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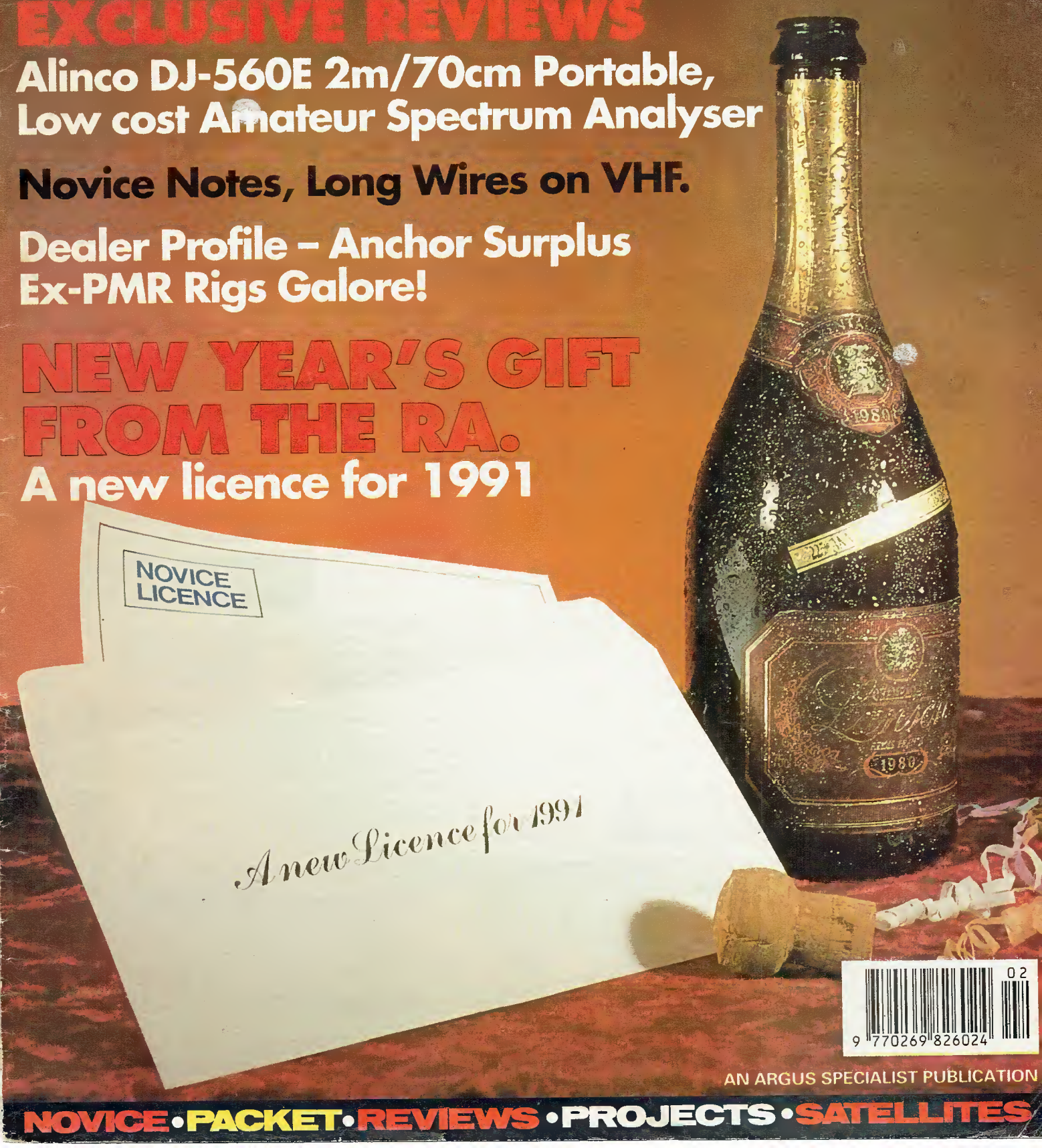

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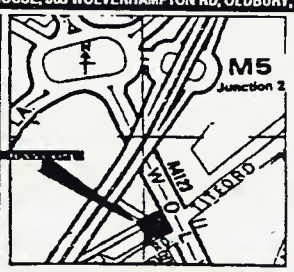

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HRT HAM RADIO TODAY

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VOLUME 9 NO 2 FEBRUARY 1991

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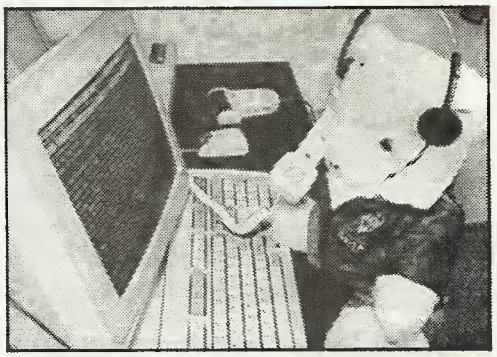
NEWS AND VIEWS

Geoff Arnold's Notebook will return next month

CQ de G8IYA



To CW or not to CW, that is the question

How about when someone becomes interested in amateur radio, maybe through reading HRT or Scanners International, and decides to 'tune in' to local amateurs on their receiver and eventually approach a local club. The last thing they want is to be 'put off' when they get there.

I remember the time I moved to a new part of the country, I was a teenager at the time, and although I was interested in amateur radio I didn't have a licence then. By listening on the air, I found out where the local amateur radio club met, and went along to meet a few amateurs, hopefully to get some information on what the radio amateurs around there did. Well, yes, someone said 'Hello' to me, but I didn't find out who it was because he didn't introduce himself, nor introduce me to anyone else. So I just stood there, like a wet lemon. A group of amateurs were doing something with a computer which looked fairly interesting, so I went over and tried to find out what it was all about. You may guess what the result from them was, apathy. After standing around for about another 20 minutes, trying to look interested, I made an excuse and left. No-one said goodbye.

Any ears burning out there? What a great way to welcome new blood into the hobby. This was my first insight of a radio club.

Some time later, the holder of a brand new G8IYA callsign visited another radio club (full of Class A licensees) for the first time. On this occasion someone did say something, they asked "So when are you going to get your 'proper' licence then?". I wonder what would happened if a Novice licensee had gone there?

Don't ignore the newcomers, and they're not all just children, least our hobby may become one of old men bemoaning the lack of new blood.

'Real' Amateur Radio

OK, so what makes a 'real' amateur? Is it someone who uses traditional modes of communication, doing things the 'good old' way for a sense of achievement? Maybe so. An analogy to this is that of talking about the 'good old days' of 'real' music, of 'real' cars, of 'real' ways of doing and building things. In other words, nostalgia. Human nature doesn't like change, it often rebels against it, but often the human mind in time adjusts, and sometimes discovers it's a 'change for the better', wondering why on earth they objected at first.

But newcomers to a subject, those who aren't used to 'things as they were', picture the scene in a different light. Their first action is often to take a fresh, new look, and weigh up in their mind whether they like it or not, based on what they see it to be. Ask most newcomers what they think of the need to study CW and pass an assessed course including it, before they can get even a Class B Novice licence for VHF and above, and they may not all be jumping up and down with excitement.

Let's try and dispel some myths, and I'll try to be factual. Now CW is an operation mode that some amateurs use, like amateurs use SSB, FM, RTTY, Packet and so on. It **can't** get through when all other modes fail, ask the professionals who need good communication, if it could then it wouldn't be getting scrapped by these users in favour of today's data modes. Simple as that. But tell us if you know different, we do listen!

Every new professional radio system in Europe now appears to use digital forms of communication. CT2 and CT3 telephones, Pan-European Digital Cellular, DSRR (Digital Short Range Radio), the list goes on. We don't see new forms of CW communication methods breaking the headlines. But some amateurs believe that anyone who isn't interested in CW is not a 'real' amateur.

Of course a large number of Class A and B amateurs enjoy CW in it's own right as a pleasant mode, enjoying both 'rubber stamp' and 'ragchew' QSOs on the bands using CW, and indeed it can be a good method of working DX without sophisticated data equipment. Few people, including ourselves, would wish to see CW abolished. But mis-information abounds, worldwide evidence for example suggests it is most certainly **not** an international requirement for operating on HF.

Emergencies

Some say 'CW is simple and useful for emergencies'. However an AM radio communications system is possibly far easier to build in an emergency situation than a CW radio communications system. First of all you need some form of electro-acoustic transducer to hear anything, let's say a speaker or even an old carbon telephone earpiece, you can use this as a suitable element in line to amplitude modulate your simple transmitter. For reception, an AM receiver is far, far simpler to 'knock up' and use than any form of CW receiver I know of. As well as that, the person receiving your CW call for help also must have a suitably complicated receiver (i.e. stable, together with a BFO or whatever), and know how to use it, and know the CW code which the vast majority of the public don't.

So what's this about CW being useful for emergencies? An automatically activated and very low cost ELT (Emergency Location Transmitter) which that tells the world where I'm lying unconscious and wounded from a crashed aeroplane, or indeed one that will be in a few seconds time, sounds a much surer bet for my money. Back to the dark ages? No thanks.

The fact remains that amateurs are still at the leading edge of technology, amateurs are moving forwards. You know, these are the guys who sit up in their shack all night to get their latest communications program going on their computer, others explore various methods of propagation, some examine how much greater gain their new aerial can give them. 'Black box' operators often 'do their bit' by experimenting with propagation and digital modes. Don't let's put them off. Through the pages of HRT we're showing amateurs are progressive, and we're encouraging active, dynamic amateur radio. And the response we've had from you shows that you like what we're doing!

Are we progressing by requiring mandatory CW for newcomers? Let's hear what you think.

LETTERS

Letter of the Month

Dear HRT,
I was interested to read the letter in your November edition concerning the desirability of CTCSS selective calling in amateur use. I have heard several comments about the clique aspect of CTCSS and must say that it is not a problem I have encountered. One of these comments was made by a mobile station who complained that "since they got CTCSS on that repeater, they don't want to talk to anyone else" and also that its use was most un-amateur. In fact the repeater concerned, like the Bedford repeaters, simply outputs CTCSS tone when in talkthrough mode with the squelch open. This allows silent monitoring, useful if one has passengers in the car and to prevent sideways glances when the repeater is beaconing from one's inside pocket. Unless there really are no stations monitoring, all the regular users do their best to reply to newcomers or to requests for assistance with routes through the area. Perhaps if a few more monitored their local repeaters, especially on 70cm, contacts would be more plentiful.

It seems totally reasonable to me that quiet monitoring is wanted when waiting for a specific call and wishing to do something else at the same time. It also keeps the squelch closed when wandering round rallies and so helps battery economy. Raynet can certainly benefit where other groups are weakly audible on the same frequency. All that is needed is a bit of liaison around the area to select mutually incompatible (or for that matter compatible) tone frequencies and everyone is happy.

The licence requires that we listen on our transmit frequency from time to time, just like listening to a repeater input, so it isn't asking too much to override the CTCSS to check on other activity.

The argument is just another example of the desire of some to keep amateur radio as it was in the distant past. It is unfortunate that some amateurs seem to want to stand still in the technological tide and degenerate useful facilities rather than turn them to their advantage. The hobby needs less whingeing and more doing, we might then reverse the decline in numbers of youngsters who join our ranks and obtain better co-operation from the powers that be, who must on occasion wonder just how supposedly forward thinking people can be so negative in their attitudes.
Brian Morrison G8SEZ,
Chairman, Bedford Repeater Group.

Editorial Comment;
This is exactly what we've been saying through the pages of HRT, and it's good to see some constructive and dynamic people out there (if running a repeater, for the service of other amateurs, isn't doing something dynamic then what is?) agreeing that amateur radio doesn't stand still, it progresses. We must continue to experiment, develop, and use new techniques of communication, otherwise we stand still and eventually die. Which cave do you live at mate?. Oh, hang on, there's my lunch walking past, where's my club? If we stand still in technology, we stand a high chance of going the way of the Dodo.

£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 HRT, P.O. Box 73, Eastleigh, SO5 5WG.

Dear HRT,
Did you do it on purpose, to bring forth this sort of response? I ask you, £35 per hour for repairing electronic equipment! Nice money if you can get it. (Letters, Dec 90 HRT).

In all seriousness, that sort of charge is totally out of order, and should not be tolerated. Suppose I set myself up in a radio repair workshop. Per week; Rent £100, Financing stock and equipment £25, My wages, NI, pension etc. £400, Power heat etc. £15, support wages (wife?) £40, Insurance accountancy £10, Vehicle £100. Total per week; £690.

Or £17 per hour. Perhaps £19.50 including VAT.

At £35 per hour I could keep another £620 a week. Please send your repairs to G0MRL, and I'll sub contract the work and make a bomb.
Laurie Bradshaw, G0MRL

PS. One of my friends (G7HRT, note the callsign) would also love to earn £1020 a week.
PPS. I suppose you know HRT stands for Hormone Replacement Therapy.
PPPS. G8IYA is not in the Callbook.

Editorial comment;
Yes, we do want to get some lively, constructive discussion going, and it looks like it's working. Well Laurie, as well as your callbook not being correct, I think you've missed a few things in your calculations. Rental of basic Spectrum Analyser, £300/ week, rental of Radio Communications Test Set, £270/ week, Advertising, £50/week (typical prices, plus VAT of course) also you'll be lucky to be working solidly on equipment, i.e. at the chargeable hourly rate, for more than about 65% of all the hours available. You've also forgotten a phone, fax (essential for circuits for Japanese equipments), training and the like but let's forget these for now. So your weekly figure of £690 comes instead to £1310, divided by 65% of 40 hours gives £50.38 per hour, adding VAT puts your charge up to £57.94 per hour. I'd say the commercial lads charging £35 an hour in competition to your £58 an hour seems fairly reasonable.

Regarding your callbook not being correct, now you see why we don't put fictitious abbreviations such as 'QTHR' in our magazine, G8IYA was in there years ago, and the RA division of the DTI will I'm

sure be happy to tell you it's my currently valid callsign. If not, then I've been pirating it when using it on the air every day!

Dear Editor,
What's all this then, gorgeous girls on page 5 of HRT? No wonder Chris has a twinkle in his eye . . .

Seriously though, HRT is a delight to read, and perhaps a shade more in touch with what is required to attract new people to our hobby, which is going through evolutionary changes — which is quite right, it would be fatal to stand still.

Now then, an idea for the two of you to consider! Packet has the potential to attract thousands of computer buffs, and I wonder if you have thought about one of these 'free idea' slots on TV?

It may seem outlandish to begin with, but being in the forefront of technical progress, the only problem seems to be when, not if!
Granville Broadhurst G1FGA/9H3JT

Editorial Comment;
What can we say! This is just what we're trying to achieve, and it's nice to know we're getting there. Regarding a TV 'slot', last week Chris our Consultant Technical Editor received an unsolicited call from Independent Television, and guess what they want to do? That's right, with our help they wish to run a feature on amateur packet radio! So it looks like through the 'New Look' HRT we're achieving our aim of getting the message of amateur radio out there to the public as well, showing that it's not all boring stuff, it can be interesting and exciting.

We're getting 'new blood' into the hobby!

Dear Madam,
I should like to thank you for publishing such an excellent magazine, long may you continue with no more hitches (I've just paid my subscription!).

On the perpetual subject of 'The Morse Test' and your comment from G3TAG may I add the following?

I accept that under the current rules I shall have to somehow get a pass in the Morse test before I can operate HF, so I am slowly and painfully working in that direction.

However my grumble is not so much the effort but the sheer boredom of it all! And having listened to many Morse QSOs (via. computer) the utter boredom and futility of most of them, (who needs to know it's sunny in Timbuctoo and he's using a G5RV, tnks for nice QSO . . . QRZ . . .). OK, so there are some extended 'ragchew' QSOs obviously being enjoyed by participants, great, but most Morse contacts could just as easily be achieved automatically.

So why must we all suffer to achieve this?

According to G3TAG's last paragraph, the old, 'work is good for you' ethic, (dreamt up by the Victorian aristocracy to keep the workers going while they enjoyed a life of luxury) seems to be his main argument.

According to DTI Information Sheet 3, much as above plus Morse transmitters can be very simple. It is an international requirement.

Why not build a proper radio (too much like hard work?) and how come Japan can opt out?

Why have different classes of amateurs anyway? I can't see any reason other than to satisfy the needs of the elitists.

However all my groaning and moaning will not have the slightest effect, I am sure, until the old buffers who run amateur radio in this country finally move over.

Now I had best shut up and get back to that horrible Morse practice.
Roger Provins G7GEG

Editorial Comment;
No matter what some people may want to think, evidence staring us in the face shows that a Morse test is most emphatically not an international requirement for amateur operation below 30MHz, it's just that some countries may like to think so. Others differ from this, such as the USSR (how many amateurs have they got then — and who put the first man in space, who put the first communications satellite in orbit, who has the only space station, even with an amateur rig on board?) and the Japanese (they've got over a million amateurs, and probably built the rig you're using) to name but two such countries.

As we live in a democratic society, if enough members of the public want something, things may get done. The 'Old Buffers' are actually sensible go-ahead people (the RA decide the conditions of our licence, no-one else) but the RA listen to those who guide them. The man to write to is Mr. R. Griffin of the Amateur Licensing Division, Room 613, Waterloo Bridge House, Waterloo Road, London. SE1 8UA, but remember he's busy so don't expect a comprehensive reply, or of course HRT will be pleased to pass on your views.

RADIO TODAY

New Computer Logging Software

The software engineering company of Enware have told us of the forthcoming release of 'Enlog', a professionally written computerised amateur radio logbook and database for the IBM PC and compatibles. Enware tell us that when used correctly it complies with RA requirements for the UK amateur licence A or B for computer logs.

Being available on both 3.5in and 5.25in IBM format diskettes with accompanying documentation, its features include colour pop-up windows and menus together with monochrome compatibility for non-colour systems. It stores information including callsign, operator's name, locator, previous QSO details, records of QSL cards, and gives access to information on any previously worked station. As well as this it automatically calculates and displays aerial bearing and distance from four and six figure Maidenhead locators, and its main display includes a 'real-time' clock and the current date.

Priced at £29.99 inclusive of VAT and p/p, it's available from Enware by mail order. HRT have been offered a review sample of this program, we'll be featuring it soon in a future issue.

Changes at Waters and Stanton

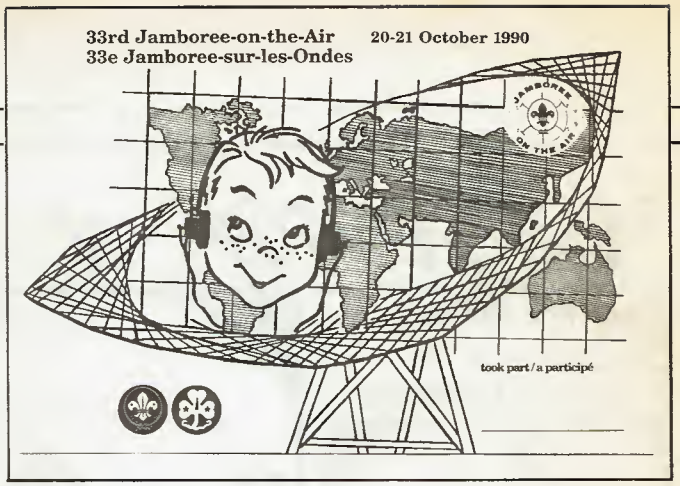
During last month, Waters and Stanton will have moved QTH into their new complex which they tell us offers 8000 square feet of sales, office and warehouse space on three floors, as well as a customer car park outside. To celebrate their move, they tell us they're making some special in-store offers during January. The recent joint venture with Maplin Electronics also means that Waters and Stanton have now taken over the control and distribution of the Alinco range of products in the UK (we at HRT of course always get to review these first!), and some of these may also be seen under the 'Communications' section in the Maplin catalogue. The 'HRT Hit Squad' will soon be paying their new premises a visit for our 'Dealer Profile' series, watch out Waters and Stanton! (OK, we'll leave the custard pies at home this time, Mike).

RAE Courses

The **Canterbury College of Technology** are running an RAE course on Tuesday evenings from 6.30-8.30pm, with Clive Widdis G1WCR as the main man. You can get further details from Clive on 0227 766081.

Unfortunately due to insufficient numbers, the RAE class at the **Green Lodge Adult Education Centre** in Clacton has been cancelled. If, however, sufficient numbers of prospective students can be assembled by the start of the spring term (i.e. right now as you read this) a new course will start, at least ten students are required. For further information you can contact any of the following;

Green Lodge Adult Education centre, Old Rd, Clacton. Tel. 0255 424151, or reg Taylor G0NIP c/o Clacton Radio Club, Tel. 0255 430466, or write to Jeff Harris G3LWM, 21 Waltham Way, Frinton on Sea, Essex CO13 9JE



JOTA Participation Card from the World Organisation of the Scout Movement.

Scouts Jamboree on the Air

As many amateurs know, in October each year Scouts throughout the World link up through amateur radio during their annual Jamboree On The Air (JOTA). In this its 33rd year, the Isle of Man had a JOTA station with the callsign GB2MSR, 'MSR' standing for Manx Scouts Radio, this station being set up by Denys GD4OEL.

The Scouts who took part this year came from the 3rd Peel and 1st Douglas groups, and they were able to pass greetings messages to other Scout stations throughout the UK as well as with Scouts in several other countries. Denys says he would like to thank the Isle of Man Post Office for their kind gift of stamp cards to be used as QSLs for the event, and Nevada of Portsmouth for the provision of a 10m vertical aerial.

All the Scouts who took part received a participation certificate from Denys and a JOTA card from the World Scout Organisation in Switzerland.

3rd Peel Sea Scouts at the October 1990 Isle of Man Jamboree on the Air. Rear L-R, Ivan Morriss, Jonathan Kneen, Patri Burden, Thomas McMeiken, Ralph Jackson, Front L-R, Stephen Quayle, Paul Gawne, Karl Cubbon, Oliver Pearn, J. Smith.

RA Cracks Down on Radio Abuse

Fraser Murray of the Radio Investigation Service tells us the RA continue to view misuse of the spectrum, by a small minority of radio amateurs, with some concern. This has recently been brought to light again with misuse of the 6.6MHz frequency range, leading to significant action being taken in Scotland. The RA say they cannot understand why amateurs such as these would want to interfere with the air-to- ground aircraft communication used on these frequencies and thus risk causing significant danger. Watch out, you're being monitored!

New Cirkit Catalogue

The latest edition of the Cirkit Electronic Constructors Catalogue has now been published. Inside its 184 pages it has several new products including PCB drafting software, low cost LED displays, scanners, aerials, connectors and the like. Well known amongst radio constructors for their comprehensive range of RF components including Toko pre-wound coils and several radio kits, they also include a good range of radio and elecronics books. A copy of the catalogue always sits on the HRT Consultant Technical Editor's bookshelf, and it certainly gets a good deal of use! Available either direct from Cirkit (Tel. 0922 444111) or at large newsagents, priced at £1.60 it includes £10.00 worth of discount vouchers and a free to enter competition for an AF signal generator.

Derby and District Society National 144/146MHz Contest

The fifth Derby and District Amateur Radio Society 2m contest is to be held on Sunday 10th March 1991 between the hours of 13.00 and 17.00 GMT. Any mode of operation is permitted, but the band plan must be observed. Fixed and portable entries are permitted, and there are two sections in the contest; stations running up to the full legal power limit, and a low power section for those running up to 30W output.

Contestants should exchange callsign, RS(T), serial number starting at 001, and administrative county (Scottish contestants should send their region). Metropolitan areas such as Greater London are still considered counties in the contest. For scoring purposes, all contacts count as two points apart from those with the Derby Society callsign G3ERD which count as 10 points. The total score is finally multiplied by the number of counties worked, each country outside the UK also being counted as a county.

Logs should be sent to the Derby and District Amateur Radio Society, 119 Green Lane, Derby DE1 1RZ to arrive by 27th March 1991, and should indicate whether the station was a single or multiple operator entry together with the section entered. Logs should show a) the time in GMT, b) Station worked, c) RS(T), d) Serial number sent, e) RS(T) and Serial number received, and f) County received.

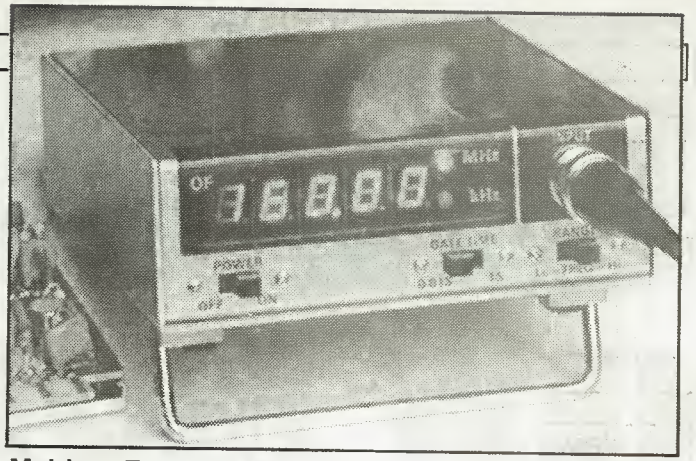
The winner and runner-up in each section will receive a certificate from the society. A complete copy of the rules is available upon receipt of a stamped addressed envelope from the club at the above address.

Bulgin Component Catalogue

Just published is the new A.F. Bulgin component catalogue, which offers amateurs and electronic engineers alike a guide to the company's range of electrical and electronic equipment. Full technical data is provided for all the products featured, from battery holders to waterproof switches, given in the 215 page publication. Copies of the catalogue are available from AF Bulgin and Co. by writing to their office at Bypass Rd., Barking, Essex IG11 0AZ, Tel. 081 594 5588.

Novice Exams Contract

The City and Guilds of London Institute, who hold the existing contract for the Radio Amateur's Examination, have also been awarded the contract for the new Novice Licence exam. They won this in competition against such organisations as the RSGB, no doubt due to their excellent long-running experience and independent nature. HRT will of course be providing full details of examination dates and venues as soon as they become available.



Multitest Type 6710 Minicounter

New Multitest Equipment

The test equipment firm of Multitest, based in St. Neots, Cambs, have recently introduced a new range of test equipment which they tell us offers maximum performance and value for money in its price range. Their oscilloscope range includes five models covering the frequency range from 20MHz to 100MHz, a 15MHz fully portable scope completing the range. A selection of seven low cost frequency counters has also been introduced covering the range 0.01Hz to 1.2GHz, tthis includes the type 6710 Minicounter covering 5Hz-160MHz, weighing 420g, and operating from internal batteries or from an external DC supply.

Greenweld Catalogue

The 1991 Greenweld catalogue is out now, with its 132 pages packed full of components at 'amateur' prices. Greenweld tell us that new for 1991 are quantity prices for bulk buyers on many items, i.e. resistors at 0.25p each and capacitors from 0.5p, more soldering equipment and tools, and over 1250 different types of semiconductors listed. Included in each catalogue are their bargain list pages together with an extra 16 page supplement. The HRT editorial team spent a very pleasant couple of hours just looking through all the bargains in the catalogue! Available for £2.50 including a supply of the next six bargain list supplements (£1.50 for the catalogue only), you can get one from Greenweld Electronics Ltd., 27 HR Park Road, Southampton, SO1 3TB. Tel. 0703 236363.

RA News

The Radiocommunications Agency tell us that in a highly successful meeting in Athens over the period 15-19 October, the European Radiocommunications Committee (ERC) reached agreement on several significant issues in European radio frequency management. The ERC is responsible via a working group for European preparations for the ITU's 1992 World Administrative Radio conference which will take place in early 1992 and which will consider revising the international frequency allocations table in certain parts of the spectrum. This conference has significant meaning for radio amateurs worldwide of course!

Eighteen administrations plus observers from the Telecommunications Directorate of the European Commission took part in the Athens meeting, and the Europeans Radio Communications Office now has a memorandum of understating which has been signed by 17 administrations, this office having been established to provide greater resources and to meet the demand for wider consultation on radio frequency management activities. The Chairman of the ERC is Michael Goddard, who is also the Head of the Spectrum management and International Branch of the Radiocommunications Agency in London. Let's hope he looks kindly on the continuing pioneering activities of amateurs!

ICOM

NEW MULTIBAND IC-970E Base Station

Designed for the serious operator on the 144, 430 and 1200MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications.

The IC-970E is supplied as an all mode dual-bander for 144 and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

Communications via satellites has never been easier. The IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated also, ten specific memory channels for satellite frequencies.

The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously, multiple scanning systems on the MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS sytem make this one of the most comprehensive multi-band transceivers available.

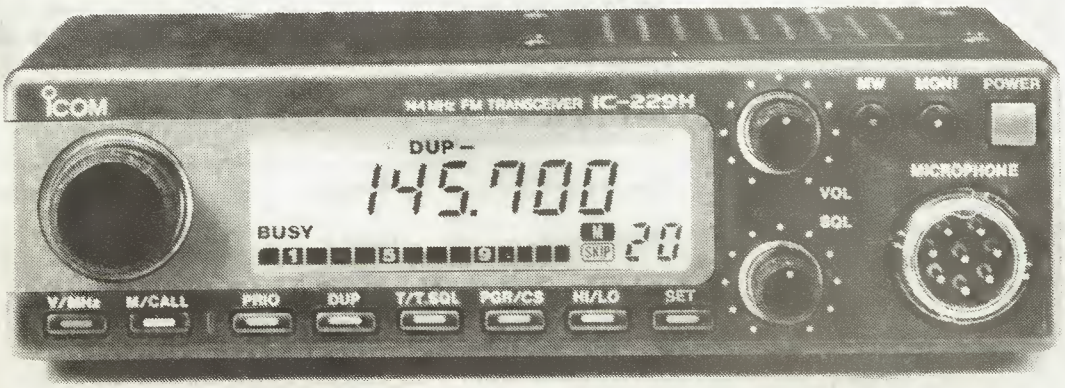
For more detailed information on the IC-970E Base Station or any other Icom radio equipment contact your local authorised dealer or call Icom (UK) Ltd.

Datapost: Despatch on same day whenever possible.
Visa & Mastercards: Telephone orders taken by our mail order dept. instant credit & interest free H.P.

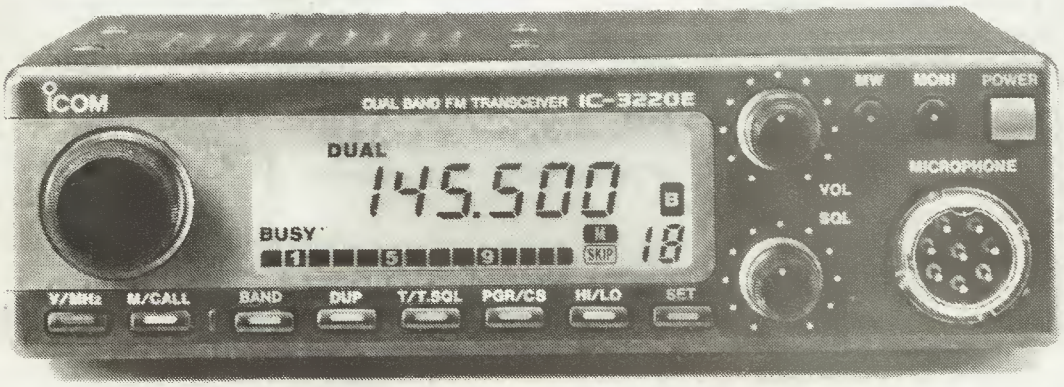
MasterCard VISA

Count on us!

NEW MOBILES



IC-229E/449E
2M, FM Mobiles



IC-3220E
Dual-Band
Mobile

Icom have built a range of ultra compact FM mobile transceivers. Similar in style, easy to operate and perfect for driving safety. Advanced features include a variety of tuning steps, memories, scan functions, adjustable R.F. power, optional pager and tone squelch units for selective calling. All these models include the HM-59 hand microphone with up/down and 1750Hz tone call for repeater operation. The unique simple operation enables each function to be operated with one switch. Illuminated switches and controls give complete night time operation.

IC-229E VHF Mobile. This VHF 25 watt transceiver measure just 140(w) x 40(h) x 105(d) mm. No need to worry about installation, its small enough to fit most vehicles. Also available the IC-229H 50 watt version where extra high power is required.

IC-449E UHF Mobile. High sensitivity with GaAs FET's and 35w output power provide optimum performance with this UHF transceiver. 20 Memory channels and a programmable call channel can be used to store most used frequencies.

IC-3220E Dual Band Mobile. Enjoy complete dual-band operation. In addition to cross band duplex operation this transceiver can receive both MAIN and SUB bands simultaneously. One of the smallest dual-band mobile transceivers available, the IC-3220E has a 25 Watt output on both bands. Where higher power is required the IC-3220H offers 45 watts on the 144MHz band and 35 watts on the 430MHz band.

Icom (UK) Ltd.
Dept HRT, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155

Novice Licence

A New Year's gift from the Radiocommunications Agency

Ok, you've heard of the Novice Licence, but what's it really all about? Well beginning right now, prospective amateurs will have a chance to train for a new 'beginners' licence, the Radio Amateur's Novice Licence. It will allow licensees to operate using low power, on sections of some of the bands allocated to amateur radio. There is no minimum age limit for the licence, and the RA tell us that the licence fee will be the minimum possible, this will even be waived for applicants aged under 21.

Learning by Doing

To attack the need for 'new blood' to the hobby, the entry route to the Novice Licence will be different to the traditional 'A' or 'B' licence. As well as a passing a simpler City and Guilds multiple-choice examination to that of the RAE, the prospective Novice must attend and successfully complete a practical course to 'Learn by Doing', to teach some of the practical aspects of radio and electronics. The course being originated and co-ordinated by the RSGB with volunteer instructors around the country, students will be taught in small groups, typically of four people each, and will be based on a number of worksheets. These have been planned to comprise;

1) Component colour code,
2) Soldering exercise, Test set No.1,
3) Soldering exercise No.2
4) Discovering Ohms's Law,
5) Codes and abbreviations,
6) More codes and abbreviations,
7) Audio Frequency Amplifier project
8) Setting up a contact,
9) Soldering exercise, Test Set No.2
10) Making a log and designing a QSL card,
11) A look at aerials
12) Putting a multimeter to work,
13) Measuring resistance,
14) Measuring DC
15) Power
16) Propagation,
17) The QSL bureau and other aids to amateurs,
18) AC and frequency,
19) Tuned circuits,
20) Demonstration of Ohm's law
21) 13A mains plug wiring
22) The spectrum
23) PL259 plug wiring
24) BNC plug wiring
25) Receiver block diagrams
26) Transmitter block diagrams,
27) Harmonics
28) Practical tests with diodes and transistors
29) Learning the Morse code
30) Getting ready for a CW contact.

Following the successful completion of this, a certificate will be issued which will then allow the person to sit for the Novice Licence examination. This will be conducted by the City and Guilds of London Institute, with exams at centres around the country being held four times a year. The 90 minute exam will comprise 45 multiple-choice questions based on subjects covered in the course together with licence conditions, however we have been told that a copy of the licence regulations will be placed on

Table. 1.

Novice Licence Bands

Freq Range (MHz)	Status	Transmission Types
1.950 - 2.000	Note 1	Morse, Telephony, RTTY, Data.
3.565 - 3.585	Primary, Shared with other services	Morse.
10.130 - 10.140	Secondary	Morse.
21.100 - 21.149	Primary	Morse.
28.100 - 28.190	Primary	Morse, RTTY, Data.
28.300 - 28.500	Primary	Morse, Telephony.
50.620 - 50.760	Primary, Note 2.	Data.
50.250 - 51.750	Secondary, Note 2.	Morse, Telephony, Data.
433.000 - 435.000	Secondary	Morse, Telephony, Data.
1240 - 1325	Secondary	Morse, Telephony, RTTY, Data, Facsimile, SSTV, FSTV.
10,000 - 10,500	Secondary	Morse, Telephony, RTTY, Data, Facsimile, SSTV, FSTV.

each candidate's desk to encourage them to 'look it up in the book', hence typifying actual station operation. If the prospective licensee wishes to operate below 30MHz, then a pass of a further 5WPM Morse test is also required.

Callsigns

Novices will of course be issued with an internationally recognised callsign, this will start with the number '2' followed by a letter A-Z signifying the licence class. Next will be a further number signifying which country they're operating from, 2 for England, 3 for Scotland, 4 for Wales, 5 for Northern Ireland, 6 for the Isle of Man, 7 for Jersey, and 8 for Guernsey, followed by the individual identification letters. So when you hear a 2B2 station on the air, you'll know what it is!

Types of Operation

Table 1 shows the bands where Novices may operate, a maximum power of 3W output (or 5W DC input in case an RF power meter isn't at hand) is allowed with no limitations on aerials or ERP levels apart from on 6m. Thus a high degree of flexibility may be obtained, i.e. even worldwide satellite communication where the Novice transmits up on 70cm and receives on 2m using tracked beams.

The Novice station may be used at either a main or temporary location, walking around with a handheld, going mobile and the like, but no Maritime Mobile operation outside of inland waterways. Unattended beacons for direction finding contests are allowed any time on 1.96MHz and sections of 28MHz, and on 3.5MHz- 3.8MHz at any time during weekends.

Licence Requirements

At the moment, there are no restrictions on commercial, homebrew, or whatever, in terms of the equipment Novices may use. Although certain amateur factions have been proposing rather restrictive limitations coupled with 'type-approved' only equipments, these have been sensibly protested against by the more realistic of us! It is however interesting to note that the Novice Terms and Limitations Booklet states that equipment must be stable and as free from unwanted emissions as the state of technical development for amateur apparatus reasonably permits, suggesting that some unfiltered oscillators with their inherent harmonics radiating straight into an aerial are a big no-no!

Completely unattended data operation such as packet radio is allowed on 50.620-50.760MHz and 1299-1300MHz as well as on sections of 10GHz, and remote control of the main station using say a handheld is also OK, thus leading to the possibilities of technical development by keen Novices. Remember, they won't all be young children, and there's a great potential for teenage computer buffs to 'get in' on the action! We need them.

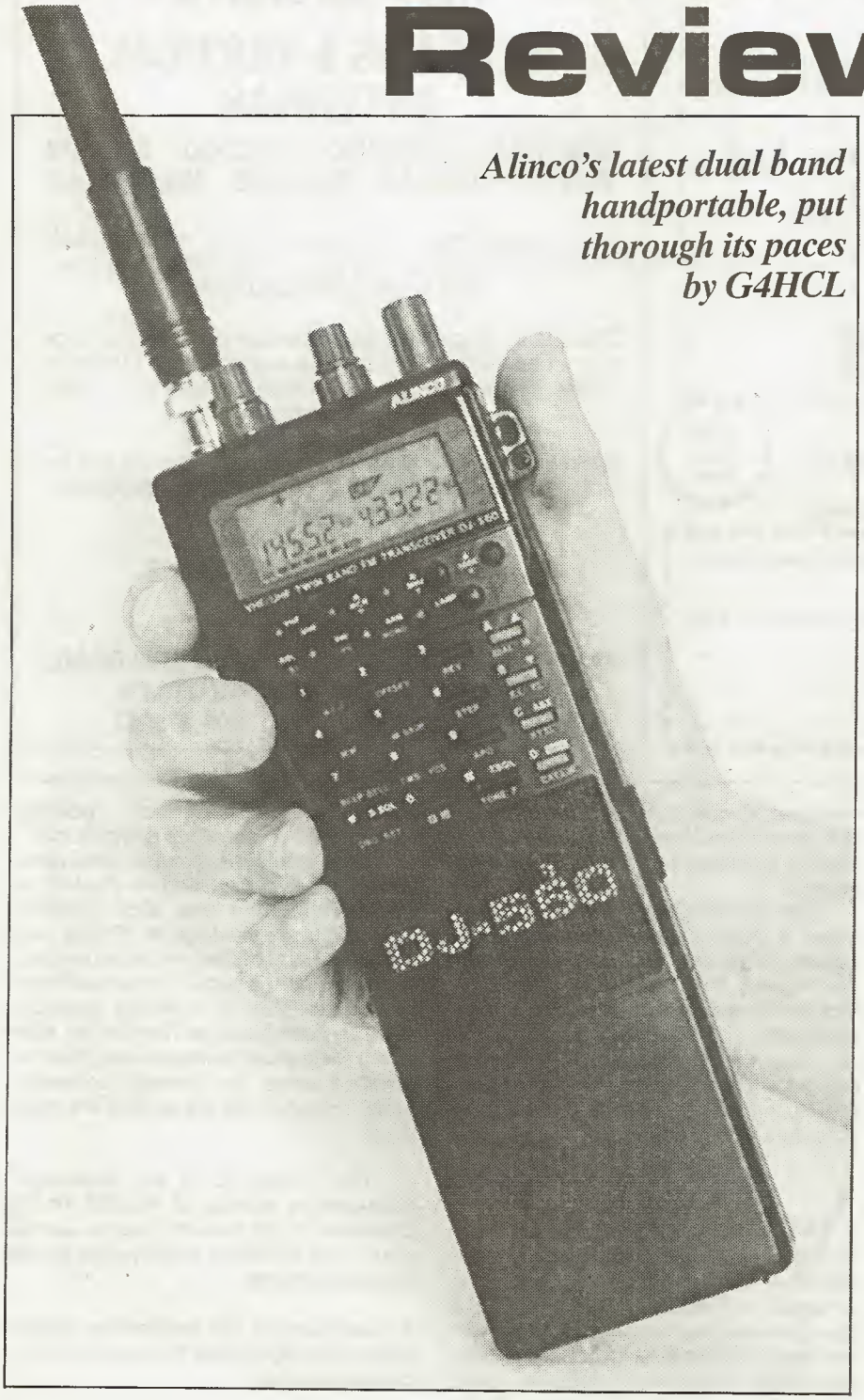
Our thanks go to the Radiocommunications Agency of the DTI for the provision of the Novice Licence details, and to the RSGB for information on the training scheme.

A maximum of 3W transmitter output power (5W input) may be used on all frequency ranges.

Note 1; Available on the basis of non-interference to other services (inside or outside the United Kingdom)

Note 2; Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level, with horizontal polarisation. No mobile operation.

Alinco DJ-560E Review



Alinco's latest dual band handportable, put thorough its paces by G4HCL

Dual band portable transceivers are becoming very popular nowadays, with offerings from all the major amateur manufacturers. In the early days, these portables offered a switched band operation between either 2m or 70cm, or of course transmit on one and receive on the other which was technically easy to do. However, recent sets have offered the facility for true dual-band operation, i.e. simultaneous receive on both bands when required, for example to allow you to listen out on 70cm whilst having a QSO on 2m.

At an economic £339, the DJ-560E from Alinco provides just that. With twin receivers together with individual volume and squelch controls and selectable transmission between 2m and 70cm, together with a variety of selective calling facilities, it has the potential of providing a good deal of flexibility.

Features

Low cost doesn't seem to mean a low level of features, as the DJ-560E is up there with the more expensive competition, even having a built-in CTCSS encoder/decoder fitted for good measure. This facility is becoming increasingly important, with many amateur groups as well as several repeaters using CTCSS facilities for both selective squelch and control modes.

Using its dual band receive capability, a nice feature is that you can plug a pair of stereo headphones in and listen to signals from separate bands coming out separate left and right channels. Alternatively, for those who prefer the simple life plugging in a mono earphone provides audio from both bands together, thus giving you the choice.

As well as the rotary click-step tuning knob on the top panel, the front panel keypad can be used for direct frequency entry. The rotary control tuning steps may be programmed to either 5, 10, 12.5, 20 or 25kHz independently on either band. As well as the two digital VFOs, 20 memory channels on each band are provided, together with a further quick-access 'Call' channel on each band to store your favourite frequencies in. Separate small 'VHF' and 'UHF' buttons are provided on the front panel to switch the 'Main' band, i.e. that which transmission occurs on, between 2m and 70cm. A useful feature provided here is the 'Automatic Band Exchange', or ABX for short, which automatically switches this for you depending on which band last had a signal present on receive. Hence if the squelch opens up with a station calling while the set is in your pocket or whatever, you know you'll be replying on the correct band!

Scanning

For searching across the bands, various scan modes are available on the set. These include a search across the entire VFO range or any specified range, across all or selected memory channels, and a 'dual watch' where a pre-selected

memory channel is sampled for three seconds followed by the VFO channel for one second, and indeed the reverse if required. This 'dual watch' can also be used during other scan modes, as well as on both bands simultaneously for those who never like to miss a thing! The receiver scan may be programmed to stop when it finds either a busy or an empty channel, and in the former case it may be set to resume scanning either immediately the signal drops or following a five second pause after stopping before starting off again.

Any repeater offset can be programmed in on a channel by channel basis, and a panel below the PTT bar allows you to transmit a 1750Hz toneburst for repeater access. Above the PTT bar a 'Function' bar doubles up many of the front panel keypad operations, including the 'reverse repeater' facility which allows you to check the repeater input frequency to see if you're in simplex range.

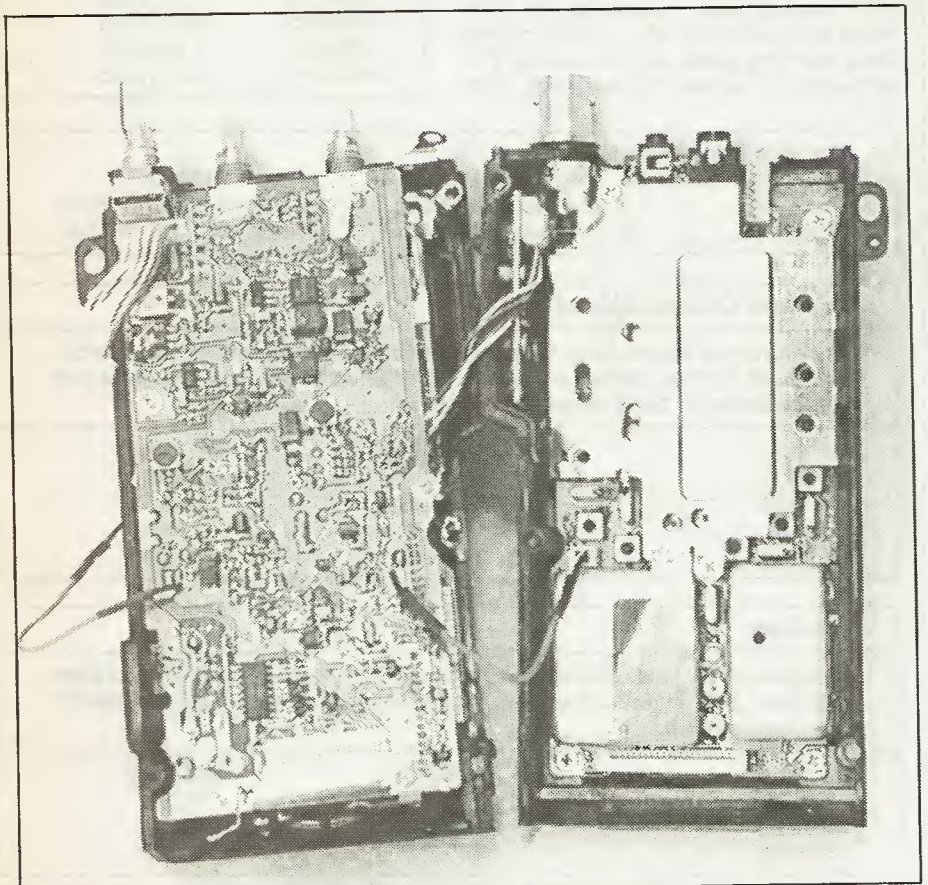
Selective Calling

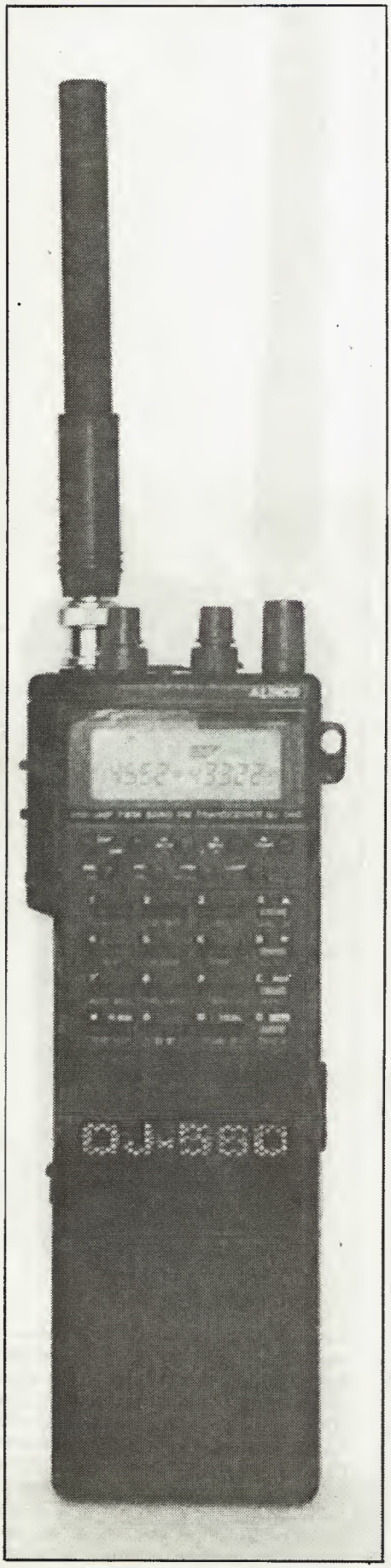
Becoming increasingly popular with amateurs operating on VHF and UHF FM are the variety of selective calling methods used. The DJ-560E, in its simplest 'Bell Tone' called indication mode, sets off a bleep tone when the receiver squelch raises with the LCD flashing a small musical note to alert you of this if you've been away from the set.

With the CTCSS facility also programmed in, this can be extended to occur only when the correct sub-tone has been received as well as this sub-tone mode being used to monitor for a required station or group on a busy channel. A further clever facility is that of three-digit DTMF (Dual Tone Medium Frequency, or 'Touch Tone') selective calling, where the set can be programmed to respond to a pre-set DTMF sequence, with even a 'wild-card' facility of a '£' being used in place of one or two digits for group call use. These may also be programmed in for automatic transmission, as can multi-digit DTMF sequences for other uses. Alinco tell us this 3-digit DTMF system is compatible with that used by other transceiver manufacturers, and for those who want the best of all worlds, the CTCSS, DTMF and 'bell' systems can indeed all be used together.

Power

With its supplied 7.2V 700mAh battery, the set measures 169 (H) x 57 (W) x 32 (D)mm, and weighs around 440g. As such, it isn't the smallest dual band around although the larger keypad, knobs and display will appeal to those who tend to prefer something they can handle with slightly larger fingers! Using the supplied battery, the set gives a specified 2W RF output on both 2m and 70cm, and connecting a larger 12V nicad available as an option boosts this to 5W for when you need to reach those distant stations. With periods of 10% receive, 10% transmit and 80% standby, the set provides around three hours worth of operation before a battery change or





recharge is needed.

Spare battery packs are of course available, and a very quick lock-on/lock-off method of attachment lets you quickly change ni-cads without a lot of fumbling around. The set comes supplied with a plug-in two pin wall charger, a carrying strap, and a belt clip together with a user instruction book. Options such as a speaker/mic, headset, carrying case, and mobile DC adapters are available as options.

In Use

Reading through the manual, plus trying out the many functions on the set, kept me nicely occupied for some time. Throughout this period I was constantly finding more operating modes that could be used with the set, the list becoming almost endless. However this caused me a bit of a problem in trying to remember everything, but eventually I found that as well as repeater offsets and the like, I could program various tones and different channel steps in each of the memory channels, thereby nicely simplifying on-air operation!

I found in use that I often accidentally pressed some of the keys when taking the set out of my pocket, the keys being raised above the case, hence I often needed to use the 'key lock' facility provided. I found a further useful function was that of a 'frequency lock', the LCD display even indicating 'FL On' when first enabled, and the set giving me a warning bleep and indicating 'FL' on the display when I subsequently tried to change frequency — this could be useful for outdoor events when I'd like to stay on the right channel!

As the winter nights drew in, I found a slight disadvantage of the set was that the backlight lit up the display but none of the keypad controls, as such I found I normally just used the memory channels with the rotary knob to guard against pressing the wrong buttons, which was easily done. I found an 'oddity' that the toneburst for repeater access didn't seem to want to operate on the review set, although the other tone signalling features operated well.

When out and about, I found there was plenty of receive audio from the small speaker, I was most surprised, and my transmit audio was reported as being nice and clear. Although the 'Battery Save' facility with its 800mS 'Off' and 400mS 'On' timing was useful in keeping the nicad going all day on a little- used channel, I sometimes found it to be rather annoying when in QSO, as I often missed the first word from my QSO partner on a simplex channel. Eventually I

LABORATORY RESULTS: RECEIVER;

Sensitivity;	
Input level required to give 12dB SINAD;	
144MHz;	0.15uV pd
145MHz;	0.14uV pd
430MHz;	0.22uV pd
435MHz;	0.20uV pd
440MHz;	0.21uV pd

Squelch Sensitivity;	**145MHz**	**435MHz**
Threshold;	0.10uV pd (8dB SINAD)	0.13uV pd (7dB SINAD)
Maximum;	0.21uV pd (19dB SINAD)	0.18uV pd (10dB SINAD)

Adjacent Channel Selectivity;		
Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal;		
	145MHz	**435MHz**
+12.5kHz;	23.5dB	51.0dB
-12.5kHz;	39.5dB	45.0dB
+25kHz;	57.5dB	60.0dB
-25kHz;	69.5dB	57.5dB

Blocking;		
Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;		
	145MHz	**435MHz**
+100kHz;	69.0dB	74.0dB
+1MHz;	74.5dB	91.5dB
+10MHz;	100.5dB	97.5dB

just disabled this.

Connecting the set up to an external roof mounted dual-band colinear aerial at home brought in a few problems on 2m. As I tuned towards the top end of the frequency range on 2m, a Fire Brigade station 2km distant with its 147MHz transmitters often caused the 2m receiver squelch to stay permanently open, although I suppose it *was* only designed as a portable rig! However a 2m packet BBS station about half a kilometre away on 144.650MHz also caused a degree of de-sensitisation when monitoring my semi-local 2m repeater using either the outdoor aerial or the set-top helical. The set worked very well on 70cm though, even rejecting the local 12.5kHz spaced signal from the primary band user in the middle of the 70cm repeater segment.

Laboratory Tests

Placing the set on the laboratory signal generators showed it was nicely sensitive on 2m, not quite so on 70cm but still reasonable for a low power portable. The adjacent channel rejection and indeed the general strong signal handling performance on 70cm was very good, although as found on air the performance on 2m wasn't really up to what I would have expected.

Measured with a very short length of UR-67 coax and a freshly charged ni-cad, to provide a representation of typical performance (as 7.2V ni-cads normally give over 7.2V unless they're just about to go flat) the transmit power on 2m was nicely above 2W although that of 70cm being on the low side, and the transmit harmonics were reasonably well suppressed on both bands. The transmit deviation on 2m and 70cm was slightly over the top although within normal setting limits. A very low toneburst deviation was found, obviously a quick adjustment would be needed here.

Conclusions

The Alinco DJ-560E provides a lot of features for your money in a dual band portable, in all being a very cost effective set. This however comes at the slight expense of a larger physical size compared some of its competition, although this may not worry many users. I was a little disappointed with the receive performance on 2m in the presence of other signals, and with what seems to have been incorrect alignment at the factory of the toneburst deviation with no user instructions on how to adjust this.

Our thanks go to Waters and Stanton Electronics for the loan of the review transceiver.

Intermodulation Rejection;

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

	145MHz	435MHz
25/50kHz spacing;	56.0dB	69.0dB
50/100kHz spacing;	62.0dB	67.0dB

Image Rejection;

Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;

145MHz	435MHz
64.0dB	63.0dB

S-Meter Linearity;

	145MHz		435MHz	
Indication	Sig.Level	Rel.Level	Sig.Level	Rel.Level
S1	0.49uV pd	-8.6dB	1.05uV pd	-8.6dB
S3	0.73uV pd	-5.1dB	1.48uV pd	-6.6dB
S5	0.93uV pd	-3.0dB	1.91uV pd	-3.4dB
S7	1.16uV pd	-1.1dB	2.31uV pd	-1.7dB
S9	1.31uV pd	0dB Ref.	2.82uV pd	0dB Ref.
Full	1.55uV pd	+1.4dB	3.12uV pd	+0.8dB

Current Consumption;

Standby, Economiser Operating;	58mA average
Receive, Mid Volume;	175mA
Receive, Max Volume;	202mA

TRANSMITTER;

TX Power and Current Consumption;

Measured with fully charged supplied battery fitted;

Freq MHz	Power	
144MHz	High	2.11W/885mA
	Low	220mW/385mA
145MHz	High	2.12W/890mA
	Low	200mW/375mA
146MHz	High	2.11W/865mA
	Low	190mW/370mA
430MHz	High	1.39W/1.32A
	Low	280mW/590mA
435MHz	High	1.42W/1.24A
	Low	280mW/600mA
440MHz	High	1.38W/1.27A
	Low	270mW/590mA

Harmonics;

	145MHz	435MHz
2nd Harmonic;	-69dBc	-65dBc
3rd Harmonic;	-67dBc	-77dBc
4th Harmonic;	-70dBc	-79dBc
5th Harmonic;	-63dBc	—
6th Harmonic;	<-80dBc	—
7th Harmonic;	<-80dBc	—

Peak Deviation;

145MHz	435MHz
5.25kHz	5.20kHz

Toneburst Deviation;

145MHz	435MHz
<50Hz	220Hz

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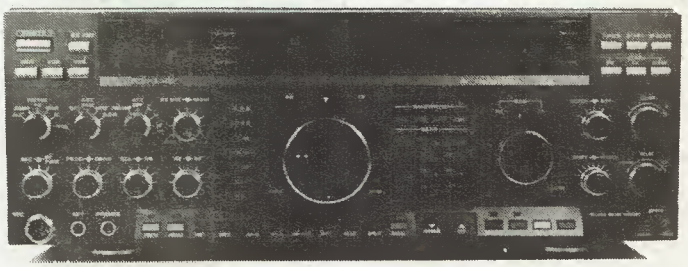

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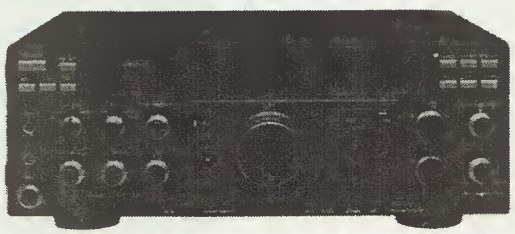

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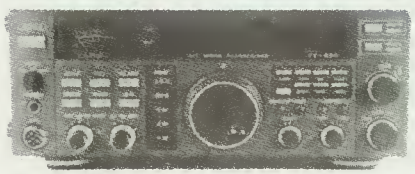

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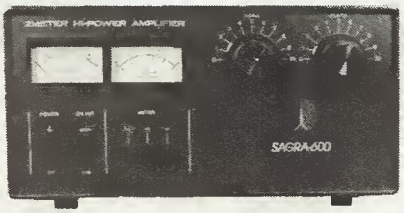

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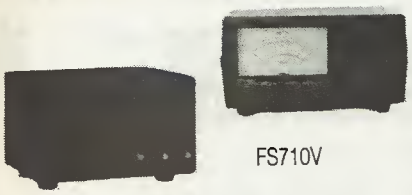

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13M20BP40	40FT BASE PLATE MOUNT	£750.95
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16M20FB80	80FT FIXED BASE MOUNT	£1219.00
16M20BP40	40FT BASE PLATE MOUNT	£851.00
16M20BP60	60FT BASE PLATE MOUNT	£952.20
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ALL TOWERS EXCEPT MOBILES ARE AVAILABLE FROM STOCK. 10M10 SERIES SUPPLIED WITH STANDARD WINCHES. 13M20 & 16M20 SERIES ALL SUPPLIED WITH AUTO BRAKE WINCHES. ALL ARE SUPPLIED WITH H2R HEAD UNIT DRILLED TO TAKE GS-065 BEARING. HOLDING DOWN BOLTS FOR BP AND FB TOWERS ARE AVAILABLE AT £28.75 PER SET EXTRA.

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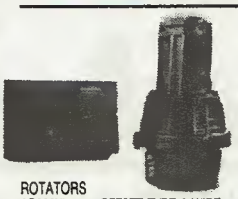

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G-800SDX	BELL TYPE 450 DEG VAR. SPD	£325.00
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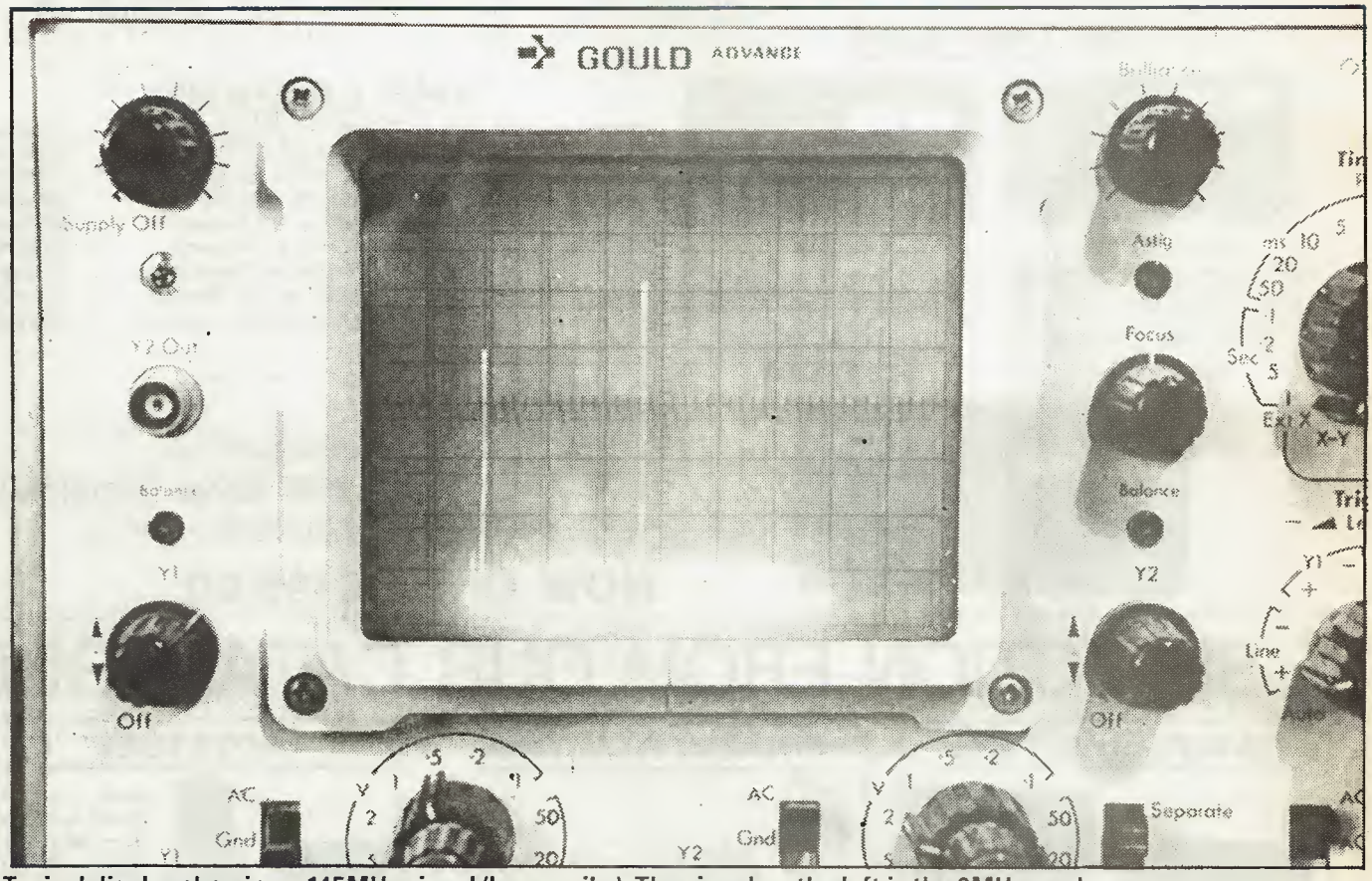
Low Cost Spectrum Analyser



Typical display showing a 145MHz signal (large spike). The signal on the left is the 0MHz marker

Exclusive Review — G4HCL tests the Waterbeach Electronics 250MHz Analyser add-on.

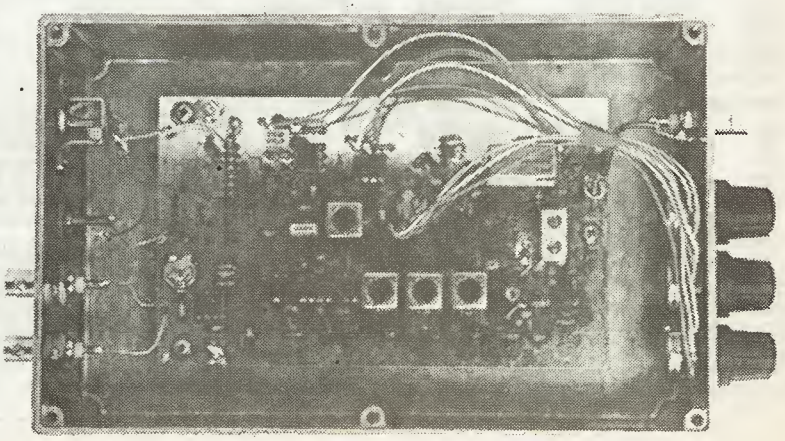
If you ever thought a Spectrum Analyser was just for the professionals, then think again! Costing just £159, this British made add-on could be of great use to amateurs!

Analyser Uses

What is a spectrum analyser? It basically provides you with a graph-type display of the relative output levels of the signal under test along the vertical axis, against a horizontal axis being the RF frequency. To take an example, let's say you're looking at the output spectrum of your latest homebrew 20m transmitter. You'd see a large 'spike' at 14MHz, then probably much weaker spikes at multiples of this such as 28MHz, 42MHz, 56MHz and so on which are your transmitter harmonics. Any other untoward signals would also warn you of spurious outputs, such as mixing products or parasitic oscillation, none of which go down well with other band users!

All transmitters radiate unwanted signals, it is the level of these signals that matter. If your 400W amplifier on 10m put out a forth harmonic at around -40dBc (dBc meaning dB referenced to the carrier frequency level) you'd be putting a significant amount of power, 40mW to be precise, right in the middle of the aeronautical navigation band. Our licence tells us we mustn't cause undue interference to other forms of wireless

Inside the unit

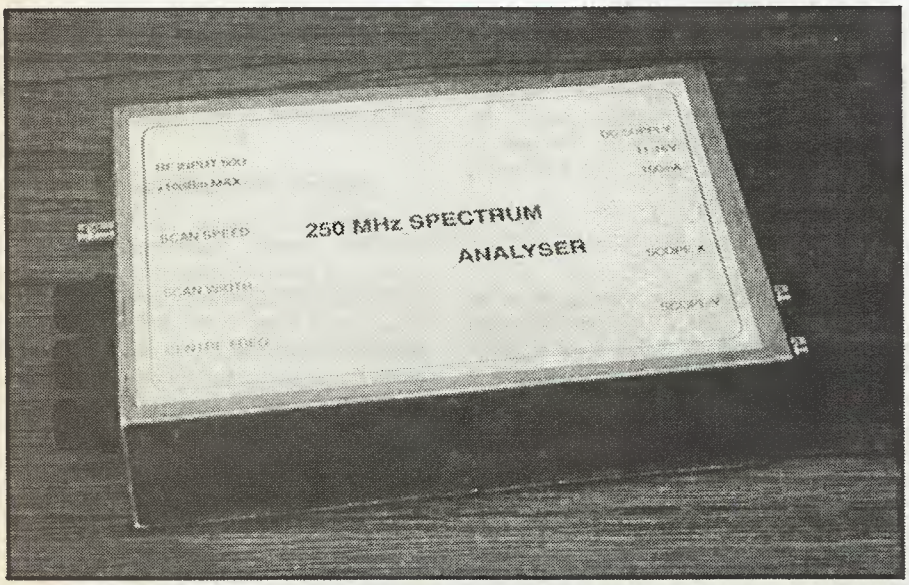


telegraphy, but using a spectrum analysers shows us exactly what we're putting out and where, so if needs be it can be corrected before a Jumbo Jet starts heading our way instead of Heathrow!

As well as this, an analyser is invaluable for experimenters who build oscillators, multipliers and the like, acting as an intelligent 'signal probe' to show exactly what the circuit's doing. It's no secret that much of HRT successful ex-PMR conversion projects were helped by the use of such an instrument.

Amateur Price

Spectrum analysers have traditionally been the domain of professional users with corresponding price tags of several thousand pounds as a minimum.



The analyser add-on

However when we took at look at the Waterbeach Electronics 'add-on', the unit converting any normal oscilloscope into an analyser, we knew this was quite a breakthrough.

Circuit Operation

The analyser operates over the frequency range of 400kHz to 250MHz, with variable scan widths over this range hence you cab 'close into' a signal if you wish. Inside, an electronically swept superhet receiver is used to measure the signal level at any instant in time over the swept frequency range. The 'noise floor', i.e. the minimum detectable signal, is -70dBm i.e. 70db below 1mW, and a logarithmic amplifier in the unit provides a level range of up to 0dBm, i.e. 70dB overall. The unit has a fixed bandwidth of 280kHz, i.e. the width sampled to provide the 'trace', however it has a variable scan width and scan speed selectable by rotary knobs on the side of the case. Hence you can vary the display to your needs but the bandwidth is narrow enough for measuring close-in modulation sidebands and the like. The 'sawtooth' sweep tuning voltage which is fed to the tuning line of the receiver is also fed to the 'X' input of your external oscilloscope, the 'Y' output (the detected signal level) being fed into the Y input of your scope, hence providing the resultant display.

In Use

Coupling the unit up to my oscilloscope took no more than a couple of minutes, my two BNC to BNC terminated leads coupling the X and Y signals, which the scope timebase set to 'External X'. Then I thought 'what can I measure'. As well as quickly plugging in a small whip aerial and checking my 2m portable, which incidentally brought forth a nice clean response, I tried plugging my rooftop colinear aerial into the unit to see what other signals were out there. What a revelation! the local Broadcast Band II stations were quickly identified, the semi-local 2m packet BBS was seen going on and off all the time as it transmitted its information. It was indeed quite fascinating!

Tracing the gain of various stages in my homebrew transmitter was quite useful also, using the analyser with a series resistor connected in line with the input to act as a high-impedance probe. I could quickly see where the various tuned circuits selected the correct frequencies, and indeed managed to tune the transmitter up for optimum performance as well as for 'maximum smoke'. Fault-finding a zero-output transmitter was also made easy, with the exact stage of non-amplification quickly being found, very handy! Measuring transmitter levels did of course require an external 50 ohm power attenuator to be used to save the analyser front end being blown up, as indeed all analysers require, so prospective users should bear this in mind before connecting their 4CX250B amplifier output straight into the unit!

Conclusions

Using a spectrum analyser unit such as this becomes just like one of those gadgets that you never knew how you got along in the past without one, it certainly simplified construction and measurement work as well as serving its possible prime purpose of measuring transmitter harmonics and the like. It's possibly a good investment for a radio club, as a useful piece of test gear for loan in cases of TVI and the like or indeed to check the latest club construction projects.

It would be quite novel to say to the RA Radio Investigation Officer when he asks to see your station wavemeter 'Sorry I haven't got one, but would this spectrum analyser do instead?'.

My thanks go to Waterbeach Electronics (0223 862550) for the loan of the review unit.

Specifications;

Frequency range;	400kHz to 250MHz
Amplitude Range;	-70dBm to 0dBm
Sens. variation;	0.4MHz-2MHz, less than 2dB 2MHz-250MHz, less than 1dB
Bandwidth;	280kHz
Max. Input Level;	10dBm
Input Impedance;	50 Ohms
Freq. Scan o/p;	0-5V Repetitive
Freq. Scan width;	1MHz/div to 30MHz div variable
Vertical output;	50mV/dB, internally settable
Centre Freq Adj;	0-250MHz
Scan Speed;	0.8mS to 20mS variable
Supply;	11-16V at 100mA

DX Audio Processor Project

Gee Goodrich G4NLA describes the Main Module circuitry

In this section, Fig. 2 illustrates the circuit diagram of the main module of the DX audio processing system. The incoming audio from the station receiver (or other device) is terminated in an 8 ohm carbon resister, this input port is also decoupled to RF by C1. IC1 is an operational amplifier configured as a voltage follower, this device having a very high impedance when compared to that of the 8 ohm resister R1. The voltages present on R1 are thus buffered and subsequently DC decoupled by C4. Note that all op-amps on this module are biased for a conventional 12V single rail supply. R4 and R5 form a potential divider whose junction has a voltage of 6V, and C4 is present to decouple audio voltages present on this rail to 0V.

Buffers

The output of IC1 is passed out via BUF OUT to the two filter modules. Having done all sorts of weird and wonderful things externally as I'll describe next month, the filters pass a processed signal back via BUF IN, this is terminated in a 100k log law potentiometer which is used as the audio level control on the front panel. IC2 acts as a further buffer, its configuration being similar to that of IC1. The output of IC2 is now split by two capacitors, C6 and C8, the former path leading to the audio metering circuit and the latter to the VMOS PA stage.

Audio Metering

Looking at the audio meter section first we see that IC3 is configured as an inverting amplifier (e.g. if the voltage goes up at the inverting input pin 2, the output at pin 6 goes down). The gain at the amplifier equates to the following general expression;

$$G = Rf/Ri$$

Where G is the gain of the stage, Ri is the input resistance (R5, RV1), and Rf is the feedback resistance (R6). Since Ri consists of two resistors, then the gain of this stage may be adjusted by RV1 across the following limits;

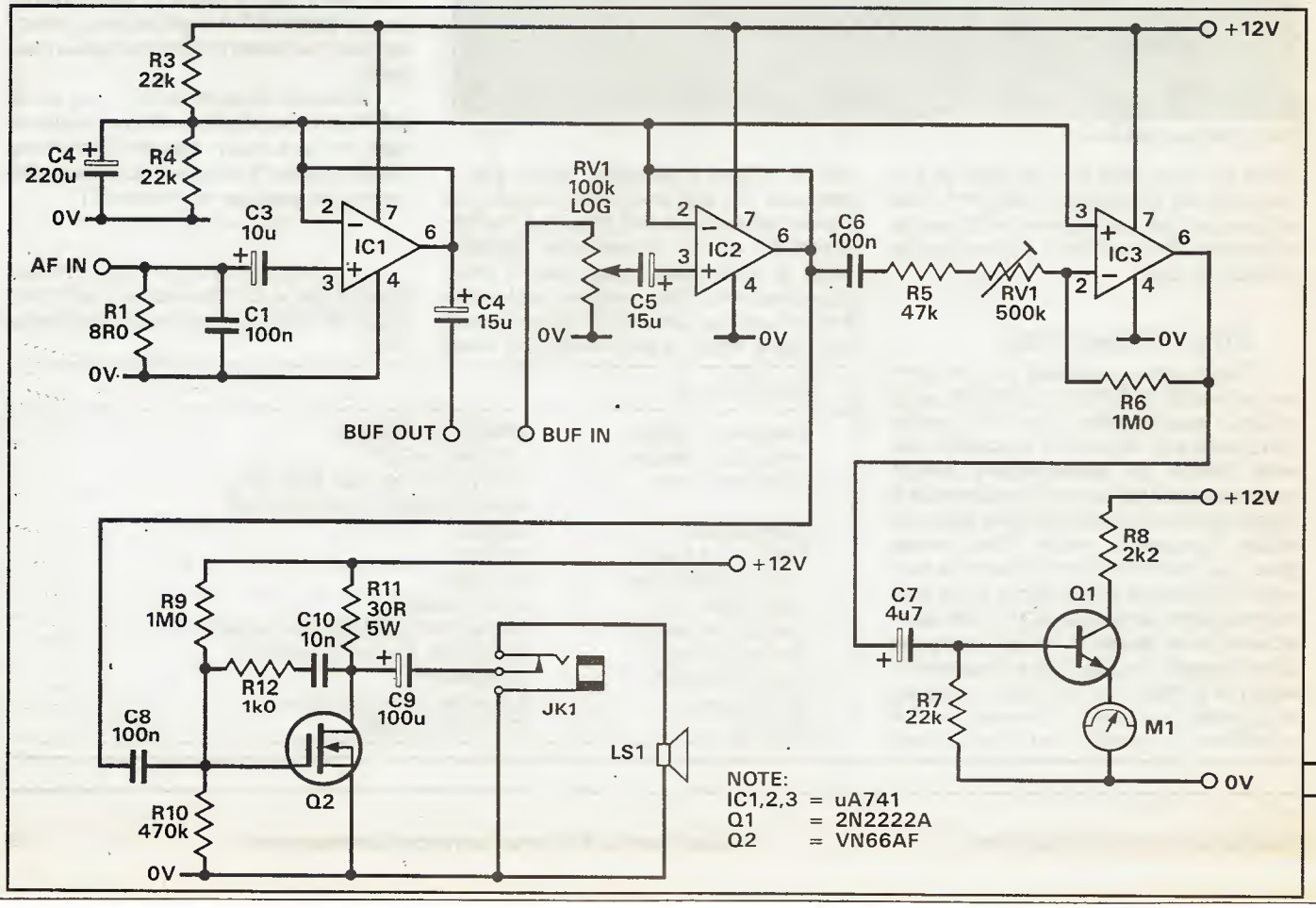
$$G = 1M/550K = 1.8$$

$$G = 1M/50K = 20$$

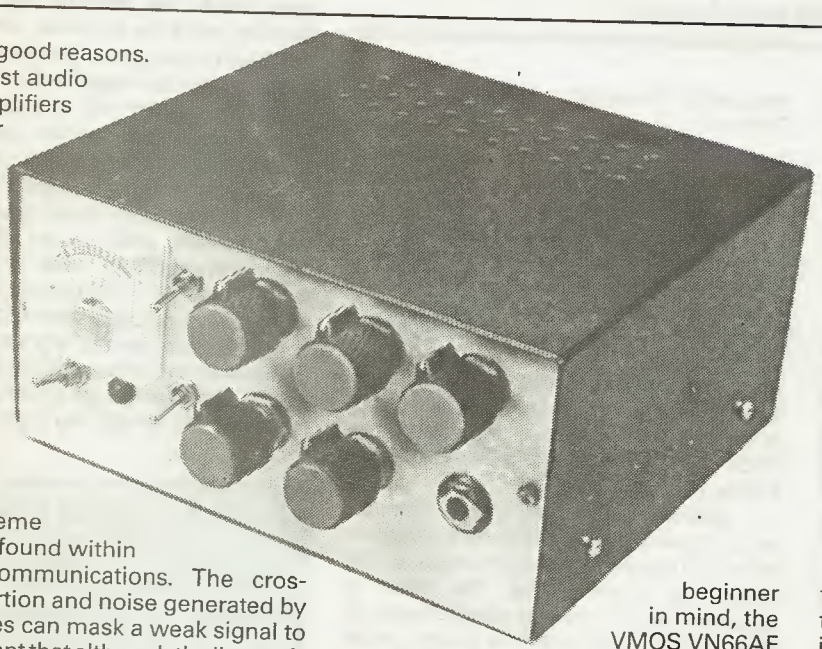
The output at IC3 is subsequently decoupled by C7 and coupled to the base at the Class C emitter follower stage of TR1 (a 2N2222A device). A positive going audio signal will forward bias the base-emitter junction of the transistor, and subsequently cause a current to flow through the collector- emitter structure. The emitter current is monitored by the meter M1, a 200uA FSD type. Note that since the transistor may only conduct on positive audio cycles then it is acting as a simple rectifier/detector, thus making it possible for the meter to follow the magnitude of the audio signal.

Audio Amplifier

Now let's look at the VMOS audio amplifier stage. Traditional homebrewers may be surprised at my choice of a VMOS (VN66AF) device, and its configuration as a class A amplifier. QRP type designers and constructors may be even more surprised since this device is quite popular in their RF power amplifiers, I chose the device and its class A configu-



ration for good reasons. Firstly, most audio power amplifiers ICs appear to use a class B output stage. Such stages are fine for general purpose use but sometimes introduce a limitation in extreme conditions found within amateur communications. The crossover distortion and noise generated by such devices can mask a weak signal to such an extent that although the listener knows' that the station is there, the readability can be reduced. Whilst I cannot claim to have done extensive work in this field, some brief experiments with a crystal controlled direct conversion receiver, a Marconi TF2016A signal generator and two audio amplifiers (one based on the TDA820, and a similar VMOS audio power amplifier) proved this point to me. Secondly, with the



beginner in mind, the VMOS VN66AF will take almost any abuse that it may be submitted to. Its chief advantage is its tendency to shut down as it gets hotter, effectively protecting itself.

In operation, the output of IC2 is decoupled via C8, and applied to the gate of TR2, the VN66AF. This is quite capable of 5W output when biased to class A conditions, indeed my original design included an audio transformer in the drain circuit in order to achieve this happy state of affairs. I subsequently rejected this component the low cost source of it could not be guaranteed as repeatable for amateur constructors. Instead the load is a 40ohm resistor which appears to do the job equally well albeit that the output at the amplifier drops to nearer 2W.

The VN66AF is biased into the linear portion of its transfer characteristic by the potential divider network R9 and R10, and a feedback network consisting of R12 and C10 has been introduced to guard against instability. The output of the circuit is AC coupled by C9 to the output transformer.

Construction

This concludes the description of the main board module. As stated in the first part, the circuitry has been arranged in a modular fashion with each module element made deliberately simple to allow a varied method of construction, such as Veroboard, depending upon personal preferences and to allow use of various physical sizes of components. Next month, I'll be detailing the audio peak and notch filters, to then allow a basic processor to be put together. The final part will detail the mains power supply and overall circuit arrangement and usage.

Starting on Sat

Arthur Gee G2UK, Chairman of AMSAT-UK, shows that satellites can be easy

Last month I described how amateur satellites came into being and what they could be used for. This month I will consider some of the principles involved.

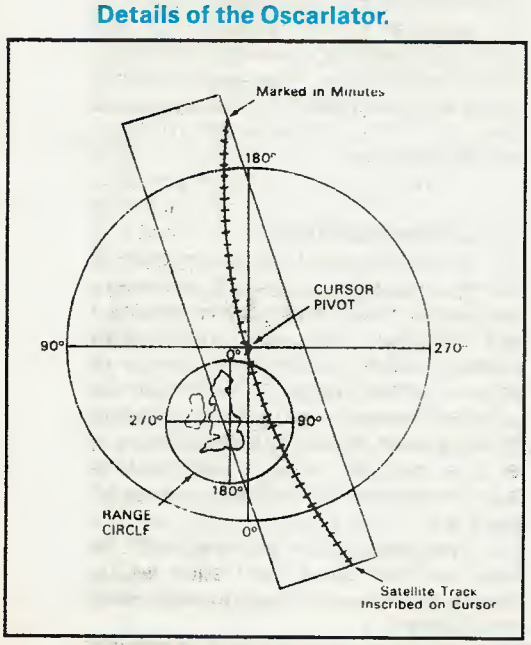
First, we need to know something about how the satellites stay up in space and what sort of path they take travelling around the world. An amateur radio satellite is more or less like an amateur radio repeater flying through space in an orbit around the earth, keeping more or less to the same orbit day after day. The sort of orbit it takes in its path through space can vary from a circular one around the earth to a very elongated one. After launch, the orbit it takes depends on a number of factors, the main one being the balance between the centrifugal force derived from the launch procedure and that from the gravitational forces from the earth. The second factor is that once in orbit, it remains in the same track round and round the earth. The earth on the other hand is rotating around its axis once each day, so that whilst the satellite maintains its orbital path, the surface of the earth is rotating below this orbital path.

This means that in order to send a radio signal up to it, one has to direct one's aerial both in the azimuth i.e. horizontally, and in elevation i.e. vertically, from the horizon. Just to make things more difficult, one has to know where one's QTH is on the surface of the earth.

You can get a good idea of what all this means in reality by getting a small globe of the world and a fixing ring of wire around it going from pole to pole, about a centimetre or so above the globe's surface. Slip a small plastic bead on the wire before attaching it to the globe. Then you can spin the globe around on it's pivot and at the same time move the bead along the wire representing the satellites orbit, you will then see how complicated the satellites position in relation to a place on the earth's surface is.

It is possible to represent these motions on a flat surface which simplifies things greatly, and at the same time provide the basis for a tracking calculator by means of which we can calculate the place, time, and position of the satellite in its orbit around the world. Once we know this, we can direct our beam aerial towards the satellite. Such a calculator known as a 'Satellite Orbital Tracker'.

Details of the Oscarlator.



Oscalator

One of the most convenient of these is the 'Oscalator'. It consists of a sketch map of the northern hemisphere of the world, which can be stuck on a suitable piece of thick cardboard or thin plywood. The north pole on the map is positioned on the centre of the board. A transparent plastic cursor is provided which is engraved with a line representing the track of the particular satellite for which it is to be used.

Satellite orbits may vary a little, so each satellite needs a different cursor of its own. The mid-point of the track on the cursor is marked and the track is engraved with a line showing minutes of time, 0-47.5 in the example shown here. The cursor is fixed to the map at the North pole point in such a way that the cursor can be moved around the fixing point.

In addition to this map tracking board, one needs an Orbital Prediction Calendar. This is a small booklet of printed figures which tells you just where the satellite's orbital path is in relation to the map. It gives the times when the satellite crosses the equator, known as the EQX, the longitude of this crossing and much else. These calendars and the parts for making up the Oscalator can be obtained from Amsat-UK, the organisation which looks after the interests of satellite enthusiasts in this country. The address to write to for information is; Hon. Sec. Amsat-UK, 94 Herongate Rd, London, E12 5EQ. From the diagram illustrating the Oscalator you will see that the map is calibrated from 0 degrees, i.e. south, round in a clockwise direction, through west to 180 degrees north, through east at 270 degrees, back to south again.

How does one use it? Let's take an example. Suppose we want to track Oscar 13 for Tuesday, October 9th. Looking up the entry for the satellite for this day we find a table of figures for this satellite in the calendar. The appropriate part of the Oscar 13 table is shown in **Table 1.** We see that at 0500 UTC, Oscar 13 is 16,184km distant from London, upon which the calendar is based, and that it will be at a point on its orbit at azimuth 144 degrees. This tells us that at this time, our aerial must be pointing with a bearing of this figure. The rest of the figures show what the azimuth for the aerial heading must be for other times during the day. It also shows the 'elevation' our beam should be raised to for best reception. This matter we will deal with in greater detail later when we come to consider aerials for satellite use.

The other figures in the table we can ignore at this stage. Oscar 13 is in a somewhat unusual orbit, i.e., an elliptical one for which we do not need our Oscalator as the calendar itself tells us all we need to know, we will deal with this later on. It is quoted here to indicate what you will find in the calendar, which is quite different from the tables for some of the other satellites for which the Oscalator must be used.

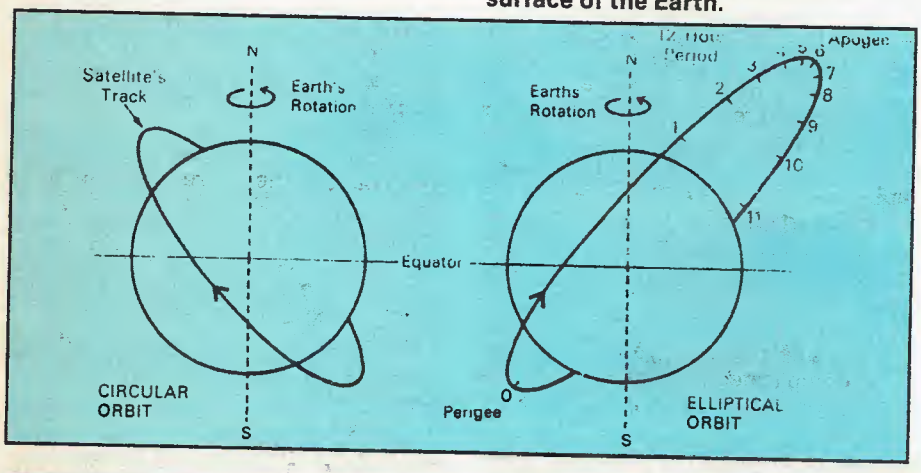
Table 1. Orbital Prediction Caler

Tue 9 Oct 90 Oscar 13 Rev:1779

Time	Range	EL	AZ
05:00	16184	1	14
07:00	30601	51	12
09:00	37004	73	13
11:00	36247	88	16
13:00	27651	83	1
15:00	9851	24	10
15:10	9375	1	10

ellites

The two classical orbits for amateur satellites and their relation to the surface of the Earth.



the position and direction of the satellite and the times it will be over various points on the Earth's surface. We can then run our finger up the cursor track until we are over our QTH, and add the number of minutes shown on the calibration of the cursor track to the time the satellite crossed the equator, which will give us the time the satellite will be over our QTH. For convenience, the table also gives two other times for the satellites. The second of the times shown is for around mid-day and the last one is for the evening. Subsequent or previous orbits can be calculated by adding or subtracting the figures shown at the top of the table.

Software

There are of course other ways of predicting orbital data for satellites. One much used by radio amateurs is of course by using a computer. If you are a 'computer buff' you may prefer to put your home computer to good use by using it for your satellite predictions, however using a computer is to some amateurs, more complicated than the simple system outlined above. There is a mass of software which will do all sorts of wonderful things of interest to the amateur satellite enthusiast. However, the purpose of this article is to try to show readers that it is possible to get into satellites in a simple and not too expensive way.

Next month we will deal with the radio side of the matter, such as the receiving, transmitting and the aerial requirements.

Table 2. Circular orbit satellites calendar

This calender has been compiled using Satscan-II V3.01 software. Three orbits are given for each day. These will normally be the first, last and mid orbits within range of some point within the UK, but there will be exceptions. Subsequent or previous orbits may be calculated by adding or subtracting the figures shown below. The times given are the times the satellite crosses the equator, here it will either be moving north (Ascending Node >) or south (Descending Node <).

Oscar11 Per 98.32 Inc 24.58	**Oscar14** Per 100.85 Inc 25.21	**Oscar15** Per 188.88 Inc 25.22	**Oscar16** Per 100.84 Inc 25.21	**Oscar17** Per 100.84 Inc 25.21
Oscar18 Per 100.83 Inc 25.21	**Oscar19** Per 100.83 Inc 25.21	**RS10-11** Per 105.01 Inc 26.38		

Oscar11	06-10-90	07:23:59	157.3<	17:13:52	304.8>	22:08:48	18.5>
Oscar14	06-10-90	09:23:46	160.4<	17:48:00	286.5>	22:50:33	2.1>
Oscar15	06-10-90	00:38:04	28.4>	14:05:04	230.1<	22:29:26	356.2>
Oscar16	06-10-90	00:33:46	27.7>	14:00:30	229.4<	22:24:42	355.5>
Oscar17	06-10-90	00:22:45	25.0>	13:49:27	226.7<	23:54:29	17.9>
Oscar18	06-10-90	08:20:42	144.4<	18:25:41	295.7>	23:28:11	11.3>
Oscar19	06-10-90	08:02:36	139.9<	14:45:54	240.7<	23:10:02	6.7>
RS10-11	06-10-90	00:12:26	131.0<	14:12:30	342.0>	22:57:32	113.9<

SQ	R-R	MA	M
82	2.3	19	B
28	1.4	64	B
7	0.4	108	B
9	-0.6	153	B
29	-1.9	198	S
111	-1.6	242	B
136	0.1	246	B

Circular Orbits

When we come to satellites with a circular orbit, we need a rather different set of data. Take a look at **Table 2**, showing a calendar for circular orbit satellites. Let's say we want to track the Russian amateur radio satellite RS 10/11. As this is in a circular orbit it will only be visible from our QTH for a short period of its orbit. Finding the entry in the calendar for RS 10/11, we can see an entry for 06-10-90 of 00:12:26 (hours, minutes, seconds). This is a 'reference orbit', the first one in the day. It means that at 00:12:26 it will be passing over the equator at 131.0 degrees latitude. So if we turn the cursor round on the Oscalator until the track line is over 131 degrees latitude, we can see

9600 Baud Packet

Phil Anderson W0XI dispels the mysteries of 9600 baud packet

Over the last twelve months, a number of 9600 bits-per-second (BPS) packet stations have begun to appear in the USA and Europe. Prior to that a handful of stations were occasionally on the air, experimenting with various methods for 9600 baud transmission, and a few network groups developed and either used or are using ad-hoc systems. Although one system is often used more widely than others, no official standard has come along to allow clubs, sysops, end users and manufacturers to use matched equipment. To our knowledge, no standard has been adopted by any ad-hoc committee or society committee either.

Of the systems used, the one adopted most often so far is a PC board kit compiled by James G3RUH. His method, similar to that described earlier by Steve K9NG, utilises a direct frequency shift key (DFSK) form of modulation. This is also the form adopted by several packet manufacturers for their add-on or plug- in modems.

At the same time, some Japanese amateurs have experimented with using a 'Telco' chip at 9600 baud, and many such systems have been reported to be operational in Tokyo. The advantage of using a Telco chip, perhaps, is that some off-the-shelf rigs may be utilised. The down side appears to be that long TXDs (TX Delay times) may be required.

The advantage of using the DFSK approach is that it is simple and works well, including short TX delays. The down side for DFSK is that, with few exceptions, the FM rigs must be modified. It is necessary to gain access to the varicap or frequency modulation section of the transmitter and to pick off reception at the product detector or discriminator of the receiver. Traditional audio processing must be avoided, in fact bypassed! So far, a few rigs have appeared on the market that provide for these functions such as the Kantronics DVR2-2.

With the number of DFSK systems installed and with the current TX delays too long for Telco chips, it appears that DFSK may be approaching a de-facto standard for 9600 BPS systems for 2m and 70cm for the amateur service as well as being used currently for inter-node links on 23cm in the UK. With this in mind, I thought it appropriate to present the essential elements of this modulation form. Details on circuitry and implementation for the boffins can be found in the various 9600 baud modem handbooks

To present the essence of DFSK, it's necessary for us to first review a number of topics, Non-return-to-zero data (used in AX.25 packets), any regulatory rules regarding allowed bandwidths for FM amateur channels, and FM modulation theory. Once we've re- examined these topics, the design just 'falls out.' This is as it should be, after all if the radios are ready for high speed data, the modems ought not to be complicated. Let's start our adventure with another look at NRZI.

NRZI Data Format

AX25 packets are coded in the non-return-to-zero format (NRZI) as shown in the accompanying diagram. Sample binary data is shown at the top, the basic return-to-zero digital format next, and the NRZI format last. Note that with NRZI, a change in level occurs only when the next bit of data is a **zero**. Alternatively, change with a ONE could have been used.

The immediate effect of using NRZI is to halve the data rate! This saves spectrum. The fastest square wave for 9600 bits per second, sending all zeros using NRZI, would be 4800 baud. Data with a mix of ones and zeros as shown in the diagram, spreads transitions out even further.

A secondary effect of using NRZI or some other formats is to add a varying DC component to the data. This would be true of the basic return-to-zero format also but not for codes such as Manchester, shown last in the diagram. Basically, one trades off redued spectrum for more difficulty in recovering receive clock for the data. Another way of saying this is that one can design a system with reduced bandwidth requirements but more circuit complexity.

So how can NRZI help us with our 9600 bps packet system? How much bandwidth will our 4800 baud NRZI scheme need? Perhaps most important, what bandwidth will the signal fit in? Let's look at the bandwidth first.

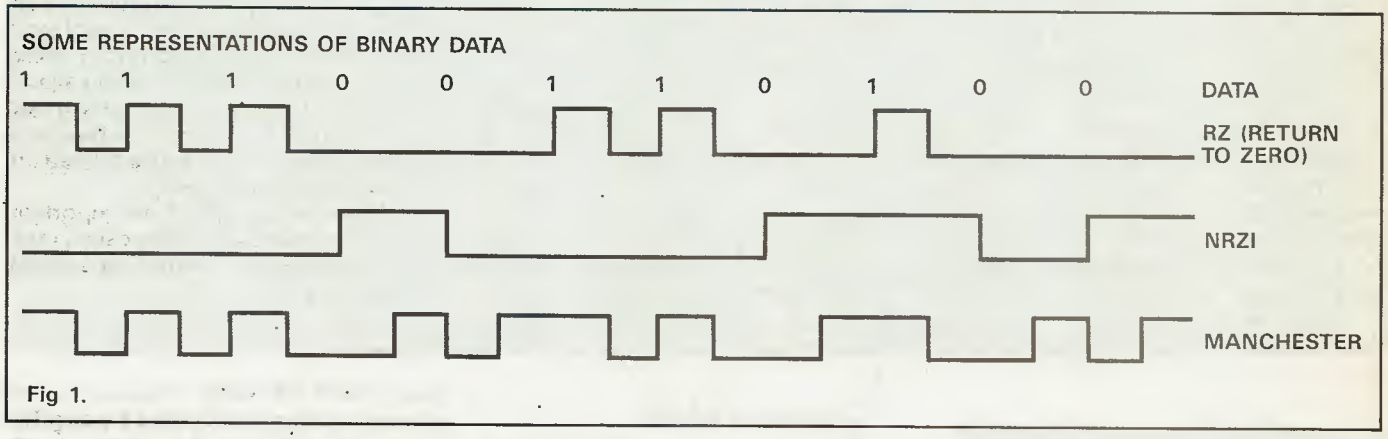


Fig 1.

FM Spectrum of a 9600 BPS Signal

Fortunately, if we shape the data going to our FM transmitter carefully, we have sufficient bandwidth. To see how this works out we must re-examine the spectrum generated by a narrow band FM transmitter.

To keep our example simple, let's assume that we wish to modulate the FM transmitter with a pure audio tone, say 1 kHz. As you may recall, the resulting FM signal will consist of a number of components, a carrier plus sidebands, spaced apart at multiples of the 1 kHz tone. In

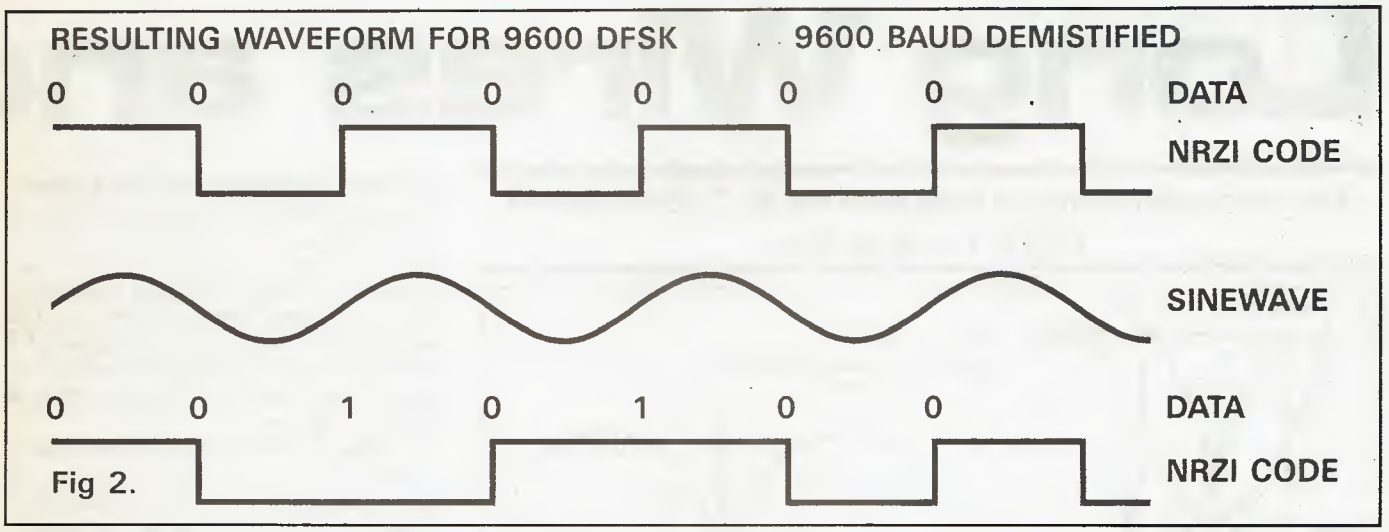


Fig 2.

general, the spacing of the sidebands is dictated by the frequency of the modulating signal, in our case the 1 kHz tone. However, the amplitude of these sidebands is proportional to the ratio of the amplitude to frequency of the modulating signal. This ratio is called the modulation index of an FM signal.

To put it another way, let's consider frequency deviation of the carrier by the modulating signal. Deviation of the FM signal (actually the RF carrier) is determined by the amplitude of the modulating signal, in this case our 1 kHz tone. The peak voltage of our audio tone determines the frequency deviation of our RF carrier, producing an FM signal. Then, the ratio of the peak deviation in frequency at RF to the frequency of our modulating signal is defined as the modulation index.

Let's calculate a few examples. Assume that our 1 kHz signal has a 200mV peak-to-peak signal and that the resulting FM signal deviates from the RF carrier by +/-3 kHz. Then, let's assume that our 4800 NRZI square wave also has a peak-to-peak value of 200mV; hence, it too will cause the carrier to deviate +/-3 kHz. However, these two signals will generate different FM spectra. First, the 1 kHz tone will generat sidebands at multiples of 1 kHz away from the FM carrier. For the square wave, each of the Fourier components making up that square wave will generate additional FM sidebands of their own, generating many sidebands.

The key to reducing the sidebands is to limit the modulation index! In other words, the way to limit the 2nd, 3rd, and 4th multiples of the 1 kHz tone is to limit the deviation of the FM carrier relative to 1 kHz. Roughly, a ratio of one or less will limit the sidebands of an FM signal to just one on each side of the carrier. Another way to say this is that by limiting the modulation index, one can limit the spectrum of an FM signal.

Still further, such a signal is, by definition, called a narrow band FM signal. Additionally, curiously, an FM signal limited in this way looks much like an AM signal with carrier and just two sidebands!

For more detail, if you wish, just consult any number of engineering texts that derive the above results and generally provide a table or graph of Bessel functions, used to calculate sideband amplitudes. This maths is out of place for this article.

Therefore, to stay within normal bandwidth limits, our 9600 bps system (or 4800 NRZI baud system) must limit the deviation of our carrier to somewhat less than plus or minus 4800Hz. Secondly, the frequency content of our modulating signal must be kept low also, in order to generate no more than the fundamental sideband, in our case plus or minus 4800Hz each side of the carrier!

Resulting TX Modulation Design

Hence it would appear that we cannot allow the pure 4800 NRZI signal to modulate the FM transmitter directly. A large spectrum would result, particularly if the modulation index were large for some components of the audio signal. So, our next option is to shape our modulating signals like those shown in Figure 2.

The first data stream is the simplest, that of continuous data zeros, resulting in an NRZI square wave. We could simply limit the audio frequencies of the square wave to the fundamental only, hence a sine wave at 4800Hz! A simple method would be to pass the NRZI signal through a very sharp low-pass filter.

For the more general data case shown second, the modulating signal should be smoothed as shown. This can be accomplished by the use of a good filter or by using EPROMS and a digital-to-analogue converter, generating exactly the shape desired given the input data stream. In this way, the spectrum of the resulting FM signal can be controlled and kept within specifications.

Then, with proper clock recovery and demodulation, the waveforms would be more than sufficient to provide a 9600 bps (4800 baud NRZI) system.

Reception of DFSK or Shaped FM

Without going into detail, the biggest problem in recovering data from a stream such as that shown is to recover a 'clock' from the data first. Assuming that a scrambler has been added to each end of the link (for other reasons too), there are plenty of reversals in the data allowing the use of a digital or other phase lock loop to recover the clock. Once the clock has been recovered, the data is lined up and can be sampled easily.

While carrier detect is important too, for channel access purposes in the packet system, we'll leave that subject for another time.

Conclusions

So, the real problems all along for 9600 bps systems for 2m FM have been the availability of appropriate radios and a way to limit the FM spectrum to stay within the desired bandwidth. We see that given the ability to deviate an FM transmitter by a desired frequency amount and by tailoring the shape of our modulating signal, that we can indeed run 9600 bps within desired limits.

The challenge now is to find those radios that can be modified to control deviation, that switch quickly between transmit and receive, or to design the radio decks desired. At present there are now some off-the-shelf transceivers that allow this, and no doubt more will come along in the future.

Long Wires and

Ever thought of using a long wire on 2m? Dave Ackrill G0DJA tells us how

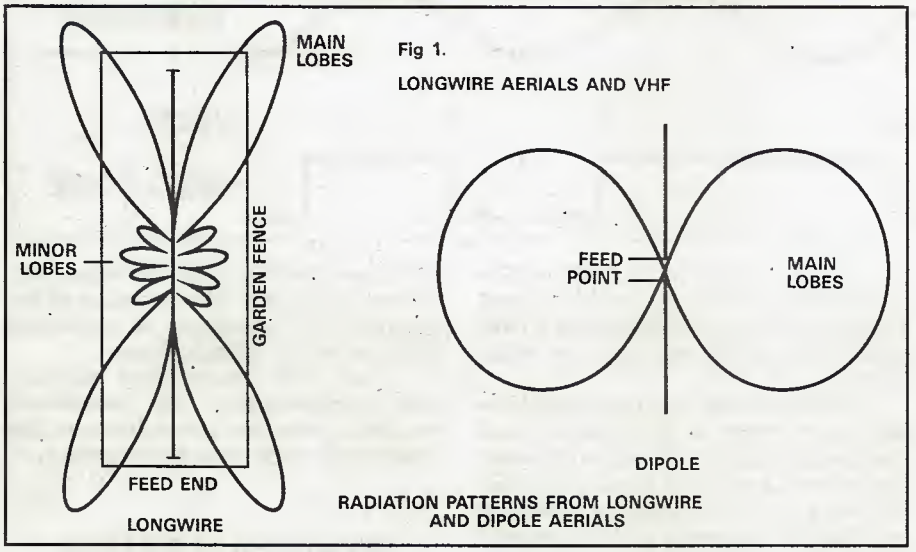


Fig 1.
LONGWIRE AERIALS AND VHF RADIATION PATTERNS FROM LONGWIRE AND DIPOLE AERIALS

A long wire aerial has usually come to mean a physically long length of wire which has been stretched out, usually horizontally, along a garden or other available plot of land. But a true long wire aerial should be over three wavelengths long on it's operating frequency. This would mean for example that on the 10m band the aerial would need to be at least 30m long. My own back garden would only just be long enough for this! But there's another use for long wires besides HF ...

VHF Long Wires

By using a higher frequency, the shorter wavelength means that a physically short length of wire will act as a 'long wire'. This means that on 2m, an aerial 8m long will produce a gain of 3dBd (i.e. 3dB gain relative to a dipole), not bad. At 10m long a wire will show a gain of 4dBd and a 30m long wire will show a gain of about 10dBd, which is comparable with a seven element yagi on 2m. Obviously long yagi aerials of fourteen elements or more will give greater gain, but several advantages of long wires over large yagi arrays should be remembered, i.e.;

a) Long wire aerials are easier and cheaper to build.

b) A long wire does not use a rotator.

c) Long wires will not blow down as easily as large yagi arrays. Should a long wire blow down it will be easier and cheaper to reconstruct than a yagi, plus a long wire will cause less damage on the way down!

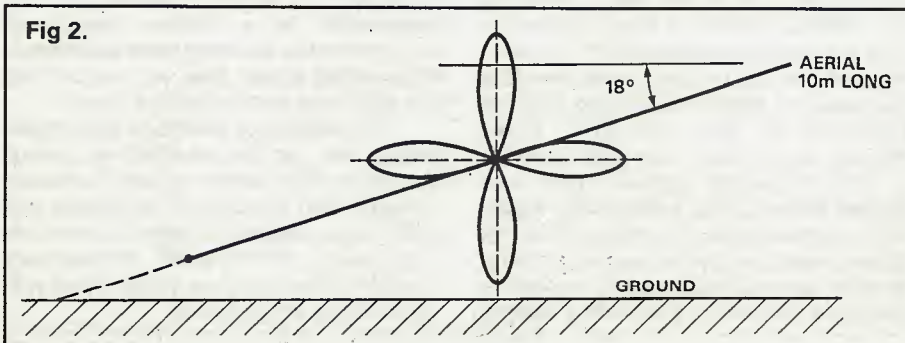
How Long Wires Work

A long wire will not show significant gain over a dipole until it is more than four wavelengths long. This is because the electromagnetic fields which radiate from the wire don't combine at a particular point in space as they do with a half wave dipole, this means that there is no one place from which the fields appear to be in phase. So the field strength at any distance from the aerial is always less than would be measured if the wire were cut up and made into separately driven dipoles, although this would require each dipole to be matched and phased properly, and would make the system less attractive to build than a simple long wire.

Now once the length of the wire is increased to over four wavelengths, the fields along it form 'lobes' of radiated energy. If the length is increased further, these lobes become sharper and tend to radiate off the ends of the wire, rather than across it as with a dipole, see Fig. 1.

Although this suggests the long wire is bi-directional, you'll often find that the aerial radiates better in one direction over all others. This is partly because, in a theoretical aerial at least, each half wave section of the wire will theoretically carry equal currents. In fact some energy is radiated as the current travels along the wire, if it didn't then the aerial wouldn't work at all! This will mean that the aerial is not completely symmetrical.

In many cases, the long wire aerial will not be completely mounted horizontally even ignoring the sag in the middle, and often the wire will slope down from the feeding end to the far end. Now if a long wire of ten wavelengths is tilted down by 18 degrees to the ground, then the radiating lobes will be aligned as shown in Fig. 2, this will result in a signal which radiates both horizontally and vertically. This can sometimes be useful, but ground effects will complicate these lobes.



HORIZONTAL AND VERTICAL LOBES BY TILTING LONGWIRE AERIAL

Rhombics

Another type of long wire aerial is the Rhombic. This comes in two forms, the 'resonant' Rhombic which is unterminated, and the non-resonant Rhombic which has a resistor connecting the legs of the Rhombic at the far end away from the feed point.

The resonant Rhombic has a bi-directional radiation pattern, this means that it will radiate most of the energy fed to it in two directions as shown in Fig. 3. There are also some minor lobes in other directions, the intensity and direction of these depend upon the number of wavelengths of wire per leg.

The non-resonant Rhombic has the same physical shape as the resonant Rhombic, but a resistor is used to con-

nect the far ends of the wires which make up the legs of the aerial. This causes the radiation pattern to become unidirectional and the signal is at maximum in the forward direction, as shown in Fig. 4.

ances in the order of 700- 800 ohms, and the resistor used to terminate the aerial should have a resistance value slightly higher than this. A value often used is 800 ohms, but some designers recommend 600 ohms. Experimentation will often show which value is best.

The only really important point to remember about the resistor is that it should be as nearly purely resistive as possible. A non-inductive type of carbon resistor will perform adequately, but it is important to avoid wire-wound resistors at all costs! The resistor should be capable of dissipating around 50% of the average transmitter output power without over- dissipating. An alternative is to connect the resistor to the terminating point via. a length of 800 ohm open wire feeder made of resistance wire which will dissipate some of the power before it reaches the resistor. This will enable a lower power resistor to be used.

The length of open wire feeder isn't critical as it is non- resonant. There are other constructional designs which will reduce the capacitance of the feeder etc., but in practice I have used several carbon resistors in parallel to terminate a Rhombic without any noticeable problems.

Rhombic aerial is around 800 ohms and balanced, where a coax is unbalanced. This requires a system of matching the rig to the aerial, and a suitable aerial tuning unit (ATU) is needed. HRT Dec 83 carried a suitable constructional article for matching long wires at VHF, and commercially made ATUs are also available. Care should be taken when choosing an existing aerial to load up on VHF, as any traps or coils will mean that the aerial will not work well, these will form a high impedance, this also being the reason why wire wound resistors cannot be used as terminating resistors for VHF Rhombic aerials.

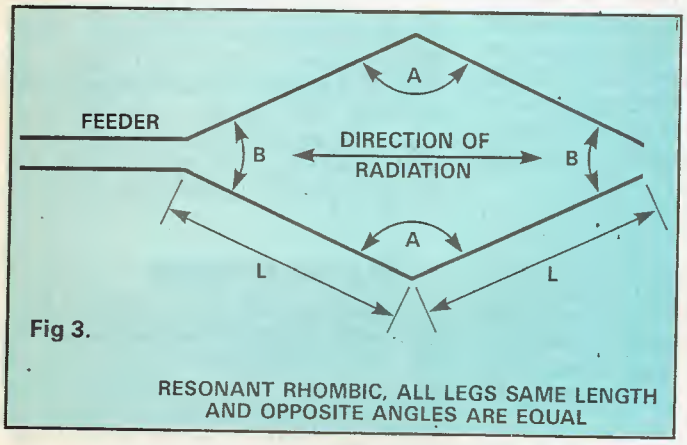


Fig 3.

RESONANT RHOMBIC, ALL LEGS SAME LENGTH AND OPPOSITE ANGLES ARE EQUAL

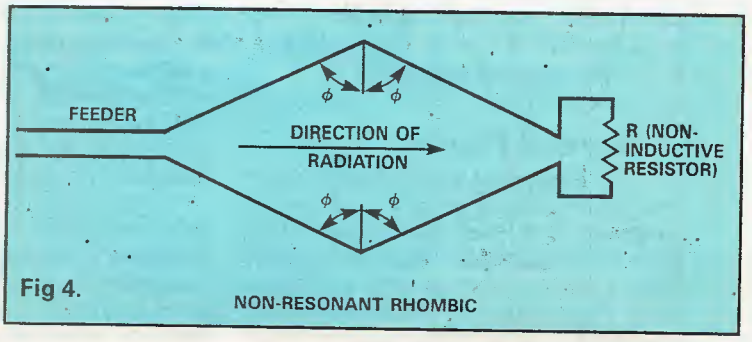


Fig 4.

NON-RESONANT RHOMBIC

Angles

To achieve maximum forward gain, the 'theta' angle shown in Fig. 4 can be found in Table 1. Gain figures for Rhombic aerials are given in Table 2, and these figures allow for a power loss of 3dB (50%) which is dissipated in the resistor. The power dissipated is probably less than this 50% but there will be some power loss due to the resistance of the wire from which the Rhombic was constructed. Hence 3dB is probably representative of the overall loss in the aerial system. The losses mentioned represent the energy which would be radiated in the other direction by the resonant rhombic, so there will be no power lost from the wanted direction of radiation.

Impedances

Rhombic aerials have input imped-

Matching

Most modern VHF rigs operate into 50 ohm impedance but the input to a

Feeder Hints

Open wire feeders are useful for feeding long wires and Rhombics on VHF. However, the red plastic 300 ohm feeder which has solid insulation between the conductors should be avoided, the insulation used in this type of line is very lossy at VHF. Another advantage of using an ATU and open wire feeders to long wire or Rhombic aerials is that losses on coax are far higher than for open wire feeder, plus open wire feeder can easily be constructed and costs less than coax.

So next time you're faced with paying large sums of money for an aerial for 2m, think about loading up the wire which you would normally use on 80m and see how it performs as a true long wire. It won't cost you a lot and you might even be pleasantly surprised with the results. It will certainly give the stations you contact something to talk to you about!

Table 1. Theta Angle

Number of wavelengths per leg	Theta angle
1	45 deg.
2	55 deg.
3	61 deg.
4	65 deg.
5	69 deg.
6	70 deg.
7	71 deg.
8	72 deg.
9	73 deg.
10	74 deg.

Table 2. Gain of non-resonant Rhombic over a dipole (assumes 3dB loss in terminating resistor)

Leg length in wavelengths	Gain over dipole (dB)
1	5
2	8
3	10
4	11
5	12

NOVICE NOTES

Verticals on HF can be useful or useless, depending on your needs, Harry Leeming G3LLL tells us

"I'm thinking of putting up a vertical for 80-10m, do you recommend this?" Vertical aerials can work very well but they do have snags and special characteristics which you should be aware of.

Ground Plane

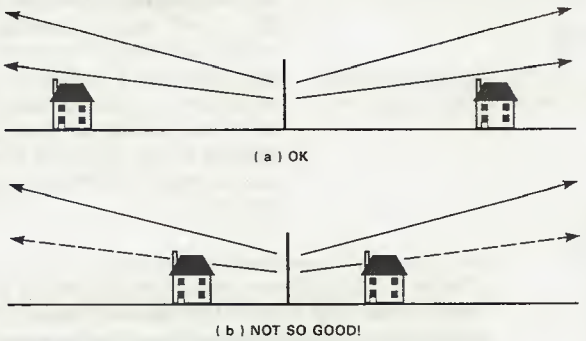
The performance of a quarter wave vertical aerial depends very much on the earth return. I once carried out some tests to compare a 8m high, £170, base station 80-10m vertical with a mobile whip. The base station aerial was set up in a field with a set of radials thrown over the ground, the mobile whip was set up on the roof of my car in the same field. Everything was checked and tuned up with an SWR bridge, and as would be expected the 8m base station aerial had a wider band width. As the tests were really intended to check the efficiency of the mobile whip when compared with the much larger unit, the shock came when I found out that provided it was operated near resonance, the mobile whip outperformed the 8m vertical on every band by just over an 'S' point.

The SWR on the 8m vertical was excellent and everything was set up as it should be. It looked very impressive, why didn't it not perform a miserable 2m long mobile whip? The answer was that at ground level, the handful of radials just couldn't compare with the metal body of a car when operating as a ground plane. An American magazine once published some tests to find out how many radials were required for maximum efficiency on a multi-band vertical. The author started with four radials, then added a few at a time noting the improvement on a distant field strength meter. With 82 radials installed, the performance was still getting better, and the conclusion seemed to be that several hundred would be the optimum number!

In summary, it doesn't seem to matter much what make of vertical you buy providing it stays up, as 90% of the performance is in the ground. The BBC go to great lengths in measuring ground conductivity when deciding on a site for a medium wave broadcast transmitter. Once they have done this, they bury tons of wire in the ground.

Radiation Angle

The radiation from a vertical aerial is, or should be, at a low angle. Low angle radiation is what you want for working DX beyond a thousand miles or so, it isn't much use for working short skip such as inter-UK on 80m. To be effective, a vertical aerial should have a clear path to the horizon at an angle of around 15 degrees, see Figs. 1a and 1b. Remember it's the high current part that radiates, and this is normally the part nearest to the ground. If you particularly want to receive interference from vacuum cleaners, electric razors and TV line time bases a vertical aerial installed as Fig. 1a has much to recommend it! Much interference seems to be vertically polarised and this together with low angle sensitivity does tend to make vertical aerials noisy.



(a) OK

(b) NOT SO GOOD!

Fig 1.

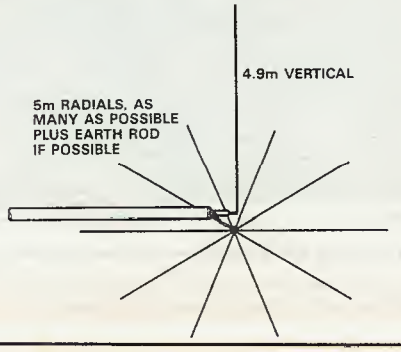


Fig 2.

VERTICAL HF AERIALS

Verticals prone to TVI and BCI

Low angle radiation and plus vertical polarisation does often cause more trouble in this direction than the use of horizontal aerials. It stands to reason that any aerial which picks up a lot of noise from adjacent electrical wiring, TV sets and is also going to pump back RF energy in exactly the same direction.

It's not all black

I have purposely emphasised the bad points of verticals because they are too glibly glossed over in some ads, I simply do not like promoting anything that causes dissatisfaction. Verticals can produce marvellous results and I know several amateurs who work the world with nothing else. So if you are interested, try one without spending a lot of money, Fig. 2 shows a simple 14MHz minimum cost vertical.

The vertical section of this can be made with nothing more expensive than a couple of garden canes and a length of insulated wire. As many radials as possible should be used and these should be about 5m each, or better still be replaced by a sheet of wire netting. The length of the 4.9m vertical section can be adjusted slightly until the SWR is below 2:1 across the band.

If the above home made system can be made to give satisfactory results on the 20m band, a commercial multi-band vertical should also give good results. If the home made aerial doesn't give acceptable performance in your locality, a commercially manufactured quarter wave loaded vertical will be no better, it will just be poor on several bands instead of only one. So don't waste your money!

In Conclusion

The best results reported to me from the use of verticals have been when they have been mounted on flat conductive roofs. If you don't happen to live in a tin hut, try lining the underside of your slates with wire netting, and then mount the vertical as low as possible on your chimney stack or on a wall bracket so that an earth lead of no more than 30cm can be run from the base of the vertical to the wire netting. Alternatively, consider just using a garage or shed roof and line this with wire netting.

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Beginners' Guide to 2m DXing

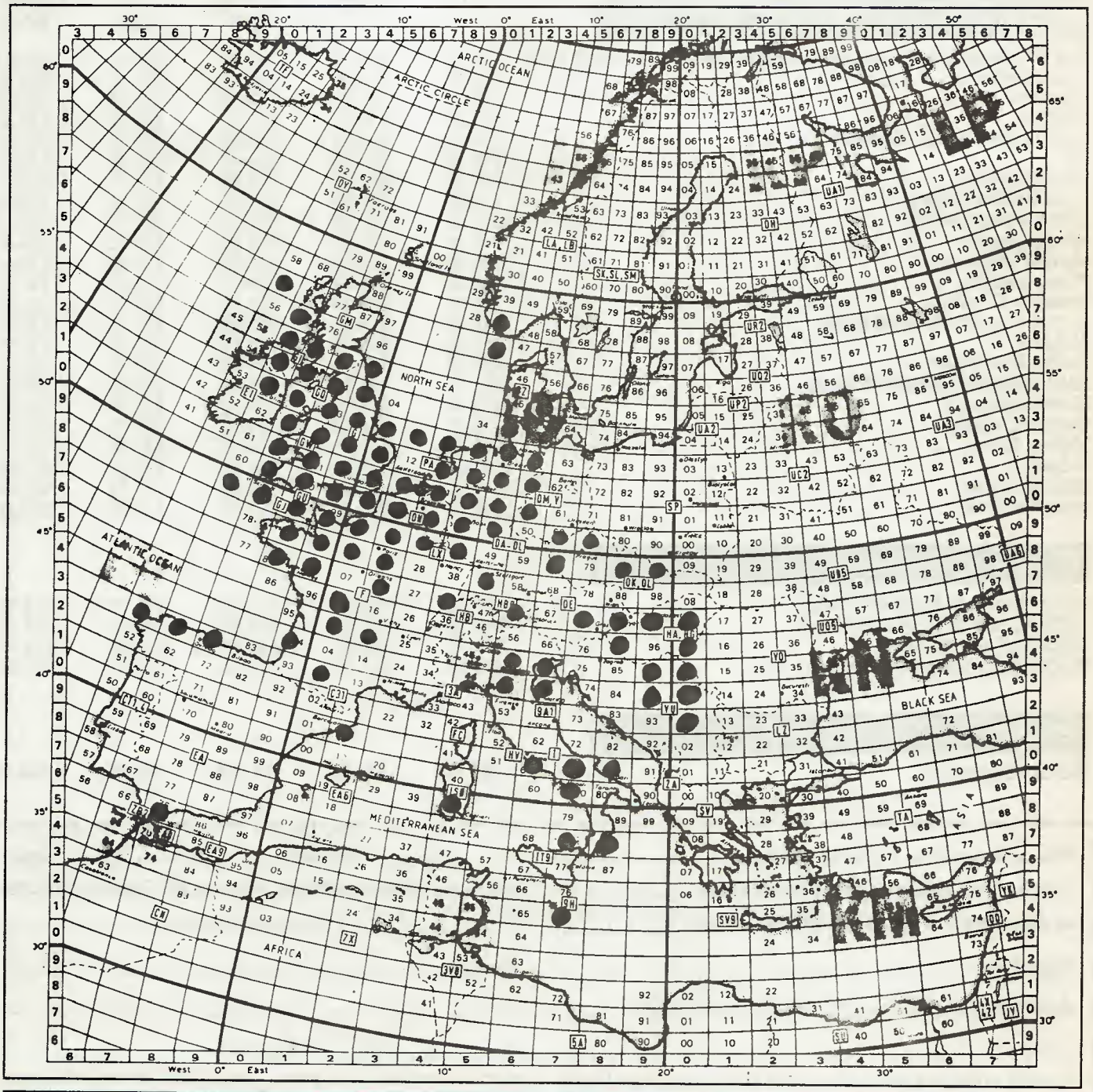
Paul Beastall G1WBZ shows newcomers to 2m how it's done

Most 'traditional' newcomers to amateur radio decide to start their career on the 2m band. There are many reasons for this but they could include the fact that there is plenty of activity on the band, and equipment can be bought fairly cheaply secondhand. Most people start on FM and are quite happy just working their friends within about a 30km radius, but as they settle into the hobby they often acquire the desire to work stations further afield.

Working DX

Working distant stations (DX) usually involves putting up a beam, and often using SSB as the transmission mode. With a reasonable although not

Fig. 1. Squares worked on 2m by G1WBZ with just 20W



elaborate setup it is possible to work stations over a wide area when conditions are right, Fig. 1 shows the map of IARU Locator squares that I have worked from Nottingham. All of the squares were worked using a very simple setup although I have improved on this now. The old system was an FT-290R, 20W amplifier and 9 element yagi on the roof of the house. With my latest system I have more power available, which can be useful but is certainly not essential for good results.

There are various techniques to working DX with simple equipment. Some stations may escape which could have been worked, but with patience it's amazing where you can be heard with 20W. To be successful requires a knowledge of the different types of propagation, how they can be used to the best advantage, and also a lot of patience.

Tropospheric Propagation

Tropospheric propagation (tropo) is the propagation mode which people generally refer to as a 'lift'. It's an enhancement in propagation caused by changes in weather conditions in the lower atmosphere. It is the most common form of VHF DX propagation and is most likely to occur during the autumn although it can happen at any time.

Tropo is probably the propagation mode most people come across first. Often the first example of DX people get on two metres is when a Dutch or German station calls into their local repeater, which often whets the operator's appetite for DX working.

Predicting a tropo event can be very difficult. It can be easy to say when an event will not occur, but a lot harder to say when one will! There *are* tools that can help an operator to try and predict good conditions, a barometer and weather map can be useful. A stable high pressure area (anti-cyclone) over Europe is a good sign, often this will not lead to good conditions but when the high pressure starts to decline, things often start to happen.

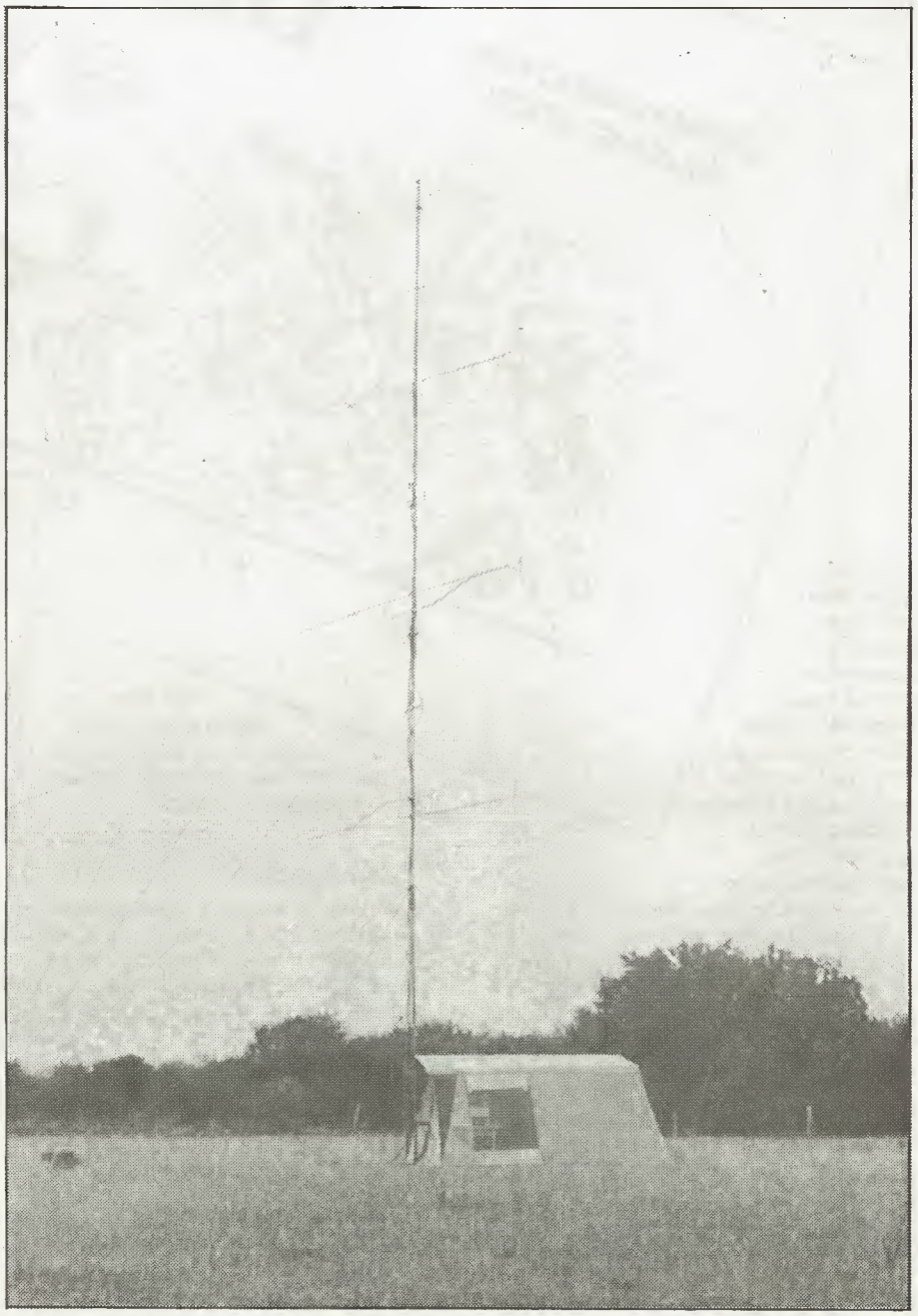
A tropo opening can provide some excellent DX, indeed some of my best DX ever on 2m has been worked via tropo. There are certain paths which yield excellent results, these are usually sea paths without any obstructions. One of the best known of these is the path from Hawaii to California, which is over a distance of about 4000km, another sea path which was worked in 1988 is the one from the UK to the Canary Islands. Although I heard signals from the Canaries they were not strong enough to work, but stations further west were receiving 5 and 9 signals, even on FM.

Check the Beacons

Having identified that conditions may be above normal, the beacon subband is then a good place to check. There are plenty of beacons around Europe which provide signals 24 hours a day with various beam headings. When you have been on the band a while, you will know which beacons you can normally hear and how strong they are, this means that it's very easy to identify enhanced conditions and identify the best direction for that opening. A listing of beacons is available from the RSGB for £1.37 to non-members or £1.16 for members including postage. The RSGB can be contacted on 0707 59015.

During a 'lift', many amateurs will just tune around the band and start calling 'CQ DX'. This is certainly **not** the way to work DX if you are only running limited equipment. If you're running 400W to four 19ele yagis at 25m, then calling 'CQ DX' could be justified, but with a normal station you will just cause unnecessary interference. Usually the best way to work the DX is to make use of your receiver, in a large tropo opening, the band will be filled with DX stations in good locations calling CQ. It is possible to work lots of choice DX by listening carefully and calling selected stations.

Another thing that you should be aware of is the 'pile-up syndrome'. This



The 76 ele 2m contest array of G4ZAP/P show why it's easy to work DX contest stations

is where if you hear a pile-up, amateurs join it straight away, and this is not usually the best way to work DX if you are using low power! Usually the very strong stations attract pile-ups, but if you tune around the band you will often hear weaker stations who are still workable, in the same general location. So *you* can work possibly three new squares while everybody else is busy trying to penetrate the pile-up!

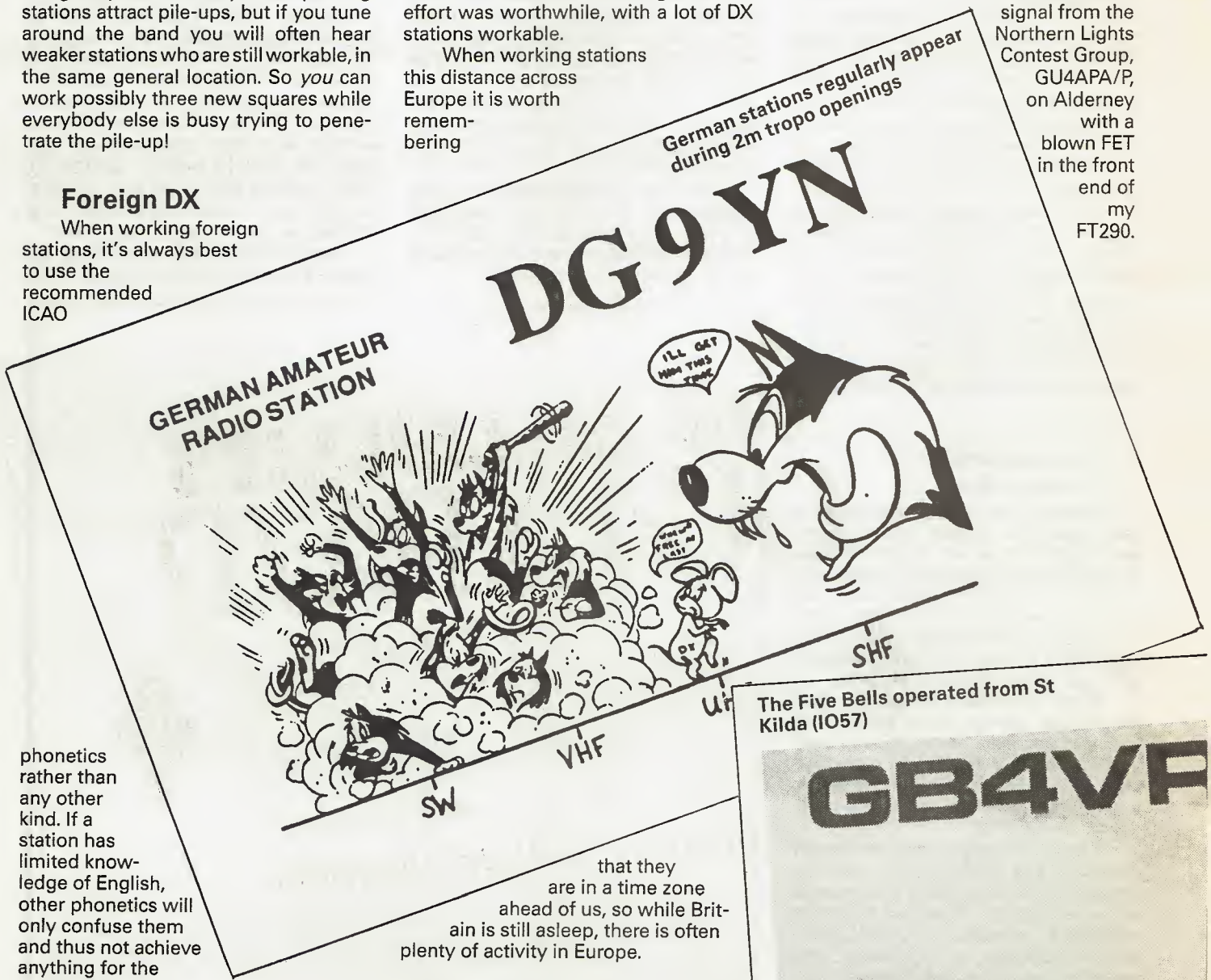
Foreign DX

When working foreign stations, it's always best to use the recommended ICAO phonetics rather than any other kind. If a station has limited knowledge of English, other phonetics will only confuse them and thus not achieve anything for the operator. If you have a knowledge of a foreign language, this can really help in DX working. For example if there is a pile-up that you really feel you have to penetrate, if you call in the DX station's own language he is more likely to answer you. I have done this many times when working German and Austrian stations.

If 2m is very good in an evening, then it can often pay you to get up early in the morning before going to work, often conditions are best just after dawn. I worked my best ever tropo DX ever in a morning, a OK3 station on the far side of Czechoslovakia, at about 7.30am. By 10.00am, the band was dead, this was at the end of a large tropo event which had started in France and moved round to Eastern Europe over a period of three days. I had worked stations in western Czechoslovakia the evening before the best DX, and so dragged myself out of bed at six o'clock the morning after. The effort was worthwhile, with a lot of DX stations workable.

When working stations this distance across Europe it is worth remembering that they are in a time zone ahead of us, so while Britain is still asleep, there is often plenty of activity in Europe.

German stations regularly appear during 2m tropo openings

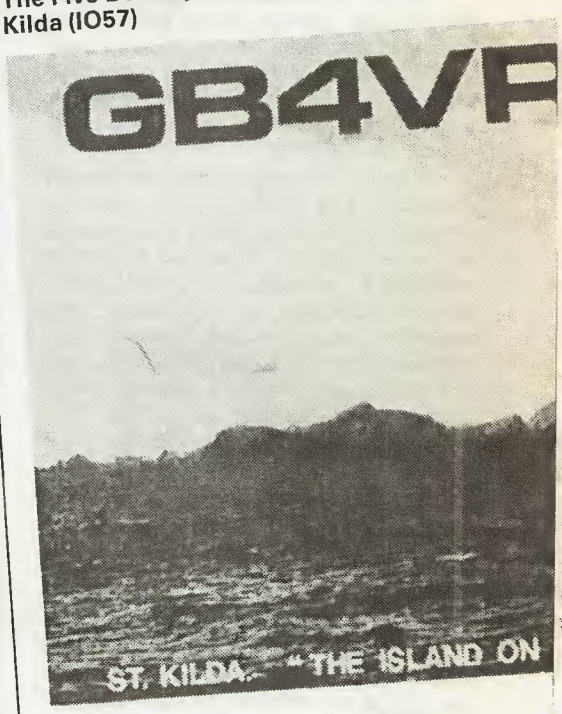


Contests

A contest is a very good time to be able to work into Europe. A big contest such as VHF National Field Day, held during the first full weekend in July, or the 2m Trophy/IARU Region 1 Contest, held during the first full weekend in September, is probably best. During these events there will be stations active throughout Europe, often with large antenna systems, high transmitter power and low noise preamplifiers.

With high performance receive systems such as this, some stations a good distance away are workable even with low transmit power. As contest stations often use high power transmitters, even if your receiver is not that sensitive it should be possible to hear quite a few of them. To illustrate this, in the Trophy Contest in 1989 I received a 5 and 8 signal from the Northern Lights Contest Group, GU4APA/P, on Alderney with a blown FET in the front end of my FT290.

The Five Bells operated from St Kilda (IO57)

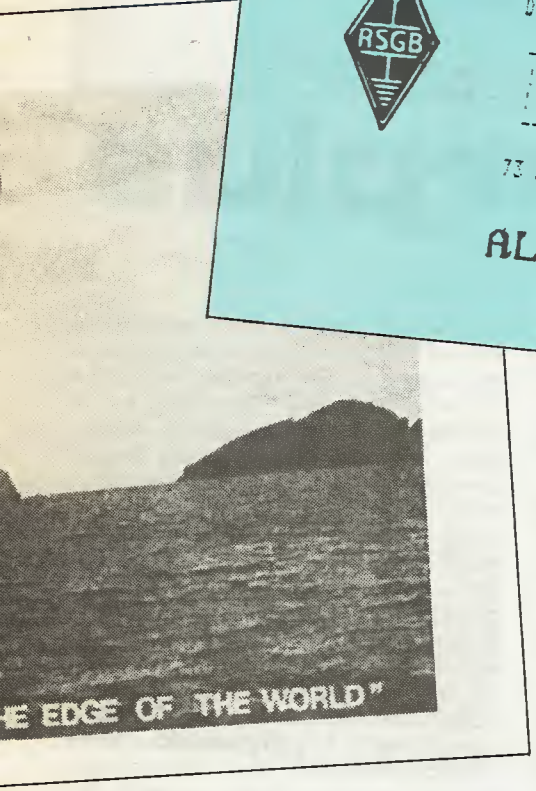


If you have never made a contest QSO before then it is a good idea to listen to a few before diving in head first. In a contest all that are exchanged are call-

signs, locators, a report and a serial number. The serial number is a number starting at one and indicates the number of contacts made. It is always given as a three digit number, hence zeros are added to the front of numbers less than a hundred. It is also given with the signal report, meaning you will normall hear reports like 'Five Seven, Zero Five Four' which means that it is that station's 54th contact and their report to the other station is 5 and 7.

If there is a particular station working plenty of DX stations in rapid succession, they will probably not welcome a relatively local station calling them at that time, it's better to wait until there is a quiet period and then call the station.

Contests are a good time to work that elusive location



Also don't feel put off if you receive a serial number of several hundred from a station while you are only on say 10 or 20. They will realise that you are not in the contest and will always be grateful for the points.

Expeditions

VHF expeditions are also a good time to be able to work a rare square or country, and groups such as the Square Bashers, the Five Bells and the Derbyshire Hills Contest Group all seem to have an annual expedition to rare areas. These expeditions are usually well publicised in HRT's monthly 'VHF/UHF Message' beforehand, with the frequencies the groups will be using on various bands given.

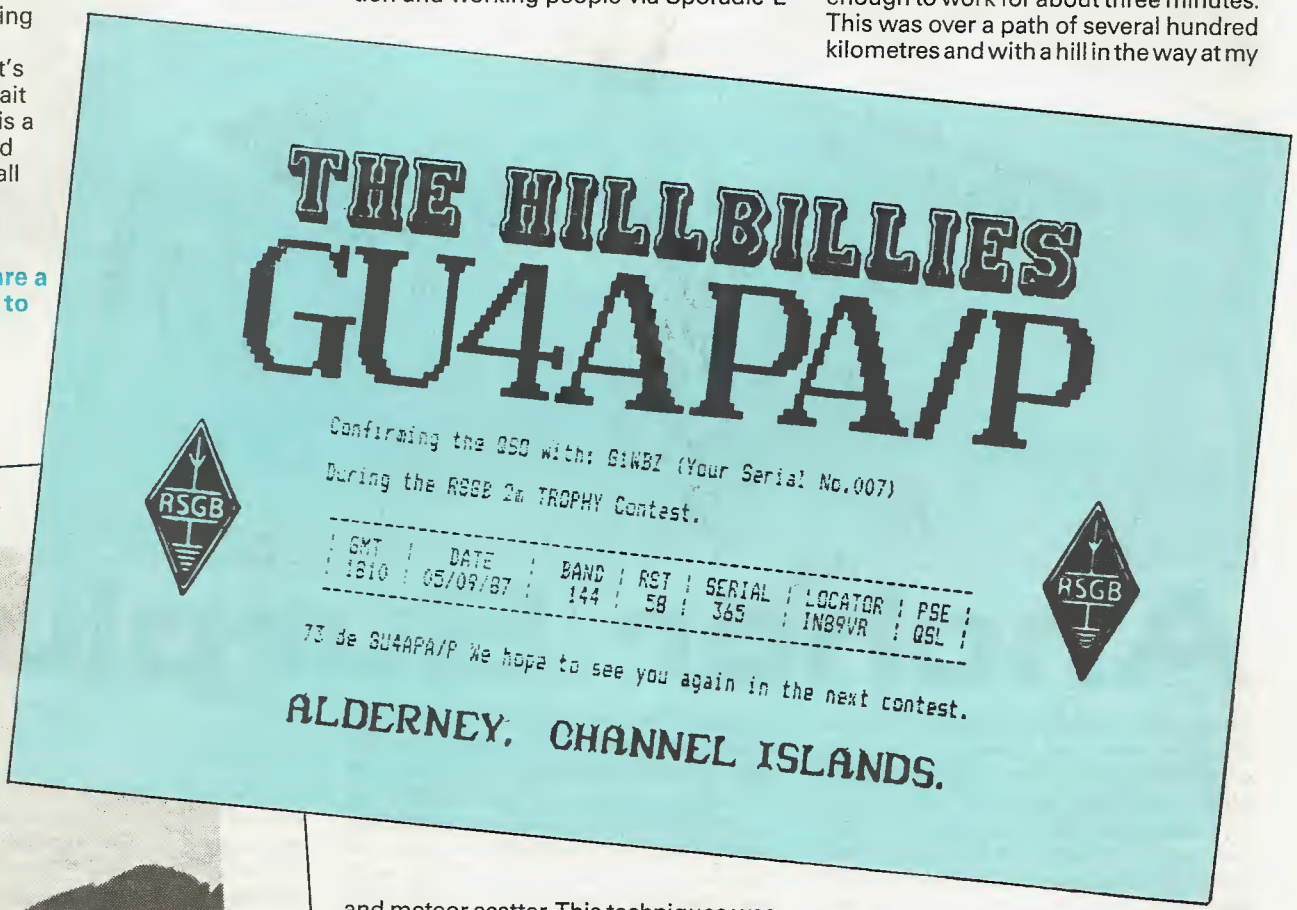
The Square Bashers have, in recent years, seemed to favour taking fairly simple equipment to a very exotic location and working people via Sporadic-E and meteor scatter. This techniques was used with great success in 1988 when, as ZB2IQ, the Square Bashers worked 22 countries on two metres in a fortnight via Sporadic-E, and this was all with a single yagi. They gave hundreds of operators throughout Europe a new country and square on 2m.

The Five Bells and the Derbyshire Hills Contest Group seem to take a different approach. They usually take large stations similar to contest stations, and work people via tropo and meteor scatter. These groups tend to operate nearer to home, with Eire and some of the Scottish Isles seeming to be favourite with these groups. Both groups often take arrays consisting of four yagis on 2m, as well as high power amplifiers and low noise receivers. With all this equipment, it gives even some of the simple stations on the band a chance to work the expedition.

It's not always easy to work the expedition stations, even with their well equipped stations. In 1988 the Five Bells went to the island of St. Kilda, the furthest west of the Outer Hebrides. They were in IO57, a very rare square with very little land in it. I was lucky to be on holiday at the time of the expedition and so was able to spend time listening for them on their allocated frequency. Over a period of three days, apart from a few meteor reflections they were only strong enough to work for about three minutes. This was over a path of several hundred kilometres and with a hill in the way at my end. They came out of the noise, I made the contact, and then they disappeared back into the noise again, this shows that patience is required to work DX using a modest setup.

QSLs may also take some time to arrive but remember that the expedition team will probably have to write hundreds or even thousands of cards when they return home. They will also be the only people around not to have worked the square that they activated, and for some squares they may have to wait years for another expedition!

Next month, I'll be concluding with Sporadic E, Aurora and Meteor Scatter propagation and operating techniques, see you then.



Dealer Profile —

Anchor Surplus

This is the first of a HRT series taking our readers 'behind the scenes' of a number of well-known amateur radio dealers. Now many readers know of several firms who advertise, often dealing with them just over the phone. We briefly see their stands at often crowded rallies, however it's always nice to be able to put a face and location to a familiar name and to many times by us at the HRT editorial office when readers phone to ask 'where can you buy such and such ex-PMR gear and where can you get it so cheap?'. But as well as PMR gear, such is the extent and variety of equipment Anchor sell that at the Elvaston Castle Rally each year while other traders set up their stalls in the various large marquees, Anchor

The HRT 'Hit Squad' descend upon Anchor Surplus

address. We've already lined up firms such as Lowe, SMC, Icom, Waters and Stanton, Raycom and the like, we've descended on some already with our cameras, but this month we kick off with a firm who can't be called Japanese 'Black Box' dealers. They're well-known firm of Anchor Surplus in Nottingham.

Ex-PMR Gear Galore

Anchor Surplus have been referred have a marquee all to themselves! At the entrance to this 'goldmine' marquee a couple of years ago, they even had an armed car complete with full military uniformed guard on duty! Next to this vehicle were several Firestreak missiles on sale, with a notice indicating a special rally price, Access/Barclaycard welcomed, airmail delivery arranged if latitude/longitude co-ordinates supplied, but sorry no export deliveries undertaken!

History

Anchor Surplus were established around 20 years ago, and now occupy no less than a 3 acre site at their head office at the Cattle Market, Nottingham, with a further large storage depot in Derbyshire. They tell us they're the largest genuine ex- government surplus dealer in Europe, and looking through the array of goodies in their latest newsletter, which stretches to 24 pages, this certainly seems quite feasible. They often buy ex- PMR gear by the container load; to take an example remember the popular low cost 2m monitor receiver project we featured in HRT some time ago, based upon the Pye 'Sentinel' fireman's callout pager? Anchor had 5000 of them in stock, selling at £1 each. We're always saying, amateur radio needn't be expensive!

After many promises, the HRT editorial team finally decided the time had come to take a trip up the M1, visiting them in person.

'Ello 'Ello

It was a rainy Saturday lunchtime when we turned up outside the gates of Anchor, (we found it by the prominent Red-Top missile mounted on the roof), immediately being met by a man dressed in typical policeman's clothes who turned out to be Rob Taylor G4ROB, their hard working Technical Manager. Even the staff it seemed were all kitted out in ex-government gear, this was brought home very plainly as the very next person we met was Sam (nicknamed Sam, Sam, the Green Kit Man) dressed in full army battle uniform, complete with camouflaged helmet! Rob told us there was no truth in the rumour that the armoured vehicle he climbed into at the entrance, complete with its fitted rocket launchers, was his company car!

Walking into their warehouse arena complex (being so large, calling it a 'store' would be rather an understatement!) was a wonder in itself, it was at this time that the sheer amount and variety of the goods sold was brought home to us. Want a battery? - they had a whole supermarket-style row full! A rig for 2m FM? - there was a crate full of 25W ex-PMR rigs, at £5 a time. Not surprisingly, on the main counter also was a stack of the Argus 'Surplus Two-way Radio Conversion' handbooks, Rob told us they usually order these a few hundred at a time!

Not Just Radios

A walk into their clothing department revealed the reason for their 'works uniforms', all manner of ex-government clothing being available ranging from police trousers, shirts and jumpers, up to foul weather and reflective jackets, and needless to say much army gear was also in evidence. The next 'hall' contained enough domestic equipment to kit out a top class restaurant, with pots, pans, silver plated cutlery and serving dishes complete with silver plated salt and pepper pots! A whole load of industrial equipment was also available in another area, ranging from small tools right up to lathes and the like.

The most interesting area, at least for our interests as radio amateurs, was that holding the radio and electronic equipment and test gear ably manned by Brian, the Electronics Shop Manager. Rows of Racal and Eddystone receivers, numerous scopes, signal generators, right down to brand new Avo test meters, as well as the comprehensive display of ex-PMR gear of course! Brand new Atari ST computers at bargain prices, hi-res colour terminals, modern new 'spy' receivers, and headphones, microphones and genuine government Morse keys completed the line- up.

Bargain Hunting

Such was the variety of gear on display, we could have stayed for hours on end searching out more and more bargains. Rob tells us they don't close for lunch, they just starve, as not surprisingly their customers often tend to spend all day there! Following our visit, an ex-visitor we spoke to said "I wonder why they don't just charge people 50p a time for the sheer pleasure of looking around — they'd make a bomb". We were tempted to agree. Thanks for an enjoyable visit Rob, we'll be back again!

QRP CORNER

Dick Pascoe G0BPS introduces 'Ugly Style' Construction

We hear a lot of comments in the G-QRP club about the difficulties of making simple circuits work, 'Oh yes, but you need a PCB' is one that is often heard. This just isn't true, it's sometimes easier with a complex circuit, but not with the simpler ones.

There are four ways of making a simple circuit work;
1) Make it 'ugly style',
2) Use Veroboard,
3) Make your own patch board, and
4) Make your own PCB.

OK, I hear you cry, what is 'ugly style'. Let's look at the circuit in Fig. 1, it's a very simple one transistor transmitter. This is used as a guide only, the circuit values are for 40m but you may change them for other bands.

Ugly Construction

As the name implies, this method of construction is not necessarily pleasing to the eye, but it does often work! First find a piece of PCB, take the transistor, turn it upside down and glue it to the copper side. Next take the two resistors marked 5k6 and 15k and solder them both to the base connection of the transistor, soldering the other end of the 5k6 to the copper base (the deck) and the loose end of the 15k to one side of the 100pF variable capacitor. The other side of this capacitor is then soldered to the collector of the transistor and the 0.1uF capacitor that is connected to the crystal.

In this circuit a 27pF capacitor is used to bring the crystal onto frequency. If this was replaced by a trimmer capacitor of, say about 7-35pF then the crystal could be 'pulled' a few Hz HF by reducing the capacitance value.

The idea of 'pulling' a crystal has been around for a very long time, what may not be so well known is that by adding an inductor, the crystal frequency may also be lowered slightly. Thus if our crystal is set on, say 3.560MHz then by adding an inductor in series with the crystal we can lower its frequency slightly. Then by adding the variable capacitor we can for example tune the crystal both above and below the QRP 'calling frequency'.

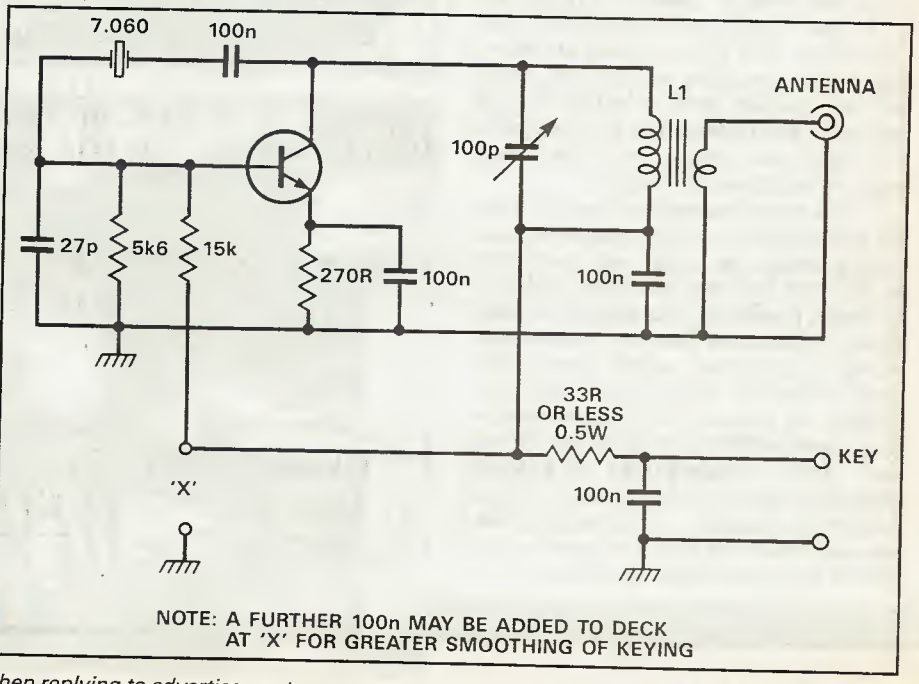
The two components from the emitter are fitted in the same way, one side of each is soldered to the transistor lead and the other to deck. Continue fitting the components in a similar manner until all are connected as required, much as seen in the circuit layout. If problems occur with joints sagging, then prop them up by soldering a very high value resistor between the joint and deck, something above 1M would be OK for example in this circuit.

Other Methods

Veroboard is made up of a series of lines of copper with holes at intervals of 2.5mm along the line. To make up a circuit, place the transistor with the three legs in three separate tracks, fitting the components much as in the layout. To open circuit or 'stop' a line, just cut it by twisting with a sharp drill.

Patch board is another simple method of making something similar to a PCB much simplified. With a sharp saw, cut up a piece of PCB material into small pieces about 10mm square. Glue these to the copper side of another piece of PCB material with the copper side of the small patches up. You now have a series of islands on your main board. Use these as pads to make your joints. The main copper area of the large PCB may be used as the ground, or earth of the system.

Making your own PCB's is outside the scope of this column, but I am sure that an article will follow soon. Just keep reading HRT!



NOTE: A FURTHER 100n MAY BE ADDED TO DECK AT 'X' FOR GREATER SMOOTHING OF KEYING

G-QRP Club News

Just a reminder that the weekend of 9/10th February is the OK/G weekend, so work as many OK stations as possible and get your logs to G8PG by 15th March. By now, those readers who joined in the winter sports during the 'after Christmas pud' session should be ready to send a copy of their logbooks to Gus G8PG.

On a lighter note, it was very nice to play host to the president of the American QRP club during her sojourn in the UK. Paula WB9TBU stayed with us for just over a week prior to visiting HRT contributor Rev. George Dobbs G3RJV and the rest of the gang at the QRP convention in Rochdale. We gained an insight into operating the American way which proved very interesting. Luke W5HKA also stayed over in Folkestone for a few days prior to his return to Texas, he was very impressed with the UK too, and both promise to return next year.

Paula's comment whilst in the depths of Dover Castle made very interesting listening; "Gee, you have graffiti here that's older than most of the buildings in the States". We are proud to mention too, that we converted Luke to tea, the English way too! About time someone did, after all they have lots over there, in Boston!

That's it for this month. Ideas and comments to me please, via. HRT editorial, GB7SEK on packet, or to 3 Limes Road Folkestone. BCNU

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SCANNERS INTERNATIONAL

As I write this, the UK tabloid press has undergone a revelation. They have found out that we scanner owners own portable receivers capable of listening into things various newspaper editors can't get on their Long and Medium wave radios. Ah well, what's new? We told you so, in these pages, maybe that where they got the idea from.

There's nothing wrong or unlawful, in the UK at least, about walking around using a scanner. I can listen in to marine radio calls about weather conditions, radio amateurs chatting about the traffic conditions on the way into work or even about the latest people in an orbiting space station they talked to the night before, as well as the latest news as it happens direct from broadcasting stations in the Gulf.

Sometimes if I press the wrong buttons, I suppose I could find myself scanning across cellular telephone conversations, or listening to wireless baby alarm intercoms operating from peoples' houses, or my neighbour talking on their cordless telephone, or the local security firm who are about to wheel clamp my parked car if I don't get back to it in a few minutes. My scanner has a circuit to stop and listen when it finds a signal, what I have to do is check to make sure whether I'm allowed to listen to it or not, and if it's something naughty then I must again press the relevant button to make the scanner carry on until I find something I'm allowed to listen to.

Of course, the *Frequency Finder* in Scanners International is useful here, this tells us what happens where, hence depending on what we're allowed to listen to we can either tune into these frequencies with confidence, or make sure we avoid them lest we are arrested and get dragged off kicking and screaming. But then, a licence I have here which refers to the UK 1949 Wireless Telegraphy Act tells me that I must make sure that my licensed equipment, ie a CB rig, amateur radio transceiver, and even a TV in the living room, doesn't cause "undue interference to other forms of wireless telegraphy". How would I check this? I suppose I could use my scanner to check my transmitter isn't causing interference to next door's baby alarm, this of course being a common occurrence of radio breakthrough nowadays. Then if it was breaking through, I might be able to do something about it before I received a complaining knock on the door. I wonder if I'd get away with it? Any likely parties for a court *test case* out there?

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AN Argus SPECIALIST MAGAZINE

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Frequency Finder

Satellites on your Scanner

Following our 'Signals from space' feature and details of the frequency bands used by weather satellites, many readers have asked us for the exact frequencies of the individual satellites. Well here they are, together with a status report of when you'll be able to hear them! For computer users with one of the of the many satellite tracing programs, we've also added the latest Keplerian elements of these, so you can load them into your computer to find out exactly when the satellite can be received in your very location, right down to the minutes and seconds of reception times each day. Next month's HRT will review such a computer program, Sat-PC, together with even a low cost automatically controlled antenna system for worldwide satellites. Also in *Scanners International*, we've already have lined up a complete computer-based weather satellite system review for you, so here's a 'taster' of what you can receive!

Ideally the 137MHz receiver you use should be capable of wideband FM reception with a 50kHz wide filter (see this month's 'Starting' feature) but FM scanners which have a 150kHz filter for wideband FM should work. There are several programs for computers which turn the received signals into very detailed pictures, i.e. 4km resolution, and the pictures are easily produced on a screen as we'll soon show you in *Scanners International*.

Weather Satellite Frequency Summary:

WX SAT	Frequency	Status
NOAA 09	137.620	Active-Afternoon
NOAA 10	137.500	Active-Morning
NOAA 11	137.620	Active-Afternoon
Meteor 2-16	137.850	Currently Commanded Off
Meteor 2-17	137.300	Active
Meteor 2-18	137.300	Currently Commanded Off
Meteor 3-2	137.300	Currently Commanded Off
Meteor 3-3	137.850	Active
Meteor 2-19	137.850	Currently Commanded Off
Feng Yun 1B	137.795	Active

Keplers;

SAT:	NOAA 9	NOAA 10	NOAA 11	Feng Yun 1B
EPOC:	90262.04297155	90267.08976277	90267.32479912	90267.51777234
INCL:	99.1736	98.5957	98.9932	98.9287
RAAN:	264.0809	292.8029	215.7884	301.7402
ECCN:	0.0016121	0.0013680	0.0013079	0.0010492
ARGP:	104.9778	347.3613	10.2958	200.6296
MA:	255.3181	12.7225	349.8477	159.9143
MM:	14.12670897	14.23738001	14.11726718	14.00545010
DECY:	6.03E-06	6.21E-06	1.116E-05	1.31E-06
REVN:	29723	20868	10295	301

SAT:	Meteor 2-16	Meteor 2-17	Meteor 2-18	Meteor 2-19
EPOC:	90266.31049032	90266.78156016	90268.08047497	90266.99041758
INCL:	82.5468	82.5410	82.5356	82.5464
RAAN:	212.5019	272.0805	148.9053	210.2301
ECCN:	0.0013237	0.0018272	0.0017595	0.0017094
ARGP:	344.5793	49.9014	93.6121	15.5148
MA:	15.4964	310.3744	266.7269	344.6536
MM:	13.83676440	13.84372296	13.84007999	13.83853774
DECY:	2.19E-06	1.17E-06	-1.22E-06	2.02E-06
REVN:	15655	13382	7938	1218

SAT:	Meteor 3-2	Meteor 3-3
EPOC:	90266.80742618	90266.60868953
INCL:	82.5406	82.5553
RAAN:	207.6393	148.6023
ECCN:	0.0019680	0.0016696
ARGP:	66.7000	80.3021
MA:	293.6121	279.9979
MM:	13.16904777	13.15864629
DECY:	3.92E-06	5.4E-07
REVN:	10393	4389

Space Shuttle Amateur Frequencies

Although at the time of writing the launch date of the NASA space shuttle STS-35 mission is undecided, the latest message from NASA Astronaut Jay Apt (N5QWL) on the Compuserve computer bulletin board, says it may be December time, with his own mission STS-37 to fly in April. They will transmit to radio amateurs on 145.550MHz FM (the same frequency the Russian Cosmonauts on board the Mir space station have been using for some time), but even though you may not be in range of this you'll find the following HF frequencies will carry all relayed audio from the Shuttle communications;

Relay Station;

WA3NAN	W5RRR	W6VIO	W1AW	K6MF	WA4NZD	Band
80m	3.860MHz	3.850MHz	N/A	3.990MHz	3.840MHz	3.855MHz
40m	7.185MHz	7.227MHz	N/A	7.290MHz	7.165MHz	7.232MHz
20m	14.295MHz	14.280MHz	14.270MHz	14.290MHz	N/A	14.267MHz
15m	21.395MHz	21.350MHz	21.340MHz	21.390MHz	N/A	21.362MHz
10m	28.650MHz	28.495MHz	N/A	28.590MHz	N/A	28.395MHz

Note the above relayed audio will normally be in SSB (Single Sideband) mode, as is commonly used on HF.

STARTING OUT IN Scanning

by Chris Lorek G4HCL

In last month's issue of *Scanners International*, I detailed what the various knobs and buttons on a typical scanner did, and provided information on memory banks and the various reception modes. This month, I'll take a look at channel spacings, Worldwide Bands and the like, and show why these are important in your choice and operation of a scanner receiver.

Channel Spacings

The keypad on a typical scanner lets you enter a frequency, but there's a 'catch' to this. The majority of scanners don't let you enter **any** frequency within their reception range, just those on a given channel 'spacing'. Also with the 'search' facility on scanners, i.e. the capability to search from a 'start' frequency, up the range to the 'stop' frequency, then jump back to the start frequency for another search ad-infinitum until a signal appears, this again always operates using a given channel spacing.

So what does this mean? To explain, let's take the case of a car radio. Remember the 'traditional' days when you tuned your radio to the station you wanted, using a rotary dial with a pointer against a tuning scale showing where you were in terms of frequency? This is an example of an 'analogue' tuning method, and often you had to be very careful in the final tuning to get the receiver 'spot on' to the station you wanted to listen to.

Now all broadcasting stations operate to a given frequency plan, for example on Medium Wave in the UK they all operate at 9kHz spacings. When you tune between these stations, i.e. between the 9kHz channels where no stations are operational, all you get is noise or a distorted signal from an off-tune station. Now think of the modern car radios, i.e. those with only up/down buttons for tuning. Switch to Medium Wave, and see what the display does when you press the 'up' or 'down' button. That's right, the set jumps in exactly 9kHz steps, with nothing in between. This means that if a station is operating on that frequency, you're 'spot on' tune with it. However, if you want to use the same radio while you're in the USA where the Medium Wave stations use 10kHz spacings, you may have a problem!

Exactly the same thing happens with scanners, but it's important to know what spacings are used and which spacings are used for what purpose, otherwise you may also get degraded reception. We've already discussed Medium Wave as an example, but what about VHF and UHF services?

Worldwide Bands

Let's take the internationally used bands first, then we'll expand into what individual countries use for their own purposes. Starting with VHF Airband (i.e. around 118MHz), you'll find that 25kHz spacing is used throughout the World although at the moment many services use 50kHz spaced frequencies (i.e. a 'two-channel' separation, but don't be misled by this). The mode of operation is also universally AM. On the VHF Marine Band (i.e. around 156MHz), 25kHz channel spacing is again used throughout the world, however in this case the mode used is FM.

So if when listening on these bands we set our scanner receiver to step in 25kHz increments, we'll be doing the right thing.

Various other services use different channel spacings, for example PMR (Private Mobile Radio) in the UK uses 12.5kHz spacing on VHF and UHF, whereas in Germany 20kHz spacing is often used on VHF. In the USA, 15kHz and 30kHz spacing is normally used on VHF with 12.5kHz spacing on UHF. Several PMR services in the UK also use AM as well as FM on VHF through historical reasons, whereas many other countries use only FM on both VHF and UHF. Because of this, some receivers offer AM only when they are programmed on the aircraft band, hence not allowing the user to select AM on other VHF ranges.

Offsets

Sometimes, frequency 'offsets' are used where although the channel spacing is a given amount, the 'start' frequency doesn't always commence at a complete unit of MHz, for example it may start at 934.0125MHz (934.000MHz plus 12.5kHz) instead of 934.000MHz, as in the case of UK UHF CB. This system uses a 25kHz channel spacing but with a 12.5kHz offset, the adjacent cellular telephone band with their base stations operating from around 935MHz upwards also uses a 25kHz spacing with a 12.5kHz offset.

Taking another example, 27MHz European CB uses 10kHz spacing but with a 5kHz offset, i.e. it starts at 26.965MHz with the next channel being 10kHz higher at 26.975MHz. Again, don't be misled!

So when you're selecting 'start' frequencies and channel spacing increments, bear the above in mind. When you're searching through the Marine band, you'll find it quicker to use 25kHz steps instead of 12.5kHz steps, as you'll normally search the range twice as fast. But some sets, often the lower cost models, don't allow us to choose the channels steps, instead typically scanning in typically 5kHz steps. Now this is normally quite okay for 15, 20, and 25kHz channel spacings, although it will of course take somewhat longer to search through a given frequency range because of all the extra unused frequencies that must be sampled. But what of 12.5kHz spacing as is commonly used? Well if you do your sums, the receiver will never be more than 2.5kHz off-frequency, and due to the bandwidth of the receiver this will normally give satisfactory reception, albeit the set won't indicate quite the correct frequency on its display.

So when you're choosing a scanner, make sure you can either change the channel step increments of it to suit what you want to listen to, or alternatively decide whether the lack of variable channel spacing wouldn't be too much of a problem to you if your budget won't stretch to an all-singing all-dancing set!

SCANNERS READERS PAGE

FOR SALE

Sony PRO80 Handheld Scanner, Air, PSB, TV, SW, FM, SSB, LW, MW. 40 memories, rechargeable batteries, instruction book and Short Wave book. 6 months guarantee left, as new, complete with all accessories. Will send by post, cost £300, sell for £175 no offers. (Bournemouth) C. Talbot, Tel. 0202 715182

Realistic DX300, good condition, 0-30MHz. Also Realistic 2008 programmable scanner, both for £200, no offers. Taking up too much space. (Mossley, Lancs). Tel. 0457 835009 5.30-7.00pm.

Collins 390A, offers. Racal 117E, very good condition, £200. AR17, looks like new, £175. HF225, few months old, £325. NRD515, £375. (Southall, Middx.) Tel. 081 571 5759

Matsui MR4099 world band receiver. No gaps 150kHz-29.9999MHz, FM/MW/LW, BFO, LSB/USB, 9 memories, auto scan, narrow/wide tuning, alarm, sleep timer, LCD, external antenna connector, AC/DC, stereo. £80. (South Petherton, Somerset). Tel. 0460 40044

PRO2004 Scanner with Royal 1300 discone and add-on BFO unit, £220. Barry, 117 Corporation Road, Dudley, West Midlands.

Bearcat 100XL Scanner, 68-88, 118-136, 136-174, 406-512MHz handheld, rechargeable, comes complete with charger, earphone, nicads, manual, frequency guides and case. Boxed and in very good condition. Bargain at £110. P. D. Carter (Merseyside), Tel. 0704 871513

Yaesu 7000 communications receiver with manual, £140 ono. Eddystone 770R, £70 ono. Juliet Battery/Mains radio, airband marine etc., collectors radio, £70 ono. Consider exchange for 2m handheld or scanner to cover to 900MHz plus. (Doncaster). Tel. 0302 531927

Realistic PRO2005 400 channel scanner, £250 ono. Codemaster CW tutor and RTTY/CW decoder, £40. K. Gibbons, 42 Cairngorm Ave, Lakelands, Lambton, Washington.

Icom IC-R1000 Scanning Receiver, immaculate condition, £650 ono. Yaesu FRG-8800 HF receiver, VHF converter fitted, £450 ono. AOR2001 scanner in 2002 case (tuning knob, keypad, LEDs etc.) £250 ono. Spectrum 128 computer, £55. (Luton) Tel. 0582 668648

AOR2002 scanner, 25 to 1300MHz, 20 memories, 5/12.5/25kHz with adaptor, telescopic aerial, power pack, frequency book, £385. (Nr. Lincoln). Tel 0522 690732, answering machine when not at home.

Yaesu FRG-8800 HF receiver, ATU, G5RV aerial, boxed, as new, £400. (SW Birmingham). Tel. 021 453 7997

Kenwood R600 HF RX, 150KHz-30MHz, £200, mint cond. (Walton-on-Thames), Tel. 0932 224655 after 6pm.

Realistic PRO-34 hand held scanner, 200 channel, 68 - 512MHz, four months old, unwanted gift, complete with box, manual and batteries, £160 ono. Contact M. McClelland (Wirral) Tel 051 355 9840

Sony ICF 2001 receiver and AC 122 power adapter, £100 ono. R. W. Bibby, (Kintore, Aberdeenshire) Tel. 0467 32562.

Yaesu FRG-9600 modified 0.2-950MHz plus discone and coax (used indoors), £500 ono. (Grimsby). Tel. 0472 352359

Realistic PRO32A Programmable Scanner, 200 memories, UHF/VHF Hi-Lo-Air. Many fatures too numerous to mention, Freq. range 68-88, 108-136, 138-174, 380-512MHz, belt clip, telescopic and rubber duck aerials, bargain at £110. (Sherbourne, Dorset). Tel. Nic on 0935 873157

EXCHANGE

Tandy 2004 scanner, excellent condition plus 48K spectrum fitted into low profile keyboard. Exchange for Yaesu 9600 scanner in top condition. Tel Newark 0636 77944, leave a message on machine or write to John Gilbert, 24 Wolsey Road, Newark, Notts NG24 2BN.

Swap Icom IC-R100 receiver, 0.5MHz to 1800MHz no gaps, AM/FM/WFM/USB/LSB, 100 memories, 9 scan modes, mint condition. Wanted NRD525, NRD515, IC-R71, HF225, up to £200 either way. (Derby). Tel. 0332 668272

Lowe HF125 receiver fitted with FM option, mains power supply, very good condition. Exchange for VHF scanner receiver or 2m transceiver, WHY. Contact Geoff (Norwich) 0603 406331

WANTED

Needed urgently, frequency film ribbon for R210 and fitting instructions. Please phone stating your price. (Spalding, Lincs). Tel. 0775 724085

60ft wind-up tower. Tiltover/ground post tower, Altron/Versatower/Strumech etc. Contact Rob G2BKZ, (Stevenage) Tel. 0438 721418

Yaesu FRG-7700 with matching accessories, must be in excellent condition. D5B80 with CW filter for sale, £55 including postage. Tom G6TFC, 1 Armadale Road, Ladybridge, Bolton. BL3 4QE. Tel. 0204 651183

Broadcast Receiver and/or airband by disabled OAP returning to amateur radio after 45 years. Call Roger (Orpington Kent) Tel. 0689 20281 evenings.

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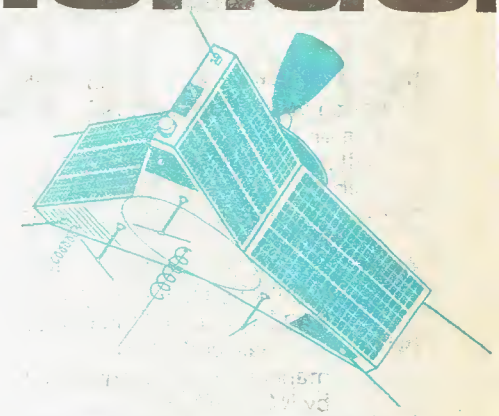


Richard G3RWL gives hints on receiving pictures from space, and looks forward to the new RS-14 satellite

For Webersat operators, here's an operating hint for those with Weberware version 1.0 picture processing software. WW1.0 expects captured data files to begin with complete packets, not in the middle of a packet. Specifically, the file must begin with the packet delimeter C0 hex and appropriate packet header bytes. To ensure that this is the case, the file capture (or 'Dump' in TLMDC) must be active before any packets are received from the TNC during a pass.

The standard procedure at Weber Stat is to begin capture (or dump) mode before AOS, consequently WW1.0 does not have a feature allowing the input file to start with a partial packet.

Of course, to successfully capture the binary WEBERSAT (or other binary Microsat data), your TNC must be in KISS mode and the communications program must handle binary data correctly. Since most commercial terminal programs do not handle binary data correctly, even in binary modes (i.e. characters such as 00 hex, FF hex, etc. are not passed correctly if at all), most data gatherers are using TLMDC, a program available from AMSAT-UK, Compuserve, and other AMSAT software sources.

Junior de Castro, PY2BJO was elected first Alternative for the AMSAT-NA Board of Directors

To place a TNC-2 compatible TNC into KISS mode, it is necessary to issue the command: 'KISS ON' and then to reboot either with the 'RESTART' command or by powering off and back on. This can be verified by the front panel lights. When KISS is started or when the TNC is powered up in KISS mode, the lights on the front flash three times. Otherwise, they flash once.

So the recommended procedure is to:

a) Verify that the TNC is in KISS mode.
b) Run a program that will properly collect the binary data (such as TLMDC).
c) Begin capture (or dump) before the pass starts so that only complete packets are recorded in the file.

Microsat

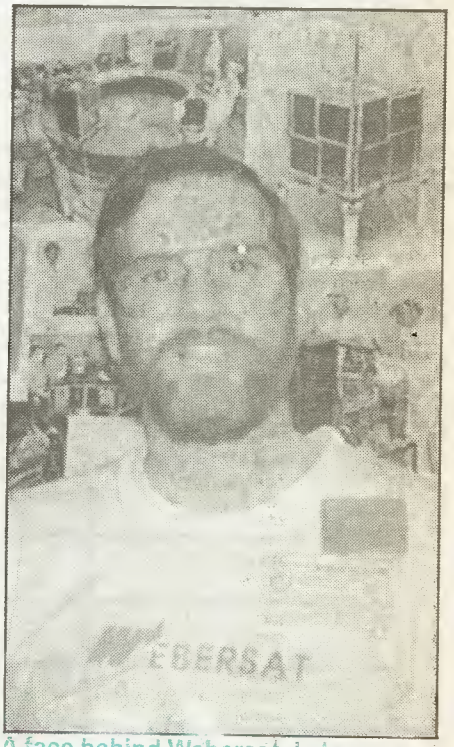
Following on from last month's AMSAT question and answer session, here's an update giving the very latest on the Microsat system as at the time of writing.

The Microsat BBS has been tested on the ground engineering unit, and is about now being uploaded to AO-16. Although the team had planned to have it running for the AMSAT-NA conference, some ground configuration and other procedural errors made it necessary to re-do some of the work. Once complete, the following elements will be available;

256k file system. This is just half of one of the four available banks of bank switched memory. The more complete file system using all four banks and the 6 Meg mass memory will uploaded after more testing.

FTL0 file server. This implements the protocol described in the FTL0 document, available in various places. It allows file uploading, downloading, and a simple directory display. It requires the use of a computer program at the ground station. A simple version, called 'PG' has been written by G0/K8KA and will be on CIS soon.

Broadcast server. This implements the broadcast protocol as described along with FTL0. This protocol has been running for several weeks on UO-14, and a few people have rolled their own receive program, at least one written in



A face behind Webersat, Lyle Johnson WA7GXD of the Weber State College

basic. A simple version, called 'KISSUI' has been written by G0/K8KA and will also be on CIS soon.

After this is loaded, the following programs will be running on AO-16:

Kernel — Operating system, by NK6K/ Quadron

AX.25 — AX.25 driver — NK6K/ WB6YMH/Quadron, pd on a KA9Q AX25 implementation.

PHT — Spacecraft control, power management & program loader by N4HY/NK6K

AARTD — AART driver by NK6K/ WB6YMH

MFILE — File system by G0/K8KA/ UoSAT

FTL0 — File upload/download by G0/K8KA/UoSAT

PBP — File broadcaster by G0/ K8KA/UoSAT

The PACSAT frequencies are as follows:

Uplink: Manchester AX.25 (FM) 145.900MHz, 145.920MHz, 145.940MHz and 145.960MHz.

Downlink: PSK AX.25 (SSB) 437.025MHz and 437.050MHz. Note the WOD feature has been removed to make room for the BBS, the new file- based WOD will make an appearance later.

Russian Satellites

There's still no official word yet on the RS14/RUDAK-2 launch, however a 'little bird' is whispering 24th November which is a couple of weeks after writing this, so we'll have to wait and see! The regular AMSAT-UK net will of course be carrying details if the satellite gets into orbit, so keep in touch.

From recently received keplers, I've noted that the Russians have put up another weather satellite, Meteor 2-20, but at present I have no other information about it.

Fuji Oscar-20

Since October 20th, mode JD on FO-20 will be activated by the demand method, i.e. a signal on the uplink will wake it up and in case of power generation becoming less than 10W, JA will be tuned off.

NORAD seem to have mixed up the keplers for FO-20 and DEBUT again, the DEBUT ones giving a perfect match to FO-20 AOS/LOS times while the set labelled FO-20 is adrift by about eight minutes. Until they sort them out again I'll be supplying both sets — suck 'em and see.

BADR-1

According to the latest keplers, this Pakistani copy of UoSat-Oscar 11 is now coming down fast. The perigee/apogee for the end of October was 183/633 km and these keplers indicate 129/577 km for 27th November. Since 130 km is the generally accepted minimum altitude before re-entry it is unlikely that BADR will see December never mind 1991, what a pity it couldn't have come down on the 5th November to add another entertaining light in the sky.

Short Bursts

The AMSAT-NA Headquarters have announced the results of the recent Board of Directors election. The following candidates were elected and will serve for a two year period in accordance with the Bylaws; Tom Clark W3IWI, Doug Loughmiller KO5I and John Champa K8OCL. The first and second Alternates are Junior de Castro PY2BJO and Joe Kasser W3/G3ZCZ respectively. The Alternates will step in to fill any seats on which occur as a result of a resignation before the next Board is seated in autumn 1991.

Amsat Italy are proud to confirm the successful operation of the ITAMSAT CPU connected to the mass memory (ram-disk) board of their future Micro-Sat. They've still got one or two bugs but all is going well.

Chinese Weather Satellite

The new Chinese weather satellite has now started transmitting thermal infra-red pictures, the APT transmission on 137.800MHz regularly includes one VIS channel and one thermal-IR channel. The HRPT transmission 1695.500MHz includes four different VIS/near-IR (daylight sensitive) spectral channels and one thermal-IR channel (£5). Both APT and HRPT transmission standards are 100% compatible with the American NOAA satellites. The frequencies of operation are;

137.800MHz APT (AM/FM 2400Hz subcarrier)

1695.500MHz HRPT (665.4kbps)

NOAA Satellites

All three NOAA satellites, i.e. NOAA-9, NOAA-10 and NOAA-11 are operating correctly, sending both APT and HRPT pictures. NOAA-9 and NOAA-11 transmit on 137.620MHz and 1707MHz. NOAA-10 transmits on 137.500MHz and 1698MHz.

Many different Soviet weather and research satellites also transmit APT pictures. The Meteor-2 and Meteor-3 series satellites transmit on 137.300MHz, 137.400MHz and 137.850MHz, and there are other Soviet satellites transmitting APT pictures besides the Meteor series. Okean-2 was heard recently during afternoon passes in Europe on 137.400MHz, 2401pm.

That's It

That concludes this month's roundup of satellite news from Amsat-UK. For more details on the society, contact AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ.

Keplers

SAT:	Oscar 10	UoSat 2	AO-13	UO-14	UO-15	PACSAT	DO-17	WO-18
EPOC:	90294.89238027	90297.12260385	90285.55558503	90297.24882574	293.23483277	90295.40866860	90295.96053991	90296.64163114
INCL:	26.0696	97.9370	56.9677	98.6913	8.6928	98.6962	98.6959	98.6960
RAAN:	178.8613	345.3899	131.3556	12.9248	8.8830	11.2732	11.8428	12.5553
ECCN:	0.5956963	0.0011964	0.7041877	0.0010938	0.0010485	0.0012174	0.0012368	0.0012965
ARGP:	186.0050	195.3256	237.6838	133.4532	145.0366	140.2587	138.6657	137.3260
MA:	160.8592	164.7611	35.4920	226.7591	215.1506	219.9521	221.5478	222.8933
MM:	2.05880717	14.65804274	2.09702865	14.28762279	14.28459268	14.28860107	14.28915980	14.29001556
DECY:	-2.4E-07	2.091E-05	-1.32E-06	6.76E-06	5.04E-06	6.86E-06	7.71E-06	6.73E-06
REVN:	2734	35485	1786	3929	3871	3903	3911	3921

SAT:	LO-19	FO-20	RS-10/11	SAT:	Mir	Salyut 7	HST	BADR-1
EPOC:	90297.11848910	90296.97855528	90296.94697757	90297.65305483	90297.72347704	90296.68738553	90297.43994154	
INCL:	98.6941	99.0259	82.9261	51.6123	51.6020	28.4710	28.4867	
RAAN:	13.0586	319.1034	233.3816	38.1872	2.5406	151.6472	351.2165	
ECCN:	0.0013215	0.0541648	0.0013152	0.0032614	0.0003101	0.0005629	0.0332529	
ARGP:	135.5831	116.8206	119.0245	175.8901	15.3953	21.3776	142.5749	
MA:	224.6414	248.9305	241.2209	184.2365	344.7024	338.6900	219.5537	
MM:	14.29074150	12.83151877	13.72118295	15.58383704	15.78780246	14.85341477	15.49984571	
DECY:	7.88E-06	7.7E-07	9E-08	4.3543E-04	1.0689E-03	6.109E-05	6.2308E-03	
REVN:	3928	3326	16710	26832	48520	2709	1525	

Packet Radio Roundup

G4HCL with the latest on BPQ Software for the Data Engine

The public are becoming more aware of packet, and it looks like they're becoming rather interested! The UK computer press have in the past run the odd article on packet radio, but in a recent 'Computer Shopper' magazine several pages were devoted to an introduction to amateur packet radio. Last week, I was contacted to help put together a TV programme on packet radio as well, it seems that Joe Public are getting more and more interested every day. Could this be the new 'alternative introduction' to amateur radio, that of computer buffs sending bytes to each other rather than chatting into a microphone?

A New Breed of Amateur

Depending on your views, this could give a much needed 'shot in the arm' to the status of amateur radio. Some amateurs of course may not appreciate a new digital era of amateur radio. A recent letter to the Editor (which I'm sure was written rather tongue-in-cheek) in 'Digicom', the journal of the Midlands AX.25 Packet group, detailed a 'new breed' of amateurs with an entirely new language with phrases such as digipeating in use. The letter finishes with "This manifestation of real radio is a danger for the rest of us, heralding the end of the true spirit of amateur radio. They bring nothing challenging to radio at all, being interested only in computerising the hobby out of all recognition. If allowed to breed unchecked they will surely destroy us all. We must stand up and be counted, those of us that are real amateurs. The clones must be dealt with. They are alien to our hobby. They must be dealt with. They must be exterminated. Exterminate. Exterminate ...."

9600 Baud

The use of higher speed packet on 2m is continuing to increase, with several more users in my area joining in on 144.625MHz 9600 baud using G3RUH modems. TNCs such as the Tiny- 9600 and the Data Engine with a built-in 9600 baud modem are already available off the shelf. I have also been informed of a node link going from London down to Brighton, across to Southampton, then to Bournemouth, on 2m 9600 baud.

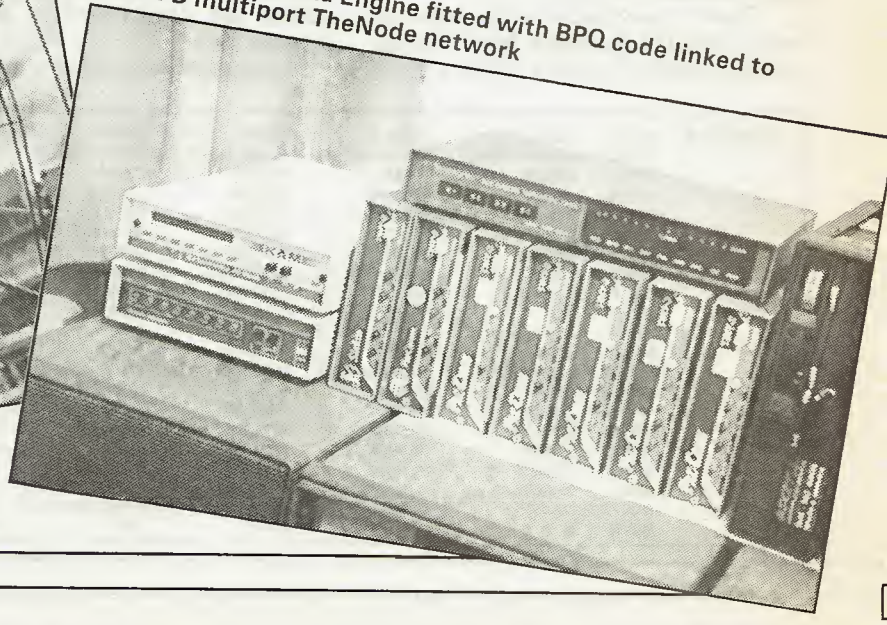
Having a one-to-one QSO on 9600 baud, or indeed passing a long file between stations separated by these several node hops, is a stark contrast to the delays experienced when using 1200 baud, and of course channel congestion has a lot to do with the latter. 9600 baud of course does much to reduce this congestion, and already there's starting to appear dedicated packet radio transceivers for 9600 baud. With this in mind, a future HRT project for a synthesised 3W FM transceiver, costing less than three figures in all, will of course have facilities for a G3RUH modem direct connection as well as mic/loudspeaker facilities, so maybe we can again get things going at low cost!

BBS News

As the RA now allow a simplified procedure to apply for BBS access ports for 70cm, using the spot frequency of 432.675MHz, the scene opens up for Novice licensee use with the 70cm band being the most likely to be used for the majority of their packet activities. 70cm ex-PMR gear is of course extremely cheap, typically costing a few pounds per set, which is good news for both BBS sysops and end users alike. The normal 'delay' for BBS port applications using 432.675MHz now, in the writer's experience having just applied and quickly received a notice of variation, is just a

James Miller G3RUH with his 9600 baud modem

The Kantronics Data Engine fitted with BPQ code linked to the CFD multiport TheNode network



few weeks as opposed to the previous lengthy delay of often over a year.

Packet Groups

On a slightly different subject, Pete G4MRU who runs GB7MRU in Stockbridge near Sheffield, tells us his was the first packet BBS in the UK to run an Atari ST. Although he tells us it took him over 9 months of calls and letters to originally obtain the licence, it is now up and running using two double sided disk drives with a 20Mb backup if needed. Pete informs us that a new packet group has been set up in Stockbridge, currently having 15 paid up members. This has appropriately been named the **South Yorkshire Packet User Group**, and their plans include the setting up of new packet nodes in Sheffield, Rotherham and Doncaster. You can get further details on the group from G4MRU @ GB7MRU.

That dynamic packet group **Maxpak**, the Midland AX.25 Packet Group, have kindly sent their latest magazine, again a bumper 40 page affair full of news and packet information including a look at how future European commercial radio networks are also all going digital. Their new secretary is Richard G0NEN, from whom you can get details of the group, his home BBS is GB7MAX.

BPQ Data Engine Firmware

John G8BPQ has now produced an EPROM version of his packet switching software for the Kantronics Data Engine. The facilities are very similar to those of the normal computer version, apart from the fact that you now don't need to keep your computer switched on 24 hours a day as well as the TNC and rigs. The two radio ports in the Data Engine are configured as if they were HDLC cards, and the async port may be used either as a KISS (or NET/ROM) link to other TNCs, or as a 'normal' TNC link to a PC. Richard G4NAD kindly sent me an EPROM configured with this code for trial in the Data Engine on test here, as well as providing a Network Node in it's own right it also provided a useful addition to my existing TheNet nodes.

The firmware runs from a 27512 EPROM, and in the current version this simply replaces the existing Kantronics firmware EPROM. However a future version may allow its use in the second EPROM socket, with selection as required from the front panel 'Aux' switch. The various uncommitted LEDs on the front panel are used to good effect, providing;

LED1 — On in TNC mode, flashes as packets are received on async port in LINK mode.
LED2 — Packet received on A port.
LED3 — DCD on A port.
LED4 — Not Used.
LED5 — Packet received on B port.
LED6 — DCD on B port.
LED7 — CSMA Indicator. Shows 'Slottime Wait'
LED8 — Flashes at one second intervals to show system is running.

The system operates in the usual BPQ fashion, a typical information text following an 'I' command being shown in Fig.1, and a 'Ports' command typically giving the display shown in Fig. 2. Further details from Lowe Electronics, who are the UK Kantronics distributors.

GB7SCA Packet/Amtor Gateway

The Plymouth AMTOR/Packet gateway, which has indeed been on the air for the past two years in attended use, has now been licensed for unattended usage using the callsign GB7SCA. Used primarily to aid international forwarding, it should by now be providing a 24 hour service. The system scans 7.038MHz, 7.039MHz, 7.040MHz, 14.0705MHz, 14.0715MHz, 14.0725MHz, 14.077MHz, 21.078MHz, 21.080MHz, 28.077MHz and 28.080MHz. The sysop is John G4SCA, who tells us he would welcome any comments or suggestions from users.

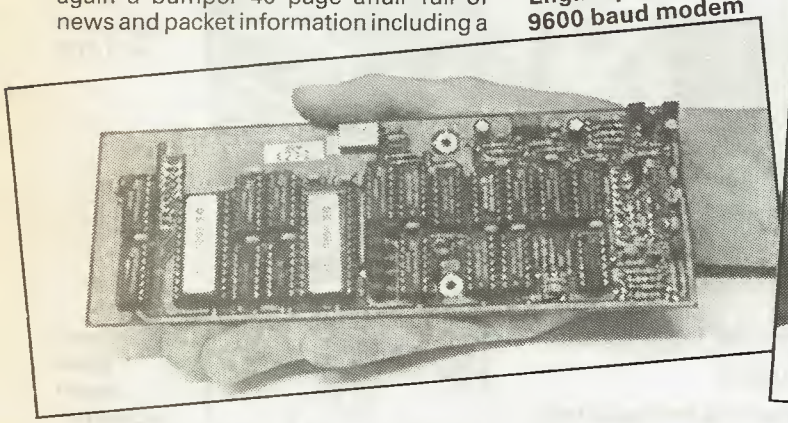
CTRL-Z End of Message

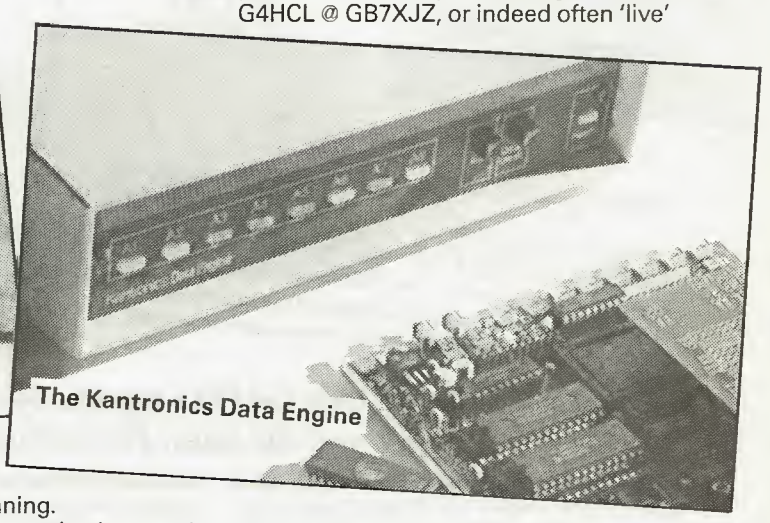
For those amateurs who found a nice new TNC in their Christmas stocking, welcome to the wonderful new world of packet! Also, the packet activity from orbiting Mir space station should by the time this becomes published be imminent. It will be interesting to see the expressions on potential new amateur's faces when they listen to these signals from space, which should be receivable on just a handheld, what a great welcome to the new year.

1991 will no doubt bring many more pioneering advances in packet, we have DSP, higher baud rates leading to less congestion, the prospect of direct international linking via. Phase III satellites, and of course the hope of a new element of keen packet users amongst our midst, the 1991 Novice. Remember to give them a hand, remember you were a beginner once.

As always I can be reached via. the packet network by a message sent to G4HCL @ GB7XJZ, or indeed often 'live' via. the DX Packet Cluster as I am normally permanently linked to my local cluster GB7SMC. Packet group news is always appreciated, and post sent to the HRT editorial address also reaches me directly. Until next month, 73 de Chris G4HCL @ GB7XJZ

The Data Engine plug-in 9600 baud modem





The Kantronics Data Engine

Fig. 1. Typical BPQ 'Info' text

CFD14:G4HCL-1} £ Running on a Kantronics Data Engine £
Commands are basically the same as NET/ROM, but to connect to another normal station (not another node), you must specify a port number before the callsign. Use PORTS command to list available ports.

Fig 2. Typical 'Ports' listing

CFD14:G4HCL-1} Ports:
1 70.325 MHz 1200 Baud
2 144.625 MHz 9600 Baud
3 Link to SYSTEM

HF HAPPENINGS

During the last month, conditions have really picked up again as is normal during the autumn/early winter period, and there has been no shortage of DX around for all to work.

CQ WW

During the CQ World Wide DX contest at the end of October there were certainly well over 100 countries worked from Britain on each of 10, 15 and 20m, and probably very nearly 100 on 40m. largely because it is virtually on the Americans' doorstep and also because there are many seldom-activated countries there, just waiting for the pile-ups to happen. This year was no exception, with serious contest entries from the Caymen Islands ZF2 (several callsigns), Turks and Caicos VP5T (my old friend Steve G3YDV on a single operator expedition), Anguilla St. Martin FS/KC1F, Guadeloupe FG5R, Trinidad and Tobago 9Y4H and Barbados 8P9X.

Virtually every island had at least

One of 1990's most successful DXpeditions, AH3C/KH5J from Jarvis Island.

Peter OH1 RY (3rd from left) in Vanuatu again this year as YJ1A

Steve Telenius-Lowe G4JVG reports on the CQ WW contest and the latest DXpeditions.

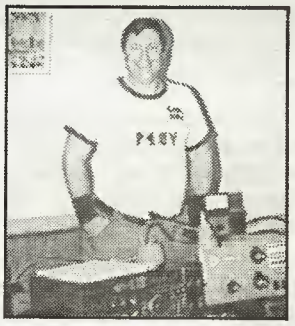
Conditions were good on all bands and even if you weren't competing seriously in the contest, there was still a lot of choice DX to be worked. As examples, Peter OH1RY travelled off to his favourite spot in the Pacific, Vanuata, again and this year operated as YJ1A. Peter who in previous years has used the call YJ0RY is one of those operators who seems to hear very well wherever he is, and he was worked in Britain on 40m as YJ1A as well as on the higher HF bands.

Other Pacific DX worked during the CQ contest was 5W1JJ from Western Samoa, ZK1XX (this was Siggi, TF3CW, forsaking the Icelandic climate for the somewhat warmer spot of Rarotonga in the Southern Cook Islands), and KH0AM a large Japanese group operating from Saipan in the Northern Marianas Islands. The day before the contest, Kiyoko ZK3KY was a good signal on 28.480MHz around 1915 GMT from the rare Pacific island group of Tokelaus.

The other part of the world that always attracts a lot of DXpeditioners for the major contests is the Caribbean, one, sometimes several, serious all band contest entries on. Arguably the most RF come out of the island of Aruba, where P40V operated by Carl Cook AI6V was competing against P40T and P40R. A little further east the island of Curacao in the Netherland Antilles supported two multi- multi operations, PJ1B mainly operated by Americans, and PJ9W operated by a huge group of Finnish contesters. Apparently the PJ9W group shipped out a large container with several towers, monoband beams, and all the transceivers and linear amplifiers necessary for a multi-multi operation several weeks before the contest. The cost, when divided by the 90 or so operators and 'support staff' was probably modest, and it certainly gets around the problem of baggage weight limits on aircraft, the bane of all HF DXpeditioners.

Banaba

Following the CQ World Wide contest, most of the operators who were QRV from the Pacific area joined forces to mount a DXpedition to the rare island country of Banaba, formerly known as Ocean Island. This island, which now belongs to the Republic of Kiribati, was formerly mined of almost all of its phosphates and is now a skeleton of rock, supporting only a tiny population, a fraction of the former population of Banabans, most of whom have left to live on the other islands of Kiribati or Fiji. The major expedition to Banaba used the callsign T33R and included Peter OH1RY and Siggi TF3CW amongst the operators. Matts SM7PKK, famous for his Pacific trips in previous years, was believed to be joining them, as was

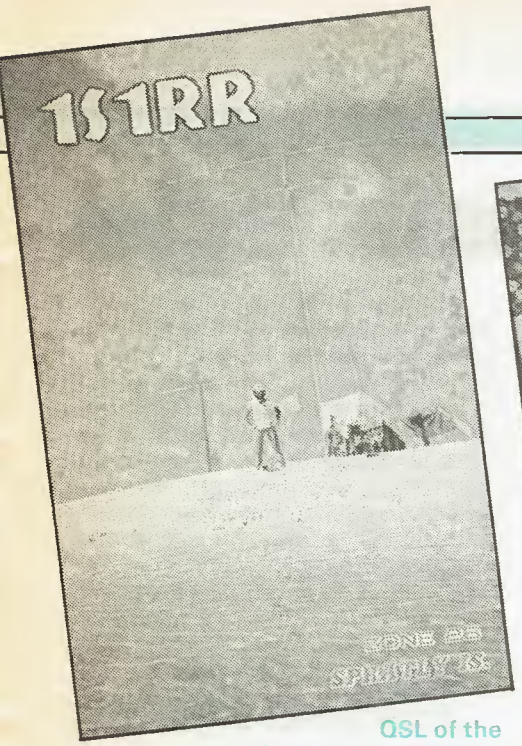


Carl Cook AI6V again operated from Aruba as P40V

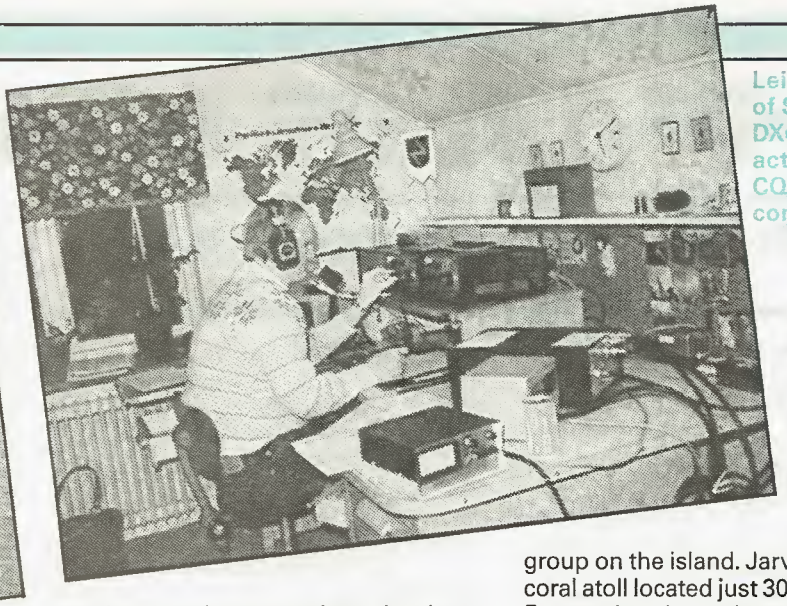
Kiyoko who was formerly active from the North Cook Islands and the Tokelaus. Just before this large group reached the island, there were reports of activity by Baldur DJ6SI and others, also from Banaba. They used the callsign T33X on CW. At the time of writing it was not clear if the two groups combined forces when the second group arrived on Banaba, of if they operated for a while as individual operations.

Malapelo Island

The other major DXpedition during the last month was the Colombian



QSL of the Month. This beautiful QSL from 1S1RR, the high succesful Spratley Island operation



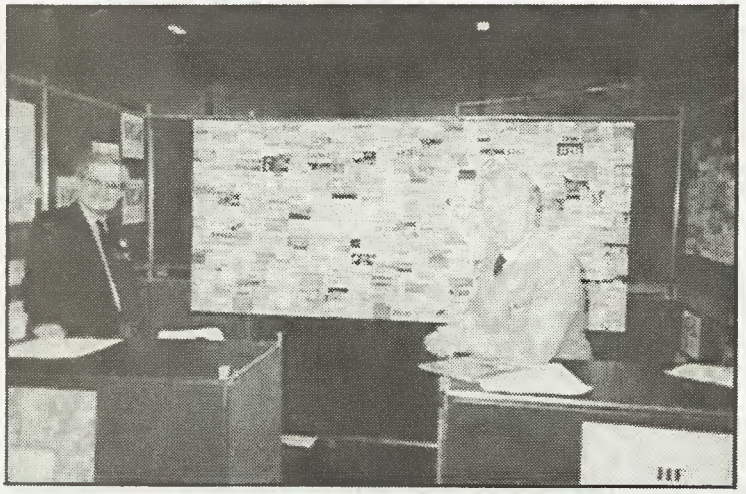
Leif SM0AJU, one of Sweden's top DXers again active in the CQ WW contest

expedition to Malpelo Island. This, the rarest of the HK islands, was active from the 2nd November until about the 8th of the month. During this time the group, which used the callsign HK0TU, was easy to work in the UK on 21MHz, once you had worked out where to call them. They were heard at various times on the traditional DXpedition frequency of 21.295MHz, but were listening on many and varied frequencies which sometimes took some finding! Andrew G0HSD reports working HK0TU on 10, 15 and 20m with ease using both CW and SSB, while Laurie G3UML says HK0TU was 59+ on 80m SSB, although there the Colombians were only working USA and refused to listen for Europe.

Reunion Island

Many DXers have reported difficulty in receiving a QSL from Reunion Island, FR, in the Indian Ocean. It is not difficult to work this country as there are several resident amateurs, at least one of which has a good DX signal on all bands, but regrettably getting a QSL is difficult. DXers will have been keen therefore to work the DXpedition to Reunion which used the callsign FR0P at the beginning of November. This was Alain F6BFH, who is well known as a DXpeditioner, having operated from Clipperton Island as FO0XC as well as FK, New Caledonia and many other exotic spots. Alain is also a founder member of the Clipperton DX Club which organises an annual DX convention in Paris, and is known as a good QSLer, so the waiting should be over for the lucky operators who worked FR0P.

One other recent DXpedition worth mentioning recently was the operation from Mozambique by Iris and Lloyd Colvin. Wherever this veteran DXpedition couple go to, they struggle against huge pileups. Everyone it seems wants to work them, even if they operated from Italy or Russia there would be a pileup! Mozambique is an awful lot rarer than either of these places, or even most of their other stops on their present African safari, so things were pretty hectic whenever C9QL appeared. Their previous stop was in Malawi, where they were a little easier to work as 7Q7KG, even though Malawi until recently was one of the most difficult countries in Africa to contact. According to the RSGB's DX news sheet, they are planning to visit Angola, D2, as their next stop, and this is also a country where it has been notoriously difficult to get operating permission in the past.



New RSGB HF comittee Chairman Bob G3PJJ (left) with John Allaway, RSGB HF Manager (right)

Jarvis Island

The 1990 Jarvis Island DXpedition is still being considered by the ARRL's DXAC as to whether this should count as a separate country. It was however a real pleasure to get my QSLs for this expedition in the post box recently. The QSL shows full-colour photos of the 21.5m boat which took the group to the island, the Makanalani, as well as the whole group on the island. Jarvis is a small flat coral atoll located just 30km south of the Equator in a dry region of the Pacific, the group travelling the 2400 mile and 35 day journey out of Hawaii to get the 1990 AH3C/KH5J DXpedition underway. Today Jarvis is a National Wildlife Refuge, with entry tightly restricted by he US government." About 55,000 people worked AH3C/KH5J, so whatever country it counts for, it will be a lot less rare now than it was before April 1990.

New P29 Activity

I am hoping to be active from at least one Pacific island during February while en route to Papa New Guinea, P29, where I will soon be working for three years. Naturally, I also hope to be quite active from P29 with a callsign yet to be notified, but which could be either P29DX or P29SL. I'll be here again next month, but following that my good friend and well know DXer Don G3XTT will take over 'HF Happenings', I know he'll get as much enjoyment in writing for HRT as I've had over the years. I'll also be keeping in touch through the pages of HRT to tell you what the HF bands sound like over in Papua New Guinea. See you next month.

VHF/UHF Message

Ken Ellis G5KW presents an update on Cycle 22 by Smithy G8KG

In the April 1990 issue of HRT, Smithy G8KG compared the progress of the present solar cycle (22) with that of cycles 19 and 21. This month he reports on the position at the end of 1990 and comments on the future;

The end of 1990 is a good time at which to review the progress of Solar Cycle 22 since it was the year in which it seemed most likely the peak would occur. The review of 1989 which appeared in the April 1990 issue of HRT showed how Solar activity in the present cycle had risen very rapidly in the early years, so that by the end of its third year, activity levels were well above those in Cycle 21 at the same age and were close to those in Cycle 19, the highest cycle on record.

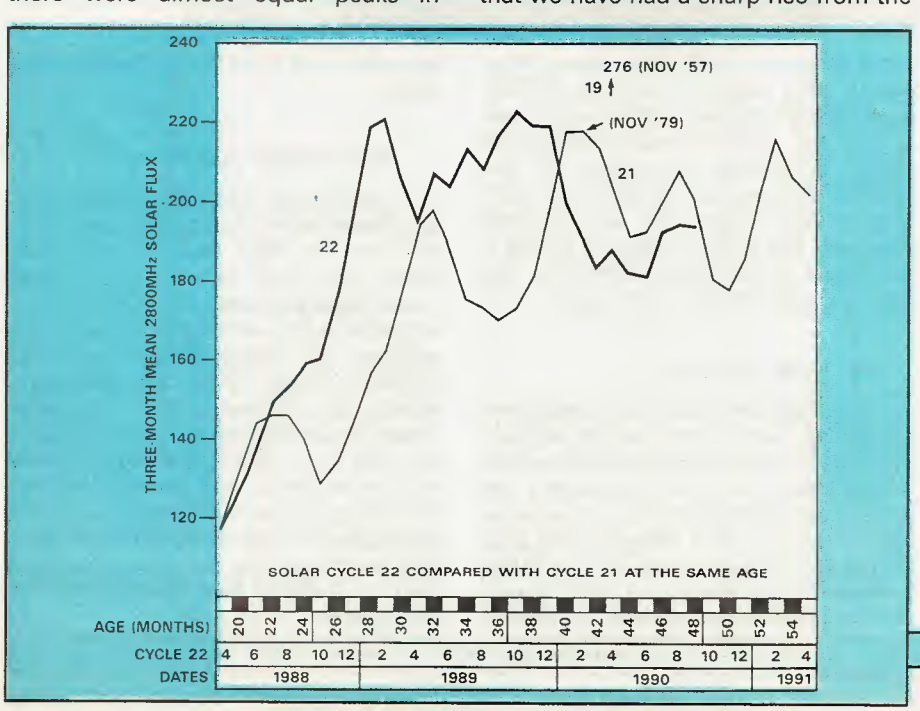
Predictions of the height and timing of the peak are based on comparison with past cycles, and this rapid rise led to predictions of a peak smoothed monthly sunspot number as high as 195 (smoothed monthly solar flux sfu) early in 1990. This, however, was not to be and what actually happened can be seen from **Fig. 1**. As in the April review, the graphs are of three- month mean 2800MHz solar flux with the minima of the two cycles aligned. In the event, the average of 223 sfu for September to November 1989 proved to be the high point of the cycle, after which mean levels fell quite steeply and have been below 200 sfu throughout 1990. Because there were almost equal peaks in months 29 and 37, the classical smoothing process produces a broad and very 'official' peak in June 1989 (month 33) with a smoothed monthly solar flux of 213 sfu or July with a smoothed monthly sunspot number of 159.

As regards the effect of activity levels on F2 propagation, the three-month mean values are a better guide and a peak can be seen to have been in the last quarter of 1989, coinciding fortunately with the seasonal improvement in northern hemisphere MUFs. It should, perhaps, be noted that solar flux values place Cycle 22 slightly highly than 21 whereas sunspot numbers reverse that ranking

What of the future?

Now that it is clear we passed the peak of Cycle 22 a year ago, there will certainly be more periods of high activity in the next year or two. The provisional monthly sunspot number for August of 199.9 was the highest since January 1959, but looks as though mean levels will be below the 200 sfu level, which probably means that F2 openings on 50MHz will be shorter, less frequent and more selective than in the winter of 1989/90. And the next peak? During this century the spacing between peaks has averaged 10.5 years so the next should be somewhere near to the year 2000!.

A study of previous cycles shows that we have had a sharp rise from the minimum to a flat high of about four years before the fall again to the minimum. This year the Autumn F2 season was late starting, but from the beginning of November some isolated openings took place to the UK from North America, Africa, Japan, Australia and other DX locations. Although the peak of Cycle 21 was during November 1979 the best conditions were during 1980/81 through until the Spring of 1982, but then falling off rapidly until the sunspot minimum.



Trans-Equatorial Propagation (TEP)

Next month an appreciation will be made of TEP which takes place before and after the Spring and Autumn Equinox. This phenomena is not, as far as we know, influenced by the solar cycle. In fact some of the most successful TEP openings have been during the 'Quiet' periods of the sun.

50MHz report from Ted Collins G4UPS

Jamaica; Wenty 6Y5IC reports that when band is quiet he will run a keyer on 50.025MHz.

Sweden; A letter from Arne SM7AED informs me that whilst he is only too pleased to obtain QSL cards from other members of the SM7 group, it would be appreciated if people would enclose suitable payment for postage for return QSLs otherwise the cards will be answered via the Bureau. Arne says that he has recently received QSL cards asking for return cards by post with no SAE or return postage. Arne has updated the SM7 group callsigns for which he can obtain QSL cards to: SM7AED, SM7CMV, SM7FJE, SM7FMX, SM7JUQ, SM7LXV, and SM7SCJ.

Juan Fernandez Island; The expedition earlier this year was postponed, but CE3BFZ reports the expedition took place 10-18 November, with the callsign CE0ZZZ. QSL via CE3BFZ

Greenland; Bo OX3LX informed me that the OX3 beacon is off the air. He is trying to find out the cause before he returns to his home QTH. QSL information via his home QTH; OZ1DJJ.

Republic of Guinea; Dave 9L1US reports that his proposed visit to 3X1 would depend entirely upon receiving a written permit for 6m from their Ministry of Communications, as there is no licensing department in the Republic. The RSGB DX Bulletin reports that the ARRL have refused to recognise 3X on any band, 3X1SG has been active for

quite a long time but is not recognised for DXCC.

Saudi Arabia; Bert W2USA operating from HZ1AB Dahran has a TS680S and a dipole at 20m for 6m operations, and has a 34 element log aerial on order. His operating times are restricted until after 1400hrs each day. QSL via K8PYD, Mr. Leo Fry, 5740 North Meadows Blvd, Columbus, Ohio. 43229, USA. Bert had his first 6m QSOs on the 14th October with ZS6WB/7Q7RM/Z23JO etc. On the 16th October he worked 50 J Stations.

Sarawak (East Malasia); An expedition to 9M8 from 9-12 November used the callsign 9M8SEA. QSL information is via. 9M8FH

Cyprus; I understand that from mid-September, all 5B4 stations have had access to the 6m band but the formal letters were not sent out until October. G3KOX worked as /5B4 and probably had the first general authority for 6m operations.

Turkey; G3KOX was active from last few days of November, first week in December, QSL via his home QTH.

Ascension Island; Jim Neiger N6TJ is on Ascension Island as ZD8Z and has just received his 6m gear, he's already active. QSL via. the W6CF QTH.

Morocco; F2CW and a party of French amateurs where active from Morocco during October and November on 6m, QSL via Jacky, F2CW.

UK Beacon GB3CTC; This important beacon was re-activated on the evening of 19th October.

First G/UK opening of the season; The first opening from G into VK took place from around 0850-0903 on the 19 October 1990. First to work; VK4BRG/GJ4ICD, then as far as I know G3ZSS, G6HKM, G3WOS and G3IBI.

Andorra Licensing Conditions

Over the last few years there has been some confusion about the legality of some Dxpeditions to the co-principality of Andorra. Peter Crosland G6JNS/C30AKA sent me the following information;

"Andorra is, as far as I am aware, the only co-principality in the world. The two princes are the Bishop of Urgel in Spain, and the Count of Foix in France. The latter title is actually extinct and is held by the President of France. The actual government is done by 28 counsellors, four from each of the seven parishes. The country is some 464 square km in area with a population of some 25,000 of which around 6,000 are Andorran nationals. The country is very mountainous, the highest point being 2,951 m ASL. Access to many of the high points is possible by four wheel drive vehicles which are easy to hire.

A local firm has four wheel drive buses offering tours to the more remote parts. Although customs control is tight for the French, the customs don't seem to bother much about other nationals. Having no currency of it's own, French and Spanish money is freely accepted with tills catering for both.

Amateur Radio is regulated by the French authorities and the National Society (URA)/local post office. The prefix is C/, not C31 as many reference books would have you believe. Licences are issued to residents in the range of C31 plus two letters. These are dealt with by the post office and no other qualification is required. The URA have also issued a small number of C30 plus three letter calls to non-residents, these are in the range C3OL plus two letters upwards. A fee of around 6,000 pesetas is payable for licences issued by the URA. Most reciprocal licences are issued by the French authorities in Perpingan. They are free and are valid until the end of the calender year of application. These are in the range C30 plus three letters, the first of which indicates the year it was originally issued, hence mine of C30AKA was issued in 1983 and those issued in 1984 commence with C30B. All licences allow operation only on the bands set out in the International Radio Regulations. Hence 50 MHz is not allowed though I believe that an exhibition in the late 70's or early 80's did have special permission for 50 MHz and 70 MHz operation.

A condition of the licence is that prior notice of the dates and locations of operation be given to the French monitoring station in Toulouse. You also have to sign in and out at the French customs post at the border, quite how you do this if you enter or leave from Spain is unclear".

50MHz Comment

Ray Cracknell G2AHU of the RSGB Propagation Studies Committee writes: After the highest solar activity so far during cycle 22, towards the end of August 1990, conditions during September can only be described as disappointing. The August conditions tended to wipe out Sporadic-E and lead to a premature end to the summer season. Solar Flux tended to remain relatively low in September and the expected good Es conditions which are looked for at least during the first half of September just did not materialise on 28 and 50MHz. As a result, African propagation was confined to the extreme south, and South America was also much more restricted than in the previous three years. The only aurora reported was by GM3WOJ on 18th September, he heard GB3NGI and GB3BUX weakly at 1655 and at 1857-1900 worked DJ and PA by what he described as Auroral Es backscatter. Nevertheless, one solar rotation after the very active August period, conditions for DX on 50MHz did improve on 20-23rd and 28-30th of September. Long path contacts on 50MHz took place on 23rd; PY-JA, 25th; 9H- JA, 27th; VKZD8 and W5 worked long path to Hong Kong.

144MHz

TEP conditions have been good with 144MHz QSO's between V51 to I0 and 3A. GJ4ICD (who has a new 1kW research permit) is conducting tests on 144.090MHz with V51 and ZS6. Please spread the word to African stations south of the Sahara capable of monitoring.

Amateur Television — The Initial Steps

Amateur TV is often regarded as being both complex and expensive. In this series of features by Brian G8ZYZ we will endeavour to prove that it need not be either.

Location and Activity

Before entering into ATV you must consider the terrain near to your location. If the property is on reasonably level and open ground or if you live on high ground it is worth checking for signs of local activity. Initially this should be done by tuning to the ATV calling channel on 144.750MHz. When you hear some activity and if you hold a transmitting licence, call in, most ATV enthusiasts will be only too pleased to give you some guidance and many will even be willing to visit you with an arm full of gear to carry out some path tests. If you are not licensed you should be able to get some idea of a station's location after listening for a while.

Once you have established that there is activity in your area you can either purchase or build the necessary equipment. We suggest that you start with a receive only system as the outlay is relatively low, and it will give you the chance to determine if this mode is really going to hold your interest.

The Choice of Band

The choice of 70cm or 24cm will depend very much on which of these bands is used by ATVers in your locality. For this reason we will explain receive systems for both bands as we progress each month in VHF/UHF Message.

Please send your reports and items for inclusion in this column to; Ken Ellis, 18 Joyes Road, Folkestone, Kent CT19 6NX Tel. 0303 53276

Club News

Local Gatherings for Amateurs

Bromsgrove and District Amateur Radio Club meets on the 2nd Friday of each month at the Avoncroft Arts Centre clubroom, Redditch Road, Stoke Heath, Bromsgrove. Club events include;

Jan. 11th. Club night.
Feb. 8th. Club night.
Feb. 23rd. Girl Guides Thinking Day special event station, Spadesbourne Suite, Bromsgrove.
Mar. 8th. Annual General Meeting.

Further details about the club from Trevor Harper G0KIN. Tel. Bromsgrove 33173.

Bromley and District Amateur Radio Society meets on the third Tuesday of each month, 7.30pm for 8.00pm, at the Victory Social Club, Kechill Gardens, Hayes, Kent. Their forthcoming event for January is;

Jan. 15th. Annual General Meeting.

Further details from Mr. Geoffrey Milne G3UMI, Tel. 081 462 2689

South Bristol Amateur Radio Club meets every Wednesday at the Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Bristol, Avon. BS14 0LN. Forthcoming events include;

Jan. 2nd Photographic equipment evening.
Jan. 9th HF activity evening.
Jan. 16th 1991 Bristol rally planning.
Jan. 23rd Soldering Iron evening.
Jan. 30th Planning evening — Lundy Expedition.
Feb. 6th Training for VHF field day.
Feb. 13th VHF Activity evening.
Feb. 20th Computer Activity evening.
Feb. 27th CW Activity evening.

Events and dates often change, so for more information Tel. Whitchurch 832222 on a Wednesday evening.

Dover Amateur Radio Club meet at Dover YMCA Godwynehurst, Leyburne Road, Dover, Kent CT16 1SN every Wednesday at 8.00pm. Dates for January are;

Jan. 2nd No meeting.
Jan. 9th Novice training course discussion evening.
Jan. 16th Natter night.
Jan. 23rd 50MHz — A Valuable resource, a talk by Ken Willis G8VR.
Jan. 30th Natter night and security marking evening, G8ZYZ.

Hastings Electronics and Radio Club meet on the third Wednesday of each month at 7.45pm at West Hill Community Centre, Croft Road, Hastings. Also every Friday at the club room, 8.30pm at Ashdown Farm Community, Downey Close, Hastings. Further details from club Chairman Ken Homewood G4UBP, Tel. Hastings 444952, or Secretary Reg Kemp G3YYF.

Horndean and Dist Amateur Radio Club meet at the Horndean Community School at 7.30pm, Barton Cross, Horndean, Hants.

Jan. 3rd High Tech test equipment by Hewlett Packard.
Feb. 7th Police communications control, by Dan G4BEQ.
Mar. 7th 'Something different' by Doug G4BEQ.

Further details from S. W. Swain, Tel. 0705 472846

West Kent Amateur Radio Society meet at the school annexe, Albion Rd, Tunbridge Wells, Kent. Further details from R. J. Taylor, G3OHV, 'Eagles Rest' 9 Jefferies Way, Crowborough, E. Sussex TN6 2UH. Dates for your diary include;

Jan. 18th TBA
Feb. 15th Talk by Nigel Peacock 'Local Radio forthcoming developments'

Northern Heights Amateur Radio and Electronics Society meet on the first and third Wednesdays each month at the Bradshaw Tavern, Nr. Queensbury, Bedfordshire, at 8.15pm. Events include:

Jan. 2nd Video evening.
Jan. 16th Annual dinner.
Feb. 6th Constructor's clinic.
Feb. 20th Mr. Dougherty's lecture.

For details contact Stan Catton G0IYR on 0274 673116

Rhyl and District Amateur Radio Club meets on the first and third Tuesdays each month at the Scout Hut, Vale Road, Rhyl. Their programme of events;

Jan. 7th Annual junk sale. All welcome.
Jan. 21st Cartography. The road to Russia by Jim GW4UWI.
Feb. 4th Computers in amateur radio.
Feb. 18th Quiz. RAE multiple choice questions.

For further details contact Mr. David Bevan GW4DMR (Chairman) Tel. 0745 345078, or Mr. Edward Shipton GWODSJ (Secretary) Tel. 0745 336939, or Mr George Greenhalgh GW0MOH (Treasurer) Tel. 0745 350896.

Stourbridge & District Amateur Radio Society meet on the first and third Monday of each month at the Robin Wood's Community Centre, Scotts Road, Stourbridge. Programme of events;

Jan. 7th On air and natter night.
Jan. 21st Sounds of yesteryear, by J.P. Stroud.
Feb. 4th On air and natter night.
Feb. 18th Constructors competition.

Their secretary is Dennis Body G0HTJ.

Stratford upon Avon & District Radio Society meet at the Baptist Church, Payton Street, Stratford upon Avon, at 7.30pm. Club dates include;

Jan. 14th Projects evening (bring your project along).
Jan. 28th New year social, Gay Dog, Lower Quinton.
Feb. 11th 10GHz the easy way, Dave Ackrill G0DJA.
Feb. 25th Aligning receivers, Geoff Foster G8UKT.

Details from A. Beasley G0CXJ. Tel. 060 882 495.

Todmorden and District Amateur Radio Society meet at the Queen Hotel, Todmorden on the first and third Monday every month at 8pm.
Forthcoming events include;

Jan. 7th Aerial design.
Jan. 21st Aerial construction.
Feb. 4th AGM and construction competition.
Feb. 18th Club station on air. (hopefully).
Mar. 4th Trip to brewery. (paid up members only).

Yeovil Amateur Radio Society meets every Thursday 7.30pm at the Recreation centre, Chilton Grove, Yeovil. Dates for your diary are.

Jan. 10th Talk on RTTY by G0LNI.
Jan. 17th Simple PSUs by G0HDJ.
Jan. 24th Discussion night.
Jan. 30th TBA
Feb. 7th Simple ATV by G3MYM

Further details from the Chairman, Adrian G4JBH. Tel. 0935 28341 or the Secretary David Briley G0NMM.

The Irish Radio Transmitters Society send out regular newsletters giving details of local activities. The contact man for this is Dave Moore EI4BZ, 12 Castle Ave, Carrigtwohill, Co Cork. Tel. (Eire) 021 883555

To include your club in this feature, make sure you send your events details to the editorial office address, then we'll make sure our readers know exactly what you're up to each month. You might even get some new members! Remember these pages are prepared two months in advance of the magazine apearing on the shelves, so dates need to be sent well in advance, i.e. dates to be included in the issue published in March should reach us at the beginning of January.

Rallies

Gatherings for bargain hunters

January 20th.
Oldham ARC Rally, at the Queen Elizabeth Hall, Civic Centre, Oldham. Further details available from Kathy, G4ZEP on 061 624 7354

January 27th.
The Lancastrian Rally is on January 27th at Lancaster University. The organisers of the event are the CLARC and ULARS radio clubs. For further details contact Sue Griffin, G1OHH, on 0524 64239 or Mike Sherlock, G4ZYN, on 0257 452287.

February 3rd
South Essex Amateur Radio Society Mobile Rally is on February 3rd at the Paddocks Long Road (A130) Canvey Island. The organisers invite you to come along if you have any interest in amateur radio, shortwave listening, electronics or any form of communications. This will be an all day event featuring trade stands, bring and buy, RSGB book stall, boot sale and home made refreshments. Doors open at 10am. Extensive free parking plus parking at the main entrance for disabled visitors. 2m talk-in on S22 (G4RSE). Further information from Dave Speechley G4UVJ on 0268 697978 or 0860 847836

March 3rd
Welsh Mobile Rally is at the Barry Leisure Centre, off Holton Road, Barry. For further details, phone Ceri GW0JCB on 0446 721304

March 9/10th
London Amateur Radio Show, Picketts Lock Centre, Picketts Lock Lane, Edmonton, London. HRT will be there! Organised by the London Amateur Radio Show committee, in conjunction with the Southgate ARC. Further details from the London Amateur Radio Show, 126 Mount Pleasant Lane, Bricket Wood, Herts AL2 3XD.

March 17th
Wythall Radio Club will be holding their 6th annual radio rally at Wythall Park, Silver Street, Wythall, Worcestershire, on the A435 near junction 3 on M42, South West of Birmingham. Rally opens at 11.00am, with an admission price of 50p. Further details from Chris Pettitt G0EYO on 021 430 7267.

March 24th
Pontefract and DARS Components Fair, at the Carleton Community Centre, Carleton, Pontefract. For further details, Tel. 0977 615549

March 31st
Centre of England Easter Amateur Radio Rally, is being held at the motorcycle museum, Brickenhill, near the NEC Birmingham. Further details from Frank Martin, G4UMF on 0952 598173

April 7th
Launceston Amateur Radio Club Rally at Launceston College. Bar, hot snacks, large bring and buy, well known traders, official Morse tests at rally, (applications through RSGB usual channels please). Doors open at 10.30, talk-in on S22. Two large halls. For more information contact Maggie on 0409 21219 or Rodney and Joy on 0566 775167

April 14th
The Trafford Rally is on the 14th April at the Greater Manchester Exhibition and events Centre, City Centre, Manchester. Details from Graham Oldfield G1IJK, Tel. 061 748 9804

Free Readers Ads!

FOR SALE

Icom ICR71E, fitted with EX310 frequency voice synthesiser, EX95T FM unit and FL44A SSB filter. Excellent condition, original container and full literature, £650 ono. (Felixstowe, Suffolk). Tel. Clive Moore, 0394 274988

Yaesu FT726R multimode base transceiver, fitted 2m, 6m, HF module and satellite module, £950, as new condition. VHF converter for FRG-7700, perfect order, £30. K. Greenough, 2 Bexley Close, Glossop, Derbyshire. SK13 9BG. Tel. 0457 855468

Kenwood TH-25E handheld 0transceiver, complete with soft case and guarantee, 7 months old with original packing, £175. GW3WSU Bungalow No. 1, Racal-Decca Trans Stat, Llancarfan, Barry, S. Glamorgan. Tel 0446 781261

Yaesu FT-107M line-up. FT-107M with digital memory unit, built in PSU, fitted CW and FM filters and boxed WARC and FM add-ons, £475. FTV-107R transverter with 2m and 6m modules installed, £250. (Eastleigh, Hants). Tel. Chris G4HCL on 0703 262105 Mon-Sat 09.30-20.30. .

Yaesu 7000 communications receiver with manual, £140 ono. Eddystone 770R, £70 ono. Juliet Battery/Mains radio, airband marine etc., collectors radio, £70 ono. Consider exchange for 2m handheld or scanner to cover to 900MHz plus. (Doncaster). Tel. 0302 531927

Realistic PRO2005 400 channel scanner, £250 ono. Codemaster CW tutor and RTTY/CW decoder, £40. K. Gibbons, 42 Cairngorm Ave, Lakelands, Lambton, Washington.

Bearcat 100XL Scanner, 68-88, 118-136, 136-174, 406-512MHz handheld, rechargeable, comes complete with charger, earphone, nicads, manual, frequency guides and case. Boxed and in very good condition. Bargain at £110. P. D. Carter (Merseyside), Tel. 0704 871513

Yaesu FRG-8800 HF receiver, ATU, G5RV aerial, boxed, as new, £400. (SW Birmingham). Tel. 021 453 7997

UHF 3 chan handheld Burndept, converted 70cm as per article in HRT Dec 90, £345 inc. aerial, nicads and post. 6 chan handheld Burndept (BE600) xtalled RB13 TX/RX, RB2 TX, RB5 TX, £100 inc. aerial, nicads and post. G4XIV (York) Tel. 0904 792208 evenings/ weekends.

Icom IC-735 plus Welz AC200 ATU, both boxed, very little use, £890, will separate. Bremi BRL500 28-30MHz, just been serviced, good condition, £200, offers. (Basildon). Tel. 0268 552978 after 6pm, ask for Alan.

Coax relays, Magnetic Devices type 951, 12V coil, 50 ohm impedance, rated 50W at 450MHz, ex-equipment, £5 each. Jim G4BEZ (Basingstoke), Tel. 0256 764943 evenings.

FT290R MkI, nicads, flexible and telescopic aerial, up/down mic, manual (no box), bargain at £215 or will accept fully synthesised 70cm FM mobile, minimum 10W output, to equivalent or plus cash makeup. Kevin (Stoke on Trent), Tel. 0782 314383

Kenwood TH25E 2m handheld, including SMC30 speaker/mic, case and spare battery pack, £170. VHF Converter for Kenwood R2000, 118- 174MHz, £100. Global AT1000 RX ATU £50. G4YJO (Rochester, Kent) Tel. 0634 843875 evenings.

AOR2002 scanner, 25 to 1300MHz, 20 memories, 5/12.5/ 25kHz with adaptor, telescopic aerial, power pack, frequency book, £385. (Nr. Lincoln). Tel 0522 690732, answering machine when not at home.

Power Supply, 10A Zetagi, variable voltage output 11V to 15V, £45 ono. Colin G1YIL, (Bridport, Dorset). Tel. 0308 27882

Diamond 2/70/DP/LOR extension/groundplane, £20. Tele HiFi unit, £20. IT Transistor tester, £5. Surer discone 25-1500MHz, £35. all items as new or good condition. Shack clearout. Ron Bland G3BKL, 11 Greatcroft, Firs Rd, Winterslow, Salisbury. SP5 1SN. Tel. 0980 862489

FT-707 with new bands plus FTV-707, FP-707, £575. Trio 9500 plus Tono 4M-70G amp, £450. FTV-901R with 2m and 6m, £325. All in mint condition. GW4UWR, V. T. Thomas, 8 Dinas Path, Fairwater, Cwmbran, Gwent. NP44 4QQ, Tel. Cwmbran 65507.

JVC CX-60GB 13cm colour TV Monitor, AC/DC with PAL/ SECAM, plus 6.5 OIRT, 6.0 — UK, 5.5 CCIR sound systems. As new, cost £319, sell for £250 ovno. Write to Mike Evans, 120 Loughton Way, Buckhurst Hill, Essex IG9 6AR.

Yaesu FT707 HF, 100W transceiver, with SMC FM board and YD148 desk mic, £350 ono. FT690R 6m TCVR. £250 ono. Both with manuals and boxed. Belcom 2m hand held, covers 140-169MHz, with speaker/mic, case, charger, £95 ono. G1BWW (Hitchen, Herts) Tel. 0462 711722

FT-102 HF, TX/RX, £495. IC 228H, 45W 2m FM, new, £275. IC 3210E 2/70 dual band, new, £375. Hallicrafter SX 62, good condition, RX, £85. Tel. G4AFY, on Kidderminster 747480

Trio TS711E, 5-25W output, 144MHz multimode, as new including mic and SP40 extention speaker, £650. Also Fluke 8024 multimeter, including leads, £150 ono. Talor capacity/resistance bridge, model 110A, £20 ono. (Northampton) Tel. Jim G1SET on 0604 713394.

FT-501 TX/RX, £195. Minimitter ATU, £25. GPO ohm meter, £10. 2m- 6m converter, unboxed, £10. MM432/144R, 70cms transverter with 15dB att, £100. 8 ele X yagi 70cm aerial, £10. 4 ele quad, £15. Blue diamond HF, RX aerial, £10. Sinclar 2in B/W TV, PSU, case, £50. (Gwynedd) Pat GW1SXN, Tel. 0286 5468.

8+8 70cm £20. TC1 transistor tester, £20. FS117D tester/dummy load, £30. TRKDM6 Dip meter, £25. SPM1000 SWR/Power/ Match, £20. CB32A LPF, £4.50. Saio stereo amp (240V AC), £20. LA2035R VHF amp £60. DNT 29/ 30FM correct readout, £35. Ron Bland G3BKL, 11 Greatcroft, Firs Rd, Winterslow, Salisbury. SP5 1SN. Tel. 0980 862489

Yaesu 690 MKII, complete with Yaesu clip-on linear and battery case, manual and technical supplement, £300 or will sell linear separately. Also Trio 9130 2m multimode 5-25W, boxed plus mobile mounting bracket, £250. (Coalville, Leics) Tel. Malcolm G1UCN on 0530 813953.

Kenwood R600 HF RX, 150KHz-30MHz, £200, mint cond. (Walton-on- Thames), Tel. 0932 224655 after 6pm.

Sony ICF 2001 receiver and AC 122 power adapter, £100 ono. R. W. Bibby, (Kintore, Aberdeenshire) Tel. 0467 32562.

Butternut HF6V 6 band vertical aerial, 80, 40, 30, 20, 15, and 10, installed for just six months. Also HQ1 mini beam, Yaesu G400R rotator, offers, contact Wayne G0JJQ (Greenford, Middx) on 081 575 7078 after 5pm.

1500 cheap type phono plugs, metal, £1 per 200. 1000 unused valves, octals mainly, some British, few side contact continental. Thousands wire wound resistors, all at very low prices. SAE for lists please to A. E Jeffrey G3HWD, 42 Dennis Road, Padstow, Cornwall. PL28 8DF

Icom IC-R1000 Scanning Receiver, immaculate condition, £650 ono. Yaesu FRG-8800 HF receiver, VHF converter fitted, £450 ono. AOR2001 scanner in 2002 case (tuning knob, keypad, LEDs etc.) £250 ono. Spectrum 128 computer, £55. (Luton) Tel. 0582 668648

2m and 70cm Multimode, FDK750E and expander, 10W, £350. Masses of components, very cheap, SAE for lists. Mr. K. Greenough, " Bexley Close, The Heath, Glossop, Derbyshire. SK13 9BG.

Yaesu FRG-9600 modified 0.2-950MHz plus discone and coax (used indoors), £500 ono. (Grimsby). Tel. 0472 352359

Amiga A500, 0.5Meg expansion, 2nd drive, Philips colour monitor, DMP2000 printer, 300 blank 3.5in disks, all cables, books, mags, £1000 ono. All items in good condition. (Washington). Tel. 091 415 1550 for more details.

Realistic PRO32A Programmable Scanner, 200 memories, UHF/VHF Hi- Lo-Air. Many fatures too numerous to mention, Freq. range 68-88, 108-136, 138-174, 380-512MHz, belt clip, telescopic and rubber duck aerials, bargain at £110. (Sherbourne, Dorset). Tel. Nic on 0935 873157

LSG17 Sig Gen 100kHz-150MHz, £60. Heatherlite mobile mic, £20. BV131 new, £65. 561 Shure mic, gooseneck, £12. Monitor 6in x 4in green screen (240V 50AC) £30. 70cm BATC ATV/TX/RX filter, complete, £15. Answercall 2000 cordless, £60. Ron Bland G3BKL, 11 Greatcroft, Firs Rd, Winterslow, Salisbury. SP5 1SN. Tel. 0980 862489

Pye Vanguard, 12 volt, modified and working on 4 metres FM, needs crystals, £30. B41 low ban 500 to 15KHz, £40 ono. Leak FM

Through line Three valve tuner, £20. Wobbulator scope impedance measuring 170-200MHz, large, £20. Buyers collect. Contact Mr. Robins G8BSK (Southampton) Tel. 0703 552247

Realistic Pro-34 hand held scanner, 200 channel, 68 — 512MHz, four months old, unwanted gift, complete with box, manual and batteries, £160 ono. Contact M. McClelland (Wirral) Tel 051 355 9840

Yaesu FT101E,manual, VGC, £300, or exchange FT-101ZD or FT-707 plus cash adjustment. Contact Mr. Turner (Peterborough) Tel. 0733 63924

Yaesu FT-101ZD MkIII spare 10MHz crystals, covers all WARC bands, £575. Realistic 2005, cost £334, sell for £270 ovno. (Sheffield) Tel. 0283 221870

EXCHANGE

Swap Icom IC-R100 receiver, 0.5MHz to 1800MHz no gaps, AM/FM/WFM/USB/LSB, 100 memories, 9 scan modes, mint condition. Wanted NRD525, NRD515, IC-R71, HF225, up to £200 either way. (Derby). Tel. 0332 668272

Tandy 2004 scanner, excellent condition plus 48K spectrum fitted into low profile keyboard. Exchange for Yaesu 9600 scanner in top condition. Tel Newark 0636 77944, leave a message on machine or write to John Gilbert, 24 Wolsey Road, Newark, Notts NG24 2BN.

Lowe HF125 receiver fitted with FM option, mains power supply, very good condition. Exchange for VHF scanner receiver or 2m transceiver, WHY. Contact Geoff (Norwich) 0603 406331

WANTED

Student requires components and cheap but working test equipment, books, information on electronics for course and home use. I am more than willing to pay for postage. Also wanted is any ham radio and electronics engineering related software for PC compatible computers, antennas, circuits for PSUs, cheap working oscilloscope 30-50MHz but less would do, scope must be up to travelling. Please contact Jim Swale, Fourwinds, Lower-Moor, St. Davids, Haverfordwest, Pembs. Wales. SA62 6PR

Good Condition DST100, SX28, HRO, AF88LF receivers; KW160 transmitter, Avo CT160 valve test data books for B7G B9A valves. 'Radio Designers Handbook' 4th, 1954, 1482 page edition. Some metal octal and earlier valves. What's available at reasonables prices?. Mr. M. J. Shepherd, 66 Westerland Avenue, Canvey Island. Essex. SS8 8JS

Yaesu FRG-7700 with matching accessories, must be in excellent condition. D5B80 with CW filter for sale, £55 including postage. Tom G6TFC, 1 Armadale Road, Ladybridge, Bolton. BL3 4QE. Tel. 0204 651183

Denco plug-in coils, particularly Green Range T, but any other types or makes will do, also other bits and pieces, variable capacitors etc. to introduce keen youngster to radio construction. Tel. Pete on 0933 845270 evenings, or P. G. Dolling G4LQZ, Time House, 30 The Crescent, Carterton, Oxon. OX8 3SJ.

60ft Tower, wind up, tilt over, ground post mounted. 'Altron', 'Versatower' etc. Contact Rob G2BKZ on Stevenage 721418.

Freqency film ribbon for R210 receiver needed urgently with fitting instructions please. Phone or write with your price to J. W. Gernert, 61 Rotten Row, Pinchbeck, Spalding, Lincs PE11 3RQ Tel. 0775 724085

HF-5 Vertical aerial without radials. Tel 0723 584670 (Cayton, Scarborough).

External aerial leads, two sets, to fit Motorola MX300 series hand held transceivers, also element for Bird Thru-line wattmeter, to cover 2m band 50W or 100W rating. Please write with prices to Tom Valentine, 38 Grampian Veiw, Montrose, Angus DD10 9SX.

Any information on JRC/NRD 505, e.g. old write ups, manual, WHY. Also books/mags, PW before 1976, 'Shortwave — Receivers past and present', 'More — Radio Receivers — Chance or Choice', 'Receivers Galore', 'Radio Data Base Int' (re. NRD 505), 'A DXers Technical Guide', and 'Enjoying Radio'. Asking price of NRD 505 if selling. Write to Mike Evans, 120 Loughton Way, Buckhurst Hill, Essex IG9 6AR

Broadcast Receiver and/or air band by disabled O.A.P returning to amateur radio after 45 years. Call Roger (Orpington Kent) Tel. 0689 20281 evenings.

Free Readers Ads!

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3. All advertisements **must** include either a contact telephone number and location (e.g. town) or a full address, or both for readers to reply, these details must be included within the advertisement. The Editor reserves the right to add a town/county location where this has been omitted. The term QTHR will not be published as many readers cannot use this, if entered the Editor reserves the right to replace it with a recently published callbook address, however no guarantee of this nor its accuracy is given.

4. Advertisements which are suspected of including illegal equipment and/or any equipment which transmits only outside of amateur bands will not be published. The magazine reserves the right to either refuse to accept in entirety, or to delete any sections, of such advertisements.

5. Advertisers must fill in their names, addresses and (if available) telephone number in the space provided, these details will not be published, and advertisers must sign the form to indicate acceptance of these conditions. Forms submitted without a signature will be rejected.

6. The submitted advertisement must be either written in block capitals or typed, illegible submissions cannot be included.

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8. The magazine cannot be held responsible for printers' errors, however we will attempt to ensure that legible submissions are reproduced correctly. In the event of a gross error, at the request of the advertiser and at the Editor's discretion, a corrected version of the advertisement will be printed in the earliest issue in which space is available.

9. Neither the magazine nor its publishers will accept any responsibilty for the contents of the advertisements, and by acceptance of these conditions the advertiser undertakes to indemnify the publisher against any legal action arising out of the contents of the advertisement.

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HRT/02/91

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Radio & Telecommunications Correspondence School, 12, Moor View Drive, Teignmouth, Devon TQ14 9UN

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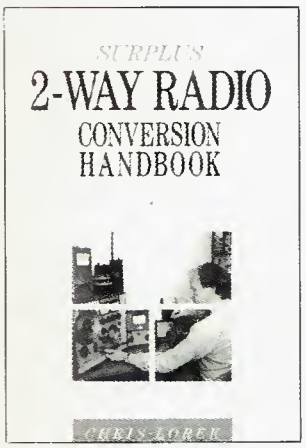

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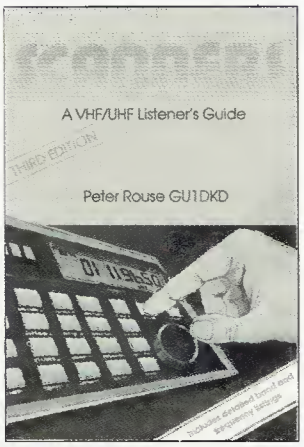

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