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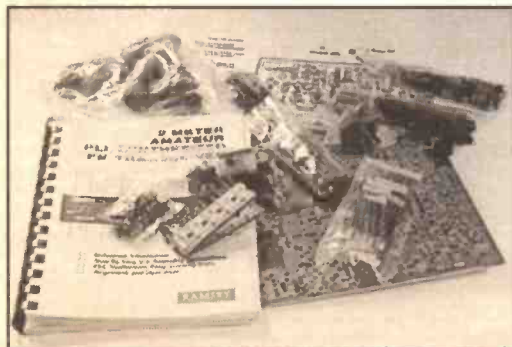
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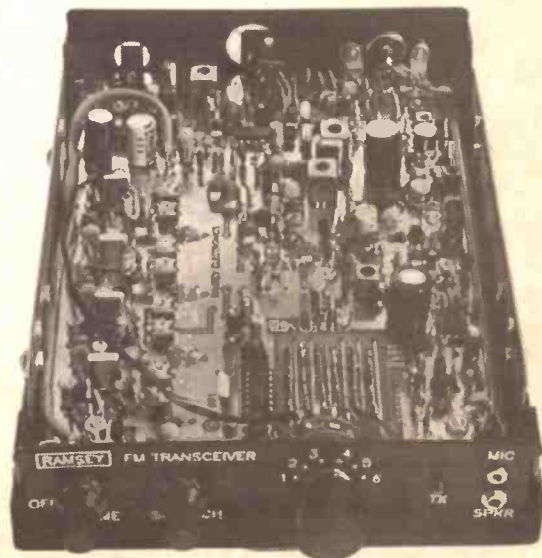
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First UK Novices receive their licenses



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CQ de G8IYA

As I write this I've just returned from the AMSAT-UK Colloquium at the University of Surrey, where Chris and I had pleasure in meeting forward-thinking amateurs from all around the world. I know one result from our meetings here will be some very interesting articles, on a variety of radio subjects, in future issues of HRT!

As well as speaking with amateurs from South Africa, New Zealand, Germany and the USA, we had a few interesting chats with Leo UA3CR (who many readers will know from his connections with the Moscow Radio Club as well as from his regular chats with the orbiting Cosmonaut amateurs in the Mir space station). Leo told us he reads and enjoys HRT each month, and we've asked if we could possibly have some articles from his colleagues in the USSR to include in the magazine — watch this space. HRT may soon have an even greater international feel, our 'Letter of the Month' in this issue even reflects the fact that the magazine is read and enjoyed by amateurs worldwide, even this morning I've just received an airmail package with an interesting letter from Stan ZL1BYR — many thanks for the ZL callbook Stan.

Maybe you're also one of the many readers reading this in a country other than the UK, if so why not drop us a few lines on your country's amateur radio activities, and if you add a suitable photo or two we'd be pleased to publish them — why not be an amateur radio 'ambassador' for your country!

WARC 92

For those who don't know what this stands for, it's the 1992 World Administrative Radio Conference. Every few years, delegates from around the world get together to decide what to do with

An international hobby, but are we going to keep our amateur band allocations?

one of our common but very precious resources, the radio spectrum. Of probably the greatest interest to radio amateurs are the decisions taken at these events, normally by a democratic vote, as to whether we gain or lose any amateur frequency band allocations. An example of this are the 'WARC' HF bands of 10MHz, 18MHz and 24MHz which were granted to us some time ago at this conference.

Now each country gets a vote, even if it's only made up of a very small population. Successful promotion of the benefits of amateur radio to developing countries could therefore easily influence the way their delegates vote at these conferences. If amateur radio is thought of simply as a non-technical hobby open only to the 'cheque book' amateurs, it wouldn't be surprising to think that these countries may look upon amateur frequencies with disfavour, believing they should be allocated instead to other uses more suited to their countries' needs.

One beneficial project which I obtained comprehensive details on from Eric WD3Q and Jonathan N1UP this weekend was 'SateLife', a name you'll have seen in past issues of HRT. They are an international group, with directors in the USA, Canada, USSR, India and Uganda. This organisation is promoting what they term an 'affordable' telecommunications system through which health professionals, academics, researchers and activists in developing countries with poor, expensive, or even non-existent telephone services, can



I was pleased to meet with Eric WD3Q of VITA — Volunteers In Technical Assistance, a man who's helping bring communications to developing countries through amateur radio work.

have access to each other as well as with their colleagues abroad to help save lives. SateLife is initially concentrating on Africa where the need is greatest, with demonstration systems in Zimbabwe, Kenya, Zambia, Tanzania and Uganda. Here, low cost portable user terminals for packet radio store-and-forward data communications, using portable suitcase-mounted satellite terminals communicating with Low-Earth orbiting satellites, are being tested. So what's this to do with amateur radio? Well the techniques were pioneered by us, yes amateurs, with our Low-Earth orbiting packet satellite systems. SateLife even uses one of the transponders on the University of Surrey's UoSat 5.

We need to get the message across to people in these countries that the promotion of amateur radio, worldwide, can lead to solutions to their needs. By showing them that the work we do can have direct benefits for them, even if they are sometimes developed by 'chequebook' amateurs, we can hope to retain or even expand our bands. Our VHF and UHF allocations especially are looked upon with jealousy by many commercial users. 'Why let the amateurs have it?' they say. I've just shown you why. We now need to let other users of the radio spectrum know why.

Subscriptions and back issues:
Ham Radio Today Subscription Dept,
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Tel: (0442) 876661/4

Subscription rates:
UK £19.20, Europe £24.00
Middle East £24.35, USA \$48.00
Far East £26.70, Rest of World £25.75
Airmail rates available on request.

USA Subscription Agent:
Wise Owl Worldwide Publications,
4314 West 238th Street,
Torrance CA90505
Tel: (213) 375 6258

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Tel: 0442 66551
Fax: 0442 66998
Printed in Great Britain by
Wiltshire Ltd, Bristol



Member of the
Audit Bureau
of Circulation



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LETTERS

Letter of the month

Hello dear HRT from Rumania, With my first letter to you I would like to send you my best wishes and all love to HRT readers and to our English Ham friends.

I'm looking forward and I'm sure that HRT could be the cultural bridge between YO and G Hams. There is so much to do and so much to say, I cannot write it all in one letter.

I have only one issue (May 91) and I have read it page by page. My friends at the radio club also appreciate the HRT magazine. I would like, if it is possible, to receive some HRT magazines, if a radio club or a group of Hams can do that in exchange of course for the Rumanian YO magazines. Also if the club or group of Hams are interested in the exchange of books, materials etc. we can afford to be host during few weeks of holiday in Rumania, at this time there will be very wide and interesting contacts.

We also would like to have a guest from HRT visit us. We are sure that he or she could find some interesting things about Rumanian Hams. Anyway everyone who comes here is, for us, a VIP and will have a lot of fun staying a while with us. We are all young (we have also YLs hi!) and a lot of us are engineers, students and we do

everything in this hobby with love!

We doubt if this letter will be the letter of the month, but we want to be the bridge of friendship between the YO and UK Hams, and to establish constructive and useful contacts with love and understanding.

Glad to meet you HRT dear friend, greetings from Rumania, all the best to you and your readers!
73s and 88s
Mihai, YO9FSR

Editorial comment;

Thank you Mihai for your lovely letter, and we hope many of our readers and clubs will get in touch with you. We are sending you a copy of our June, July, August, and September 1991 issues (plus this issue when it comes out), hoping they arrive safely and you enjoy reading them, as well as a small 'package' as a reward for the letter of the month. Thank you also for the kind invitation to visit you, we may take you up on that one day!

HRT would also like to send love and greetings to you and your friends at your radio club in Rumania. For readers interested in taking part in the exchange, the address to write to is; Stan Mihail Dan (YO9FSR), LT. Stancuion No. 35A, B1. 10. EI. 1. Ap.5, Tirgoviste 0200, Rumania.

attend our RAE evening class for two terms!

I will see the Novices through to whatever result they will accept but, it is doubtful that I will subject any more students to this scheme. I hate to label this marvellous idea as a failure, but I for one am a very disillusioned Novice instructor.

73, Clive Williamson, G4IEB

Editorial comment;

The RA have told us they know there will be 'problems' in the initial period of the Novice licence scheme, and be assured we'll forward your comments onto them in our next meeting on the Novice licence. However Novice students are of differing standards and we're currently getting a number through the course ourselves in association with one of our local schools, these students seem to have few problems with the technical level needed. The UK 'Novice' standard certainly appears to be set higher than, say, the USA Novice standard, but of course only time will tell!

Dear HRT,

I am the owner of communication equipment which enables me to receive from 0-1.5GHz. I was curious about the legal aspect of using the equipment to receive PMR, air, marine etc., so I contacted the DTI hoping to obtain some form of information. I was transferred seven times (yes seven) before speaking to someone who even knew what I was talking about.

On passing on my enquiry regarding licensing I was informed that nothing existed to grant me permission to listen on anything other than broadcast or amateur bands. I was also told to "listen to what you want, but don't tell anyone!". This simply tells me that I can effectively ignore the law and go about my listening! How can you have a law that is unenforceable regarding the use of receiving apparatus. Can we have some help DTI?

On the subject of the Novice exam; best thing to happen to this hobby in years! I will study for my Novice licence as soon as I can find a tutor in Brighton.

Keep up the good work HRT, I look forward to getting your magazine every month. How about making it thicker?

Yours sincerely,
Mr. T. Ward, Brighton.

Editorial comment;

Dear HRT,

I would like you to know of my concern that the Novice licence will be a sad failure, for many of those children who take the practical course because, they will be unprepared for the written City and Guilds exam. I read the specimen exam paper with incredulity, I could not bring myself to let my Novice students know of its existence for some time. I told them only when I had just covered a topic, and I knew they would be able to answer at least one of the specimen questions!

I have three points to make; first, the 30 hour practical course does not prepare the novices for the written paper. Second, the questions are as difficult as the RAE (in fact students at my school who passed the RAE last year said they would not have done as well in this new novice exam). Third, the example questions in the specimen paper were often dubious in their structure and the correct answers were

sometimes improbable.

I am quite prepared to tell you that I did not answer 8 of the 45 questions correctly. My qualifications? An amateur since 1977, a teacher for 18 years, teaching electronics for nearly 10 years. I teach 2 GCSE courses and one A level.

The project 'YEAR' and the Novice licence were *mainly* aimed at the young, but unfortunately I think we will regret the difficulty of the written paper. I predict that there will be many young people who obtain the certificate for the practical work, but who will not be able to pass the Novice exam. I believe the only way my Novice students will pass the exam, is to have a similar evening class with a syllabus geared to the written paper. As the practical work is taking at least twice as long as the instructor's manual suggests, I do not think many young people will *stick at it* for what could be over a year of study. They may as well

£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, A.S.P., Argus House, Boundary Way, Hemel Hempstead, HP2 7ST.

"TONE" BURST'S "CLASS WARS" Part 1



With thanks to Stan Clegg, Ronald Barber, & Ronald Barber.



I am a Class A! I look down on HIM.....



...I am a Class B! I look up to HIM...



..but I look down on HIM. He is a Novice



Oi know moi place*!
(*and sure keep me in it!)

...More to come... Stan Clegg

The guidelines for wideband coverage have now been clarified, and if you've been foolish enough to have, say, an amateur 2m or 70cm rig with an 'opened up' receiver and have 'sensitive' frequencies programmed into the memories, you'll find yourself at the sharp end of the law. (See this month's 'Scanners International'). I'm glad you're going in for your licence, no doubt there will be a new '2E' on the air from Brighton in the future.

Dear HRT,
With reference to the letter of the month from Bob Ralph G4KSG (July 91 issue). Perhaps Bob did not peruse the article in HRT in 1988, when the then DTI were thinking of selling off the radio spectrum. This idea has again cropped up in one of the 'CQ de G8IYA editorials.

Bob states that the authorities have no legitimate reason to refuse to issue licences, because licensees operate within the law and terms of the licence, and that amateur radio is not ownable — *wrong*. If there were no organisations representing the licensees then it is not likely in these circumstances that there would be any serious consequences, again — *wrong*. The radio communications 'big boys' are again urgently pressing the government in selling off the radio spectrum. It is your prerogative to withdraw your financial support to the RSGB, but please do not start protesting when you have to pay by the hour to use the radio spectrum, it will then not be a hobby, but a financial institution run for profit. Not forgetting that the DTI gave the radio spectrum to the Radiocommunications Agency, who are greatly interested in selling.
Yours sincerely,
J. H. Clifton, G710U

Editorial comment;
Commercial licenses for a group of channels for exclusive use in the UK come to several tens of thousands of pounds per year. We owe our retention of the bands to progressive amateurs such as the

forward-thinking types who are experimenting with new technologies of possible value to the human race. As the saying goes, there's no such thing as a free lunch.

Dear HRT,
I hope you won't suppress my views on the subject of the CW route to class A!

I and several of my pals actually enjoy the mode, it has many, many plus points going for it. For example, smaller bandwidth, less power required for DX, it lets the rest of the family sleep! etc. etc. If people came onto HF without CW knowledge, I would be concerned that the CW only (I know 'recommended' sections would be 'invaded' by phone and over-wide data stations.

My suggestion would be to allow class B operators on all HF bands but restricted to the (recommended) telephony sections only. I also feel the RAE is too easy, it should cover more testing on EMC and operating questions. With regard to the CW test itself, this would be less daunting, and of more practical use, if it took the form of a dummy QSO with normal abbreviations and figures incorporated.

The new Novice Licence would become the first rung on the ladder, with QRP. The existing class A and new 'telephony on HF' class B the second rung (remaining at 400W and A1A on VHF), and perhaps a third rung, after a more searching examination, that would allow power outputs of up to 1kW??

Congratulations on a much improved magazine.
Yours sincerely,
Mike Thorogood, GM0JKF.

Editorial comment;
Thanks for your constructive letter Mike, this could certainly be a 'stepping stone', what do other amateurs think? Over-wide data transmissions may be annoying to non-data users, but remember this is currently the future of all radio communication, so maybe we

should instead try to 'educate' these users rather than suppress them!

Dear HRT,
I would like your opinion regarding a subject that has been bothering me for some years now. I regularly read your magazine plus other radio magazines and what I want to know is this, why is there absolutely no price difference between the suppliers of imported equipment?

Take for an example, the Kenwood TS850S. The price of this is exactly the same no matter which supplier's advertisement you look at. This would lead one to suspect that there must be some sort of price fixing or cartel in operation here, contrary to the recent consumer legislation.

The magazines that I read regularly publish letters and articles on just about every conceivable aspect of amateur radio with the noticeable, to me at least, absence of any comment on pricing. Now, I am not naive, and I appreciate that you are caught in a rather delicate situation as no doubt if you were to mention this interesting state of affairs then I suppose you may find yourself devoid of advertising. I would be interested to hear your reply.
Yours faithfully,
J. Maxwell, G7DXC.

Editorial comment;
As with all consumer goods, which amateur radio is a specialised form of, there are 'recommended retail prices' set by the manufacturers or distributors. These, of course, are commonly the advertised prices for a given set. Just take a look at the price lists from, say, a number of different new car dealers for a certain make and model of virtually any new car, and you'll see this isn't restricted to amateur radio. But the 'customer is king', and if you don't like the advertised price there's nothing to stop you making an offer. But remember the poor dealer, as 'price cutting' often brings with it poor backup service and the like in a relatively small section of the consumer market such as ours.

RADIO TODAY



John Redwood, the DTI Minister of Corporate Affairs, presented the licences

First UK Novices receive their licences

At a function hosted by the Radiocommunications Agency on Thursday 25th July at their Victoria Road offices in London, seven of the first UK novice licensees selected at random were presented with their licences by the DTI Corporate Affairs Minister John Redwood. Many senior staff from the RA as well as personnel from the City and Guilds were also present at the event, and HRT were of course invited along to be present at the function and to meet and chat with the novices and RA staff.

When referring to the RA Novice Licence Scheme, Mr. Redwood said "I am glad to see young people joining this scheme to use amateur radio. This hobby can be a valuable introduction to careers in radio and electronics". He continued by saying that he was most pleased to be asked to issue licences 001 to 007, something he had longed to do, especially licence 007!

Following the presentation, Mr. Redwood answered questions from the press. The novices then had a chance to

chat informally over the handsome buffet provided (thanks RA), and some even took the opportunity to make their first 6m FM contact on a transceiver set up in the RA conference room. Five of the seven licensees took advantage of this, with the first novice call to be heard aired being 2E1AAC.

The first novice licensees were;

Jonathan Page, 2E1AAA, from Poole. Jonathan is 16 years old and became interested in amateur radio through CB, he hopes to eventually have a career in electronics. Jonathan's brother, Gareth, also passed the novice RAE.

Simon Kahn, 2E1AAB, from Manchester. Simon is 12 years old and actually passed the full RAE when he was 11. As the lower age limit for a full licence is 14, he decided to go in for the novice to get on the air.

Robert Cherry, 2E1AAC, from Kingston. Robert is 14 years old, and has been involved through his school in using amateur radio to keep in contact with the replica Viking boat plotting the course of Erik the Red's voyage from Norway to the USA.

Victoria Foster, 2E1AAD, from Yorkshire. Victoria is 11 years old, and is off to a good start as her father is also licensed. She's also interested in computing so we wonder if her callsign will soon be seen on packet?

Natasha Weir, 2E1AAE, from Oxford. Natasha is 12 years old and became interested in amateur radio through the guides 'Thinking Day on the Air'. Natasha's sister Suzanne has also passed her novice RAE.

Hugh McNeill, 2E0AAA, from Preston. Hugh is 13 years old, and he passed his novice examination and Morse test together with his brother Matthew.

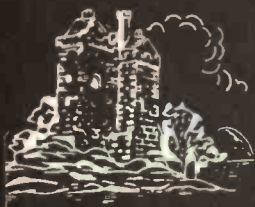
David Hull, 2E0AAB, from Telford. David is 15 years old and was taught by his stepfather, having already passed his full 12 words-per-minute Morse test at the age of 13 the RA has granted him a Class A novice licence.



The first novice contact — "This is 2E1AAC calling CQ 6m, CQ 6m"



The first amateur radio novices await their licenses



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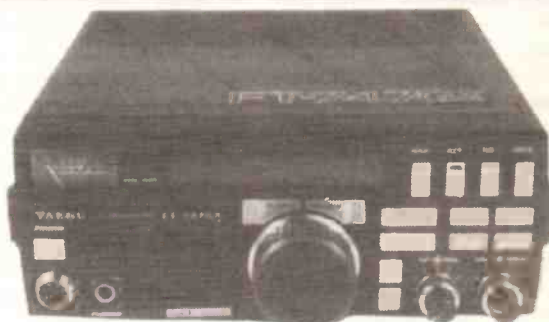
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Elvaston — Anchor Surplus Prize Draw

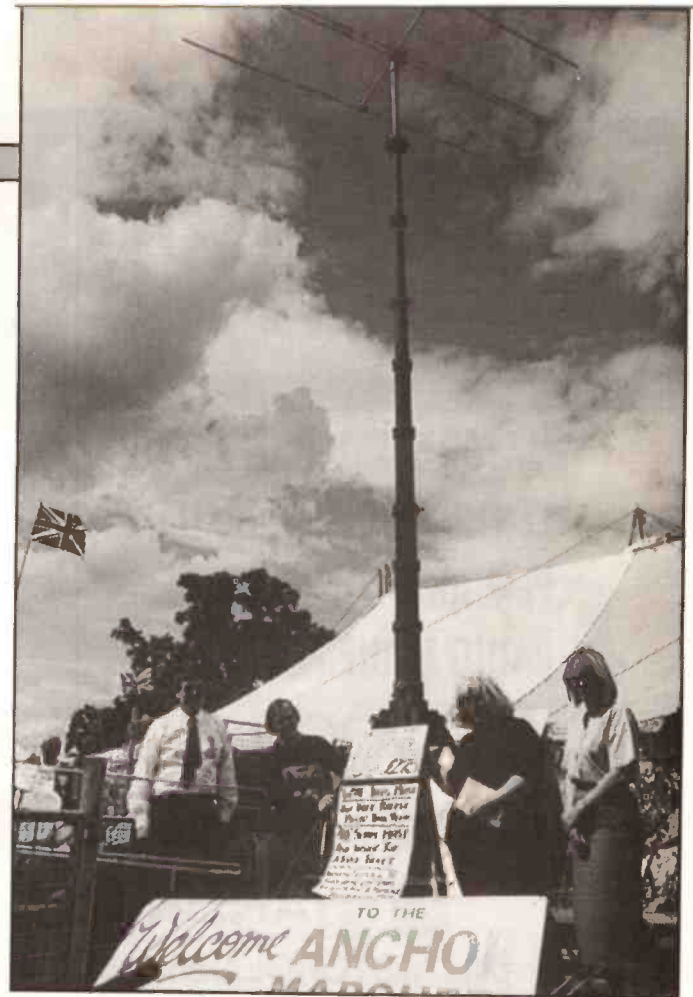
At the recent Elvaston Castle rally, the highlight of the day was the prize draw for a 12m telescopic tower, provided by HRT advertisers Anchor Surplus. Chris Lorek and Donna Wells of HRT were pleased to join Rob Taylor of Anchor at the prize draw, with Chris pulling out the winning tickets from the large box of free entries.

The winner of the first prize was Jill Marshall G6LMH, and together with husband Paul G8MJW (who's

also the secretary of the British Amateur Television Club) they were very pleased indeed with their prize! The runners-up were each presented with gift vouchers, and each winner received an autographed copy of Chris's 'Surplus 2-Way Radio Conversion Handbook', all supplied by Anchor. Chris was also kept busy autographing the books (with over 250 sold on the day) in the Anchor marquee — yes, not just a stand, they had an entire marquee to themselves, and amongst the electronic goodies they even had an armoured car and a red-top missile for sale!



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Draw winner Jill Marshall G6LMH with husband Paul G8MJW alongside their prize



Chris Lorek pulls out the winning ticket for the telescopic mast

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Icom (UK) have just launched their new IC-R7100 VHF/UHF receiver, this continuously covering all frequencies from 25 to 2000MHz. Icom tell us the IC-R7100 allows you to tune into any signals you wish on VHF or UHF including amateur, air, marine, citizens and utility bands plus FM and TV broadcasts, with reception modes of SSB (USB, LSB), AM (normal and wide), FM (normal and narrow) and WFM (wide FM) modes. They add that by using an optional TV-R7100 unit, you can view TV broad-

casts on your CRT monitor and listen to FM broadcasts in stereo.

The receiver has two tuning modes, with a rotary main dial control and direct keyboard entry. A total of 900 memory channels store frequencies, modes and tuning steps, these memory channels being grouped in 9 memory banks for ease of handling and editing. An automatic recording mode is available to record broadcast programs even when you are away from the receiver.

For further details on the IC-R7100 contact HRT advertisers Icom (UK) Ltd.

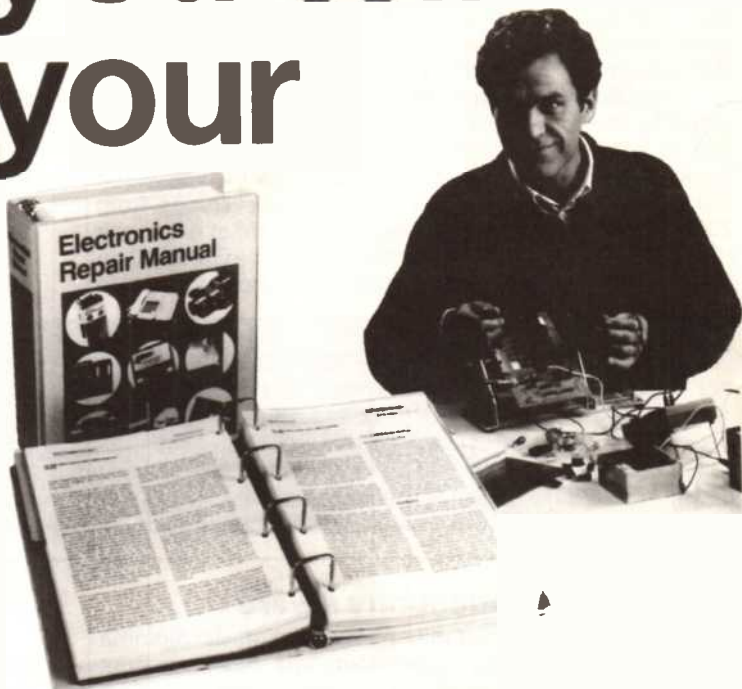


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RAE Courses

The **City of Westminster College** (formerly Paddington College), will be running a Radio Amateurs Examination evening course commencing early September 1991 (for the May examination). Both class A and class B licences will be catered for, i.e. a Morse course will run concurrently. Professional college lecturers will conduct the course. Prospective candidates should contact the Ann James at the Science and Technology Dept., Tel. 071 723 8826 for enrolment details.

The **Glenrothes and District Amateur Radio Club** is planning to run an RAE course for the RAE in May. The course will be from 7.00pm-9.00pm on Monday evenings beginning late September. A second course on Morse will be run during the same period on Tuesday evenings from 7.00pm-9.00pm, and both courses will be held at Balwearie High School in Kirkcaldy. Contact Mr. Ken Horne GM3YBQ on 0592 265789 evenings, or Mr. McGill at the school during mid

September on 0592 640335, for further details of enrolment dates.

The **Radio and Telecommunications Correspondence School** also run a variety of courses, including the RAE, Microprocessor, Telecomms Tech C&G, and an Introduction to Television. For details of their courses write to; 12 Moor View Drive, Teignmouth, Devon. TQ14 9UN. You can telephone them on 0626 779398 remembering to quote HRT.

Not all readers can get to an evening class to study for the RAE, so for those the **Rapid Results College** home study program covers both parts of the syllabus. Would-be radio amateurs searching for a way to take their RAE can study with them to sharpen their skills before taking the exam. For further details contact The RRC, Dept JN100, Tuition House, London SW19 4DS. Tel. 081 947 7272, 9.00am-5.00pm or use their answering machine on 081 946 1102 quoting HRT and reference JN103.

WACRAL Conference

The annual conference of the *World Association of Christian Radio Amateurs and Listeners* will take place on

the 13th, 14th and 15th September 1991, at the Elim Bible College Conference Centre, Nantwich. This weekend of fellowship combines worship with social events and ama-

teur radio. The WACRAL club station G3NJB will be active, particularly on Sunday morning from 0800, this being the usual WACRAL Sunday morning net held on 3764kHz. The

inclusive cost of the weekend to members and guests is £44 a person. To reserve places, contact Geoff Peterson G4EZU, 124 Darnley Road, Gravesend, Kent. DA11 0SN, Tel. 0474 533686

European Community Award

The European Community Award is an official diploma issued by the 'Reseau Luxembourgeois des Amateurs d'Ondes Courtes' in order to commemorate the 25th anniversary of the European Community. The diploma is available to both radio amateurs and SWLs.

Each contact with a station from any one of the member countries of the European Community, made on or after the day of its accession to the European Community, counts 1 point. The rules;

- Each station may be counted only once.
- No more than 20% of the points may be obtained by contacts with one and the same member country.
- A contact with the special station LX0RL (*) may replace a missing contact with any of the member countries.
- Contacts made via active earthbound reflectors or repeaters may not be counted.
- There are no band or mode restrictions.
- European applicants must amass 100 points: each member country must be worked at least once; 5 LX-stations must also be worked. No more than 10 contacts with stations from the applicant's own country may be counted.
- Non-European stations must amass 100 points: each member country must be worked at least once; 3 LX-stations must also be worked.

Applicants should submit a GCR-list confirmed by two licensed amateurs, or by one club official or by a notary. If there are any questions, the diploma manager may ask the applicant to submit the QSL-cards for checking purposes. The application fee is 10 IRCs, or 8 USD, or 200 Flux, or 10 DM. Applications shall be sent to: Reseau Luxembourgeois des Amateurs d'Ondes Courtes, Awards Manager, P.O. Box 1352, L-1013 Luxembourg.

The Awards Manager asks applicants to type, print or write neatly, to list the stations for each country in alphanumerical order, and to include a self-adhesive address label when forwarding your application. The Awards Manager LX2EA can be also contacted on packet radio at the LX0PAC

mailbox.

The following list gives the names of the member countries of the European Community and the date of their accession:

March 25th, 1957:

DL Federal Republic of Germany (since 3/10/90 Y2 stations also count)
I Italy (including IS, IT)
ON Belgium
F France (including TK)
LX Luxembourg
PA Netherlands

January 1st, 1973:

EI Ireland
OZ Denmark
G United Kingdom (including GD, GI, GJ, GM, GU, GW)

January 1st 1981:

SV Greece

January 1st, 1986:

EA Spain
LX Luxembourg
(*) The callsign LX0RL is the call of the club station of the RL. Other calls which may be used in replacement of LX0RL are:

LX5RL (used from 1/1/87 to 31/12/87 to commemorate the 50th anniversary of the RL), and;

LX150L (used from 1/1/89 to 31/12/90 to commemorate 150 years of Luxembourg independency)

These callsigns replaced the official Club station call LX0RL during the above periods.

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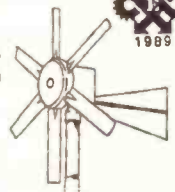
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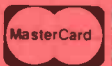
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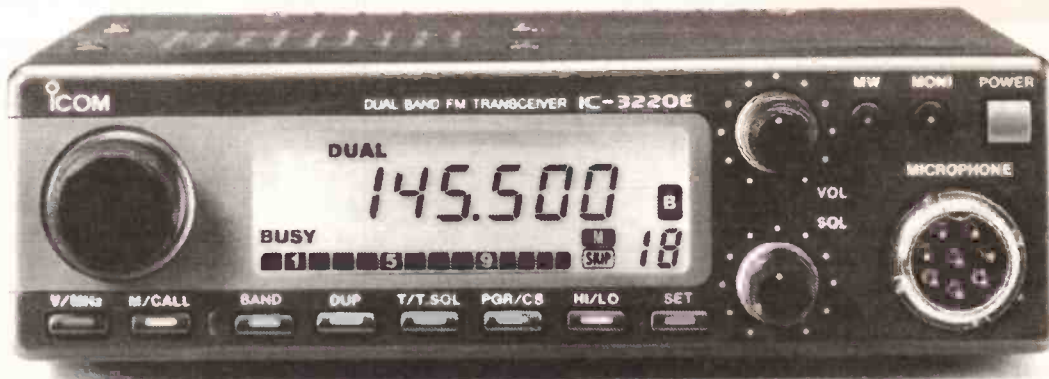
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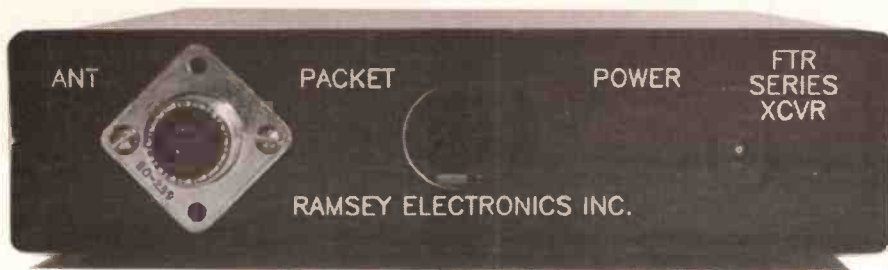
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I first heard about the Ramsey Electronics 2m synthesised 'do it yourself' transceiver when I saw it advertised in one of the many USA radio magazines we receive at the HRT office. These kits have recently been brought to the UK by the firm of Raycom Ltd., and a chat with their Managing Director quickly brought one of the very first 2m rig kits to hit reach UK shores on its way to the G8IYA QTH.

Are Japanese 'black boxes' a shade too complicated? Then try making your own! Sheila G8IYA tried her hand

the number of channels to whatever you like, and technically-minded amateurs will no doubt be dreaming up simple channel scanning circuits and so on (see later). Also possible of course if you know what to do are add-on power amplifiers, CTCSS units, and of course you can even incorporate the transceiver PCB into a larger project, for example a stand-alone packet radio station. But I digress, as in this feature I'll be showing you exactly what went into building the transceiver kit, with a short 'end piece' by our Consultant Technical Editor Chris G4HCL on how the set finally performed.

Construction

A thick spiral-bound manual came with the kit, this giving excellent detailing on constructing the set with stage-by-stage guides and checklists for component identification and assembly. The set is constructed in logical stages, first the DC supply section, then the receiver audio amplifier, FM detector and squelch circuit, 10.7MHz IF and so on, finishing up with the transmitter power amplifier. In general I found no difficulty at all in following the clear step-

Ramsey Kits 2m Transceiver

Build It Yourself

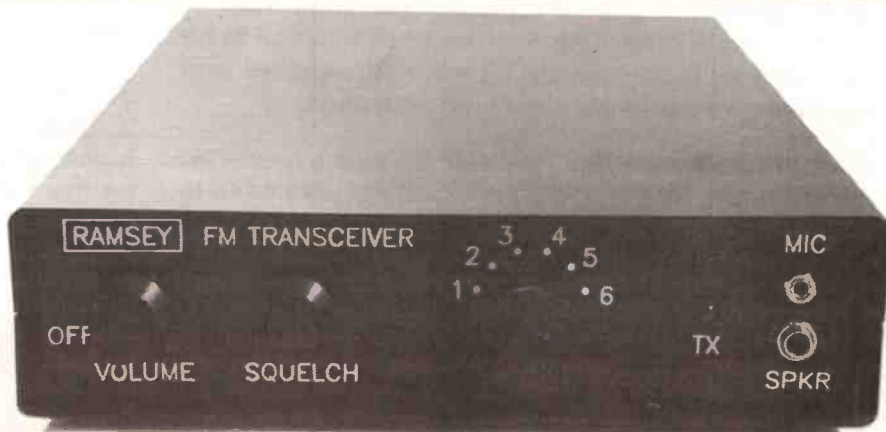
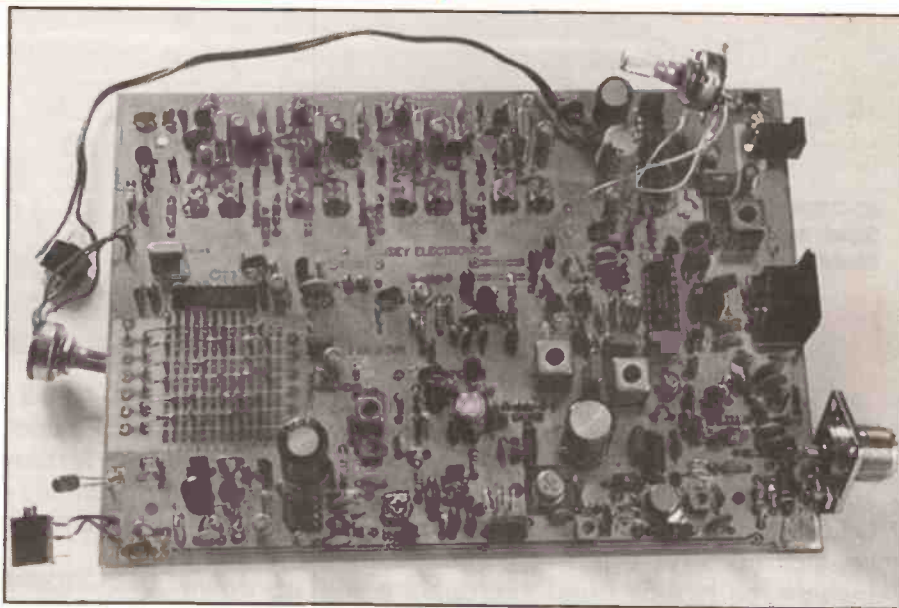
You may say 'But I can't build something complicated like a synthesised transceiver!' Well the simple answer is that it's not complicated at all, with a single IC and a few components taking the place of the 'usual' crystal multipliers and so on, the entire transceiver circuit fits on a single printed circuit board. Microprocessors? None to be found in this rig, just a six way channel selector for you to choose which 2m simplex or repeater channel you want to operate on.

What You Get

The basic kit comes with the PCB and all the components you'll need to build a complete 2m transceiver, together with a comprehensive instruction manual. The transmitter power output is stated as being around 5W (4-6W specified), with a receiver sensitivity of better than 0.35uV pd for 12dB SINAD. OK, so it won't have the power and the absolute receive performance of the latest Japanese 'wonder boxes', but for local chats or packet use, or even for monitoring your local 2m repeaters, it could prove to be perfectly satisfactory in many cases.

Expansion

If you're a dab hand with a soldering iron and a piece of Veroboard or similar, with a handful of diodes you can expand



by-step instructions, although some of the component identifications varied from those given in the manual. Following the construction of the RX and TX audio stages, a brief check could be made to see if each section was operating correctly. Here's where I needed to find a suitable handportable-type external microphone and a speaker, as these are required for the checks even if you're only going to use the set for, say, packet radio operation with direct audio connection to a TNC.

The PCB uses a plated-through-hole construction, this really simplified the layout as I didn't need to insert wire links everywhere, nor solder the top and bottom legs of each component lead as needed in some kits. But be warned, as the manual repeatedly says it's very difficult to replace an incorrectly fitted component once in, as the solder very

diodes (specialised RF types used for aerial changeover) were missing, together with two missing capacitors. I had two surplus capacitors left over at the end, and it took me a couple of hours of repetitive checking to ensure I hadn't substituted two wrong values somewhere!

Programming and Alignment

That great moment came, the transceiver assembly had been completed, and all that was left was the programming and final alignment. Four crystal oscillators are used for mixing signals in the synthesiser circuit, one for receive, one for simplex transmit, and one each for positive and negative 600kHz transmit offsets for repeater use. Each crystal oscillator has an adjustment for 0kHz

potentiometers next to the crystals for spot-on frequency. I couldn't get two of the crystals to 'pull' far enough, however the manual warns of this with the comment that a number of extra 5pF capacitors are supplied to add across the rear of the PCB as crystal 'padders' where necessary. Well my kit didn't come with any, so I again raided the junk box! (the suppliers would of course normally replace or supply any incorrect or missing parts).

Next came the receiver stages, here it was a simple case of tuning the two IF coils for the best received signal and the discriminator coil for maximum audio, but when I plugged in a 2m aerial and selected my local repeater channel, I found these coils were almost 'spot on'. What I did find was that the receiver was initially rather on the 'deaf' side. The manual hints that spreading open the turns on the pre-wound coils in the front end circuit can improve sensitivity, doing this brought signals at first right down in the noise right up to almost fully quieting. A final adjustment on a weak signal for absolute best results, and that was it, now for the transmitter.

I plugged my microphone and 50 ohm dummy load in, and pressed the PTT. Listening on an adjacent 2m receiver showed a healthy signal with good modulation, but could I get any power output? I found the PA driver transistor was amplifying, but not the PA transistor itself. After chatting with the suppliers a suggestion was made for the PA coils to be 'stretched', this bringing the transmitter into life on another set, but unfortunately didn't give any results. So I replaced the PA transistor, after almost destroying the PCB ground plane around the transistor (remember it's soldered all around its metal can as well) and one of the plated through holes, but the same result occurred, no output. So the suppliers kindly offered to get it working — no problem! While this was being done (we had a deadline to meet for the review!) a quick check on a further assembled set showed a healthy transmitter output of just over 5W, which of course is what it should be.

Finishing Off

Finally, to complete the assembly I built the transceiver PCB into the optional custom-made black metal case, this being priced at £24.95 and comes with matching knobs which fit on the On/Off/Volume, Squelch, and Channel controls. This case gave it a smart appearance, but I found the rear panel had been slightly altered by the manufacturer for the 'Packet' connector to line up with the chassis opening.

The front panel has a 2.5mm jack socket for a portable-style microphone,



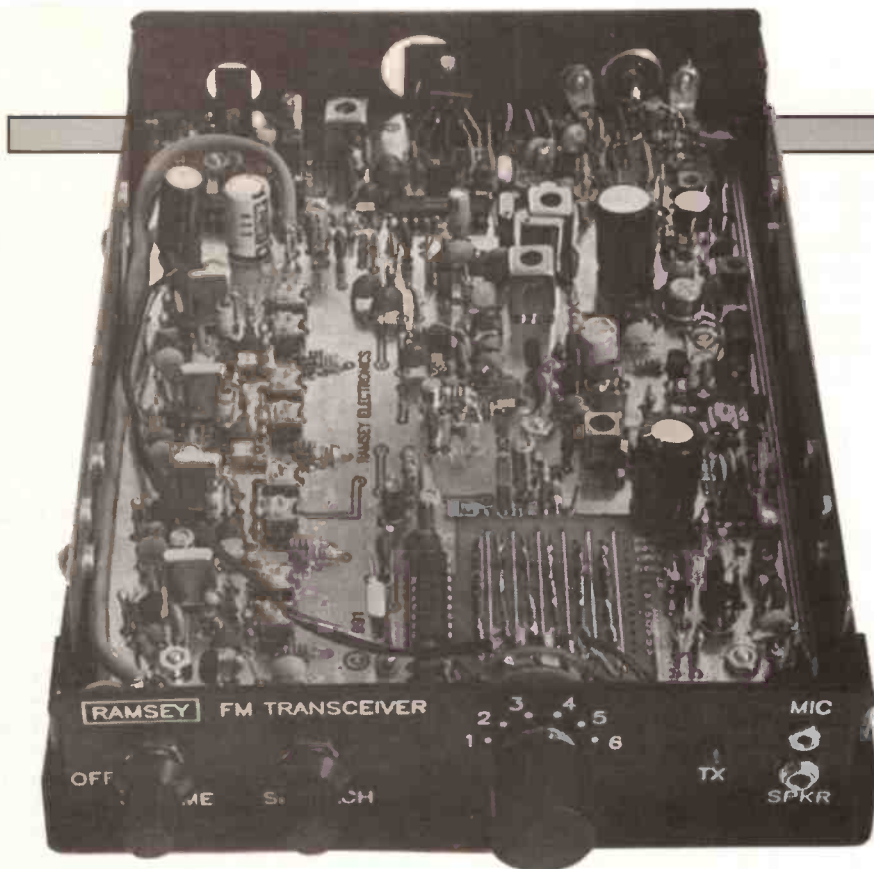
nicely 'fills up' the resultant plated-through hole in the PCB. The moral, *get it right first time!*

It took me 18 hours in all to assemble the transceiver by deliberately following the instructions very carefully, and by not taking any 'short cuts'. The PA transistor doesn't use a heatsink, instead the instructions tell you to carefully solder its earthed metal case to the PCB ground plane for this to help in the heat dissipation, which I wasn't quite happy with.

As would be expected, the required tools for assembly weren't supplied with the kit, neither was the required portable-type microphone and speaker for testing, nor any solder or the required special capacitor adjustment tools for the final alignment, hence these, you'll have to obtain if you want to complete the kit. Although I found most of the component parts were present, two PIN

and +5kHz operation, the end result being coverage of 2m in 5kHz minimum steps. A binary combination of diodes on each channel is used to program the frequencies to the 10kHz step required, then further diodes are added for a +5kHz offset if needed, and then the TX shift of zero, +600kHz, or - 600kHz. The well-documented instructions on this made what would otherwise have been a difficult job very easy, and within half an hour I'd assembled the diode arrangement for six channels (two packet and four FM voice). Now for the alignment.

A voltmeter and a VHF frequency counter is needed here (or alternatively a tunable 134MHz receiver with a BFO and an accurate frequency readout in place of the counter). The first stage was to adjust the VCO for a defined 'lock' voltage on both transmit and receive, followed by adjustment of the



with an adjacent 3.5mm jack socket for a speaker (an internal speaker isn't used). A suitable speaker/mike for this would be one of the Yaesu or Icom types, their TX switching arrangements being suitable for this. A five-way 180 degree DIN socket on the back carries RX audio (either speaker audio or discriminator audio, internally linked), TX audio, PTT and ground lines as well as a 12V DC line, handy for packet TNC interconnection, but unfortunately I noticed the pin-out configuration for this was reversed on the circuit diagram — good job I checked first!

Conclusions

I had no problems in building the set although it did of course take many hours to finish, the end result being an impressive transceiver of distinct use rather than just another 'accessory' for the shack. The economic price of just under £130 for the transceiver PCB assembly makes it an attractive proposition for the both the newly-licensed amateur wishing to get on 2m as well as for the amateur wanting a 'second set' either for occasional use or even as a dedicated packet rig. We at HRT were pleased with the set, so much so that we'll soon be publishing a few small 'add on' construction projects for the unit, for example a simple two-IC channel scanner, channel extension PCB, and interfacing details for 9600 baud packet use and the like. Watch this space!

Our thanks go to Raycom Ltd., who are the UK Ramsey Kits distributors, for the loan of the review sample.

was quite pleased with the results when considering the reasonably simple circuit arrangement. These tests were performed using the methodical HRT lab methods as carried out on all equipment reviewed by us. The results achieved were quite reasonable, the sensitivity although not up to that gained from the latest 'state of the art' rigs match a 5W transmit power when used into a 2m repeater and the like. The strong signal handling was very good for such a set, especially the intermodulation, although the image rejection (probably due to the 'front end tweaks' performed!) wasn't exceptional. The heat-sinking arrangements for the PA would cause it to get quite hot during long 'overs', so keeps your transmissions short unless of course you add a clip-on heatsink to this transistor.

LABORATORY RESULTS:

Sensitivity;	
<i>Input level required to give 12dB SINAD;</i>	
0.68uV pd	

Technical Comments;
Chris G4HCL performed a brief set of measurements on the receiver, and

Adjacent Channel Selectivity;	
<i>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;</i>	
+12.5kHz;	43.5dB
-12.5kHz;	50.0dB
+25kHz;	63.0dB
-25kHz;	63.5dB

Blocking;	
<i>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;</i>	
+100kHz;	80.0dB
+1MHz;	96.5dB
+10MHz;	95.5dB

Intermodulation Rejection;	
<i>Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;</i>	
25/50kHz spacing;	70.5dB
50/100kHz spacing;	72.0dB

Image Rejection;	
<i>Increase in level of signal at first IF image frequency (- 21.4MHz) over level of on-channel signal to give identical 12dB SINAD signals;</i>	
37.0dB	

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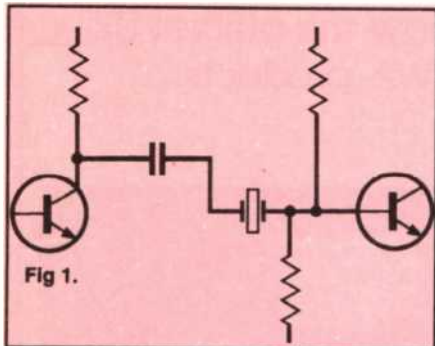


Fig. 1 The simplest crystal filter, but not very effective

The crystal filter today provides us with one of the most convenient methods for achieving high selectivity in an intermediate frequency amplifier. There's no 'magic' about it, here's what goes on 'inside the box'.

The Simple Crystal Filter

Like an L-C circuit, a quartz crystal plate exhibits both inductance and capacitance, and in use it has series and par-

allel resonances, but on closely adjacent frequencies. Crystal filters normally make use of the series (low impedance) resonant mode of the crystal.

If a crystal were placed directly in series with the signal path, signals on the series resonant frequency would be passed with little or no attenuation, but signals on any other frequency would severely attenuated. There would also be some stray capacity across the crystal and its holder, which would provide a path for unwanted signals. To overcome this difficulty, the simple filter places the crystal in a bridge circuit (Fig 2). In this, an anti-phase signal is fed past the filter, the amplitude being controlled by a capacitor such that it equals, and consequently cancels, any signals passing the crystal due to the stray capacity.

At this adjustment, the filter will be very sharply resonant with a symmetrical passband of only a few tens of Hertz. Should, however, the capacitor be slightly misadjusted, the symmetry will be lost and a deep 'notch' will appear on the steeper side of the resonance curve. These characteristics make the simple filter of far more use to the experienced CW operator than may be thought, for by careful use of the 'phasing' control, this 'notch' can be used to reject a closely adjacent interfering signal whilst still

providing a high degree of selectivity on the wanted frequency.

For SSB use, a broader filter characteristic is required, this may be provided by half and full lattice filters.

The Half Lattice Filter

The circuit of the half lattice filter is very similar to that of the simple filter previously described, with the exception that the phasing capacitor is replaced by another crystal whose frequency is slightly displaced from that of the original crystal.

The effect of this is that each crystal passes signals on its own series resonant frequency whilst its stray capacitance is, to a large degree, balanced by that of the other crystal. Consequently the passbands of the two crystals combine and give an overall bandwidth comparable with the frequency difference between the two crystals with sharp rejection outside this limit.

In such a circuit the selection of crystal frequencies is obviously critical, for if the frequencies are too close together, the passband will be too narrow to pass the whole of the SSB bandwidth without deterioration, whilst if they are too far apart, the sideband response of the two crystals will not combine to give a reasonably flat topped response curve. In practice, if the crystal frequencies are displaced by between two and three kHz, the passband will be found to be about 1.2 times this frequency difference.

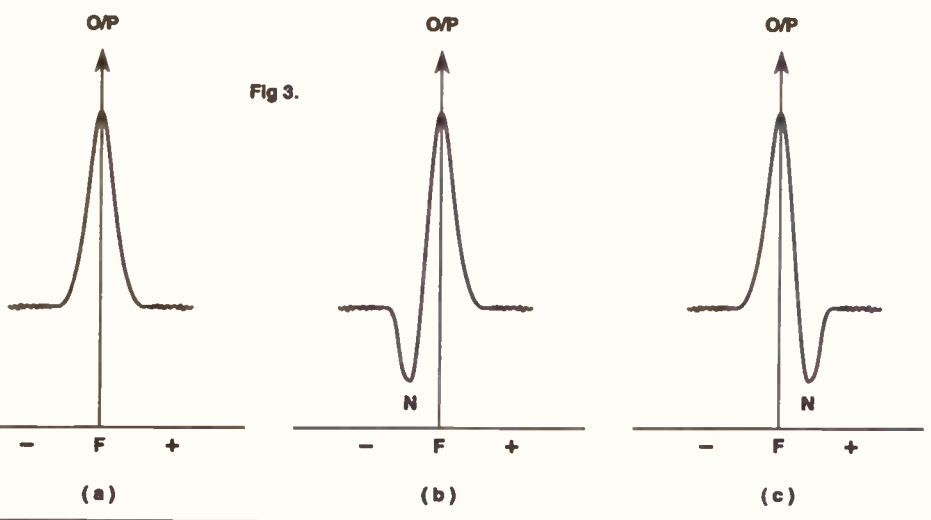


Fig. 3 Response curves of a simple crystal filter. (A) Correct adjustment of phasing capacitor, (B) too high, (C) too low. The notch (N) is a convenient method of eliminating strong adjacent signals

allel resonances, but on closely adjacent frequencies. Crystal filters normally make use of the series (low impedance) resonant mode of the crystal.

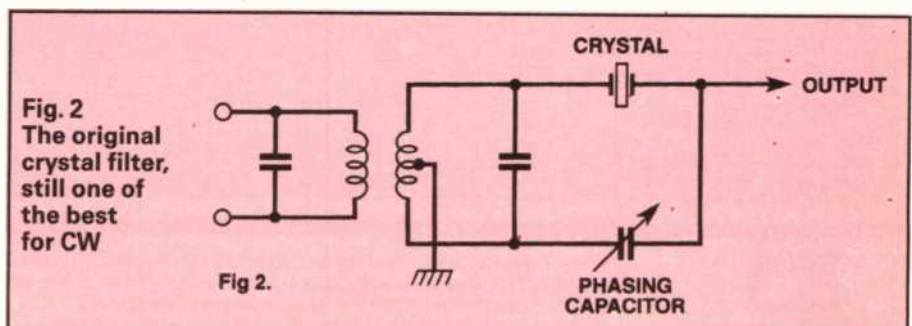


Fig. 2 The original crystal filter, still one of the best for CW

The Full Lattice Filter

An improved response can be obtained if two further crystals are added to the circuit to form a full lattice filter. The operation of the circuit is very much as before but the additional crystals make the top of the response curve flatter and also improve the skirt selectivity both in terms of steepness and attenuation.

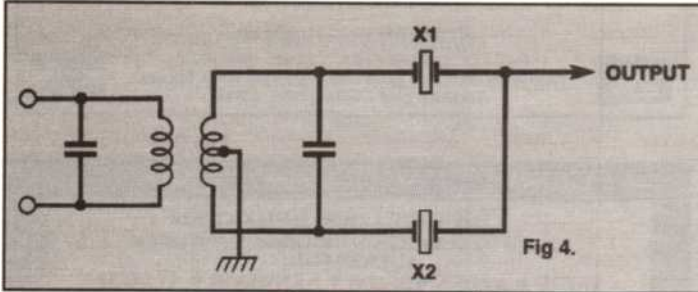


Fig. 4 The half lattice filter. X1 and X2 should be displaced by 2-3kHz

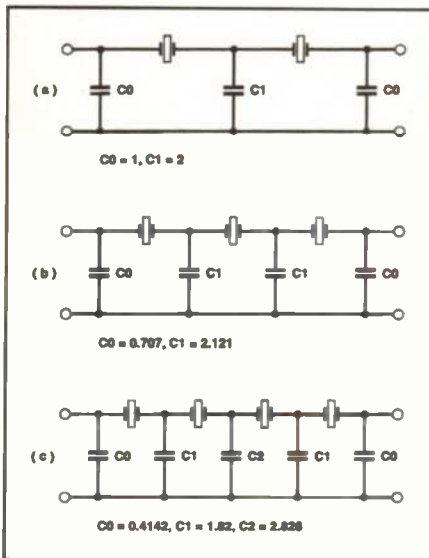
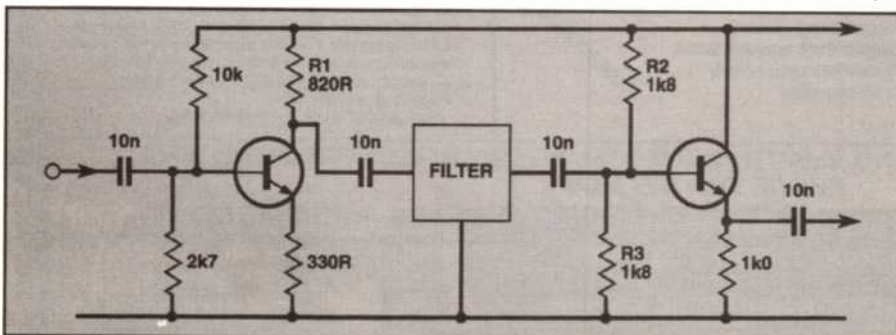


Fig. 6 Crystal ladder Filters with their capacitor design coefficients (see text)

Fig. 7 A simple matching circuit for a ladder filter. Note that R1 should equal the impedance of the filter, and that R2 and R3 should be equal and each twice the filter impedance



The Ladder Filter

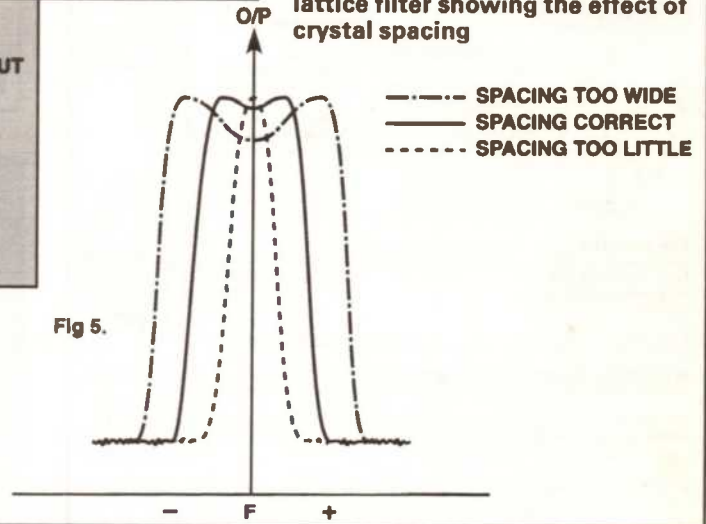
Over the past fifteen years, an alternative filter design has become more common — the ladder filter. This filter has the advantage over earlier designs of not requiring any L-C tuned circuits but the disadvantage that careful matching of input and output impedances are necessary to obtain optimum results.

In simplest terms the circuit of the

able for SSB filters at frequencies of around 8 to 9MHz.

In the example shown in Fig. 6 (c), Input R is 820 ohm, F is 8.5MHz, Co is 8.2pF, C1 is 39pF and C2 is 56pF, all crystals are the same frequency. The overall response will be little if any inferior to a commercial 9MHz SSB filter.

Fig. 5 Response curves of a half lattice filter showing the effect of crystal spacing



ladder filter is similar to a Butterworth or Chebyshev filter with the inductive elements replaced by crystals. Any number of crystals may be used, with three as possibly the minimum number which can produce satisfactory results. The design of ladder filters can be very complex, but effective short cuts are possible by using a series of coefficients to calculate the capacitor values.

To calculate the value of each capacitor, multiply the appropriate coefficient by $1/6.28 \times R \times F$, where R is the required filter impedance and F is the frequency in Hz. When the theoretical values have been determined, the nearest preferred values may be used with little deterioration in performance.

The impedance selected affects the overall bandwidth of the filter with the lower the impedance, the more narrow the bandwidth. The bandwidth is also affected by the frequency of the filter, growing broader as the frequency increases. In general, a filter impedance of around 800 to 1000 ohms will be suit-

Practical Considerations

To achieve optimum performance, careful matching of input and output impedances are necessary. This is not difficult and may be achieved by using the circuit shown in Fig. 7. In this, the collector load of the input transistor should be made to match the impedance of the filter while the two resistors forming the bias circuit of the output transistor should be equal and each twice the value of the filter impedance. Almost any small signal bipolar transistors can be used in the circuit.

Crystal filter construction is not difficult and excellent results can be obtained if the filter is well screened to prevent extraneous input, and care is taken to ensure that the input and output circuits are well isolated to prevent signals bypassing the filter through stray capacity.

In practical terms, the dyed-in-the-wool CW operator would probably fare best with the simple crystal filter, for with phasing adjustment, despite its simplicity, it is capable of possibly the best single signal performance.

If a wider bandwidth is required, either the half or full lattice filter will prove satisfactory. However, obtaining the correct frequencies may prove difficult and/or expensive and it is probable that it will be far easier and cheaper to obtain four crystals on the same frequency to construct a ladder filter of equivalent or better performance.



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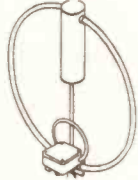
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E & EO.

NOVICE NOTES

What goes on inside your rig? G4HCL kicks off with receiver intermodulation

Intermodulation — a long word which instantly sends many people straight off to the next section in the radio specifications! This is what this occasional series is about — to provide a 'guiding hand' to newcomers and not-so-newcomers alike in understanding what goes on inside your rig.

Why do I hear a mixture of voices?

If you've tuned across the VHF/UHF FM channels in a built-up area, you may have occasionally heard a brief signal on one channel comprised of a mixture of two voices, one louder than the other. It often comes and goes, and isn't related to anything else on the channel apart from the fact that it may often wipe the wanted signal out. This is what's called intermodulation and it's caused much head-scratching in the past, but it's very simply explained. It's not limited to FM, it occurs on all modes and all bands, but this mode is used here as an example.

Mixing

When two signals are mixed together, sum and difference signals are obtained, containing mixtures of the fundamental signals and their harmonics. The first of these is how a simple superheterodyne receiver works, by a local oscillator signal combining with the received frequency signal to give a third, intermediate frequency. This can be shown as:

$$f_1 + f_2 = f_3$$

$$\text{or } f_1 - f_2 = f_3$$

To take a practical example (get your calculator out), for a receiver on 51.51MHz (f_1), a local oscillator of 40.81MHz (f_2) will give the commonly used IF (Intermediate Frequency) of 10.7MHz (f_3) in a mixer stage inside your

receiver.

If we take the next case and consider a mix with the second harmonic of one of these signals, we get;

$$(2 \times f_1) + f_2 = f_3$$

$$\text{or } (2 \times f_1) - f_2 = f_3$$

So, if we have strong FM signals on 51.53MHz (f_1) and 51.55MHz (f_2), using the second formula and after a few seconds on our calculator we can see that a third signal on 51.51MHz can be generated in a mixer stage again. Because the second harmonic of the signal on f_1 , and the first harmonic (i.e. the fundamental) of f_2 , is used in the mixer, the resultant FM signal will have the normal-sounding deviation (i.e. loudness) of f_2 but twice the deviation of f_1 , mixed together just like they were generated in a hi-fi recording studio.

Receiver Limitations

This doesn't happen with all signals of course, if this was the case then we wouldn't be able to make much sense of signals on the band! The reason for this is that the mixing occurs at the RF frequency, and receiver designers try to keep these stages as linear as possible and subsequent stages as well filtered as possible to prevent these mixing products. But there is a limit of course, and all amplifying devices have a point where their strong-signal handling limit is reached and they go into non-linear, i.e. mixing, operation.

The possibilities of this become worse the further along the many amplifying stages of the receiver we go. The aerial signal receives some amplification, followed by designed-in mixing to a given first IF (Intermediate Frequency). Here's where there is normally plenty of amplification, as it may be done at a fixed frequency with little change of RF instability if careful design is used.

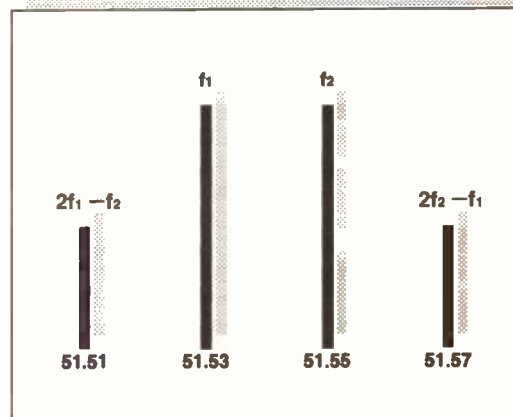


Fig 1.

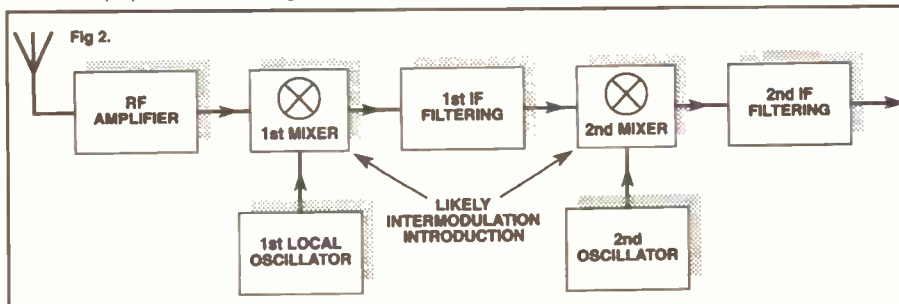
Good filtering can be used to limit the overall bandwidth to that around the wanted signal, before too much more amplification is performed. When a second IF is used, a further mixer and more filtering is normally used, to 'narrow' the bandwidth down even more.

This is all OK if the bandwidth of the first IF filter is nice and narrow, for example if a 10.7MHz crystal filter is used (typical bandwidth 20kHz), but let's see what can happen if a wider filter, such as a low-cost 10.7MHz ceramic filter (typical bandwidth 200kHz), is used instead. Signals separated by, say, 25kHz and 50kHz are nicely attenuated in the first instance and so won't present a high signal level in the second mixer to cause problems. But in the second case, these virtually pass straight through, and can cause intermodulation to occur at much lower interfering signal levels than the first case.

Figures

In our HRT equipment review technical results, we show what difference in level these interfering signals need to be to cause problems, measured in dB as the difference in level between the interfering (off-channel) signals and the wanted (on-channel) signals. The higher the figure, the better the intermodulation performance. We also measure them at two sets of frequency separations, to check the effectiveness of the close-in receiver filtering.

By now, hopefully you'll know why receiver intermodulation performance is important, and possibly more usefully how it can sometimes be overcome by a simple filter improvement in your next homebrew rig.



Direct Digital Synthesis

Mention frequency synthesisers to people and they immediately think of phase locked loops, voltage controlled oscillators, and the like. However this is not always the case as there are several ways of synthesising a signal. One new method which has arrived on the amateur radio scene is called *Direct Digital Synthesis* or *DDS* for short. Although the method itself has been known for some time, technology has now advanced to the state where it is commonly used for generating RF signals in commercially made amateur radio gear.

How It Works

As the name suggests, DDS generates the waveform directly. This is in contrast to the phase locked loop where a

*Ian Poole G3YWX
unravels the mysteries of
DDS, the latest method of
frequency generation*

wave, as shown in Fig. 2. As time progresses, the oscillator moves round the circle and generates the corresponding output which is normally a sine wave.

The movement round the circle is a useful visual aid because the position around the circle at any time corresponds to the phase. This idea is at the

is normal to use a ROM or PROM IC for most applications. Any required waveform can be stored, sine wave, square wave, saw tooth or whatever is needed.

A Digital to Analogue Converter is now used to generate the analogue signal, and this signal is then filtered to remove any spurious products which are outside the operational range. There are a number of different spurious products, the major ones being caused by a process called *aliasing*. Here, images of the required signal are generated on either side of the clock frequency and its multiples. For example if the required signal was being generated at 2MHz and a clock of 10MHz was being used, then alias signals would appear at 8 and 12MHz as well as at 18 and 22MHz and so forth.

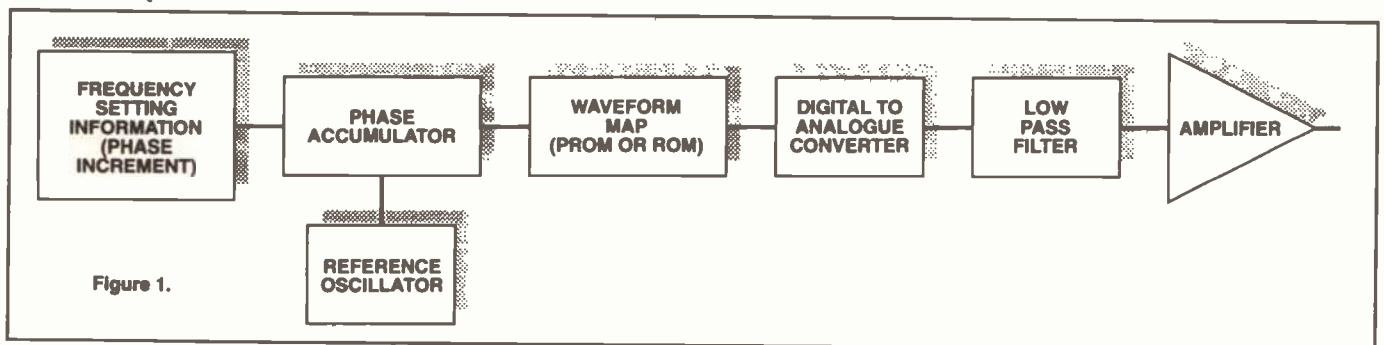


Figure 1. Block diagram of a Direct Digital Synthesizer.

signal on one frequency (the reference) is converted to a signal on another by the action of the loop. Direct Digital Synthesisers make up the waveform in a digital form, and then convert this into an analogue form, this being filtered and amplified as required.

The basic Direct Digital Synthesiser consists of four basic circuit blocks as shown in Fig. 1, a Phase Accumulator, Waveform Map, a Digital to Analogue Converter, and finally a filter to remove out of band signals.

How It Works

Any oscillator will produce a repetitive waveform, and this is often visualised as a point travelling round a circle. One complete revolution of the circle corresponds to one cycle of the waveform, and similarly, points on the circle will correspond to points on the

very centre of direct digital synthesis, as one of the circuit blocks shown in Fig. 1 is called a *Phase Accumulator*. This is essentially a specialised form of counter which adds a given number to its current one when it is clocked by the clock oscillator. Once it fills up, it resets itself and starts all over again. This corresponds to the circle, and each number in the phase accumulator corresponds to a point on the circle. So when a number is added to the value held in the phase accumulator, then this corresponds to a movement around the circle, or an advancement in phase of the waveform.

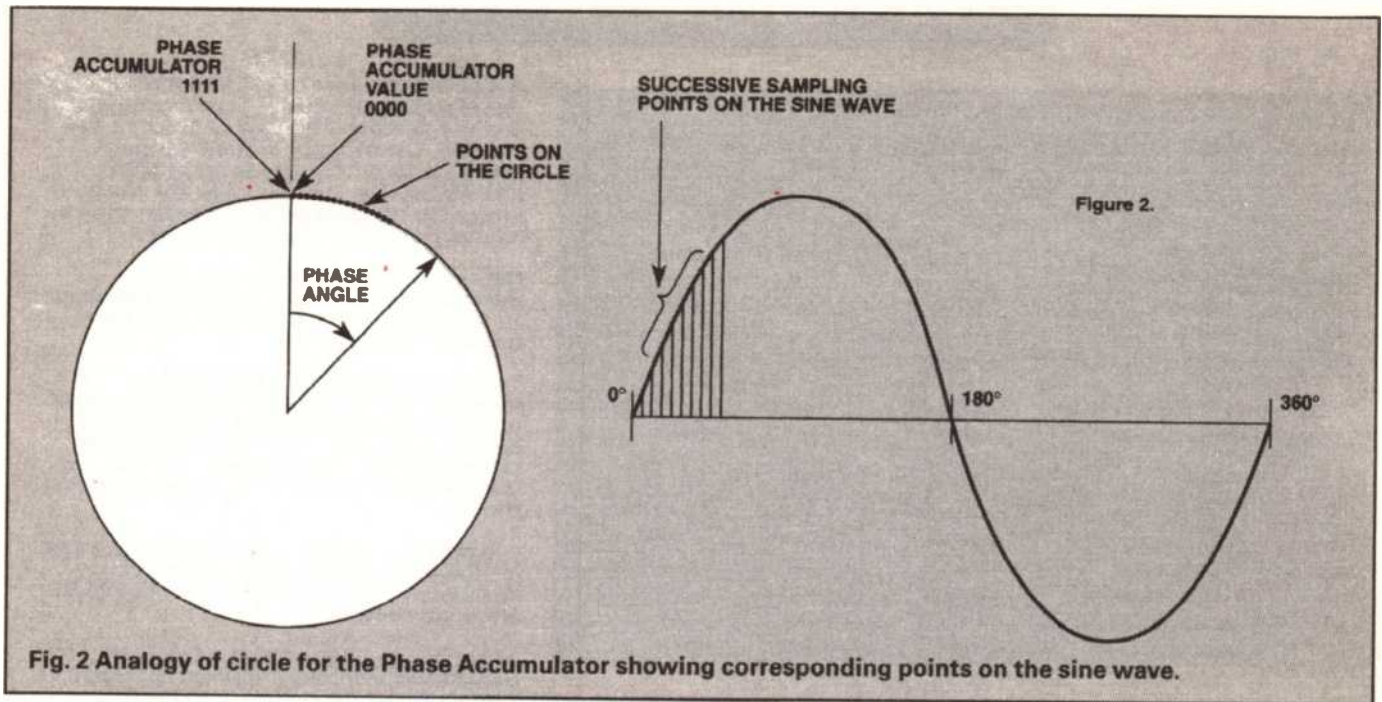
Digital Conversion

The next stage is to convert this into a digital representation of required waveform. This is done using a Waveform Map which stores numbers corresponding to the desired output amplitude for different points on the waveform. These values can be stored in almost any form of memory, although it

Step Sizes

The Phase Accumulator has only a finite number of steps, although the number is usually quite large. Each one of these steps will in turn correspond to a point on the waveform map stored in the memory, and the more points there are then the better the performance will be. However it is surprising how few points are needed to create a waveform. Theory says that just two points are needed, but in this case the signal will need plenty of filtering to ensure that excessive harmonics are not generated.

Apart from this, the tuning characteristics are also affected by the number of available points on the Phase Accumulator. The frequency of the signal depends upon the rate at which the Phase Accumulator fills up, so to change the frequency, the size of the step taken must be altered if the clock rate is kept the same. The frequency can in fact be changed by simply adding a different number onto the one held in the phase accumulator i.e. changing the step size.



For example, for one frequency the Phase Accumulator may be adding 4036 each time and the next frequency will be obtained by adding 4037. From this it can be imagined that there will be a finite difference between the two frequencies and that the minimum frequency difference (i.e. frequency resolution) is determined by the number of points available in the Phase Accumulator. To give an example, a 24 bit Phase Accumulator will provide a little over 16 million points and this gives a frequency resolution of about 0.25Hz when used with a 5MHz clock, quite sufficient for all amateur radio purposes!

It's worth noting that when the synthesiser changes frequency, it simply adds the new number or phase step to the value already held in the phase accumulator, and there is no need for a reset. This means that when the frequency changes, the system simply continues from its current phase value, and frequency changes occur virtually instantaneously. This is different to the phase locked loop based systems, where a certain amount of time has to be allowed for the loop to get to its new frequency and settle down.

Pros and Cons of DDS

Direct digital synthesisers are currently more expensive than their phase locked loop counterparts, as the frequencies at which they operate demand very high speeds for the ICs. In turn, new technology has to be used and this is always more costly than more established methods. It is also the reason why these new synthesisers have only recently started to become used on the

amateur market.

Despite their cost, these new synthesisers do offer several advantages. The instantaneous frequency change has already been mentioned, but the main reason why designers of amateur equipment are using them is because they offer a very much better adjacent frequency noise performance. There's no low frequency phase comparison for any phase noise in the loop bandwidth to be multiplied, also they don't use Voltage Controlled Oscillators which give rise to noise outside the loop bandwidth. As DDS circuits operate at frequencies below their clock oscillator, they will tend to have a performance which could in theory be better than the clock.

Finally, DDSs are able to operate over a very wide frequency range. As a result it's possible to use a DDS to allow an HF receiver to cover the whole of its

frequency band without any switching in the local oscillator. An equivalent phase locked loop synthesiser wouldn't be able to accomplish this as easily.

Inside Your Transceiver?

Whilst Direct Digital Synthesisers have many advantages, their cost is a major drawback, this being particularly relevant for amateur equipment. This has meant that where DDSs are found in amateur transceivers, they're often used alongside conventional phase locked loops. By doing this, the upper frequencies of the direct synthesisers can be reduced to a level where the costs are acceptable. It also means that the advantages of both systems are used to the best, giving a reasonable cost low noise synthesiser.

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UK Specific:

For ease of operation in the UK, the search banks have been pre-programmed at the factory. They may be easily re-programmed by the user. Each of the ten numeric keys is labelled with the corresponding search band, simply press one button and the receiver starts looking for interesting frequencies.

Frequency coverage:

The receiver has an exceptionally wide frequency coverage from 500 kHz to 1300 MHz (1.3 GHz) with no gaps. The modes available are AM, FM (narrow) and FM (wide). Any available mode may be selected at any frequency within the receiver's coverage. There is no frustration in mode selection encountered here, you are *not forced* to listen to a specific mode at a specific frequency or band.

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SCANNERS

INTERNATIONAL

Radiocommunications Agency - their views on scanners.

The RA have now clarified their position regarding scanners and the UK law, although we're told by the RA library their printed leaflet on this "is not available to the general public". We of course can't admit to having seen this, can we, however here's some sobering thoughts to bear in mind;

It's not against the law in the UK to simply use a radio receiver, e.g. a scanner, without a licence. However Section 5 (b) (i) of the Wireless Telegraphy Act 1949 says a person is guilty of an offence if he listens to a message which he, or his principal, has not been authorised to receive. This means listening into any transmission other than those of licensed radio amateurs and authorised broadcasts. It's not even necessary for you to act on any information received to break the law, because if you just make a mental note of the contents of what you've listened to then you could be in trouble. It's yet another offence, under section 5 (b) (ii) of the 1949 Act to pass on any

information received. It's a common fallacy in the UK where some people believe they can listen to whatever they want as long as they don't pass it on or act on it, as we've always said in *Scanners International* this is totally untrue, so be warned!

Now the upshot of all this means that even listening into CB, aircraft or marine international channel messages is an offence under section 5 (b) (i), although this in reality could be construed as relatively harmless. In the past I've been told by the RA that listening into messages such as weather broadcast transmissions from coastguards on Marine VHF channels is not illegal (when I requested a licence application to do this), but later another division of the RA told me it is illegal, so who's right?

Listening into police and private mobile messages would, I'm sure, be deemed a far more serious offence. In Northern Ireland recently, a scanner user was reportedly imprisoned for five years for keeping a note of police frequencies for use with his scanner, showing the powers-that-be are taking a very determined 'hard line' on this issue.

If you're even just suspected of using a scanner illegally, then Section 79 of the Telecommunications Act 1984 allows the seizure of your scanner upon the suspicion of an offence under the 1949 Wireless Telegraphy Act, and the courts can order the scanner to be forfeited if you're convicted of an offence under Section 5 (b).

If that's already got you worrying, then get ready for more. Another Act, this one being the Interception of Communications Act is all about the interception of radio transmissions if these form part of a designated public telecommunications system. In plain language, this means listening into cellphones and the like. Now using a scanner to monitor cellphones or even domestic cordless telephones would be an offence under Section 5 (b) (i), but the violation of privacy from intercepting these communications is a much more serious offence.

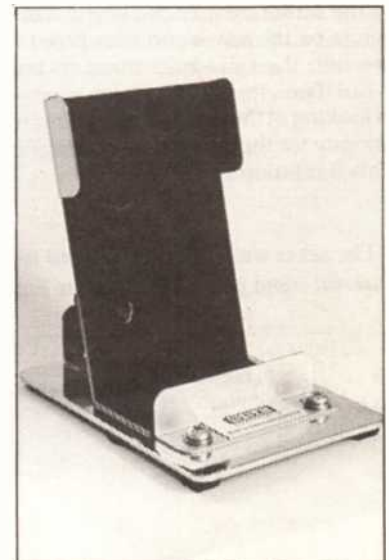
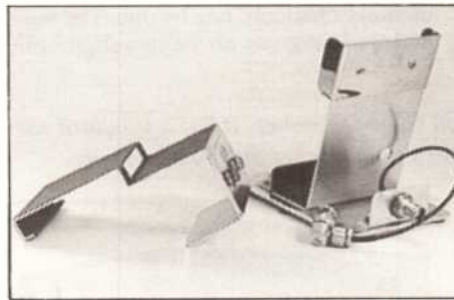
So now you know. Shock, horror? We've been telling you all along, but now it appears that our law-enforcement officers have also been told by the RA. Comments, letters to the Editor, all appreciated.

New Products

From Solid State Electronics in Southampton come a pair of newly-introduced stands for handheld scanners. The BH-A3 base stand allows several different types and sizes of handhelds to be supported when used at a fixed location, the stand having an adjustable front stop which enables the stand to be used with scanners either fitted with a belt clip or those without.

For in-car use of a handheld scanner, the CH-A4 car mounting holder fits between the door-window rubber seal, this stand uses the scanner's belt clip to support the unit. Further details from SSE.

You can win one of these stands in next month's *Scanners International* 'giveaway' by simply sending in the reply-paid coupon.



Realistic PRO-2025 Mobile Scanner

Many dedicated scanner enthusiasts already have a good set-up for use at home, but sometimes feel they'd like their listening activities to follow them when driving around by using a low cost permanently fitted mobile scanner. Listening to VHF or UHF in the car certainly makes a change from medium wave broadcast stations!

At the other end of the scale, some users don't wish to spend a high amount of cash just to be able to listen into a few programmed-in channels, for example their locally used amateur and marine channels. For these users, the PRO-2025 currently selling at £99 may be an ideal solution to their needs.

No Search

Before I continue, let's clarify the radio's function. The PRO-2025 is a scanner receiver, capable of scanning up to 16 pre-programmed channels of your choice. To listen to these, you need to enter the frequencies in manually. The set has no 'Search' facility, i.e. no capability of searching out new active channels for you to listen to, instead it relies on what you've programmed in. So if you're new to scanning bear this in mind, you'll need a frequency list at hand to let you know what's active in your area.

This of course presents little problem if you already have a full-featured scanner at home, from which you can find the active frequencies you'd like to listen to on the move and thus program these into the PRO-2025 fitted in your car. But if not, then you've been warned, and looking at the latest UK distributor's catalogue for the set it make no mention of this limitation.

▼ *The set is well constructed and is good value for money. It has a standard car aerial input as well as sockets for an external speaker and power supply.*



▲ *The PRO-2025 measures 140x45x175mm. It has a standard keypad, Volume, Squelch, Priority, WX, Lock out, Review, Scan and Manual and controls.*

Features

After that little piece, let's look at what else the radio does. The reception range covers 68-88MHz in 5kHz steps, 136-174MHz in 5kHz steps, and 406-512MHz in 12.5kHz steps, receiving on FM. As such, it's capable of receiving the 70MHz (UK), 144MHz and 430MHz amateur bands plus of course a wide range of other services where the reception of these is allowed.

You enter frequencies in directly using the front panel keypad, with up to 16 memory channels available for the storage of these. Repeated presses of the 'manual' button cycle you through the memory channels, one by one. The normal readout given on the two-digit LED

display is the memory channel number. A press of the front panel 'review' button gives a sequential frequency readout, digit by digit, to remind you of what's stored in that particular channel.

The 'scan' button initiates a scan of all the programmed channels, and you can manually lock out any number of channels from the scan mode with a push of the 'lockout' button, a front panel LED lighting when you manually select that channel. A 'priority' feature allows the set to automatically check memory channel 1 every two seconds, halting on that channel whenever a signal appears on it regardless of activity on any other channel.

The set comes in a smart looking grey case, measures 140mm (W) x 45mm (H) x 175mm (D) and weighs 800g.

In Use

Switching on the scanner each time places it automatically into 'scan' mode, the set cycling through the programmed memory channels looking for a signal. Naturally as soon as the squelch raises on one of the channels, the set pauses, the scan continuing a second or two after the squelch closes.

With this simple, no-nonsense approach, I found using the set was simplicity in itself, especially when I was



driving around in my car. Here I just wired the set to the car's ignition switched voltage supply, then whenever I was in the car I just let the set 'look after itself'.

I did however have a slight problem with the aerial connector. This uses a car radio style socket, not an BNC or SO-239 type as virtually every other scanner on the market has. In the accompanying handbook, the owner is advised that a specific model number of Tandy mobile aerial is required for use - as for myself I just obtained a car radio style plug and made myself an adaptor, wiring this to a short length of 50 ohm coax cable and then to an in-line BNC socket. This allowed me to use my wide band window-mounted VHF/UHF mobile whip to good effect with the scanner.

Performance

I found the performance on VHF to be reasonable, although not quite as good on the 2m (144MHz) amateur band as a purpose-built receiver, this of course is to be expected. However I found the set to be rather on the 'deaf' side on UHF, with signals I could clearly copy on 433MHz inside the car on a handheld receiver hardly lifting the squelch on the PRO-2025. This of course could be due to the lossy aerial connector arrangement Tandy have chosen to use on their set, these losses increasing as the frequency goes up.

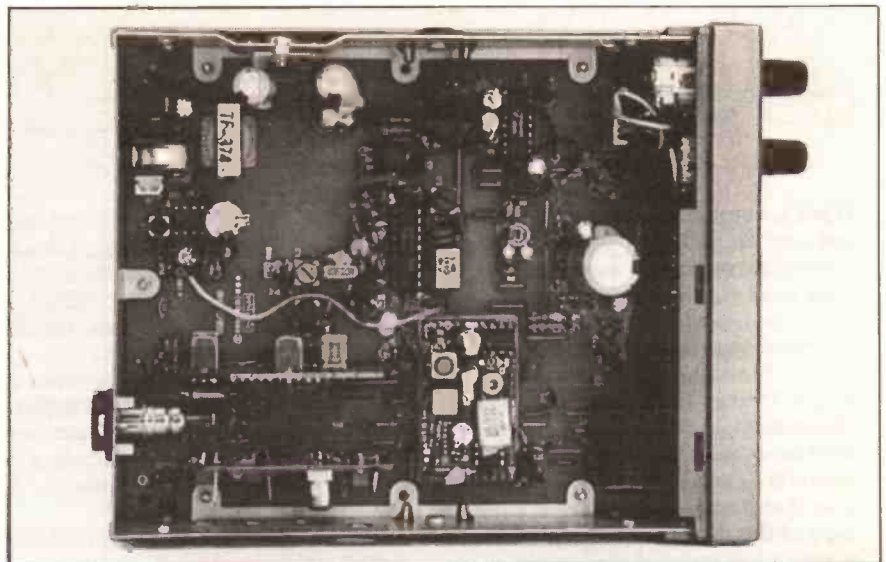
I found there was sufficient audio from the small internal speaker provided I tilted the set up slightly so the speaker wasn't pointing directly into the fascia or the floor carpet. The response was rather on the 'toppy' side as would be expected, plugging in an external speaker improved this of course.

I had very few problems indeed with interfering signals on other channels, a quick look at the laboratory measurements confirming the set has generally good strong-signal handling performance.

Conclusions

The set obviously doesn't have the performance nor the features of some of the 'top range' scanners, but considering the current selling price of under £100 I believe it represents very good value for money indeed. It's very simple to operate, and it's very easy to just 'fit and forget' in a car with its operation not requiring you to be endlessly tapping buttons and looking at frequency displays whilst on the move. I feel it's good as a low cost 'second scanner' for the car, or for a primary scanner for home use providing you know the frequencies you want to listen to, although remember the absence of a 'search' facility limits its use as a 'stand alone' first scanner.

My thanks go to Link Electronics in Peterborough for the kind loan of the review scanner.



▲ The reception range covers 68-88MHz in 5kHz steps, 136-174MHz in 5kHz steps, and 406-512MHz in 12.5kHz steps, receiving on FM

LABORATORY RESULTS

Sensitivity

Input level in μV pd required to give 12dB SINAD with a 3kHz deviation FM signal

Freq MHz	Sig. Level
68	0.39 μV
78	0.44 μV
88	0.48 μV
136	0.53 μV
145	0.47 μV
155	0.43 μV
165	0.49 μV
174	0.52 μV
406	1.42 μV
420	1.13 μV
435	1.18 μV
455	1.07 μV
470	0.89 μV
512	1.10 μV

Adjacent Channel Selectivity

Measured on 145MHz 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

+12.5kHz;	2.0dB
-12.5kHz;	17.5dB
+25kHz;	56.5dB
-25kHz;	58.0dB

Image/IF Rejection

Measured on 145MHz as increase in level of signal at -21.4MHz image frequency, over level of on-channel signal to give identical 12dB SINAD signals

25.0dB

Blocking

Measured on 145MHz as 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

+100kHz;	66.0dB
+1MHz;	81.5dB
+10MHz;	91.5dB

Intermodulation Rejection

Measured on 145MHz as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product

25/50kHz spacing;	53.0dB
50/100kHz spacing;	60.0dB

Maximum Audio Output

Measured with 1kHz audio tone at 3kHz deviation

3 ohm load;	720mW RMS
8 ohm load;	955mW RMS
15 ohm load;	945mW RMS

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Next month, a free draw will take place with a pair of high quality 'JIM' scanner stands to be won, one base and one mobile. Two 'Readers Ads' coupons will be drawn from the box, the lucky winners will receive their prizes in the post. If you'd like to enter without an ad, just use the coupon below with 'Competition Entry Only' entered in the ad section.

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Uniden 760XJL scanner, manual, boxed, pristine condition only 3 months old, used approx 10 times at most, genuine reason for sale, £150. Contact R. Chapman (Norfolk), Tel. 0362 691099

Bearcat 220FB scanner, with instruction book and service manual, £99. Contact John Hanrahan (Walton, Somerset), Tel. 0458 45909

IC-R100 with SSB, 500kHz - 1800MHz no gaps, unmarked, non smoker, £375 ono will haggle. Contact J. Bobbett (Glastonbury, Somerset), Tel. 0458 34917 evenings and weekends.

AR1000 scanner MkII, one month old with receipt, 500kHz - 600MHz, 805MHz - 1300MHz, charger, excellent condition, I need money for Novice packet node, £200 offers considered. Please write to Martin Saunders, 182 Clarendon Road, Broadstone, Dorset BH18 9JA

AOR-2002 scanner, 25 - 550, 800 - 1300MHz, excellent condition, £330. Contact Mr. T. Raybould, Tel. Sheffield 582137

Realistic PRO-2005 FWO, £250. Contact J. Stephens (Basingstoke), Tel. 0256 53896

Realistic PRO-2006 scanner, 400 memories, 25 - 570MHz, 720 - 1300MHz, AM/FMW/FMN, 2 months old, mint condition, genuine reason for sale, £250. Contact Brian Forster (Sheffield), Tel. 0742 887052 anytime.

Trio R600 receiver, AM/USB/LSB, boxed and in near mint condition, with manual £170 ono. Also Jil 200 'professional' scanner, very little used, very good condition, boxed with 2 manuals, £125 ono. Also FDK Sky Voice professional civil airband monitor, PLL thumbwheel tuning, metal cased, with manual, carry case and charger, virtually unmarked, £50 ono. Contact Roy Harding (Llandudno), Tel. 0492 547623

Bearcat 950/760 XLT mobile/desk, free coverage 29 - 952MHz in 5 banks, 100 memory channels, 3 months old, boxed with manual, cost £259 sell for £100. Contact Arne Lovseth (Brighton), Tel. 0273 301508

SX-200 scanning monitor receiver, with FM/AM and scan A scan B scan control, Ex-ANT dimmer clock, £175 ono. Contact Peter Austen (Newbury, Berkshire), Tel. 0635 32828

Sony PRO-80 receiver, all mode, 150kHz - 223MHz with Sony mains adaptor, £175. Also Realistic 2005, 400 channel, 25 - 1300MHz, boxed as new, £175,

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QRP CORNER

Time flies as the old saying goes, it is now nearly one year since the first of these short communiques, written by yours truly, on matters of interest to the QRP operator first appeared in this magazine. Comments from the many readers I've met at the various shows and rallies have been very encouraging. The whole world of QRP is now changing, for the better, with the influx of the UK Novices.

The News

After years of the QRP operators telling the world that we can manage with less power, I'm pleased to tell readers the American FCC seem to have proved our thoughts!

How many times have we sat here in the UK and listened to two, or more US stations having a QSO. 'Not unusual' you may comment. But when you find these same stations are both running 1.5kW as a matter of course, to communicate over relatively short distances, you may get a little uptight. Most UK amateurs manage to work the world, and many have achieved DXCC, with the UK maximum power level being limited to 400W.

In the USA, the FCC visited about 200 stations, the cry was that it was not a 'station inspection' but a friendly visit to check out their operating. Each station operator was asked to initiate a contact with another amateur, and after a few

Dick Pascoe G0BPS describes holiday gear for QRP operation

minutes into the contact they were instructed to reduce power by 50%. About 98% of the stations visited were able to do so, and in most cases no difference in the communication was noted. In one instance a comment was even made that the speech quality was more natural and the signal strength had increased!

One or two amateurs didn't know how to reduce power from their set. Don't shout too loud! Can *all* readers reduce power if required? One amateur increased power to continue the QSO because his contact complained of interference.

This experiment was strongly denied by the FCC as a 'power checking experiment' with a view to reducing the maximum power levels permitted to amateurs. I'm not so sure, any amateur listening to the bands will be convinced of the advantage of lowering power levels to all amateurs. At the moment we have some able to use 1.5kW, whilst others are restricted to 100W.

No comments on this experiment have yet been made by the FCC, but I think that we can form our own conclusions by their request.

free of course). They were amazed when I told them I was running QRP — it can be done!

Rigs such as the FT7, the HW7/8/9 series and similar are ideal for holidays too. Their low power output means that high currents aren't required from the battery, so most car batteries will last for many, many hours running a simple rig.

Whilst on holiday the main station aerial may also be missed, and here I find that a kite gives me the best of all worlds. It's fun for my son to get up in the air, and it gives me a good semi-vertical aerial. If you're trying this, use very light wire, and strong line. I occasionally use a true vertical too, see Fig 1. This is also a very good aerial for field days and special event stations too, although wind changes may cause problems.

Copper Balls

The magazine of the Michigan QRP club dropped through my door today. It is called *The Five Watter*, I mention this because they have an article by C. F. Rockey W9SCH, who writes about an old time aerial which uses a copper ball float which he uses.

The aerial is a simple dipole with one leg vertical tied to the gutter or a suitable tree, the other leg horizontal as per the diagram. "Several of these horizontal legs may be used," he wrote, in use this will make a simple quarter wave vertical with a matching ground plane. The copper ball is not essential, but it provides a form of capacity hat which reduces the physical length of that leg. If nothing else, it should raise some comments if used for a special event station!

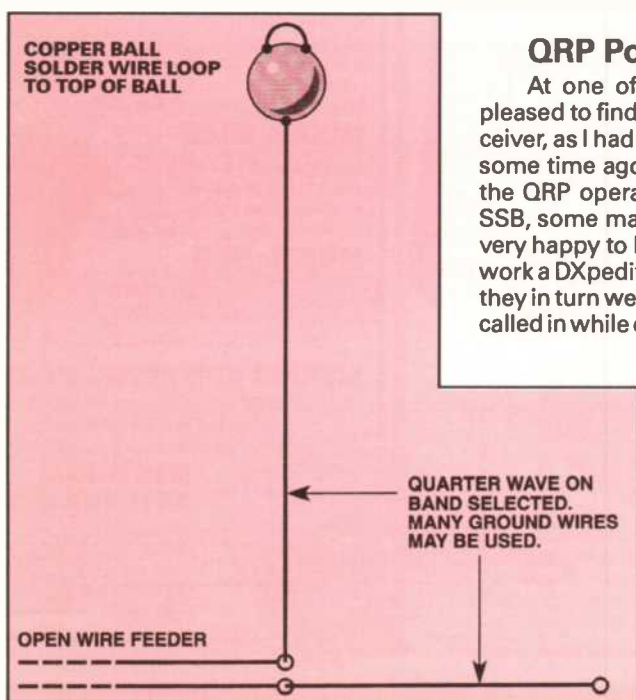
Rochdale QRP Convention

The third QRP Convention is to be held at the church of the G-QRP Club's secretary, the Rev. George Dobbs. Everyone is invited, whether licensed or not, members or not, just an interest in any aspect of QRP working is all that's needed. We've been told that members from Holland, Germany, France, Canada, USA and other countries are intending to be there. So come and meet your scribe and the committee of the club at St. Aiden's Church Hall, Manchester Road, Rochdale, Lancashire on Saturday, 19th October 1991.

That's it for this month, ideas and comments to me via. GB7SEK on packet, by letter via. the Editor or direct to 3, Limes Road, Folkestone.

QRP Portable or Mobile

At one of the recent rallies I was pleased to find another Yaesu FT7 transceiver, as I had to part with my other one some time ago. These sets are ideal for the QRP operator, giving about 10W of SSB, some may give a little more. I was very happy to break a pile up recently to work a DXpedition on Market Reef (OJ0), they in turn were pleased to work me as I called in while driving on the M25 (hands



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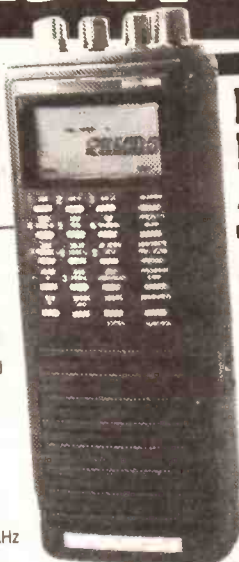
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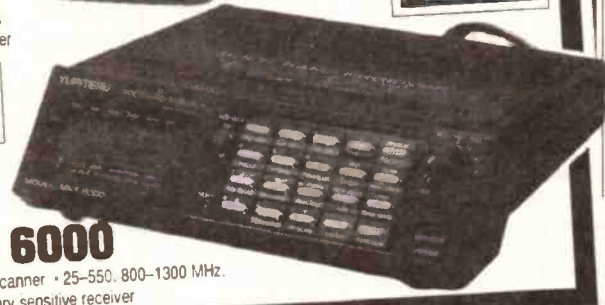
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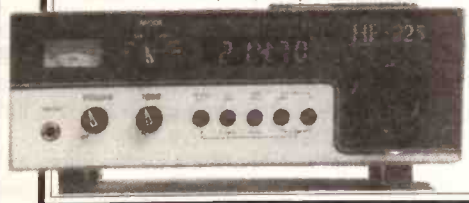


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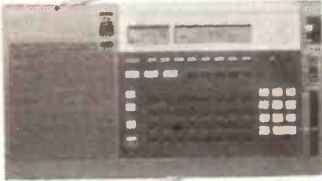
FOR THE RADIO ENTHUSIAST

SONY RADIOS

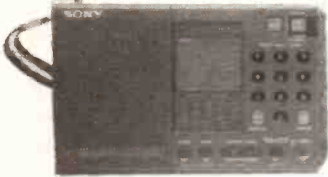
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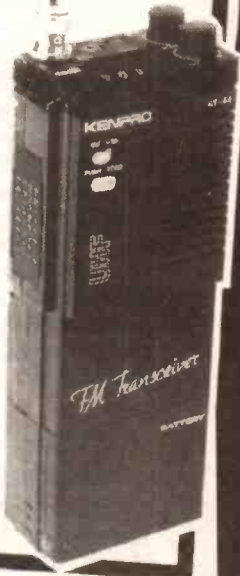
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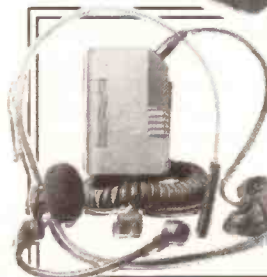
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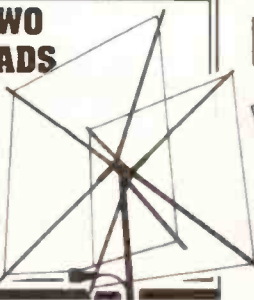
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Project – Random Morse Text Generator

Carrying on from last month where we constructed the Morse text generator, Terry now explains its uses and gives an expanded technical description to allow you to customise the operation and the data stored in the unit to your exact needs. Note that some of the figure numbers given here necessarily refer to diagrams shown in last month's feature. If you missed this, then a large SAE to the HRT Editor will bring you a photocopy of this with our compliments.

Using The Morse Generator.

The text held in memory is listed in Table.1. The first three blocks contain Morse abbreviations, Q-codes and punctuation along with some commonly used non-abbreviated words. The fourth block is similar but in addition includes numbers. Procedure signals are also included, and each time a *K*, *KN*, *AR*, *VA* or *PSE K* occurs, a period of silence ensues followed by *CT*. *AS* is also followed by extended spacing as with *BK*, which is sent twice with spacing in between. This has been done to highlight the manner in which they are used.

When first using the Morse Generator, set the delay control to the D5 position which introduces maximum inter-word spacing. Adjust the speed control for an approximate 60% copy, i.e. the percentage of words correctly recognised. Practice at this speed until you improve to around 80% copy, then gradually reduce the delay setting until this copy rate is achieved when reading cali-

brated Morse. Further improvement is best accomplished by repeating the above process as practice at a high copy rate leaves little room for improvement.

During use, a conscious effort should be made to perceive some or even all of the word prior to setting down on paper. This may prove difficult at first, but will become natural with time. It is expedient to use script as opposed to block capitals when copying text down. Those who aspire to speeds in excess of 30 WPM will find that it becomes impractical to copy any text down at all, and the CW conversion becomes a purely mental process.

Conclusion.

The Random Morse Text Generator does not boast to replace or surpass any existing method or system of Morse instruction, nor does it replace live on-air practice. Rather, it is hoped that it will be used by the trainee to enrich the learning process, and by the more experienced

operator to enhance on-air reception skills. Although a low-power loud-speaker has been included in the design for convenience, it is sometimes preferable to listen through a pair of headphones. Used in this way the generator will support over one hundred daily half-hour practice sessions when the battery pack is fitted with six AA alkaline-manganese cells.

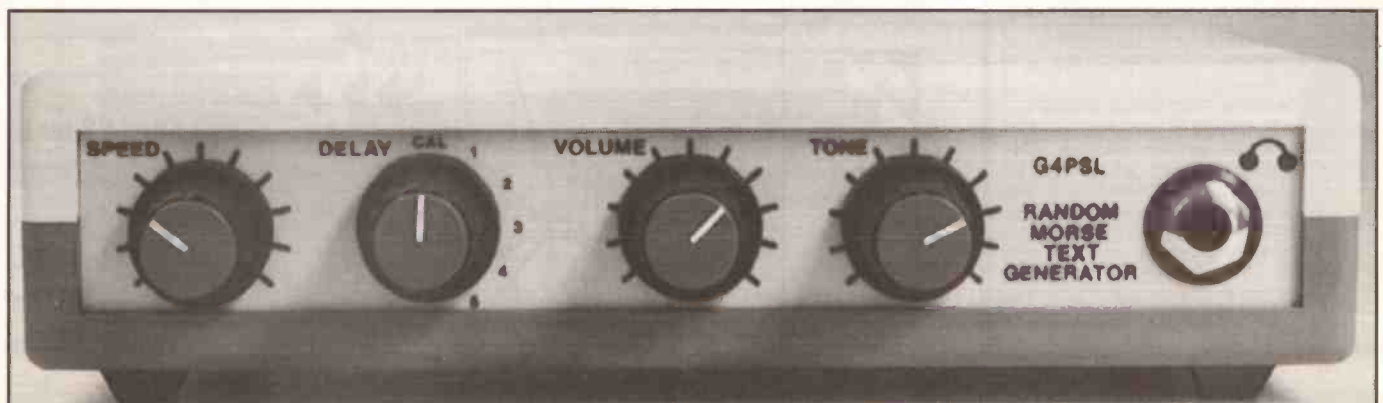
Technical Description

This may be useful for the more experimentally-minded amateur, who may like to modify the Morse generator operation to his or her specific needs. Note this is purely for the 'boffins', and although you don't need to understand it all just to build the unit it may prove useful for faultfinding and modification purposes;

EPROM Memory.

256 Morse words are stored in a 27C256 32-kilobyte x 8-bit word EPROM IC. Each Morse word is allocated 128 consecutive bytes of memory. Fig.1 in last month's issue illustrates an example of this, showing how the twenty seventh stored Morse word is arranged within its assigned area of memory. When the memory locations are addressed sequentially and in ascending order, commencing in this example at memory address HEX 0D00, the Morse word GE (abbreviation for Good Evening) appears at data output Q6, labelled MO — Morse Output. Dots and dashes are represented by logic 1s, and spacing by logic 0s. For clarity only the 1s are shown, the unoccupied spaces being 0s.

*Terry Grice G4PSL,
gives a technical
description of the
Random Morse Text
Generator.*



The Q0 output (CAL) will generate a pulse six spaces beyond completion of the Morse word. The leading edge of this is used as a reset which causes another Morse word to be selected for reproduction. The first addressed location of each Morse word contains all zeros, thus the new word provides the seventh time interval needed to create a calibrated inter-word space.

Outputs Q1 to Q5 (D1 to D5) generate reset pulses at progressively later points in time thereby extending the inter-word spacing. In use, any one of four separate 8-kilobyte blocks of 64 Morse words may be addressed, as illustrated in Fig.2. This does not include the start of transmission signal CT (also used in the Novice test) which is common to blocks 1, 2 and 3. In each case this is stored in the area of memory allocated to the end of message procedure signals.

Circuit Description.

The block diagram of the unit is shown in Fig.3, the complete circuit diagram in Fig.4. The circuit operates in the following manner;

IC5c and IC5d form the initialisation and reset circuit. At switch on, input pin 13 of inverter IC5d is held low by the initially discharged capacitor C3. This forces the output pin 11 high producing an initialisation pulse of approximately 0.5s duration — the time taken for R5 to charge C3 to the input positive voltage threshold. During the initialisation period, the reset line, pin 2, of Word Address counter IC4 is held high thereby holding outputs Q1 to Q7 of this 7-stage binary ripple counter low. The LE (Latch Enable) input, pin 11, of IC2, an octal transparent D-type latch, is also held high. In this state the outputs Q1 to Q8 follow the input changes seen by D1 to D8. These input levels, with the exception of those present on D7 and D8, are generated by the Word Select counter IC1, a 12-stage binary ripple counter. IC5a along with R3 and C1 forms a free-running astable HF oscillator which produces over 1,000,000 pulses per second. Each negative-going edge appearing on output pin 3 strobes the clock input, pin 10, of IC1 incrementing the binary count present on outputs Q1 to Q12 by one. When the initialisation pulse ends, the LE line of IC2 is taken low. At this instant, the count that exists on the input data lines is latched in and the Q outputs provide a stable address on pins A7 to A14 of EPROM IC3. Line A7 has a binary weighting equivalent to 128 decimal. The memory is therefore addressed in 128-byte steps, this is the number of bytes allocated to each Morse word.

The two most significant address lines A13 and A14 are controlled by the block select switch SW1. If prior to latching data into IC2 the switch is in the 'Mix' position, then any one of the 256 stored Morse words may be selected. Switch positions 1, 2, 3 and 4 produce the fixed codes 00, 01, 10 and 11 selecting one of four 64 word Morse blocks, the respective start address of each being Hex 0000, 2000, 4000 and 6000.

The termination of the initialisation pulse also releases IC4, the word address counter, from the reset state. Each negative transition of the waveform generated on output pin 4 of the free-running astable LF oscillator formed by IC5b, R4, RV1 and C2 now strobes the counter clock input, pin 1, incre-

menting the binary count that exists on outputs Q1 to Q7 by one. Consecutive memory locations of IC3 are addressed through lines A0 to A6 up to a maximum binary count equivalent to decimal 127. This results in the selected Morse word being produced at Q6, the Morse output, pin 18, with the stored logic 1s forming dots and dashes and logic 0s providing the necessary spacing. Upon completion of the Morse word, six separate positive going reset pulses appear on IC3 outputs Q0 to Q5. The first, in time, occurs at the Q0 (Cal) line. If the delay switch SW2 is set to this position then calibrated inter-word spacing will ensue. Outputs Q1 to Q5 (D1 to D5) offer progressively longer inter-word delays with D5 being the longest. The selected reset pulse is fed to input pins 8 and 9 of inverting buffer IC5c which gives a negative-going pulse on output pin 10. This action takes input pin 12 of IC5d low, forcing output pin 11 high to generate a reset pulse. This completes the cycle that creates one Morse word. Subsequent Morse words are produced by repetition of the same cycle.

The stored Morse words are of varying length and any one, when selected, takes at least a few hundred milliseconds to complete. As the word select counter is clocked at several hundred kHz, synchronism between this and the end of word reset pulse cannot be maintained. This, along with the deliberate lack of stable input levels on the IC2 D-inputs prior to latching lends a sufficient degree of randomness to the Morse word selection process. Speed control RV1 sets the overall text output rate to the approximate range of 10 to 40 WPM.

The simple, sequential manner in which data is accessed from memory was not deemed to justify more elaborate use of IC3 chip enable and output enable connections, pins 20 and 22, which are permanently enabled by connection to the 0V rail. The asynchronous manner in which the Q-outputs of IC4 change when incremented can result in unwanted address bus patterns on lines A0 to A6. Any transients appearing on IC3 outputs as a result of this will be suppressed by C4 and C5. In each case, the capacitor forms a low-pass filter with the associated Q-output resistance setting a time-constant somewhat longer than the settling time of IC4 Q-outputs. Switches SW1 and SW2 should be of the 'Break before Make' type to avoid unnecessary shorting of outputs when operated. R1, R2 and R3 are pull-down resistors which sustain correct logic levels during switching.

IC6 is a bipolar 555 timer configured as a gated astable AF audio oscillator. Logic 1s appearing on the Q6 Morse output of IC3 take reset pin 4 high allowing the oscillator to run. This converts the string of logic 1s and 0s that form the Morse word into an audible signal. Tone control RV3, R7 and C7 form the oscillators feedback circuit. The audio pitch is con-

tinuously variable between the limits of 150Hz and 7kHz for respective maximum and minimum settings of RV3. The audio output signal produced at pin 3 is fed to LS1 via DC decoupling capacitor C8, current limiting resistor R8 and volume control RV2. Connecting headphones to SK1 automatically switches the loudspeaker out. The control input, pin 5, is not used and is decoupled to ground by C6 to remove any noise.

Voltage Supplies

Reverse battery polarity and mirror image insertion protection circuitry are inherent in the regulator design. 7805 regulator pin compatibility is maintained and, at the expense of not realising total battery capacity, this alternative may be installed. C13 decouples the regulator input, this component should always be installed when the external power source is more than a few cm from the input. When using the LM2940 device, C12 must be included as it is essential to output stability. The 5V DC supply rail is decoupled by C9, C10 and C11 which are distributed around the circuit.

Remember that PCBs and kits of parts are available from HRT advertisers, and programmed EPROMs are also available from the author (details given last month). This concludes the feature, have fun!

Table 1 — Memory contents.

Block 1.	
ABT	ABOUT
AGN	AGAIN
ANI	ANY
BD	BAD
BFO	BEAT FREQUENCY OSCILLATOR
BI	BY
BN	BETWEEN
CLD	CALLED
CPY	COPY
CQ	GENERAL CALL
CW	CONTINUOUS WAVE
DF	DIRECTION FINDING
DX	LONG DISTANCE
ER	HERE
ES	AND
FB	FINE BUSINESS
FD	FREQUENCY DOUBLER
FER	FOR
FM	FREQUENCY MODULATION
GA	GOOD AFTERNOON OR GO AHEAD
GB	GOODBYE
GE	GOOD EVENING
GM	GOOD MORNING
GN	GOOD NIGHT
HI	LAUGHTER
HR	HERE OR HEAR
HRD	HEARD
HV	HAVE
II	REPEAT (AFTER ERROR)
MS	METEOR SCATTER
ND	NOTHING DOING
NM	NO MORE
NW	NOW
OM	OLD MAN
OSC	OSCILLATOR
QRO	INCREASE POWER
QRP	DECREASE POWER
QRT	STOP SENDING
QRZ	WHO IS CALLING?/CALLED BY
QSB	FADING

QSL	ACKNOWLEDGE RECEIPT	TFC	TRAFFIC	WG	APOSTROPHE
QTH	LOCATION	TMW	TOMORROW	DU	HYPHEN
R	RECEIVED ALL SENT	TRX	TRANSCEIVER		
RX	RECEIVER	TU	THANK YOU	Block 4.	
TKS	THANKS	USB	UPPER SIDE BAND	AMPS	
TNX	THANKS	WA	WORD AFTER	BAND	
TX	TRANSMITTER	WB	WORD BEFORE	BE	
U	YOU	WID	WITH	BEAM	
UR	YOU ARE	WKD	WORKED	HF	HIGH FREQUENCY
VY	VERY	AR	END OF TRANSMISSION [1][7]	I/P	INPUT
WKG	WORKING	KN	INVITATION TO TRANSMIT, NAMED STATION. [1][6]	JOIN	
WL	WILL			MILES	
WUD	WOULD	KK	R.H. BRACKET	MTRS	METRES
WX	WEATHER	RR	INVERTED COMMAS	OHM	
XO	CRYSTAL OSCILLATOR			O/P	OUTPUT
YF	WIFE	Block 3.		PWR	POWER
YL	YOUNG LADY	ATU	AERIAL TUNING UNIT	VOLTS	
YR	YOUR	BCNU	BE SEEING YOU	VOX	VOICE OPERATED SWITCH
BT	DOUBLE HYPHEN	BLV	BELIEVE	VSWR	VOLTAGE STANDING WAVE RATIO
K	INVITATION TO TRANSMIT [1]	BURO	BUREAU	WATTS	
VA	END OF WORK [1]	BUT		YAGI	
AAA	FULL STOP	CONDX	CONDITIONS	ZEPP	
IMI	QUESTION MARK OR REPEAT	CPSE	COUNTERPOISE	ZO	CHARACTERISTIC IMPEDANCE
GW	COMMA	CUAGN	SEE YOU AGAIN	ZONE	
		CUD	COULD	J2B	EMISSION
		CUL	SEE YOU LATER	J2C	
Block 2.		DIPOLE		J2E	
AA	ALL AFTER	ENUF	ENOUGH	RST479	SIGNAL REPORT
AB	ALL BEFORE	FONE	TELEPHONY	RST489	
ADR	ADDRESS	FREQ	FREQUENCY	RST548	
AM	AMPLITUDE MODULATION	HIGH		RST549	
ANT	ANTENNA	IF	INTERMEDIATE FREQUENCY	RST589	
CC	CRYSTAL CONTROLLED	INPT	INPUT	RST5NN [4]	
CFM	CONFIRM	IS		4dB	
CK	CHECK	LONG		9dB	
CKT	CIRCUIT	LOOP		4EL	FOUR ELEMENT
CL	CLOSING DOWN	LOW		7EL	
CNT	CANNOT	LTR	LATER	5Hz	
CO	CRYSTAL OSCILLATOR	MNI	MANY	10FT	TEN FEET
CRD	CARD	MOD	MODULATION	3TFT	[5]
DE	THIS IS	NAME		60FT	
DR	DEAR	PA	POWER AMPLIFIER	7km	
GD	GOOD DAY	PSU	POWER SUPPLY UNIT	9km	
GLD	GLAD	QRA	STATION NAME	6M	SIX METRES OR MILES
GMT	GREENWICH MEAN TIME	QRI	tone (AMATEUR T1-T9)	15M	
GND	GROUND (EARTH)	QRM	MAN MADE INTERFERENCE	40M	
GUD	GOOD	QRN	STATIC INTERFERENCE	50M	
HPE	HOPE	QRV	READY	8TM	[5]
HVY	HEAVY	QRX	WAIT-CALL AGAIN AT.	50MHz	
HW	HOW	QSP	RELAY	55kHz	
LOC	LOCATOR	QSV	SEND SERIES OF Vs	4W	FOUR WATTS
LSB	LOWER SIDE BAND	QSX	LISTEN	10W	
LSN	LISTEN	RADIO		15W	
MSG	MESSAGE	RCD	RECEIVED	20W	
ND	NOTHING DOING	RCVR	RECEIVER	3TW	[5]
NIL	NOTHING	RPRT	REPORT	40W	
NR	NEAR OR NUMBER	RSGB	RADIO SOCIETY OF GT. BRITAIN	8TW	[5]
OK	IS CORRECT OR WE AGREE	SHORT		OS	COLON
OP	OPERATOR	SIGS	SIGNALS	2:1	
OT	OLD TIMER	SRI	SORRY	6:1	
PM	PULSE MODULATION	TEST	CONTEST	55	BEST SUCCESS
QRK	INTELLIGIBILITY (AMATEUR R1-R5)	TCVR	TRANSCEIVER	73	BEST WISHES
QRL	BUSY	THE		88	LOVE AND KISSES
QRQ	SEND FASTER	TUNE		AS	WAIT [1]
QRS	SEND SLOWER	VERT	VERTICAL	/A	ALTERNATIVE
QRU	TRAFFIC	VFO	VARIABLE FREQUENCY	/P	PORTABLE
QSA	SIGNAL STRENGTH (AMATEUR	VIA		/M	MOBILE
QSO	COMMUNICATE WITH	VXO	VARIABLE CRYSTAL OSCILLATOR	/MM	MARITIME MOBILE
RIG	EQUIPMENT	WAB	WORKED ALL BRITAIN		
RPT	REPEAT	WAC	WORKED ALL CONTINENTS		
SA	SAY	WAS	WORKED ALL STATES		
SED	SAID	WAZ	WORKED ALL ZONES		
SKD	SCHEDULE	WIRE			
SCHED	SCHEDULE	XTMR	TRANSMITTER		
SN	SOON	XTAL	CRYSTAL		
SSB	SINGLE SIDE BAND	XYL	WIFE		
STN	STATION	PSE K	INVITATION TO TRANSMIT [1][3]		
SUM	SOME	BK	BREAK [1]		

Notes:

[1] See text.

[2] CT is stored in all four blocks.

[3] This is East European protocol equivalent to KN.

[4] N is sometimes used to replace 9.

[5] T is sometimes used to replace 0.

[6] Also LH bracket.

[7] Also plus sign.



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A New Aerial for Burndept Handhelds

Rob Ford GW0DRS shows how to improve your ERP

The Burndept UHF portables are now rapidly finding their way onto the 70cm bands, and operate reasonably in their present state. However here's a short project to allow you to substantially boost their performance with a more effective aerial.

New BNC Mount.

First you'll need to remove the existing aerial screw mount from inside the head. Unscrewing the retaining screws and gently pulling the head from the body, do so with care as there's a chance of the interconnecting pins being bent. Look inside the head and you'll see the existing screw mount bonded onto a strip of black plastic, this part of the plastic strip must be removed. One method of doing this is by melting the plastic along it's width using a soldering iron, with the circuit board, transducer and jack socket still inside the head. Alternatively you can remove all of the components from the head and cut the plastic strip with a hacksaw.

To allow access for the 'soldering iron method', carefully remove the two circlips which hold the circuit board to the mounting posts, now unsolder the wires connecting the aerial mount and the transducer from one end of the cir-

cuit board, lift the board, and remove the two insulating washers from the mounting posts. Keep these safe together with the two circlips. By carefully lifting the circuit board at an angle you'll have enough room to melt the plastic with a soldering iron and thus remove the old mount. Now remove 15mm of plastic from the end to provide clearance for the new BNC socket. If you prefer to remove all of the components and cut the plastic using a hacksaw, then with the head removed, unscrew the locknut from the jack socket at the side. Unscrew the two hexagonal

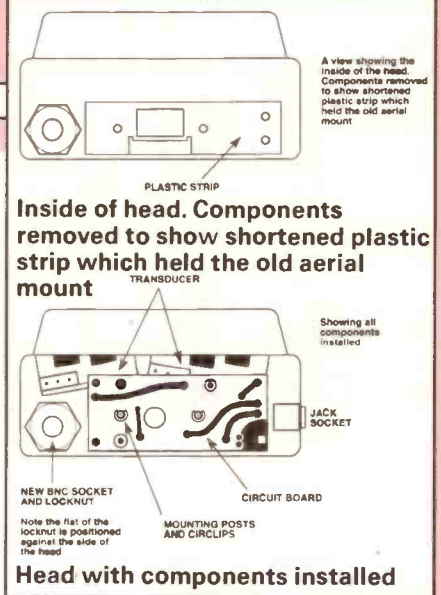
studs from the top of the head, these studs are connected to the circuit board via a miniature coaxial cable and are normally used to connect a mobile aerial when used with a suitable adaptor. Because of this cable, slight resistance may be felt when the studs are unscrewed. A wise precaution at this point is to make a note of where each wire is soldered onto the board, as wiring can become brittle with age and may break away from a joint with the slightest amount of movement.

Remove the two circlips from the mounting posts, disconnect the wire from the aerial mount to the board, and remove the black wire from the transducer. Gently raise the board clear of the mounting posts and remove the two insulating washers (keep these in a safe place), then unscrew the mounting posts and remove the PTT button. Disconnect the green wire from the transducer at the circuit board end, and gently lift the board and jack socket away from the head. If the transducer does not come away freely, carefully prise along it's top edge with a small screwdriver, once it's removed you can take out the plastic strip and cut off the surplus material neatly with a hacksaw. The mounting hole may now be enlarged and the new BNC socket fitted.

New mounts for old

The existing mounting hole needs to be enlarged to suit the new BNC socket. The hole diameter for this is 10mm, and you'll have to file the existing hole 'off centre' to be able to screw the locknut onto the new mount. Upwards and inwards about 3mm seems adequate. The best way of marking the correct position of the hole is by placing the locknut inside the corner of the head with the flats against the sides, marking the diameter with a sharp pencil.

Place the locknut and earth tag in position inside the head and fit the BNC socket. If you removed the plastic strip using a soldering iron, replace the insulating washers onto the mounting posts



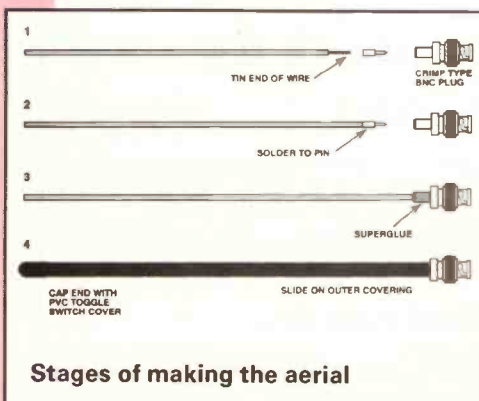
and secure the circuit board using the circlips. Reconnect the wire from the transducer and connect the BNC centre pin PCB aerial connection, place the head onto the connecting pins and gently push it back onto the body, replacing the screws.

Alternatively if you removed all the components, replace the shortened plastic strip inside the head and secure with the two hexagonal studs. Replace the transducer, the two mounting posts, and the PTT button ensuring it's peg is central between the posts. Remove the thin coaxial cable from the underside of the circuit board if you don't intend to use the mobile mount facility, otherwise resolder it to the studs when the board is replaced. Re-fit the jack socket and place the two insulating washers on the mounting posts. Check that all wires are correctly connected before replacing the board, securing it with the circlips. Finally, reconnect the wires from the transducer, and solder a wire from the centre pin of the BNC socket to the aerial connection on the circuit board. Place the head onto the connecting pins and push it gently back onto the body and replace the screws. This completes the BNC modification.

The 1/4 wave aerial

If you don't already have a suitable 70cm set-top aerial, here's a very easy way of making one. You'll need a BNC plug and a 225mm length of coax with a solid centre conductor. Remove the outer covering and braid leaving just a length of insulated centre conductor. Remove 12mm of insulation and lightly tin the end of the wire, then solder the BNC plug pin to this. Push the pin and attached wire into the body of the BNC plug and complete the assembly as shown. Finally, cut the aerial to a length of 165mm from the top of the BNC body, this corresponding to a quarter wave on 70cm.

Good luck and may your new aerial reach the parts that the original couldn't!



From My Notebook

*Geoff Arnold G3GSR
looks at fuses in their
various forms*

Fuses are looked upon by most people as quite uncomplicated things. While they're working, they tend to be forgotten; when they blow, they're usually roundly cursed and just replaced or rewired in the hope that they won't blow again. In fact, like most things technical, there's far more to them than meets the eye, and if you are fault-finding on a system or piece of equipment or, even more importantly, designing or installing one, there's quite a bit you ought to know to ensure that you do things safely. I'll try to cover a few of the most important points here

Shape and Size

First of all, let's look at the physical aspect of fuses. Other than in house-wiring systems and old radio or electrical equipment, you're not very likely to come across rewirable fuses nowadays, so I shan't spend much time on those. In the domestic situation, you'll hopefully find a card of fuse-wire of the appropriate values hung in a nail next to the fuse-box or consumer unit! For the devotee of old equipment, you'll find tables of wire gauges and their fusing values in old reference books. In either case, the important things to remember when repairing the fuse are:

(a) use the correct gauge of wire for the circuit, and

(b) don't kink or stretch the fuse wire whilst fitting it. The design of some fuse-carriers can make achieving (b) a rather ticklish operation, but if you do ill-treat the wire, you'll almost certainly reduce its current-carrying capacity, so that it will blow even more readily next time!

Because of the skill needed to rewire a fuse properly, and also the fact that repeated blowing can deposit a conductive layer over the surface of the insulating body of the fuse-carrier, with subsequent risk of 'tracking' from one

terminal to the other, cartridge fuses, or fuse-links to give them their correct name, have been the preferred form of fuses for many years.

The smallest common tubular cartridge fuses, the sort found in radio and electronic equipment, are 16mm long by 5mm diameter. Going up in size we come to the European standard 20mm x 5mm, then the 25mm x 6mm size used in 13A flat-pin mains plugs, and next the old faithful '1-1/4in x 1/4in' size (32mm x 6mm). Above this you are into the realm of industrial fuses, which come in an enormous range of shapes and sizes, some of which still clip into place, some screw in, and some have terminal lugs welded onto the ends.

The body of the fuse-link, the tubular part between the metallic end caps, is usually made of glass or ceramic, though at one time fibre-board cases were used. Glass has the advantage that you can see through it (unless the fuse manufacturer has painted it, or put a slip of paper inside to carry details of the value), and can tell by inspection whether the fuse is intact. The problem is that glass is fragile. That means that you might break it in handling, but more important is the fact that it might shatter when the fuse blows violently.

Prospective Current

To appreciate why that might be so, we need to realise that a fuse of, say, 10A rating isn't just going to be called upon to safely break a current of 10A, or even double that figure. If you look in a catalogue of fuse-links, you'll find a rating called 'prospective current'. In simple terms, the prospective current of a circuit is what would flow if there was a dead-short across the supply rails immediately at the output side of the fuse. If you have a supply of 12V (a lead-acid accumulator for example), and the

resistance of the battery plus the wiring up to the fuse was one hundredth of an ohm (not unreasonable for a hefty supply circuit intended to feed a mobile linear amplifier), that dead short could cause a current of $12/0.01 = 1200A$ to flow.

So that poor little 10A fuse could have to safely break a circuit carrying over a thousand amps. There's a lot of heat energy and pressure to be dissipated from the resulting arc, easily enough to blow a glass fuse-link apart. Even if the glass remains intact, the metal from the vaporised fuse-wire is likely to deposit itself on the inside of the glass tube, laying down a bridging circuit with an even higher current-carrying capacity than the wire had; a very dangerous situation.

So, although glass cartridge fuses are safe for low-energy circuits, with low prospective currents, fuses in high-energy circuits need the extra strength of a ceramic tube body, and the additional safety factor of a filling of sand to absorb the heat and pressure of the sudden melting of the fuse-wire.

To give a couple of examples, a typical standard 32mm glass cartridge fuse will safely break just ten times its rated current, but the equivalent ceramic bodied fuse will safely break 10,000A.

Speed

The current rating quoted by a fuse manufacturer is what the fuse-link will carry safely over a long period. The current that will cause it to blow is higher than that rating. Fuses do not blow instantaneously — they take a certain length of time, depending on the type of fuse and the amount by which the current exceeds their rating. The blowing current and time can vary quite widely, even in an identical type and rating of fuse, due to manufacturing tolerances.

Taking the common-or-garden quick-acting glass fuse, a typical specification says that they should blow within 10 seconds at 1.5 to 2 times their rated current. But at 10 times their rated current they may take anything from 1 to 100 milliseconds to blow. Hence the annoying case of the fuse protecting a transformer or a power supply reservoir capacitor, which *sometimes* blows due to the in-rush current surge at switch-on and *sometimes* doesn't!

There aren't only quick-acting fuses, of course. You can also get super-quick-acting fuses, for protection of semiconductor circuits, and a variety of anti-surge fuses, for use in circuits which are subject to occasional current surges in normal operation. Anti-surge fuses have also been called Time-delay or Slow-blow fuses, though nowadays terms for the various types are becoming standardised on a system based on abbreviations of descriptions in the German language. Quite why, I've not been able to discover. You'll find the magic letters 'FF', 'F', 'MT' and 'T' (see Table 1) stamped on fuse end-caps, and printed in circuit diagrams and parts lists.

There are two ways of achieving a delayed-action effect. In the type with the highest surge rating, the fuse element consists of a spring attached under tension to a length of resistance wire by means of a blob of low-temperature solder. A prolonged steady overload produces enough heat in the resistance wire to melt the solder, whereupon the action of the spring will clear the circuit. The thermal inertia of the blob of solder protects the fuse against surges of short duration, unless they are large enough to melt the resistance wire, which is of a gauge appropriate to the rating of the fuse.

The other method, which produces a fuse with a characteristic mid-way between quick-blow and full anti-surge, is to use a high-melting point nickel fuse-wire, with one or more blobs of magnesium powder attached to it by a binding varnish. The thermal inertia of the blobs again allows surges of short duration to pass without damage, but a prolonged overload raises the magnesium powder to ignition temperature. The burning magnesium melts the wire and the fuse clears. Severe surges will melt the wire in the normal way.

Electrical

Use of a multimeter to check a fuse-link for continuity does not present any risk of blowing even the smallest ratings. Testers of the 'lamp and battery' type, on the other hand, could be a problem. A 60 or 100mA fuse isn't going to take kindly to being asked to pass the current of a 0.3A lamp.

Another point to bear in mind is that small fuses have a significant resistance, in excess of 30 ohms for a 60mA fuse for example. On a continuity tester with a low full-scale deflection, such a fuse could well give the impression that it was a 'dud'. For values above 500mA, the resistance is below half an ohm.

For fuses with a high current rating, the fuse clips or holder must make effective electrical contact with the fuse end-caps if over-heating is to be avoided. Beware of trying to use a fuse-holder above its quoted maximum rating. The common panel mounting type which takes 32mm fuses in a screw-in or bayonet carrier will usually have a limit of 10 to 15A, 20A at the most. I recall a ship-board transmitter which consumed around 22A from a 24V DC supply on key-down, and was fitted with a 25A 32mm fuse in such a holder. If ever the fuse blew, it was usually impossible to replace it, for it would almost always have welded itself to the contacts. Each time, it meant replacing the holder as well as the fuse.

Another application where poor fuse contacts can cause trouble is in those 13A flat-pin plugs. I have seen the results of using a cheap plug on a 3kW electric heater, where the heat generated at the fuse contacts was carried through to the socket and caused the insulation on the live conductor to melt and peel back for well over half an inch. Luckily it was clear of the earthed metal box.

Energy

I mentioned earlier the amount of energy which is dissipated as heat and pressure when a fuse suddenly blows. There is another, quite different, aspect to this question of energy which is very

important in protecting semiconductor circuits.

Taking the typical transformer/rectifier/reservoir capacitor/series regulator set-up used to power a 12V mobile transceiver from the AC mains supply as an example, it is essential to protect the transceiver from the drastic over-voltage which could result from the series pass transistors in the regulator failing to a short-circuit state. That protection must operate very quickly if the rig is to survive the application of the full output voltage from the rectifier.

It is hopeless to try to rely on the fuse in the mains transformer primary circuit, which will very likely be an anti-surge type in order to survive the normal switch-on surge due to transformer magnetising current and reservoir charging current. There must be a fuse in the secondary circuit, and it must come after the reservoir capacitor, primarily to remove it from the part of the circuit which carries the surge current which charges the reservoir at switch-on, and secondly in order to separate the regulator and the rig from the charged-up reservoir when a fault occurs.

If that fuse is to provide any worthwhile protection at all to semiconductor circuitry, it must blow within a few milliseconds. This is where the Super-quick-acting (FF) fuses come into their own, for they are typically specified to blow within 2 milliseconds at ten times rated current, but at four times rated current they may survive for anything from 2 to 15 milliseconds. Without ascending to the realms of integral calculus, it is fairly obvious that to maintain that rate of current over that length of time requires a significant amount of energy, all of which will have to come from the charge in the reservoir capacitor — there will not be time to re-charge it from the next half-

Table 1 — Common Abbreviations

FF	Super-quick-acting
F	Quick-acting (from German 'Flink')
MT	Semi-delay (from German 'Mittel Trage')
T	Anti-surge (from German 'Trage')
HBC	High Breaking Capacity (suitable for circuits with high prospective current, such as equipment directly connected to the mains or a large storage battery)
LBC	Low Breaking Capacity (suitable for circuits with low prospective current, not recommended for equipment directly connected to the mains)
HRC	High Rupture Capacity (same as HBC)
LRC	Low Rupture Capacity (same as LBC)
SF	Sand-filled

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cycle of the AC mains. This in turn means that the capacitor must have a high surge rating, able to support that very rapid discharge without destroying itself. If the reservoir is not able to supply the energy required to blow the fuse quickly, the supply and the rig will sit there, gently (or maybe not so gently) cooking while the fuse wire warms up sufficiently to melt. (*I know! — see this month's 'Packet Radio Roundup' - Tech Ed.*)

The FF grade of fuses are not cheap, especially if you are talking about protecting the supply to a 100W rig which might draw the best part of 25A. Lest you are tempted to substitute a standard quick-acting fuse, remember that it could lead to a very expensive repair bill indeed. Another solution for high-current supplies is to use some sort of electronic protection circuitry, but this must be as simple and reliable as it can be, and ideally should be fail-safe in its operation.

Identification

As previously mentioned, the fuse type (F, T, etc.) is often marked on the end cap nowadays, either just before or just after the current rating. If you encounter a fuse marked something like '1AT', this means a 1A anti-surge, not as might be

first thought, a mysterious magnetic fuse with a 1 ampere-turn rating.

The current rating can be marked either as a number on the body or end caps (the most common method now for fuses of the sort used in radio and electronic equipment), or in a colour code (see Table 2), sometimes both. Ratings below 1A marked as a number can appear in several different ways, so that a 500 milliamp fuse might be marked 500mA, or 0.5A, or even 5/10A. Sometimes the letter 'A' is left off.

Conclusion

Though I've really only scratched the surface of the subject in this article, I hope that I have convinced you that there is rather more to the humble fuse than meets the eye. Like any device connected with safety, it should be treated with respect.

Modern domestic equipment like TV sets, hi-fi systems and so on, has been designed to meet the safety requirements of British Standard BS415. If you replace a fuse, or any other safety component, in one of these with a different type, you invalidate the type approval of the equipment, and could turn it into a dangerous, possibly lethal, item. Beware!

Table 2 — Colour Codes

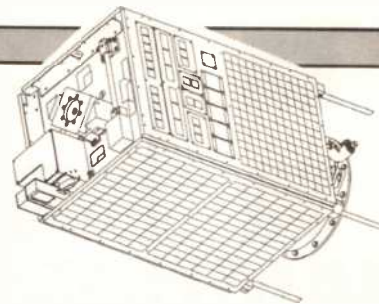
2.1 — 25mm fuses to BS1362 (for 13A plug-tops)

Rating	Colour
1, 2, 5, 7 or 10A	Black
3A	Red
13A	Brown

2.2 — Other fuses

Rating	Colour
10mA	Green/yellow
15mA	Red/turquoise
25mA	Eau-de-nil
50mA	Salmon pink
60mA	Black
100mA	Grey
150mA	Red
250mA	Brown
500mA	Yellow
750mA	Green
1A	Dark blue
1.5A	Light blue
2A	Violet
2.5A	Yellow/violet
3A	White
5A	Black/white
7.5A	Orange
10A	Orange/black
12A	Orange/grey
15A	Orange/green
20A	Orange/violet
25A	Orange/white

Satellite Rendezvous



As this is being put together, I'm getting ready for the sixth annual International Conference on Satellite Communication hosted by Amsat-UK, the 5 day event being held as usual at the University of Surrey. It's hoped to have a brief photographic report on the event in the 'Radio Today' section of this month's HRT.

Oscar 13

On August 12, if all goes to plan there will have been a re-orientation to 180°+20° lasting until September 18. During this time, operation on the satellite will be mode-B only, as the pointing (squint) angles are too poor for modes L & S. The new transponder schedule from September 18 is shown here.

A recent SSTV experiment on AO-13 resulted in several check-ins from the US, Canada, and Japan, and pictures were exchanged successfully on both Modes B and J. If you are interested in hearing more about these tests or possibly participating in future sessions, contact WB6LLO via LUSAT, PACSAT, or FO-20.

Oscar 10

Oscar-10 is again available for Mode-B operation; signals are reported to be very good at some stages of the orbit. **Please do not** attempt to use it if you hear signals are FMing. Oscar-10 celebrated its 8th birthday on June 16.

Russian Satellites

Readers from last month may remember the problems on AO-21 transponder #1, where it was suspected that the preamplifier was oscillating and blocking the RX, (this also being used for the command uplink). Using the Main-Satellite command link, the control group managed to turn the transponder off, and during the second week of June the system was recovered and successfully switched back to transponder #1. Remember that Rudak-2 is linked only to transponder #1. There is still hope that the self-oscillating problem in the receiver section may have gone and further experiments are being performed.

As part of their tests, they are running a schedule on AO-21 which gives Monday and Tuesday on transponder #1 with beacon only, Transponder #2 inter-

mittently on/off (mainly on) from Wednesday to Sunday, and a little piece of transponder #1 operation between Saturday 2000/Sunday 0400 and the same mode Sunday night. The tests include sometimes switching the 2m downlink off every 10 minutes for 10 seconds and also sometimes putting a 12dB attenuator in the receiving section.

The *Amsat-U-Orbita* and *Amsat-U-Sputnik* groups have announced they are offering a special prize for receiving and decoding telemetry from AO-21 as an new form of 'technosport', although they haven't yet said what the prize is.

Sergei U5MIR on board the Mir space station asks that amateurs should look for him operating voice on FM simplex on 145.550 MHz, he says he will be there when he has 'free time'. It should be pointed out that this Mir crew has an

The latest Amsat-UK news, collated by Richard Limebear G3RWL as he gets ready for the 'event of the year'

extraordinary work schedule ahead of them, 8 EVAs are planned to accomplish 3 entirely different objectives along with the usual list of experiments and crystal manufacturing. Only time will tell how 'radio active' the crew will become.

MicroSats

The recent UO-14 tests and WOD surveys are related to the full commissioning of the alternative uplink receiver. They're trying to measure the centre frequency of the receiver, check that the AFC and discriminator are OK, and generally prepare for some activity from Africa. This has meant some periods of 'audio loopthrough' testing, in which the uplink audio is used to directly modulate the downlink, creating an analogue FM repeater.

The AO-16 command team has revised the telemetry coefficients for Pacsat, users of TLMDC and TLMDC-II will need to update their PACSAT data files accordingly. The equations which have been updated are for channels

0x1F, 0x20, 0x21, 0x2D, and 0x2E, as shown here.

Wednesday Experimenter's Days on AO-16 have resumed. The Raised Cosine PSK transmitter (on 437.050 MHz, normally straight PSK on 437.025 MHz) has been brought into use and the mode S beacon is activated.

The Straight PSK and Raised Cosine PSK modulation techniques used on the Microsat transmitters exhibit different spectral and PEP characteristics, making subtle differences in user downlink operation and performance. Occasional use of the alternate transmitter allows users to experiment and gain experience with the differences. Note that the Pacsat transmitters are not always operated at the same power levels, so S-meter and signals strength comparisons alone are not necessarily valid.

Also, some users are experimenting with S band converters, and are interested in gaining experience with narrowband demodulation of a weak, quick moving, rapidly doppler shifted source. On most Experimenter's Days, the Pacsat 2401.143 MHz beacon is activated to allow for such experiments. However note that AO-13 Mode S is nearby, with a beacon at 2400.664MHz and transponder output at 2400.715-2400.749MHz and the *Dove S band beacon* is currently active on 2401.2205.

Experimenter's Days allow for various transmitter combinations and power settings to be tried so that the command team can optimise the electrical system (solar cells, batteries, computer, and transmitters) performance in various loading modes.

Since AO-16 has been in stable, routine BBS operation for over six weeks, it was felt that resumption of these test activities was appropriate at this time.

Friday is Experiments Day on LO-19, the CW Beacon is on at 437.125MHz simultaneously with the BBS and the PSK transmitter on 437.150MHz. The performance of the PSK TX-A (437.150MHz) is different from that of the Raised Cosine



PSK transmitter ordinarily used (which is on 437.125MHz), and the circular polarisation is opposite of Pacsat and Webersat.

WO-18 has been doing strange things lately, its rotation about the Z-axis has begun to accelerate. For several months the spin seemed stable at about one revolution per 21 minutes, the latest WOD clearly shows a change to around one revolution per 10 minutes. All passes across the magnetic equator now are yielding earth-pointing attitudes, and perhaps not surprisingly, there is now in memory five separate good pictures.

The good news is that if this rotation keeps up, it gives a much better chance that the passes will be pointing sunward during the upcoming eclipse on July 11th. Fingers crossed.

Short Bursts

The satellite news bulletin service Via UoSat-Oscar-11 has resumed. The task of preparing bulletins etc for it has been picked up by Amsat-UK at the University of Surrey's request and bulletins are currently being updated fortnightly, the editor is yours truly G3RWL.

To enhance the transmission accuracy of Amsat-NA Keplers, a checksum has been added as the last line of each set transmitted in Amsat format. This will allow the user to verify that data has been received properly. Initial tests show that the addition of this line does *not* interfere with current tracking software conversion routines, and it's expected that any later releases of tracking software would incorporate this verification feature. In brief, the checksum is merely the decimal sum of all numerical characters (and +/-) between 'Satellite:' and the beginning of the 'Checksum:' line.

Amsat-UK News

Ron G3AAJ at Amsat-UK now has copies of the ARRL PacSat/MicroSat

telemetry handbook together with PC software on a 5 inch disk, he also has the Amsat-NA book on decoding telemetry and the papers from the ARRL 9th telecomputing conference, so you know where to get them.

For further information about Amsat-UK contact: Amsat-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. A large SAE gets you full membership info, and SWLs as well as licensed amateurs are welcome.

AO-13 Transponder Schedule, 1991 Sep 18 — Dec 12

Mode-B	: MA 000 to MA 095 !	<--- Mode B OFF MA 10 — 40
Mode-JL	: MA 095 to MA 125 !	from Nov 17 — Dec 09
Mode-LS	: MA 125 to MA 130 !	to cover long eclipses
Mode-S	: MA 130 to MA 140 !	(max 60 minutes)
Mode-B	: MA 140 to MA 256 !	
Omnis	: MA 240 to MA 060 !	ALON/ALAT = 180/0

AO-13 Smoothed Keplers; The following data, flying in the satellite, has been smoothed from 90 day's worth of NASA keps:

<i>Epoch Year</i>	1991	<i>Arg perigee</i>	254.9758 deg
<i>Epoch day</i>	142.281842 day	<i>Mean Anomaly</i>	21.7240 deg
<i>Inclination</i>	56.7954 deg	<i>Mean motion</i>	2.097019 rev/d
<i>RAAN</i>	93.3695 deg	<i>Rev</i>	2248 —
<i>Eccentricity</i>	0.717990 —	<i>Semi Major axis</i>	25783.14 km

AO-21 Transponder #1

Uplink: 435.102 — 435.022 MHz (80 kHz bandwidth)
Downlink: 145.852 — 145.932 MHz (inverted)
Beacon: CW Telemetry (8 parameters) @ 145.822 MHz
 digital PSK (30 parameters) @ 145.952 MHz
 (1100 baud scrambled)

AO-21 Transponder #2

Uplink: 435.123 — 435.043 MHz (80 kHz bandwidth)
Downlink: 145.866 — 145.946 MHz (inverted)
Beacon: CW Telemetry (8 parameters) @ 145.948 MHz
 digital PSK (30 parameters) @ 145.938 MHz
 @ 145.800 MHz
 (1100 baud scrambled)

AO-16 Updated Telemetry Equations

1F +5V Bus:	+2.864583	4.090715E-2	-1.930042E-4	Volts << Rev
20 +8.5V Bus:	+7.720951	+8.25979E-3	-1.76254E-5	Volts << Rev
21 +10V Bus:	+8.882535	+1.39771E-2	0.000	Volts << Rev
2D BCR Input Cur:	-2.103334E-2	+3.382738E-3	0.000	Amps << Rev
2E BCR Output Cur:	-7.146611E-3	-5.247935E-5	4.878499E-5	Amps << Rev

Keplers

SAT:	AO-10	UO-11	AO-13	UO-14	FO-20	AO-21	RS-10/11	RS-12/13
EPOC:	91173.06914142	91174.09087683	91173.75313884	91174.7336887	91175.39441778	91175.16264941	91175.05916594	91174.83113993
INCL:	25.7941	97.8972	56.7478	98.6652	99.0290	82.9417	82.9269	82.9234
RAAN:	139.3114	218.7097	87.7149	254.1473	156.1836	228.5594	53.7824	99.1855
ECCN:	0.6032795	0.0013099	0.7196447	0.0011185	0.0540184	0.0033826	0.0011792	0.0027752
ARGP:	262.4433	146.4442	257.5679	144.4280	285.2432	239.4483	160.1059	262.6262
MA:	36.2637	213.7574	20.2672	215.7623	68.9574	120.3325	200.0552	97.1735
MM:	2.05882678	14.67044935	2.09706085	14.29159191	12.83183140	13.74390104	13.72194565	13.73906619
DECY:	-0.0000000	1.883e-05	-1.92e-06	5.57e-06	1.8e-07	1.20e-06	8.0e-07	1.35e-06
REVN:	3234	39031	2314	7392	6448	1998	20053	1905
SAT:	AO-16	DO-17	WO-18	LO-19	MIR			
EPOC:	91174.41836947	91174.53824628	91175.76813716	91172.52230334	91174.59157206			
INCL:	98.6714	98.6721	98.6715	98.6718	51.6036			
RAAN:	254.1774	254.3469	255.6194	252.4514	255.1588			
ECCN:	0.0011992	0.0011938	0.0012598	0.0012822	0.0004049			
ARGP:	142.6516	142.1292	139.7941	149.1026	27.7183			
MA:	217.5467	218.0731	220.4173	211.0911	332.4514			
MM:	14.29243349	14.29330727	14.29373111	14.29447928	15.57846771			
DECY:	5.21e-06	5.78e-06	4.92e-06	5.63e-06	2.3940e-04			
REVN:	7388	7390	7408	7362	30616			

Mode	Bands Worked Matrix	Country: Nepal
CU	▲	Bearing: 75°
SSB	▲ ▲	Range: 7377 Kn, 4585 Miles
RTTY		Sunrise: 23:42Z, Sunset: 13:13Z

Pop-Up sub-windows in ClusTerm are used to good effect

as this, a small on-screen 'matrix' of bands and modes is displayed, you can instantly check the status of this to see whether you need it or not. I found in use that I could also use the cursor keys to scroll up and down the last 15 DX Spots noted, with this information and matrix displayed for each one — very nice indeed!

'Talk', 'WWV' and 'Announce' messages all come up in a sub-window, and you can set the audible warning for these to whatever you like — for example the default for a 'Talk' message coming in is the Morse characters for TALK, with on-screen options given to either reply

Packet Radio Roundup

Many readers use packet radio simply as a means to an end, one example of this is clearly shown by HF DX chasers and VHF/UHF propagation experimenters in their use of the DX PacketCluster system (see Don Field G3XTT's article on this in last month's HRT).

Cluster Usage

As well as being logged into the PacketCluster, many amateurs also use transceivers which may be computer controlled through an RS-232 interface port on the set, but often the shack computer is just used for Cluster access and possibly logkeeping. Now if you could 'selectively filter' the DX spots of interest to you, for example those on 40m SSB, or on 6m in the 'DX Window', you'd probably find it quite useful. If then on receiving a 'DX Spot' from the Cluster you could instantly tell whether you need that country or not, together with details of your required beam heading and other details on the country, it would be even more useful. If you could then just hit a button and your rig would automatically QSY to that frequency, and fill in your log for you, it starts to get incredible! Well that's what John G3WGV has done in his program 'ClusTerm', a sample copy of which recently came into the Editorial post room.

ClusTerm

The first task for which the program is extremely handy for is automatic control of the connection to your local Cluster (or indeed to one of up to four Cluster nodes). You enter the details once, then forever more upon command it will connect into your local, or not-so-local, DX Cluster through however many node and digipeater paths you specify, auto-

Mode	Bands Worked Matrix	Country: Nepal
CU	▲	Bearing: 75°
SSB	▲ ▲	Range: 7377 Kn, 4585 Miles
RTTY		Sunrise: 23:42Z, Sunset: 13:13Z

A typical ClusTerm 'Filtered DX' window

atically waiting for a 'Connected' reply or whatever from each before connecting onto the next 'hop' in the line. Very useful!

In use, the program employs a selection of full-screen 'windows'. The first displays 'raw' packet data, and together with 'one touch' function key commands for 'SH/DX', 'DIR/N' and so on it also has a handy one-line transmit text editor (hands up those who never spell anything wrong!). But the three further windows are where it gets interesting! The first is a 'Filtered' DX alert window, where you can filter the alerts according to the bands and modes you prefer, and whether you need the particular DXCC country or not. Here when a reported DX spot comes up, the program automatically determines the DXCC country name, beam heading from your location, distance, and sunrise/sunset times for the country concerned. As well

Chris Lorek G4HCL looks at 'ClusTerm', a dedicated TNC program to help DX PacketCluster Users

or to resume the normal display.

Another full-screen window shows 'Unfiltered' DX spots, i.e. all reported spots, and another window is used for Cluster mail functions. By suitable pre-configuration, you can even set the program to automatically read and download your mail for you, storing it on disk so it's ready for you to read when you get back into the shack.

As for announcing spots and the like (the Cluster is a two-way affair!), 'pop-up' windows are used for these with prompts for the frequency, callsign and so on, thus making life that bit easier. If you have your computer-interfaced transceiver connected via an additional

COM port on your computer, the frequency even gets entered for you automatically, and on receiving a spot a press of the 'F7' key QSYs your transceiver for you automatically!

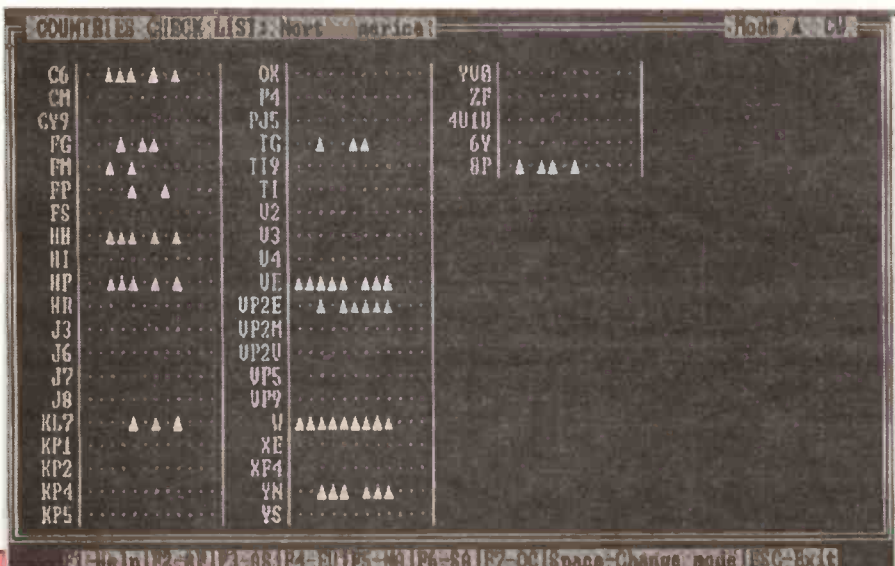
Plenty of other 'niceties' for the DX chaser are detailed, with any twelve selected bands (the default is 160m-2m) covered in the various menus. A shareware text editor is also on the disk so you can modify the various configuration parameters and the like if you don't have a suitable non-document editor for your computer.

The ClusTerm program is designed to run on an IBM PC or clone, and comes supplied as either a single 3.5in or 5.25in disk. Unlike Paket4 as I detailed last month, ClusTerm isn't supplied as 'shareware' and will cost you £35, being supplied with your callsign programmed together with a 42 page manual and a handy 'memory jogger' A4 card. You normally use the program after 'installing' it onto either a hard disk or another floppy disk, and subsequently modifying the separate source-code configuration file to match the parameters of your computer drives and directories, TNC type and baud rate, your location, and connect paths to your nearest DX Packet-Clusters.

I found this editing to be the most awkward part, indeed the user who is unfamiliar with DOS paths and tree structures, or the use of a text editor, could find this an obstacle (although the 'default' DOS paths are given for common hard disk usage on drive C:). A pity, as this could have been made far easier by the program author. Thankfully this only need be done once, and the rest of the program was very easy to use. Yes, there were some things I felt could have been improved on to make it even more versatile, but then where does one stop!

Overall, I'd heartily recommend the

Utility screens such as a countries check list are also provided



program to confirmed Cluster users, and my thanks go to John G3WGV of the UK ClusTerm distributors Canberra Communications, for the supply of the evaluation copy of ClusTerm. If you'd like to see it in action, John tells me there will be an all-day demonstration of ClusTerm running at HF convention in Daventry later this month.

More 2m Packet Frequencies?

On September 28, the RSGB VHF Committee will again be sitting down and considering can be done to reduce packet traffic congestion on 2m. They've asked for feedback from packet users, in particular if you normally suffer delays when;

- 1) *Communicating directly with another user?*
- 2) *Communicating with another user via a digipeater?*
- 3) *Communicating with another user via one or more nodes?*
- 4) *Communicating directly with a BBS?*
- 5) *Communicating with a BBS via one or more nodes?*

and whether the delays are due to;

- 1) *Other user-to-user communication on the same frequency?*
- 2) *Other users on the same frequency trying to access the same BBS?*
- 3) *Two or more BBSs on the same frequency?*
- 4) *Insufficient channels into a node or BBS?*
- 5) *Inter-node linking on the same frequency?*

You can send your replies via packet direct to the Chairman of the VHF Committee who is Peter G3UBX @ GB7MAX.

10th ARRL Packet Conference

If you happen to be in San Jose in the USA on the weekend of the 27-29

September, then at the Radisson Airport Hotel the Northern California Packet Association (NCPA) is hosting this year's ARRL Computer Networking Conference, and they invite all interested packet operators and sysops to attend. Amateurs from around the world will as usual be presenting papers on what they're doing in the packet radio field, if you take a look at any of the recent conference papers (I have a well-thumbed set of them here — they also make very interesting reading for the packet radio developer) you'll see a very diverse range of packet-related subjects are covered.

If you're interested in attending, then you need to call Lori Weinberg at ARRL, 225 Main Street, Newington, CT 06111, USA, Tel. 203-666-1541, Fax 203-665-7531, as soon as possible! Lori is handling the arrangements for the proceedings, and he can also give you information on how to register for the conference, hotel reservations, transport details, and the costs of the conference and the optional special events. Rumour has it that a Hawaiian style 'Luau' as a special group dinner is being organised on the Saturday evening in the hotel, which itself should be a memorable occasion!

CTRL-Z, End of Message

Many thanks to the many amateurs who have contacted me over the packet network, as always I try to ensure a reply gets sent the same day! Following the recent spate of electrical storms in the UK several packet nodes and BBS have been affected, but hopefully by now the system should be getting itself back together. If you've missed your local node, then remember who puts it on air for you, to use free of charge. My 4m/2m/70cm/23cm TheNet node system suffered with the 35A 12V power supply going up to 24V (caused by heat rather than storm damage), taking out five of my interconnected Tiny-2 TNCs and four transceivers. Fortunately the BBS I run was unaffected apart from the rig, but it certainly still came to a big repair bill! I'm sure I'm not the only one affected, so spare a thought for your local sysops. One of the local users of my nodes was most arrogant and voiced his opinion that I should fix the system immediately, he quickly received a very short answer from another amateur!

Next month I'll be detailing the effect of 'battery saver' circuits in hand-portables and their effect on packet use, and I'll be providing circuit details on how to disable the internal 'economisers' on the PF2/PF3 series of Pye Pocketfones to achieve far better packet operation. Until then, 73 de Chris G4HCL @ GB7XJZ.

VHF/UHF Message

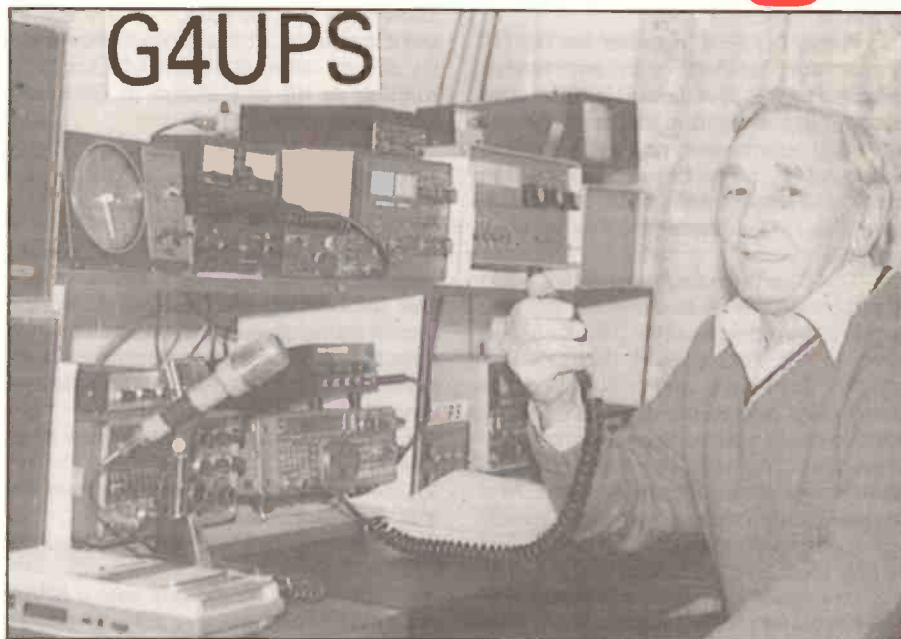
**Ken Ellis G5KW,
introduces the new
VHF/UHF columnist, but
don't worry as he'll soon
be back!**

When the Editors of HRT invited me a year ago to extend the 50MHz column which I had been writing previously, to the present VHF/UHF form I agreed to accept the challenge on a trial basis for a few months. Little did I anticipate the favourable response and support that I would receive from HRT readers, UK and abroad! Whilst in the UK I have been contributing in radio and other magazines for nearly six decades, but I've reluctantly decided the time has come to call a halt and hand over to a younger person with a fresh approach to the subject. The Editors have wisely chosen Geoff Brown GJ4ICD to take over from the next issue. Geoff is of course already well known to HRT readers from his regular reports to the VHF/UHF column, and his keenness as chairman of the UK Six Meter Group this year. Geoff is very much involved with the Editors of the UK Six Metre Group newsletter. In wishing him well I know the VHF/UHF column is in good hands and should I am sure continue to get your support.

As last year, Geoff hopes to be on the HRT stand at the Leicester show on both Saturday and Sunday, to greet his readers and members of the UK Six Meter Group of which he is the 1991 Chairman. *(Ken has kindly agreed to continue writing the occasional feature for us, and I'm sure we echo the sentiments of our readers in congratulating Ken on a 'job well done' in all his pioneering VHF work and in thanking him for sharing his wealth of experience with us through his HRT articles. We already have a very interesting feature from Ken planned for inclusion in a forthcoming issue — Ed).*

From the mailbag

Geoff GJ4ICD's June Report; 1/6/91 widespread Es to I, OE, DL, CT, EA, 9H, 4X, OY, GM, SM, LA, this opening lasting for 12 hours in GJ. 2/6/91 AM worked 4X11F for a new country and square number 459. 4.00PM, 144MHz open to LZ, SP, I for 1 hour. 5/6/91 very large aurora on 50MHz and 144MHz and I even heard a weak station on 432MHz. I switched on at 1700z and 50MHz was packed, signals were S9++, and I worked over 100 stations on the band. PA, ON, EI,



G, GI etc. but no GMs. In fact the aurora was very strange, at 1942z I was working G stations on the south coast and nobody up north, but I did hear GM3WOJ. 6/6/91 1720z worked CU3/K6EDX 59+/59 divide, then D44BC. PY and some LU stations worked but signals were only S3 maximum. 16/6/91 AM GJ first and new square number 460, YU3EU at S9+ followed by YU3AN giving square 461, total countries worked today equalling 40.

Some news on the HV3SJ Expedition; 16/6/91 the operators were I0DUD (OSL manager) and I0CUT, 260 QSOs on 6m, 175 stations from UK, 22/23 countries worked. A special note comes in a letter received from G4OUT, saying the ARRL have now confirmed that 5NO is not valid for ARRL DXCC on 50MHz, and also RSGB. YU is now legal from 14/6/91, confirmation coming from FC1MKY. but no 50MHz operation will be allowed from 3A2.

Steve Damon G8PYP, from Wimborne Dorset writes; During the last month or so, conditions from the south coast on 2m and 6m seem to have picked up with some quite good DX available. Although the MUF has been over 100MHz on several occasions, no 2m sporadic E has been heard or (as far as I am aware) reported. I heard a brief 73s from Italy-17??? on 144.300MHz at 1822z on 22nd June, but this may have been a long meteor burst.

For the last five years I, and several other local 2m DXers, have tried to be in the shack as much as possible during the first full week in June, and up until 1990 this was very productive with at least

one or two openings being caught. However this hasn't been the case over the last two years, when the majority of the openings appear to be in July and early August. Possibly there may be some link between the rough dates of the 2m sporadic E peak and the solar/geomagnetic cycle? The aurora on the 5th June produced some very good 2m DX, this event, at least in the extreme south, comparing very favourably with the large aurora in March 1989.

A 2m SSB meteor scatter 'sked' with HA4XT on the 6th June was completed in about 50 minutes, although another 2m 'sked' with ZB0W on the 28th June produced no reflections. I found later that Paul ZB0W couldn't be in the shack to make the arranged contact, the first sked that Paul has missed.

6m Report from Ted G4UPS

Yugoslavia; At long last I can report that from mid-day on Friday 14th June 1991, all class A amateurs in YU have had access to the 6m band. I received two phone calls on the subject on Saturday 15th June, one from Dave OZ3SDL (G3SDL in Denmark) and another from Yugoslavia, both calls giving identical information. Their power limit is 10dBW ERP in built-up areas, and 20dBW ERP for those living in rural areas, and allowed modes are CW, SSB, RTTY and Packet. The first G/YU contacts are believed to have been made on 16th June 1991, I worked YU3EU, YU3AN and YU3ZM that day, these being the only YU stations I heard.

Gibraltar; Wilfred Guerrero ZB2IB has recently moved from the address shown in callbooks. He's asked for all QSL cards to be sent to P.O. Box 211, Gibraltar.

Italy; Those who were fortunate enough to work the special event station IY4AJ in JN54 on 2nd June 1991, might like to know that the QSL route is via. IK4BWC.

Austria; Peter Wippel, who is well known on the 6m band under his callsign OE6WHG, has moved recently just across the OE4 border line. He's been active from his new QTH as OE4WHG, a new prefix on 6m, although Peter is still in JN87. His old locator was JN87AB, his new one being JN87BB. I worked him on 1st June when he asked me to pass along the explanation for his new callsign.

4J1FS; The QSL route for this expedition which occurred in May is via. OH2BU Jari Jussila, Pilvi Jarvi, SF-02400 Kirkkonummi, Finland.

Vatican; On June 8th, Ugo I0CUT and several others installed a 6m 5 element yagi at the site of HV3SJ, and operated the station for several hours. But as our Italian friends said, "conditions were appalling!" They only managed to work a few stations in the Rome area, but HV3SJ had a major opening on 16th June, working all over Europe on 6m. The first report of HV3SJ activity was from PA3BFM in a rushed telephone call at 0823z, followed in minutes by reports from OZ stations, then 6G stations in the eastern area of the UK when he became audible there about 0918z. I managed a QSO at 0925z for a new country! The operator was Ugo I0CUT, and in a telephone call on 17th June, Ugo informed me that his first QSO was around 1828z and the last one just after 1200z, he added he could have worked many more if it had not been for the pile-ups and the QRM. The QSL route for HV3SJ is via. I0DUD.

Saudi Arabia; HZ1AB, who is the only active HZ station QRV on 6m, has had access to the band denied during the recent historical happenings! (the HZ club station is located at the Dhahran International Airport, and G5KW/HZ1KE operated from there in 1972-75 before moving to Riyadh). Bob Godlewski, now using the callsign W2USA/MM, is active on the bands for the time being from LL57.

Azores; Bob Cooper VP5D and more recently ZL0AAA, stopped off in London on his way from ZL for a month's operating on Terceira, one of the islands in the Azores. His first opening on 6m was on 6th June, first reports being from around 1645z but it was not until 1740z that I managed to work him. Within a few minutes of working Bob, I heard VO1NE calling CQ on top of Bob, who was then

fading badly. QSL via. KA3B.

First 6m Opening Across the Pond this Season; I believe the first signals heard from across the pond this season were in fact from VO1NE, and within a few minutes the VO1ZA beacon was audible and peaked to 579, but faded out at 1810z. At around 2200z the same evening, several VE1/VO stations were worked by northern G stations, with stations reported to date being VE1XDX, VE1MR, VE1ZZ and VO1QF.

Orkney Islands; Clive Penna G3POI, who has been active from the Orkney Islands on a few occasions over the past couple of years, has now taken up residence permanently there, in locator IO88. His new address is Mr. Clive Penna GM3POI, Northwindbreak, Deerness, Orkney Isles KW17 2QL.

Important address changes; Dave Court G3SDL has moved to Denmark to live for a few years with the callsign OZ3SDL, his address is EGE Bakken 18, DK-3520 Farum, Denmark. Bill Stirling GM4DGT, is now at 58 Tippet Knowes Park, Winchburgh, West Lothian EH52 6UP. After having his 6m rig stolen a few months ago, Bill is back on the air for the time being with a borrowed rig.

QRT

Two very active 6m stations have gone QRT recently; Adrian ZC4MK is

already back in the UK working as GOKOM, and 7Q7JA went QRT at the end of June. 7Q7JA has requested QSL cards for recent QSOs to go to JL1IHE.

The Early Days of 5m and 6m

The November issue is planned to contain a feature article on the early history of five-six metres with contributions by some of the pioneers who blazed the trail, both on the ground and in the air. Photographs of field days in the thirties, before the advent of black boxes and multi-element aerial systems, will indicate the changes over the last six decades. When a QSO over a hundred miles was considered DX, who could envisage that we now at least two UK operators who have qualified for DXCC on 6m!

Tie the Ribbons

Before closing, may I thank all those who by sending in reports, have helped me to put this column together. In particular Ted Collins G4UPS (ex ZD8TC).

Don't forget to send your future reports to the new *VHF/UHF Message* columnist, Geoff Brown GJ4ICD, The TV Shop, Belmont Road, St Helier, Jersey, Channel Islands. Telephone/Fax. 0534 77067.

144MHz Aurora report 5/6/10th June 91 from G8PYP

Date	Time	Station	Comments
5/6/91	1508	G6IJM	SSB aurora — IO83 (Lancs)
	1530	DC6DY	SSB aurora — JO31
	1535	DB8WK	SSB aurora — JO33
	1542	PA3CWI	SSB aurora — JO11
	1603	ON1AEN	SSB aurora — JO10
	1627	DB8KJ	SSB aurora — JO30
	1650	FD1JRX	SSB aurora — JN25
	1702	IV3CER	SSB aurora — JN66
	1703	DC4FD	SSB aurora — JO40
	1706	PE1NHZ	SSB aurora — JO20
	1708	DB1VY	SSB aurora — JN39
	1709	DJ3FI	SSB aurora — JO31
	1711	PE1IIV	SSB aurora — JO22
	1714	DD4VK	SSB aurora — JN39
	1717	FC1CNE	SSB aurora — JN28 ??
	1718 — 1739		QRT
	1740	FC1ADT	SSB aurora — IN94
	1745	G1JTG	SSB aurora — JO02
	1747	ON5ID	SSB aurora — JO10
1809	F1CFX	SSB aurora — N/C	
1823	FC1OWT	SSB aurora — JN08	
2250	G8XVJ	SSB aurora — N/C	
6/6/91	1050	HA4XT	SSB MS — JN96 — C
10/6/91	1545	G1GSB	SSB aurora — IO93
	1556	G1SWH	SSB aurora — IO83
	1604	G7FWE	SSB aurora — IO83
	1727	G1VJP	SSB aurora — IO83
	1743	FC1???	SSB aurora — N/C

HF HAPPENINGS



The G3XTT station of 1968, 10W into a Codar AT5 made CW a necessity!

October is the month which brings HF contesters out in their thousands. Firstly, there is the *VK/ZL Phone Contest* on 5/6th, with the CW leg a week later. The 13th also sees the *RSGB 21/28MHz Phone Contest* (1991 will probably be the last year this sunspot cycle when 28MHz figures prominently, and even that can't be relied on). A week later there is the *RSGB 21MHz CW contest*, but the climax comes on 26/27th October with the *CQWW SSB Contest*, the major event in the contesting calendar. This is the one which draws contest DXpeditioners to remote islands (many amateurs schedule their holidays around the CQWW), and it therefore offers DXers as well as contesters an opportunity to work a 'new one'. Many of these contest DXpeditions are active before and after the contest, so keep a close watch on the bands.

If you enjoy contesting but don't own a mega-station, you can enter one of the QRP (5W maximum power) categories, or join forces with one of the multi-operator efforts. There are several increasingly successful multi-operator contest groups in the UK these days, and most of them welcome additional operators. There is currently considerable debate about whether there should be a 100W category in these events, as many operators have no linear amplifier. Next year, maybe.

At the time of writing I have very little information about expeditions planned to coincide with the CQWW contests. Often these are only announced at the last moment to avoid alerting the opposition! However, rest assured that there will inevitably be operations from many of the Caribbean islands, as well as Madeira, the Canaries, and quite a few somewhat rarer spots. I haven't even finalised my own plans yet, though it looks like a choice between a multi-single effort from the Channel

Islands or joining a group in the East of England who plan to set a new UK record in the multi-multi section.

There's lots of advice I could offer regarding the contest, but much of it is common sense. The biggest debate seems to be about when to take your sleep (if you find it difficult to keep going for 48 hours without any!), and how to balance your operating between multiplier chasing and running. If you plan to send in an entry (many UK stations take part and then fail to send in an entry, which is a pity) then make sure you have copies of the rules, log sheets and cover sheet. I can help with any or all of these in return for a large SAE. Better still, if you have an IBM-compatible PC I would recommend buying, and using, the K1EA logging software, see my software articles in HRT earlier this year. This not only makes the contest itself a lot easier, but enables you to generate the necessary paperwork after the event with the least amount of effort, and I'm sure it's the paperwork which puts many people off sending in an official entry.

Don Field G3XTT with a roundup of HF contests, one with a first prize of a free holiday!

By the time this appears the results of the 1990 CQWW Contests, both phone and CW, should have appeared. I plan to compile a complete list of UK scores as well as current UK records in these contests, and I'll be happy to provide this in return for an SAE.

Of course if you really can't stand contests, don't despair. Nowadays there are always the WARC bands to turn to, and 18MHz in particular seems to provide extremely reliable propagation for many hours of the day. None of the contests I mentioned at the beginning are multi-mode, so you can always escape to SSB if your weekend is disturbed by a CW contest, or to CW if the event is on phone (provided you are comfortable with CW — see my remarks later in this column).

Discovery of the New World Contest

Just in are details of the 500th anniversary of the Discovery of the New World contest, sponsored by the national radio club of the Dominican

Republic. This one may well be worth taking part in, as the winner will receive a round trip ticket to Santo Domingo (but from Madrid, unfortunately), and three night's free hotel accommodation. Other participants are eligible for a certificate provided they make at least 200 contacts, 100 of which must be with the Americas and at least one must be with an HI station. Special stations HI1UD to HI9UD, HI3JR, HI3RCD, HI8RCD, and HI500UD will be active in the contest.

The idea is to work all comers, but contacts with your own country score no points, contact between European stations score only one point, and contacts between Europe and the Americas (North and South) score 3 points (6 points on 80m and 40m). The contest is phone only, on 80m through 10m, and the contest exchange is RS plus serial number. The dates are 12th and 13th October, for 48 hours starting at 00.00GMT on the Saturday. Multipliers are DXCC countries in the Americas, HI call areas, and the special HI stations listed above. I can provide a photocopy of the full rules on receipt of an SAE. So start brushing up on your Spanish, and have fun!

Telecom 91

This month, Geneva will once again host the four-yearly *Telecom* exhibition. If you're going to be there, then do look out for fellow hams. The telecommunications industry, not surprisingly, employs many amateurs and at Telecom 87 I met many HF enthusiasts, most of whom signed the visitors book on the IARU stand. The IARU stand was also the venue for the Telecom 87 special event station, HB9/4U1ITU, no doubt there will be a similar special event station this time round.

DX News

Usually, before telling you about forthcoming DXpedition activity, I like to give a brief resume of what has been on the bands. However, looking back at my logbook for July I saw the HF bands were very poor indeed, several auroras kept the VHFers happy but did nothing for HF enthusiasts! There was very little to be worked from the Pacific, so much of the interest focussed on the occasional DX station from nearer to hand, such as XU1NQ from Kampuchea and JA2PDQ/BV4 from Taiwan. Even the path to the US, normally pretty reliable, was almost non-existent for days on end. This did nothing for those participating in the IARU Radiosport Contest in mid-July,

nor for anyone trying to maintain skeds with friends in North America.

The LF bands produced a few rare ones from the south (where it is winter and hence the main DX season) such as **Z21HS** whom I heard on 80m CW one evening plaintively calling CQ with very few takers. As usual there were some unusual prefixes such as **T100SUN** (Costa Rica, for the solar eclipse) and **YL91IFF** (Latvia). There was also a flurry of activity from various European islands which, since the publication of the new IOTA Directory, now count for the Islands on the Air award. Check around 14.260MHz any weekend and you're almost bound to run across several such operations.

Now to the future. The most significant news is that Romeo, 3W3RR, travelled to the US recently and was able to satisfy the ARRL with his Myanmar (formerly Burma) licence. Romeo planned to operate from XZ in late-August or early September, although as I write this he is still in need of substantial funds to enable the DXpedition to take place. However, the omens seem to be good. There has been no legitimate operation from Burma since the 1950s, although every other country has been activated at least once since 1970, so this is a very rare one indeed and should generate massive pile-ups when it appears on the bands. The plan was to take enough operators and equipment to be able to run two stations round the clock for at least two weeks in order to satisfy as much of the demand as possible.

Meanwhile, the latest news on the *South Sandwich Islands* operation

(another rare one) is that it has been delayed until March 1992. Keep your fingers crossed that it doesn't slip any further.

On the DXCC front, not one but two new countries have been added to the list in recent weeks. Firstly, as I mentioned last month, the *Penguin Islands* off Namibia become country number 323. QSLs may be submitted with DXCC applications and updates from 1st September. Since that announcement, and as anticipated, the DX Advisory Committee has unanimously voted to add *North Korea* to the list. This vote has to be ratified by the DX Awards Committee, but this should be a formality. All we need now is a decent operation from there! There have been a few appearances of North Koreans stations with the P5 prefix in the past couple of years, but there is some doubt as to their authenticity.

Meanwhile more UK amateurs are finding their way on to the DXCC Honour Roll including, most recently, **G3COJ**, **G3VOF**, **G4CNY** and **G4IUF**. Many congratulations. Incidentally, the DXCC desk is now almost up to date not only with dealing with new DXCC applications, but also with updates. Now that the computer system is up and running they should be able to keep on top of the backlog, so expect a much faster turnaround in future than has been the case in recent years.

CW Operation

For many years now there has been controversy over whether there should continue to be a mandatory CW test before amateurs are allowed on to the HF bands. For now, at least, the question is academic as ITU regulations still require it. However, the ITU regulations do not

specify the exact nature of the test or the speed requirement, and by now the HF bands should be buzzing to the CW of the new UK novice licensees (identifiable by their unique 2A prefix).

I appreciate that passing the Morse test can often seem a chore, and many new Class A licensees promptly drop their use of CW and stick to SSB operation. For many of us who, like myself, were licensed 20 years or so back this really wasn't an option. There are a number of regular DXpedition operators who work exclusively CW, not only because they find it more satisfying but because they can command a pile-up quite easily with 100W from a small transceiver whereas to achieve the same on SSB would require them to take a linear amplifier along on the trip.

I'm delighted to say, following this year's HF National Field Day, that several Class B members of my local radio club were sufficiently impressed by the high QSO rates G3WGV and I were able to maintain on CW, despite the NFD limitations on antennas and power levels, that they are resolved to stick at it with the code until they too can join in. I hope many more of you will do the same.

With that thought I will leave you for another month. Do feel free, as always, to write with your news and photographs. I would also welcome suggestions for HF-related topics that you would like me to cover. My address is correct in all recent callbooks or you may send information to me via. *P.O. Box 73, Eastleigh, Hants. SO5 5WG.*

HB9/4U1TU, the official IARU station at Telecom 87



The apt QSL of Roger G3KMA, director of the IOTA awards programme

The amateur radio station in the USSR pavilion at Telecom 87



Club News

Acton, Brentford & Chiswick ARC meet at 7.30pm on the 3rd Tuesday of each month at the Chiswick Town Hall, Turnham Green, Chiswick, London W4. A date for your diary;

Sep. 17th 'Wadley Loop System', talk by G0LZB
Further details from Paul Truitt G4WQO, Tel. 071 938 2561

Bedford and District ARC meet every Tuesday at the Allens Club, Hurst Grove, Bedford at 7.30pm for 8.00pm. Most meetings are social evenings, other club events include;

Sep. 10th Committee meeting.
Sep. 17th Talk; Amateur radio, another view.
Oct. 15th AGM.

Further details from their secretary Glenn G0GBI, 81 Duchess Rd, Bedford. Tel. 0234 266443

Braintree and District ARC meet at the Community Centre, Victoria Street, Braintree at 8pm on the 1st and 3rd Mondays of each month (except bank holidays). Club events;

Sep. 16th QTH reports and social evening.
Oct. 7th Junk sale with 'bring and buy'.
Oct. 21st Computers in amateur radio — Dave G0DEC.
Nov. 4th QTH reports and social evening.

Details from M. J. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ. Tel. 0376 27431

Bromley and District ARC meet on the 3rd Tuesday of each month, 7.30 for 8.00pm at the Victory Social Club, Kechill Gardens, Hayes, Kent. Club events include;

Sep. 17th Valves, G6ODE.
Oct. 15th Junk sale.

Further details from Mr. Geoffrey Milne G3UMI, 142 Hayes Lane, Hayes, Kent BR2 9EL Tel. 081 462 2689.

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

Sep. 11th Bristol rally planning evening.
Sep. 15th Bristol rally.
Sep. 18th Rally review.
Sep. 25th Exhibition of calligraphy.

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

Coulsdon ATS meet on the second Monday in each month, 7.45 for 8.00pm at St Swithun's Church Hall, Grovelands Road, Purley, Surrey. Programme of events;

Sep. 9th Linear amplifiers, by John G8MNY.
Further details can be obtained from Andy Briers G0KZT, Tel. 081 668 7004 or Alan Bartle, Tel. 081 684 0610

Dorking and District RS meet on the 2nd and 4th Tuesdays at 7.45pm at various venues, details from John Greenwell G3AEZ, Tel. 0306 77236. Dates, other than the informal gatherings, are;

Sep. 7/8th IARU region 1 HF FD SSB.
Sep. 24th Digital communication part 2.
Oct. 22nd Satellites.

Echelford ARS meet in the Community Hall, St Martin's Court, Kingston Crescent, Ashford, Middlesex at 7.30 for 8pm. Dates for your diary;

Sep. 9th Keys and keyers, G3ESH.
Oct. 14th Basic test equipment for construction.
Further details from P. Townshend G6PMT, Tel. 0344 843472

Edgware & District RS meet at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak. Events include;

Sep. 12th GX3ASR on the air.
Oct. 10th His Master's Voice sound recording.
Oct. 24th Simply simple aerials, discussion led by G3SJE.
Further details from Hank Kay G0FAB Tel. 081 205 1023 or Howard Drury G4HMD Tel. 09274 22776

Exeter Amateur Radio Society meet on the 2nd and 3rd Monday of each month at the Community Centre, St David's Hill, Exeter at 7.30pm. Every third Monday is a social gathering in the bar, other club events include;

Sep. 9th Frequency measurements.
Oct. 14th AGM.

Further details can be obtained from Ray Donno G3YBK Tel. 0392 78710

Fareham and District ARC meet on Wednesdays at 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. Club events include;

Sep. 11th /P up mountains, by Peter G0FIM.
Sep. 25th Junk sale.
Oct. 9th The GDO, by Ron G3XPH.
Oct. 23rd The world above 1GHz, by Bob G8VOI.

Further details from club chairman Ron Smith G0ERS, Tel. 0705 373572

North Ferriby United ARS meet at North Ferriby Football Club Social room, Church Road, North Ferriby at 8pm. Meeting details as follows;

Sep. 6th Night on the air.
Sep. 13th Construction competition.
Sep. 20th The way ahead meeting — Ken G4VKK.
Sep. 27th 'Characteristics' — Norman G3NJP.
Oct. 4th Topic of the day — Tony G4KHT.

Oct. 11th RSGB video.
Oct. 18th Night on the air.
Oct. 25th Basic test gear — Tony G3TEU.

Further details from F. W. Lee G3YCC, Tel. 0482 650410

Hambleton ARS meet in room A5, Northallerton Grammar School at 7.30pm. Club events;

Sep. 16th RAE.
Sep. 23rd Electronic countermeasures — Frank G3HSG
Sep. 30th RAE.
Oct. 7th Raynet — Nick G7COC

Oct. 28th Electronics production — Pieter G0LIY
Further details from Nigel Robertshaw G0NHM, Tel. 0609 776608

Hastings ERC meet on the third Wednesday of each month for their main meetings, at the West Hill Community Centre, Croft Rd, Hastings, at 7.45pm. They also meet every Friday at Ashdown Farm Clubroom, Downey Close, Hastings at 8.30pm, for a social evening. Dates for your diary;

Sep. 18th Intricacies of Cellnet — talk.
Sep. 24th Practical evening.
Oct. 16th Junk sale.
Oct. 29th Practical evening.

Further details from Ken Homewood G4UBP, Tel. Hastings 444952 or Secretary Reg Kemp G3YFF.

Keighley ARS meet at the Cricket Club, Ingrow, near Keighley every Thursday at 8.00pm. Most club meetings are 'Natter nights' other events include;

Sep. 12th Ideas for club events 1992.
Sep. 26th Quiz, guests Northern Heights, Pie and peas.
Oct. 31st Junk sale.
Nov. 14th Films

Further details from Kathy Conlon G1IGH on 0274 496222

Kettering ARS meet every Thursday at 7.30pm at The Electricity Sports and Social Club, Eksdale St, Kettering. Dates for your diary;

Sep. 24th Satellites, by Derek G3FOZ.
Oct. 22nd 1990 expedition to Ben Nevis, by John G3WGV.
Further details from Len G7EMM, Tel. 0536 514544

Lothians RS meet in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh at 7.30pm on the second and fourth Wednesdays of each month. Dates for your diary;

Sep. 11th The President's Address.
Sep. 25th 'Open Night', including flea market and bring & buy. Novice instructor present with details of Novice licence and CW classes.

Oct. 9th Radio from the Munros, by David Gentles.
Oct. 23rd Practicalities, by Mel GM6JAG.

Further details about the club and also details on table space for flea market, can be obtained from Mel Evans, 56 Southhouse Road, Edinburgh EH17 8EU, Tel. 031 664 5403

Maidenhead and District ARC meet at the Red Cross Hall, The Crescent, Maidenhead. Meetings start at 7.30pm.
Sep. 17th SSB Exciters, by Dave G3SET.
Oct. 3rd Junk sale.
For more information contact Neil G8XYN, Tel. Maidenhead (0628) 25952

Norfolk ARS meet at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich every Wednesday at 7.30pm for 8pm start. Dates to remember;
Sep. 11th Flying kites.
Sep. 18th Practical trouble shooting.
Sep. 25th Informal and committee meeting.
Oct. 2nd Oscillators.
Oct. 9th Castle Mall archeological excavation.
Oct. 16th Vintage radio, hear it like it was.
Oct. 23rd Informal.
Oct. 26th Club outing to Leicester show.
Oct. 30th Introduction to microwaves.
For further details contact Jack Simpson G3NJQ Tel. 0603 747992

Northern Heights ARES meet on the first and third Wednesdays each month at the Bradshaw Tavern, Nr. Queensbury, Bradford, W. Yorkshire at 8.15pm. Events include;
Sep. 4th Computer controlled Jacquards.
Sep. 18th Repeater update.
Sep. 26th Visit to Keighley ARS, quiz night.
Oct. 2nd Radio and electronics in the fire service.
Oct. 16th Visit to fire service.
For details contact Stan Catton G0IYR on 0274 673116



Nottingham ARC meet every Thursday at 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. Forthcoming events include;
Sep. 12th Le Mans start fox hunt.
Sep. 19th 2m foxhunt and activity on the air.
For further details contact Rex G1LRI Tel. 0602 733740

Porthmadoc and District ARS meet at the Harbour Cafe, The Ffestiniog Railway, Porthmadoc. Meeting details as follows;
Sep. 19th Talk and demo on Amateur TV, by GW8WNB.
Oct. 17th Talk on gold mining by Mr. J. Collins.
Further details from Ralph Taylor GW2HCJ, Tel. 0766 770637

Reading and District ARC meet at the Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading on 2nd and 4th Thursdays at 8pm. Forthcoming events include;
Sep. 12th Autumn 'Junk Sale'.
Sep. 26th Packet radio explained, by Paul G1PLT.
Oct. 10th RSGB evening, David Evans G3OUF.
Oct. 24th Satellite Communications, Brian G3AKF.
Further details from Vin Robinson G4JTR, Tel. 0734 476873

Rhyl and District ARC meets on the first and third Tuesdays each month at the Scout Hut, Vale Road, Rhyl. A date for this month;
Sep. 16th AGM.
For further details on the club contact Mr. David Bevan GW4DMR (Chairman) Tel. 0745 345078, or Mr. Edward Shipton GW0DSJ (Secretary), Tel. 0745 336939, or Mr. George Greenhalgh GW0MOH (Treasurer), Tel. 0745 350896.

Salisbury RES meet at 7.30pm in Grosvenor House, Churchfields Road, Salisbury. They have Morse classes every Tuesday starting at 7.30pm with Evan G5YN, and RAE classes every Tuesday at 8pm with Frank Mitchell G8PCB, who has also recently been accepted as a Novice instructor. Club events include;
Sep. 24th CW operating procedures, with John G4POF.
Oct. 1st Ray G3WZ talks about his world travels.
Oct. 15th Committee meeting.
Oct. 22nd How to use simple test equipment.
Further details from A. Newman G2FIX, Tel. 0722 743837 or David Kennedy G7GWF, Tel. 0722 330971



Stratford upon Avon & District RS meet at the Baptist Church, Payton Street, Stratford upon Avon, at 7.30pm. Club dates include;
Sep. 9th Open evening, 10 minute stories by members.
Sep. 23rd Converting PMR equipment, Bill G3TQM.
Oct. 14th Jandek Kits, Derek G3ZOM.
Oct. 28th Oscilloscopes for the beginner, Terry G3MXH
Details from A. Beasley G0CXJ, Tel. 060 882 495.



Sutton and Cheam RS meet on the 3rd Thursdays each month, 7.30 for 8pm at Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Natter nights are on the first Monday of each month in the Downs Bar. Dates for your diary;
Sep. 19th The RIS, by Chris Winton, RIS District Manager.
Oct. 17th Junk sale.
For further details, Tel. 081 644 9945

Three Counties RC meets every other Wednesday at the Railway Hotel, Liphook, Hampshire at 7.30 for 8.00pm. Club events include;
Sep. 11th Wines of the World.
Sep. 25th Royal Corps of Signals TA.
Oct. 9th Communications on the battlefield, with Ptarmigan.
Oct. 23rd Development of British windmills.
For further details contact Dave G4VKC.

Todmorden and District ARS will meet at the Queen Hotel, Todmorden at 8pm on the following dates, all are welcome.
Oct. 7th Surplus equipment/Junk sale.
Oct. 21st International evening.
Nov. 4th Drink driving, talk by G1DWA.
Further details from Esde G0AEC, Tel. Halifax 882038

Wakefield and District RS meet every Tuesday at 8pm on the first floor rooms, Ossett Community Centre, Prospect Road, Ossett. Club events include;
Oct. 1st Debate, 'The Future for Construction'.
Oct. 22nd Construction project.
Further details about the club from John G0MVA, Tel. 0924 220048

Wimbledon and District ARS meet on the second and last Fridays of each month in St. Andrews Church Hall, Herbert Road, Wimbledon, London SW19. Dates for your diary;
Sep. 13th 'Radio with computers' by G3XTC and G4XLM.
Sep. 27th Surplus equipment sale.
Oct. 11th Radio in modern aircraft, by Chris G0IPD.
Oct. 25th AGM.
Further details from Chris Frost G0KEB, Tel. 081 397 0427

Wrexham ARS meet at Maesgwyn Rd Community Centre, Wrexham. This month's club event;
Sep. 17th Junk sale.
Details from Martin GW0KYT or Ruth GW7FNR Tel. 0978 266887

National and International

G-QRP Club publish a quarterly magazine devoted to low power communication, and hold regular get-togethers. Their secretary is Rev. G. Dobbs, St. Aiden's Vicarage, 498 Manchester Road, Rochdale. Lancs. OL11 3HE. Tel. 0706 31812.



International Short Wave League who as well as running an International QSL bureau for amateurs and SWLs, have a monthly newsletter and regular get-togethers at their rally stands. Details from ISWL HQ, 10 Clyde Crescent, Wharton, Winaford, Cheshire. CW7 3LA

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



Radio Society of Great Britain are based at Lambda House, Cranbourne Road, Potters Bar, Herts. Tel. 0707 59015. Potential Novices — contact them for details of your local Novice course. They also publish books, maps, and look after special event call signs.

British Amateur Radio Teledata Group (BARTG) have a quarterly magazine, hold two contests and one rally each year. For informa-

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tion on the group contact their secretary and publicity officer Ian Brothwell G4EAN, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ or via packet, G4ATG @ GB7BAD

To include your club, and rally, in this feature, make sure you send us your events details early. We'll then make sure our readers know exactly what you're up to each month. Note we only list active clubs, i.e. those who send us details of their planned talks/events! Dates to be included in the issue published on the first Friday in November must reach us by the 13th September, addressed to 'Club News' at the HRT Editorial address.

Rallies

September 14th

Isle of Wight Rally is at the Wireless Museum, Arreton Manor, Near Newport, starting 11.00am and finishing 5.00pm. There will be various stalls, a bring and buy, refreshments, free entry and free parking. There are some disabled facilities and indoor accommodation available if wet. Talk-in will be on 2m FM by G3IOW. Further details from Douglas Byrne G3KPO, Tel. 0983 67665

September 15th

The East of England Radio Rally, organised by the Peterborough Radio and Electronics Society, is in the ICI Building, The East of England Showground, Oundle Road, Peterborough. There is a traders main hall with bar and catering, traders marquee with bring and buy, separate outside area with flea market, plus a car boot sale. Admission is £1 and the doors open at 10.30am (10.00am for the disabled, toilet facilities available). For further details contact Nigel G1ARV on 0733 78685 or Mike G0CVZ on 0733 222588, 2 Chancery Lane, Eye, Peterborough PE6 7YF

The British Amateur Radio Teledata Group (BARTG) Rally will be

held at the Sandown Exhibition Centre, Esher, Surrey. Located close to London, 10 minutes from the M25 (junction 10) with free parking for over 5000 cars. Many exhibitor and special interest groups will be attending with the latest radios, computers, software, books, aerials, kits, components, test equipment and much more. Admission is £1, under 14s free if accompanied by an adult. Doors open at 10.30am and talk-in is on S22 and SU22. Further details from Peter Nicol, 38 Mitten Ave, Rubery, Birmingham B45 0JB Tel. 021 453 2676

September 29th

Harlow and District ARS Rally is to be held at the Harlow Sports Centre. The main hall will have a large selection of traders, the upstairs studio also housing trade stands along with a bring and buy and special interest groups. The event is within easy access of the M11 (Junction 7), and talk-in will be on S22 and SU22. Ample car parking next to the centre for 1000 cars, and full facilities for the disabled. Catering and licensed bar provided. Entry is £1, children under 14 and OAPs 50p. Further details from Liz G0MDL, Tel. 0277 364742 evenings and weekends only.

October 6th

Horncastle Amateur Radio, Electronics and Computer Fair will take place at the Horncastle Youth Centre, adjacent to the A128 Lincoln to Skegness trunk road. There will be a whole range of computer, radio and electronic components as well as second hand and surplus equipment on sale. It is hoped to hold a large flea market/car boot sale in the outside sports area. Admission is £1 per person with negotiated discounts for organised groups. Refreshments will be available. Further details from Tony Nightingale G6CZV, Tel. 0507 522482 (24 hours)

November 10th

Barnsley Amateur Radio Rally, will be held at Willowgarth Senior High School, Brierley Road, Grimethorpe, Barnsley, South Yorkshire, just off the A628 midway between Barnsley and Pontefract. Large halls with lots of traders, refreshments and ample parking. Further details from Ernie Bailey G4LUE, Tel. 0226 716339 between 6.00pm and 8.00pm only.

Free Readers Ads

FOR SALE

Kantronics KPC-4 dual port TNC, latest firmware, £195. **Andrews Heliac LD4-50**, 30 metres (new), £90. New connectors (M/F), £16. **Jaybeam 137MHz** cross dipole for weather sat (new), £29. Back numbers of **Ham Radio Today**, please enquire. Contact P. Chamberlain (Crawley) Tel. 0293 515201

KW2000B plus power supply/speaker, VFO 4B, Shure mic, valves and manual, good working order, £175 ono. Buyer collects or pays postage. Contact Mr. A. Humphreys GW6WFW, 45 Cwm Place, Llandudno, Gwynedd LL30 1LP.

Regency Digital Flight Scan desk top airband scanner, 16 channel (108-136MHz), fitted with 16 LEDs, smart wooden case, 2W audio output, incorporates search facility, 240V AC or 12V DC, mint condition, original cost £264, bargain at £75. Contact Mr. Hemingway (Cranleigh), Tel. 0483 272331 evenings.

Surplus ex-TV and radio valves from 10p each, take your pick. Contact Mr. P. Slark (Bolton, Lancs), Tel. 0204 26684

IC-R100 with SSB, 500kHz to 1800MHz no gaps, unmarked, non smoker, £375 ono, will haggle. **FT-747GX**, due to time waster, FM board, £450 ono. **ZX Spectrum** plus interface for TNC and software, £85 ono. **Howes DCRX**, 20 and 40m receiver, plus **CSL4** filter, £40 ono. Wanted, **FT-767GX**. Contact Mr. J. Bobbett (Glastonbury, Somerset), Tel. 0458 34917 evenings and weekends.

Atari 520STE C/W Atari B/W high res monitor, various amateur radio software programs plus games, less than 6 months old. Contact Steve G6URJ on 0634 666015 or 0831 163791

Yaesu FT-980 computer aided transceiver, 160-10m frequency range, good condition, £750 or part exchange for Yaesu FT-102 with cash adjustment. Contact Mr. G. Thomas (Chesterfield), Tel. 0246 825154

Small AVO digital multimeter, £25. **Fuke** digital multimeter, £40. **Current clamp meter**, £20. **Veger** optical tacho, £25. **HV probe**, £16. Contact S. Petelle, Tel. 081 554 2913 evenings 6-9pm.

AR1000 MkII scanner, one month old with receipt, 500kHz-600MHz, 805MHz-1300MHz, with charger, excellent condition. I

need money for Novice packet node, £200 offers considered. Please write to Martin Saunders, 182 Clarendon Rd, Broadstone, Dorset BH18 9JA

Apple IIe, 3 disc drives, 128k grapper parallel, green monitor, dot matrix printer 132C, fan-fold paper, software, manuals, £500 ono. Contact Mark (Whitehaven, Cumbria), Tel. 0946 693959

Yaesu FT-747GX in box and excellent condition, tuner ET-1, £450. Contact Mr. W. Cross (Grays, Essex), Tel. 0375 381362

Yaesu FT-901DM HF transceiver, VGC, mic, manual and original box, £520 including postage. Will swop for Icom IC-551 or WHY for 6m. Contact Andy GD7JQI (Isle of Man), Tel. 0624 626080

Yaesu FRG-7700 receiver and **FRT-7700** aerial tuner, both in excellent condition, £200. Contact Mr. V. Coleman (Ashford, Middx) Tel. 081 666 2846 daytime or 0784 241350 evenings.

Famous British rig; KW2000A HF transceiver, covering nine bands 1.8-29MHz without gaps (HRT modifications). Stabilised VFO, attenuator, RF pre-amplifier, Q-multiplier, spare valves, documentation, power control (i.e. suitable for Novice/A licensee). Worked W/VE all nine bands, £240 ono. Contact Ed Taylor (Dorset), Tel. 0202 891656

Grundig satellite 600 professional shortwave radio receiver, 1.8-30MHz, programmable computer control tuning, SSB, LSB, BFO clarifier, as new, £220 ovno, will post. Contact Timothy Colingwood, Tel. Fareham (Hants) 235969

Ham Radio Mags for sale or possible swop, CQ, 73. Also some US SWL mags, **Monitoring Times**, **Popular Communications**, **Ham Radio mags**, **Equipment Buyer Guide**, plus **Antenna Buyer Guide**. Wanted, **Practical Wireless mags**, send SAE for list. Contact Mike Evans, 120 Loughton Way, Buckhurst Hill, Essex IG9 6AR

Yaesu FRT-7700 ATU, £40. Icom IC-R1 hand held receiver, complete with carrying case and spare battery pack and charger, £400. Contact T. Powell (Salop), Tel. 0691 622368

Ten-Tec Corsair II, with remote VFO, PSU, extra filters, good condition, contest winner, £820. HF linear, homebrew prof design **4CX1000A**, 2kW output 80-10m, £400. Contact Dave Gascoigne G4OSY (Pontefract), Tel. 0977 641189/640609

CBM64C, many extras includes

full size music keyboard, £250. **ERA Microreader MkII**, £100. **Tornado 1000 10m** linear, 240V, £200 ono. **TAU SPC3000** ATU, £150 or swap. Contact Ian Duffin (Eccleson-Sea, Norfolk), Tel. 0692 580201

Uniden 760 XJL scanner, boxed with manual, pristine condition 3 months old, used approx 10 times, genuine reason for sale, £150. **Yaesu FT-290**, muTek board, nicads, charger and case, very good condition, boxed with manual, £250. **Standard C7800** UHF FM, very good condition, boxed with manual, £160. **UHF Westminster**, repeater, simplex, packet frequencies and toneburst fitted, £40. **Digital frequency counter** to match FT-101, £50. Contact P. Chapman (Dereham, Norfolk) Tel. 0362 691099

KW2000E transceiver, 1.8-29.5MHz, in perfect order. Also **Trio JR-310** receiver, £275. Contact P. Manetta (Eltham, London), Tel. 081 850 5387 after 6pm.

Bearcat 220FB scanner, with instruction book and service manual, £99. Contact John Hanrahan (Walton, Somerset), Tel. 0458 45909

Kenwood TS-670, QRP (10W) HF general coverage transceiver, with 6m (50-54MHz), £625. May consider exchange for 10m multi-mode or similar with cash adjustment. Please contact Mr. Barry Williams (Bradford, Yorkshire), Tel. 0274 880895

FT-790R MkI, nicads, MML 432/30 linear, £285. **Amstrad FD1** disc drive, £50. **RS232C** serial interface, £40. **RS232 Commstar** interface, £45. All suitable for **Amstrad CPC 464/664/6128**. Contact W. Benton (Seaford, E.Sussex), Tel. 0323 893278

Bearcat 950/760 XLT, mobile/desk, freq coverage 29-952MHz in 5 banks, 100 memory channels, only 3 months old, boxed with manual, cost £259 accept £100. Contact Arne Lovseth (Brighton), Tel. 0273 301508

FTDX-400 transceiver with handbook, VGC, £150. Will swop for good receiver or 6m rig. Contact Mr. P. Furringer (Pontifract), Tel. 0977 620973 evenings.

Philips PM3215 50MHz dual beam CRO, £185. **Crotech 20MHz** dual beam CRO and component tester, £125. Contact John Turner (Cannock, Staffs), Tel. 0543 579818

FT-501 200W output, SSB/CW, spare valves, S-meter fault hence £180. **48k Spectrum**, **Spectrum** plus, 3 microdrives, IF1, 60 carts, **Kempston 'E'** printer IF, software,

RTTY, FAX, WAB, slow scan, CW etc. £190 ono. **Minimitter ATU**, £25. **Hameg scope**, £50. Exchange for PC computer **WHY**. Contact Patrick GW1SXN (Caernarfon, Gwynedd), Tel. 0286 5468

Yaesu FRG-7 and **Sony AN1** active aerial, both in good condition, £170 ono, buyer to collect. Contact C. Anderson (London W8), Tel. 071 937 7620 evenings.

FT-980 HF transceiver, 160-10m and general coverage receiver, very good condition and boxed, £750. Contact T. Hartshorn (Chesterfield), Tel. 0246 236496

Free to good home, **Cossor** double beam oscilloscope model 3100, including service manual, dead, for spares or repair, good tube, very heavy to collect. Contact Mr. C. Taylor (Kendal), Tel. 0539 727659 answerphone if out.

Racal 9901 universal frequency counter timer (0-30MHz), £50 ono. **AVO 8**, excellent condition, £70 ono. **1707B** Hewlett Packard oscilloscope, excellent condition, £200 ono. **Anders** digital auto-ranging multimeter, £60. Contact K. Baum (Redhill, Surrey), Tel. 0737 769251 evenings

Yaesu FC-757 automatic ATU, as new condition and boxed, £200 ovno, buyer collects or pays Securicor costs. Please contact W. Barnett (Liverpool) Tel. 051 931 1942 evenings.

Dymar Lynx 4m FM 25W, with both calling channels, £25 or uncrystalled £20. **Dee Com 4m** vertical, £7. **Motorola HT220** handheld with speaker/mic, crystallised RB0, 1W output. Contact David Cooper (Cramlington, Northumberland), Tel. 0670 712514

KW2000B HF transceiver, PSU/LS, second VFO, manuals, 160-10m, recently serviced by KW, £200 ono. Contact Mr. R. Dexter (Manchester), Tel. 061 431 0184

SX-200 scanning monitor receiver with FM, AM, and scan 'A' scan 'B' scan control, ex-ant, dimmer, clock, £175 ono. Contact Peter Austen (Newbury), Tel. 0635 32828

Yaesu FRG-7, digital readout, SSB filter, FM demodulator, in good condition, £130. Contact Mr. A. Jaques G3PTD, 88 Sandy Lane, Stretford, Manchester, M32 9BX Tel. 061 865 9398

AOR 2002 scanner 25-550, 800-1300MHz, excellent condition, £330. Contact Mr. T. Raybould, Tel. Sheffield 582137

Transverters, R plus N, 6m, 2m, £120. 70MHz, £65 both meon. All 28MHz IF and hardly used, 2m T/V has 600kHz repeater switch. **Barograph** £120. Contact Michael Williams (London SW18), Tel. 081 874 5784

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Ten-Tec Corsair-2, £895 ono. AEA MM-3 Morse machine, £135. ETM-SQ dual paddle, £25. Revex W520 SWR/PWR, £55. Revex W540 SWR/PWR, £50. TF-600 pre-scaler, £30. Ten-Tec 705 mic, £20. Ten-Tec 288 SSB filter, £30. IC-R100 receiver, 500kHz-1800MHz no gaps, AM/FM/SSB, boxed and immaculate, £375 ono. Contact Mr. A. Guest G0MSP (Bridgwater), Tel. 0278 456292

IC-735, mint condition and hardly used, £675. Reason for sale going QRT on HF. Contact Dennis Downes (Fakenham, Norfolk), Tel. 0328 863005 evenings please.

Yaesu FT-101ZD Mk3, 9 bands, full manual, excellent condition with original packing, includes Johnson Viking matchbox ATU, £480. Rig only £430. Contact Nigel G4UXO (Northampton), Tel. 0604 862761

Sony PRO 80 receiver, all mode 150kHz - 223 MHz, with Sony mains adaptor, £175. Also Realistic 2005, 400 channel, 25MHz - 1300MHz, boxed as new, £175, may deliver. Contact Mr. A. Pawley (Winsford, Cheshire), Tel. 0606 593459

Yaesu FRG7 receiver with SSB filter fitted, manual, VGC, £100. Also Yaesu FT-101 transceiver, manual, spare valves, SEM tranzmatch SWR bridge, good condition, £225 ono. Contact David Rogers (Bolton, Lancs), Tel. 0204 43589

National Panasonic RF8000, first class world band receiver sensitive up to 2m, cost £2000, bargain at £450. Exchange Yaesu FRG-7700 receiver with memories matching FRT-7700 tuner. Also matching FRV-7700 VHF convertor, mint condition,

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Realistic PRO-2006 scanner, 400 memories, 25 - 570MHz, 720 - 1300MHz, AM/FMW/FMN, 2 months old, mint condition, genuine reason for sale, £250. Contact Brian Forster (Sheffield), Tel. 0742 887052 anytime

EXCHANGE

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Tornado 10m 1000W linear, 240V, VGC, 5XEL519, Exchange for PRO2004 scanner. Contact Ian Duffin (Eccles-on-Sea), Tel. 0692 580201

Any combination of the following; Spectrum 128k, interface 1, microwave, cartridges, joystick, interface, Seikosha SP180A printer, music machine midi interface. Swap for PRO-34 scanner or similar specification scanner. Also available for swop C64 modem, 8 octave keyboard, and software. Contact Stephen Brown (Kilmarnock, Scotland), Tel. 0563 32971

AOR2002 base scanner, 25-1300MHz, for Icom IC-R1, or Fairmate HP200, or AOR1000 handheld, or sell for £300. Exchange AOR2002 and Uniden 2830 for Yaesu base or mobile transceiver, must have 10m fitted

and power output. Contact Mr. A. Lane (Lincoln), Tel. 0522 690732

Roberts R808 receiver, 150-29.999MHz, £129.99, plus 10m multimode. Exchange for either an R101 or a Sony World Zone CRF230. Contact Robert Earle (London SE4), Tel. 081 469 0397

Amstrad 16400 mono PB, plus 3.5 in ext drive, plus approx £300 worth of software, for AR2002, WHY. Contact Mr. Howard Cowan (Enfield), Tel. 081 363 3093

AOR2002 UHF/VHF scanner in mint condition for 2m multimode transceiver, must be in mint condition, not FT-290R, or WHY. Also wanted Ten-Tec 515 Argonaut. Also BNOS 144-3-100W linear AMP, mint, £120 ono. Contact Mr. B. West GW00SQ (Pontypool), Tel. 0495 757221

WANTED

2m 50W linear for portable use, must be VGC and sensible price. Contact Martin Cooper G1VUG (Fulstow, Lincs), Tel. 0507 363244

For HR0MX, valve base, VX6 valve skirt screening can, top cover grid clip, one 6D6 valve. Contact Roy Draper (Birmingham), Tel. 021 350 0824

Belcom LS102 10m multimode, 15W dig. Contact Stuart Stevens (Shoreham-by-Sea), Tel. 0273 455659

Manual/circuit for Pye Solent MkII marine D/F receiver. Contact Roger Johnson GW4UJT (Trawsfynydd), Tel. 0766 87421

Realistic PRO-34 and discone aerial, or aerial for Fairmate, outdoor aerial please. Contact Mr. Tallentire, Tel. Bishop Auckland 710341

Trio 1000 receiver manual or circuit wanted. Contact J. Cooper on Faversham 538196.

Heath HW16, working or non working. Have large percentage of spares. Please write giving specific details plus realistic price required to Mr. R. Q. Marris, 35 Kingswood House, Farnham Road, Slough, Berks SL2 1DA

Cabinet for AR88D, also the large cover on top of chassis. Can collect. Contact Roger Smith (Northampton), Tel. 0604 767533 after 7pm.

Old valve data books, Mullard etc. Service manuals for Pye UHF base stations ref. T414 TX and R414 RX. Contact John (Cannock, Staffs), Tel. 0543 579818

FT47GX or IC-725 or similar budget HF rig. Also decent ATU and Capco loop aerial. Contact Jim Simpson (Newcastle-on-Tyne) Tel. 091 488 2995

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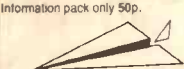
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