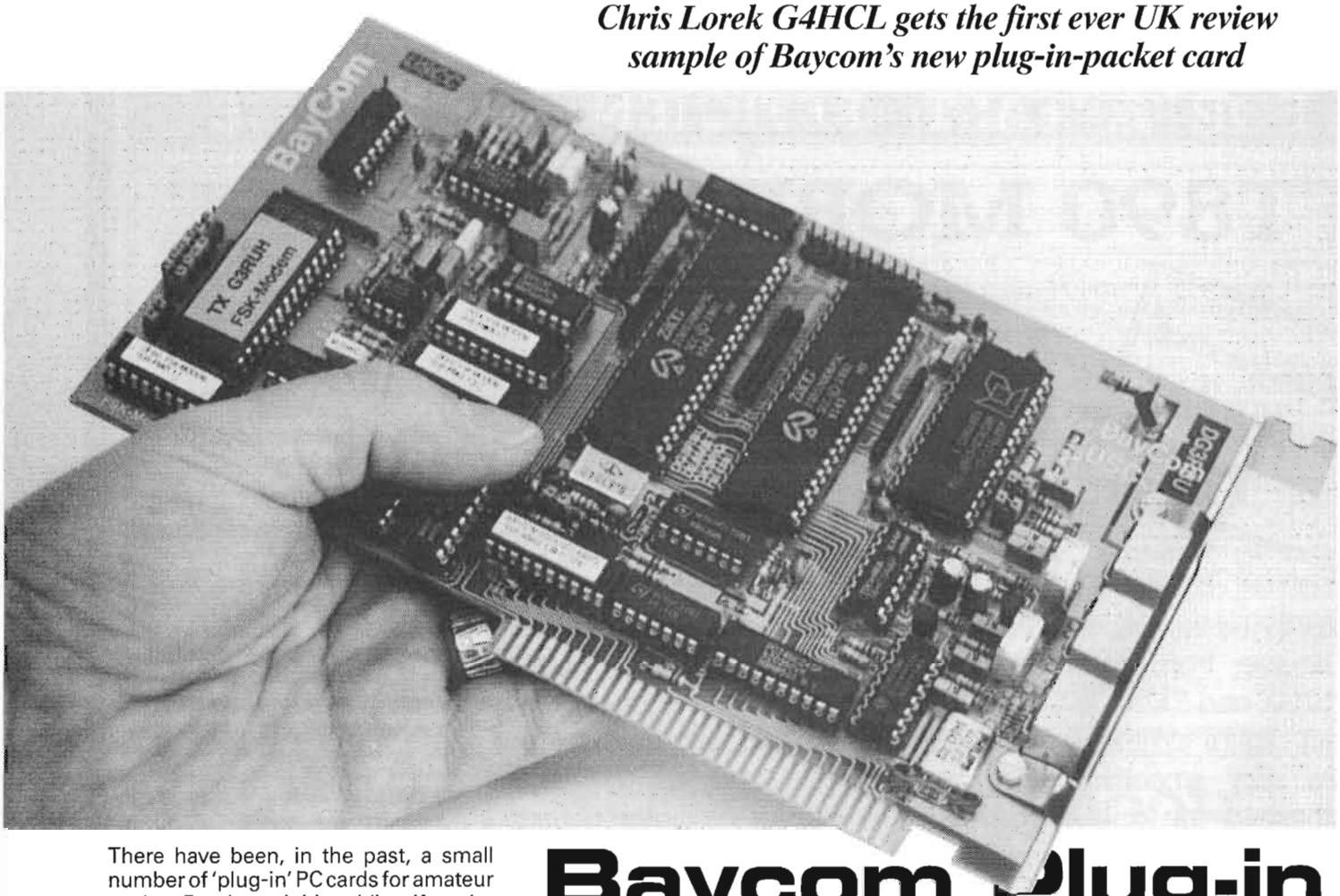
The Clusterm filtered DX alerts screen



The main logbook screen, DX spots from the cluster appear in the bottom window

Exclusive Review

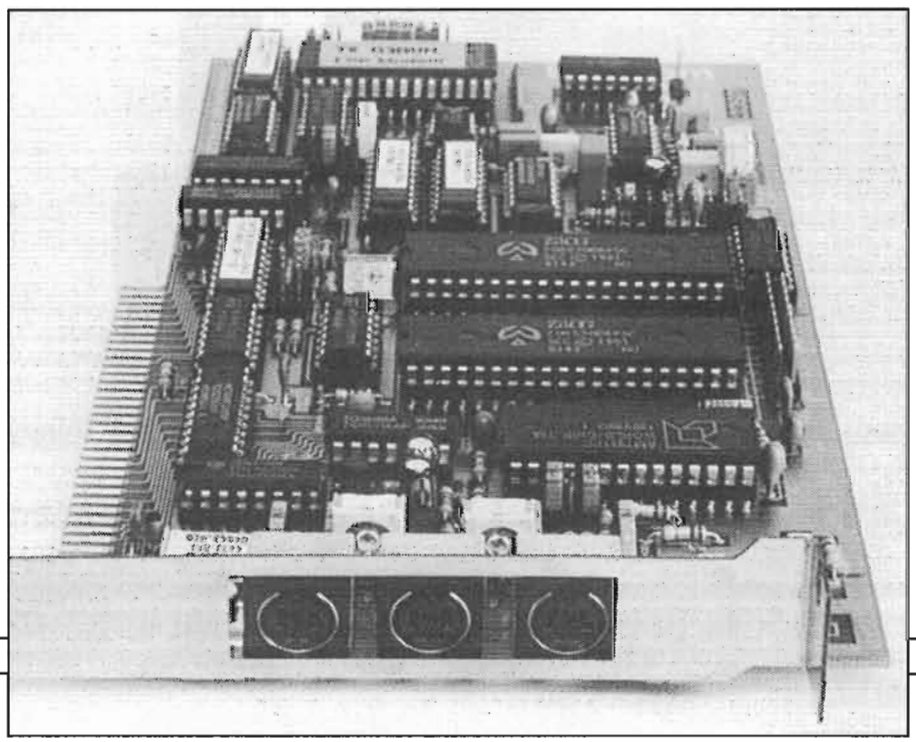
Chris Lorek G4HCL gets the first ever UK review sample of Baycom's new plug-in-packet card



Baycom Plug-in Packet Card

There have been, in the past, a small number of 'plug-in' PC cards for amateur packet. For the uninitiated (i.e., if you're not a regular reader of HRT!) these come as a self-contained PCB which, literally, plugs into an expansion slot in your IBM PC clone, giving you a packet TNC without the necessity of you having to wire up and power an external 'box of tricks' to your computer via. one of the computer's serial ports.

In the March 1992 issue of HRT I reviewed the Baycom 'Minipak' system, an economic system running 'Baycom' software and using a packet modem which was self-contained within a computer serial port plug, the lead from this going straight to your transceiver. The response to this was, literally, staggering, and a promise came in the next issue of a forthcoming review of the Baycom plug-in expansion card. This operates under the same software, and gives you up to four packet radio ports.



Baycom

Baycom is an abbreviation for the Bavarian Communications Club, this being an active southern German ama

teur packet group. Take a look at the photos in the May 1992 issue of *Packet Radio Roundup* and you'll get an idea of the vast extent of engineering which they put into one of their packet node systems. The Baycom program created by the group I discussed in detail in the 'Minipak' review. This software is *very* easy to use, and this 'user friendliness' I must say is a great help in getting on the air on packet. I don't intend to repeat the software details here, take a look in your back issues if you missed it.

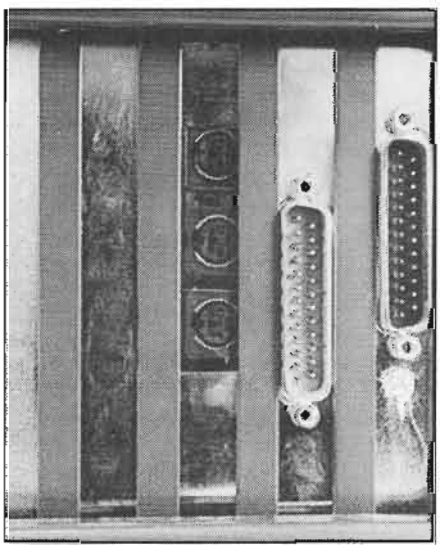
Ports

The card, which they've titled the 'Baycom USCC Card', has four ports fitted;
Port 1; 300 or 1200 baud (HF or VHF) packet using an AM7911 modem IC,
Port 2; 1200 baud VHF using a TCM3105 (as used in the Tiny 2, KAM and KPC4)
Port 3; 9600 baud G3RUH compatible using the DF9IC design
Port 4; High speed disconnect header, for use with external modem such as PSK, G3RUH etc.

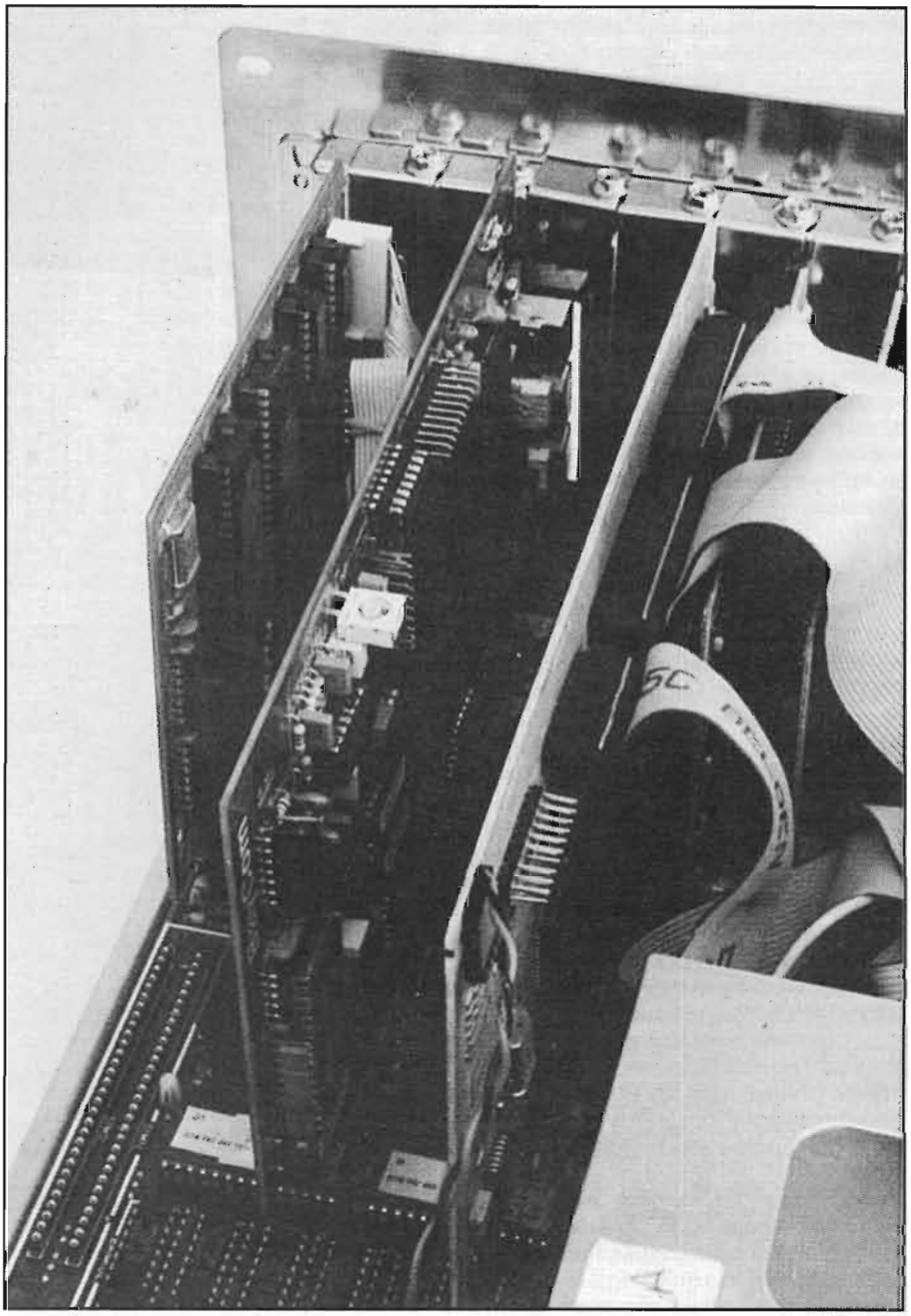
This currently gives you about as wide a choice as is possible with such a simple 'plug-in' affair, with the added bonus of having it operable from the very 'friendly' Baycom software.

9600 baud

Until now, getting going on 9600 baud packet has been a 'separate TNC' affair, or a 'plug-in' TNC wired up to an external modem. The Baycom team are,



to my knowledge, the first to have integrated the world-standard G3RUH modem onto their expansion card. As most transceivers need to be modified, with direct audio in/out connections, to use 9600 baud, the team have produced a comprehensive 137 page A5 manual detailing 9600 baud techniques. This includes much information on the modem itself, connection information, and details of modifications needed covering a large number of transceivers. Although this handbook is currently written in German, it's being translated to English right now (see this month's *Packet Radio Roundup*).



The Baycom card just plugs into an expansion slot in your IBM PC clone

Network Use

If you're a BBS or Node SysOp, you'll be interested to know that John G8BPQ (the very person who's famous node software hundreds of BBS/Node SysOps around the world run in their computers) has included the card in his list of supported hardware. As well as the 'Baycom' software, the card comes with John's latest BPQ node software as well to help get you going using the board for network use.

Technicalities

The unit comes on a half standard size card, hence if your PC doesn't have a full array of full-size slots you don't have to use one of the valuable 'full size' positions for the card. The card's circuitry is arranged into five sections, namely the main digital control and the four ports. The digital section handles the PC-bus interface, central clock generation and HDLC control, and has two SCC Z8530

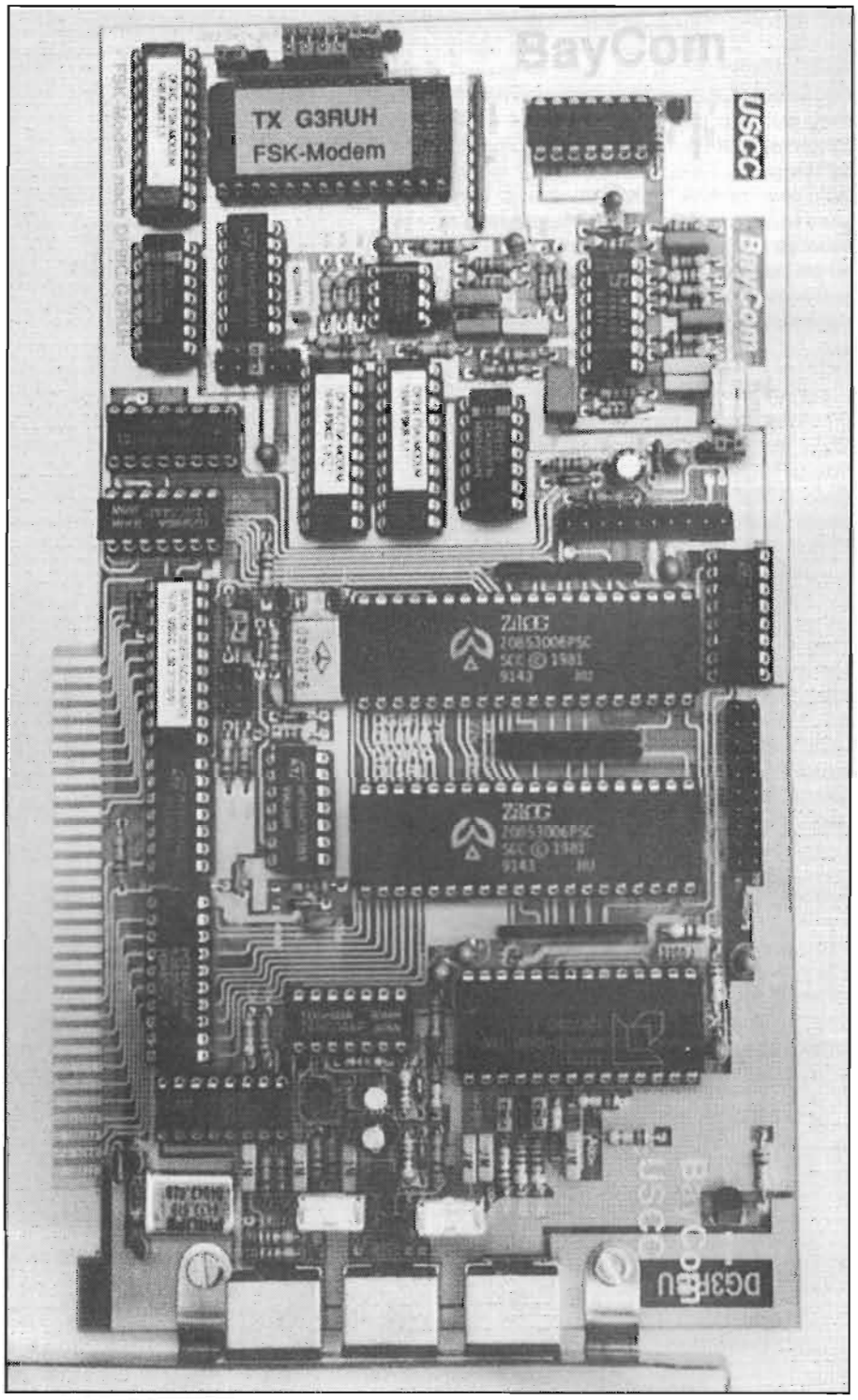
ICs to allow synchronous data transmission. These each contain two ports, giving four communication ports in all. Three of these have on-board modems fitted, and it's useful to note that the Port 3 modem may be changed in communication speed right up to 38400 baud by modifying a few resistor and capacitor values on the board, the values of these being given in the user manual. You will, however, need a fast 386 PC for full-duplex 38400 baud operation! Port A of the second Z8530 (the 'free' port) is connected to a modem disconnect header, so you can connect an external modem of your choice. The card uses CMOS ICs such as 74HC series for low power consumption, to keep the current drain down.

In Use

Prior to installing the PC card, I needed to configure the various links on this for my intended use. The first was the 'PC interrupt', i.e., the base address of the card within the PC input/output addresses. This was needed so the PC and the software running on it knew where to 'find' the card and communicate with it. The default installation setting was 300 hex, and if you don't have other cards installed you'll probably find this OK, I found the corresponding software also had this as a default setting. After this, all that really remained was a check of the other jumpers on the modems which set the various speeds/tones etc., to make sure these were what I needed. The user manual gives full information on this, plus a large layout diagram showing the locations of jumper link settings. The card was then ready to plug into my PC.

On configuring the software, I checked the base address here matched that set on the card jumper, then loaded my callsign and so on using a text editor program. After again checking all was OK, I was ready to connect the radios! The UK distributors provide multi-way leads, suitably terminated at the card end with the required 6 pin sub-miniature DIN plugs. These carry the usual RX audio, TX audio, Mic, PTT, and Ground lines, so interfacing the system with my transceivers was fairly straightforward.

As mentioned, the on-air operation of the Baycom software has already been detailed in HRT, and Node/BBS sysops intending to use the card in their PC will already be familiar with BPQ node software (version 1.5 was supplied with the card) so I won't dwell further on this. As would be expected, the final arrangement was a compact system, giving multi-transceiver use without the need for a 'spaghetti' arrangement of multiple RS-232 leads and the like!



Conclusions

The Baycom USCC card can give a unique combination of 300 baud, 1200 baud and 9600 baud packet data systems on a single plug-in card. Running under the superb Baycom software, it should provide a useful 'do almost everything' system for terrestrial packet. It does, however, need a degree of initial configuration in terms of editing various parameters and the like, so 'first time' packet users could find this s little difficult unless it is an upgrade to their existing single or dual TNC system. For end-users as well as packet SysOps, the 9600 baud facility is also of interest now that a 9600 baud 'user gateway' frequency for network access has been formally proposed, showing that this speed is certainly not just for inter-node linking use!

The card is currently priced at £269 in the UK, and my thanks go to Siskin Electronics, who are the UK distributors, for the loan of the review sample.

A Versatile Shack Accessory

Richard Justice builds a multi-purpose unit which is based on low-cost components (apart from the box!)

Last Christmas, I was given a bottle of 15 year old Laphroaig single-malt Scotch whiskey — a kindly thought. Doubly so indeed, in that the bottle came in a beautiful tin box. Obviously it just *had* to be turned into something useful for the shack!

Four things came to mind, namely a capacitor substitution box, a resistor substitution box, an oscilloscope calibrator, and a sweep generator. There is in fact room for all four items. As the box had a nice black-and-white design on the front, top and bottom, all the controls, sockets and whatever would come out of the back, so the end result would ornament the workshop as well as be useful.

Resistor/Capacitor Substitution Box

For the first two items, my junk box yielded most of the components and switches required, four terminals also came from the junk box *(rally goers will no doubt be able to purchase similar 'goodies' at low cost — Ed)*. The circuits of the two substitution boxes are shown in Fig. 1 and Fig. 2. The varied collection of values in each case were chosen to be 'in the alley' whether I was playing with, say a valve amplifier or a transistor radio. A valve radio interstage capacitor for instance, must *not* be electrolytic, or the most horrible distortion appears to confuse the issue. On the other hand too small a value will merely reduce the LF audio response, and a larger one can be chosen from experience out of the junk box. A transistor amplifier will usually want higher capacitances, and be more tolerant of electrolytics.

A similar argument applied to the resistor values. One high value for valve circuits, the rest lower for transistors, but you may of course add what your needs indicate. Use metal film or metal oxide resistors for stability. Regarding tolerances, it's nice to have close-tolerance resistors if only because it gives you a handy check on the resistance range of your test meter, but otherwise just use what you have or can obtain at low cost.

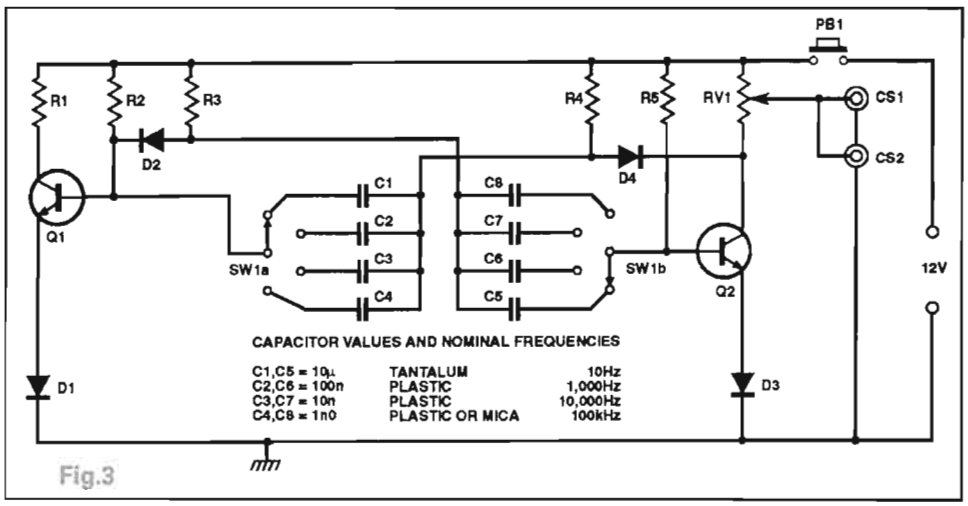


Fig.3

Oscilloscope Calibrator

The oscilloscope calibrator shown in Fig. 3 is merely a standard 'both-edges-sharp' multivibrator circuit, you may find in text books. I used BC108 transistors for the simple reason that they were the only ones I had two of in the junk box, but similar types will serve. RV1 serves nicely to adjust the amount of square-wave offered to the oscilloscope. Use a cermet type here, carbon types may not stand up to repeated use and wire-wound types may show some distortion of the higher ranges. Some possible values are given for the switched ranges, you may alter these if your particular oscilloscope prefers different frequencies. D1-4 are fast switching diodes, ZS140s were in my junk box, but similar types will serve. The ones in the emitter circuits serve to protect the transistors. CS1 and CS2 enable you to check either the internal or external trigger, and power is fed to the circuit by push button PB1, (push buttons are almost given away at radio rallies!). If you have a well stocked junk box, and a capacitance meter, you could do worse than match the pairs of capacitors.

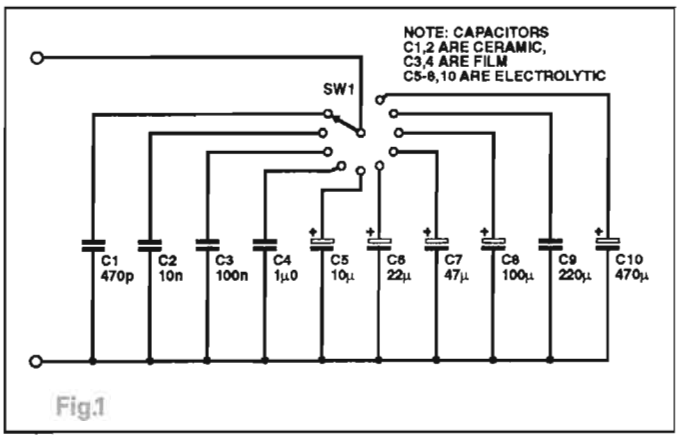


Fig.1

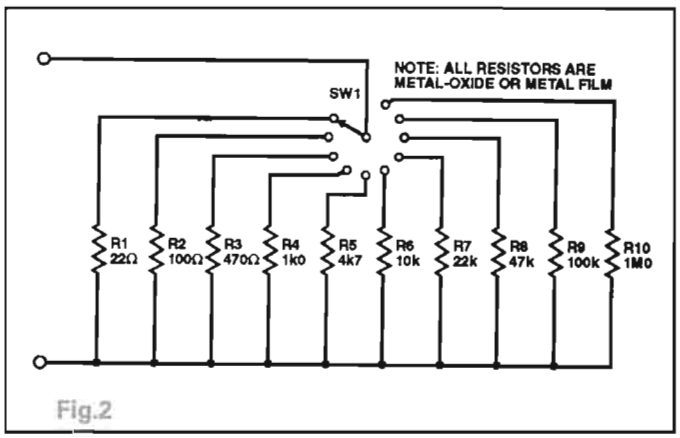


Fig.2

Sweep Generator

Early British books call this a 'wobbulator', because the circuit is used with an oscilloscope with older oscilloscopes having an output from the time-base which you could use to 'wobble' the frequency. Modern instruments with triggered timebases usually lack this facility, but they do have an 'external trigger' terminal. This means we have to build the 'wobbler' into our sweep generator, and use an output taken from it to trigger the oscilloscope timebase via. the external trigger input.

My oscilloscope is a Crotech 3132 double beam, 20MHz bandwidth, which requires at least 1V p/p at the 'EXT TRIG' input. So in Fig. 4, R3 was chosen to achieve this, via. CS2. Another oscilloscope may require more or less drive here, so you can adjust R3 on test to give a reliable trigger on your own oscilloscope. Transistor Q1 is used as a voltage control. When the voltage rises enough to turn Q2 on, C1 immediately discharges, so turning the triangle wave at pin 4 into a saw tooth. This improves the display on the oscilloscope screen by getting rid of the ghost image.

What then about the older oscilloscopes with the respective timebases? My personal inclination is to throw them away except as museum pieces! However, it is possible to use the 'timebase out' waveform from such an oscilloscope by altering the circuit of Fig. 4 to that at Fig. 5. The IC1 circuitry is no longer needed, the triangle wave from the oscilloscope goes in to SK2, and R1 is now adjusted to give a reasonable range of sweep. However, if the scope flyback time is significant you may see a 'ghost image' as well as the real one on the CRT.

You may wish to add a small PSU in the box. However, since many shacks already have a DC supply, you may prefer to use what's available, as I have done, thus getting rid of a cumbersome extra mains lead around the workbench. There are never enough mains outlets round here anyway! A push-button PB1 connects the 12V, around 40mA when you want it. Looking at the circuit of Fig. 4 the heart of the circuit are the two NE566 ICs. These each give out triangle and square waves. The triangle out from IC1, converted to a sawtooth as already explained, provides the voltage to make IC2 sweep in frequency. Because there is plenty of harmonic content in the latter's square wave, we can take advantage of this to look well above the 1MHz upper limit of the devices.

The question next arises of the frequency needed out of IC1. Imagine we're using a 20MHz oscilloscope to look at the IF of a receiver. Alas, woe is us, our *usable* bandwidth is nothing like 20MHz, since we are looking right down in the audio frequency range when we take the IF bandwidth and the receiver circuit around the take-off point into account. The sharper the filter we are looking at, the worse the problem! The routine then, is to test out on a really sharp filter, and slow the repetition rate of IC1 down progressively until a further slowing-down produces no apparent change in the shape of the response curve. Then stick to this bottom speed!

You often hear old-time service engineers disfavour the use of a wobbulator as being deceptive, the reason in every case being that they speeded the sweep rate up to 'stop the flicker'. I recall, back in the sixties, using a Furzehill spectrum analyser on a super SSB filter and finding there was a difference between one sweep every thirty seconds and one every six seconds! Slow as that rate is, it's still quicker and probably more accurate than using a signal generator, receiver, calibrated attenuator and graph paper, even if you've got these.

Construction

As already indicated, I used a decorative tin box. If you go out and buy a bottle of 15 year Laphroaig, that's an expensive way to get a case! If you do like

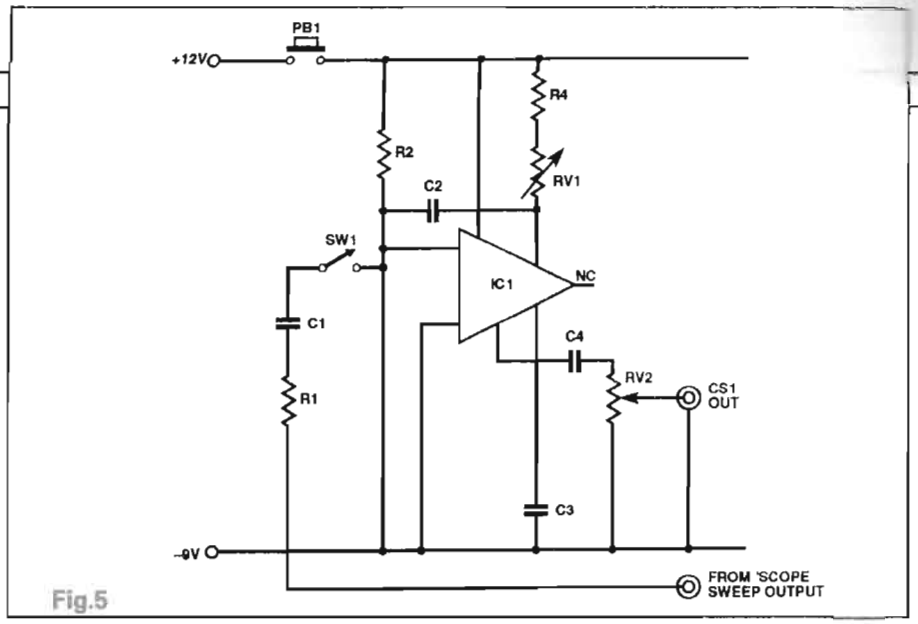


Fig.5

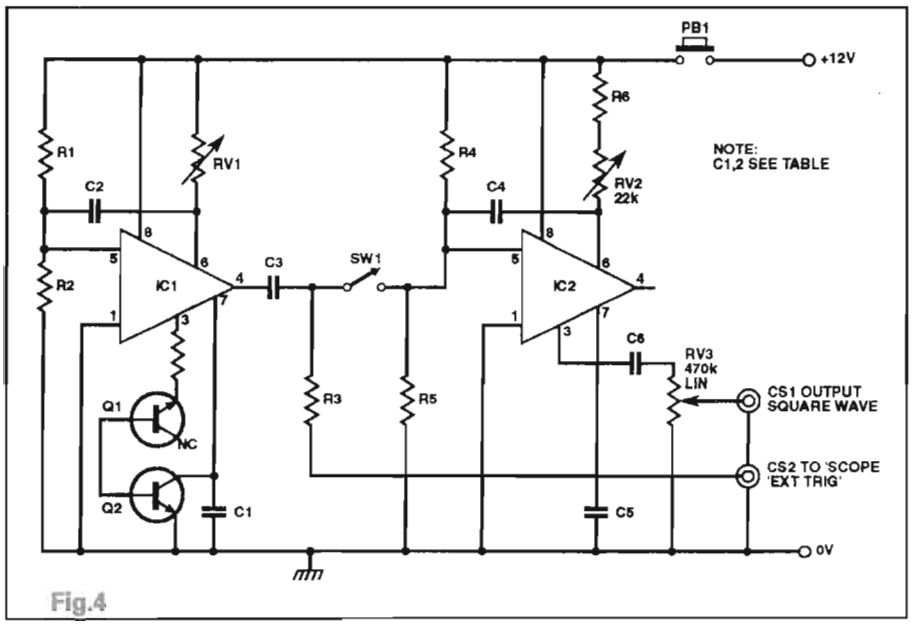


Fig.4

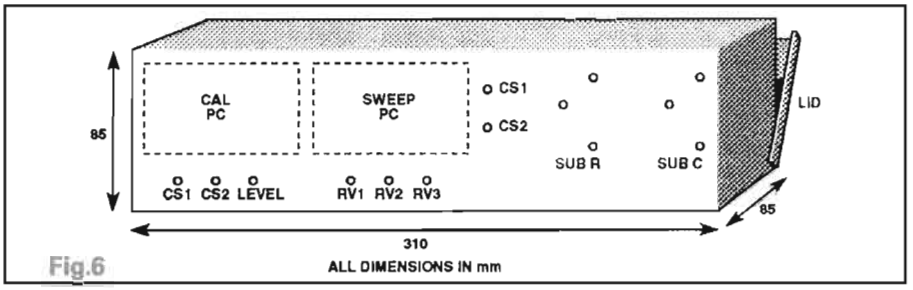


Fig.6

this idea, great care should be taken in the drilling out of the holes; use a block of wood inside the box to avoid distorting the box, together with cleanliness and padding to prevent marring the outside ornamentation. The tin, standing with its base to the wall, shouldn't give away what it has become! Alternatively you might prefer to build each unit in a separate case. I built the electronics for the calibrator and the sweep generator using 'dead bug' style construction (plastic ICs lying on their backs with legs in the air) on PCB off-cuts. Push buttons switch the DC voltages on when required only, but you could use switches if you prefer.

Layout

Since the maximum circuit frequency is only around 1MHz, the layout is not critical. However, you want to be able to use the harmonics of the signals, the layout should be as compact as is convenient. That's one reason I prefer 'dead bug' construction, allowing the layout to be changed if problems arise, such as you particular arrangement deciding to 'hoot'. Neither circuit seemed to be fussy though, once I'd found and sorted out my obligatory wiring errors!

Usage

The C and R substitution boxes can be used for cross checking the C and R measuring ranges of test gear, and come in handy for times when you've something to mend with a suspected open-circuit capacitor or resistor.

The Oscilloscope calibrator will be found useful in various areas. Calibrate it initially by listening to the harmonics on a general-coverage receiver, on the calibrator's 'nominal' 10kHz range for example, you will hear harmonics around 10kHz apart up the band. If your receiver is blessed with digital readout you can measure this spacing precisely and quickly. I wouldn't bother to 'trim' the ranges precisely to their nominal, but merely mark with the actual values achieved. The noise generated can be used to rough-check a receiver for instance. Inject the signal by way of a small capacitor, to keep the receiver front-end transistor happy Set the receiver controls to noted positions, tune in the harmonic at noted frequency X and note the S-meter reading,move to some other frequencies, and so on. If the receiver remains as sensitive as it was, the results should be repeatable over time.

As a calibrator for the oscilloscope, the oscilloscope probe can be placed on the output pin, when a square-wave should be available on the oscilloscope. Now, by switching ranges on oscilloscope and calibrator, and using the graticule, you should be able to see any errors in your timebase sweep, or with an older oscilloscope you can set the timebase speed to a desired figure. In addition, you can check the 'Y' amp gain approximately. With a 12V supply you have about 11.5 volts maximum of square wave, so clearly you can calibrate the output by Ohms Law.

The sweep generator is a useful device if you are using RTTY, experimenting with filters, or aligning receivers. The table gives some possible capacitor values for use on the IC pin 7, one suggests 10uF on IC1 and 100pF on IC2, but by all means switch ranges if that be your fancy. With S1 open the output frequency is steady, close S1 and the frequency is swept in either version.

Cost

As indicated, the tin sparked off everything. Apart from the tin, I bought the two ICs, and the rest came nicely from the junk box. Hence the cost can be kept very low, especially through 'radio rally' hunting for components and suitable enclosures. Tobacco tins, printed circuit board panels, and so on may all be used for enclosures to keep costs down. I know an amateur who swears by the tins which contained mackerel fillets for his projects!

Component Listings

Oscilloscope Calibrator

R1	510R
R2	9k1
R3	1k
R4	1k
R5	9k1
RV1	500R linear
Q1, Q2	BC108 or similar
D1-D4	ZS140 or similar
C1-C8	See diagram

Sweep Generator

Fig. 4 values;

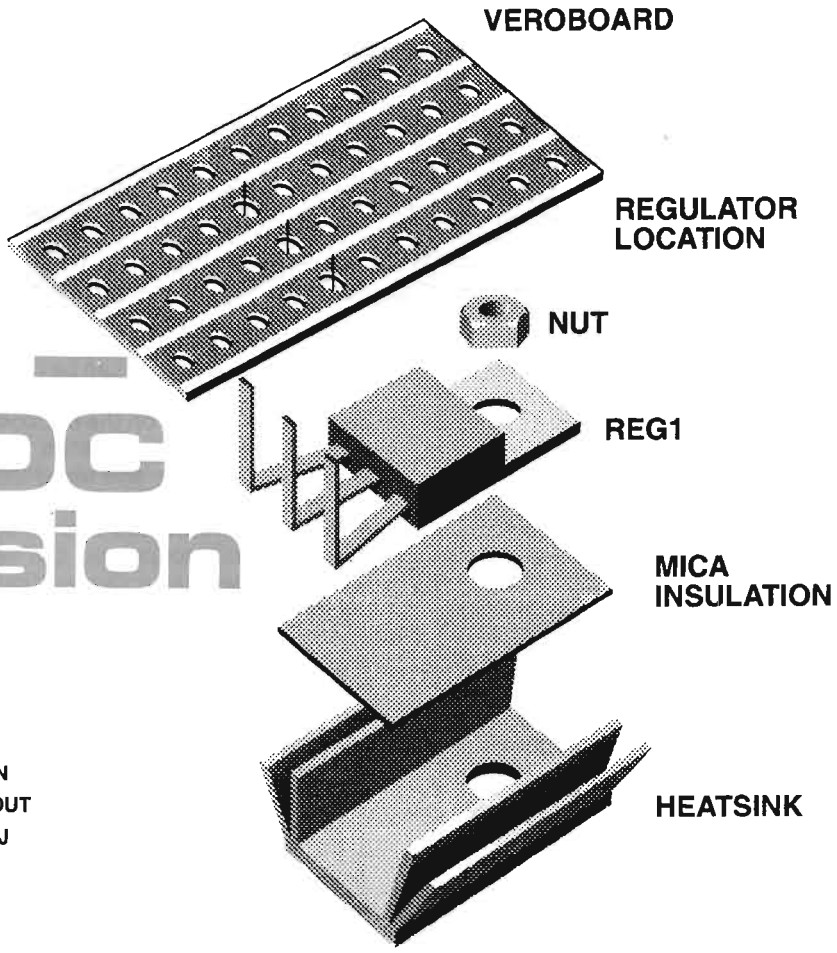
R1	1k5
R2	10k
R3	See text
R4	1k5
R5	10k
R6	1k5
RV1	10k linear
RV2	22k linear
RV3	470k linear
IC1, IC2	741 or similar op-amp
Q1, Q2	BC108 or similar
C2	0.001uF
C3	4.7uF
C4	0.001uF
C6	0.1uF
C1, C5	100pF (120-1000kHz) 1nF (12-120kHz) 1uF (12-120Hz) 10uF (1.2-12Hz)

Fig. 5 values;

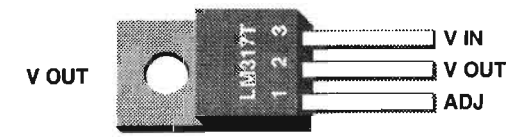
R1	See text
R2	1k5
R3	10k
R4	1k5
RV1	22k linear
RV2	470k linear
IC1	741 or similar op-amp
C1	4.7uF
C3	100pF (120-1000kHz) 1nF (12-120kHz) 1uF (12-120Hz) 10uF (1.2-12Hz)
C4	0.1uF

Tony Skaife G4XIV, builds this simple DC converter to run your handheld from a car battery

Project – DC to DC Conversion

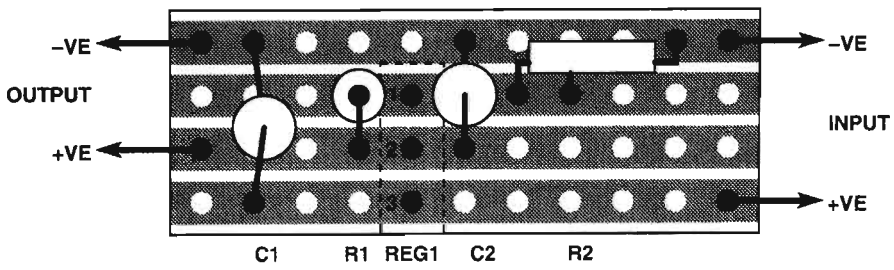


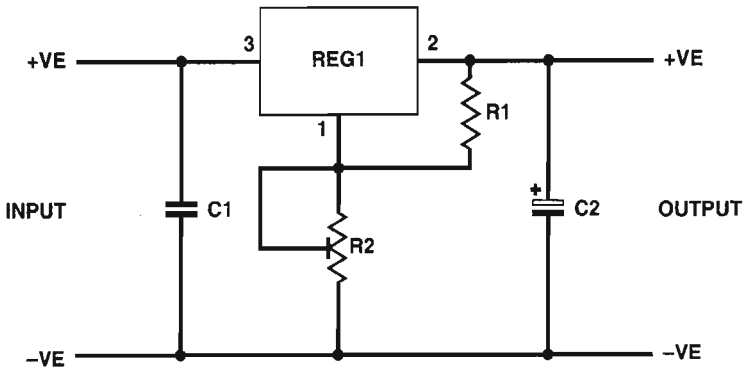
EXPLODED VIEW OF CHASSIS



LM317T PIN CONFIGURATION

VERO BOARD COMPONENT LAYOUT





CIRCUIT DIAGRAM

This little device was prompted by my desire to run my 10V ex-PMR handheld (a PF85) from my car's battery supply. Many Japanese handhelds operate from a nominal 7.2V supply, and this unit would be ideal for these also. It doesn't take much imagination to see other uses for it, and it's inexpensive and so simple that more than one can be constructed in one evening.

The circuit is simply a variable voltage regulator, the range it covers in this case is approximately 1.5V to 10.5V at up to 1A. The selection of R1 and R2 determines the output voltage by the formula;

$$V_{out} = 1.25 \left(1 + \frac{R2}{R1}\right)$$

Therefore, by simply varying R2, the output voltage can be set as required. C1 and C2 are decoupling capacitors, helping to remove any voltage spikes that may occur on the leads as well as reducing any tendency for oscillation.

Virtually any size of project box will accommodate the unit, but should you need to go out and buy one, it's advisable to obtain all the other components first to ensure they will all fit in.

A piece of Veroboard with four complete tracks forms the mounting for the electronic assembly, and all components can be mounted on the track side just like surface mount devices. However, to save space, mount R1, C1, C2, and REG1 in the conventional manner on the underside, leaving R2 on the top to allow for adjustment when completed.

Construction

Fit REG1 using a suitable mounting insulator to it's small heatsink, and if you're using a project box secure this to the box lid. Bend up the legs of REG1 so they line up with the appropriate holes in the Veroboard, making a sliding fit, but don't solder them yet. If you're unsure of the component solderability, I'd suggest tinning the component leads and the tracks of the Veroboard to help ensure no dry joints occur. To do this, first clean the track and leads by rubbing with an eraser, then holding the soldering iron on the track or component lead run a small amount of multicore solder on to give it a light coating. If you've gone 'over the top', remove excess solder from holes in the track with a solder sucker or desolder braid.

Fit and solder all the components to the board, taking care with the lead polarity of C2, the 1uF tantalum capacitor. Set R2 to mid point, and connect the input and output leads. Leave the connectors off at this point, as bare leads often make it easier to read the output voltage with a multimeter than when connectors are fitted. Having carefully checked your soldering, and that all the components are in their correct positions, fit R2 upwards on the three legs of REG1. After soldering, REG1 should hold the board solidly.

Testing

Apply a current-limited 13.8V DC supply to the input, simulating the car's battery. With a multimeter on the output, adjust R2 for the output voltage you require. When you're satisfied that all is well, close the unit up bringing the input and output leads through holes in the box, taking care to note the polarity for the connectors you wish to use.

If this unit is to run a handheld that doesn't normally have provision for an external supply, instead of using a project box, take an old battery block (as in the PF85), and after removing it's innards, fit the circuit board in it. Do remember that the maximum current drawn may be 1A only, i.e. this should be OK for 2W handhelds and the like, but don't try running 5W sets and the like, these drawing more than 1A, from the unit. Also ensure adequate ventilation for the heatsink if you intend running long periods of transmission, in these cases the heatsink will need to get rid of the heat somewhere!

When you've completed this device, you will have an inexpensive DC to DC converter, as the rig makers call them. Good luck with your home constructing.

Parts list

Reg 1	LM317T
R1	270R
R2	2k cermet or carbon preset
C1	100nF
C2	1uF tantalum

Veroboard, heatsink, box, wire, and plugs to match.

SCANNERS INTERNATIONAL

From the Editor's Desk

Since the RA's latest information sheet on scanners, clarifying exactly what is and what isn't legal to listen to in the UK, scanner enthusiasts have been taking a rather worried approach, now realising that they're restricted, as they always have been (see back issues of *Scanners International*), in what they can listen to. Public awareness however still isn't as high as most enthusiasts would believe. We regularly receive questions ranging from 'but isn't it illegal to own a scanner?' to 'I want to listen to my local police, what frequency should I set my scanner to?'. We'll say it again, you can own a scanner, but it's the way you use it that determines whether you're within the law or not. There's nothing sinister about this, by the very fact you're reading this issue you may also own a radio transmitter, say for amateur radio or CB, it's only the way you use your gear which could put you on the wrong side of the law.

In Scanners International we have never, ever, promoted the use of scanners to listen into sensitive communications such as the police. This is despite advertisements in the UK press (which we're pleased to say haven't appeared in this magazine) actively encouraging members of the public to buy the advertised radio to listen into such communications.

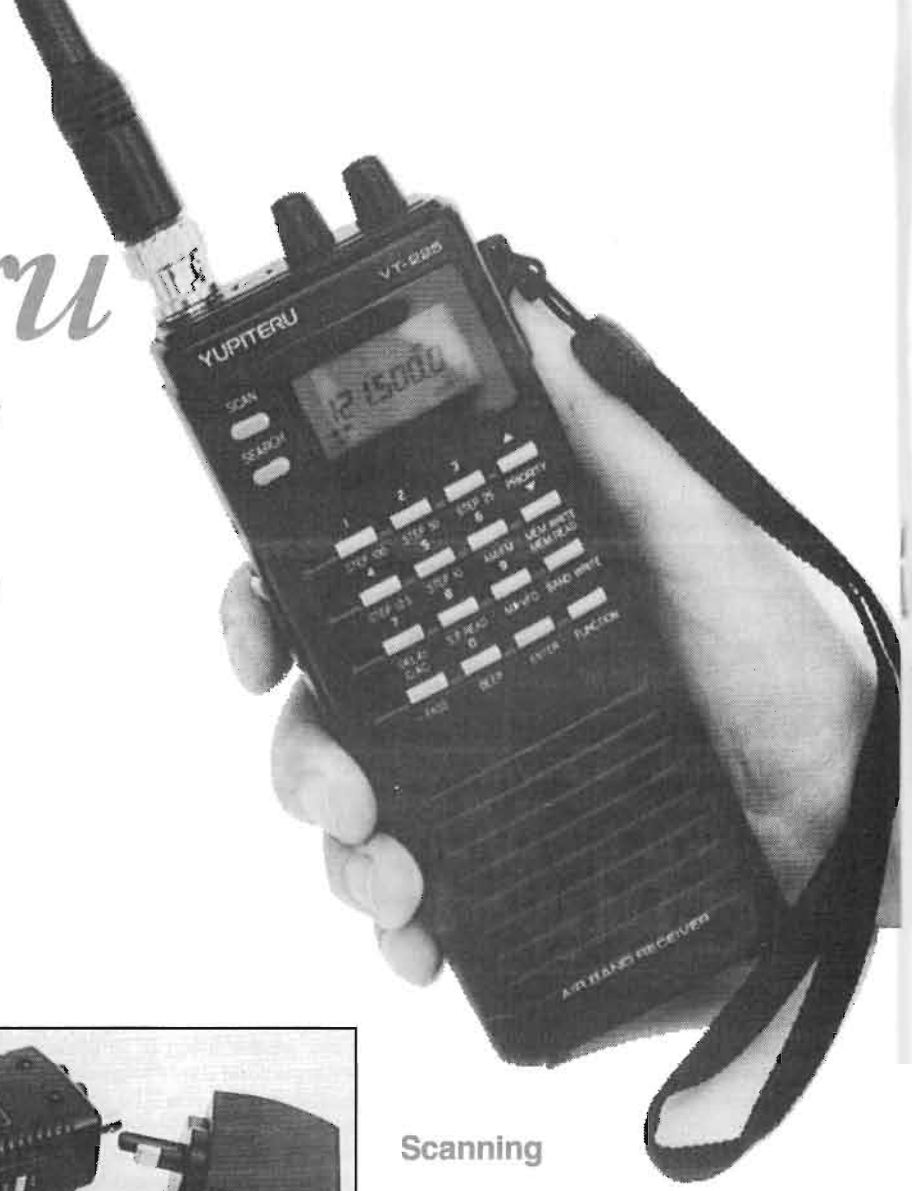
Fortunately, some groups of two-way radio users are now realising that radio communication transmitted 'in the clear' is very likely to be listened to, by someone, somewhere, and that if they don't want people to listen to what they're saying they should be realistic and take precautions such as scrambling. Don't start thinking this is a bad move, making you 'miss out on your fun' in the future. The alternative could be a total ban on scanners, driving them 'underground' so that *only* the 'bad guys' have them. A while ago it was illegal to listen to many things without authority, now at least we're told we can listen to *some* things, even if this doesn't include common hobby interests such as airband transmissions, which many people listen to in open (ignorant?) defiance. One day, things could get better, maybe one day you'll be able to legally use the VT-225 we've reviewed in this issue! I wonder when Airband enthusiasts are going to get a suitable petition up to the RA?

New Products

AR1500 Multimode Handheld Scanner

As well as packing in a wide frequency coverage of 500kHz to 1300MHz, the new AR1500 from AOR also manages to fit a BFO (Beat Frequency Oscillator) within its case to allow reception of SSB and CW as well as AM and wide/narrow FM modes. Many of the operating features of the well-known AR2000 have been replicated in the AR1500, and the addition of a 'fine tune' control lets you tune between the 5kHz minimum step sizes to resolve those SSB signals on the bands. We've already had an exclusive 'on-air' trial of the AR1500, and we'll soon be publishing a full review of this impressively featured set, watch this space!

Yupiteru VT-225 Review



If you're an airband enthusiast, then this one's most certainly for you! Some time ago I reviewed the compact handheld VT-125 scanner *(Scanners International, Aug 1991)*, which covered the civil airband spectrum. The VT-225 could be called the VT-125's 'big brother', adding coverage of the military airband spectrum together with extended VHF coverage and switchable AM/FM modes. The frequency coverage is 108-142.1MHz,

149.5-160MHz, and 222- 391MHz, meaning that as well as airband it covers other ground or water based services as well, for example the 156MHz marine VHF band for air/sea rescue operations and so on.

Lightweight

Like its brother the VT-125, the set is very light, weighing in at around 280g. Measuring 59mm (W) x 147mm (H) x 38mm (D) it easily fits into a palm, as you can see from the accompanying photo. A short purpose-made flexible aerial is supplied, to give good performance on both VHF and UHF airband ranges, and as usual the set has a BNC coaxial connector fitted to let you plug an external aerial in for home or mobile use.

With the number of air displays occurring this summer (I was rather staggered to read a very lengthy list of all those in the UK!), you'll be pleased to know the set manufacturers have made the VT-225 easy to carry about for use out of doors. The light weight helps of course, and a metal belt clip lets you clip the set onto your clothing, a carrying strap also being supplied to save you dropping the set when carrying it around in your hand. For private listening (or indeed when the outside noise get rather high) an earphone is supplied, this plugging into the 3.5mm jack socket on top of the set.

For its power source, the VT-225 uses four standard AA size batteries, with four nicads and a matching AC wall charger being supplied with the set. Although these should give you several hours worth of listening, the use of standard batteries makes it easy to carry a spare set in your pocket in case you're out on a full-volume 12-hour listening expedition or whatever! For mobile use, a 12V DC lead is supplied, this also charging the internal nicads when the set is switched off, and of course an extension speaker can be plugged in for easier listening when driving around.

Scanning

In terms of 'bells and whistles' the set has all the features of the 'best' handheld scanners, including 100 memory channels arranged into ten banks of ten channels each, a 'priority' channel, and ten frequency search banks to let you scan across different frequency ranges looking for signals. Another 'top range' feature is that of up to 100 'pass' frequencies which you can easily program for use in 'search' mode. These stop the set from halting on spurious signals, the scanner simply ignoring these frequencies when it's searching across a given range. A five-segment S-meter on the set's display shows you the relative strength of received signals, which can be quite handy.

As well as the 50kHz and 25kHz steps usually used for airband you may instead program 12.5kHz or even 10kHz frequency steps for either manual tuning using the up/down buttons, or automatic searching. These would be useful on the 'extended' ranges of the set. As usual when scanning, the set halts when the squelch raises, and a 'delay' button lets you select either a two second or four second delay before the set starts scanning again.

In Use

After switching the set on and programming a few of the memory channels, I was pleased to see how sensitive the receiver was. With just its set-top whip connected, I

could hear distant signals clearly which didn't even raise the squelch on my usual 'wideband' scanner with its no-doubt equally 'wideband' whip. This good sensitivity did have a negative side when my youngsters switched on their plastic-cased computer which generated rather a high degree of RF noise on some frequencies. These signals often stopped the set searching, but here I found the 'frequency pass' facility very useful. As soon as the set halted on one of these signals, all I needed to do was simply to press the 'Function' button followed by the 'Pass' button, the set automatically storing this frequency.

Armed with my frequency lists I slowly started to fill up the set's memories. Here simply by entering the required frequency followed by the 'Function' and 'Mem Write' buttons automatically incremented the memory channel for me each time - very useful. Although I had already programmed up several memories, I spent some time looking for 'new' channels to enter, letting the set search around the various bands for me (*some* users *do* change their frequencies around occasionally!). Here I found the 'pass' function was again rather useful, to temporarily skip by the signals I already knew about. A note in the handbook tells you s the set can't receive FM within the ranges 253- 255MHz, 262-266MHz, 271-275MHz and 380-382MHz ranges (these are restricted ranges for the Japanese market). Although I didn't find this a problem (the set just jumped over these when in search mode and programmed to FM) this may be worth noting.

I found the set easy to carry around, with sufficient audio from the internal speaker for listening in 'normal' conditions. Sensibly placed 'Scan' and 'Search' buttons let me use the set with it placed inside my pocket, a large side mounted 'Key Lock' slider switch being useful in preventing the keypad being accidentally operated as I moved around. Throughout the on-air tests, with the set plugged into the supplied charger each night I never found the nicads to go flat even when monitoring all day, very good! One thing I did find was, with the belt clip fitted, the set very easily toppled over when stood up on a table top if I accidentally touched the set. After picking it up plenty of times, I learned to lie it flat or use a purpose-designed stand at home. This helped me see the LCD more clearly too, as I found this difficult to see when I looked down on the scanner with it stood up due to the fairly narrow viewing angle of this.

Although the set is primarily an airband scanner, having the chance to go out in tidal waters on board a motor yacht occasionally showed me how useful the marine band coverage facility was. Being able to listen to the local coastguard's broadcasts, and those from other vessels on channel 16 (156.800MHz), from my top pocket was quite useful, as I was often out of listening distance from the on-board VHF set. I did find I could improve the scanner's performance here by replacing the set- top whip with a helical cut for 156MHz (the performance in terms of pulling in weak signals then being superb!), suggesting the provided whip has been optimised for the airband ranges.

Laboratory Tests

The receiver sensitivity, as found on air (no pun intended!) was quite good, although the measured figures coupled with the on-air results show that the purpose-designed set-top aerial must have been having rather a beneficial effect also. The strong- signal rejection, i.e., being able to receive the wanted signal while strong off-frequency signals were around, was very good for such a scanner. The image rejection, which many 'simple' scanners fall down on badly (hearing signals on the wrong frequency) was also very good. The measured current consumption confirms the scanner should easily give a full day's worth of on/off listening.

Conclusions

The VT-225 worked very well indeed, both on air and on the test bench. With its light weight and optimised performance for the airband frequency ranges, it's bound to be popular with the dedicated airband enthusiast. It has a few 'extended ranges' together with FM receive facilities which could be useful in some circumstances, as indeed I found, but it certainly isn't a wideband do-everything scanner. But for the airband-only enthusiast, superb.

My thanks go to Waters and Stanton Electronics for the loan of the review scanner.

LABORATORY RESULTS:

All measurements taken at 125MHz with 60% AM modulation at 1kHz unless otherwise stated.

Sensitivity;

Input level required to give 12dB SINAD;

Freq MHz	Level
108	0.36uV pd
120	0.30uV pd
130	0.29uV pd
140	0.25uV pd
150	0.14uV pd (FM)
155	0.16uV pd (FM)
160	0.17uV pd (FM)
222	0.29uV pd
250	0.32uV pd
300	0.36uV pd
350	0.31uV pd
390	0.51uV pd

Squelch Sensitivity;

Threshold;	0.13uV pd (5dB SINAD)
Tight;	1.14uV pd (22dB SINAD)

Adjacent Channel Selectivity;

Measured as increase in level of interfering signal, modulated with 400Hz at 30% modulation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal;

+12.5kHz;	48.0dB
−12.5kHz;	48.5dB
+25kHz;	52.0dB
−25kHz;	52.5dB
+50kHz;	54.5dB
−50kHz;	58.0dB

Image/IF Rejection;

Increase in level of signal at first IF image frequency (+90.0MHz), over level of on-channel signal to give identical 12dB SINAD signals;

57.5dB

Blocking;

Measured as increase over 12dB SINAD level of interfering signal modulated with 400Hz at 30% to cause 6dB degradation in 12dB SINAD on-channel signal;

+100kHz;	63.5dB
+1MHz;	91.0dB
+10MHz;	94.5dB

Intermodulation Rejection;

Measured as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;

25/50kHz spacing;	53.0dB
50/100kHz spacing;	62.5dB

Maximum Audio Output;

Measured at 1kHz on the onset of clipping;

3 ohm load;	198mW RMS
8 ohm load;	191mW RMS
15 ohm load;	140mW RMS

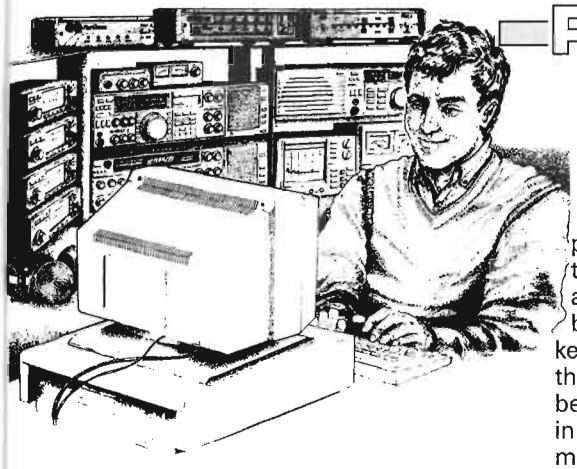
Current Consumption;

Scanning, no signal;	58mA
Receive, mid volume;	87mA
Receive, max volume;	25mA

S-Meter Readout;

Reading	*Signal Level*	*Relative Level*
1	0.33uV pd	0dB ref.
2	0.86uV pd	+8.1dB
3	2.08uV pd	+15.7dB
4	3.32uV pd	+19.8dB
5	5.98uV pd	+24.9dB

Packet Radio



Roundup

Chris Lorek G4HCL looks at faster speeds

Moon Digipeater

No, it's not a joke. *DIGIMOON* is a project, currently being coordinated by Eduardo Sweet LU7AKC, to place a packet radio digital repeater on the surface of the Earth's moon to extend the range and performance of terrestrial amateur packet radio networks.

Eduardo is a professor of Aerospace Engineering with spacecraft design as his speciality, and he currently has two groups of senior design students working on lunar landers along the lines of the NASA 'Artemis' proposal (a small, low-cost lunar lander to be launched in 1995/6). Although the students' projects won't actually provide a moon digipeater, Eduardo has suggested their work could be useful reference information for a DIGIMOON project. The two-week long lunar night would pose challenges for both the electrical power and thermal control subsystems, so are there any engineers out there who could offer useful help? Feedback regarding this DIGIMOON project can be addressed to LU7AKC via. packet; LU7AKC @ LU7AKC.#COL.CF.ARG.SOAM, via. satellite; LU7AKC @ LU8DYF (or any packet satellite gateway), or by post to Eduardo Sweet LU7AKC, DIGIMOON Project, Ramon Freire 487, Buenos Aires, (1426), Argentina, South America.

Packet News in Space

Even though we may have to wait a while for DIGIMOON, packet radio is already well and truly operational via. satellites in Earth's orbit (see 'Satellite Rendezvous' each month in HRT), and on board the Mir space station. For the Mir Cosmonauts, packet radio provides them with a useful insight into packet news from Earth. Every week, KD2BD edits 'Spacenews' for distribution on packet, and Dave N6JLH has been translating portions of this into Russian and uploading it to the personal BBS on board Mir, so the Cosmonauts could keep abreast of the latest happenings in the amateur space program. This must be the first amateur newsletter to be read in space! This isn't just a 'one-way' information service, as the message shown here was recently downloaded from Mir showing that they're keeping us in touch with what's happening up there also.

Circuit Diagrams via. Packet

The medium of packet radio is an excellent way of disseminating information, error-free, to other amateurs. But this has been mainly limited to text. In 'Repeater Link' in the April issue of the Wireless Institute of Australia's 'Amateur Radio', Will VK6UU @ VK6BBS asks 'Why not circuit diagrams as well?'. Will refers to the advantages of sharing circuits for different types of repeater designs amongst the amateur fraternity via. packet, and of course this can be extended to all forms of circuit diagrams. We've seen various 'mod' text files stored on BBSs, wouldn't it be ideal if we could settle on a standard for circuit files as well? Will suggests 'Draft Choice' version 1.51, which is a shareware program, it would be interesting to see the interest in the UK on this. Do *you* run this (I don't even have a copy of it here), either way drop me a message, to G4HCL @ GB7XJZ so I can share your views with others through this column.

Faster Speeds

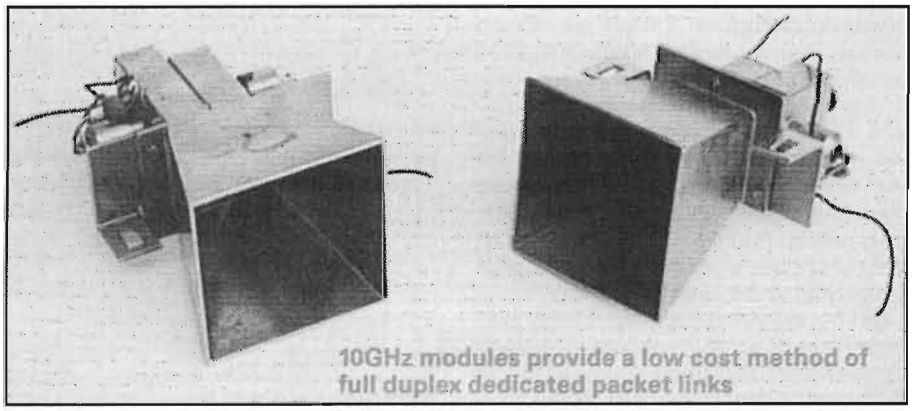
On HF we use 300 baud, on VHF and UHF we use 1200 baud. Well, most of us do. Others have, for some time, been using faster speeds on VHF/UHF, indeed it was around three years ago when I first set up a 9600 baud 2m node, hardware linked to other bands/speeds.

9600 baud packet 'as we know it' stems from the work of James Miller G3RUH, the designer of the world-famous RUH modem which was originally used for packet satellite operation. Nowadays, 9600 baud TNCs with the RUH modem design incorporated are readily available, however the transceiver often has to be modified with direct TX/RX audio in/out connections. Although some commercial transceivers come 9600 baud-ready 'off the shelf' or dealer modified, many amateurs currently 'modify their own'.

James is now helping to add material to a '9600 baud cookbook' (see this month's Baycom card review), and he asks for *your* experiences. If you've used 9600 baud packet with your rig, even if it's a very common transceiver, he asks you to send him a message detailing the TNC you used, how you connected it, what transceiver you used and how you connected it up, and any other notes such as on-air performance which others may find helpful. James adds 'here is *your* opportunity to nudge amateur packet radio a little further forward', and you may even be credited in the resultant manual! Send your info to G3RUH @ GB7DDX.#22.GBR.EU

10GHz links

Over line-of-sight paths, there *is* a very cheap way of getting very, very fast, full duplex, packet links in operation. The packet node I run currently has ports on 6m, 4m, 2m, 70cm and 23cm, with forwarding between this and my local, line-



10GHz modules provide a low cost method of full duplex dedicated packet links

of-sight BBS, taking place currently on 23cm. Searching for 'another' band, we decided upon 10GHz. At this year's VHF Convention, I saw plenty of 10.75GHz Doppler units, very easily re-tuned for the 10GHz amateur band, on sale for just a few pounds each. The addition of an op-amp/transistor arrangement for transmit, and a simple 10.7MHz wideband FM IF IC circuit for receive, is all that's needed to get these operational as a full duplex wideband link. Over a short line-of-sight path, each unit can simply be placed in a plastic box, with the built-in horn aerials aimed at each other.

If higher gain is needed for longer paths, a small dish may be added if your Doppler unit is of the 'single waveguide' type, i.e., similar to a Gunnplexer, rather than the lower-cost 'twin waveguide' type with the TX and RX units placed side by side sharing a common horn. These Gunnplexers are commonly available for less than £20 each at rallies, and the 'twin waveguide' types pictured here cost me £8 each. Who'll be the first with a 1Mbaud packet link then?

Packet Bandplan Proposed

The RSGB's Data Communications Committee have provisionally agreed a bandplan for use on packet in the UK. The general idea is to separate out different uses onto different channels, in an effort to alleviate some of the congestion we currently see. This plan is still under discussion however, indeed their next meeting on this subject will be later this month as I write this. They invite comment from users, sent either to the group's Chairman Ian GM4AUP @ GB7MAC or to your local DCC member.

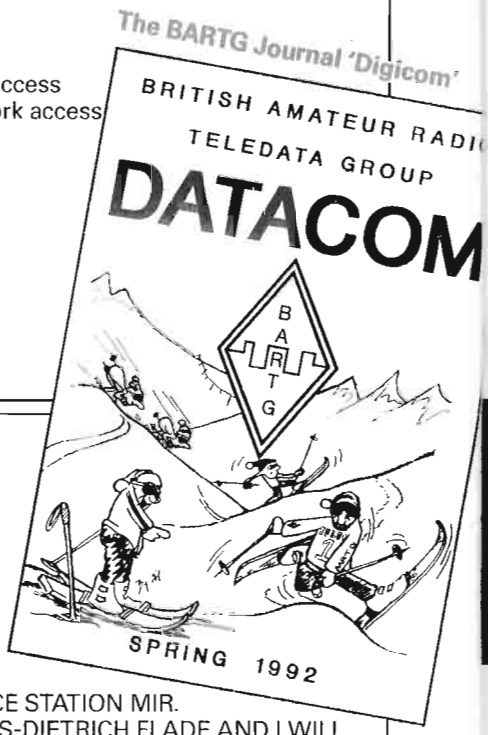
Commodore User Group

Since the mention of the latest version of DigiProm, MB.XA, Paul G0NDV has been in touch to thank us for the mention. He feels the C64 is very underrated, having seen most packet message systems to know that the C64 system is, or sometimes has, better facilities than PCs. As well as providing his voluntary services (which I know are much appreciated by many amateurs) as a Digiprom copier, Paul also runs a user group called *The Commodore Club 64/128*. This again is entirely voluntary, distributing shareware-only software for the C64 and C128 radio amateur and SWL fraternity (no games supplied!). This was started with help from the earlier 'Commodore Radio Users Group' which had unfortunately folded.

The club membership, which currently stands at 145 members, is entirely free. All they ask is that you send 5.25in formatted disks (maximum three at a

Proposed Packet Bandplan

Freq MHz	*Application*
50.61	DX PacketCluster user access
50.63	User access to network
50.65	User access to mailboxes
50.67	DX and simplex working
50.71	TCP/IP
50.73	Not used, guard band
50.75	9600 bps network links
70.3125	Network links
70.325	DX PacketCluster user access and linking
70.4875	Network links
144.625	TCP/IP user access
144.650	Network and mailbox user access
144.675	DX and simplex
430.625	Networking channel
430.675	Networking channel
430.700	Networking channel
430.725	Networking channel
430.775	Networking channel
432.625	Duplex channel or network access
432.650	9600 bps mailbox and network access
432.675	Mailbox user access
433.625	DX PacketCluster access
433.650	Network access
433.675	DX and simplex working
439.825	Network links
439.875	Network links
439.900	Network links
439.925	Network links
439.975	Network links



Stat : PR
Posted : 92/03/24 19:04
To : ALL
From : U5MIR
@ BBS :
BID :
Subject : dosvidania

PRIVET!

TODAY I FINISH MY WORK ON THE SPACE STATION MIR.
TOMORROW ALEXANDR VOLKOV, KLAUS-DIETRICH FLADE AND I WILL GO HOME
FLIGHT ENGINEER ALEXANDR KALERI WILL CONTINUE MY WORK ON THIS STATION.
TOMORROW CALLSIGN OF THIS PMS WILL BE CHANGED TO U8MIR-1
MANY THANKS FOR CONNECTIONS WITH US AND FOR HELP US DURING THIS MISSION.
I DO NOT HAVE THE LICENCE TO OPERATE ON THE EARTH YET
BUT I SHALL ASK LEO (UA3CR) SAVE MAIL FOR ME ON MOSCOW BBS RK3KP

THE MOST CONVENIENT ADDRESS FOR LETTERS:
141160
MOSCOW REGION
STAR CITY
POST OF COSMONAUTS
SERGEI KRIKALEV

DOSVIDANIA
73 U5MIR

Message received from the Mir space station via. packet

time) and return mailers (or US Dollars) and they will supply whatever you require. Their software catalogue is available from Mr. Fred Roe GM0ALS, 8 South Gyle Gardens, Edinburgh. EH12 7RZ Scotland, just send him *two* first class stamps and a self-addressed sticky label (for UK addresses) or two US dollars (for outside UK) and he'll pop you a catalogue in the post, but note that IRCs aren't unfortunately acceptable for catalogues. Thanks for the information Paul, it looks like you and your team are continuing to do a very good job in helping others! You can contact Paul via. packet with a message sent to G0NDV @ GB7BSX.#19.GBR.EU

CTRL-Z, End of Message

The latest copy of Digicom, the quarterly journal of the British Amateur Teledata Group has just dropped through the door. Once again it's filled with information of interest to data-over-radio users, whether on Packet, RTTY, AMTOR etc. on HF or VHF. Their current subscription rate is £10 per annum in the UK, you'll find their details in this month's 'Club News' section.

Peter GM7EEY @ GB7NES has been in touch, just a few days after starting on the mode, to say how delighted he is with his 'Minipak' system after seeing the HRT review and ordering the system. He had to wait a couple of weeks for it to arrive because it seemed like they were selling like hot cakes (!), but he felt the short wait was very worthwhile and he'd recommend this to anyone thinking about packet. I'd agree with you Peter!

Please keep your messages coming, it's great to hear what *you're* getting up to! Packet groups — let me tell others what you're doing also. You can contact me by phone on 0703 262105, Fax on 0703 263429, post to P. O. Box 73, Eastleigh, Hants, SO5 5WG, 'live' occasionally via. the PacketCluster system, or of course via. the BBS system with a message to G4HCL @ GB7XJZ.

Sporadic-E VHF Propagation

Charlie Newton G2FKZ, Jim Tregig W6JKV and others analyse the theories of Sporadic-E

For over 40 years now, scientists, propagation experts and radio amateurs have been trying to find a solution to the mystery of how and why the form of radio propagation known as 'Sporadic E' causes long distance two-way communication during the summer months at some VHF frequencies, even during the sunspot minimum period. In the following appreciation, Charlie Newton G2FKZ, a member of the RSGB Propagation Studies Committee for many years and who has performed a considerable amount of research on the subject, combines his own theories with the work of others...

G2FKZ Writes..

If we ask the question 'What is Sporadic E?' then the honest answers is 'at present we really do not know'. Initially we have to define what we mean by sporadic E, and secondly where we are talking about. To answer the first point we will take the VHF bands, 28-70MHz, so 50MHz is well placed in terms of this review. If anomalous propagation takes place. i.e. signals can be received over long ranges, say 2000km or more by means of ionospheric refraction, then it is most likely by means of a patch of dense ionisation which has formed in the E layer; sporadic E.

The second point which presents greater difficulty is in the auroral zones, because we are talking about energetic particulars, and the injection of electrons etc. If we are at the equator then the Farley two stream plasma instabilities would give a good explanation, but when we get nearer home, into the temperate zones, there is no firm theory, and from time to time wind shear, turbulence, instability, jet streams and meteoric dust all have a go.

Consequently when theorising about the temperate zone sporadic E, the theory you like best is probably the one you like to believe in, even though it may not fit all the relevant facts. Let's be very honest. To my knowledge there isn't currently a theory that can explain all the known aspects, and like most people I am biased in that I believe in some theories more than others, but I will try to be impartial. We have to try to find a mechanism that can move ionised plasma in such a way that it is concentrated. We require a blob or a thin sheet to form, and this must form in the E layer. It was thought at one time that meteoric dust, mainly composed of metallic ions, was swept up by ionospheric winds, thus providing the source of material. I am afraid, however, that the idea fell rather flat when Geoff Grayer G3NAQ, using considerable computer power and the best data available, analysed it to produce a best fit curve. It showed that the sporadic E was more likely to appear first, and the meteorites with their metallic ions afterwards. Since his efforts, others have shown that correlation is very poor regarding the turbulence theories, possibly the best known one of these is the thunderstorm idea by Rastogi. It was suggested that gravity waves would propagate up to the E layer and so transport material. However, if we apply this over a long period, most storms are in the wrong place, and other aspects, such as magnetic fields, are ignored. A more recent idea, that of jet streams, may have something, but it is not very clear how the magnetic field would fit in. In the end we are left with the wind shear idea. It's been around a long time — since 1956, and still stands up to all the attacks. Perhaps you may have your own pet theory, but there are a lot of related facts that have to be fitted in with it somehow.

Regional Effects

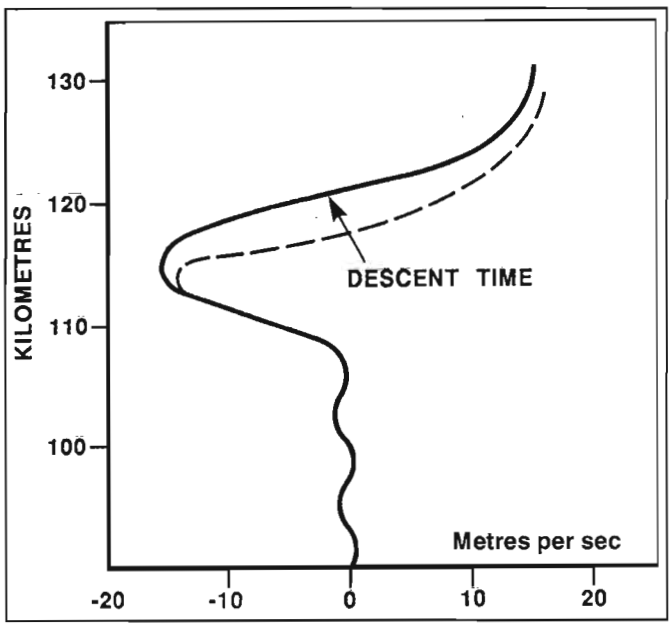
If we look worldwide, there is much more sporadic E over Asia and very little over South Africa, so what's the connection? If we look at the Earth's (horizontal) magnetic field component we find that the force over Asia is 0.35 CGS units, but only 0.15 over South Africa, and if we plot worldwide then we find a definite correlation between the H magnetic force and the incidence of sporadic E, so obviously this must come into our theory.

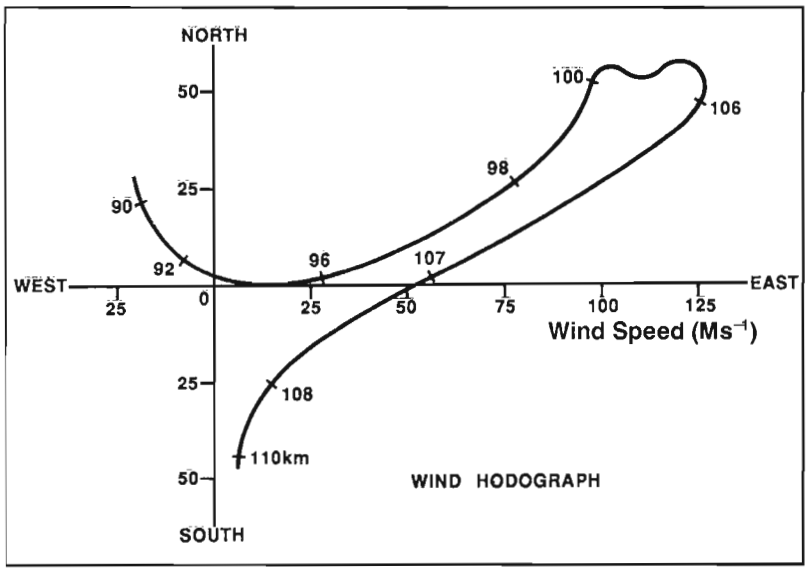
If we speculate about when the event is most likely to happen, then without doubt it's summer time around midday. But if we look worldwide then the most intense events observed by the world's ionosonde stations show that in the higher latitudes it tends to be prenoon, and for the lower latitudes post noon. The most dramatic events have been noticed to occur near sunset, so the seasonal and time dependent aspects must also come into our theory. Looking into the solar cycle we find it disputes this theory, but some American work suggests that there is a negative correlation as the cycle increases the probability in hours of sporadic E decreases. Events are shorter at sunspot maximum and get longer at minimum. However, the correlation with magnetic activity is very much better as the geomagnetic A index goes down, then the probability of events goes up. However, we need quiet conditions and there is another point that I feel needs looking into. When we have a quiet ionosphere, the F region height changes (it is lower) and the effect of this is to squeeze the E layer into a thinner sheet. This means that it is concentrated some what before we apply wind shear, or any other ideas.

The size of the ionised cloud is very much dependent on what frequency we are talking about. Recent work seems to suggest that the weaker low frequency events may extend over 1000km or more, with a size reduction as we increase the frequency to 70MHz to only 200/300km. This very important aspect is being looked at in considerable detail by workers from the University College of Wales, we await their findings with considerable interest. We should also consider the drift speed of the cloud. It would appear on present evidence that the slower the drift the longer and stronger the drift. Also, the decay seems to be due to recombination of the ions and not so much to the dispersal of the cloud, hence the interest in long life ions.

Wind Shear

So, we are back to wind shear, let's look at it in detail. The earth's atmosphere is dragged round with the rotation, but as we go higher the degree of slip increases. In the lower ionosphere there are always winds, but there are also other forces at work which affect the steady slip, such as higher temperatures expanding the atmosphere.



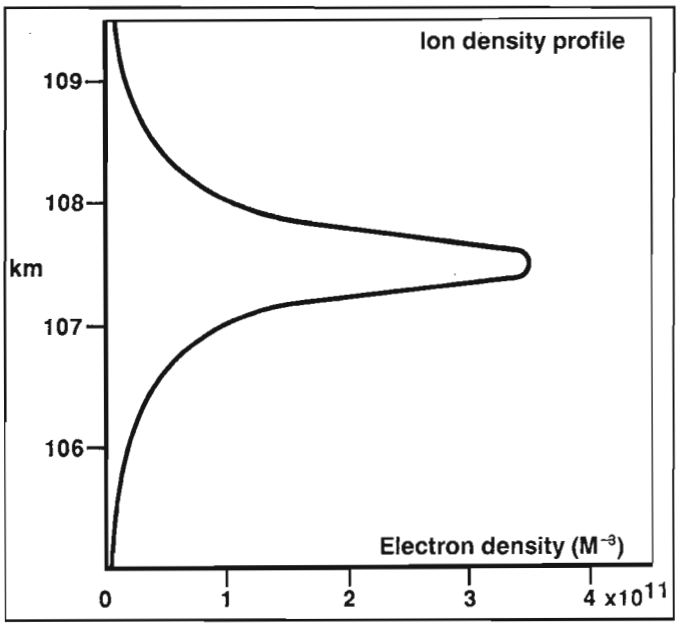


The surface massive weather systems transport by vertical convection, pushing up or pulling down massive amounts of atmosphere. This, in addition to the Lorenz rotating force, affects the lower ionospheric interface. There is also the varying plane between the polar and temperate zone atmospheres, and the very jet streams that feed the lower weather patterns and possibly other events of which we know little. It therefore comes as no surprise that the lower ionosphere is mainly subjected to forces from below. In 1956 Dunday pointed out that ionisation could be concentrated by a compression process.

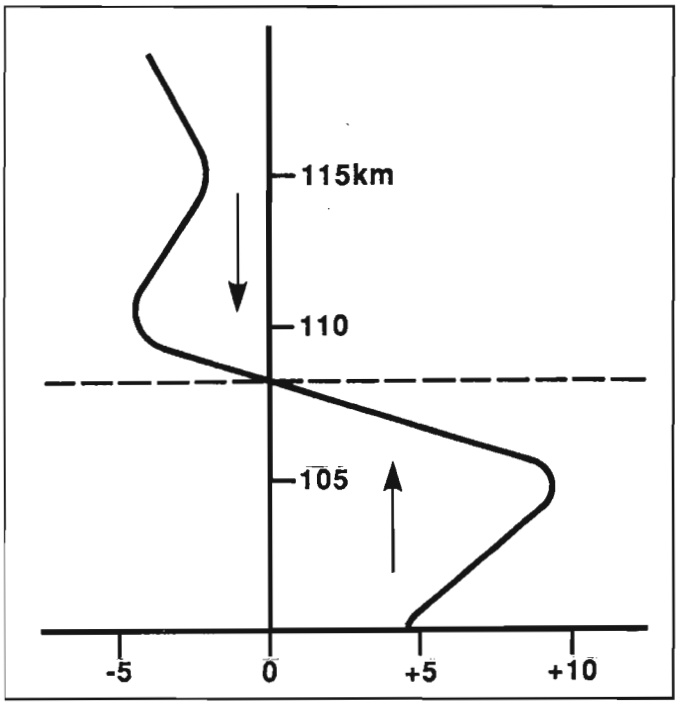
Consider a North/South wind shearing motion moving the ionisation up and down the magnetic field lines. This idea was looked at by many, and it soon became obvious that although this was so, the effectiveness was very poor. However, Whitehead showed that if this was applied to East/West wind shears, the magnetic field, together with the Lorenz rotating force, would produce ionisation levels up to those observed. Let us suppose that if we have a situation where over the critical E layer height we have a decrease in wind speed, and the shear is East/West; i.e. we have less wind velocity with increase in height and an Eastward shear component, the shear could be about 60 metres per second or more for a kilometre of height. Here is a concentrating mechanism that occurs where the ions are converging and the vertical drift velocity is close to zero.

In later work it was suggested that gravity shock waves were also set up. This has the effect of causing a downward phase velocity from higher up, transporting ionisation by the corkscrew effect and concentrating even more material. We must also look at the magnetic field. When you move material across magnetic fields, electric currents flow and further local magnetic fields are generated that help concentrate the layer still further. So, the stronger the magnetic field, the more the effect. By these means, layers of ionised material from one to a few kilometres in thickness and up to at least 1000km across, can build up.

Diagrams show the role of winds in forming stable Sporadic E layers (see text)



Ascending and descending plasma velocity



Sporadic E at Woomera 1971

Possibly the best evidence of what wind shear can do was seen at Woomera in 1971 when rockets probed an event over Woomera, this was real evidence, not theory. A wind shear of over 100 metres a second was measured at E layer height. Unfortunately, the E layer is too high for balloons to probe, and too low for satellites, otherwise we may have had some better answers by now.

Wind shear at least seems to offer a plausible explanation that fits many of the requirements. Of course in the end it may turn out that there are different sorts of E, that gravity waves are more influential sometimes than others, and no doubt that the electric currents vary considerably. Also the underlying weather systems may have more effect in some places than others. By now perhaps you can see why the bulk of our sporadic E is to the south or south east, the concentration is stronger there. Over Scotland the H field is only 0.15 units, whereas over the Mediterranean it is 2.5 to 3.0 units.

Long Distance Sporadic E

There are of course nagging problems. At the very high frequencies, i.e. 144MHz, theories suggest that it is not possible to concentrate enough ionisation even with considerable wind shear. It brings us to the most major question of the lot, how do we get a signal across the Atlantic? Is it by a series of E patches and wind shear in just the right places? If so, then why does it only occur on a seasonal and time basis? If you think that your theories can explain what wind shear cannot, then I would like to hear about it, or is it back to the drawing board to look for other explanations like electron gradients at the polar/temperature zone ionospheric interface? I have my own ideas, but who knows?

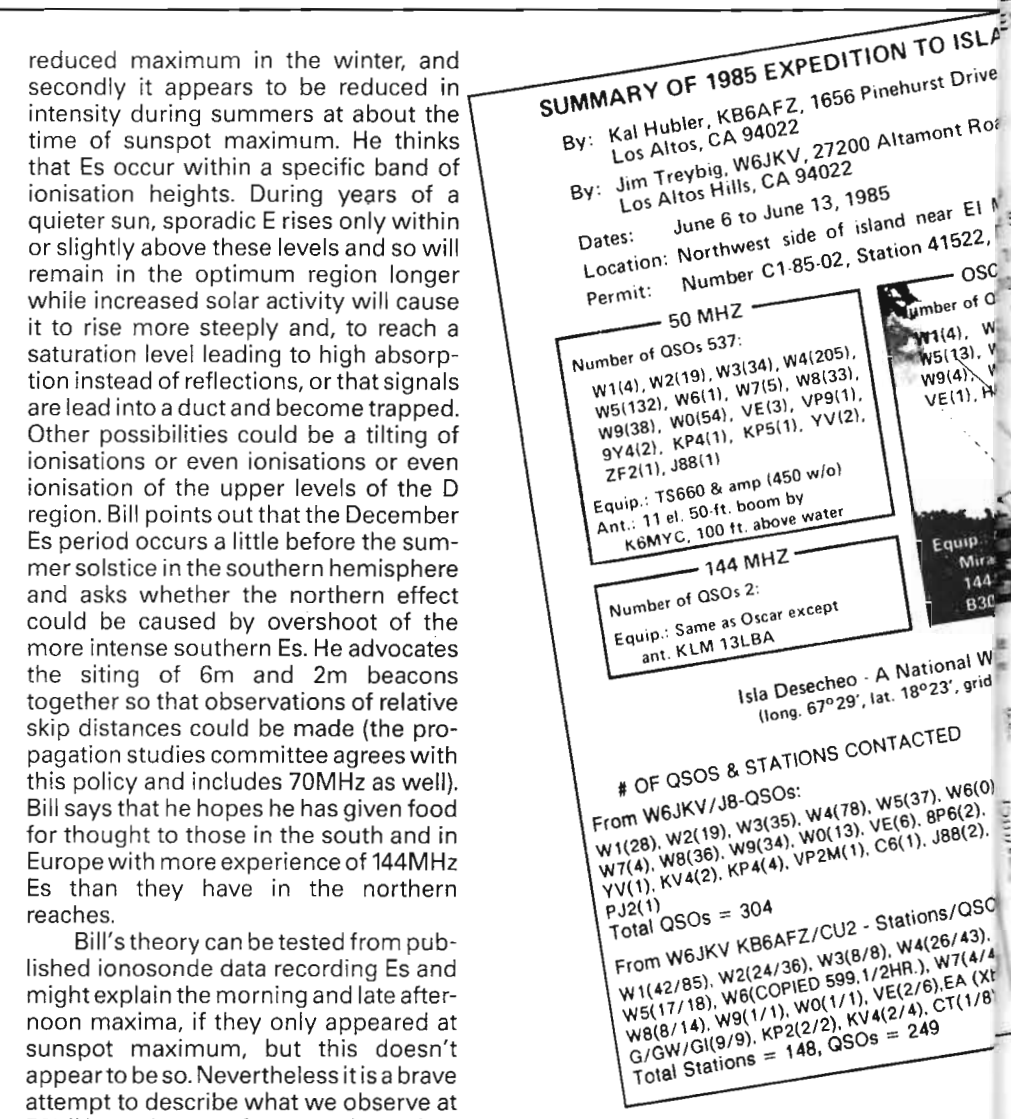
References:

S. Whitehead — 1970 Geophysics and Space Physics V8 65 144
D. Rees — Planetary and Space Science V24 476 478
Kersley Walker — 1967 Conference Publication 247-IEE 180 181.

GM3DGT's Theory of Sporadic E with comments by Ray Cracknell G2AHU

Bill writes to say that the puzzling occurrence of sporadic E has led him to believe that the decline in years of sunspot maximum has a lot to do with solar activity. Firstly, it is seasonal and around the summer solstice and has a much reduced maximum in the winter, and secondly it appears to be reduced in intensity during summers at about the time of sunspot maximum. He thinks that Es occur within a specific band of ionisation heights. During years of a quieter sun, sporadic E rises only within or slightly above these levels and so will remain in the optimum region longer while increased solar activity will cause it to rise more steeply and, to reach a saturation level leading to high absorption instead of reflections, or that signals are lead into a duct and become trapped. Other possibilities could be a tilting of ionisations or even ionisations or even ionisation of the upper levels of the D region. Bill points out that the December Es period occurs a little before the summer solstice in the southern hemisphere and asks whether the northern effect could be caused by overshoot of the more intense southern Es. He advocates the siting of 6m and 2m beacons together so that observations of relative skip distances could be made (the propagation studies committee agrees with this policy and includes 70MHz as well). Bill says that he hopes he has given food for thought to those in the south and in Europe with more experience of 144MHz Es than they have in the northern reaches.

Bill's theory can be tested from published ionosonde data recording Es and might explain the morning and late afternoon maxima, if they only appeared at sunspot maximum, but this doesn't appear to be so. Nevertheless it is a brave attempt to describe what we observe at 50MHz, and most of us would certainly accept that Whitehead's wind shear theory has not explained every phenomenon associated with sporadic E. He is


SUMMARY OF 1985 EXPEDITION TO ISLA

By: Kal Hubler, KB6AFZ, 1656 Pinehurst Drive Los Altos, CA 94022

By: Jim Treybig, W6JKV, 27200 Altamont Roa Los Altos Hills, CA 94022

Dates: June 6 to June 13, 1985

Location: Northwest side of island near El M

Permit: Number C1-85-02, Station 41522,

50 MHZ

Number of QSOs 537:
W1(4), W2(19), W3(34), W4(205), W5(132), W6(1), W7(5), W8(33), W9(38), W0(54), VE(3), VP9(1), 9Y4(2), KP4(1), KP5(1), YV(2), ZF2(1), J88(1)

Equip.: TS660 & amp (450 w/o)
Ant.: 11 el. 50-ft. boom by K6MYC, 100 ft. above water

144 MHZ

Number of QSOs 2:

Equip.: Same as Oscar except ant. KLM 13LBA

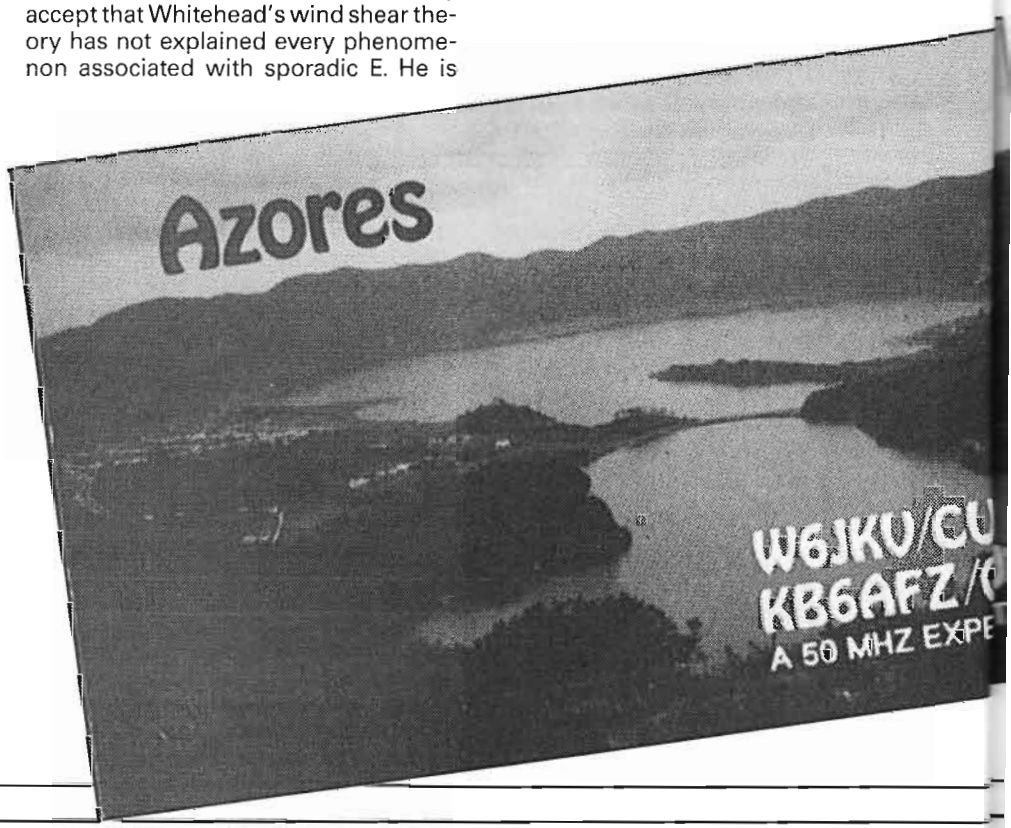
OSC

Isla Desecheo - A National W
(long. 67°29', lat. 18°23', grid

OF QSOS & STATIONS CONTACTED

From W6JKV/J8-QSOs:
W1(28), W2(19), W3(35), W4(78), W5(37), W6(0) W7(4), W8(36), W9(34), W0(13), VE(6), 8P6(2), YV(1), KV4(2), KP4(4), VP2M(1), C6(1), J88(2), PJ2(1)
Total QSOs = 304

From W6JKV KB6AFZ/CU2 - Stations/QSO
W1(42/85), W2(24/36), W3(8/8), W4(26/43), W5(17/18), W6(COPIED 599,1/2HR.), W7(4/4 W8(8/14), W9(1/1), W0(1/1), VE(2/6),EA (X G/GW/GI(9/9), KP2(2/2), KV4(2/4), CT(1/8 Total Stations = 148, QSOs = 249

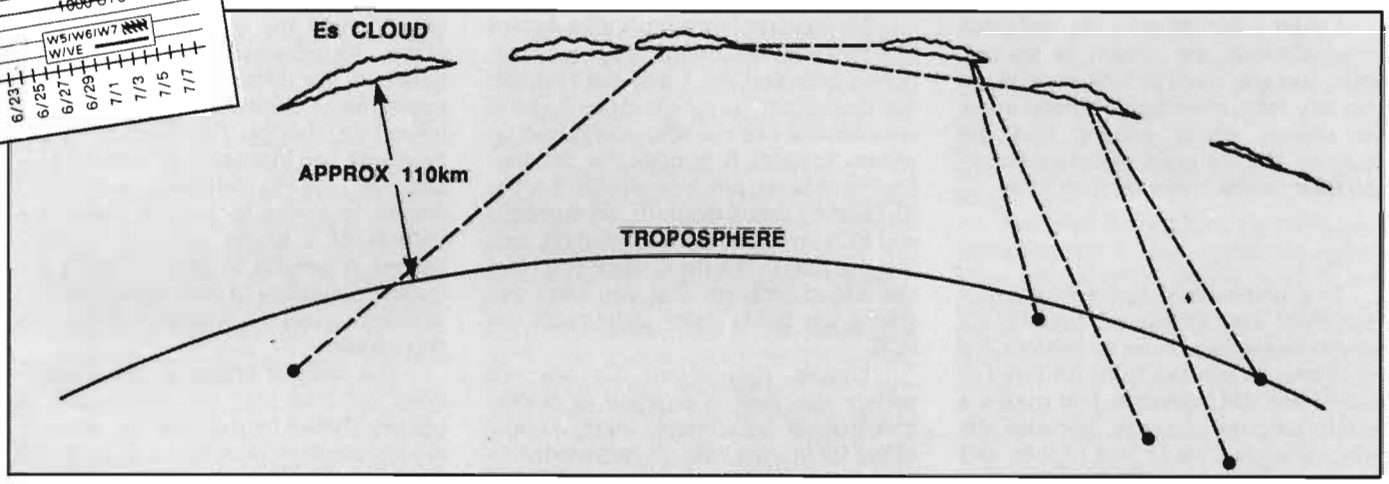


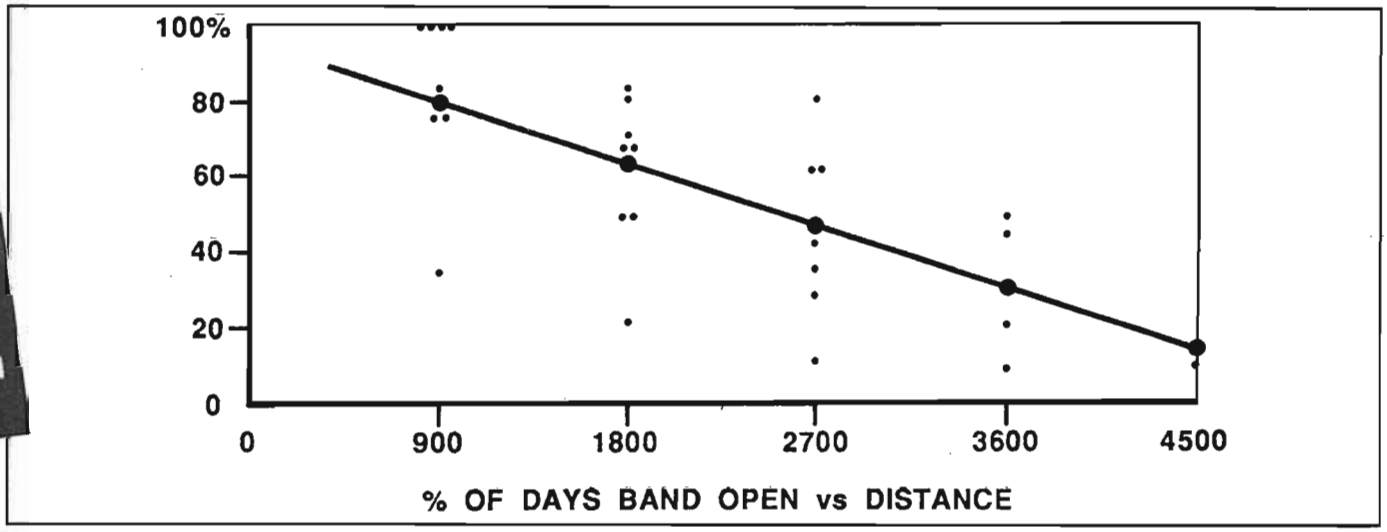
Call sign of W6JKV	Yr.	Dates	# of days	1450km #	%	2900km #	%	4350km #	%	5800km #	%	7200km #	%	Pwr(W) Ant(el.)
XE1JJU/XF4	'82	6/12-16	5	5	100	3	60	2	40	1	20	NA		100/3
ZF2DN	'82	7/22-25	4	4	100	3	75	1	25	NA		NA		100/4
W6JKV/T19	'83	6/11-19	9	3	33	2	22	1	11	NA		NA		100/11
VP2EME	'84	5/31-6/10	11	9	82	7	63	5	45	5	45	1	9	500/22
W6JKV/OX	'84	6/24-30	7	6	86	6	86	3	43	1	14	NA		107/7
V3GE	'85	5/29-6/3	6	6	100	3	50	2	33	NA		NA		100/11
W6JKV/KP5	'85	6/6-11	6	5	83	5	83	5	83	2	33	NA		500/11
W6JKV/J8	'86	6/10-15	6	6	100	3	50	3	50	3	50	1	16	500/7
W6JKV/CU2	'86	6/23-7/8	16	12	75	11	70	10	63	3	19	2	13	400/7
% days open of poss. days					80		61		45		29		12	

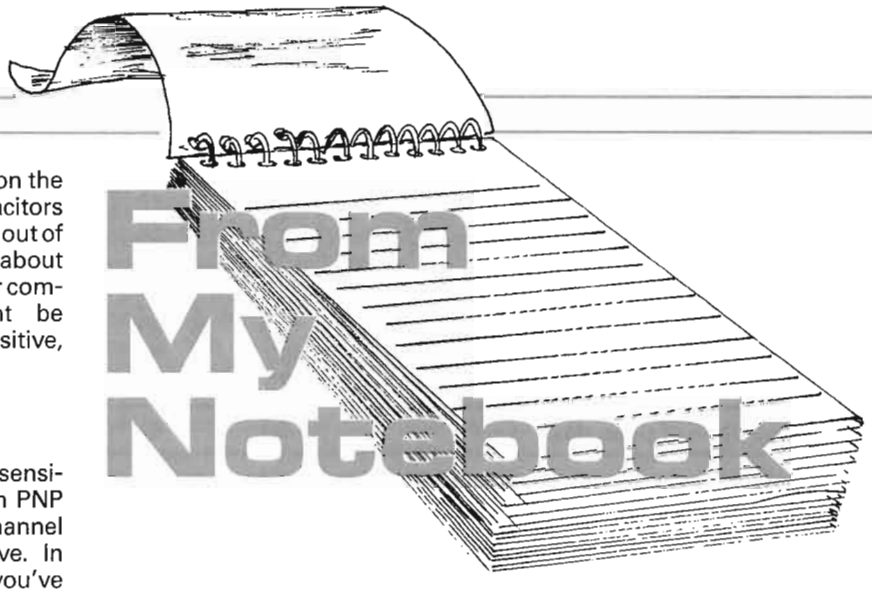
aiming to start a discussion and it is hoped that others will take him up constructively.

7200km — Summer Sporadic E on 50MHz

During the last decade Jim Treybig W6JKV has made many DXpeditions to illustrate the potential for long distance multi-hop QSOs using E propagation. He has kindly sent us a summary of the visit to Isla Desecheo in 1985, Azores and St Vincent 1986, with data from other expeditions. He writes; Our expeditions to the Azores and St. Vincent illustrate the potential for 7200km 50MHz DX using E propagation. Success at these distances requires constant operation since openings are short, and requires reasonable power and aerials because of the 4 or 5 hops (500W and 7 elements or more). The data shown is extracted from my recent summer expeditions (E propagation). NA means there were no or almost no stations at this distance with large aerials and power. The data is actual QSOs and for sure the band was open more than shown here. The band was open over 5800km for 29% of the days, and was open over 7200km for 12% of the days. /T19 was the only real exception. Night time was impossible which probably limited our success. QSLs are still available for above as well as F2 expeditions: C5AEH, A35JT, 3D2JT, ZK1XE, KC6YE, W6JKV/KHO, W6JKV/CEO.







Geoff Arnold G3GSR continues his look at polarities, including methods of connecting transformers

I'm afraid I got a bit carried away on the subject of polarity-sensitive capacitors and diodes last month, so that I ran out of space before I had a chance to talk about transistors and ICs and some other components which perhaps might be described as orientation-sensitive, rather than polarity-sensitive.

Transistors

Transistors are both polarity-sensitive (in other words they come in PNP and NPN or P-channel and N-channel flavours) and orientation-sensitive. In this article I shall assume that you've selected the appropriate PNP or NPN or whatever, and are only worried about fitting it the right way round in the PCB.

Illustrations showing the lead-out arrangements for small transistors are by convention drawn as viewed from underneath; in other words looking at the ends of the wires. If you are building a unit from a magazine design, or from a kit, the drawings provided should make it clear which way round the device is to be connected. The printed circuit boards included in kits will often have the component layout screen-printed onto the top face of the board to make life really simple.

Larger transistors in flat-pack encapsulations are drawn in various ways, and you need to look carefully at how any tabs, chamfers or metal areas are shown, whilst praying that the designer and the artist or draughtsman had their minds firmly on their jobs!

ICs

In a unit which uses a mixture of transistors and integrated circuits, it's easy to forget that, unlike transistors, ICs are drawn as viewed from on top. For dual-in-line (DIL) devices, that makes a certain amount of sense, because the pins are accessible to test probes and clips from on top of the PCB, and you can count round from Pin No. 1 to find the one that you want.

How do you find Pin 1? Usually there is a small dimple in the body next to Pin 1. Alternatively, there is a semi-circular cut-out in the body at that end of the IC. Sometimes (though not often) the figure '1' appears on the IC body next to Pin 1. With a DIL IC positioned so that the pins face away from you, and the end you have identified as carrying Pin 1 is at the top, the pin numbers run from top to bottom down the left-hand side and then from bottom to top up the right-hand side.

Circular-can ICs, the sort that look like an overgrown BC107 or BFY50 transistor that's sprouted extra legs, are also drawn as viewed from above, even though you can't see the connections from the top, nor get at them easily or reliably above the PCB with test-probes. As with its cousin the DIL IC, the leads on a circular IC are numbered anti-clockwise when viewed from above, and therefore clockwise when viewed from below. The leads are equally-spaced around a circle, so that the only way of working out which pin is which is by counting from the small tab projecting from the side of the can.

No great problem, I suppose, except that for some reason the tab is not positioned between Pin 1 and the highest-numbered pin, as would strike a chord with anyone like me who was raised on valves. Instead, it is opposite the highest-numbered pin, typically Pin 8 or Pin 10. Relating circuit diagram, pin numbers and PCB layout when fault-finding, etc., is a real pain in the neck, since you have the added problem that you can't see where the tab is from underneath the PCB.

Luckily, circular-can ICs are not widely specified in amateur or home-constructed equipment, being mainly called for to cope with the more extreme environmental needs of professional and military installations.

For ICs in other packages, such as 'single-in-line' (SIL) or 'quad-in-line' (QIL) it's a case of back to the reference books again, I'm afraid.

Transformers

With transformers, we're dealing primarily with AC signals rather than DC, although there may be DC currents flowing through the windings too. Where AC signals are concerned, the polarity is constantly changing, and it's the phase relationship between the currents in the primary and secondary windings of the transformer that can be important.

For mains transformers, phasing between primary and secondary is generally not important, though you will sometimes come across a receiver or amplifier where the output hum level changes according to which way round you connect the mains supply to the mains transformer primary. Phasing between the different secondaries on some mains transformers can be very important, though. I'm thinking of the type with two identical low-voltage secondaries (see Fig. 1a) which can be connected in series to provide twice the voltage of a single winding, or connected in parallel to provide twice the current capability. In both cases it is vital to interconnect the windings in the correct phase.

The relative phase of the secondaries on this sort of transformer is usually shown by marking the secondary connection tags. For a dual 6-volt output they'll be marked '0' and '6', or '0V' and '6V', for example. If you wanted a 12-volt output, you'd link the '0' tag on one winding to the '6' tag on the other, and take the output from the two remaining tags (Fig. 1b). Because the two windings are connected in phase and in series, their voltages are added together, but the current capacity is the same as that of each individual winding.

If, on the other hand, you wanted a 6-volt output at higher current, you'd link the '0' tags on the two secondaries

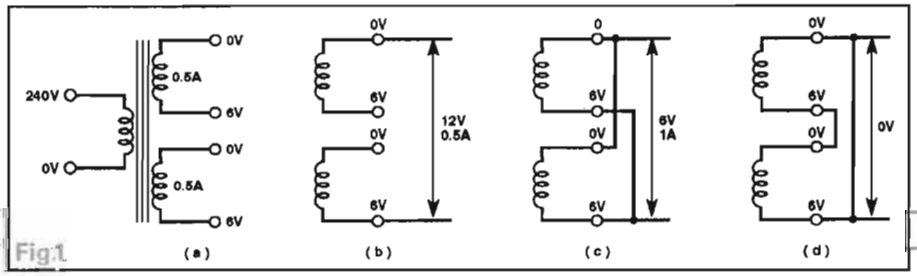


Fig.1

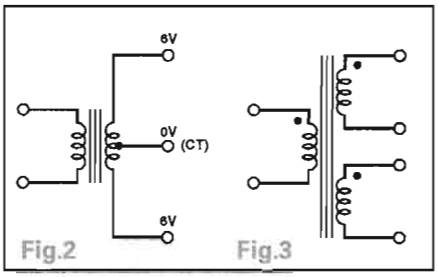
together, and also link the '6' tags together, taking the output from across the paralleled windings (Fig. 1c). Because the two windings are connected in phase and in parallel, their current capacities are added together, but the output voltage is the same as that of each individual winding.

What happens if you get the connections wrong? Well, if you're talking about the series-connected case (Fig. 1a) you will get zero output, because the two windings will be opposing each other and as you know 6 — 6 = 0, but you won't do the transformer any harm. If you reverse one of the windings in the parallel-connected case, you'll also get zero output, but at the same time it will do the transformer a power of no good! The interconnections will then look like Fig. 1d, which is the same as Fig. 1a with a short-circuit across the output terminals.

What I've been talking about so far is transformers with two identical secondary windings, designed and made to be suitable for parallel or series connection. That means that not only will each give the same output voltage when off load, they will also have the same winding resistance, so that when parallel-connected they will share the output current equally between them. Transformers not specially designed that way can have secondaries connected in series with no problems — they don't even have to be the same voltage. You could, for example, provide a 9-volt output by series-connecting a 5V with a 4V winding. You could even get a 1-volt output by connecting them in anti-phase, so that the two windings oppose each other. What you shouldn't do is to **parallel**-connect windings not specifically made for such use, for even though they be marked with the same voltage, the difference between their characteristics is likely to cause internal circulating currents (and therefore heating) as well as the uneven sharing of output load I've already mentioned. Parallel-connection of secondaries with **different** voltage ratings is just asking for trouble!

How do you identify the phasing of secondaries which aren't marked by the manufacturer? Very simple — you link them in series and use an AC testmeter to measure the voltage across the outer connections, as in Fig. 1b. If the windings are in phase, their voltages will add; if they are in anti-phase, their voltages will subtract.

A transformer with two secondary windings linked in series is of course exactly equivalent to one with a single secondary with a centre-tap (CT) as shown in Fig. 2. In other words, the arrangement of Fig. 1b could be used in a circuit design which specified a 6V-0-6V centre-tapped transformer, simply by taking a centre-tap connection from the



link between the two windings. Don't be confused by the fact that the labels on the ends of the windings have apparently changed; those in Fig. 1 are intended to indicate phasing, whilst those in Fig. 2 indicate the actual output voltages. The two ends marked '6' in Fig. 2 are of course in anti-phase, so that one goes positive as the other goes negative.

It's not only the secondaries of mains transformers that have multiple windings intended to be connected in series or parallel. Exactly the same arrangement is made of the primaries of transformers in equipment which may be used in different areas of the world on either 110/120V or 220/240V supplies.

Signal-frequency Transformers

For transformers which are used to couple together different parts of a circuit at audio frequencies or at video or radio frequencies, phasing can also be very important.

If the transformer is used simply to pass the signal from one stage to the next, providing DC isolation and perhaps impedance matching in the process, the phasing is not usually critical. However, instability problems may rear their ugly head in the form of a low-frequency oscillation (what used to be called 'motor-boating'), especially if the standard of the power supply decoupling is not all that it might be. Inter-stage coupling transformers with two or more secondary windings are a different matter, for the correct phasing **between** those various secondaries will usually be important.

With any transformer which is used to provide feedback, whether it is positive feedback such as in an oscillator, or negative feedback such as used in an amplifier to reduce distortion, correct phasing is of course absolutely vital. Get it wrong and your oscillator will not oscillate. Your amplifier, however, almost certainly will!

Various methods have been used to mark the correct phasing of signal transformers, both on the component itself and on circuit diagrams. Back in the days of valves, on iron-cored transformers used to couple audio frequency amplifying stages together, the terminals of the primary winding would often be marked 'A', meaning anode, and 'HT+'. The secondary terminals would be identified 'G' for grid and 'GB-' for the connection to the grid bias battery. A more general system of marking in use for many years is the use of the abbreviations 'IP' for 'primary in', 'OP' for 'primary out', 'IS' for 'secondary in' and 'OS' for 'secondary out'. A variation on this is 'SP' for 'start primary', 'FP' for 'finish primary', 'SS' for 'start secondary' and 'FS' for 'finish secondary'.

Nowadays, the usual way of marking the phasing of transformers on circuit diagrams is to put a heavy black dot or 'blob' alongside one end of each winding, indicating that all the ends marked in this way are in phase (Fig. 3).

If the transformer is mounted on a PCB, correct phasing should have been taken care of by the draughtsman who did the original design. If you have to adapt a different transformer in doing repairs to an old unit, or the transformer is connected to the board by flying leads, you may need to do some detective work to make sure that you get everything the right way round.

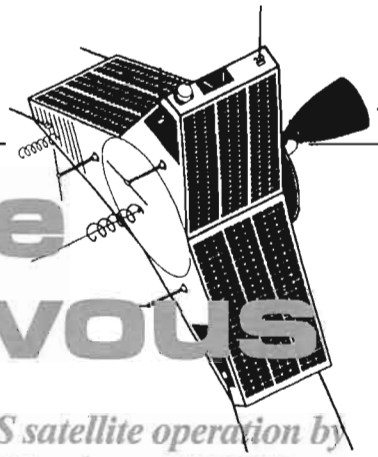
Resistors

No, I'm not trying to tell you that resistors are either polarity or phase-sensitive. The way you fit them to a PCB can, though, greatly affect its final appearance. You do want to be proud of your latest constructional project, don't you?

Not only does it look far more professional, but it also makes the resistance values far easier to read in any subsequent fault-finding if the resistors are all fitted with the ends carrying the colour-code bands towards the same edge of the board. All horizontally mounted resistors with their banded ends towards the left-hand edge of the PCB and all vertically mounted resistors with banded ends towards the top of the PCB, for example. For resistors mounted on end, with one short leg and one long leg, fit them so that the bands are at the end furthest from the board, where they will be much easier to see and read.

It makes no difference to the operation of the circuit, but it does make a world of difference to the appearance of the unit.

Tech Ed's Note; In Geoff's feature in the May 92 issue, we edited out his text saying that plastic-faced chipboard comes in imperial sizes with widths of 6, 9, 12, 15, 18, 21 and 24 inches, and lengths of 6 (sometimes) or 8 feet. Although all sizes we've seen for sale are also given in metric measurements, we're told this may have caused confusion to some readers, for which we apologise.



Satellite Rendezvous

AMSAT-UK news, including UoS satellite operation by Royalty, collated by Richard Limebear G3RWL

H. M. Queen Elizabeth II listens to OSCAR-22

Her Majesty Queen Elizabeth II visited the University of Surrey on the morning of Friday March 20th, to attend the ground-breaking ceremony for the University of Surrey's new Centre for Satellite Engineering Research, to tour the UoSAT Control Room, and to attend a service in Guildford Cathedral.

Watched by members of the press and the University staff, and in the company of Prof. Martin Sweeting, G3YJO, Her Majesty first unveiled a hologram of OSCAR-22. This symbolic event marks the start of construction of the Centre for Satellite Engineering Research (CSER) which will house the UoSAT Unit and other satellite engineers from the University. The new £1.5 Million building will have clean-rooms, laboratories, offices and a new Satellite Control Room. It is scheduled to be completed this autumn.

From the construction site, The Queen went to the UoSAT Control room and Jacky Radbone and Neville Bean described the UoSAT programme. UoSAT-OSCAR-22 came into range transmitting a digitised voice message, which The Queen listened to on a hand-held UHF receiver. UO14 also delivered a message from the President of Zambia, and The Queen left a reply message which will also be carried by UO-14. This exchange marks the formal inauguration of the SatelLife HealthNet Network on UoSAT-3, Oscar 14.

Oscar 13

The experimental schedule mentioned in past issues ends on June 8th, so if you're reading this just as the magazine's appeared then you've got this weekend left! For the latest information on what happens next (not finalised as this was being put together), listen to this Sunday's AMSAT-UK net on 3.780MHz +/-QRM. Alternatively, up to date information about AO-13 operations is always available on the beacons, 145.812MHz or 435.658MHz in CW, RTTY and 400 bps PSK.

OSCAR-13 stayed in Mode-B instead of Mode-L on March 25th and March 27th to facilitate the Cocos-Keeling Island Expedition which operates from March 17th to April 6th. Did *you* manage to work DXpeditioners VK9CL and VK9CK from there?

Oscar 10

The current ALON/ALAT predictions for this are; 6th June, ALON 301.7, ALAT 12.8; 27 June, ALON 299.3, ALAT 12.2. It's currently available for Mode B operation when it is view. Please *do not* attempt to use it if you hear the beacon or the transponder signals FMing.

MicroSats

Listeners may recall mention last month of 'passengers' on Oscars 16 & 19; callsigns that, due to some software quirk, were permanently logged in. Once LUSAT got a second passenger, AMSAT-LU decided to reload the software to get rid of them. This was done on the 23rd March, and the LO19 BBS is alive again. They hope to upgrade with new code (for the new PB) as soon as possible.

QRP operations on AO-16 are encouraged on Experimenter's Day, which take place each week. Your uplink power should be limited to 20 watts EIRP. If you are using your AO-10/13 beams, this means you must crank your power back to about as low as it will probably go, no more than 2 watts. And don't forget to turn off your amplifier!

While Experimenter's Day operations are scheduled to be conducted weekly, users are reminded that these operations may be shortened or cancelled to allow uploading of improved spacecraft software. Watch for bulletins on the AO-16 BBS and/or the telemetry text frame for changes to the schedule.

Russian Satellites

OSCAR-21 is back, on 12th Mar the digital beacon on 145.800MHz (FM) was turned on by the Main Command Centre. There is, however, not much activity at the moment. There is currently no regular transponder schedule and some more changes in the operations are to be expected soon including re-activation of RUDAK-2. The Main Command Centre resumed command of AO-21 after agreements with AMSAT-U. Amsat-DL hope to have some more progress soon.

On 17th March a new SOYUZ went up to Mir taking the next pair of replacement cosmonauts and a visiting German cosmonaut who used the callsign DP1MIR. Sergei U5MIR, Alex U4MIR, and the visitor returned to earth later.

It had been intended to connect a digital memory unit to the 2m transmitter on board Mir. Here, calling stations would be recorded for one minute and re-transmitted in the next minute. Unfortunately this activity was unsuccessful after the digital voice memory was damaged during transportation, they suspect a connector was probably broken. DP1MIR was only heard once, on the Fri-

Keplers

SAT:	OSCAR 10	UoSat 2	AO-13	UO-14	PACSAT	DO-17	WO-18
EPOC:	92086.34275609	92085.61481977	92078.16721807	92085.75059351	92081.22125668	92085.17066882	92081.21732590
INCL:	26.2691	97.8630	56.8959	98.6408	98.6487	98.6486	98.6469
RAAN:	91.8960	124.7570	36.6168	168.2707	164.3078	168.3277	164.4499
ECCN:	0.6057790	0.0012200	0.7291892	0.0011752	0.0013064	0.0013141	0.0013683
ARGP:	330.2431	355.8758	280.7795	60.7490	69.4077	58.8602	71.7254
MA:	5.9509	4.2348	11.6748	299.4862	290.8505	301.3867	288.5416
MM:	2.05881265	14.68397052	2.09710799	14.29587588	14.29649539	14.29776153	14.29768950
DECY:	6.1E-07	2.518E-05	2.13E-06	7.61E-06	7.55E-06	7.84E-06	7.29E-06
REVN:	3807	43087	2882	11335	11271	11328	11272

SAT:	LO-19	FO-20	AO-21	UO-22	RS-10/11	RS-12/13	Mir
EPOC:	92085.23503098	92084.30047494	92086.79729324	92082.19361686	92086.84470523	92086.92775568	92086.94628082
INCL:	98.6484	99.0664	82.9456	98.5111	82.9274	82.9218	51.6017
RAAN:	168.5399	18.6129	23.8864	158.4885	209.2202	253.7430	300.3993
RCCN:	0.0014071	0.0541330	0.0034692	0.0007343	0.0012859	0.0028042	0.0015552
ARGP:	58.5535	24.9945	186.1963	198.8695	115.4001	207.9480	230.7577
MA:	301.7021	337.6356	173.8777	161.2211	244.8490	152.0176	129.1820
MM:	14.29856054	12.83207424	13.74473717	14.36582057	13.72274100	13.73982151	15.59034215
DECY:	7.03E-06	5.3E-07	1.63E-06	9.67E-06	1.75E-06	1.62E-06	4.3199E-04
REVN:	11330	9961	5798	3576	23849	5710	34944

The AMSAT-UK 'Oscar News'

day, when he talked about recent activities. At the moment the packet system is still working.

The ex-Soviet countries have now formed a space agency, the *RKA*, somewhat similar to NASA. Projects for space-operations must be submitted to it, and the RKA then will investigate the project and evaluate the need, necessity, costs and eventual contribution from state-funds. Projects aimed to achieve political or chauvinistic prestige won't stand a chance. After analysing a project it will be sent to the parliament for consent about eventual funding. After consent, the project will be sent back to the RKA to put it out to tender on the basis of free enterprise and free market.

Software Update

PB bugs have been fixed since the first release of the 'new version' in December. In addition to bug fixes, some new features for automated station operation have been added which use batch file techniques. DOS batch commands aren't particularly complicated or comprehensive, but a good system can be assembled using the hooks provided.

PG has been stripped of all functions other than uploading. It is also possible to have PG upload waiting messages and exit without human intervention. This should make life easier for fully automated stations based on PG/PB.

The filenames to look for are *PB920224.ZIP* and *PG920225.ZIP* but, so far, only UO-22 is compatible with the new programs. Users of AO-16 & LO-19 should use the older program versions until spacecraft software is updated.

NASA Space Shuttle QSLs

If you heard the recent amateur FM operation from the Shuttle, or actually made two-way radio contact with the Shuttle, you're eligible for a SAREX QSL. The QSL address for this is:

The Sterling Park Amateur Radio Club
P.O. Box 599
Sterling, Virginia 22170
USA

Please include a large, self-addressed envelope (stamped or with IRCs included for overseas) with your QSL. Please mark it 'STS-45 SWL' for a confirmation of a signal report, or 'STS-45 QSL 2-way' for confirmation of a two-way QSO. Include the date, time, and signal report with your QSL.

There was, sadly, an unfortunate side to this mission. Well-meaning people disseminated the USA uplink frequencies (which are in the European beacon band) leading to considerable discord early on. In addition to this, the frequencies actually being used included a Raynet channel and an ATV talkback channel. AMSAT-UK apologise to existing users of these channels, we've already moaned to the US guys about this, and we'll be doing some more moaning after the mission. Let's hope they get their act together for the next mission (whenever it occurs).

Short Bursts

As this is being put together, the latest information available on Doug Loughmiller's (KO5I) medical condition is that, while he has been feeling much better recently, his doctors are still unsure as to cause of his condition. He was scheduled to see an additional specialist, and hopefully this will lead to a diagnosis that will allow him to receive appropriate treatment so that he can be back with us shortly. You may remember seeing his photo in the March 92 issue of HRT's 'Satellite Rendezvous', following his election of Chairman of the AMSAT-NA Board of Directors.

Doug expresses appreciation for the many cards and letters he has received so far. Those wishing to express their encouragement for his quick recovery, are asked to address their messages to the AMSAT-NA office, 850 Sligo Ave. Silver Spring, MD 20910 USA.

AMSAT-UK News

The AMSAT-UK Colloquium at the University of Surrey takes place over the 30th July - 2nd August 'long weekend'. Ron G3AAJ tells us that a total weekend price has now been negotiated for the weekend of lectures, fun and food, entertainment and sleep arrangements. 'Extra touches' are an Official Dinner in the Chancellor's Restaurant and Banqueting Suite on the Saturday, musical entertainment, a massive raffle, and a shortened equipment sale. A 200 seat lecture hall is again available, and if required some thirty extra en-suite bedrooms for accommodation. You can arrive from Wednesday evening, and depart up to 10.00am Monday morning 3rd August. Thursday 30th July is 'International Day', where satellite groups are invited to provide inputs to amateur radio satellite programmes. This is your chance to meet some of the folk who design, build, and launch the satellites, and to ask, advise, request or even agree with their decisions. If you'd like to attend, request a 'Colloquium Booking Details Package' from Ron G3AAJ, enclosing a large SAE or IRCs as appropriate.

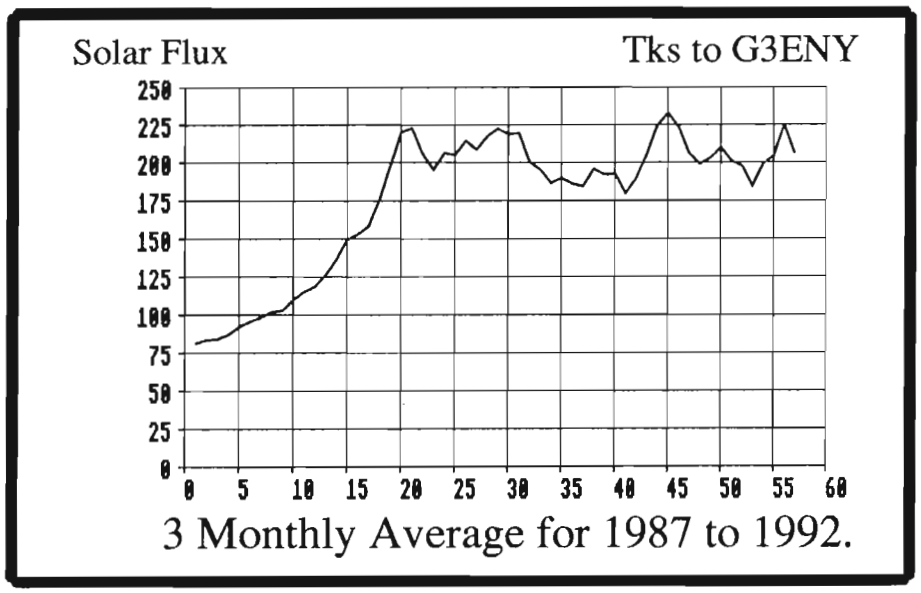
AMSAT-UK is updating and re-writing the 'guide', if you have any suggestions please get in touch with me, either direct or via. AMSAT-UK.

If you're either operational on the amateur satellites, or are becoming interested, or even if you just 'listen in', you can get further information on AMSAT-UK from Ron Broadbent G3AAJ, 94 Herongate Rd, London, E12 5EQ. A large SAE gets you full membership info. The group publish a bi-monthly journal, *Oscar News* of interest to satellite enthusiasts, covering specialised interests on amateur satellites.

VHF/UHF Message

Geoff Brown GJ4ICD gets set for 23cm DX

As can be seen in the graph, Cycle 22 is still hanging in there, at the time of writing this column solar flux levels were around the 160 mark with increasing geomagnetic activity. Cycle 22 looks as though it may well exceed the average 11 year cycle, maybe 13 years, who knows? But don't despair or sell your 50MHz radio, as even March brought some welcome DX on six. This month there's also news that the CQ WW VHF contest is back on again, a report on tropospheric ducting on six, and a very special DXpedition to TA9.



CQ WW WPX VHF Contest

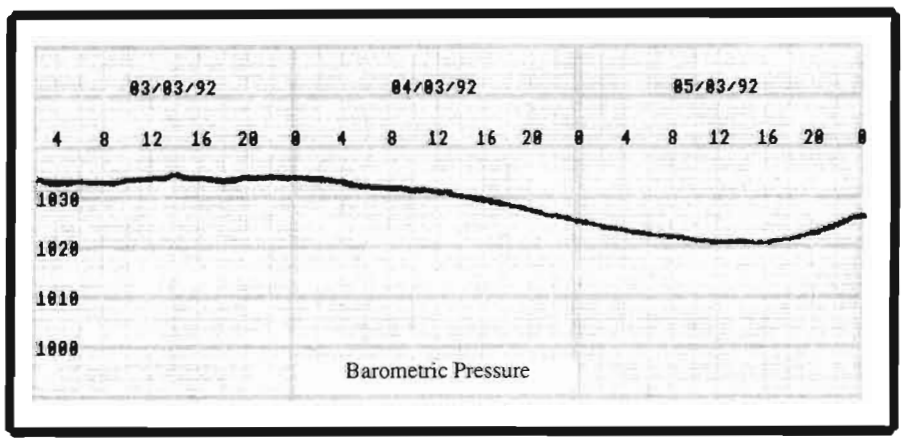
Joe N6CL recently wrote to me explaining that the CQ WW WPX VHF contest is back on again after a few years of non activity. I remember these contests well during the 1980s, as I was lucky enough to win the World section on 144MHz two years running. When you consider that you have the 'Big Guns' in JA and the USA competing, then it's quite hard to do! Also a 48 hour 'single operator' stint is destroying, it took me three days to recover!

The rules are simple and if you require a copy of them please send an IRC and SAE to me. However the guidelines are as follows; The contest starts at 0000z on Sat July 11th 1992, running until Sunday July 12th at 2400z; yes 48 hours again! The bands covered are 50MHz, 70MHz, 144MHz, 222MHz, 432MHz, 903MHz, and 1296MHz. You can operate single band single op, or multi band single or multi op, or whatever your fancy. The idea is to work as many *prefixes* on VHF/UHF as possible during the 48 hours. Good luck.

Tropo on Six?

Whatever caused the massive opening on 50MHz during the 4th March is welcomed again. As you can see by the barometric pressure chart, at around 2.00am pressure started to fall, this is a classic case of VHF/UHF tropo ducting providing other factors are taken into account.

As I passed my barograph that morning I knew what was going on. I had expected good conditions on 144MHz and 432MHz, but not on 50MHz. On tuning around and looking at the beacons I found that GB3BUX on 50.000MHz was S9+40dB, after a couple of calls there was a big pile-up with stations in the Lancashire and Yorkshire areas. This is quite rare to say the least, in fact it's been 5 years since we had such propagation to the north on six, and that was via. sporadic E, but signal strengths during this recent opening were S9+++. Many stations were worked in the north of England from GJ, but only stations over 330m ASL, proving that some unusual ducting was taking place.



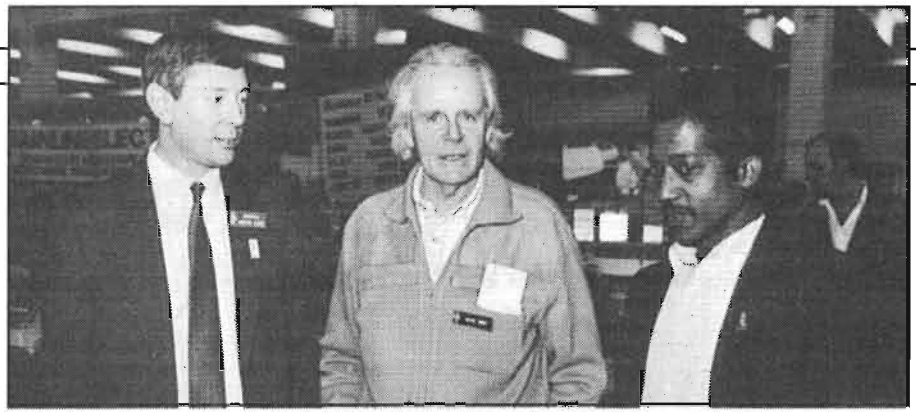
Turkey now on 50MHz

Eric F1JKK, well known for his operation as TL8MB last year, phoned me to pass on the latest news of his travels this year. As from April, Eric will be QRV from Turkey as TA9/F1JKK for four months. Eric will also be QRV on 144MHz throughout the sporadic E season, the grid locator should be KM77 or KM87 and the QSL route is F6FNU. Eric also mentioned that he will be with the UN forces during November in Cambodia (XU) and this time he will be QRV on 6m, 2m, and HF, more details later. Please note that the FT4 expedition is now cancelled, as his XYL is expecting a new harmonic.

New beacons on Six

Jan OG1ZAA called me to say that while he was operating in PJ2 he decided to 'plant' a new beacon there. The call is PJ2SIX and the frequency is 50.006MHz. The OD5SIX beacon should now be QRV, it's on 50.078MHz FSK.

During the next month or so another new beacon should be QRV on 'six', this will be the Zimbabwe beacon and will sign Z23SIX KH52. The frequency has



VHF/UHF DXers (left-right) Geoff GJ4ICD, Mike G3JVL, and Nev G3RFS 'snapped' chatting at this year's VHF Convention at Sandown

not yet been finalised, more on this one later.

I'm also informed by Dave G8OPR that after many years of not being QRV, the GB3IOW beacon on 1296.900MHz is back on the air.

Band reports

As usual we start with 50MHz which, during the first half of March, was rather quiet. On the 4th, Bob VG1YX caused a stir with the special callsign, things were then quiet for a few days with no JAs being reported this year as predicted! The 8th and 9th brought ZS6s into the UK, and at 1300 on the 9th Alan GW3LDH had a nice little pile-up into north Wales. The 10th brought a shock to your scribe with the FR5SIX beacon coming in at S9+, and 4S7AVR (Sri Lanka) coming in at 59 with lots of flutter on the signal. Others into the UK that day were TR8CA, ZS6s and the V51 beacon on 50.018MHz. Again for a few days the band was quiet, the 18th and 19th saw a return of TEP to the south with 7Q7CM, TU4DH, and the FR5 beacon being copied.

The South African contest was scheduled for the 21st/22nd, and what propagation they had! A22BW, ZS9A, V51DM, and dozens of ZS6s were happily working into the UK, and Ela G6HKM heard ZS9A on her newly installed halo in the dining room (now that's dedication for you). New squares heard in GJ were ZR6DW (KG45), and ZS6BTL (KG23). But it didn't last as the 22nd was very poor in comparison.

8Q7HP (Maldives) was heard on the 22nd but very weakly, however Paul 9H1BT called to say he had just worked the JA DXpedition who were also QRV from 4S7 as 4S7/JA1OEN? Things got a little better despite the increase in geomagnetic activity. VK6PA was back into Europe with vengeance after a lapse of a month or so, surely a good sign. On the 23rd Chris G3WOS reported 7Q7 into the UK at 0930z, and ZS6AXT in at lunch time. On the 25th 8Q7HP was again heard weakly, the last few days brought weak openings to TU4, and ZS6. Solar flux levels still continued to climb, but doom was forecast for 50MHz.

Sandown Park

March of course was the month this year for the RSGB VHF Convention, held at the plush Sandown Park Racecourse. The UKSMG had their AGM which seemed very professionally worked out. The highlight of the AGM was when Ken G8VR cut the birthday cake of the UKSMG, which was ten years old this year (the group, not the cake!). It was nice to talk to so many old friends that I had met on the bands over the years, for instance, on 144MHz in the 70s I used to speak to Mike G3VYF many times each week, however I only met him face to face at Sandown Park after all this time. The event seemed thinned out this year, with maybe less people going to such an event due to the current recession situation, but there were still many bargains to be had. It was also nice to see Aspen Electronics displaying the full range of Bird power measuring equipment for the first time.

Quiet on Two

March was rather quiet on Two, however Ela G6HKM did manage a little DX (again!). Ela reports a good opening on the 19th/20th with the north coast of Spain in the shape of EA1EHT (IN73), EB1EHT (IN73), EA1TA (IN53), EA2AGZ (IN91), and FC1CDS (IN77) the latter two being new squares.

432MHz open to EA

On listening around on 70cm during March, things were quiet except for one special day. On the 19th, on switch on, EA1TA in IN53 was S9+ and working into central England. Ela G6HKM also had a nice path into northern Spain and gained a few new squares.

Klaus DL3YEE sent us a photo of his new 432MHz EME array, and as you can see they are long, long, yagis.

Get ready for the pile-ups!

Well the last band to report on this month is 23cm, and due to the many demanding letters that I have had from the UK and Europeans you will be pleased to note I am now QRV again on 23cm. The run-down is as follows; FT-736R which is a good 10W output, driving a Tokyo Hy-Power solid state amp (three modules in parallel) which gives a good 50W out, into LDF-450 Heliax. The aerial system is an array of 4 by 23 element F9FT Tonnas. I hope to increase the power level later this year.

Late News

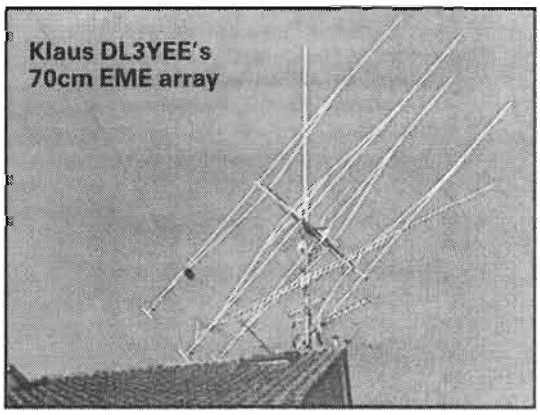
KG4DD in Guantanamo Bay is now QRV on 50MHz, the grid is being reported as FK29.

Neil G0JHC reports and confirms that *no Polish* stations will be allowed on 50MHz for at least another 6 months. This was also verified by Chris SP4TKK, it appears that there are many problems with the amateur movement in Poland and not just the PZK. The UKSMG will continue to preserve its role in promoting activity on 50MHz to the amateurs in countries such as this.

Other news is that a keyer on 50.090MHz signing 7Q7XX is now QRV, and I was informed by Costas SV1DH that the V51 beacon on 50.018MHz went QRT late on the 22nd March.

The first contacts of the Sporadic E season have been made between the UK and Italy on the 25th March. Southern stations in Italy were very good signals for over 30 mins.

ZB2VHF (50.035MHz) will be going QRT for a short while, it will undergo a site move and frequency change of a few kHz due to causing QRM, thanks to Mark ZB0T for this latest info. Mark ZB0T should be a little louder on 144MHz EME very soon, as it looks like he will be taking delivery of a large new amplifier.



Klaus DL3YEE's 70cm EME array

So that's it for this month. Shall we meet on 23cm? If not you can always drop me a line letting me know what DX you've worked, or what's going on Novice-wise in your area, we need those reports! Please send any info, photos, QSLs (or even pound coins!) to; Geoff Brown GJ4ICD, TV Shop, Belmont Rd, St Helier, Jersey JE2 4SA Channel Islands, or Tel. 0534 77067 (fax at night), or 'late line' 0860 740727 anytime.

QRP CORNER

Dick Pascoe G0BPS offers a challenge to use real lemon power!

The last few weeks have seen a couple of the largest rallies in the South East. The show at Picketts Lock in London gave the G-QRP club the chance to have a stand and an opportunity for all interested in low power operating to meet and chat with a couple of the 'stars' of the club. George Dobbs G3RJV (the Secretary) is perhaps the best known, he was in attendance for the Saturday only, but still managed to spend almost the whole of the day chatting to members.

Peter Dodd G3LDO, he of the *Antenna Handbook* fame, was also there, promoting his book and the club as well. Several of the clubs officers also offered their services to publicise the club, including your's truly together with Ian G3ROO, John G8SEQ and Bob G4JFN who also drove up from the depths of Hampshire to help out.

Ian is the technical adviser of the club, assisting members with problems found in home construction, he is currently designing a full HF multiband transceiver for the club. John G8SEQ is the VHF manager of the club, and is available for advice on all matters germane to the VHF operator.

As we mention VHF, the second of the two was of course the VHF convention at Sandown Park. I was disappointed with this show, a lot of computer junk and very little of the real junk that is of so much interest to the constructor. However I was pleased to have a brief chat with Geoff GJ4ICD (HRT's VHF/UHF columnist) and also spend some time chatting with HRT's Tech Ed Chris G4HCL.

Rallies, of course are the mainstay of the builder, why spend £6 plus on a variable capacitor for that project when you will often find them for £1 or under at the local rally? But I have noticed over the past few years the decline in this type of equipment, and the huge increase in the number of computer associated stands at the shows.

Real lemon power

I was amazed to see in the latest issue of QST (the ARRL 'house magazine') an article about a *lemon powered* radio! My thoughts went back to my school days, both long ago and also not so long past when I spent a year as a laboratory technician at a technical school. Working in the physics labs helped enormously in finding sneaky ways in generating power, both in volts and at RF.

I well remember spending a lesson at school (30+ years ago) trying to use a lemon as a replacement battery. It appears that Bob N7FKI & Wes W7ZOI both fancied some low power operating, and just for fun tried to use fruit power. I know it may appear to make me out to be a nutcase, but I also tried this some time ago (P.S. nuts don't work).

What these two intrepid chaps did was to find two nails, one copper and one zinc coated and pierce the lemon. The 'battery' provided an open circuit voltage of 0.9 volts which dropped to 0.6V with a 2kohm load.

Not to be put off, these two 'high profile' types tried a different approach. As the standard lemon didn't have the 'zest' required to drive the transmitter, an alternative was tried. A more practical battery was constructed using 125mm x 180mm zinc coated roof tiles, the tiles being separated by lemon juice soaked paper towels and a smaller sheet of copper clad PCB material. Two of these cells connected in series provided an open circuit voltage of 1.9V at 64mA.

This 'battery' was coupled up to a small crystal controlled transmitter, and tests were carried out. A two way QSO was achieved over a distance of two miles, output power initially being about 1.5mW. That was until battery polarisation effects terminated the QSO.

As they observed, high power is not always required to make those 'juicy' contacts, and this type of experimentation is in the true flavour of the amateur spirit (especially Gin).

Whilst talking over this project with another amateur (Ian G0DOT), Ian mentioned that he'd tried this experiment but had not had much success with lemons, having to move the nails on a regular basis because of the segmentation of the lemon. He did say that he has great success using potatoes! Apparently there is a relatively high acid level in these which can be used to great advantage.

A challenge

So, can we Brits let the Americans get away with it? I offer a challenge to all readers, beat the 2 mile record set up by Bob & Wes. Use a simple transmitter on any band, build your own battery using fruit juice with the zinc and copper plates as above and see how far you can transmit a signal. The full callsign of the transmitting station and the words 'juice of the fruit' must be heard by the receiving station.

I'll award a prize to the most original report and the greatest distance achieved. No cheating either. Alternatively, try using a large King Edward. The potato, that is, not the real thing or even a cigar. This could be a fine summer project for any group or club.

The two American pioneers (lemoneers?) used a single transistor, crystal controlled transmitter on 10m. I consider that the LF bands would be more beneficial, as a slightly higher power, which could equal greater distance could be achieved.

A copy of the circuit used is shown (courtesy of QST the magazine of the ARRL), I would suggest a fundamental crystal on 80 or 40m. Try various transistors until you find one that suits your purpose.

Remember that the aim of this project is primarily that you have some fun. So why not make it a club project, have a club 'race' to get the greatest distance. Best of luck to all!

The closing date for entries, stating distance worked, a circuit of the transmitter used, (with a photograph if possible) and a certified attestation that the test was carried out in the spirit of the event, to reach me at the address below by not later that 1st September 1992.

That's it for this month, news and reports to me please via HRT Editorial at P. O. Box 73, Eastleigh SO5 5WG, or packet to GB7SEK, or to 3 Limes Road, Folkestone CT19 4AU.