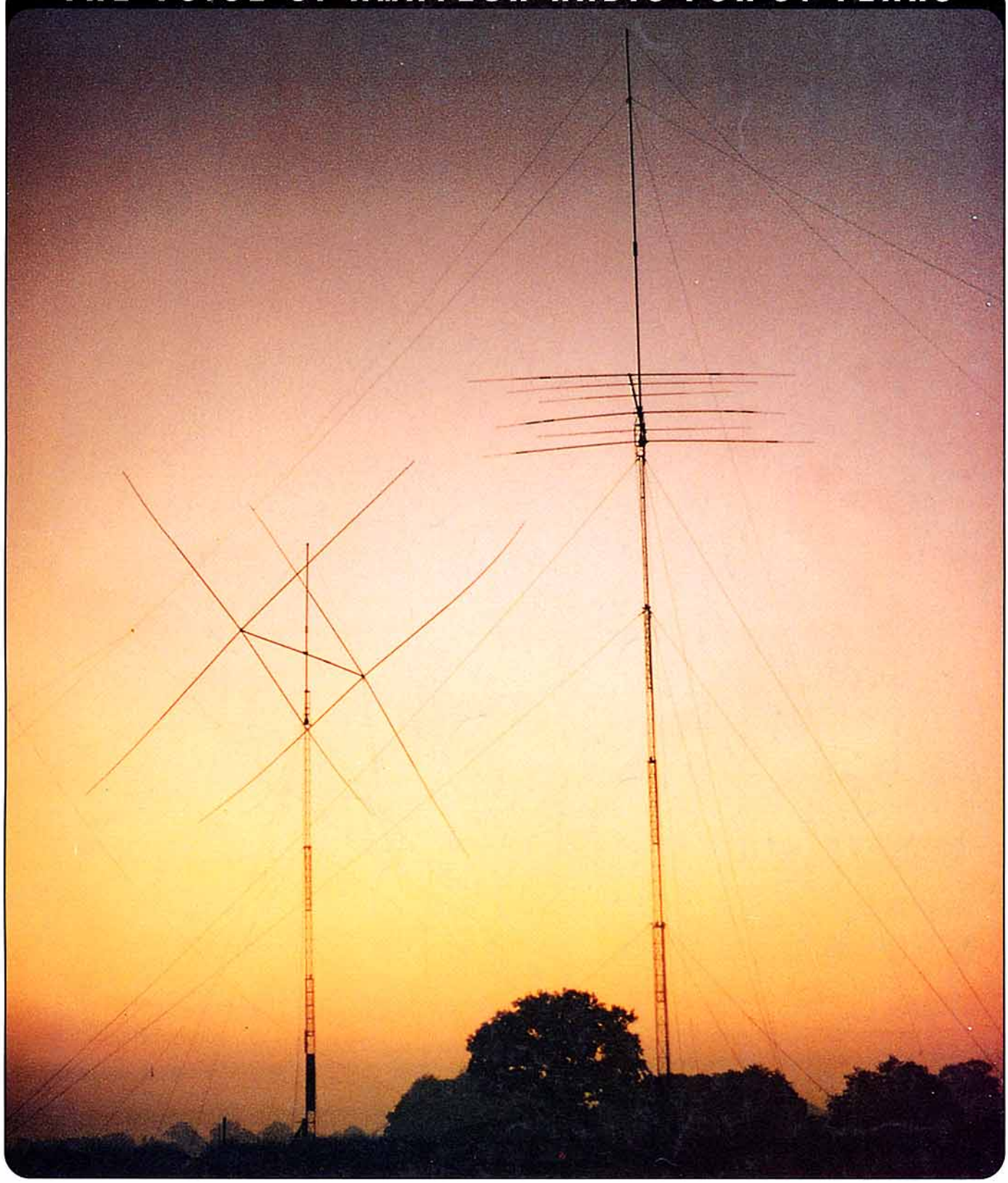
Radio Communication

The Journal of the Radio Society of Great Britain

February 1994

Volume 70 No 2

THE VOICE OF AMATEUR RADIO FOR 81 YEARS



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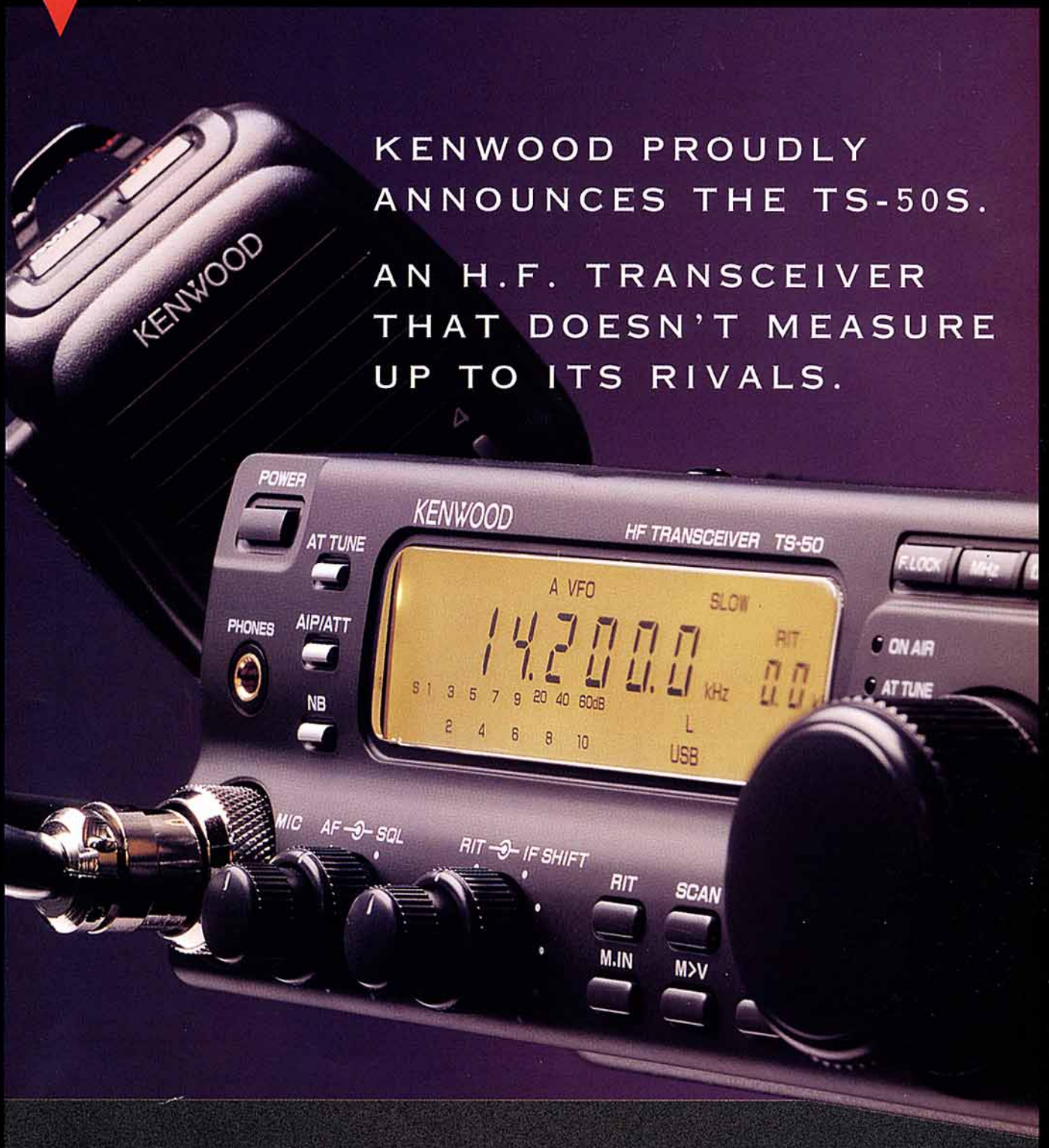

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Editorial Secretary
Erica Fry

All contributions and correspondence concerning the content of *Radio Communication* should be posted to:

The Editor
Radio Communication
Lambda House, Cranborne Road
Potters Bar, Herts EN6 3JE

Tel: 0707 659015
Fax: (Editorial *only*) 0707 649503
E-mail (Telecom Gold) 87:CQQ083

Radio Communication is published by the Radio Society of Great Britain as its official journal on the first day of the relevant month and is sent free and post paid to all members of the Society.

Closing date for contributions, unless otherwise notified, is five weeks prior to publication date.

Filmset by JJ Typographics Ltd, Southend, Essex.

Printed by Southernprint (Web Offset) Ltd, Poole, Dorset.

RSGB membership at 31 August 1993: 31,061

ISSN No: 0033-7803

Radio Communication

COVER PICTURE:
Sunrise at the Lichfield ARS station, G3WAS/P, winner of the Open Section of the 1993 SSB Field Day. Antennas are: TH6 at 75ft, 7MHz Quad at 60ft and a 3.5MHz Loop at 105ft. Turn to page 82 for the full results.
Photograph: G3NLY

NEWS AND REPORTS

TECHNICAL FEATURES

REGULARS

REVIEWS

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS
Founded in 1913 incorporated 1926. Limited by guarantee
Member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the Membership Services Department from which full details of Society services may also be obtained.

Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telephone: 0707 659015 - Members Hotline and book orders
Fax: 0707 645105. Telex 9312 130923 (RSGB)
Electronic Mail Via Dialcom/Telecom Gold: 87 CQQ083

General Manager: Peter Kirby, MIMgt, MISM, G0TWW
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Special arrangements exist for blind and disabled persons. Details are available from RSGB HQ.

Membership application forms are available from RSGB HQ

RSGB Main Switchboard:
0707-659015

The RadCom Leader

I D Suart, GM4AUP

THE FOLLOWING is from a speech delivered by Ian Suart, GM4AUP, on the occasion of his Installation as President on 15 January in Glasgow.

FELLOW PRESIDENTS, Honoured Guests, Ladies and Gentlemen, it is indeed a great honour to become the 60th President of the Radio Society of Great Britain.

Around 1968/69 I was given an old valve radio by my grandfather which had on it a band called 'trawler band'. Tuning around this band amongst loads of chatter, which I later found out was christened 'fishfone', I came across someone from the same village as myself – Milnthorpe, Westmorland. One thing led to another and I soon visited the home of Cliff, G3JGP, (George 3 Jolly Good Pirate as he referred to himself).

Cliff was a great help in my early days and when I took the RAE and Morse test in 1971. Sadly, he is no longer with us and neither is G6VQ but others local to me then, such as G3UEC and G3CRJ, are still on the air. One of the amateurs that I met in those early days, G3JYP from Appleby, is present in this room tonight and it is good to see him again.

I cannot allow this occasion to pass without a reference to my father who was also a radio amateur but in fact it was I who introduced him to the hobby – we both took the RAE and the test together (in the Royal Liver Building, Liverpool) but he received the first licence as G4AUO. Sadly he is no longer with us but he would be very proud of his son.

In 1969 I joined the RSGB as an Associate Member with the listener number A6765, moving to Corporate Membership in 1972. My amateur radio activity was somewhat sporadic for a while as I was at College in London for three years before joining my present employer the Independent Broadcasting Authority, now called NTL, as a broadcast engineer. RSGB and IBA/NTL have had a very good relationship over the years with many radio amateurs on the staff – a previous Council member of RSGB, G3HRH, was a senior member of IBA staff when I joined the company. At this juncture it is important that I acknowledge the help and cooperation of the Regional Manager for Scotland and Northern Ireland, GM3YMK, for his efforts in allowing me flexibility to assist the

continued on page 7 ▶

NEWS & REPORTS

● STEPHEN TUCKER, G0TUK, is seeking the views and support of any amateurs in the Manchester area who are interested in the installation of a 23cm FM television repeater. He can be contacted by post: Steve, c/o 16 Parrbrook Close, Whitefield, North Manchester. His phone number is 061 980 5506, or he can be reached by packet, G0TUK @GB7BEV or E-Mail TUCKESM@CIX.COMPULINK.CO.UK.

● A TIME CAPSULE was placed inside a monument dedicated to worldwide amateur radio at a ceremony to celebrate the 60th anniversary of the RCU, the Uruguay national society, in August 1993.

● SOUTH DORSET Radio Society hopes to operate from Weymouth's Nothe Fort celebrating the 50th anniversary of D-Day. Proposed dates are 28-30 May and 4-6 June.

● PRESIDENT OF the new Canadian national society, the Radio Amateurs of/du Canada, is Farrell Hopwood, VE7RD.

● THE TROWBRIDGE and District Amateur Radio Club (G2BQY) celebrated its tenth birthday on 1 December 1993.

● THE ANGUILLA Amateur Radio Society has been accepted as a member of the IARU.

● THE TURKS and Caicos ARS has been accepted as a member of the IARU.

New Executive Vice-President

AT ITS JANUARY meeting, the RSGB Council elected Clive Trotman, GW4YKL, as Executive Vice-President for 1994.

In order to carry out the EVP's duties, Clive is relinquishing the Chairmanship of the Membership Liaison Committee (MLC). The new MLC Chairman is the Zone A Council Member, Peter Sheppard, G4EJP.

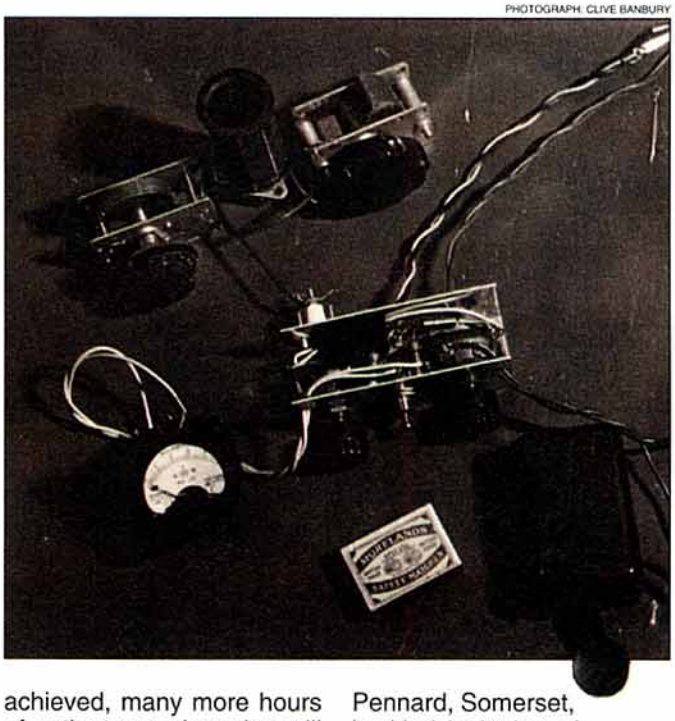
Yeovil Amateur Radio Club Claims Earliest Transistor Sky-wave Contact

The Transistor Transmitter is Forty

IN THE early fifties, whilst commercial researchers were concentrating on the transistor as a revolutionary audio device, amateurs in Yeovil succeeded in making what is believed to be the world's first sky-wave contact using a transistor transmitter. According to research done by G3MYM, the contact was 18 months ahead of anything similar in the USA.

On 21 February 1954, the Yeovil Amateur Radio Club station, G3CMH, made an unarranged contact with G3CAZ who then lived in Haslemere, Surrey. The G3CMH transmitter was a 3.504MHz crystal controlled, negative resistance oscillator, using a point contact transistor (transistors did not have numbers then).

PHOTOGRAPH: CLIVE BANBURY



Bulletins

THIS WAS recorded in a news item in the March 1954 *RSGB Bulletin* 'Ninety-mile Contact on 3.5Mc/s with Transistor Transmitter'. The *Bulletin* said that the transmitter ran 30mW input and fed a 274ft VS1AA aerial, resulting in a 559 report throughout the QSO.

The following month's *Bulletin* devoted a page to the circuit (with further details in May), pointing out that "there is plenty of scope for experiment with the values of components used in transistor circuits . . . ." and there is a recommendation to avoid heat damage by holding transistor leads with pliers whilst soldering. The transistor oscillated successfully with up to 100mW input but overheating caused the note to become unstable. Readers were cautioned that the battery connections (transistors were PNP only then) were "the reverse of those in a thermionic valve circuit".

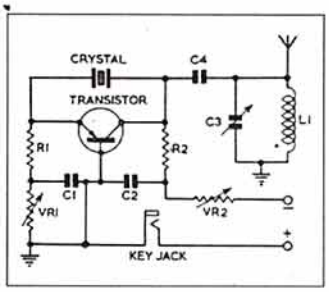
The designer C G Banbury, BRS20100, concluded his article with: "Although good results have so far been achieved, many more hours of patient experimenting will be needed before the performance desired by the writer is obtained."

Commemoration

THE YEOVIL ARC plans to commemorate the event in two ways. On Thursday, 17 February, Rob Micklewright, G3MYM, will give a lecture at the club, describing the history and technology of the 1954 event.

Then on Sunday the 20th, the club will operate a commemorative station at East Pennard, Somerset, by kind invitation of G7LMX. GX3CMH/P will operate on 3.560MHz CW using an equivalent QRPP transmitter to that used in the first tests. A 'Yeovil' transceiver (a club project which runs 10W on 20, 40 and 80m) will be used on SSB to publicise the event.

Further details of this historic anniversary can be obtained from club Secretary C H White, G4JBL, telephone 0258 473845. This month's *QRP* column gives details of the Yeovil QRP Convention in May, where the construction competition will involve a replica of the BRS20100 transmitter.



Reproduced from the *RSGB Bulletin*, April 1954, is the circuit of the pioneering 3.5MHz transmitter designed by Clive Banbury: C1, C2 0.01μF; C3 200pF variable; C4 0.006μF; R1 3k; R2 3.3k; VR1, VR2 100k variable; L1 "to tune to crystal frequency with C3".

IEE Conference

THE ELECTRONICS Division of the Institution of Electrical Engineers is to hold its sixth International Conference on HF Radio Systems and Techniques at the University of York, 4 – 7 July. The RSGB is associated with this event and any RSGB member wishing to submit a paper, or requiring further details should contact Peter Chadwick, G3RZP, QTHR.

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The RadCom Leader

continued from page 4

RSGB in various capacities. Roger is also here this evening.

In researching subjects for my speech this evening I was given copies of previous Presidents' speeches and the 1988 speech from Sir Richard Davies, G2XM, attracted my attention because it seems to be as topical now as it was then. To quote him:

"Without doubt one of the major considerations, not only in this country, but in most of the world at this time is the ability of amateur radio to attract young people to its ranks. One eminent radio amateur commented recently that the average age of radio amateurs appears to be increasing by one year as each year passes. If this trend continues it will most certainly die of old age."

The Society has made tremendous progress in attempts to introduce young people into amateur radio with initiatives such as

Tom Sprenger, PA3AVV, VERON President congratulated Ian Suart.

the introduction of the Novice licence. We have contributed tremendous effort and resource into the Novice programme and although it is really still in its infancy there are signs that the number of interested persons is increasing. Discussions have been taking place with organisa-tions such as the Air Training Corps with a view to having amateur radio taught as a related subject. Should this develop this will be a further step towards publicising amateur radio to young people.

Sir Richard went on to say: "However, now and certainly over the past two years, there are all the signs of the number of radio amateurs flattening out and indeed the trend is now that the number of radio amateurs in the UK is actually showing signs of decreasing."

The 1993 annual report from the Radiocommunications Agency, shows that the number of licensed amateurs dropped. No-one is quite sure what the reasons are for this. My own theory is that it may be associated with a decision made in the last few years that the Morse test qualification would be valid for life; this allowed those not active to let their A-class licence lapse knowing they could get it back without resitting the Morse test. However, a recent announcement by the RA on licence renewal procedures may well halt this trend since in order to have a lapsed licence renewed all appropriate documentation needs to be provided. Many older amateurs no longer possess their Morse test pass slips since they were only valid for one year. RSGB has commented and is still commenting on the problems associated with this renewal procedure.

What the two quotations from Sir Richard show is the problems we perceive now are not new and that the efforts made by the Society to attack the problems highlighted have not yet come to fruition. However, the initiatives are most certainly continuing.

The Society is continuing its regular discussions with the RA on licensing matters. A number of important changes took place in 1993. For instance, the licensing of speech and TV repeaters has been placed on a different footing with the issue of Notices of Variation to the Keepers' own licences. This places more of the onus of responsibility on the Keeper – a situation desired by the RA. We have seen major beneficial changes to licence conditions for unattended operation on the 70cm band, extra frequencies have been added to the mailbox Notice of Variation agreement thereby reducing the delay in licensing which the formal site clearance procedure seemed to have.

The RSGB is an enthusiastic supporter of the IARU and was represented at the Region 1 Conference in De Haan, Belgium in October 1993 when a number of important decisions affecting all parts of the spectrum were made.

And yet with all this good work it is very sad to me that while RSGB is one of the most respected societies throughout the world-wide amateur radio community we do not have the wholehearted support of licensed amateurs in the UK.

We are often criticised, sometimes justifiably, for things we do, or more importantly things we do not do, and yet when officers of the Society try to get to the bottom of the problem it either does not exist or it was someone else's problem. In latter years this criticism of the Society is very common on the packet network. In most cases this has turned out to be very unfair and untrue and yet the damage is done. As many of you will know I have been, and still am, a very passionate supporter of the packet network and the types of bulletin allowed but I deplore its use to mischievously, maliciously or vindictively criticise individuals or organisations when no attempt has been made to ascertain the true facts.

Outgoing President Peter Chadwick, G3RZP, presents the chain of office to 1994 RSGB President Ian Suart, GM4AUP.

The Society needs to be portrayed positively against the untrue accusations levelled against it and one of the ways of doing this is by going out and meeting the members and, just as importantly, the non-members. This has already been done with some success at the Scottish Amateur Radio Convention last September. My only disappointment was that there were not more people present who had doubts or complaints. To continue this Open Forum principle all Zonal Council Members have been charged with finding venues where officials of the Society to be seen and questioned in all parts of the UK. The first of these events should take place early in 1994.

Each and every one of us in this room who is involved in amateur radio should take every opportunity to publicise the RSGB and the massive benefit of being a member, both to the individual and to amateur radio in general. Make no mistake though, we will be present at any national or international event, or at meetings with governmental bodies which discuss amateur radio, fighting for the rights and benefits of *all* radio amateurs in the UK.

Finally I cannot allow this event to pass without recording a vote of thanks to all the volunteers and staff who make this Society what it is. I would also like to extend this one stage further and place on record my thanks to the partners of all the volunteers since they have almost as much involvement as the volunteers themselves, particularly in areas such as answering the telephone and taking messages – we should never forget that help.

Overseas dignatories welcoming the new President included: (above) Vincent Magrou, F5JFT, Overseas Liaison Officer of REF; (centre) Gaston Bertels, ON4WF, President of UBA and (below) Horst Elgering, DL9MH, President of DARC.

Radio Scientist is an OBE

PROFESSOR LES BARCLAY, G3HTF, a member of the RSGB's Propagation Studies Committee, was awarded the Order of the British Empire in the New Year Honours list. The award was for his national and international work in the field of propagation research.

He spent 1957/58 studying the ionosphere at Halley Bay (where he was VP8CR) with the Royal Society International Geophysical Year Antarctic Expedition, which resulted in him being awarded the Polar Medal. After seven years at Marconi Research, he joined what is now known as the Radiocommunications Agency of the DTI and is currently Deputy Director – Head of the RA's Research and Radio Technology Group.

His scientific career has involved him in international discussions in many roles, including Chairman of the CCIR Study Group which deals with propagation research. Most recently he was awarded the ITU Silver Medal for his Chairmanship of the 600-strong ITU Radiocommunication Assembly in November 1993. Also last year he was appointed visiting Professor at Lancaster University.

Les is one of the many who has discovered amateur radio during Jamboree On The Air and he pays tribute to the members of the Southend and District ARS who ran that JOTA station and who have greatly encouraged him since, particularly G3CQL and G6MH.

Propagation researcher Les Barclay, G3HTF, who was awarded the OBE in the New Year Honours List.

Although an RSGB member since 1958, he has not been particularly active on the air. Nevertheless, he has helped to protect the Amateur Service by trying to ensure that amateur work is properly recognised and taken into account by such bodies as the CCIR. He is currently a member of the RSGB Propagation Studies Committee, Essex Raynet and the Dengie Hundred ARS.

● Lighthouse keeper Donald Michael, GM0KCY, was awarded the MBE in the 1994 New Year Honours List. More on this next month.

Amateur Radio in Schools

AS ANNOUNCED in *News & Reports*, Jan 94, the STELAR group was launched at the Annual Meeting at Birmingham University of the Association for Science Education.

STELAR (Science and Technology through Educational Links with Amateur Radio) is a group of educationalists whose aim is to promote amateur radio in education as a means of supporting good practice in the teaching of Science and Technology.

In order to bring together, coordinate and pool resources within the Education community, the first STELAR initiative is to distribute a newsletter called *AMRED* (AMateur Radio in EDucation) to all interested educationalists. It is intended that *AMRED* will become the vehicle by which news and information may be distributed between centres of education and STELAR, keeping all interested parties in touch with future initiatives and activities.

In the first instance *AMRED* will appear termly (August, December and April) with the first issue due for Summer Term 1994. Listed **right** are the schools/colleges of which we have basic contact information (gathered from the RSGB's Project YEAR database). If your school or college (or one with which you have contact) would like to be included on the distribution list of *AMRED*, please contact STELAR as soon as possible. They would like to hear from all schools and colleges, whether on this list or not, who have an interest in amateur radio activities. Useful information includes full contact details, callsigns of club station and contact person, modes and frequencies of operation and any details of club activities (eg special event stations) and interests.

STELAR is at present attempting to forge international links with educationalists throughout the world who are involved with amateur radio and to this end three of the committee have been invited to speak at the annual meeting of the German equivalent of STELAR – 'Amateurfunk in der Schule' in March. If you have information on international educational contacts, this too would be appreciated.

Information should be sent to the Chairman of STELAR, Richard Horton, G3XWH, QTHR, or by FAX on 0423 871027. He is also available via Packet Mailbox – G3XWH @ GB7CYM, or E-Mail – INTERNET COMZRH@GPS.LEEDS.

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Preston School
Rushey Mead School
St Cenydd School
Strattallan School
The Blue Coat CE School
The Hollins County High School
The Royal Grammar School Guildford
Tonbridge School
Warwick School

Schools and colleges known to have an interest in amateur radio as an educational activity

Licences Revoked

THE RADIOCOMMUNICATIONS Agency has informed the Society of their action in revoking the licences of two radio amateurs recently. Their letter reads:

"The licence records which we hold are confidential, therefore I am unable to give the names or call signs of amateurs whose licences are revoked. Nevertheless I think it is important for licensed amateurs to appreciate that we *do* revoke licences where appropriate. These particular revocations followed complaints of abuse of amateur repeaters in the Midlands area that led to the offenders being convicted of offences under the Wireless Telegraphy Acts. Further unlicensed use is likely to result in heavy penalties on conviction."

● ESTONIA HAS implemented CEPT TR61-01, so a reciprocal licence is no longer required for Gs to operate in ES.

Thinking Day on the Air

THE ANNUAL Guides Thinking Day On The Air (TDOTA) takes place over the weekend 19/20 February. Many GB and special club callsigns will be on the air introducing Girl Guides and Brownies to amateur radio.

Operating only on the Saturday will be ZC4BGC (British Guides Cyprus) There are only nine ZC4s licensed for the Sovereign Base Areas of Cyprus and most will be involved in this special station.

80m Band Plan

THERE WAS a discrepancy between the digimode sub-band on the 80m band reported in the IARU Region 1 Conference report (*RadCom*, November) and the Amateur Radio Band Plans published last month. The error was in the Conference report and the bandplans are correct.

Two Repeaters Back on the Air

THE ARFON Repeater Group's 70cm Repeater, **GB3AN**, returned to service in December at a new, better site and on a new channel. The new site is at Nebo, Pensarn, Nr Amlwch, on the North East coast of Anglesey, locator IO73UJ, and the new channel is RB8. GB3AN will link to GB3AR on R4. Reports would be welcomed by the Repeater Keeper GW6DOK, (QTHR) from whom further details can be obtained. The Swindon 70cm Repeater, **GB3TD**, returned to service on 18 December, after a site and channel change. The new channel is RB3. Further details can be obtained from the Repeater Keeper G4XUT (QTHR), who would no doubt appreciate reports.

PoSat-1 Available Soon

THE FOLLOWING letter was received recently by Ron Broadbent, Secretary of AMSAT-UK. It clears up a number of points regarding the future of the Portuguese satellite launched last September:

AMSAT-PO
PO Box 227
2003 Santarem Codex
PORTUGAL

10.12.93

Dear Ron,

On the 6th of December an agreement was signed by AMSAT-PO and the PoSat Consortium.

The Minister of Industry and Energy was present at the ceremony and has ratified the agreement. This means that the agreement will be published in the *Diario da Republica* – where all official documents, laws, state rules, etc are published. Only after publication does it become a Portuguese state document. The PoSat agreement will then become an official document in Portugal.

This agreement, is in order to have all our rights recognised by the consortium. This means that they recognise what amateur radio is all about.

Here is a small resume of the agreement:

The PoSat Consortium accept all the aims of the Amateur Radio Service, all the Rules of IARU and all the Rules which are common practice between all AMSATs. This means the access to the spacecraft will be free for every amateur station and no fee will be paid for the use of PoSat-1 by any amateur radio operator.

We will use, at least, 6 Megabytes of RAM disk. This will be exclusive for us.

The name of PoSat-1, when in use by the amateur radio community will be PoSat OSCAR 28, OSCAR 28 or PO 28.

The amateur community will NOT take any imaging files from the Store and Forward system.

When the spacecraft is in the 'Amateur Mode' no other organisations will have access to the spacecraft systems.

All amateur radio operators who want to make amateur radio experiments in the spacecraft systems will have access to the engineering model for experimentation, carried out on the satellite.

All data, except imaging, can be used in the normal way.

The schedule of the satellite will be renegotiated every two years. If AMSAT or the Consortium representatives do not ask to change the schedule in the 90 days before the end of the two year period the schedule will continue as it is.

If the Portuguese State needs to use the satellite, for safety reasons, AMSAT-PO will be notified 20 days beforehand (if this time is available) the 'Amateur Mode' will be discontinued.

A technical committee was established to obtain a schedule for the next two years. In the agreement this committee comprises two AMSAT-PO officers and two Portuguese Marconi officers. The time to finish the task is one month. The AMSAT officers on this committee will be myself and Henrique, CT1EUT.

So, as soon as I have the schedule for the next two years I will send another fax/letter to you.

I ask you, on behalf of AMSAT-PO, to spread this good news for the amateur radio cause.

Many thanks for the work that Surrey Satellite Technology Ltd has carried out in putting an amateur transponder on this bird. Without the work of SSTL we would never have had the chance to have another bird for the amateur satellite service.

Thanks also for your great support over the negotiation period (one year) and for your friendship. You have made several good friends here in Portugal.

73, Pedro Carvalho, CT1DBS

Further to the above, G3AAJ informs us that the satellite PO-28 is expected to be open for amateur use on 29 January. The final frequencies will be available from AMSAT-UK after that date.

Bucks Morse Examiner Vacancies

THE SOCIETY has vacancies for Morse Test Examiners in the county of Buckinghamshire. Radiocommunications Agency requirements stipulate that prospective examiners must demonstrate their ability to receive at 20WPM and send a typical test passage on a manual key at 12WPM. In addition, the Society is looking for people with the ability to deal with candidates in a professional and helpful manner.

Applicants should contact the Chief Morse Examiner, Roy Clayton, G4SSH, QTHR, tel: 0723 862924. Interviews will be conducted at the RSGB London Amateur Radio and Computer Show on 12 March.

70cm Repeater Stolen

THE COMPLETE GB3GF 70cm repeater was 'very professionally' stripped and stolen from its site at Guildford, Surrey between 0300 and 0815UTC on Thursday 30 December.

The repeater is crystalled for dedicated operation on 433.0MHz transmit, and 434.9MHz receive and its cavity filters are set to these frequencies. The transmitter identifies in Morse code with 'GB3GF' every five minutes.

If any of the following is offered for sale or modification, please contact PC 1284 Clarke at Guildford Police on 0483 31111 x 3128 without delay:

Pye F9U wall-mounted base station, much modified and containing microprocessor control board and tone-decoder.

Six home-brew copper and brass cavity filters (each tubes approx 8in long by 4in dia) slotted in a black wooden box. Each is stamped GB3GF.

Hexalator (ferrite circulator) mounted in a black-painted die-cast box with GB3GF engraved on the lid.

Power amplifier (8W) in unpainted die-cast box with GB3GF engraved on the lid.

Home-brew 12V PSU in black plastic-covered box.

J-Beam 5-element 'white stick' collinear with white fibreglass outer tube. Approx 11ft high.

X-50 dual-band 'white stick' collinear with white fibreglass outer tube and three small radials near the base. Approx 5ft high.

4-stack folded dipole array by J-Beam. Approx 6ft high.

This equipment should be very easy to identify and there is a possibility of its illegal use on 70cm. If you are offered any of this gear, or hear unusual signals on channel RB0, please contact Guildford Police straight away.

● STOLEN from Stony Stratford, Milton Keynes on New Year eve/day: Yaesu FL-101 S/N 4M302016; Yaesu FR-101 S/N 5K310108 and a computer in a mini-tower case with 'G0FMC' marked inside. Any information please to M G Miles, G0FMC, tel: 0908 566796.

The 1993 RSGB President, Peter Chadwick, G3RZP, presented a plaque to Rob Muir, G3LHN, Chairman of the Thames Valley Amateur Radio Transmitters Society on the occasion of their Diamond Jubilee celebration dinner.

Amendments to RLO List

FURTHER TO THE list of RLOs in counties starting with the letters A – N (*RSGB – at Your Service*, January), we have three updates:

Zonal Council Member for **Zone G (Scotland)**, Frank Hall, GM8BZX: Telephone number is now 0307 467565.

RLO for **Avon**, D H Collins, G4ZYF: Telephone number is 0272 676381.

New RLO for **Bedfordshire**: Geoff Linssen, G0PIZ, 401 Dallow Road, Luton, Beds LU1 1UL; tel 0582 415576.

RLO for **Borders**, Ian Wilson, GM4UPX: Telephone number is now 0835 862656.

New RLO for **Hereford and Worcester**: John Marks, G0OWT, 61 Sebeight Road, Wolverley, Kidderminster, Worcs DY11 5UA; tel 0562 850061.

New RLO for **Northumberland**: Jack Swayne, G3BLE, 12 The Haven, Beadnell, Chathill, Northumberland NE67 5AW; tel 0665 720601.

The remainder of the RLO list can be found on page 91 of this month's *RadCom*.

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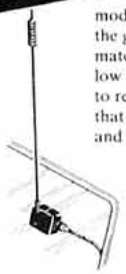

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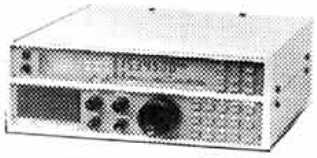

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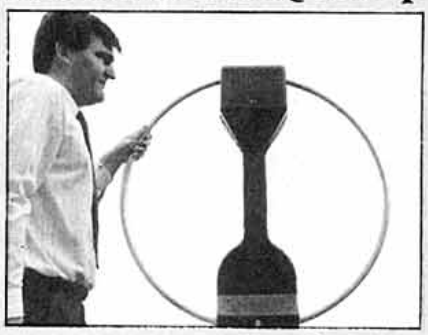

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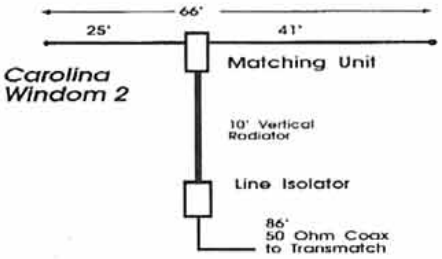

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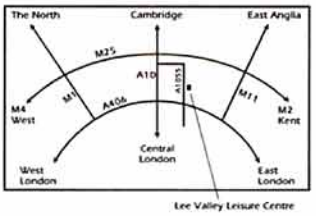


By public transport, take bus W8 from Edmonton Green BR station

The London Amateur Radio & Computer Show is presented by RadioSport Ltd, in co-operation with the Radio Society of Great Britain and Southgate Amateur Radio Club

THIS MONTH'S LEADING PROJECT

A QRP CW Transceiver for Experimenters

The first of a two part article by Steve Price, G4BWE

THE CONTINUING POPULARITY of CW provides a marvellous example of how both the old and the new can happily co-exist within amateur radio. Morse code may be getting on in years but it is still recognised as an extremely effective mode of communication [1], and one which has been able to take full advantage of the many advances in receiver, transmitter and antenna technology.

Not surprisingly, the design and construction of CW rigs – particularly for operation on the high frequency bands – remains a popular strand of the hobby. It has long been recognised that a few watts of Morse can travel a long way, and on bands such as 14MHz contacts are often a lot easier to obtain than with SSB, which so often involves fierce competition with stations using the full panoply of speech processors, big linears and multi-element beams! Also, CW will often prove to be a more socially acceptable mode of communication because the use of lower transmit power lessens the risk of interference to other services and nearby entertainment equipment.

DECISIONS, DECISIONS

ALTHOUGH A CW rig may be fairly rudimentary in its design, the home constructor still has many options to consider before rolling up his sleeves and warming the soldering iron. For instance, would it be better to build a complete transceiver, or just a transmitter to be used in conjunction with an existing receiver? My own view, for what it is worth, is that there is a lot more satisfaction to be gained from the design, construction and use of transceivers. Having said that, the beginner may find it easier to start with separates, especially if a serviceable receiver is already available and only a simple transmitter, perhaps using 'foolproof' crystal control, will get him or her on the air.

Is it a good idea to attempt a multi-band design? The answer here depends very much on the constructor's experience and knowledge: It is important to realise that many of the common problems – spurious responses in receivers and PA instability in transmitters, for instance – tend to multiply in unforeseen ways when extra bands are added . For this reason it is probably better to start with a single bander.

There are, of course, a great many other options involved in the production of a final design and the choices made will often depend on factors beyond the purely technical; such as the cost and availability of components. A good way of illustrating this process is to take a look at a project that has already been completed.

A 14MHZ TRANSCEIVER

FIG 1 SHOWS THE BLOCK diagram of a CW transceiver for 14MHz. It's a good idea to start with a diagram like this because it provides an easily digestible overview of the complete system. Even a single band transceiver can become fairly complex and the block representation focuses attention on some of the important higher level decisions which need to be made at the outset – before consideration is given to the circuitry and devices which will occupy each of the blocks.

Most importantly, we need to decide how many of the blocks may be able to provide a dual function – for instance, can a particular amplifier, mixer or filter be used on both transmit and receive? The initial reaction will probably be to give all the blocks a dual function, thus saving on the number of components. However, careful examination of the block diagram normally reveals that the involved transmit/receive changeover switching necessary to achieve this goal would add its own complexity. This defeats the object of saving components and may make the design impractical to implement. Furthermore, the creation of numerous signal paths between stages can lead to instability and spurious responses.

Finally, some of the stages, such as the sidetone oscillator, will have functions that are specific either to transmit or to receive and so cannot be used twice anyway. Arriving at a final design therefore involves consideration of various compromises and trade-offs, and it may well be necessary to re-draw the block diagram a number of times during this process.

Returning to Fig 1 we can follow the receive signal path. Incoming signals are routed by RLA1 to a bandpass filter which serves to attenuate unwanted transmissions at frequencies both above and below 14MHz. The wanted signals are then sent via RLA2 to the mixer where they are translated to an intermediate frequency (IF) of 4.43MHz by mixing them with the output of a variable frequency oscillator (VFO) which has a tuning range of 9.57 to 9.67MHz. To receive a signal at 14.050, for instance, the VFO must be tuned to 9.620MHz (14.050 – 9.620 = 4.43). An RF amplifier, if desired, would be placed between RLA2 and the mixer input.

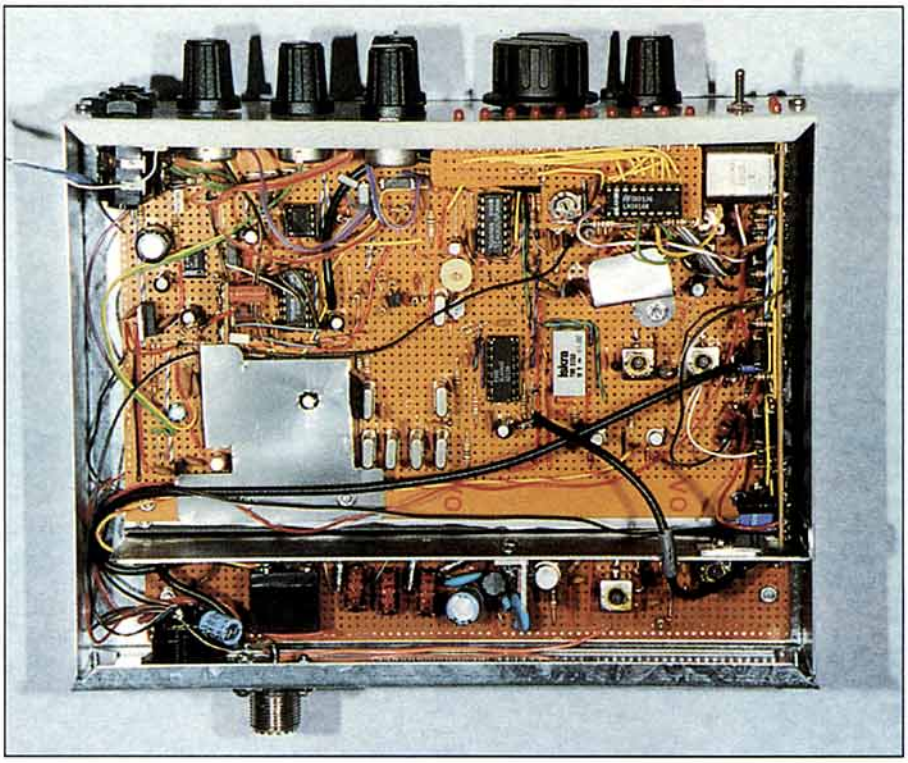
The IF signal is now passed through a crystal filter with a bandwidth suitable for CW reception – but we will look at this again later.

The IF amplifier, which may have a number of stages, raises the signal voltage considerably before it is input to the product detector. This latter stage, which is simply another mixer, down-converts the signal to audio frequency (AF) by mixing it with the output of a 4.43MHz oscillator. An audio pre-amplifier follows and this in turn feeds the AF output stage via an audio gate. The gate serves to disconnect the output of the AF pre-amplifier automatically during transmit and also allows the sidetone oscillator to drive the output stage instead.

During transmit mode the circuitry must operate differently. In response to the first depression of the Morse key, a timing circuit changes the positions of RLA1 and RLA2 automatically. As well as this, each time the key is depressed the 4.43MHz oscillator is connected to the mixer input by the keying switch. The mixer now adds this locally generated 4.43MHz CW signal to the output of the VFO, which results in a product at the desired transmit frequency (using frequencies from the previous example – 4.43 + 9.620 = 14.050). The RF power amplifier raises the level of the transmit signal before it is sent to the antenna via RLA1.

There are naturally other ways of arranging the blocks to obtain the same result, and if the design were to employ a Direct Conversion (DC) receiver instead of a superhet, there would obviously be considerable differences. Nevertheless, the solution outlined in Fig 1 is practical in that the transmit/receive changeover switching is not excessively elaborate. Furthermore, the mixer and most of the AF circuitry perform dual functions, as discussed earlier. The VFO is also used on transmit and receive but this is, of course, pretty much a prerequisite in the case of a transceiver.

The crystal calibrator and tuning meter operate more or less independently of the rest of the design and so may be considered separately. The overall performance and specification of the transceiver will be determined by the circuitry and components used to perform the functions within each block. The builder must therefore make a number of decisions before proceeding further. In particular, what should the transmitter power be, and what level of performance is to be demanded from the receiver? In order to illustrate how a final design might be arrived at, let us examine the circuitry developed to provide one possible implementation of the transceiver outlined in Fig 1.



CIRCUITS

FIG 2 SHOWS MOST OF the circuitry for the 14MHz CW transceiver. The missing blocks are the RF power amplifier, power supply unit, crystal calibrator and tuning meter – these will be examined later. Before delving into the intricacies of the design it's worth considering exactly how original the details are. In the case of a block based around an IC (Integrated Circuit), many of the interconnections, and even some of the component values, are often determined by the internal workings of the device itself. It is advisable, therefore, to obtain a manufacturer's data sheet for the IC; these are available from the larger component suppliers (eg RS) and normally contain example application circuits which may be used with the minimum of modification. Data sheets also provide important pointers as to the suitability of a device for a particular design – the maximum frequency of operation, supply voltage range and current consumption, for instance.

Finally, bear in mind that many of the commonly available ICs have been developed for specific mass market 'consumer' applications in TV and Hi-Fi. Some of these devices may indeed be used in amateur radio projects, but a degree of caution needs to be exercised. A good example of this is encountered in the selection of IF amplifiers. Many inexpensive consumer ICs contain complete IF subsystems, so on the surface they appear very attractive. However, the small print often reveals that the IF is of the limiting variety intended purely for FM reception and therefore unsuitable for CW and SSB.

Many of the circuit blocks use just a single active device and perform very common functions: The crystal oscillator based around TR3 in Fig 2, for example. These circuits are rarely original and their lineage can often be traced back to the valve era. The best sources of circuits are books [2,3] and previous constructional articles from magazines such as *RadCom*. Some component values may need to be changed to suit the frequency of operation, however, and it is also necessary to consider whether minor modifications are required in order to integrate the block with the rest of the design. In the case of TR3, resistors R48 and R49 are used in place of what would normally be a single emitter resistor. This creates a potential divider to reduce the output voltage of the oscillator to a level

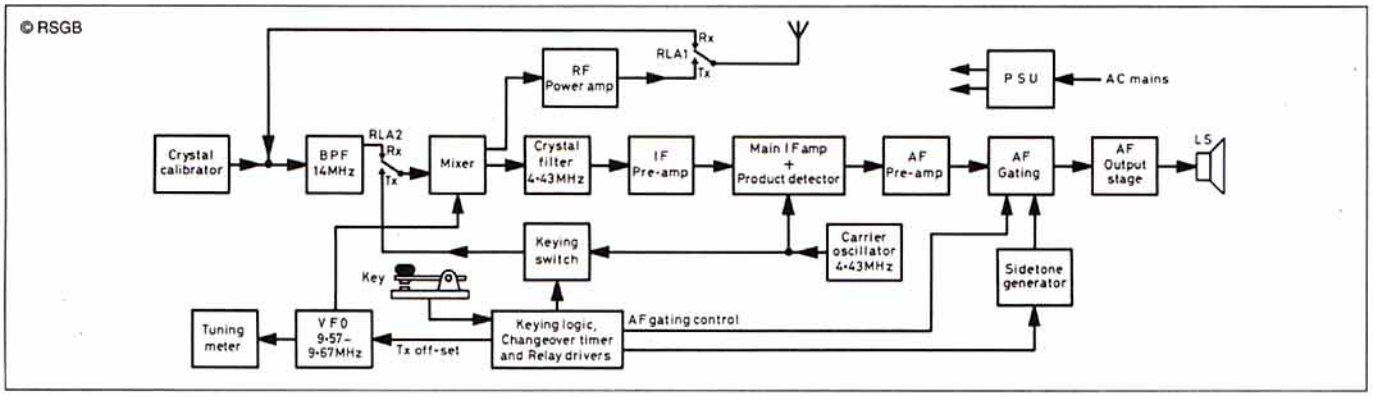


Fig 1: Block diagram of a CW transceiver for the 14MHz band.

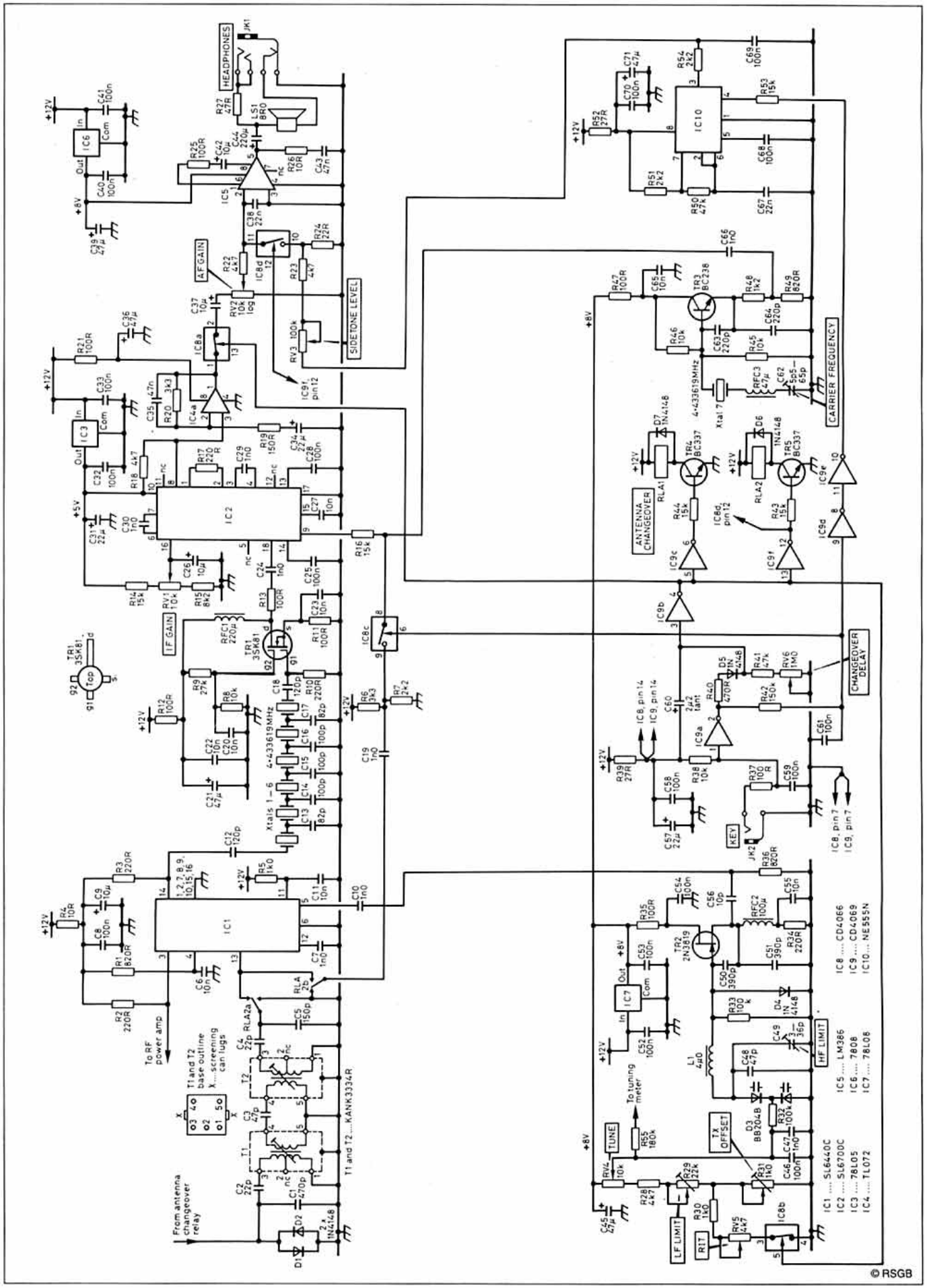


Fig 2: Signal processing, VFO and Tx/Rx changeover circuitry. L1 is 29 turns of 24SWG enamel on a T68-6 powdered iron toroid.

suitable for driving the mixer (via IC8c) on transmit.

Although they are invariably ICs, operational amplifiers , or 'Op-Amps', can usually be considered in the same vein as single active devices, albeit ones that are normally restricted to operation at lower frequencies. It follows then that the audio amplifier circuit utilising IC4a in Fig 2 is very similar to a vast number of previously published designs. Component value differences arise, for example, because it is necessary to set the Op-Amp's voltage gain. This is normally achieved by calculating the appropriate ratio between the values of two external resistors (in our case R19 and R20) and will vary depending on the gain required. The basic amplifier circuit has also been modified by the inclusion of C35, which serves to increase the negative feedback at higher frequencies. This adds an HF roll-off characteristic to the receiver audio response, so reducing background hiss.

BANDPASS FILTERS

OUR GRAND TOUR of Fig 2 proper begins with the bandpass filter based around T1 and T2. Ignoring D1 and D2, which form a clamp to protect against excessive input voltages and are not actually part of the filter, this block is notable in that it contains no active devices whatsoever. It is, nevertheless, very important. The main winding between pins 1 and 3 of T1 works in conjunction with the series combination of C1 and C2 to form a parallel tuned circuit resonant at 14MHz. T2, C4 and C5 act similarly. The secondary windings of T1 and T2 (pins 4 and 5) are coupled by C3, thus providing a signal path between the tuned circuits.

Signals picked up by the antenna must therefore pass through both of these before reaching the mixer. This ensures adequate suppression of signals at the receiver's image frequency near 5MHz (9.620 – 4.43 = 5.19 if listening on 14.050MHz) and also helps to improve strong signal handling performance by attenuating out of band transmissions that might otherwise generate intermodulation products.

The 50Ω antenna is matched to the much higher impedance of the first tuned circuit by the ratio between the values of C1 and C2. C4 and C5 match the filter output to the 500Ω input impedance of the mixer. As an alternative to basing the filter on the Toko pre-wound components T1 and T2, suitable inductors may be fabricated by winding enamelled copper wire onto dust iron toroids – see [4].

On receive RLA2a couples the output of the bandpass filter to the balanced mixer, IC1. This is a Plessey SL6440C and has been chosen because despite being easy to use, it can provide high performance. R5 sets the collector current of the two internal output transistors and this determines the dynamic range. There is a trade-off here which involves choosing an appropriate compromise between an extremely good intercept figure but with little or no voltage gain and high current consumption, or higher gain, lower current consumption but only a moderate intercept figure. With R5 1K0, each output transistor draws a collector current of approximately 10mA, and IC1 consumes a total of around 40mA. Working under these conditions the SL6440C delivers a voltage gain of 10 – 12dB and a third order intercept of +5 – +8dBm.

The mixer is followed by a six-pole crystal filter of the ladder type comprising XTAL1 to 6 and C12 to C18. A considerable cost saving is achieved here by using inexpensive 4.433619MHz quartz crystals manufactured in large quantities for use in domestic colour TV receivers. This explains the choice of IF frequency. The measured –6dB response of the prototype filter is 4.43209 to 4.43316MHz, a bandwidth of 1.07kHz. The passband ripple is minimal, and setting C62 to give a carrier frequency of 4.43159MHz results in a –6dB audio response of 500 to 1570Hz at the product detector output.

The filter has been designed so as to be easily reproducible, and it should not be necessary to check the resonant frequency of the crystals before construction; although it is probably a good idea to order the crystals together from the same supplier. A simpler four-pole filter providing a narrower bandwidth of around 500Hz could be considered, but in order to ensure low passband ripple it would be necessary to obtain a set of four crystals having only a minimal spread in resonant frequency. The 'throw together' six-pole design is therefore a more practical option, and although the precise bandwidth and rip-

continued on page 64 ▶

COMPONENTS LIST

Resistors

All fixed resistors are 0.25W, 5% carbon film types, unless otherwise stated

R1, 36, 49	820R
R2, 3, 10, 17, 34, 62	220R
R4, 26	10R
R5, 30, 63, 66	1K0
R6, 20, 60	3K3
R7, 51, 54, 75	2K2
R8, 38, 45, 46, 57	10K
R9	27K
R11, 12, 13, 21, 25, 35, 47, 59	100R
R14, 16, 43, 44, 53	15K
R15	8K2
R18, 22, 23, 28, 56, 64	4K7
R19	150R
R24	22R
R27, 69, 73	47R
R32, 33, 68	100K
R39, 52	27R
R40, 58	470R
R41, 50	47K
R42	150K
R48	1K2
R55	180K
R61	39K
R67	680K
R70, 74, 76	270R
R71	120K
R72	82K
R77	27R 2W
Presets R29, 65	22K
Preset R31	1K0
RV1	10K lin
RV2	10K log
RV3	100K lin
RV4	10K lin, ten turn (wirewound)
RV5	4K7 lin
RV6	1M0 lin

Capacitors

C1	470p ceramic plate or polystyrene
C2, 4, 73	22p ceramic plate
C3	47p ceramic plate
C5, 72	150p ceramic plate
C6, 11, 20, 22, 23, 27, 55, 65, 74, 75, 76, 78, 79, 80, 86, 88	10n disc ceramic
C7, 10.19, 24, 29, 30, 47, 66, 85,	1n0 disc ceramic
C8, 25, 28, 32, 33, 40, 41, 46, 52, 53, 54, 58, 59, 68, 70, 89, 91, 92, 94, 95, 98, 100, 102, 103	100n disc ceramic
C9, 26, 37, 42, 99	10u 25V electrolytic
C12, 18	120p plate ceramic
C13, 17	82p plate ceramic
C14, 15, 16	100p plate ceramic
C21, 36, 39, 45, 71	47µ 25V electrolytic
C31, 34, 57	22µ 25V electrolytic
C35, 43	47n polyester
C38, 67	22n polyester
C44	220µ 25V electrolytic
C48	47p polystyrene
C49	3 - 36p foil trimmer
C50, 51	390p polystyrene
C56	10p ceramic plate
C60	2µ2 35V tantalum bead electrolytic
C61, 69	100n polyester
C62	5p5 - 65p foil trimmer
C63, 64	220p ceramic plate
C77	15p ceramic plate
C81, 84	220p polystyrene or silver mica
C82, 83	470p polystyrene or silver mica
C87	100µ 40V electrolytic
C90, 93	1µ 35V tantalum bead electrolytic
C96, 97	4p7 ceramic plate
C101	4700µ 40V electrolytic
C104	100µ 25V electrolytic

Inductors

L1	4µ0 - 29 turns of 24SWG enamel on a T68-6 powdered iron toroid
L2-4	0µ6 - 11 turns of 22SWG enamel on T50-2 powdered iron toroids
RFC1	220µ Toko 7BS, or similar
RFC2	100µ Toko 7BS, or similar
RFC3	47µ Toko 7BS , or similar
RFC4	6µ8 Toko 8RBS, or similar (high current)
T1-4	Toko KANK3334R
T5	50VA mains transformer with 17.5V secondary (eg Cirkit C5017 - see text)

Semiconductors

D1, 2, 4, 5, 6, 7, 8, 9	1N4148
D3	BB204B varicap
BR1	2A, 200PIV bridge rectifier
LED1-13	TIL209, or similar
TR1	3SK81
TR2	2N3819
TR3, 6,	BC238
TR4, 5	BC337
TR7	BFY51
TR8	VN88AFD
IC1	SL6440C
IC2	SL6700C
IC3	78L05
IC4	TL072
IC5	LM386
IC6	7808
IC7	78L08
IC8	CD4066
IC9	CD4069
IC10, 14, 15	NE555N
IC11	LM3914
IC12, 13	74LS90
IC16	7805
IC17	7812

Additional Items

JK1	Headphone jack socket (see text)
JK2	Single circuit key jack of choice
LS1	8RO miniature loudspeaker
RLA1	SPCO relay with 12V DC coil
RLA2	miniature DIL encapsulated DPCO relay with a 12V DC coil
F1	500mA anti-surge with insulated holder (mains)
F2, 3	1A fuses
S1	SPST miniature toggle
S2	DPST mains toggle
X1-7	4.433619MMHz quartz crystals (see text)

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham B17 8QB

JOHN PODVOISIS, G0NPI (QTHR), says that the next Baltic DX meeting Summer Camp will take place at Birstonas in the south of Lithuania between 23 July and 1 August. It combines a holiday with radio and gives an opportunity to work from an unusual location, see the sights, or just laze by the river! The station's callsign will be LY94BDX or LY/own callsign. John says "friendly people and friendly prices" – for more information contact G0NPI on 061 793 5922. Birstonas is located 90km west of Vilnius and 45km south of Kaunas. If you are interested please get in touch with G0NPI as soon as possible as there are discounts available for those who book early !

Have you ever considered visiting the DX convention at Visalia in California? This year it will take place between 15 – 17 April at the Holiday Inn – Plaza Park, Visalia. Pre-Convention booking costs US$45 and this can be done through Don Bostrom, N6IC, 4447 Atoll Avenue, Sherman Oaks, CA 91423, USA. Don can also provide further information.

Next month's issue will contain the final 1993 WARC Bands Table. I hope to run a table again this year – so start counting *now*!

DX NEWS

IN A NEWS release dated 30 November ARRL announced that the following operations have now been accepted for DXCC credit (the date given is the starting date for validity): 3D2UF (20.11.92), 4J1FM (21.10.92), 4J1FW (21.10.92), 5W1VL (25.11.92), 6O/FE1LVR (18.1.93), A61AF (3.8.93), C56V (30.10.93), C56/KF7AY (28.10.93), C56/AA7NO (28.10.93), KH2/N6SVL (5.11.93), KH6/N6SVL (3.11.93), V51/DJ2ZS, V51/DJ0WQ, and V51/DK2WH (all from 17.8.93), V63UF (10.11.93), V73UF (17.11.93), YA1AR (5.12.92), ZK1AUF (17.11.92), ZL/N6SVL (11.11.92), ZS9/DJ2ZS (6.8.93), ZS9/DJ0WQ (6.8.93), and ZS0PI (28.7.93). The DX Advisory Committee has received a petition asking it to grant separate country status to the self-proclaimed 'Turkish Republic of Northern Cyprus'. At the time of writing the country is only being recognised internationally by Turkey. The various `1B' callsigns being used are not issued in accordance with ITU protocol.

The *Long Island DX Bulletin* says that XT2BW will probably visit **Ghana** for a two or three month vacation. This will probably take place beginning late January. He has applied for a 9G licence. Monica, EL2PP, is often near to 21.250MHz from 1530. ST0K is the first club station in **Sudan.** This use of the ST0 prefix has caused some confusion because hitherto it was only used in Southern Sudan. However, it now seems possible that it is going to be used for club stations. ST0K seems to like 18.085, 21.001, and 24.895MHz between 1230 and 1430. F6FNL and F6EXV will be in **Rwanda** until the end of the month. Their callsigns are 9X5CW and 9X5DX respectively.

RSGB DX News Sheet says that N0TG, AA4VK, KW2P, and WA4DAN are reported to be planning a major DXpedition to **Nauru** which may take place during February or March this year. IV3UHL's Pacific trip should still be under way when this reaches readers. From 1 December until 31 January he was expecting to be on from **Tonga** as A35MQ. He was scheduled to return to **Fiji** for the period 1 to 15 February during which time he hopes to get to **Rotuma** for a week. From 15 to 28 February he will be on **S Cook Is**. No further details were available at the time of writing. He tends to favour 7.002, 7.098 14.022, 14.190, 14.260, 21.022, 21.190, 28.022, 28.460, and 28.490MHz. 'VR8B' has been active again and is believed to be located somewhere on the north island of New Zealand. According to *RSGB DX News Sheet* there are now twelve amateurs on **Pitcairn Is** out of a total of 59 residents and they are said to be forming the Pitcairn Amateur Radio Club which will have the callsign VR6PAC !

DXPRESS reports that John, PA3BTQ, has now been issued with the callsign S21SAE for his operations from **Bangladesh**. Previously he used S21/PA3BTQ. His favourite frequencies seem to be 14.015, 14.315, 21.015, and 21.315 MHz. A new club station situated in the Dubai Men's College of Higher Technology in **United Arab Emirates** with the callsign A61AF came on the air on 3 August last. Fred Laun, K3ZO, is likely to be in **Thailand** just now and on the air as HS0ZAR until the middle of this month. The projected activity from **Pratas Is** had still not taken place by the time this column was being written. Rumours were rife and it was being said that the Taiwanese authorities have decided that no foreign nationals will be permitted to go on an expedition to Pratas. The twice weekly air service to the island is said to be booked up for some time ahead and the government is not giving any assistance to the expedition. Having said all this – if it hasn't happened yet it might be worth keeping a very close check on the bands. *RSGB DX News Sheet* also gives the news that DK9KX has recently applied to the DX Advisory Committee for DXCC country status for **Huangyan Dao**. This is otherwise known as Scarborough Reef and is located at 15.07N 117.51E – some 250 kms west of Olongapo in the Philippines. It belongs to the People's Republic of China and is uninhabited – an interesting point is that it is *more* than 225 miles from the nearest point in China.

BAND REPORTS

Thin pickings this month partly due to the absence of several regulars due to postal delays! However, thanks to G2HKU, G3s EUE, GVV, IZD, KKJ, G4DJC and GW4KGR who reported the following: (CW callsigns in italics):-

10MHz
0000 *PY0FM.*
0900 *ZL7FD.*
1400 *H44/JA1JOY.*
1500 *JW9XG.*
1600 *S79MX, S79UU, VK9XO, 4S7/OH2VZ, 9D2UU.*

14MHz
0800 BV2FA, BY5RT, HL9AX, ZL6ALG, *ZL7FD*, 3D2MQ, 9X5GC.
1100 *V63UF.*
1300 VK9XO.
1500 VU2LMT, *7X2DG.*
1600 J52AK.
1700 *FM5CW*, VK6WR, ZL2ADX.
2000 S79TD.

18MHz
0800 *OD5/SM0THK*, ZL2AAG.
1000 *9D2UU.*
1200 HK0TCN, 4S7/F6AUS.
1300 A61AD, *FH/DL9AWI, ST0K, ZA/OK2PSZ.*
1500 *ET3BH, HK0ER, J68AK, JY8VJ, PY0FM.*
1700 *FH/DL9AWI, KG4DX, ZB2/G3MRC, ZD8M, 3B9FR.*

21MHz
0800 BY5HZ, HL5ADG, VK, ZL.
0900 BV6ER, BY5RSA, S21ZX, VK, VR2.
1100 CW0L, D2EGH, HV3SJ, VK6APZ, 9N1HI.
1200 EL2PP, *ST0K*, VU2CSV, *YI9CW, ZA/OK2PSZ, 6W6/KB3AYP, 9V1ZB.*
1400 *HV4NAC, PJ2/WJ2O*, VP5/AI5P.
1500 A22EX, TY1IJ.
1600 FR5DX, *KP2A, TI2C.*

24MHz
0900 *TL8NG.*
1200 *J68AK, ST0K, 3B9FR.*
1300 *ET3JR*, YS1RRD.
1500 *PY0FM*, ZS8MI, 3X0DEX.

28MHz
1000 *9J2BO.*
1300 FR5DX, *KP4QI, W1,W3, W4, W5* (until 1800).
1400 HH2PK, *L5V*, VP5SM.
1500 A22MN, CE7AOY.
1700 *VE3PN, VE3XU, VO9S.*

QTH CORNER

S21SAE	via PA0EQ.
TA1/W6QL	YASME Foundation, P O Box 2025, Castro Valley, CA 94546, USA.
TA2BK	Bahri Kacan, P O Box 88, TR-34002 Topkapi, Istanbul, Turkey.
VR6DB	Dave Brown, P O Box 13, Pitcairn Is, Via New Zealand.
XF4CI	XE1CI, Sierra Chalchihui 235-502-B, Mexico 11000 DF, Mexico.
ZD8Z	Garth Hamilton, VE3HO, P O Box 1156, Fonthill, Ontario, Canada, L0S 1EO.
ZF2VV	Nao Akiyama, NX1L, P O Box 310855, Newington, CT 06131, USA.
9D2UU	LZ2UU, Box 196, 7200 Razgrad, Bulgaria.

1993 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G3KKJ	**149**	**207**	**167**	**523**
G3IZD	126	185	160	471
G3IAR	117	141	98	356
G3SXW	125	127	73	325
G4XRV	115	118	52	285 (CW)
G0MHC	60	125	63	248
G2AFV	96	91	51	238
G4OBK	84	115	35	234
GJ4GG	37	63	41	141
G4MUW	2	71	46	119
G3IQF	45	41	17	103
G0KDS	2	75	3	80
G4CMZ	17	–	–	17


ITU-ZONE 44 SHANGHAI CHINA CQ ZONE 24

BA4AC

MEMBER OF BY4AOM Ex-1936-41XU8WM, 1989, BZ4CWM, 1990VK1CWM,

TO RADIO Radio Communication Journal CFM OUR QSO UR REPORT

Date	Time	Freq.(MHz)	Mode(2 Way)	Ur Sig	QSL
Day Month Year	UTC	3.5.7.14.21.28	CW SSB	R S T	PSE
31 OCT 1993	06.00	50 144 430	AM FM		TNX

Rig, TS-520 100W.
Ant, Random, Vpole El Yag
Rmks, all best tu!

QTH, APT 1.68.E.HENGBANGROAD
SHANGHAI CHINA 200081
73! OPR, TOM T[illegible] Tom 唐仲涇

The QSL card from RSGB member Tom Tang, BA4AC.

There is a new station active from **Svalbard**: LA5EBA is JW5EBA and will be there until July. He will be on all bands/modes and is located on Hopen Is (IOTA EU-026). A letter recieved from the national society in **Bosnia-Herzegovina** gives details of the prefix structure in that country and says that their HQ station has the callsign T90ARA. The T99XAA-XZZ series is allocated to digipeaters, T99VAA-VZZ to VHF repeaters, T99UAA-UZZ to UHF repeaters, and T99YAA-YZZ to beacons. Class A licensees use T9 1-9 followed by a one letter suffix, Class B T94AA – T94ZZ, Class C – T95LAA – T95LZZ, Class D T93DAA – T93DZZ and T93NAA – T93NZZ, Class E T92PAA – T92SZZ, and Class F T96RAA – T96RZZ. The old callsigns YT4/YU4/YZ4/4N4/4O4 are no longer valid.

CHINA

RSGB MEMBER Tom Tang, BA4AC, has written again to clarify some of the information given in the August issue. He says that there are now eight kinds of prefix – BY (club stations), BZ (individual callsign to be used from a club station), BA, BD, and BG (individual callsigns to use at own station – first, second, and third class licence respectively). BG is also allocated to listeners (who have 4th class licences) – for example 'BG4-01-001' could be in Shanghai. BT is used for special stations and BW will be used for visitors. B is used on 144MHz for club and individual stations.

PREVIOUS ZD8 CALLS

ZD8X HAS contacted *RSGB DX News Sheet* to say that Ascension ARC records showing callsign allocation over the years have been destroyed. We are holding large numbers of QSL cards for various ZD8 calls, mainly issued to short-term visitors of whom we have no records of names or current addresses. We would be grateful if anyone who has operated with a ZD8 callsign could provide these details, on receipt of which and cards held will be despatched direct. The last batch of cards from a particular bureau contained three cards for contacts made in 1964 ! Write to Chris Salmon, CSO, PO Box 2, Ascension Island, South Atlantic.

CONTESTS

RESULTS OF the 1993 *CQ* 160 Metre WW DX Contests have now been published. In the CW section UK scores were : **GW3YDX** (472,052 points), **G4BYG** 211,560, **GM3YOR** 208,054, **G3XTT** 164,580, G3KDB 161,075, G0IVZ 69,312, G3BPM 51,725, GM3CFS 36,285, G4MVA 27,634, G3BDQ 27,219, **GI0KOW** 26,235, GW4HBK 24,453, GW3GWX 14,751, and G3IGW 7,194. In the multi-operator section **G3VGG** scored 84,189 points. In the SSB section **G3NAS** scored 98,070, and G3UUV 33,699. Holders of calls in bold receive certificates.

In the **Holyland DX Contest 1993 G4IQM** scored 11,745 points and **G0SUK** 5,980. G4IQM was eleventh in the world listing.

THE 38TH KYOTO CONTEST

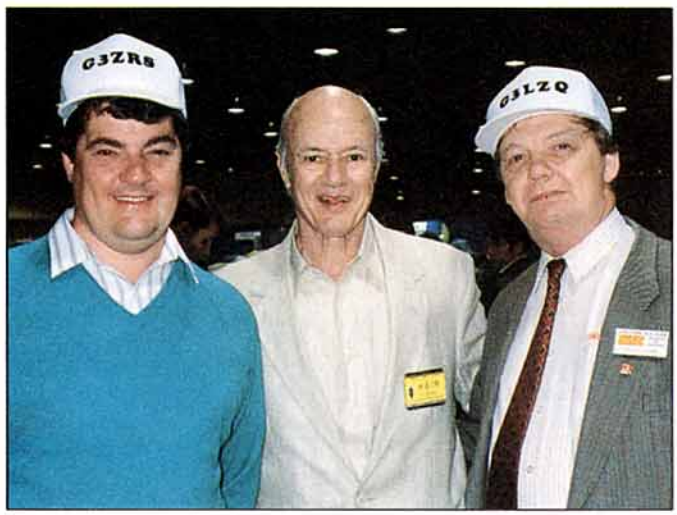
1200 5 February to 1200 6 February

This is to celebrate the 1200th anniversary of the city of Kyoto. Single-operator single or multi-band and multi-operator multi-band. Exchange RS/T plus *CQ* zone number (UK is 14). Two way SSB QSOs with Kyoto stations count two points, on CW they count three. Multipliers are the number of areas in Kyoto prefecture contacted. Logs must be mailed before 28 February to JARL Kyoto Club, Contest Committee, PO Box 21, Muko, 617, Japan. (I have copies of rules – SASE please).

PACC CONTEST

1200 12 February – 1200 13 February

1.8 – 28MHz (no WARC bands). CW and SSB following IARU Region 1 Contest preferred segments where applicable (CW – 1.830 – 1.850, 3.500 – 3.560, 14.000 – 14.060MHz, SSB – 3.600 – 3.650, 3.700 – 3.800, 14.125 – 14.300MHz). Single and multi-operator and listener sections. Exchange RS/T plus serial number from 001. Dutch stations also give their province (GR, FR, DR, OV, GD, UT, NH, ZH, ZL, NB, LB, YP). Each QSO with PA/PB/PI counts one point and a station can only be worked once per band (either CW or SSB). The multiplier is one per province per band (maximum 6 x 12 = 72). Final score is total multipliers from all bands times total points. Listeners count one point per Dutch station heard and must log both exchanges in full. Entries have to be mailed before 31 March 1994 to: Frank E van Dijk, PA3BFM, Middellaan 24, 3721 PH Bilthoven, Netherlands. I can supply photocopies of the rules (SASE please).



At Dayton Hamvention, Dayton, Ohio. From left to right: Peter Rodmell, G3ZRS, Beverley, Humberside; Ken Miller, K6IR, Rockville, Maryland; John Dunnington, G3LZQ (ex ZS6ZE, EP2WR), Brough, Humberside.

EA RTTY CONTEST

1600 12 February – 1600 13 February

3.5 to 28MHz following IARU band plans. Single operator single and multi-band, multi-operator multi-band, and listener sections. Call 'EA Test'. Exchange RST and *CQ* zone. EA stations send RST and province. On 14, 21, and 28MHz contacts with own continent count one point, elsewhere two. On 3.5 and 7MHz three and six respectively. Only multiplier credit for QSOs with own country. Multiplier is DXCC countries and Spanish provinces on each band. Mail entries before 9 April 1994 to: EA RTTY Contest Manager, Antonio Alcolado (EA1MV), PO Box 240, 09400 Aranda de Duero (Burgos), Spain. I can supply copies of rules (SASE please).

ARRL INTERNATIONAL CW DX CONTEST

0000 15 February – 2400 16 February

1.8 to 28MHz (no WARC). Single-operator single and multi-band. QRP all bands (5W output or less). Multi-operator single and multi-transmitter sections. Work USA/Canada. Exchange RST and three figure number indicating approximate output power. W/VE stations will give their state or province. Three points per QSO. Multiplier is sum of US states (not KH6 or KL7) plus DC and VE provinces. Official entry forms are recommended but entries may be submitted on disk. Entries must be mailed within 30 days of the contest. I have copies of the full rules (SASE please).

BYLARA CONTEST

1900 – 2200 10 February

1000 – 1300 12 February

Copies of rules available (SASE please)

HSC CW CONTEST

0900 – 1100 and 1500 – 1700 27 February

CW only between 10 and 30kHz from lower band edge. I can sup-

ply copies of the rules (SASE please).

AGCW SEMI-AUTOMATIC KEY PARTY

1900 – 2030 16 February

3540 – 3560kHz. *Only* mechanical semi-automatic keys allowed. Send RST and the year you first mastered a semi-automatic key! Copies of rules available (SASE please).

AWARDS

ALGOA BAY NOVICE CW AWARD

This is issued by the Port Elizabeth Branch of the SARL and it is an attempt to encourage newcomers. QSOs since 1 January 1991 count and it is only available to *Novices*. They have to submit proof of two way CW contact with at least 50 stations and log entries are sufficient for this purpose. Send a list of claimed contacts verified by two licensed amateurs to The Awards Manager, Port Elizabeth Branch, SA Radio League, PO Box 10402, Port Elizabeth 6015, Republic of South Africa. There is no charge for this award.

ALGOA BAY CW MERIT AWARD

This is available to all licensed amateurs for QSOs on or after 1 January 1979. Requirements are: Class C – 250 QSOs including at least five ZS contacts, Class B – 500 QSOs with 10 ZS, and Class A – 1000 QSOs including 20 ZS stations. Send certified log extract with US$5 or 10 IRCs to the address given above.

REPUBLIC OF BULGARIA AWARD

Issued for confirmed contacts/listener reports after 1 January 1965. European applicants need five QSOs with LZ1/LZ3 and five with LZ2/LZ4 on 3.5 or 7MHz.

FIVE BAND LZ AWARD

Requires ten QSOs/listener reports since 1 January 1979. One QSO with LZ1/LZ3 and one with LZ2/LZ4 on each band 3.5, 7, 14, 21 and 28MHz.

W 100 LZ AWARD

Confirmed QSOs/listener reports with different LZ stations *during one calendar year* (since 1 January 1979).

W 28 Z ITU AWARD

For confirmed QSOs/listener reports since 1 January 1979 with stations in ITU zone 28. These include DL, TK, HA, HB9, HV, I, IS0, LZ, T7, OE, OK, OM, SP, SV, SV5, SV9, SY, YO, YU, ZA, 4U1ITU, S5, 9A, and T9. Class 1 requires 28 QSOs with different stations in 20 countries, Class 2 28 QSOs with 16 countries and Class 3 28 QSOs with ten different countries. In addition five QSOs with different LZ stations are needed. Send a detailed list (certified by two other licensed amateurs or a club official) plus 10 IRCs to: Bulgarian Federation of Radio Amateurs, P O Box 830, Sofia 1000, Bulgaria.

ON4CLM AWARD

If you worked ON4CLM remember that you can claim this award by sending details plus US$5 to Postbox 110, B-8300 Knokke, Belgium. Any profit from this award is put towards financing future activities.

PROPAGATION

THE G8KG STORY this time goes as follows: "After the encouraging start in October, HF band conditions in November/December are best described as disappointing, at least as far as the higher bands were concerned. Solar activity was generally low with the daily solar flux fluctuating gently between about 85 and 105 sfu and the 27-day average just touching 100 for the period centred on 28 November. At this stage of the cycle the higher bands are, of course, very sensitive to quite small changes in solar activity levels and to the presence or absence of help from Es. Taking a somewhat broader view it seems that activity has been on yet another `plateau' during the second half of the year with the three month mean solar flux almost level at around 95 sfu. The corresponding figures for the same period last year were 125-135 and this is a good time to remind readers that the 2800MHz solar flux at the very bottom of the cycle is not zero but around 65 sfu so when comparing different levels it is useful to subtract this constant ie the level in the past six months is only about half that in the same period last year in equivalent sunspot number terms."

THANKS

TO ALL WHO contributed this month and specially to *DXPRESS* (PA3FQA), the *Long Island DX Bulletin* (W2IYX), and *RSGB DX News Sheet* (G4DYO). For the **April** issue I need to receive your news no later than **14 February** please. This is a little earlier than usual.

NORMAN FITCH G3FPK
40 Eskdale Gardens, Purley,
Surrey CR8 1EZ

EARLY WINTER Sporadic-E provided some welcome DX on 50MHz and there is news of QSOs between South Australia and Antarctica. The prolonged spell of deep Atlantic depressions assaulting the British Isles in December put the proverbial 'kibosh' on tropospheric propagation, judging by the lack of reports. The Geminids meteor shower provided good reflections, though activity seemed low.

PUBLICATIONS

THE WINTER issue of *FM News*, the newsletter of the Central Scotland FM Group, is the first one to be printed and collated by a professional printing company. Surprisingly the pages were not numbered even though the index refers to them. The Tech Talk column features a reprint of an article by GM6SHB on lead acid batteries. The membership list occupies four pages and shows first names, when subscriptions fall due and which local repeater members use. Treasurer Stan McQueen, GM8MRW, reports that the CSFMG's funds are in a healthy state but likely to be severely dented soon when ageing repeater GB3CS is replaced in the Spring.

Both the November and December issues of *The VHF-UHF DXer* arrived in December. In the former, Sam Jewell, G4DDK, completes his description of the 'DXer 50' transverter, dealing with filtering and switching. The WB3JYO 144MHz preamp project, mentioned last month, is also featured. Band reports are the main articles in both issues. Contact Dave Hardy, G8ROU, QTHR, for further information.

The November *Report* from the Six and Ten Reporting Club, edited by Ray Cracknell, G2AHU (HWR), includes the daily, three-hourly K-indices for Eskdalemuir (DGL), and the daily solar flux, sunspot numbers and X-Ray background data for October and November. Also featured are 50MHz reports from Britain Greece, Malta, Sweden, Zimbabwe, Japan and Antarctica. Contact Ian Brotherton, G2BDV (DOR), for subscription details; he is QTHR.

The December *Newsletter* published by the European Radiocommunications Office (ERO) includes a brief resume of the ERC meeting in October. The eight members of the Management Team for the Detailed Spectrum Investigation (DSI), covering 29.7-960MHz, are identified. The Third CEPT Radio Conference held in Madrid in November is also covered. The next one will be in Prague on 21-23 November 1994. The ERO's address is Holsteinsgade 63, DK-2100 Copenhagen, Denmark.

In his World Above 50MHz column in the December *QST*, Emil Pocock, W3EP, publishes a graph of the smoothed 2.8GHz solar flux values for Cycle 22 with predictions to the peak of Cycle 23. The NOAA's Space Environmental Services Center forecasts this will be in 2001, with a peak nearly as high as this cycle.

In the January column, W3EP includes a table comparing the characteristics of the newer coaxial cables of the 5D FB, 8D FB and 10D FB varieties from Japan. These are available from Nevada Communications.

REPEATERS

BRIAN DAVIES, GW4KAZ (GDD), wrote about the Arfon Repeater Group's three repeaters. GB3AN was QRV again on 20 December on its new channel, RB8, from a new site 144m ASL at Nebo (IO73UJ), near Amlwch on the northeast coast of Anglesey. Coverage should be good from the Lleyn Peninsula to the west, to the Wirral and Lancashire coast to the east.

GB3AR on R4 has been operational for 12 years and a new PA was fitted on 14 December to bring up the power to the licensed 25W ERP. Both repeaters use the GB3US logic system with modified software to comply with the specification for linking. The RA has granted an extension to the experimental 70cm to 2m linking period.

GB3TM is a 23cm ATV repeater, a first for Wales, licensed for channel RT2R. It will be co-sited with GB3AN and should be on air during February or March. The group also runs packet nodes GB7AN, GB7AR and GW4GTC-2 at the Gwynedd Technical College in Bangor. It assists in running packet mailbox GB7ABB. Brian is QTHR if you want further information.

The Leicester Repeater Group publishes a quarterly periodical called *Lens*. An edition produced for the Leicester show last year includes a list of the 73 members, an engineering report on GB3CF on R0 and contributions by President Jack Hum, G5UM, and Chairman John Theodorson, G4MTP. The group runs GB3LE on RB4, colour TV repeater GB3GV on RT2 and microwave beacons GB3LES and GB3LEX. The membership secretary is Stefen Esposito, G4MGG, and the group's address is PO Box 180, Leicester.

FIRSTS

THERE ARE some important corrections to the 70MHz data given on p17 in the December 1993 *RadCom*; these are itemized in the 70MHz section. To continue the list of claimed 144MHz 'firsts' by English operators we have: G5NF-I1KDB 1025 14/6/59; G4STB-IT9TAI 1758 23/6/76; G2HCG-KP4BPZ 6/64 (EME); G3ILD-LA9T 6/10/60; G3TDR-LX? 9/65; G3LTP-LZ1DW 0900 3/5/64 (MS); G3CCH-OE6AP 8/60 (MS); G3HBW-OH1NL 0300 14/12/60 (MS); G3WSN-OH0NC 10/75; G3WSN-OK1VHK 12/8/74 (MS). G6DH-ON4FG 25/9/48; G3CCH-OY2BS 15/11/69 (MS); G6LI-OZ2FR/OZ6B 24/7/52; G6DH-PA0PN 2233 14/9/48; G3MY/P-SM6QP 2235 1/3/53; G3HBW-SP3GZ 30/4/60 (A); G3CCH-TF3EA 0400 6/5/70 (MS); G3LTF-UA1DZ 0500 3/5/64 (MS); G2CIW-UK2AAA 0620 6/7/74 (A); G3LTF-UP2KAB 12/12/64; G3WSN/G3SEK-UQ2GDA 10/75; G3OZP-UR2CQ 9/66 (A); G3DIV-YO9KPB/P 0910 4/7/65 (Es) and G3GOP/P-YU1CW 1345 7/5/61. Please write if you know of prior claims to any of the above.

SUMMER CAMP

JOHN PODVOISKIS, G0NPI (MCH), writes that another Summer Camp is planned in Lithuania this year. It is to be held at Birstonas in the south of the country in the last week of July. It will also suit non-radio folk, who will be able to see the sights or just laze about by the river. For further details contact John at QTHR. His telephone number is 061 793 5922.

CONTEST

ELLA TUGWELL, G0FIP (SXW), sent details of the 11th BYLARA Contest. There are two sessions; 10 February 1900-2200 UTC and 12 February 1000-1300 UTC. On 2m, do not operate between 144.750 and 145.175MHz and 145.6-146.0MHz. No-go areas on 70cm are 432.800-433.375MHz and 434.600-434.975MHz. YLs can work YLs and OMs, but OMs should only work YLs. Exchange callsigns, reports, serial number starting at 001 for each session, name and whether you are a BYLARA member. Scoring is 5pts per YL BYLARA member, 3pts per YL non-member, 2pts per OM associate member and 1pt per other OM contact. Entries to be received by G0FIP by 4 April. Contact Ella at QTHR for further details.

SOFTWARE

THE PARAGRAPH in the December *VHF/UHF News* brought several replies from readers using the Amstrad PCW8000 series computers. Please note I do *not* have a 3.5" drive, so cannot provide copies of software for PCWs running CP/M on that size of disk. I have added PagePlus 2.0 and TurboCAD to the main office PC system, a Toshiba CD-ROM drive and Orchid Sound Producer Pro card.

Rod Smith, G4DQY, sent the latest copy of his Public Domain and Shareware Library's (PDSL) *PC Shareware Reference Guide*. It is Major Issue 17a and includes several pages of CD-ROM titles. To whet your appetite, the 'QRZ Ham Radio Collection' contains the entire FCC *Call Book* and thousands of amateur radio programs – all for the princely sum of £18. The amount of data stored on a typical CD-ROM is equivalent to what you get on about 300 3.5" HD floppies. The cost of that quantity of blank disks would be about £200.

METEOR SCATTER

JOHN HUNTER, G3IMV (BUX), was active in the December Geminids shower. His best DX was with DXpedition station UA1C (KO58) at a distance (QRB) of 2070km. The annual Bavarian Club MS contest took place in this shower, but did not appear to attract much interest among British operators.

John found reflections rather brief with no significant peak and conditions were reasonably good over the active radio period of the shower. This suggests that the meteoroids are now pretty evenly distributed around the orbit. In the *1993 Meteor Shower Calendar* published by the International Meteor Organization (IMO), editor Alastair McBeath refers to up to three possible sub-centres of activity. This may explain why no definite peak was observed.

The next significant shower is the Lyrids, predicted to peak on 22 April.

MOONBOUNCE

144MHZ

The only report is a brief one from G3IMV who had accumulated 135 'initials' – different stations, that is – up to the end of 1993. John runs a 3CX800 PA and uses two 17-ele Tonna Yagis, so that is a fine achievement. He mentioned that Marc de Munck, ON5FF, currently in Santa Cruz in the Canary Islands, had taken lots of skeds for the 1/2 January sked weekend but probably wouldn't be able to keep them because his PA blew up.

432MHZ

Writing on 12 December, Ian White, G3SEK (IO91), reported his new antenna array for 70cm had survived the December gales. He found conditions in the 4/5 December sked weekend quite good, but that activity was low. He suggests this may have been due to the ". . . . post-contest slump." Not too many US stations were on for the Europe/North America window, early on the Saturday morning, their time.

In his January *432 and Above EME News* Al Katz, K2UYH, mentions a good turn-out of stations, both regular and new. Libration conditions were excellent and produced many good SSB contacts, but those with fixed polarization found Faraday rotation a problem. The transatlantic path was near 90° most of the time.

Although 15 UK stations were worked by contributors, the only British operator who sent in a report for the January *NL* – the abbreviation for K2UYH's report – was Peter Etheridge, G4ERG (IO93). New initials were; in the ARRL Contest on 6/7 November VE3ONT, G3SEK, F5MZN and EA3UM; on 3 December OZ1HNE; 4th DF6NA; 5th I5MPK and 6th ON5OF, bringing the total to 59. In the December sked weekend his echoes were 6dB over noise; he heard VK3UM and JA9OBH.

The next favourable weekend, which you may just catch, is 29/30 January. The average declination is + 2.4°, the 2m sky temperature 232° K and signal degradation – 0.25dB. The corresponding data for the 26/27 February weekend are – 0.7°, 267° K and – 0.19dB. As before, these data were generated by the VK3UM EME Planner program.

50MHZ

NEWS

First some fascinating news from Antarctica, as chronicled in the November report of the Six and Ten Reporting Club. At 0938 on 19 November, VK5BC heard beacon VK0AQ (OC53MM) from Casey Base on Macquarie Island; it is on 50.200MHz and runs 50W FSK to a 3-ele Yagi beamed on VK5. At 1030, Steve Gregory, VK3OT copied it at S2A, but at 1130 it was RST559. Steve telephoned the base at 1205 and at 1209 worked VK0AQ, operated by VK5AVQ, on SSB exchanging RS55 reports. VK3LK and VK5NC worked the station at 1215 and 1230 respectively. The QRB for VK3OT is 3,758km and the most likely propagation mode was auroral-E.

The only UK 6m input this month was from Ted Collins, G4UPS (DVN), who reports that Zimbabwe beacon Z21SIX (KH52MK) on 50.052MHz came on air at the end of November. It runs 3W to a half-wave dipole and its keeper is Mal Geddes, Z23JO. Following servicing, Greek beacon SV1SIX on 50.040MHz was reactivated on 8 November. Thanks to Costas Fimerellis, SV1DH, for passing on this information.

T97M is in Sarajevo (JN93) and is ex-YU4AX/4N4AX. Edin's QSL manager is DL8OBC, PO Box 1253, D-3007 Gehrden 1, Germany [I think that postcode may have changed – G3FPK]. IK0OKY should be in Somalia

now on a three months tour of duty. He has amateur radio gear and hoped to get a 6m permit in which case his call would probably be T5/IK0OKY. QSLs should be sent to Emilio's home QTH: Via Battaglioni d'Assalto 6, I-00143 Roma, Italy.

ACTIVITY

Winter Es appears to have occurred on 9 December when beacon ES0SIX was copied at G4UPS for 9 min from 1635. OZ7IGY was S5 for 15 min from 1725 and S55ZRS was S7 at 1815. QSOs were made with 9A3FT (JN83), IK5NTE and EH7AH (IM67) between 1903 and 2005. In the period 12-14 December, Ted lists numerous QSOs, some of which were Geminids MS ones.

From 1637 on the 12th he completed with several SPs, LA1KHA (JO49) and a few SMs and OZs. He notes lots of OZs on MS till 2200. From 1607 next day there was propagation to SP, OE, S5, YU and I8 till 1800, then lots of MS activity with completions with S59AM and S59UN (JN76). On the 14th the S55ZRS beacon was S6 at 1640. QSOs were made with S53ZW (JN86), OE6FEG (JN76), I2ADN (JN45) and I4CIL (JN64). All signals were fading rapidly by 1805.

On the 20th in-band Euro-TV was observed from 1550. QSOs were completed with YU1, 9A3, OM3, S5, IK2, I0, IK8 and IK1 stations between 1559 and 1730. From 1653 on the 22nd the band was open to CT, EH1-3 and 7, DL, F, I2, 4, 5 and 0, S5 and 9H; signals faded quickly after 2045. So it seems there is reasonable DX to work on the band, even in mid-winter during a rapidly declining sunspot cycle.

70MHZ

BRIAN BOWER, G3COJ (BUX), wrote to correct details about the early history of, and claimed 'firsts' on, 4m. On page 197 of the *RSGB Bulletin* – the predecessor of *RadCom* – for November 1956 there was news of a new band, 70.2-70.4MHz, available until the end of 1958. The February 1960 issue carried the news that the Post Office (GPO) had agreed to the continued use of the band indefinitely; it was later extended to 70.025-70.7MHz. It seems that much of the 'negotiating' with the GPO, War Office, Air Ministry, etc was done very informally at a Christmas cocktail party!

Brian supplied photocopies of pages from *The Bull*, as we affectionally called it, claiming the following firsts: G5KW-FA3JR on the evening of 16/6/57; G5KW-F8GH 20/6/57. He also states that the first EI contact was made by G6NB in April 1957, as reported in the May 1957 *Bull*. In 1957 the European 4m allocations were: Finland 70.2-70.3MHz, France and Yugoslavia 72.0-72.8MHz, Irish Republic 70.575-70.775MHz and Holland 70.3-70.4MHz.

144MHZ

IN THE December *VHF/UHF News* I featured John Nelson's, GW4FRX, airborne propagation observations on 29 October. Ern Warwick, BRS20307 (DVN), noted that the VORs mentioned at Talla, Sumburgh and Berry Head were all on about the same meridian of longitude. He wondered if there was any significance in this? I queried this with John and he doesn't think so.

Dave Gilligan, G1OGY (ESX), has traced his 'grotty signal' to a fault in the final mixer circuit in his FT726. He asked about the country status of such as S5. YU is Serbia, which includes Vojvodina, Kosovo and Montenegro, Z3 is Macedonia, S5 is Slovenia, T9 is Bosnia-Hercegovina and 9A is Croatia. The original Czechoslovakia is now the Czech Republic, OK, comprising Bohemia and Moravia, and the Slovak Republic OM3.

G3COJ was not very active last year. Brian embarked on a major equipment reorganization, pensioning off his 1949 vintage high voltage PSU, with mercury vapour rectifiers and swinging chokes, and has yet to replace them with these new-fangled solid-state components! Phil Catterall, G4OBK (YSN), was the only entrant in the Squares Table to respond to the request to update his score. He has also been rather inactive of late.

John Fitzgerald, G8XTJ (BUX), took part in the Cumulatives and his best DX up to 29 December was G4KUX (DHM). His main interest is in the WAB nets on 144.43 and 144.44MHz in connection with the Jubilee and Winter Activity awards. Angie Sitton, G0HGA (HFD), has various EMC problems. She finds that CQ calls on any mode often go unanswered so she ends up on the GB3PI or GB3VA repeaters just to get a contact.

Joe Ludlow, GW3ZTH (GNM), missed last month's deadline but his November report is interesting. From home on the 18th he worked EA1ABM (IN73), a poor direction for him. On the 20th he was out portable from IO81FP trying out a petrol generator. Conditions were average, best DX being PE1BVM (JO21) and F6HPP/P (JN19). On the 28th, with the pressure falling, he went out /P again in extremely cold weather. His first call at 1000 resulted in a contact with F1CML (JN07), followed by a string of DL, HB and F stations till closedown at 1100. The tally was 39 stations in 16 squares, best DX being F1BPB/P (JN13) and F6IFR (JN35).

LOCATOR SQUARES TABLE
STARTING DATE: 1–1–1979

Callsign	50MHz	70MHz	144MHz	430MHz	1.3GHz	Total
G4RGK	167	–	319	182	58	726
G3XDY	–	–	224	153	100	477
G3IMV	434	15	510	125	52	1136
G1GEY	–	–	179	125	35	339
GJ4ICD	611	1	264	121	68	1065
G6HKM	456	–	242	118	61	877
G0GMB	66	–	216	108	–	390
G4SSO	191	–	279	100	–	570
G0EHV	–	35	191	82	–	308
G0CUZ	125	–	388	80	–	593
G4DEZ	201	–	255	71	62	589
G6ODT	–	3	62	66	–	131
G0EVT	230	12	249	65	1	557
G1SWH	245	33	179	63	9	529
G0FIG	200	–	192	53	–	445
GW8JLY	–	–	277	36	–	313
G3FIJ	32	24	82	27	3	168
G0ISW	147	–	64	20	–	231
GW6VZW	377	–	143	6	–	526
G7EWL	54	2	79	6	–	141
GU7DHI	363	–	111	5	–	479
GI1CET	95	–	60	3	–	158
G7CLY	70	–	60	2	–	132
G4IGO	565	–	250	–	–	815
G6HCV	468	–	250	–	–	718
G0JHC	512	–	48	–	–	560
G4SWX	–	–	404	–	–	404
G0HVQ	310	–	71	–	–	381
G1UGH	234	–	122	–	–	356
G8XTJ	182	–	126	–	–	308
G3FPK	–	–	246	–	–	246
GW4FRX	–	–	236	–	–	236
G4DOL	–	–	226	–	–	226
GM1XOG	181	–	–	–	–	181
GW0PZT	–	–	168	–	–	168
G7LIJ	–	–	153	–	–	153
G1JDU	93	–	39	–	–	132
GM0GDL	–	–	122	–	–	122
G4OUT	–	21	100	–	–	121
GU4HUY	–	–	84	–	–	84
GM0NXP	–	–	69	–	–	69
G4OBK	21	1	45	–	–	67
G3UOL	–	–	43	–	–	43

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Next deadline is 24 February. Band of the month 430MHz.

430MHZ UP

PHIL BOORMAN, G0JBA (KNT), has been struggling through a 600-hour French language course which has limited his time on the bands. On 70cm in the good tropo on 31 October he worked DK5WO (JO30), OK1UBR (JN69), DL9NDD (JN59) who was using 600W and four 40-ele Yagis, OE3XUA (JN77), DG1GLH/P (JN48) and F5SVQ/P (JN37). His station comprises a TS-790E, 19-ele Tonna Yagi at 17m AGL, 1.5dB noise figure masthead preamp, LDF4-50A Heliax feeder and 100W BNOS amplifier.

On 23cm the same day he contacted OE3XUA (JN77), who was running 200W and a 55-ele Yagi. Phil's station on this band is the TS-790E, four 23-ele Tonna Yagis at 16m AGL, 1.9dB NF masthead preamp, LDF4-50A feeder with 2.6dB loss giving 6W at the antenna. Recent gales reduced G1OGY's 70cm array to three 17-ele and one 10-ele Yagis, so Dave hasn't been very active lately.

Karl Lamford, G6ODT (NHM), lists many DLs and OE5VRL/5 (JN78) worked on 1 November on 70cm. On the 28th he contacted HB9AMH/P (JN37). He is busy collecting QSLs for various RSGB awards. He has written an interesting computer logbook program an early version of which I tested. He has now substantially upgraded it and I'll be evaluating version 6.01 as soon as I have completed this piece.

COPY DATES

THE DEADLINE for the **April** issue is **24 February** and I would appreciate more reports; this month they were thin on the ground. The deadline for **May** is **31 March**. The fax number is 081 763 9457; the BT Gold Mailbox is 76:MSX021; my CompuServe ID is 70630,603 and for those using Internet the route is 70630.603@compuserve.com.

RSGB NATIONAL VHF CONVENTION

Sandown Exhibition Centre, Esher, Surrey

SUNDAY 20 FEBRUARY 1994

● One Day Exhibition and Lecture Programme ● Specialist Groups ● Full Lecture Programme on VHF, UHF and Microwave Subjects ● Morse Tests ● Presentation of Trophies ● Comprehensive Trade Exhibition

PROGRAMME

1030	Convention opens. Enter through main entrance.
10.30	AGM Remote Imaging group
11.00	Refreshments. Snack bar in the hall will be open from 1100 to 1800 and the licensed bar will be open throughout the convention.
1130	AGM 6m Group.
1330	Convention address and presentation of trophies by RSGB President I D Suart, GM4AUP.

LECTURE PROGRAMME

Detailed arrangements for lectures will be notified on arrival

	A	B
1415	Update on the New Amateur Radio Satellites *Ron Broadbent, G3AAJ*	10GHz Comes of Age *Mike Walters, G3JVL*
1515	Spread Spectrum Techniques *James Vincent, G1PVZ*	Microwave EME *Charles Suckling, G3WDG*
1615	VHF Contest Committee Forum *Chaired by Bryn Llewellyn, G4DEZ*	Microwave Committee Forum *Chaired by Steve Davies, G4KNZ*
1715	Lecture Sessions End	
1730	Trade Exhibition Closes. Convention Ends.	

ADMISSION

Admission will be by payment on entry as follows:

Convention and Exhibition £3.00	(over 65)	£1.50
	(under 18)	£1.00
	(under 14)	Free

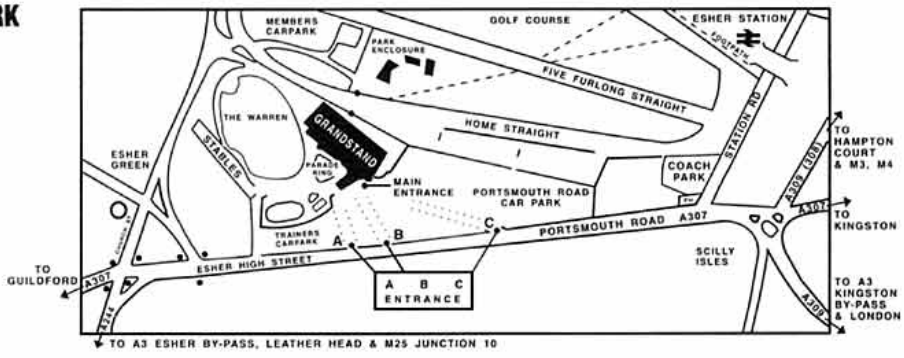
ACCESS MAP TO SANDOWN PARK

RAIL TRAVEL:
British Rail
WATERLOO TO ESHER

TALK-IN STATION:
GB2VHF:
Channels S22 SU22

STAND BOOKINGS:
Les Hawkyard G5HD
Tel: 0409-281342

DETAILS:
Geoff Stone G3FZL
Tel: 081-699 6940



Map by courtesy of United Racecourses

SWL NEWS

BOB TREACHER BRS 32525
93 Elibank Road, Eltham, London SE9 1QJ

MARC DOMEN, ONL6945 is a leading light in SWL circles in Belgium. Through the UBA, he is suggesting that a basic set of SWL rules be adopted in the Region 1 HF Contest Guidelines. The proposals make a good deal of sense. The motives are to avoid confusion arising from the many different rules that are now in operation, to set standard rules to be used by all organisers of HF Contests, and to simplify log adjudication for contest organisers.

The basic draft rules recognise the basics of SWL operation. In listening during a contest, the idea is to read at least one of two stations exchanging contest details. The rules make the extremely valid point that, due to propagation, it is not always possible to copy both transmitting stations in QSO.

The requirements of a valid QSO should be one callsign (the station heard), the contest details given by this station (the report sent), and the callsign of the station that the contest details were sent to (the station worked). Listeners should not be tempted to stay too long with the same station. Possible restrictive measures could be the limitation of repeating the same 'station worked' on the same band. The Society's restriction of "1 in 3 except if the station heard is a multiplier for the listener" is the best option on offer currently.

As for the contest log, it should show date, time in UTC, Callsign of the station heard, the report sent by the station heard and the callsign of the station worked. Turning to points and multipliers, it is thought that as there is similarity between licensed amateurs and SWLs, then the same scoring system should apply to both sections, thus making log checking easier.

I would be interested in any comments on these proposals both from SWLs that partake and enjoy contests, and those that would enter contests if the rules were easier to understand. The results of last year's RSGB SWL contest are shown opposite.

HF NEWS

Conditions during November and early December were quite poor, so the better DX was logged on 7, 3.5MHz and even 1.8MHz. On the latter band, ZD8VJ was the pick, with Z30M (from Macedonia) added by several listeners during the CQWW CW contest. JA6IEF and 4X4NJ was also heard on CW. On 3.5MHz, A25/OH7XM was new for several, while 9V1XQ looks like being a regular this winter, too. Pity he cannot be dragged to 7MHz, where 9V1 is needed for a new country on SSB! Other interesting stations on the band included V85PB and 9M8DB. 7MHz had produced perhaps the best DX of the period with J28RP, VK9XO and 4S0DX being the pick of the stations mentioned.

ITU PROJECT

LISTENERS ARE invited to partake in an ITU HF Field-strength Measurement Project to monitor a station transmitting from Svelo in Norway (LN2A). This station broadcasts 24 hours a day using 1kW on frequencies of 5470, 7870, 10407, 14405 and 20945kHz. It transmits for four minutes on each frequency before passing to the next frequency, thus completing the cycle every 20 minutes following the schedule shown in **Table 1**. Station identification is in Morse code which is followed by a digital sequence.

The RSGB Propagation Studies Committee is collating signal reports and is keen to hear from any listeners (or transmitting amateurs) who would be willing to report on a regular basis. No-one is likely to hear the station all of the time, or could spend long periods of time listening every day, but if several people report, it is possible to add them together to get a reasonably comprehensive picture.

All reports should be sent to Ray Cracknell, G2AHU, at 18 Green Lane Crescent, Yarpole, Leominster, Herefordshire HR6 0BQ. Full details of the project will be sent to those listeners (or transmitting amateurs) who notify Ray Cracknell of their intention to take part in the project.

Frank, BRS94781, in his Warwickshire shack. Frank uses a Drake R8E receiver into a G5RV and a long wire. He has been an SWL since 1988 and has his main interest in the Heard All Britain award.

LZ AWARDS

THE BULGARIAN Federation of Radio Amateurs has an interesting awards programme of six attractive awards available to SWLs. Applicants only have to use the General Certification Rule (GCR) where two licensed amateurs at your local club verify the details in your log. Each certificate costs 10 IRCs and should be sent to P O Box 830, Sofia 1000, Bulgaria. Here are three of them:

The Republic of Bulgaria Award requires the logging of five different LZ1 or LZ3 stations and five loggings of different LZZ or LZ4 stations on 7 or 3.5MHz since 1 January 1965.

The Black Sea Award is a bit harder! You need 60 loggings from 1 January 1979 of different amateur stations located in countries bordering the Black Sea. There has to be at least one station from each of LZ, TA, YO, UA6 and UB5.

Finally, try for the Sofia Award. Again the start date is 1 January 1979. You have to have 100 points from hearing stations in Sofia. You get one point if the station is heard on 14MHz, and two if heard on any of the other main amateur bands. Each station may only be counted once on each band, irrespective of mode.

FINALE

NEWS, VIEWS, BAND reports and other details for **2 April** must reach me by **9 February**. I also require good colour photographs, so please remember to send these in.

Times in mins after each hour UTC	00–04	04–08	08–12	12–16	16–20
	20–24	24–28	28–32	32–36	36–40
	40–44	44–48	48–52	52–56	56–00
Frequency (kHz)	14405	20945	5470	7870	10407

Table 1: Listener reports are needed on the 1kW beacon LN2A.

SWL	Total	28	21	14	7	3.5	1.8	Checked Score	Multipliers Points
1	ONL–383	280	54	220	291	116	63	13	211,960
2	G7NRY	193	11	113	274	135	69	10	118,116
3	GM7NVA	176	–	78	370	64	88	12	107,712
4	UA3–1221393	187	50	93	188	69	47	23	87,890
5	BRS94154	152	7	60	210	70	40	17	61,408
6	RS95258	154	22	112	111	40	37	–	49,588
7	OK2–9329	145	4	84	100	36	29	–	36,685
8	G7OCI	131	21	10	120	40	63	–	33,274
9	G7JHE	150	8	32	101	23	44	13	33,150
10	BRS93838	102	5	42	115	74	34	–	27,540
11	OK1–33168	93	11	35	106	32	19	–	18,879
12	RS94706	84	–	32	87	30	10	–	13,357
13	BRS20249	53	–	12	26	14	11	–	3,339

Result of 1993 RSGB SWL Contest. Congratulations to the winner, Jean-Jaques Yerganian, ONL-383.

Contest Exchange

ANDY COOK, G4PIQ
Fishers Farm, Colchester Road,
Tendring, Essex, CO16 9AA.
G4PIQ @ GB7MXM.#36.GBR.EU

I WRITE THIS while the new year is still very young indeed, and it seems an appropriate time to consider some of the changes which have been made to the RSGB contests for 1994. At HF the changes are none too major. The County Round-Up contest has been abandoned for this year, however it will be replaced by something new in 1995 of which more details later. Last year's IOTA (Islands on the Air) contest proved a great success both within the UK and internationally. The IOTA faction of the hobby where contacts with different islands around the world around count towards awards is extremely popular within the HF DX community, and this must have had a major part to play in the popularity of this new contest. This year's event will take place on 30/31 July and will include both SSB and CW, although the rules will change slightly as a result of the 1993 experience – these will be published in full very soon.

CHANGES TO VHF

AT VHF THERE has been a little more of a shake-up, but nothing too major. For the sharp-eyed amongst you, VHF NFD has *not* been moved to Friday/Saturday as shown in the January '94 contest calendar – it will run, as normal on the first Saturday & Sunday in 2/3 July, and it will revert to three transmitting sections as in the 1992 event. The March 2m/70cm and the September 2m contests have also had the number of sections which they contain reduced. For March, the low power sections have been ditched, but do remember that certificates are awarded to the leading single operator fixed and portable stations with 25W or less and single antenna anyhow. In place of the old sections, following the popularity of the May 2m event's six-hour section, both March and September now also contain a six-hour section for single operator fixed stations. This is ideal for those people who, for all sorts of reasons such as family commitments and so on cannot operate for the complete 24 hour period of the contest. What's more, the choice of which six hours to operate is up to you, within a few small constraints – see page 83 of January 1994 *RadCom* for full details. This should help many of you who complain that you just cannot afford the time to be on for the complete contest, so, please do come on and take advantage of the facility.

IARU CHANGES

FOLLOWING A decision which was made at last year's IARU Region 1 conference, there will now be a 50MHz IARU contest held on the first full weekend of June (4/5). This means that, hopefully, there will be a very high level of contest activity in Europe during this weekend in the middle of the Sporadic-E season. Some concerns have been expressed over the clash of a 6m event on this weekend with HF CW NFD, however there is also a very positive side to bringing these two dates together. Many clubs will have a significant number of Class B licensees in their NFD team who, although an essential part of the setting up and support processes in HF NFD, are also unlikely to be able to help directly with the CW operating. But, why not also take a 6m station to the NFD site – it doesn't take a lot of hardware to put a useful 50MHz station together (remember, only 100W ERP) – just a rig, a small 3- or-5-element yagi, some UR67 or better feeder, and a smallish pole. Then, while the HF event is running, the people who are not the top notch CW operators can be operating and enjoying themselves on 6m! The RSGB 50MHz trophy contest will run for the first eight hours of this event. The multiplier for the RSGB event only (no multiplier for the IARU event) will be locator squares, and there will be now be no upper limit on the number of points per QSO – just to make life less complex!

It doesn't have to be that big to work! The original G4PIQ antenna system (circa 1988) which won a useful set of contests – 14 el on 2m, 21 el on 70cm and 23 el on 23cm at 30ft.

BACK-PACKERS' CONTEST

NOW, DO YOU fancy a little lightweight contesting out in the sunshine during the summer. Well, if so, perhaps the new 2m 'Back Packers' events are for you. These are a series of four 4-hour events, often tacked onto the end of existing 2m contests, but with some extra time at the end to allow some operation after the big-guns have closed down. Power output is limited to 3W or 10W according to section, and equipment must be battery powered. The intention is that it will be possible to put together a competitive station which can easily be 'back-packed' to the operating site, however it is quite permissible to operate say from a car. All in all – some low pressure contesting, which would also form an ideal introduction to the art. For newcomers to contesting, an information pack will be made available covering all you need to know (and probably more!) – for full details of the contests and the information pack, please take a look at page 82 of January 1994 *RadCom*.

Finally on the changes front a few small ones – the March 70MHz fixed contest and the 23/13cm fixed contests have been shortened; the scoring for the 23/13cm events will be radial ring; the 70MHz trophy has been moved one week later so as not to clash with the Weinheim VHF meeting, and the May 2m, the July low powers, the August 70cm Fixed and the Christmas contest will experiment with a multiplier consisting of the sum of countries, counties and large locator squares (eg JO01, IP90 etc) worked.

Many of these changes have been made in direct response to the requests and comments made by you, and as such I'm sure that they will encourage an increased entry from you. A few people will certainly feel that some of the changes are not to the good, but before taking off like a 4CX250 amplifier with 25W of drive but no antenna connected, please do remember that it is impossible to keep everyone totally happy all of the time. In spite of its heavy use within today's English language, there is no such thing as a totally level playing field in contesting – just a more or less lumpy one! On a personal basis, I am very happy with almost all the rule changes. However there are always the odd ones which, while I don't think they are bad, fall into the 'let's wait and see what they produce' category and I've been very pleasantly surprised by the success of some apparently crazy ideas in the past. It is very important that the committee takes a few risks since if no changes are made, the contest scene quickly stagnates – so just keep that mind open!

CHAMPIONSHIPS

THE START of the year is also a good time to consider the contest championships which run throughout the year. These are tabulations which reflect a station's performance in all the major contests of the year, and separate ones run for HF and for VHF – in fact for VHF there are two championships, one for single operator fixed stations and one for all other stations. Detailed rules will be published later, however the HF event consists of a normalised weighting applied to different contests according to their importance, and this year the IOTA contest will be added to the table and given top weighting. The VHF table has a flat weighting for each event, and covers all the 'trophy' contests (23/13cm are combined), the March 2m/70cm contest, the May 2m, and the July low power events. It is quite a challenge to win any of these championships and hence be the UK No: 1 in your category, but it is a challenge which is worth going for since many of the big guys don't make it on for very many of the contests, leaving the field open for the less well equipped but more committed stations. 1993's results will hopefully be out in a few months (unfortunately, adjudication of all the relevant contests has to be completed first!), and why not make it your aim for '94 to do just that bit better than you managed in '93.

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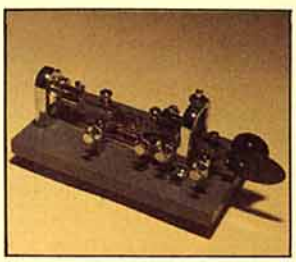
ORIGINAL



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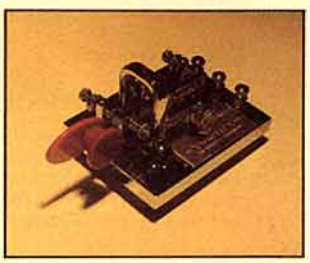
VIBROKEYER



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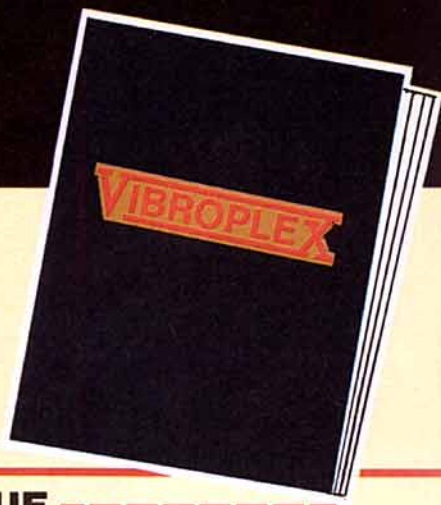

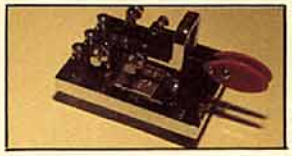

◀ IAMBIC

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AT THE LONDON AMATEUR RADIO SHOW

HF F-LAYER PROPAGATION PREDICTIONS FOR FEBRUARY 1994

The time is represented vertically at two-hour intervals GMT for each band, ie 00=0000, 02=0200, etc. The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally F-layer openings at 50MHz and 1.8MHz are indicated by a plus (+) sign in the 28 and 3.5MHz columns, with these latter bands having a probability of 9.

Time / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	....1443....	....36662...	....68885...	....88887..	...3877785..	42.765557853	9855322247 88	++42....24++
MALTA	....24332...	....46654...	....78887..	....88894..	...3877888.	662765557986	9986322357 99	+++3....24++
GIBRALTAR	.....2211...	.....4433...	....27766..	....58888..	....8888883.	342276557884	8987533347 99	++++2....4++
ICELAND	.....1....	.....221...	.....2564...	.....47872..	....2788871.	11..666678 61	7732643356 87	++++3...245+
** ASIA								
OSAKA	..........11.....	....43.....	....65.....	...1762111..	...1532246 21	....21..2573	.....24.	
HONGKONG	....341.....	....563.....	....7851....	...1787 3....	...1565532..	1...2323562 2	1.....2576	253
BANGKOK	....4663....	....68751...	....1788 74...	...2687 76...	...1365673..	3....3235734	3.....2578	255
SINGAPORE	....5665....	....7887 2...	....2788 85...	...2587 87...	...1255673..	3....3235745	2.....2577	254
NEW DELHI	....5652....	....7874....	....2788 7....	...3577 1...	...2245 54...	521..1235445	73.....2578	4.....25+
TEHERAN	....6765....	...17887 2...	...4778 85...	...6667 87...	1..5335574 11	7433..235766	873.....2588	+4.....25+
COLOMBO	....67651...	...17887 3...	...3678 86...	...3467 81...	...1135575 11	22....235767	61.....2578	3.....25+
BAHRAIN	....6766....	...17887 2...	...4778 85...	...6557 87 1..	2..4224557 22	8532..125777	872.....2588	+4.....255
CYPRUS	....77763...	...18888 6...	...3988 982..	...6888 895..	3217666788 43	9855334689 8	9963 1.1136 88	++3....3++
ADEN	....77663...	...17778 5...	...4667 882..	...5446 785..	4..4113578 53	9431...25788	872.....2577	+4.....255
** OCEANIA								
SUVA/S	..........11.....	.....144....	.....4662...	....2556 53..	....432355 1.	...121..23..	....	
SUVA/L	....1.....	....31....1.	....642..141	11..8642.352	1112754436 52	..1452124 52.	...22...12..	....
WELLINGTON/S	.....1....	.....231....	.....1564 1...	....2676 3...	....6656 61..	...1532354 1.	...121..23..	....
WELLINGTON/L	.....	.....	.....2.....11	.1..52...132	112.741..452	..1252113 52.	...12...12..	....
SYDNEY/S	....3311....	....55331...	...1876 63...	...2877 76...	...3765 72..	...1432356 11	....1...252.	.....2..
SYDNEY/L	....	....	.....12....2.	....351...41	..1.6532.263	....5322364 1	....2...142.	....
PERTH	....66421...	...17864 2...	...3788 65...	...4687 771..	1..2355575 11	2....2235764	2573	.....25.
HONOLULU	....	....	.....1..	.....3..	.....1.161.	.1...2221441.	..2321..21..	...3.....
** AFRICA								
SEYCHELLES	....23663...	...14578 5...	...3557 882..	...4446 785..	41.2113578 53	952....25788	851.....2578	+2.....24+
MAURITIUS	....57664...	...16788 6...	...3667 883..	...4446 7861.	42.2113578 64	852....24799	83.....2588	+.....25+
NAIROBI	....65775...	...17778 71..	...3666 884..	1..4444 787 31	54.4111578 75	9841...24799	883.....2588	+5.....255
HARARE	....35676 1..	....46788 3..	...1566 8962.	11.3444 688 42	6514111379 87	9842....14799	883.....2588	+5.....25+
CAPETOWN	....23777 2..	....45788 41.	....6667 8731	1..1544 589 63	6414211268 98	9853....3699	8841.....478	+52.....5+
LAGOS	....58877 3..	....78888 51.	....8766 8841	22..7545 797 3	7724521258 98	9986 2...2699	7883.....478	4++.....5+
ASCENSION Is	....36446 4..	....58667 61.	....8766 7841	12..8644 587 3	6741631129 98	99964....389	8886 1....158	+++3.....2+
DAKAR	....18877 4..	....38878 61.	....6876 7841	121.8754 687 3	565.7421369 8	9895 51....489	8786 2....168	54+3.....3+
LAS PALMAS	....16766 3..	....38888 5..	....6998 983.	....8888 895 1	3431876678 95	8986643346 99	9897 4211479	+++4.....4+
** S. AMERICA								
Sth SHETLAND	.....2344..	....24566 1.	....1477 7741	111.4676 6662	464.6544 3355	6774 5311.124	3455 2.....1	.222.....
FALKLAND Is	....25674..	....47786 1.	....2687 774.	.11.4775 5552	455.7642 2355	7884 531...24	5776 2.....2	2453.....
R DE JANEIRO	.....33124..	....65346 1.	.....8656 64.	.1..1754 4562	455.4621 1266	9994 53....37	8886 2.....15	+++3.....2
BUENOS AIRES	....15354..	....37576 1.	....1676 663.	....3774 4552	344.6642 1245	7994 531...15	6886 2.....2	3++3.....
LIMA	.....6664..	.....8776 1.	.....8766 3.	.....7544 41	122.2152 1123	5782 422....3	5886 21.....1	2++4.....
BOGOTA	.....6554..	.....7775 1.	.....8766 3.	.....7644 41	112.1253 1123	6771 432....4	6886 21.....1	3+54.....
** N. AMERICA								
BARBADOS	.....6564..	....18776 1.	....4866 63.	....6754 551	122..652 1255	7772 332...26	8876 21.....4	++44.....
JAMAICA	.....3553..	.....5765 1.	.....7766 2.	.....7754 4.	.11.1154 2133	5661 4321...4	6885 21.....1	3+54.....
BERMUDA	.....3553..	.....6765 1.	....1777 73.	....2765 65.	.11..553 2354	6661 2321..36	8885 21.....3	5+54.....
NEW YORK	.....1442..	.....2664..	.....5876 2.	.....6766 4.	.....2553 453	565.1322 1135	7884 21.....3	4++4.....
MEXICO	.....442..	.....664..	.....8751.	.....7642.	.....253 111	365.3222 1..1	2784 31.....	.4+4.....
MONTREAL	.....342..	.....2664..	.....4876 2.	.....6777 4.	.....2554 552	564.1322 1235	7884 21....13	4++4.....
DENVER	.....21..	.....32..	.....1651.	.....3762.	.....5543 1	353.2.12 2112	3784 31.....	.4+3.....
LOS ANGELES	.....1..	.....32..	.....64..	.....751.	.....2642.	243.21.231.1	1584 31.1...	.2+3.....
VANCOUVER	....	....	.....3..	.....251.	.....563.	242.21.24322	2463 21..21..	.253.....
FAIRBANKS	....	....	.....	.....1..	.....1241.	22..3222 4642	2333 21..2321	..23.....

The provisional mean sunspot number for December 1994 issued by the Sunspot Data Centre, Brussels was 49.4. The maximum daily sunspot number was 99 on 1 December and the minimum was 8 on 15 December. The predicted smoothed sunspot numbers for February, March and April, are respectively: (classical method) 39, 37, 35 (±9); (SIDC adjusted values) 22, 20, 17 (±5).

IARU

JOHN ALLAWAY, G3FKM
and
TIM HUGHES, G3GVV

THE SOCIETY is proud to be able to say that Professor L W Barclay, G3HTF, was elected Chairman of the first International Telecommunication Assembly, which met in Geneva from 8 to 16 November 1993. This new organisation, the successor to the Plenary Assembly of the International Consultative Radio Committee (CCIR), acts as the management body for the work carried out by the Study Groups of the Radiocommunication Sector (ITU-R). Some 545 delegates, representing 96 countries, participated. Whilst much of their work will continue as previously, a major change will be that the studies of technical and procedural matters for World Radio Conferences (WACS) will be handled by a Conference Preparatory Meeting (CPM) organised by the Radiocommunication Agency (*in Geneva – not London*).

The Assembly's major task was the production of Agendas for the next two WRCs. The draft Agenda for WRC 95 includes:

(1) The review of a Report to consider alternatives to the way in which the radio frequency spectrum is allocated; this may also involve a review and simplification of the Radio Regulations.

(2) The review of the technical constraints associated with allocations and associated provisions for Mobile-satellite services (MSS) below 3GHz.

(3) The review of the date of entry into force of certain bands allocated to MSS (1.980 to 2.010GHz and 2.170 to 2.200GHz in Regions 1 and 3, as well as 1.970 to 2.010GHz and 2.160 to 2.200GHz in Region 2).

(4) Allocations and regulations applicable to feeder links for MSS.

(5) The review of power limits for earth stations in earth-exploration space research and space operation services in the band 2.025 to 2.110GHz.

(6) Consideration of various space service allocations in band between 8 and 35GHz, and

(7) The use of the HF bands newly allocated to broadcasting.

Amongst the items in the Draft Agenda for WRC 97 are:

(1) The review of propagation information used for the determination of coordination area in frequency bands between 1 and 40GHz when shared by space and terrestrial services.

(2) The protection of space services from 2.025 to 2.110GHz and from 2.200 to 2.290GHz.

(3) The earth-exploration satellite service in 401 to 403MHz, 13.4 to 13.75GHz and above 50GHz.

(4) 'Allocation issues of other unplanned space services.

(5) Spurious emissions, wind profiler radars, multi-service satellite networks.

(6) Examination of the HF bands allocated to broadcasting.

(7) Issues related to implementation of the Global Maritime Distress and Safety system.

(8) Transmitting frequencies for stations in the Maritime Mobile Service.

From the above, it will be noted that the main implication is the details of use *within* bands which are already allocated, rather than reallocation. The report from the Voluntary Group of Experts (VGE) concerning the simplification of the Radio Regulations will be considered at WRC 95, but these will not be substantive changes. By implication, there will probably be continuing pressure on the amateur bands, particularly 13 and 23cm, and the need continues for informed representation at Conferences.

IARU representatives during WRC 93 in Geneva were Louis van de Nadort (PA0LOU, Chairman, IARU Region 1) and Dr Larry Price, W4RA, (secretary of IARU). In addition there were many amateurs who were there as members of national delegations. Mr M Goddard of the Radiocommunication Agency (*London*) was elected Chairman of the Radiocommunication Advisory Group (RAG) and G3HTF Chairman of Study Group 3 – Radio Wave Propagation.

At the closing session of the Assembly, the Director of the Radiocommunication Bureau and the Secretary-General both complimented Professor Barclay on the efficient, productive and friendly meeting; Professor Barclay was presented with the Silver Medal of the ITU.

IARU Region 1 has now received confirmation that stand space has been allocated for an IARU exhibit at Africa TELECOM 94, which will take place in Cairo during late April. As we said last time it will most likely be manned by representatives of the Societies in the Sultanate of Oman, South Africa, and Egypt under the overall responsibility of Hans, ON6WQ, who is Chairman of the Region 1 STARS Working Group (*Support of The Amateur Radio Service* in IARU Region 1). Many officials of African and Middle Eastern countries should attend and it will be another opportunity for IARU to draw their attention to the great value of the amateur services to their countries.

A Harmonised European Plan of Frequency Allocations and Utilisation is being produced by CEPT and the CEPT ERO is now conducting its Detailed Spectrum Investigation study into the ranges 27.5 to 900MHz. This is being closely monitored at every stage and IARU input has already been made at earlier stages concerning the frequency ranges 960MHz to 3.4GHz and 3.4 to 105GHz. A questionnaire has recently been sent to all Member Societies seeking information for use in preparing Region 1's DSI-2 input. CEPT is of course not the whole world but it is an extremely influential organisation and its ideas are likely to be given serious consideration by other administrations. Wojciech Nietyksza, SP5FM, attends most meetings of relevant working groups on behalf of IARU Region 1. An idea of the high degree of IARU involvement in ITU work can be gleaned from a list of planned assignments for the period 31 January to 15 April 1994. It is as follows:

TG 2/4 (1 to 3GHz sharing) – VK3ADW,

CPM-1 WRC 95 conference preparation) – SP5FM,

VGE-7 (Volunteer Group of Experts) – SP5FM,

ITU-R Study Group 8 – W4RH,

and Radio Advisory Group – W4RA.

The Ethiopian Amateur Radio Society and the Armenian Federation of Radioamateurs and Radiosport have applied for details of membership of the IARU.

Visitors to the amateur radio station at the National University of Lesotho in Maseru.

A success for IARU Region 1 efforts to promote amateur radio in Africa – a group of newly licensed amateurs in Lesotho.

As the Pantomime Season draws to a close, here's a bit of a "Grand" Finale!

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COMET CX903 2m/70cms/23cms 6.6/9.0/13.5dB 2.95m long	£139.95
COMET CA2*4DXM 2m/70cms 8.9/12.2dB 6.05m long	£179.95
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QSL

JOHN HALL, G3KVA
Corfe Lodge, Ipswich Road, Long Stratton, Norfolk NR15 2TA.

THE NEW GJ QSL Manager is Reg Allenet, GJ3XZE, Les Sablons, Le Bourg, St Clement, Jersey.

Laurie Harvey, G4XJU, has written to let me know that his return rates for QSL cards are as follows:

JA, LU and PY	100%
DL	80%
G	74%
SM	66%
W	60%

That was out of 151 cards sent all for CW contacts. Laurie says people expect their cards too quickly and he says a two-year wait for a return is quite normal.

RSGB BUREAU HISTORY III

ARTHUR MILNE, G2MI, handed over the task to Ted Allen, G3DRN, who was the first salaried holder of the post, albeit the remuneration was very small. The work remained outside RSGB HQ and Ted and his wife sorted and distributed all the cards from their home in Wimbledon. I visited Ted there once and I can tell you there was very little room left for Ted and his family once the thousands of cards had been accommodated!

Ted tells me that the thing that most astonished him was the lack of knowledge of the system exhibited by so many users of the bureau. Not complicated matters, merely the need to sort cards alphabetically and the address to send them to!

He carried on the work until June 1989 when the incoming side was taken into RSGB HQ at Potters Bar. The outgoing cards were still sent until May 1990 when that was also transferred to HQ and Ted and his wife took a well earned rest. He is, however, still actively supporting the system as a QSL sub-manager.

The bureau now operates from RSGB HQ and is staffed by a small number of part time employees, one of whom is the bureau supervisor. A licensed amateur is nominated to liaise with the bureau to see that things work efficiently and to members satisfaction. So the wheel has turned full circle again and the bureau has returned to RSGB HQ. It is currently handling well in excess of 2,000,000 cards per year.

QSL CARDS

DUNCAN AIRD, G3MFE, was 9Q5DA in 1987/88 but his QSL manager (KC4NC) had a massive house fire after a lightning strike and all the logs were destroyed. However, the good news is that Duncan has a full copy of the log and should anyone be desperate for a card from that operation he will be glad to supply one. His address is 25 Milford Avenue, Stony Stratford, Milton Keynes MK11 1EY.

Lesley Lewis, S92YL, writes to say that Sao Tome has no official QSL Bureau and if anyone wishes to QSL direct the address is: Box 522, Sao Tome DRSTP. They would appreciate a contribution to the cost of return postage.

Cliff Underhill, G0MMI, has written to let me know that he is getting cards destined for YI1BGD and he does not want them! Cliff has written to half the ham world telling them that fact but still the cards roll in! Cliff also tells me that he has it on good authority that the YI1RJ operation is in order and acceptable for DXCC; he gets the logs for this operation and is dealing with these. However there are a number of other YI calls which are not properly documented. Cliff is also manager for LX1DM who is still in hospital following an unfortunate road accident recently. Cliff will deal with these as soon as he receives the logs.

Cliff also acts for Roger, G0TLC, who has recently operated from JY6ZZ on certain specific dates. He will deal with those relevant QSLs but no other. The motto seems to be 'ask for the route when you work them'.

'Jakey' Gould, G3JKY, has written to say that it is always a good idea to use postage stamps marked 1st or 2nd class when sending envelopes to a Sub Manager. I have mentioned that recently but it is worth repeating that such stamps never need updating. Jakey also says he is getting the odd card or two for V85KX/G3JKX and he doesn't know why! Whatever the reason is he doesn't want them.

I have received a letter from UA4AVN asking us to send QSL cards for UA4A to: Box 3, Volzhsky 404130, Russia, because they haven't had any cards from PO Box 88 for two years!

AWARDS

BOB NEWLAND, G3VW, advises me that he is the proud owner of a badge and a hand-painted Empire DX certificate (Number 204) signed by Dr Smith-Rose and John Clarricoats.

I have mentioned most of the RSGB awards that can be obtained but there are others from the UK.

Here is one of them for award aficionados. It's the RAFARS Affiliated Clubs Award, reproduced below, which is available to all licensed amateurs and SWLs who contact or hear ten RAFARS Affiliated Club stations on or after 1 January 1992. The cost of the award is £1.50 and full details of how to achieve it can be obtained from the Awards Manager, Dave Bloomfield, G0KUC, at 8 Sunningdale Drive, Boston, Lincolnshire PE21 8HZ.

Reproduced on this page is the Manchester Olympic Bid Award Certificate issued for working five of the fourteen special event stations on air during last July, August and September from the Manchester area. If you like the look of it then check your log books to see if you qualify. The stations were: GB0/2/4 MOB; GB0/2/4 OBM; GB0/2/4 MOG; GB5/2/8 MO; GB0BM and GB2OOO. The cost of the certificate is £1.50.

Also shown are the six special QSL cards produced for the occasion. If you worked all six (the 'super six') then you can see the picture they make up.

Leland Vandervort, G0SZP, has written to let me know about a new award for CW operators. It is the Samuel Morse Achievement Award which is presented by the Bedford & District ARC to any individual who demonstrates courtesy and professionalism in Morse operation. There is no cost for the award but one can only be obtained by nomination. To make such a nomination a report should be submitted to the Morse Manager at the Bedford & District ARC, 22 Queensbury Close, Bedford MK40 4RE, detailing how the nominated individual has carried out amateur operations in a courteous and professional manner. There are a number of guidelines to assist nominators and these can be obtained from the Bedford ARC Morse Manager.

The award is primarily aimed at the newcomer and younger enthusiast although it is stressed that it is available to *all* amateur radio CW operators.

It is worth mentioning that two have already been awarded. The recipients are 2E0AFW and 2E0AGN/G7ASH. I am more than happy to give such an award some publicity.

The Manchester Olympic Bid award.

RAFARS Affiliated Clubs Award.

The six special QSL cards produced for the Manchester Olympic Bid.

NOVICE NEWS

MRS ESDE TYLER, G0AEC
43 Nest Est, Mytholmroyd, Hebden Bridge, W Yorks, HX7 5BH

STARTING THIS month a new NRAE course will be running at Runcorn. Everyone passed the exam following the last course and it is hoped to match that achievement with the new class of Novices.

G0SPH sent the information – adding that Sam, G0SBI, was actively involved, not only with the class, but with Morse tuition, preparation for the full licence, and offering help and support both before and after the course. This is not unusual but if I add that Sam is 65, suffered a stroke less than a year ago and intends to be fully involved with future courses, a picture of an amateur dedicated to helping others into the hobby begins to emerge.

I am only too pleased to give credit to amateurs like Sam for their efforts, hoping that others are inspired by them. If you know of someone who deserves recognition for their work in this field, please tell me. Novices work hard and deserve success, but behind each Novice there is a dedicated Instructor who tries to ensure it.

For information on this course or other opportunities in the Runcorn area, ring 0928 701096.

ST ANDREW'S EASTBOURNE

NOVICE CLASSES began at the above school in January 1992 and students have achieved a very high pass rate with some of them studying further with the full RAE pass as their goal next year.

John, G3SER, is the Instructor for these youngsters and sent the information and the photograph to show their obvious delight. Not only did they complete the construction required to gain the pass slip, they went further.

Each boy built the Sudden – a direct conversion amateur band receiver and a 70cm HB9CV antenna from a DeeComm kit. The school then decided that it needed an all band receiver and the best way to get one was to build it. The White Rose transceiver (see *RadCom* February 1990) was chosen and everyone was involved in building at least one section of it. A six metre converter was needed next and at the time of John writing, that was under construction.

The boys' enthusiasm has been recognised by the school – a purpose-built shack has been provided equipped with an FT77 for the HF bands and an FT790R 70cm multimode. At least one of the boys could now be 2E0— giving him the chance to use the HF equipment. With four more Novice students on the way that shack may need elastic walls!

Finally, John expressed a view that I have heard before. He wonders if a small part of some telephony sections of the HF bands allowed to Novices would persuade more of them to gain their 'A' licence. As he points out, not everyone likes Morse as a first means of communication although many come to love it through use. I wonder what Novice licensees think.

OTHER MEANS

COMMUNICATION BY radio is what this hobby is all about but there are, of course, other means of keeping in touch with friends. Not least of which is by the exchange of letters. This used to be a carefully practised art but given telephones, computer generated exchanges and all other modern means, letter writing is almost relegated to the "Thank you" letter to relatives in many cases after Christmas.

There have been one or two references to pen pals recently in this column and here is another. Andy, UA3PIP, is in his mid twenties and lives a couple of hundred miles South of Moscow. He builds all his own equipment and runs QRP CW only. His knowledge of English is excellent – much of which he claims to have learnt from listening to Beatles records! He appears to have a fine sense of humour. Andy is starting up a new Club to link young people who are interested in amateur radio all round the world. A copy of his letter has been sent to *QST* in America.

Class 'B' Novices are not debarred as the postal service does a grand job in the meantime – and this could be the spur to achieve that Class 'A'. A pen-friendship could easily become a radio-friendship in the future.

If you are interested and under thirty, send a brief description plus a photograph of yourself to: A Trubachov, 301264 Russia, Tula Obl, Lipki, Gagarina 10, K14.

Lee, G0MTN, sent the information to me along with a sheet about 'The Young Operators International Club' (YOP) in which Andy sets out his aims. He would welcome interest from any youngsters who hope to take up amateur radio in the future as well as those already licensed.

He hopes to publish a newsletter – growing perhaps in time to a small magazine – where members can share ideas on all subjects. If you write, please be patient – these things take a long time to get under way.

MORSE TUITION

MORSE TUITION on computer disk has been mentioned before in this column and here is information on a tutor for those who have IBM (or compatible) computers. Derek, G4UXD, sent a disk which has given a great deal of much-needed practice to me.

From the initial learning of the characters to full test standard – both Novice and amateur – this program caters for all. You can set the character speed at anything between 5WPM and 100WPM, and the space speed from 1-200WPM depending on how much *thinking time* you need. You can have Q-codes and amateur abbreviations included in your practice along with numbers and punctuation. There are over four thousand words – carefully chosen so that pre-reading and anticipating what is coming next is practically impossible – which overcomes the biggest handicap.

There are 130 sample tests – some the new QSO style and some the plain text type – which are interesting to read and give good practice. You can type in your own text and save it in memory. When recalled, it returns as beautiful computer generated Morse – a boon for busy Morse teachers who can have passages 'that they prepared earlier' for instant use. These can then be received by students at different levels by setting the speed and spaces to their individual requirements.

The program can also receive your Morse – instructions for connecting a key to the computer are given. In fact, I couldn't find any omissions in the facilities in the times I have used it. And there is more that I have not explored yet!

The disk is available at £8.95 for the 5.25" and £9.50 for the 3.5" disks and there is a BBC/Master series version available on 5.25" disks for £8.95. Updates are available for £4 if you return the original disk. The program is personalised for you. If you would like to know more or wish to order, write to: Derek Brandon G4UXD, 1 Woodlands Road, Saltney, Chester CH4 8LB or ring 0244 683563 (home) or 0978 290666 (work)

MEETING A CHALLENGE

ALTHOUGH EMMA, 2E0AAX, has been busy taking exams, she found time to make some interesting radio contacts.

Emma has developed a system to ensure that she gets those interesting QSL cards, and it certainly works! When she gets a DX contact and wants to make sure that a card comes her way, she sends an addressed envelope with two IRCs [International Reply Coupons, available from any Post Office – *Ed*] and waits.

Two hand-painted cards, from Malawi and India, prove the point. The Malawi contact was on six metres! She contacted 3Z4PAR in Poland also on six metres, while he was allowed on that band just for a few days.

Emma considers the restrictions on power provide a challenge to Novices. A challenge she can more than meet! With 29 countries already worked on 6m and 66 countries on 10m, Emma is well on the way for the DXCC.

Novices at St Andrews School: Ronald, 2E1BJW; Ian, 2E0ACA; Rahul, 2E1BKD; Andrew, 2E1BJU; Thomas, 2E1BSQ; Ankit, 2E1BJV; and Sam, 2E1BJT.

Novice Note Book

IAN KEYSER, G3ROO
Rosemount, Church Whitfield, Dover, Kent CT16 3HZ

THIS MONTH THERE ARE two little projects, each most useful in its own way. Like many items in *Novice Notebook*, they would be equally useful to Full Licensees or Novices.

HAND HELD STAND

JACK, GM3ZVF, HAS produced a KISS version of the hand held transceiver stand featured in *Novice Notebook*, June '93, and although the additional bends make it a little more difficult to produce, it does have the distinct advantage of a storage place for spare batteries – or perhaps a charger.

CONSTRUCTION

First cut a piece of semi-stiff sheeting, such as tin or aluminium, 7" x 9.5". Then make a template from the pattern shown in **Fig 1** and transfer this to the piece of tin. Cut the tin where indicated. Then fold it carefully, avoiding sharp edges, which should be filed and sanded.

If required you can cover both sides of the stand with sticky paper or leatherette.

The lugs prevent the set falling back, and there is plenty of space at the back to keep your ear plugs and spare battery.

THE TRIPUS!

WHAT IS A TRIPUS? Well, some might know and some might have guessed that it is an invention of Reverend George Dobbs, G3RJV! George found that he was constantly going to rallies and seeing meters that he could not check or determine their sensitivity. So he designed the Tripus which I have taken one stage further by adding another cell, thus enabling it to check LEDs and seven-segment displays.

This is a simple unit consisting of two cells, two resistors and three crocodile clips on leads which are all held together with tape!

The circuit diagram (**Fig 2**) shows how the unit works. When the black and red leads are shorted together, 10 milliamps flows across the circuit and when the black and yellow leads are shorted together, 100 microamps will flow.

When testing meters, start with the black and yellow leads and if the meter reads half scale the movement sensitivity is 200mA FSD (Full Scale Deflection). If the meter flies over to FSD it is more sensitive than 100 microamps, but as the most sensitive meter that you are likely to find will be 50 microamps the meter should not be damaged.

If the meter hardly deflects at all then its sensitivity is obviously low, and this is where the 10 milliamp red lead can be used. The result obtained enables the sensitivity to be estimated in the same way as with the yellow lead.

For testing LEDs we use the 10mA leads and this should be enough to illuminate all colours if the battery is fully charged. We can also tell if seven segment displays are common anode or common cathode as we know the polarity of the battery within the Tripus.

For charging my Tripus I clip the black and yellow leads onto my nicad charger and charge in the normal way for the cell size used.

And why is it called the Tripus? Well, it only has three legs!

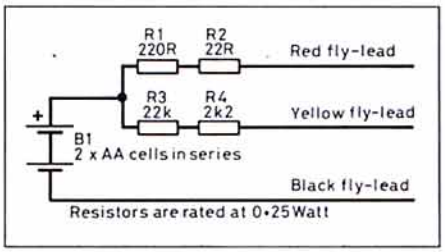


Fig 2: The Tripus can test meters, LEDs and 7-segment displays.

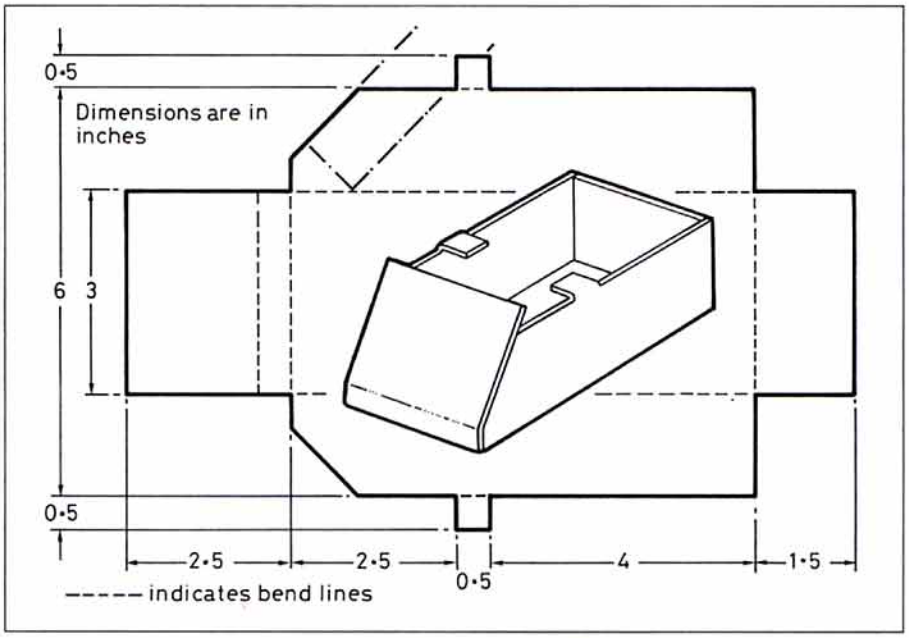


Fig 1: You will find this radio stand also includes space for a charger.

A simply constructed stand for your hand-held.

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

A 13.8V @ 30A power supply with a linear regulator can be fitted in a transceiver-matching external speaker cabinet without crowding out the speaker. **Walter Ottl, DL5MA,** showed how in *cq-DL* 2/93. He updated the details after fifty units were built.

THE PSU COMPONENTS other than the mains transformer and front-and-rear-panel items are assembled on both sides of a single-sided PCB. This makes for a package only 40mm thick which is directly mounted on a fan-cooled heatsink.

THE CIRCUIT

MAINS VOLTAGE is applied to the transformer primary, **Fig 1**, via a 3A fuse (in the UK in the mains plug), an RF-filter, an on/off switch on the front panel, a temperature switch and a *SurgeGard**. This semiconductor device is a resistor with a super-negative temperature coefficient: cold 2.5Ω, hot (at 3A) 0.15Ω. It limits the inrush current.

The 660VA mains transformer is a toroidal type with two secondary windings; the main winding is rated 2 x 16V at 20A and an auxiliary winding provides 20V at 1A. [Two or three separate transformers could be used at a slight loss of efficiency; the 20V could also be obtained by adding a 4V winding of 22 SWG or heavier enamelled copper wire in series with one 16V winding, not difficult on unpotted toroidal transformers – *G4LQI*].

The full-wave main rectifier D1 is a Schottky dual-diode in a TO-218 case. [Schottky barrier diodes have a lower voltage drop than PN junction silicon diodes, permitting the use of a 2 x 16V transformer in lieu of the more often seen 2 x 17V; the extra volt would cause additional dissipation – *G4LQI*]. Smoothing is provided by C1-5, 5 x 10,000µF; [their 25µ rating is a bit skimpy but no higher-voltage electrolytics of similar capacity and size seem to be available – *G4LQI*]. R1-2 are bleeders.

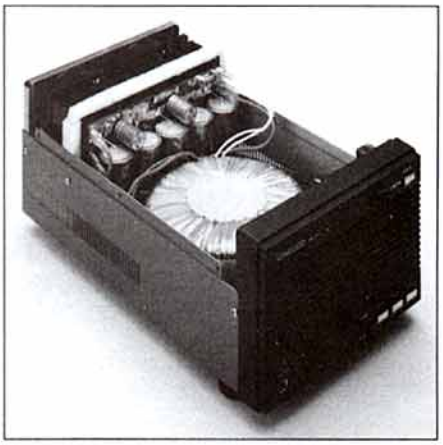
IC1 controls the three Darlingtons in parallel, TR1-3, to make a series voltage regulator. C8 provides inverse feedback across the series regulator. The emitter resistors R3-5 ensure equal current sharing between TR1-3. The voltage developed across these resistors is summed through R6-8 into the base of the current limiting transistor TR4. If the output current exceeds 33A, TR4 conducts and draws the output current of IC1 away from the bases of TR1-3. The lamp bulb LA1 lights and it could be installed on the front panel as an overload indicator.

There is no specific over-voltage protection. This power supply was designed not only for radio gear but also for industrial loads, including motors; these could generate transients which would fire the usual thyristor crowbar, an intolerable interruption of service. Most cases of over-voltage, however, are caused by a collector-emitter short within a pass transistor, which, in turn, is caused by an increase of leakage current within the transistor due to overheating. The Philips BDV67B Darlingtons were chosen for their very generous current (20A peak) and dissipation (200W) ratings. These are not exceeded even under fault conditions, and if they were, the devices would be expected to fail 'open circuit', ie harmlessly.

The output voltage can be set anywhere between 5 and 15V by changing the voltage on the control pin of IC1 by means of the voltage divider RV1-R12. RV1 is screwdriver-accessible.

The output terminals are bridged by the bypass capacitor C7 and the parallel bleeders R10-11. L1a-b, 5 turns of 2 x 2.5mm² figure-8 cable wound on a 6cm-long ferrite rod, are connected between the output pads on the PCB and the output terminals on the back of the cabinet to keep stray transmitter RF out of the regulator IC1.

The unregulated voltage from the main



A 13.8V/30A power supply in a Kenwood SP31 accessory speaker; top cover removed.

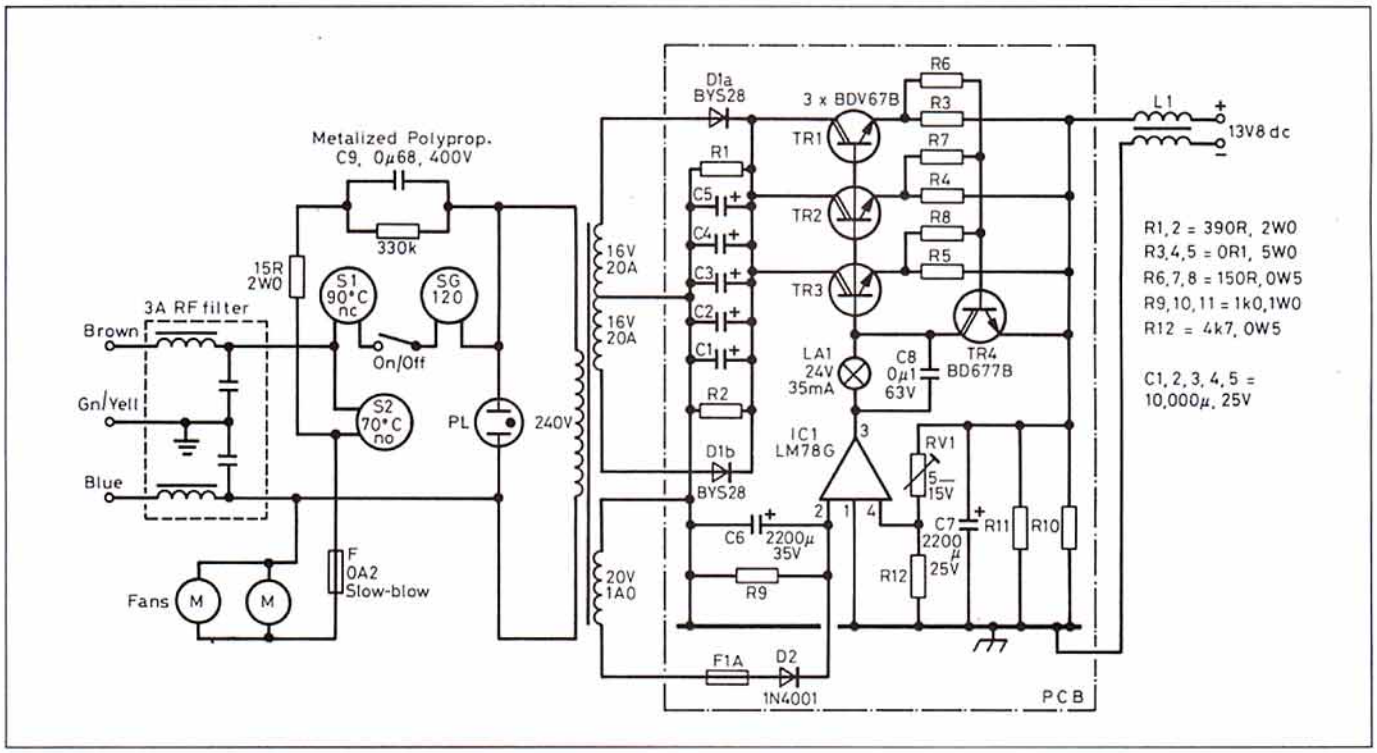


Fig 1: The circuit of the 30A PSU described by Walter Ottl, DL5MA, in *cq-DL*, February 1993.

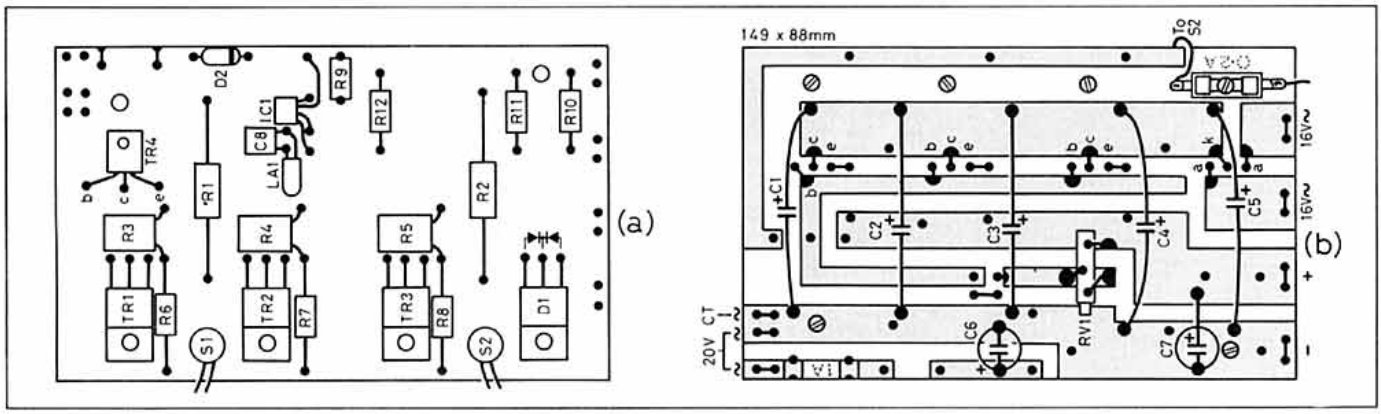


Fig 2: There are components on both sides of the PCB: a) semiconductors and resistors on the heatsink side; b) capacitors and fuses on the solder side.

rectifier is too low for IC1. Therefore, an auxilliary 24V DC supply is made up with 20V AC input from the transformer. It consists of a 1A fuse, a rectifier D2, a smoothing capacitor C6 and a bleeder R9.

KEEPING IT COOL

THE REGULATOR IS laid out for a dissipation of 600W, which can occur under short-circuit conditions only. During normal operation, no more than 150W is delivered to the heatsink.

The 160 x 100 x 40mm heatsink is fan-cooled. Two small (80 x 80 x 25mm) fans operate in parallel. One bigger unit may be used instead, depending on space on the cabinet's back panel. In either case, AC models are preferred; 12V DC units would stop if the output is short-circuited and 24V DC fans fed with unregulated DC would slow down when, under full load, that voltage would drop; just the conditions when maximum cooling is required!

The forementioned normally-closed temperature switch disconnects the mains transformer if the heatsink temperature exceeds 90° and does not reconnect until cooled to near 50°. The fans run at reduced speed whenever the mains switch is *on*; if, however, the heatsink temperature exceeds 70°, a normally-open temperature switch connects the fans for full-speed cooling, even if the mains switch is *off*, the fan slows down only after the heat sink has cooled to below 40°.

Reduction of the fans' speed is achieved by feeding them through a capacitor, C9. Its value may have to be changed for different fans. The 15Ω series resistor limits inrush current.

If this PSU is to supply no more than 20A, the fans can be dispensed with. The heat sink then must be mounted in the back panel so that the fins stick out and ambient air can flow by them unimpeded.

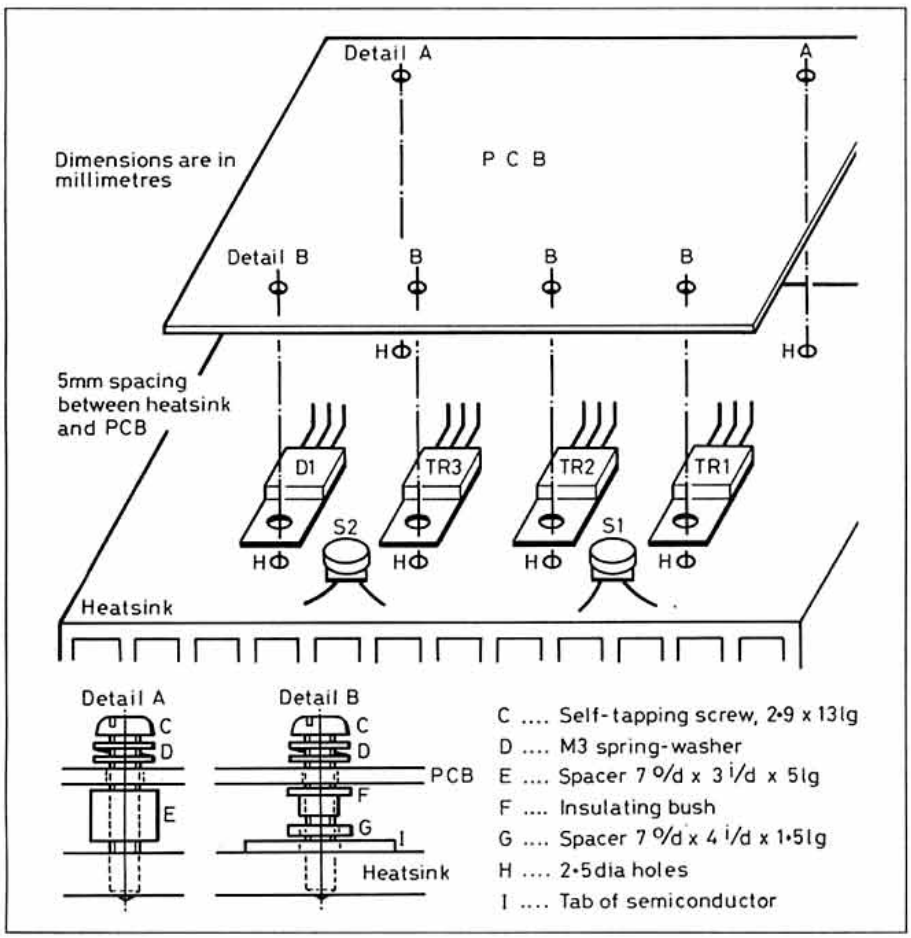


Fig 3: Assembly of the PCB to the heat sink.

THE MECHANICS

THE POWER SUPPLY was designed for mounting behind the speaker proper in a transceiver-matching external speaker cabinet such as the Kenwood SP31 or Yaesu SP102. The mains switch and neon pilot light are fitted on the front panel. The mains transformer is bolted to the bottom shell of the cabinet.

The back panel is cut out and drilled to take the fans-heatsink-PCB assembly, the mains filter/connector, the 30A(!) output terminals and a speaker jack. The latter must be insulated from the case and connected to the speaker proper with twisted leads.

The thin PCB copper tracks, though wide, cannot carry 30A. Therefore, the copper should be well-tinned after the semiconductors and resistors have been mounted. **Fig 2.**

The power transistors are bolted directly to the heatsink. **Fig 3.** Mica insulating washers would inhibit adequate heat transfer from the small transistor tabs to the heatsink. Heat-conducting silicone compound is used, but sparingly. The only insulation between the tabs at approximately +20V and the earthed heatsink is the latter's anodisation. Avoid scratches when drilling the heatsink. The transistor mounting screws tap into the heatsink, so they cannot be allowed to touch the tabs. Plastic bushes insulate these bolts. A 400V insulation test between the transistor tabs and the heatsink is recommended.

As the temperature switches carry mains voltage they are insulated from the heatsink by means of shrink tubing. 1.5mm thick rubber disks between the PCB and the temperature switches press the latter against the heat sink. A strip of foamrubber (this is shown white in the photograph) serves as a gasket between the PCB and the surrounding cabinet to keep hot air behind the heatsink and away from the capacitors in the front compartment.

* SurgeGard, Thomatronic Model SG120. In the UK, Siemens SurgeGards are sold by Electrovalue Ltd, Egham, Surrey TW20 0HB. Tel: 0784 433603.

RADCOM TECHNICAL FEATURE

Using Ceramic Resonators in Oscillators

by Ian Braithwaite, G4COL

FORTUNATELY, IT IS possible to build quite simple transmitters and receivers with very respectable performance on the air. These all require a stable oscillator, traditionally based on a resonator using either the piezoelectric effect of a quartz crystal, or a combination of inductors and capacitors.

In recent times, low cost piezoelectric ceramic resonators have become available, around which good variable frequency oscillators (VFOs) can be built. This article describes work done in this area, the intention being to stimulate further experiments.

CERAMIC RESONATOR CHARACTERISTICS

FIG 1 SHOWS A SPECTRUM analyser/tracking generator frequency response measurement of a 3.58MHz ceramic resonator, which bears a strong resemblance to that of a quartz crystal. Notice that 3.58MHz, at the centre of the plot, lies between the series and parallel resonance. From such a plot, it is possible to extract the parameters given in **Fig 2**. The peak in response is due to the resonance of the series inductor and capacitor, the higher frequency notch being the parallel resonance.

Compared with a typical quartz crystal, the series resistance is similar, and series capacitance higher by a factor of up to 100. Series inductance and unloaded Q are lower by a similar factor, and parallel capacitance is higher by a factor of about 10.

What makes the ceramic resonator promising for a VFO covering the relatively narrow range of an amateur band, is that its Q factor is several times larger than for a high quality inductor-capacitor (LC) tuned circuit, while its series equivalent inductance is much smaller than for a quartz crystal, which suggests that a much larger pulling range is possible.

In addition, ceramic resonators are physically small, and are readily available at low cost. Although the available frequencies are limited, they include 3.58MHz, conveniently in the 80 metre band (see Appendix).

PULLING THE FREQUENCY

THIS CAN BE ACHIEVED quite readily either by adding series capacitance to shift the series resonance higher in frequency, or parallel capacitance to shift the parallel resonance lower. A sample measurement using a 13-80pF variable capacitance gave an 80KHz tuning range, both for the series resonance when placed in series, and the parallel resonance when placed in parallel with the 3.58MHz resonator. Although precise measurements were not made, the Q factor was not significantly affected by this amount of pulling.

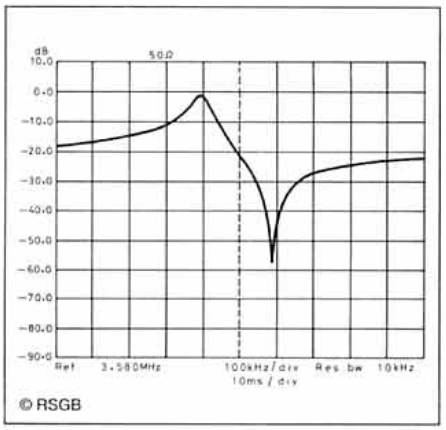


Fig 1: Frequency response of 3.58MHz ceramic resonator.

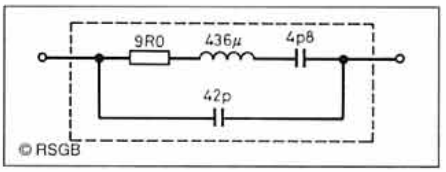


Fig 2: Equivalent circuit of 3.58MHz ceramic resonator close to resonance.

EFFECT OF TEMPERATURE

A CRUDE TEST USING a hair dryer to raise the resonator temperature from room temperature (23°C or so) to over 50°C produced the following observations:

- The shift with temperature appeared far from linear. Lowering the temperature with freezer spray shifted the frequency in the same direction as raising the temperature, suggesting a turning point to room temperature, where temperature sensitivity would be relatively low.
- For the sample tested, the parallel resonance shift of around 3kHz over the 23 to 50°C range was less than half that of the series.

Although much further work could be done, it is obvious that rapid temperature changes must be avoided if a low drift rate VFO is to be achieved.

FREQUENCY ACCURACY

FIG 3 SHOWS THE SCATTER in frequency of seven resonators placed in an oscillator circuit. The range is about 0.2%. The specification allows ±0.5%, and so some trimming must be included in the oscillator design.

A PRACTICAL OSCILLATOR CIRCUIT

THE CIRCUIT OF A CERAMIC resonator VFO is given in **Fig 4**. The oscillator operates in the high impedance, parallel resonant mode because the series resonance occurs a little below the 80 metre band, and pulling it up would have wasted tuning range. A 50pF air-spaced variable capacitor is the main tuning element, with a 90pF trimmer used to set the frequency. The oscillator transistor is a J310 junction gate FET, and a common base transistor buffers the output.

A voltage regulator feeds both the receiver incremental tuning (RIT) control and the base of the buffer transistor, which in turn regulates the oscillator drain voltage. This arrangement results in very low sensitivity to supply voltage changes. The oscillator was constructed on a small printed circuit board as the photograph shows.

RESULTS

TABLE 1 GIVES SOME DRIFT figures for the oscillator. Although these cannot be guaranteed to be reproduced consistently, they were obtained without any special effort, and are very acceptable. The resonator is not noticeably sensitive to vibration.

The oscillator is the signal source for a three-band direct conversion transceiver, the 40 and 20 metre bands being obtained by frequency multiplication. Coverage on 80 metres is a little over 20kHz with the values given, the RIT range being 1.5kHz at the high capacitance, and 3kHz at the low capacitance end of the main tuning capacitor. The resonator is not noticeably microphonic.

CONCLUSIONS AND SUGGESTIONS

CERAMIC RESONATORS offer the constructor a cheap and convenient way of making compact VFOs with the stability of a good LC oscillator and much greater tuning range than that of a crystal oscillator.

The limited set of available frequencies is not as much of a disadvantage as might be thought. Most of the amateur bands have a lower boundary at a multiple of 1MHz, which can be exploited in a number of ways. For instance, I built a multi-band transmitter using an oscillator phase-locked to a multiple of a

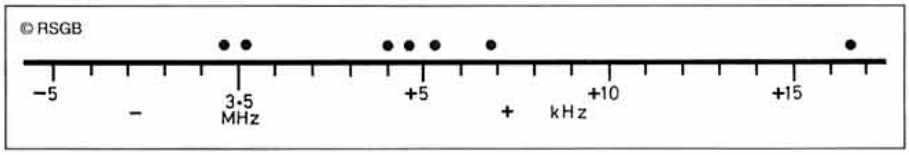


Fig 3: Scatter in frequency of seven 3.58MHz resonators.

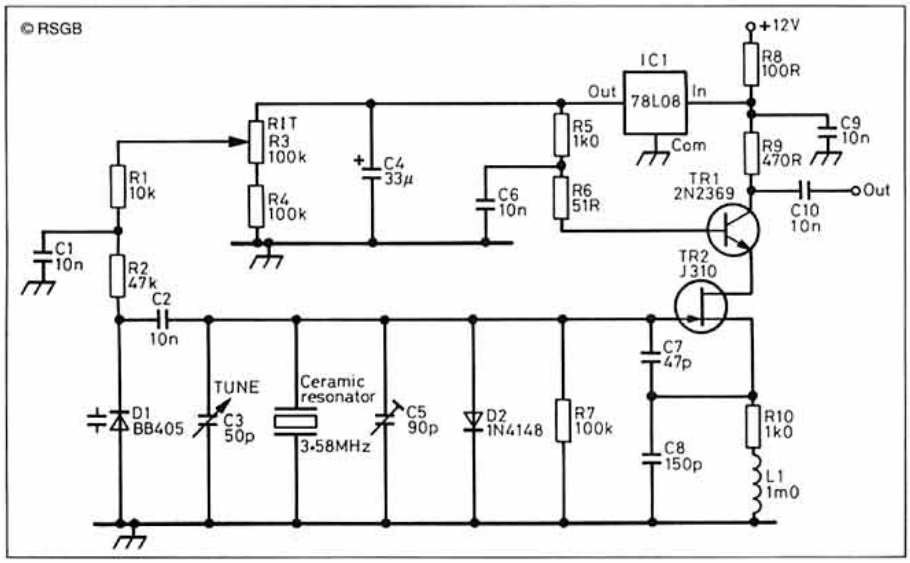


Fig 4: Circuit diagram of ceramic resonator VFO.

1MHz ceramic resonator VFO, covering 7, 14, 18, 21 and 28MHz with a tuning range of over 150kHz on 28MHz.

Fertile areas for experimentation might be temperature compensation or stabilisation, miniaturisation, direct keying and frequency modulation. There is clearly scope for some fun with these devices.

Elapsed time	Frequency (MHz)	Drift (Hz) from datum
0	3.550321	0
1 min	3.550306	−15
9 min	3.550302	−19
28 min	3.550314	−7
3hr 27 min	3.550350	+29
3hr 58 min	3.550338	+17

Table 1: Drift figures for ceramic resonator oscillator.

APPENDIX

WHERE TO OBTAIN CERAMIC RESONATORS

The following frequencies are available for less than a pound each from Electromail (RS Components): tel 0536 204555, or Maplin, tel: 0702 554161 with stock codes as shown:

Frequency (MHz)	Electromail Code	Maplin Code
0.5	658-514	DJ28F
1	656-158	CP91Y
2	656-164	DJ30H
3.58	656-170	DJ31J
4	656-186	DJ32K
4.19	656-192	DJ33L
4.91	656-209	DJ34M
6	656-215	DJ35Q
7.37	656-221	DJ36P
8	656-237	DJ37S
10	656-243	DJ38R
11	656-259	DJ39N
12	656-265	DJ40T

Simply Silicon

by Paul Lovell, G3YMP

CML FX365C CTCSS Encoder/Decoder

- Low voltage (down to 3V) supply
- 39 programmable sub-audio tones
- High voiceband/CTCSS isolation
- Separate sub-audio and Rx/Tx audio paths and filtering
- Applications in amateur radio and PMR
- 24 pin DIL (J suffix) or surface mount packages

MORE AND MORE repeaters are being fitted with the Continuous Tone Coded Squelch System (CTCSS), especially on 70cm. Of course, the older 1750Hz access tones can still be used, but CTCSS has a number of advantages. These include the ability, to monitor one particular repeater on a given channel when several are within range. On the transmit side, CTCSS permits access to one repeater when the appropriate sub-audio tone accompanies the transmission.

An integrated circuit from CML Semiconductor Products, the FX365C, takes all the hard work out of adding CTCSS to an NBFM (narrow-band FM) transceiver, and looks ideal for those who wish to update their rigs. Although the device is capable of encoding and decoding all 39 tones used in commercial systems, the amateur service at present only uses nine of these, as shown in **Table 1**. For amateur radio repeater purposes, the UK has been divided into 23 different CTCSS regions. These were illustrated in *RadCom*, Oct 92 and can also be found in the 1994 *RSGB Call Book* (see *RSGB Book Case* on pages 94/95).

MANUFACTURER'S DATA

THE FX365CJ IS A 3 volt, half duplex predictive CTCSS encoder/decoder microcircuit. It has integral voice-band filters for the pre-filtering of Tx audio and the rejection of the CTCSS tone on receive.

Under microprocessor control, the FX365C will encode and decode any one of 39 sub-audio frequencies (plus no-tone) in the range 67.0Hz to 250.3Hz. Tone frequencies and all functional commands can be loaded to the device in either pin-selectable 8 bit parallel or serial format.

A separate Rx/Tx voice-audio path is available with a high pass (sub-audio reject) filter automatically placed in the relevant voice line **Fig 1**. The functional block diagram is shown in **Fig 2**.

The receive sub-audio CTCSS path contains a bandpass filter for the selected tone frequency. It also has a period detector which provides a logic level output (Rx tone detect) to indicate a successful decode operation.

Rx 'Press to Listen' (PTL) and Tx 'Squelch-tail elimination' are available in both command loading modes. The squelch-tail elimination function will provide Tx tone phase-reversal to minimise the annoying audio outputs that occur at the receiver on completion of a transmission.

Tone frequencies and filter accuracies are maintained by an on-chip 1.0MHz clock oscillator with external crystal or clock pulse input.

The FX365C, which exhibits high performance at both audio and sub-audio frequencies, is available in 24-pin/lead DIL, small outline and quad surface mount packages. Connections to the various external functions, and some typical component values are given in **Fig 3**.

SOUND CHOICE

DIFFERENT INPUT pin combinations select the functions as in **Table 1**. An 'x' indicate a 'don't care' condition, and the top line (a) with both PTL and Rx(0)/Tx(1) inputs at zero is the normal tone transmit condition. Line (b) with PTL=1 is the tone Tx mode with phase reversed. Line (c) in the table (No tone) shows a mode which enables the transmit path, even though there is no sub-audio tone generated.

The remaining four input options are for receive modes. Line (d) is normal decode standby and, below this, line (e) uses the PTL input to enable the receive audio path. Line (f) shows the normal 'decode of correct CTCSS tone' condition, and as the table shows PTL has no effect here.

The last condition, line (g), is with the data input switches selecting a no-tone combination. This enables the receive audio path, and leaves the tone transmit output open circuit.

The switch selections for different tones used on current UK amateur repeaters are shown in **Table 2**. All 39 sub-audio tones are available if required.

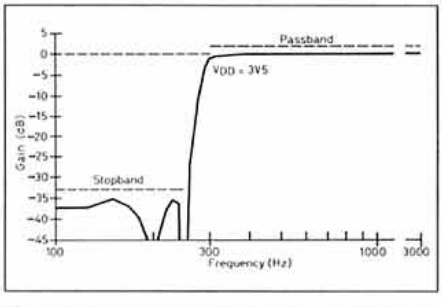


Fig 1: Voiceband filter response. CTCSS tones have practically no effect on the received audio.

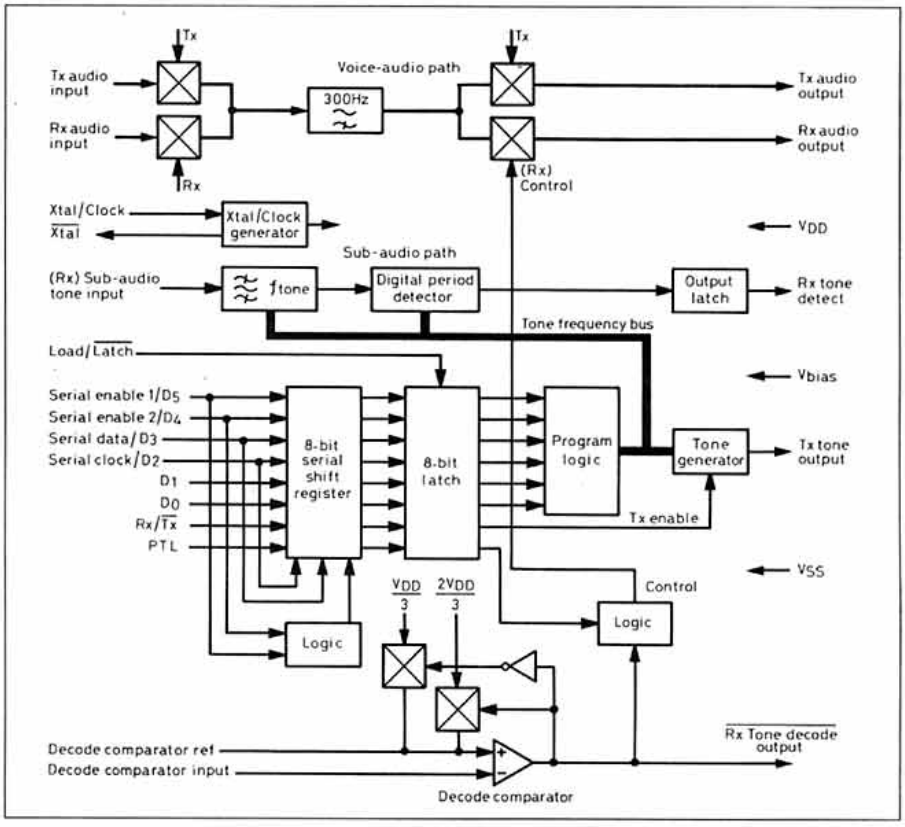


Fig 2: Functional block diagram of the FX365C integrated circuit.

	D0 to D5	Rx/Tx	PTL	Decode Comp. Input	Rx Tone Detect	Rx tone Decode	Tone Tx Enabled	Tx Tone Phase Reversed	Tx Audio Path Enabled	Tone Decoder Enabled	Rx Audio Path Enabled
(a)	TONE	0	0	x	0	1	Yes	No	Yes	No	No (BIAS)
(b)	TONE	0	1	x	0	1	Yes	Yes	Yes	No	No (BIAS)
(c)	NOTONE	0	x	x	0	1	No (BIAS)	x	Yes	No	No (BIAS)
(d)	TONE	1	0	0	0	1	No (o/c)	x	No	Yes	Yes
(e)	TONE	1	1	0	0	1	No (o/c)	x	No	Yes	Yes
(f)	TONE	1	x	1	1	0	No (o/c)	x	No	Yes	Yes
(g)	NOTONE	1	x	x	x	0	No (o/c)	x	No	Yes	Yes

Table 1: Combinations of input and output conditions.

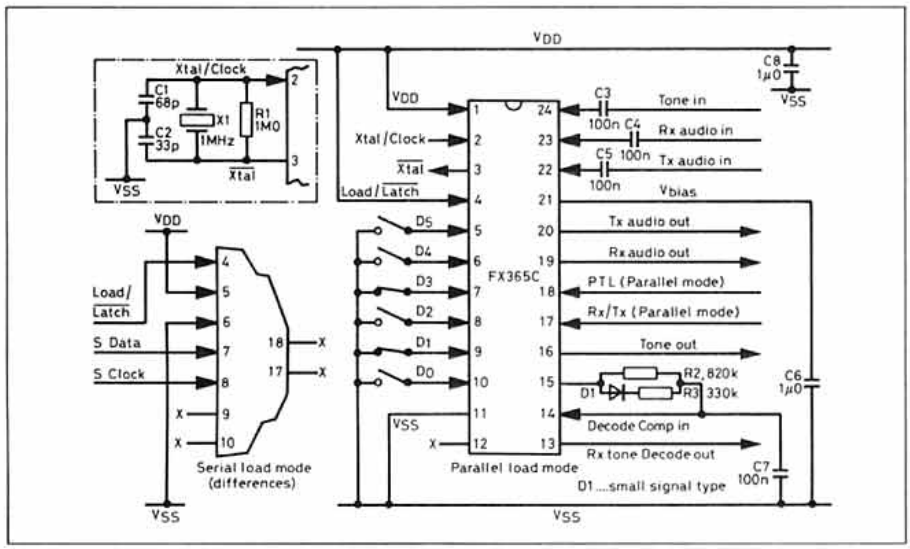


Fig 3: **Recommended external components. The device can either be used with parallel input tone selection, or programmed in serial input mode from a microcontroller.**

AVAILABILITY

THE CML FX365CJ (24 pin DIL version) is available from Joseph Electronics Ltd, 2 The Square, Broad Street, Birmingham B15 1AP, tel: 021 643 6888. Price including P&P is £14.59 + VAT. Cheque with order is required, and it is advisable to telephone the company for current delivery times. Please mention *RadCom* when ordering.

CHARACTERISTICS

Supply voltage:	3.0 to 5.5V
Decode I/P level:	–20.0dBm typical
Encode tone o/p level:	627mV typical
Encode harmonic distortion:	2% typical

NOTE: Device characteristics and application notes in *Simply Silicon* are compiled from manufacturers' published data. Circuit diagrams are included for experimental purposes only, and have not been proven by *Radio Communication*. Transmitting equipment must be operated in accordance with national regulations. All data is copyright of the device manufacturer.

Tone Area	Nominal Freq(Hz)	FX365C Freq(Hz)	Error %	D_0	D_1	D_2	D_3	D_4	D_5
A	67.0	67.05	+0.07	1	1	1	1	1	1
B	71.9	71.90	0	1	1	1	1	1	0
C	77.0	76.96	–0.05	1	1	1	1	0	0
D	82.5	82.59	+0.10	0	1	1	1	1	0
E	88.5	88.61	+0.13	0	1	1	1	0	0
F	94.8	94.76	–0.04	1	0	1	1	1	0
G	103.5	103.43	–0.07	0	0	1	1	1	0
H	110.9	110.77	–0.12	1	1	0	1	1	0
J	118.8	118.8	0	0	1	0	1	1	0
	No-tone	No-tone		0	0	0	0	1	1
Serial Input Mode				x	x	Clock	Data	0	1

Please note: 'x' = 'don't care' condition – input '1' or '0'.

Table 2: Tone programming inputs. Although a total of 39 are available, only those currently used for amateur repeaters are shown above.

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HL100B/80	80M Linear, 10W in 100W out PEP	**210**	C
HL66V	6M Linear, 10W in 50-60W out Rx Preamp	**149**	C
HL166V	6M Linear, 3/10W in Auto select 80/160W out Rx Preamp	**299**	C
HL37VSX	2M Linear, 0.5-5W in 20-35W out variable gain preamp	**109**	B
HL62VSX	2M Linear, 5/10/25W in 50W out preamp	**235**	C
HL36U	70cm Linear, 6/10W in 25/30W GaAs FET Preamp	**155**	B
HL63U	70cms Linear, 10/25W in 50W out GaAs FET Preamp	**259**	C
HL180V	2M Linear, 3/10/25W i/p auto select 170W out Rx Preamp	**389**	C
HL130U	70cms Linear, 3/10/25W i/p auto select 120W out Rx Preamp	**485**	C
Transvertors			
HX240	2M to HF 80,40,20,15,10M 2.5/10W Drive 30-40W o/p	**329**	B
HX640	6M to HF Specs as above	**329**	B
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LPM432-3-50	70CM 3W in 50W out	~~£260~~	**205.00**	C
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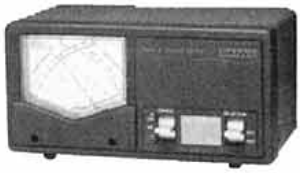

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PRODUCT NEWS

Note: Product news is compiled from press releases sent in by the manufacturers and distributors concerned. Details are published in good faith but *Radio Communication* cannot be held responsible for false or exaggerated claims made in the source material.

NEWS JUST IN, from Chris Smith, Managing Director of **LMW Electronics Ltd**. Despite moving to new premises service to radio amateurs continues as normal. As well as an extensive supply of components, the company also produces an interesting range of kits for the UHF and microwave bands.

If you're active or just interested in 70, 23, 13 or 9cm amateur band operation why not take a look at their latest catalogue. It's free to *RadCom* readers – just send an A5 SAE to the company at their new address:

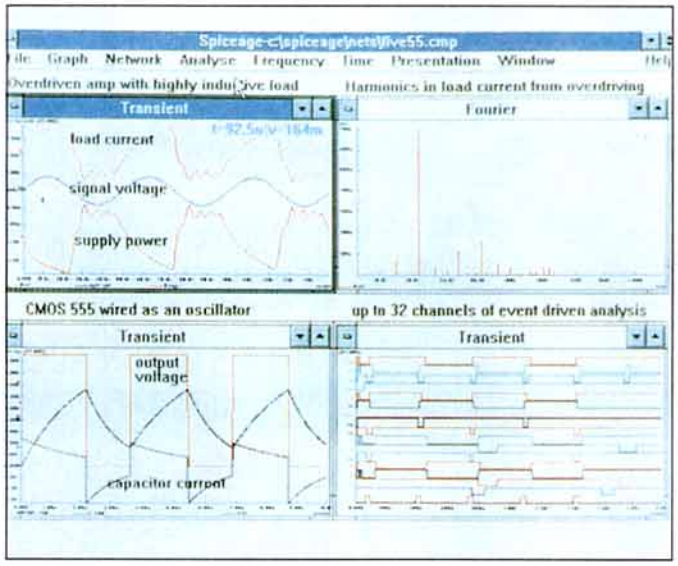
LMW Electronics Ltd, LMW House, Leeside, Merrylees Industrial Estate, Desford, Leics LE9 9FS. Tel: 0530 231143.

SOME CW ENTHUSIASTS will have heard about the splendid little **KIRSTA Iambic Keyer**. First marketed by Kirsta of Scotland, kits are now being supplied by Kanga Products. The unit is built on a PCB about 2 x 1.25in, and has to be seen to be believed. You could do worse than write off for the latest Kanga catalogue: It features kits for both the beginner and more advanced constructor, including some useful items of test equipment. Kanga supply kits for a number of *RadCom* and *D-i-Y Radio* construction projects, as well, as the G-QRP club's *Sprat*. The catalogue is free provided you enclose an A5 size SASE.

Available from: Kanga Products, Seaview house, Crete Road East, Folkestone CT18 7EG. Tel: 0303 891106.

DAVID THOMPSON, K4JRB, has announced the publication of the 1994 edition of the **Amateur Radio Mail Order Catalogue and Resource Directory.** It has 250+ pages, nearly 200 categories and lists more than 1,600 mail-order products and services for the radio amateur. It includes a list of amateur radio bulletin services and a directory of foreign (non-US) amateur radio magazines. Price is $16 plus postage. Available from:

Resource Solutions, 6050 Peachtree Parkway, Suite 340-228, Norcross, GA 300092, USA. Tel:0101 404 448 9836.



MANY READERS will have heard of the famous SpiceAge analogue and digital analysis software for the IBM-PC and compatibles. The new Windows version, **SpiceAge 3** has just been released and this offers a number of new facilities over its predecessor. In fact SpiceAge 2 was believed to be the fastest analogue simulator of its type, and the new version is even faster. Major new features include: (i) An optimising algorithm to cut out redundant transient analysis calculations, (ii) A 32-channel logic analyser-style display for digital signals with adjustable low-high threshold, (iii) A new digital signal input syntax with individual and bus groupings, (iv) The Zetex SPICE library and (v) A new op-amp model topology in the library.

Many smaller improvements to the software have also been introduced by the company, who say they have been specialists in circuit simulation software since 1982. Further details from:

Those Engineers Ltd, 31 Birbeck Road, London NW7 4BP. Tel: 081 906 0155.

CIRKIT'S NEW 240 page **Electronic Constructors Catalogue** is now on sale. It has an extra 16 pages compared to the previous one – packed with new products. The kits and modules section is again expanded with further additions from Velleman – Europe's leading kit manufacturer. New kits include a digital tachometer, audio spectrum analyzer and five audio power amplifiers. Other new items in the catalogue include high-capacity NiCad batteries with two-hour fast chargers, shortwave portable receivers and the latest technical books, including several on amateur radio by *D-i-Y Radio* contributor, Ian Poole. The popular RC14 20m direct conversion receiver, originally featured in *RadCom*, is also included. The catalogue is available from branches of WH Smith or direct from Cirkit price £2.20 including p&p:

Cirkit Distribution Ltd, Park Lane, Broxbourne, Hertfordshire EN10 7NQ. Tel: 0992 448899.

THE 128 PAGES of issue 17a of the **PC Reference Shareware Guide** contain some of the best shareware programs around. There is a comprehensive range of software for IBM-PC compatible computers, and amateur radio topics are well catered for. There is a special selection of programs for radio amateurs and short wave listeners.

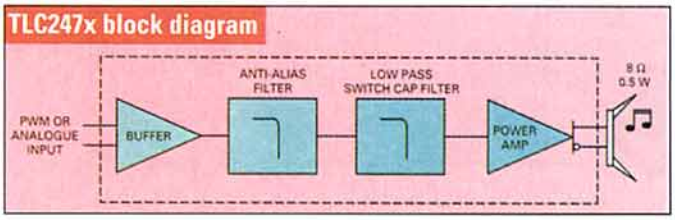
This selection features Morse code tuition, antenna design, propagation predictions, satellite tracking, PCB design, circuit analysis and much more. CD ROMs covering a number of different topics are also featured in the catalogue, which is obtainable free from:

The Public Domain and Shareware Library, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: 0892 667473.

WHAT WILL they think of next? Just when you thought you'd seen it all, they've come up with a range of audio amplifier chips which accept either analogue or digital inputs! The new **Texas Instruments TLC247x** family of integrated circuits also incorporate low-pass switched capacitor filters, and have a power output of 500mW into an 8Ω load. They're available in standard 8-pin DIL packages.

Four ICs make up the range, and each can operate from a single 5 volt supply. A particularly useful feature of these devices is their ability to switch automatically to a 10μA standby mode when no input signal is present – a great idea for portable equipment. The digital input decodes pulse width modulated (PWM) signals and an anti-alias filter is included in the chip to prevent high frequency noise. In digital mode the loudspeaker volume is controlled with a single pin connection.

Further details from: Texas Instruments, European Literature Centre, Blackhorse Road, London SE99 7UB.



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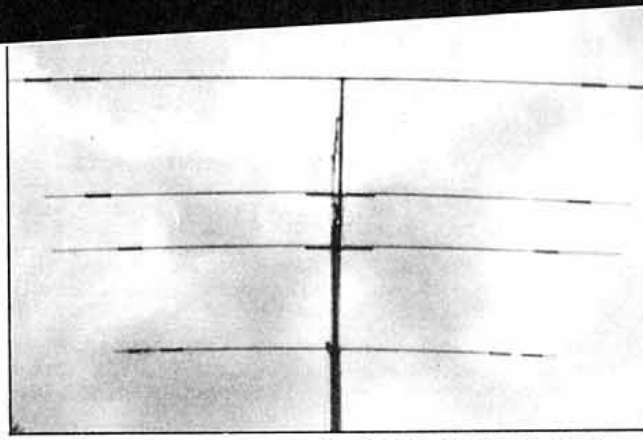

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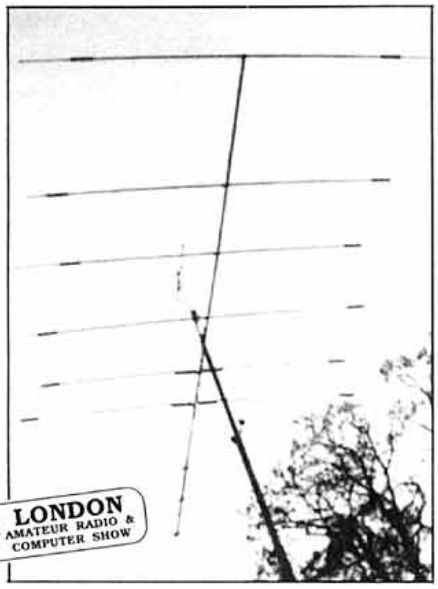

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Pat Hawker's Technical Topics

A 3KV 600MA OVEN PSU

JOHN HARPER-BILL, G3IZM, was interested in the salvaging and recycling of high-voltage transformers and other components from scrap microwave ovens as noted by Dave Penny, G3PEN, in the November 1993 *TT*, p47. G3IZM is professionally connected with the domestic appliance industry and as such has access to many scrap items from microwave ovens. He writes:

"The power supply for my 4CX1000 linear amplifier is made from two identical oven transformers. As suggested by G3PEN it is dangerous to lift the earthy end of the secondary winding as the insulation to ground is insufficient. However if two identical transformers are used, both earthed ends can form the centre tap of a 2700-volts-plus transformer which will deliver well over 500mA. Obviously, correct phasing must be observed when paralleling the primaries, but the result can be full-wave rectification with consequent improvement of the ripple filter, working at 100Hz rather than 50Hz.

"If you have enough scrap microwave ovens, you can also recycle the high-voltage rectifiers. Some ovens use non-encapsulated diodes that can be used directly but other diodes are encapsulated in oil in the 'HV Unit'. This is a can containing both the capacitor and the diode. In this case you need four HV units as the diode dissipation is enhanced by being in oil. The cans may be cut open and the diodes removed. I series-connected two diodes in each leg of a full-wave rectifier as shown in **Fig 1**. The diodes as removed from the cans already had the 200k resistors across them."

G3IZM's PSU incorporates an AC Variac to provide an input to the transformers of 0 – 250V AC, providing an adjustable 0 – 3000V DC output. The smoothing capacitor consists of ten 400V electrolytic capacitors fixed to the aluminium plate. The diodes are mounted on a stand-off board parallel with disc ceramic and 330k resistors (he removed the original flat-film 200k resistors).

The 600W oven transformers used by G3IZM are made in Bristol by Jackson Appliances Ltd (Model 001) with nominal ratings as follows: primary 240V, 4.92A; secondary: 2765V, 0.58A, heater 3.35V, 14A; frequency 50Hz, Insulation class H.

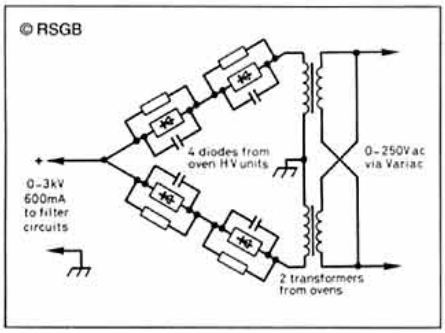

Fig 1: Basic details of G3IZM's high-voltage power supply unit based on two ex-microwave ovens and four ex-oven high-voltage rectifiers. Fed via a Variac this provides 0 – 3kV DC at up to 600mA to the ripple filter circuit including ten 400V electrolytic capacitors. Without the input Variac the unit would function as a 2.8kV high-voltage unit. The PSU includes soft-start circuits. At these voltages extreme care should be taken to avoid any risk of lethal shock from the PSU or associated amplifier.

These are used on Creda microwave ovens (and similar ones on Hitachi ovens). Class H insulation implies that they can run at extremely high temperature without damage. The usual voltage of filament winding on oven transformers is 3.37V at 14A; G3IZM does not use these windings in his PSU; since they have few turns they can be fairly easily removed if not required.

It goes without saying that with any high-voltage power supply unit and the associated linear amplifier, it is essential to recognise that the voltages concerned are lethal and *great care* should be taken to ensure complete safety!

G3IZM also adds to G3PEN's list of useful material that can be salvaged from ovens. He writes: "There is still more to be got from the scrap oven. G3PEN may like to know that dud magnetrons also yield useful parts. Most commercial magnetrons are held together with 'toymakers tabs' which can easily be prised open to liberate two extremely powerful ring magnets. One of these has been tested as a 'mag mount' at up to 100MPH carrying a 144MHz quarter-wave whip antenna!

LOW-NOISE UHF PRE-AMPLIFIERS

AT UHF, UNLIKE HF, there is still a requirement for high gain, low-noise signal-frequency pre-amplifiers, and at such frequencies the GaAs FET devices are now being joined by various HEMT (High Electron Mobility Transistor) and related devices (see *TT*, August 1992, p40 for the noise figures of various state-of-the-art modulation-doped field-effect devices).

In the ARRL's *QEX* (November 1993), Zack Lau, KH6CP/1 describes a 13cm (2.3-2.45GHz) preamplifier which uses an NEC NE32684A PHEMT device and 100pF ATC IOOA chip capacitors with a measured noise figure of approximately 0.4dB and a gain of around 14 to 17dB.

Two MGF1302 GaAs FETs are used by Davide Cardesi, I1DDS, (*Radio Rivista*, November 1993 p36) for a 900-1800MHz low-noise pre-amplifier: **Fig 2**. At 1296MHz this has a gain of some 27dB and a noise factor of 1.5dB, and is based on a design by Matjaz Vidmar, YT3MV, published in *VHF Communications*, February 1992.

THE COMUDIPOLE IS REVISITED

JOHN HEYS, G3BDQ, ADDS a suggestion concerning the PA0SE 'Comudipole' multiband antenna (*TT*, May): "The technique of having a 'pre-ATU' matcher is one I have found useful, especially on 1.8 and 3.5MHz when using end-fed wires presenting an unworkable impedance/reactance into a conventional ATU.

"I feel, however, that the PA0SE design as shown presents a practical problem: weight and sag. The balun as described will have appreciable weight (500cm of coax plus former and hardware) with the coax downlead, even when using RG58 or similar, will add to this. Were I to make a similar antenna, I would have a vertical section using open wire, 300Ω slotted line, or the new, excellent 450Ω slotted line which would descend down to a wood pole about 10ft (or less) high, at the top of which would be the balun. Onwards would be the coax (even heavy UR67) which could be run along the ground to the operating posi-

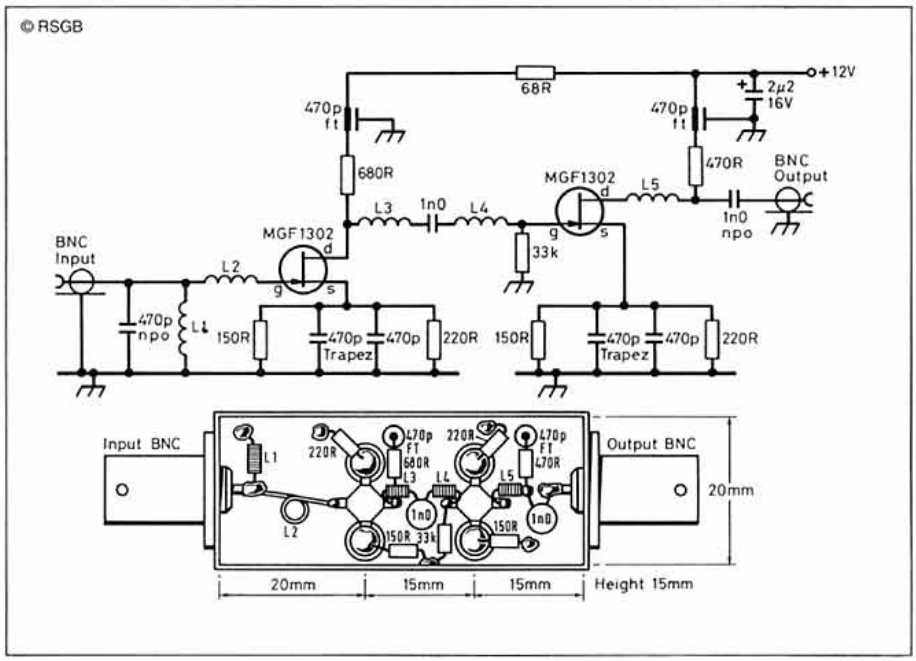

Fig 2: 1296MHz (900-1800MHz) low-noise UHF pre-amplifier as described by I1DDS providing some 27dB gain and a noise factor of 1.5dB based on an earlier design by YT3MV. L1 6cm of copper wire of diameter 0.15mm with diameter 1mm. L2 1 turn of silvered copper wire diameter 0.5mm to a diameter of 3mm. L3 and L4 represent the inductance of the 1nF (NPO) capacitor. L5 is the inductance of the GaAs drain lead.

tion. An added bonus to this scheme would be that the open-wire part of the downlead would in effect increase the total length of the antenna, making it effective on 3.5MHz even were the top (A-B) only 60 or 70% of the half-wave dipole length for the lowest frequency band." G3BDQ adds: "The high SWR on the coax (up to 20:1) means that for powers above about 100W it would be advisable to use good quality UR67 or similar to avoid the flash over that could occur with 'thin' cables." **Fig 3**.

I might also add that the weight problem with the balun situated as specified by PA0SE might also be overcome with the antenna erected as a symmetrical inverted-vee with central support.

SUPER-LINEAR FRONT ENDS

BY COINCIDENCE, TWO VERY similar comments have come to me in respect of the *TT* items on the double-balanced quad-FET mixers described originally in *QST* by Jacob Makhinson, N6NWP, (*TT*, September 1993) and the improved H-mode variation of Colin Horrabin, G3SBI, (*TT*, October). A letter from J Broutin, RS87251, of Biscarrosse, France and a telephone call from B J Mitchell, G3HJK, both felt that full acknowledgement for the early development of super-linear receiver mixers should be given to W K Squires, W2PUL, who in 'A new approach to receiver front-end design' (*QST*, September 1963) was the first to draw attention to the importance of balanced switching mixers based on beam-deflection valves such as the now virtually unobtainable 7360 in improving the strong signal performance of single and multiple conversion communication receivers. The 7360 had originally been developed by RCA as a high-level mixer for SSB transmitters and W2PUL appears to have been the first to investigate in depth its value as a receiver mixer: **Fig 4**. Some details of this article and W2PUL's mixer duly appeared in *TT* (December 1963) and subsequently in every edition of *Amateur Radio Techniques* including *ART – Edition 7* which is still in print.

W2PUL's radically new approach to receiver design (no RF amplifier was required in front of the 7360 mixer) was subsequently adopted for the Squires-Sanders SS-1R receiver but soon afterwards both Squires and Sanders were killed in an air crash. The merits of the balanced beam-deflection mixer lived on. In the UK such a mixer was used by Peter Martin, G3PDM, for a hybrid valve-solidstate receiver described in a series of articles in *RadCom* under the title 'Plagiarize and Hybridize' and most recently by Ray Howgego, G4DTC, in his 'hybrid ultimate' receiver of which the front-end was described in *TT*, December 1987, and subsequently appears in the new *Technical Topics Scrapbook, 1985-89* [see *Book Case* page 93 – *Ed*].

W2PUL showed that a 7360 balanced switching-mixer could cope with extremely strong signals without cross-modulation or desensitization (blocking) but in 1963 little attention was paid to the IMD products of receiver mixers and amplifiers. At that time valve-mixers were still superior to solid-state mixers. However in 1968, R P Rafuse presented a paper 'Symmetrical Mosfet mixers of high dynamic range' including an arrangement with a dynamic range of 115dB. His experimental double-balanced broadband HF mixer used four Fairchild 2N4067 FRET devices with a local oscillator power of 2.5 watts (*TT*, March 1973, Fig 1).

Ed Oxley, KB6QJ, of Siliconix developed a basically similar double-balanced JFET mixer covering 50-250MHz using four U310 (*TT*, March 1973), **Fig 5**, as the forerunner to a series of high-performance switching (commutation) mixers based on integrated FET arrays such as the Si8901 used by N6NWP and the D5000 used by G3SBI. By the 1970s it was recognised that probably the most critical characteristic of a receiver was the hypothetical 'third-order intercept point' roughly some 15dBm higher than the compression point. Peter Chadwick, G3RZP, has pointed out that although the basic strong signal handling performance of the 7360 was extremely good, its intercept point was less impressive. The H-mode mixer is thus truly state-of-the-art for HF mixers.

Both RS87251 and G3HJK drew attention to an article by Ray Moore, 'Designing communications receivers for good strong signal performance' (*Ham Radio*, February 1973) in which he discussed the problem of intermodulation. However it was not until later than this characteristic began to be usually specified in terms of ±dBm.

A number of articles by Ulrich Rohde, DJ2LR, while working in the USA, have further described high-performance solid-state mixers, and the advantages of doubly balancing instead of singly-balancing as in the original W2PUL 7360 mixer are now well recognised. However, it seems appropriate to trace the lineage of high-performance mixers including the latest H-mode mixer which can be seen as a direct descendant of W2PUL's 7360 mixer and the radical approach he adopted for the SSR-1 receiver of 1963.

GROUND-PLANE CONSTRUCTION VERSUS PCBS

DURING 1992 A NUMBER of items in *TT* pointed out that for home construction there were valid alternatives to the use of d-i-y printed circuit boards, which seem too often to be accepted as the essential technique for modern electronic circuitry. Mike Graber, WA1SVF in the regular Lab Notes column of *QST* ('Printed-Circuit Board Circus', October 1993) provides guidance on using and making your own PCBs, but also asks: "Printed-circuit boards seem to be almost universal these days, but are they really necessary?" The answer given by WA1SVF is: "In most cases no. In fact, many other construction techniques, such as wire wrap, 'ugly' construction, breadboarding and point-to-point wiring, are frequently used by the home electronics hobbyist. The best technique for a particular project depends upon its complexity, the need for easy modifications during development, durability, the environment in which it will be used, ease of construction, components used, operating frequency and other circuit requirements."

But WA1SVF then concentrates solely on etched-PCB construction. It seems apposite

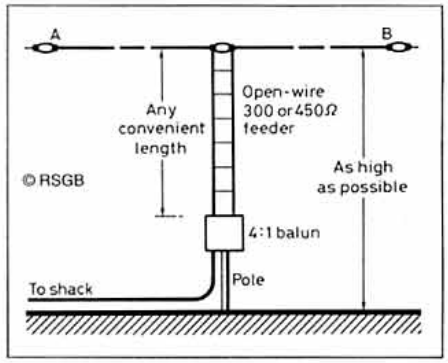

Fig 3: G3BDQ suggests that supporting the pre-match-unit (balun) of PA0SE's 'Comudipole' multiband HF antenna (*TT*, May) on a low pole with an open-wire section would minimize sag and weight problems and permit effective use of smaller A-B top spans.

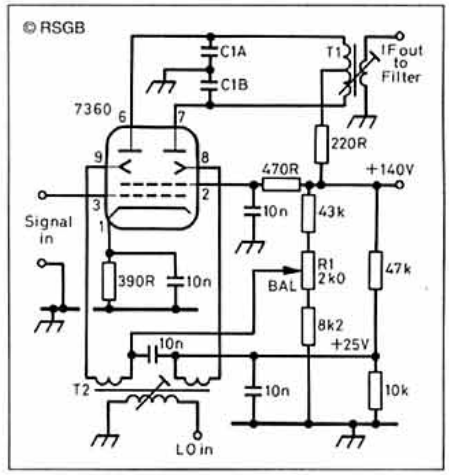

Fig 4: The 1963 recommendation of W2PUL using the RCA 7360 beam-deflection valve as a first or second receiver mixer as a means of reducing cross-modulation and blocking in HF communications receivers. This was incorporated into the radically new receiver configuration of his SS-1-R receiver marketed by Squires-Sanders Inc (associated with Clegg Laboratories) until both were lost in an aircraft accident. The mixer functioned as a balanced, switching (commutation) mixer. Oscillator voltage at deflection plates some 1-10V rms. T1 and T2 and general layout needed to be arranged to maintain balance.

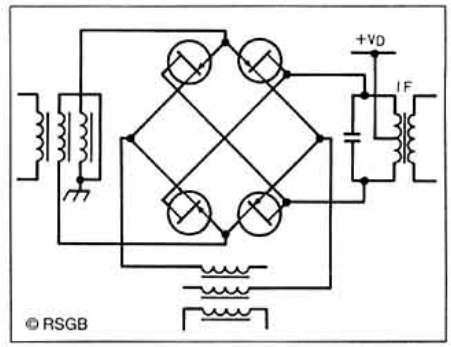

Fig 5: Basic configuration of the doubly-balanced FET mixer as described by Ed Oxley, KB6QJ, of Siliconix in *TT*, March 1973 opening the way for high-performance semiconductor mixers. This was developed as a broadband 50-250MHz mixer using four Siliconix U310 FETs.

to quote a 1992 letter from R C Arnold, G8ZDU, who also sent a number of photographs of equipment built without the use of conventional PCB techniques: "Like many

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others of the older generation of radio amateurs, I have encountered many problems with the manufacture of one-off PCBs and have seriously questioned many of the on-board wiring configurations needed to joint quite simple componentry together. Often there were serious problems when I tried to etch the unwanted copper-laminate off the board as it tended to take part of the wanted tracks so wasting the time-consuming labour spent in preparing the track layout on the board.

"I could not see the wisdom, at least for one-off projects, of firstly having to draw the circuit onto a board with all the problems of overlapping wiring or tracks which had to travel all round the board. I found myself questioning the wisdom of having long lengths of tracks that must be inductively or capacitively coupled to each other. I felt that point-to-point wiring must be simpler and present fewer problems. Many of my store of components were unsuitable for PCB construction, along with the need to predict accurately their fixing positions and pin-layout. In 1968, faced with the onslaught of ICs and semiconductors, I decided to abandon the PCB approach in favour of the to me more familiar ground-plane, point-to-point wiring which seemed to have more credibility for the projects I wanted to build.

"Although at first it was impossible to obtain double-sided fibreglass board (single sided formica type board tended to warp badly) I now use only double-sided boards. An early system I adopted was to have one face as the VCC+ rail, with the other face as ground plane. Although this presented no difficulties, it made later identification of the stuck-on ICs impossible due to their upside-down mounting, and tended to look scrappy and non-professional. This technique has therefore been relegated to history.

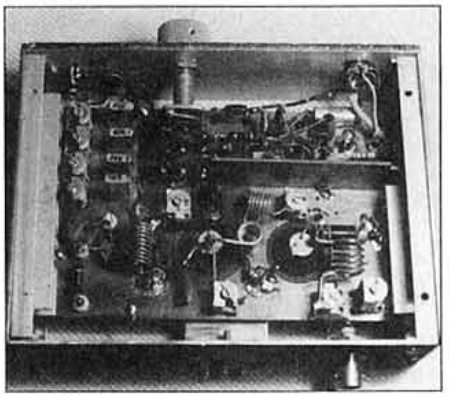
"Then I found that pre-drilling holes for ICs presented a problem with the end of small-size drill tending to skate over the surface of the laminate. This was remedied by outlining the pinout on a spare piece of Vero (prototype) board and then using this as a drill guide and drilling template. It became quite easy to counter-sink two holes each side of the board using a 3.5mm drill, where the Vcc+ and signal control legs required insulating from the board. The IC can then be located with a small amount of glue on the back to fix it to the board or, as I sometimes do, just solder the grounded legs of the IC to the ground plane. The remaining pins provide adequate fixing points for the necessary point-to-point wiring. Other insulated fixing points can similarly be provided by inserting a serrated pin into a drilled and countersunk hole.

"One of my favoured set-ups is to segregate the VCC+ supply wiring from the signal path wiring; this simplifies decoupling and inductive wiring runs which could inter-react with other circuit elements by having these on one side of the board and the signal path circuits on the other side of the separating ground planes. This has the additional effect of simplifying the circuitry on the signal-path side of the board.

"Transistors can be located by drilling out an appropriately-sized hole and countersinking each side to prevent the case from making contact with the ground plane; then pushing the transistor in dead-bug fashion, through a nylon washer and then into the tightly-fitting hole in the board. Hole size can be adjusted with a half-round needle file. I note that industry is now beginning to use similar techniques for test projects and UHF equipment."

HEAVY DUTY (15A) POWER SUPPLY UNIT

AL AKERS, ZS2U (*Radio ZS*, June 1993) claims no originality for the power supply unit shown in **Fig 6** but reports that it has given him eleven years of trouble-free service in providing a well-regulated supply for his FT7B transceiver. He writes: "The circuit diagram is largely self-explanatory. The transformer secondary needs to be capable of supplying the required current. Diodes DI to D4 should be rated at 100PIV with a current rating of preferably twice the required maximum current, with the fuse rating capable of sustaining the in-rush switch-on current and again roughly twice the load current.



Examples of ground-plane plus point to point wiring used by R C Arnold, G8ZDU.

"Use one 2N3055 for each 5A of required current. With the three shown it becomes a 15A supply. Mount the 2N3055s, the MJ2955 and the LM317K on suitably-sized heatsinks. The 0.2Ω resistors in the 2N3055 emitters should be wirewound and capable of each carrying 5A. The ferrite bead winding must be capable of carrying the required output (ie 15A in this case). This bead and the associated capacitors form an RF filter to prevent RF feeding back into the power supply. The 5k (linear) potentiometer is adjusted to give the required output voltage."

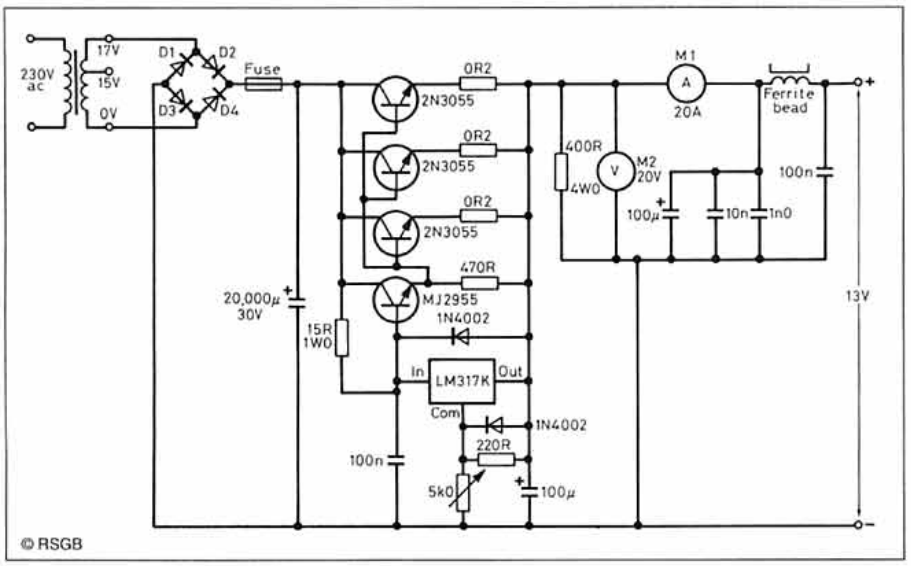


Fig 6: Heavy duty power supply unit used by ZS2U with a FT7B transceiver over the past eleven years without problems.

HERE AND THERE

DR HARRY KLEIN, W2SQ, notes in *QST* (October 1993) that a 46-year-old microwave technician in Ohio with electronics experience in the military and in TV broadcasting was diagnosed as having a lead level in his blood that was ten times higher than other members of his family. A university-based pharmacology and toxicology clinic discovered that for 20 years the patient often stripped wires with his teeth [Don't do this! I used to and it ruined my teeth – *Ed*] and sometimes chewed on bits of wire insulation. Samples of coloured-plastic wire coatings were analysed and found to contain 10,000 to 39,000 micrograms of lead per gram. A note in *Nature* (August 19, 1993) emphasises that lead-free solders are highly desirable, given the toxicity of lead; it points out that alloys of silver and tin offer high resistance to [metal] fatigue – good news to those who torture their circuits by repeated bending or thermal cycling. It has been shown that by adding just a smattering of zinc to an alloy of silver-tin a solder has been developed in which the microstructure is much more uniform giving it a peak strength of 48% higher than the zinc-free equivalent and an order of magnitude better high-temperature creep resistance.

George Benbow, G3HB draws attention to an item in a recent *IEE News* which states that with effect from January 1995, the nominal UK 50Hz mains voltage will be 230V with a tolerance of –6%, +10%. Minimum voltage

will thus be 216V, maximum 254V. Since these tolerances cover the present 240V, I remain uncertain whether a voltage change will actually be introduced next January.

Roger Wheeler, G3MGW, takes me to task for drawing attention to N4AQ's disguised flagpole antenna (*TT*, August, Fig 5) as a means of flouting restrictions on outside antennas: "I shudder to think, in the event of interference or collapse, what a lawyer would make of it, let alone what a huge dent it would put in our public image." He blames this lapse on my interest in wartime clandestine radio but doesn't mention the 1950s deception by a highly respected RSGB President!

John Taylor, G0AKN, suggests that a good way of keeping the sections of a mobile HF whip from getting damaged or lost when not in use is to carry them in a plastic tube. He purchased some scrap lengths of 1.5in diameter plastic water pipe from the local builders' merchant together with collars and screw caps for the ends. The collars can be glued to the tubing, if they are not a tight fit. This enables the whip sections and loading coils to be transported without risk of bending or becoming mixed up with bits from other antennas.

Those hifi enthusiasts bemused by the rival claims of digital-CD versus analogue-LP vinyl recordings may be relieved to learn that a German test showed that only 4 out of 160 audiophiles could successfully distinguish between analogue and digital sound sources, as reported by the *New Scientist*. While laboratory tests show that CDs have noise levels 20 to 30dB lower than disc records, with better stereo channel separation, and a superior dynamic range of some 90dB, it remains questionable whether these advantages can really be heard in a home environment. Results remained similar with tests using play out equipment costing £400 and £4000. But presumably the LP records were new and not with the scratch noise of many playings with a heavy pick-up.

Sadly, Joe Cropper, G3BY, died in late November at the ripe old age of 92-93 years. Joe contributed the original *TT* item on 'Dirty DC' recharging of dry cells and was also responsible for my naming PA0KSB's ingenious system for drift-free oscillators as the "huff and puff VFO" stabilizer, He was active on the bands to the end, in contact with some of his former wartime Hanslope Park (SCU3) colleagues including G4DR (Pat), G8DX (Ron) and G2DTD (Wilf) the week he died.

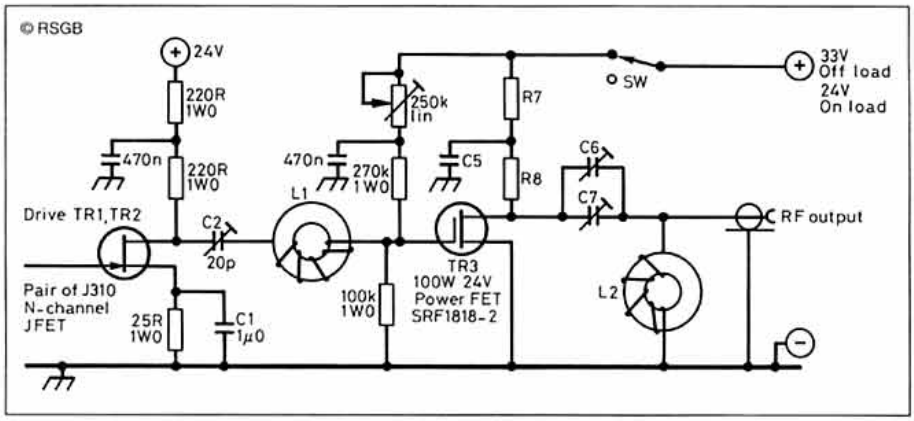


Fig 7: The G3IPV FET linear amplifier providing some 50 watts output on 3.5MHz and claimed to reduce the risk of self destructive unstable or parasitic oscillation. TR3 was an SRF1818-2 Powerfet (surplus from J Birkett with no data available). Bypass and capacitors are polyester layer types and C5, C6 and C7 are 1000pF mica compression high power capacitors (obtained surplus from J Birkett). L1 Ferrite toroid 47 turns 24SWG for 3.5MHz. L2 Ferrite toroid 3 turns 18SWG for 3.5MHz. R7, R8 each 1.5Ω, 50-watt metal cooled.

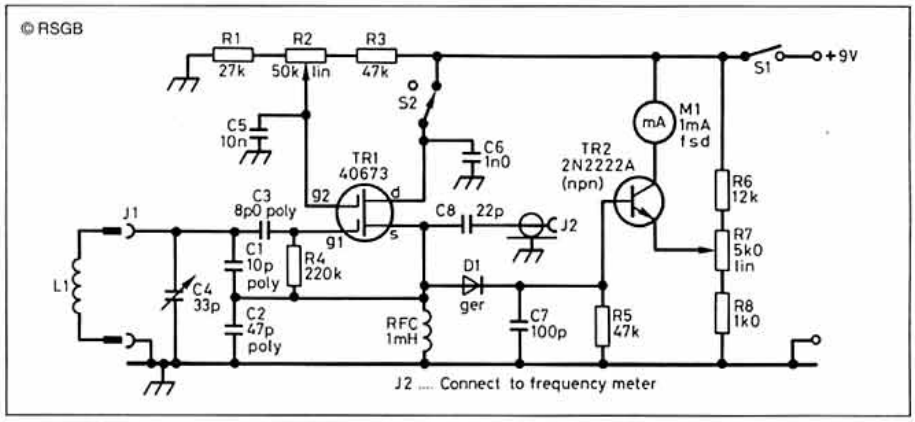


Fig 8: Circuit diagram of the dip-meter (GDO) built by I1FLC. Resistors ½W, capacitors ceramic unless otherwise specified.

G3IPV'S STABLE POWERFET AMPLIFIER

ONE HAS COME TO EXPECT from Peter Haylett, G3IPV, some novel ideas centred around the problem of using FET devices in RF amplifiers not prone to self-destructive oscillation. As his latest offering he writes: "While constructing powerfet amplifiers it is possible to experience a number of problems that can result in the destruction of expensive devices. The main problems appear to be caused by self-oscillation, parasitic oscillation, switch-on transients and inadequate heat sinks.

"Self-oscillation and parasitic oscillation are caused mainly by inadequate control of feedback and by the presence of unnecessary inductance. I have found that ferrite beads can pick-up or radiate sufficient RF to cause trouble in amplifiers. The drain power-supply isolation and decoupling choke can act as a high-Q inductance with many resonant frequencies and so produce unwanted voltage feedback.

"In the amplifier shown in **Fig 7** all unnecessary inductances have been removed other than the stray inductances of the resistors which do not appear to cause difficulty. Feedback is controlled to a low value by the input series tuned circuit's tuning capacitor which must be less than about 10pF. This system was used in earlier amplifiers and worked well except that occasionally a powerfet was destroyed when the amplifier was switched on, apparently by transient voltages across drain-isolation and the decoupling RF choke. The problem has been overcome by using extremely high gate-bias resistors and, as an extra precaution, the drain choke has been replaced by high-wattage resistors.

"It would seem that N-channel JFETs are protected by using low-value gate resistors, whereas power FETs appear to be protected by high-value gate resistors, although this anomaly needs further research if all risk of self-destruction is to be achieved.

"The use of a low-value input series tuning and coupling capacitor does not reduce positive feedback to zero but rather to a reasonably safe value. Further investigation is needed into the linearity etc of the output from an RF amplifier with and without feedback. Without any feedback or with negative feedback there would be much lower output than with some positive feedback as currently used with most FET RF amplifiers.

"The amplifier is currently used at G3IPV on 3.5MHz and delivers an output power of about 50 watts into a coax-fed pre-tuned commercial end-fed Zepp. Output power varies with changes of ground conditions under the antenna. On one occasion the amplifier was accidently left switched on without drive or antenna. No harm was done except the melting of the insulation of the output coax socket.

"No precautions seem necessary when the amplifier is in use such as switching on drive and antenna in a predetermined order; in practice the amplifier has often been used accidently without the antenna connected. It has been in use over a period of six months and come to no harm."

Reg Moores, G3GZT/VS6CD, warns that the power transistors in modern transceivers operating at low power can easily be destroyed, apparently by momentary parasitic oscillation. This occurs when the PTT switch is released and the drive stops and the antenna switches to 'receive' or, as in his case, the surge of power burns out a thermocouple ammeter in the ATU, resulting in the possibility of a form of solid-state 'TPTG' oscillation. He believes that this type of switching condition may be responsible for the by-no-means

uncommon failure of PA transistors, particularly when using multi-band antennas. G3GZT suggests that when using a thermo-couple meter, for any purpose, it is advisable to fit a low-value non-inductive resistor in parallel with it. This is unlikely to significantly affect the meter reading but does insure that in the event of the meter burning out (which can happen with even moderate overloads) the antenna remains connected to the transceiver, although this may not prevent self-oscillation when the PTT switch is released.

Range (MHz)	Length (mm)	Diameter (mm)	Turns	L (µH)
3.0 - 4.5	30	21	75	59.60
4.0 - 5.5	25	21	62.5	47.85
5.0 - 7.5	19	17	47.5	23.50
7.5 - 11.0	10	17	25	10.25
10.5 - 16.0	11	11	27.5	5.55
15.0 - 22.0	6	11	15	2.50
20.0 - 31.0	6	9	15	1.80

Measurement of unknown capacitors or inductances is carried out by forming a parallel resonant circuit comprising one known value and one unknown value capacitor/inductance and then 'dipping' to find its resonant frequency (preferably using a counter rather than GDO calibration) in conjunction with the formula:

$L = 25355/C \times F^2$ or $C = 25355/L \times F^2$

where L is in µH, F in MHz and C in pF.

Table 1: Coil information for Luigi Falcone's, I1FLC, gate dip oscillator design.

THE UBIQUITOUS GDO

IT IS SOME TIME SINCE *TT* included details of a GDO (or dip-meter). This versatile instrument can be either a 'grid-dip oscillator' (still a valid approach) or more likely a 'gate-dip oscillator.' The value and flexibility of these devices can be further advanced when used in conjunction with a counter-type frequency meter to provide rather more accurate calibration than when used in isolation. A GDO is ideal for checking the resonance of antennas, antenna traps, measuring the value of unknown small capacitances or inductances, the velocity factor of transmission lines such as coaxial cables, etc, etc.

The GDO shown in **Figs 8 and 9** uses a standard handbook circuit and comes from an article by Luigi Falcone, I1FLC, in *Radio Rivista*, 10/92, pp23. He uses seven plug-in coils covering 3.0 to 30MHz in a Colpitts oscillator circuit. The coaxial socket J2 permits connection to a frequency meter when required. The coils are wound on Teflon formers with two 'female' sockets which plug-in to two 'male' plugs on the instrument. TR2 forms a DC amplifier permitting the use of a 1mA FSD meter with sensitivity controlled by R7. With TR1 switched off (via S2), the instrument forms a field strength meter/RF sniffer.

Such a GDO need not be constructed to duplicate exactly the I1FLC design, but care should be taken that the oscillator components are mounted rigidly and not subject to 'hand-capacitance effects' in use. I1FLC built his GDO in a small metal box 16 x 10 x 6cm with the PCB mounted vertically but one could equally well use 'ugly' construction. If a somewhat larger value variable capacitor (C4) is used with a slow-motion drive the number of coils to tune 3 to 30MHz could be reduced. **Table 1** gives the coil information as published by I1FLC although the article does not give the gauge of the enamelled wire.

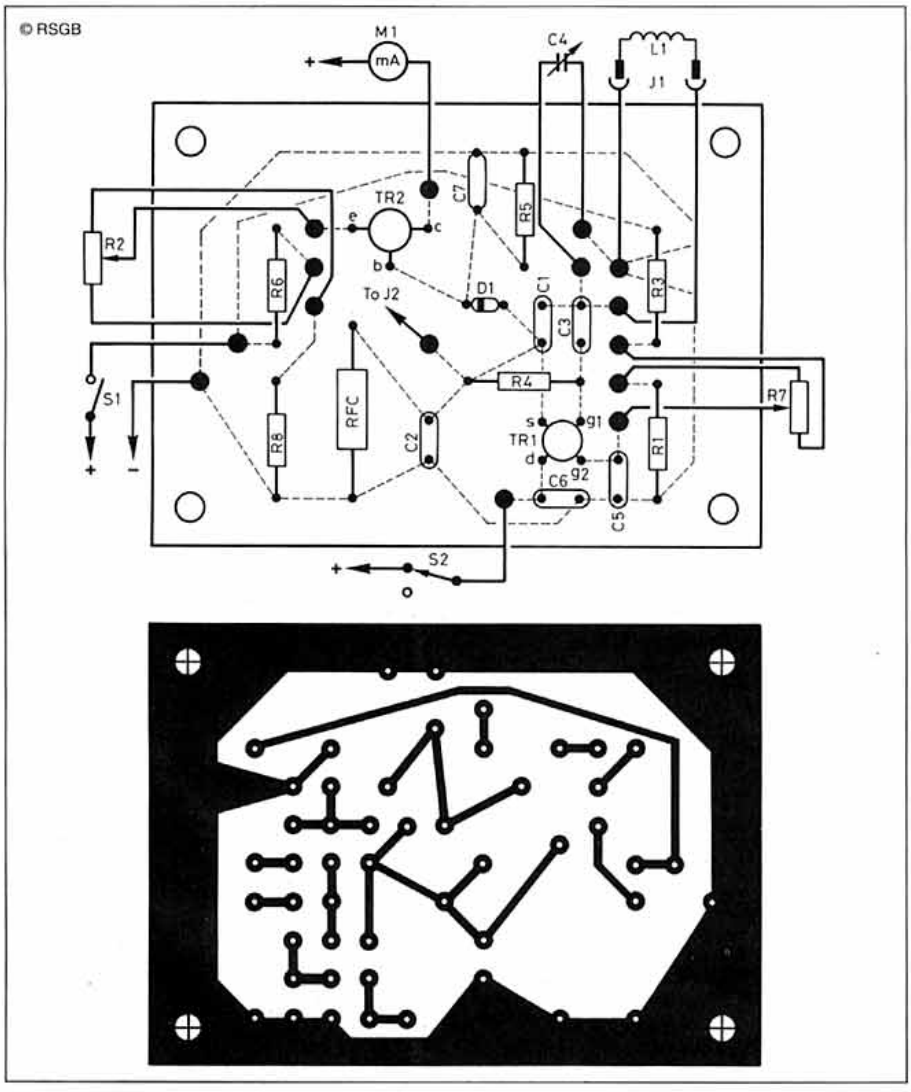


Fig 9: Printed-circuit-board layout as used by I1FLC for his GDO.

END OF AN ERA

OVER THE 21 YEARS THAT I have been using a Labgear/Pye LG300 transmitter manufactured over 35 years ago, I had come to believe that the Canadian Marconi 813 valve was virtually indestructible, unlike modern RF power semiconductor devices. Came the day, came the shock when I discovered the 50W filament had finally gone open-circuit. Fortunately new 813/CV26 valves are still available (although at a cost greater than I had originally paid for the LG300!). And a Mullard-manufactured CV26 has once again brought the old rig to life!

But rather sadly this trauma coincided with the last days of the old Mullard/Philips Mitcham factory which finally closed on 24 December, 1993 – a factory which in its heyday turned out more than a million valves a year – many destined to find their way into amateur rigs. Set up in 1928 as Mitcham Works Ltd (to conceal the link between Mullard and Philips of Eindhoven) for the production of radio sets, 1932 saw the beginning of valve production, with transmitting valves added in 1934 and CRTs in 1937. Production expanded during WW2 with the setting up of associated factories elsewhere. First production in the UK of the famous EF50 was at Mitcham.

Many British TV sets by various manufacturers owed much of their design to the work of the Mullard Central Applications Laboratory at Mitcham. Later the factory was responsible for many semiconductors when they began to reduce the demand for valves in the 1960s and 1970s.

According to *Philips Post*, (Winter 1993), while ordinary employees were allowed during wartime air-raids (the factory was hit several times) to seek safety under their benches, managers were expected to remain upright! Mitcham, it appears, was the site of ghostly phenomena, including 1937 appearances of a woman burned as a witch in the 17th century after predicting, inter alia, "strange instruments and devices from which would come forth musick and oft-times speaking or singing". Many people were afraid to walk past B building because of 'strange happenings'. An employee, George Wainford, it is claimed, "once saw a chain and padlock on the main gate unwind itself to allow the gate to open, then close and lock itself. No one else was around."

At its peak, Mitcham employed over 5000 people but in its final months there have been empty buildings and the ghosts of past commercial trials and triumphs. The factory, which made an impact when it was built in the 1920s by its size and modern European style of architecture, is being sold for redevelopment. *Sic transit gloria*! ***G3VA***

For the best view of the Yaesu FT-840...

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RADCOM USER REVIEW

YAESU FT-840 HF Transceiver

A user review by the *RadCom* team

HF TRANSCEIVERS don't seem to be getting any larger, but the number of features and extras inside shows no sign of slowing down. The new Yaesu FT-840 HF transceiver is an excellent example of the latest trends in amateur equipment. It runs 100W SSB or CW on all nine HF bands, as well as 25W AM and (optionally) FM.

In common with most 'black box' HF radios, receiver coverage extends over the complete MF and HF spectrum. Yaesu have built a large number of operating facilities into the FT-840, and most of them are genuinely useful to the amateur rather than just 'gimmicks'. So let's take a look and see just what makes this new rig 'tick'.

FASCINATING FEATURES

FRONT PANEL controls are neatly laid out, and for the most part self-explanatory. On the extreme left, above the headphone and mic connectors is the main power on/off switch. For certain functions to become operative (eg BFO offset), another button must be pressed at the same time as the on/off, but once selected these modes remain in memory when the transceiver is powered down. Above the on/off switch is a button which switches the analogue meter to show either power output or ALC level on transmit. At the top is a manual transmit (MOX) switch.

Above the rotary controls for mic gain/RF power and AF gain/squelch are four push buttons. From left to right they control the 12dB receive attenuator, built-in transmitter speech compressor, slow/fast AGC selection and noise blanker on/off. Four switches to the left of the tuning knob control the transceiver's operating mode. Each of these controls needs an additional push to change from USB to LSB or to enable the narrow CW filter, but their operation is very user-friendly.

The amber LCD display gives a bright, clear indication of true transmit frequency in all modes. It also shows which of the two VFOs is selected (A or B) and data such as memory channel (where applicable) and mode selection. Programmable features such as split frequency operation and fast tuning are displayed on the LCD panel but, unusually these days, received signal strength uses a conventional analogue meter.

One of the impressive features of the FT-840 is the tuning dial which operates smoothly in minimum steps of 10Hz. Yaesu deserve credit for having made the torque adjustable – a simple operation using an Allen key. Some operators will always like a lighter 'feel' than others, and a stiffer dial is more suited to mobile use. Tuning rate is selectable, and on SSB/CW can be set to approx 5, 10, 50 or 100kHz per revolution. The selected frequency can be also be locked, if required, using the appropriate push button.

THANKS FOR THE MEMORY

FUNCTION SELECTORS to the right of the main tuning knob enable selection of one of the two VFOs or recall of a frequency from memory. There are 100 memories on the FT-840, and the one currently available is shown. This group of buttons is also used for split-frequency working. If you haven't used this mode before, a little experimentation will pay dividends – it's easy to press the wrong one

in the heat of a DX pile up! With Yaesu's FT-747, it is practically essential to program each amateur band into a memory position, but the new FT-840 has up and down buttons with the amateur bands already programmed. Another nice touch is that should you change bands for a quick 'tune around', you'll always return to the same frequency on the original band. In the receivers 'general coverage' mode, the band switch operates 100kHz or 1MHz increments.

The clarifier knob on the right of the front panel is better known as the Incremental Receiver Tuning or IRT. However, it's the control below this which provided a pleasant surprise. This is the IF passband shift adjustment, which is invaluable for eliminating QRM. This was found to be especially effective on 40m CW in conjunction with the narrow CW filter (YF-112C) fitted in the review rig.

At the rear of the radio, are connectors for functions such as computer control (using the Yaesu CAT system), optional auto antenna tuner and linear amplifier interface. Also present are DC power input and a 0.25in jack for the Morse key or keyer. The antenna connector is the familiar SO-239 type.

FT-840 IN ACTION

TESTING WAS CARRIED out with the optional FP-800 power supply/speaker and FC-10 automatic antenna tuner. Both performed well, and the large forward-facing speaker in the FP-800 is a considerable improvement on the FT-840's internal unit. Performance was more than adequate, with excellent speech quality reports. Both SSB and CW operators should find many features to their liking, not all of which are available on budget rigs. For example it is possible to change the CW offset frequency in 100Hz steps *and* the sidetone note at the same time.

Tests were carried out with longwire and 20 metre dipole antennas, and the test period included the *CQ* WW CW Contest. Receiver front end performance was quite acceptable and it was only found necessary to use the attenuator on 1.8MHz, to cope with cross-modulation from a very local medium wave broadcast station. Sensitivity is good right up to the 10 metre band, and operating was a delight with all controls conveniently to hand.

The 40-page manual is comprehensive and well illustrated and even the beginner should have no problems. Fitting instructions for the various accessories leave nothing to the imagination and full programming details for the computer interface are given. Full circuit and interconnection diagrams are supplied with the radio.

FINAL THOUGHTS

A GREAT DEAL of care has obviously gone into the design of the FT-840, and it would be nice to think that Yaesu are responding to the needs and ideas of the amateur fraternity. For newly licensed operators and old timers alike, the FT-840 has a great deal to offer.

The Yaesu FT-840 is distributed in the UK through local Yaesu dealers. Price is £879, plus £299 for the optional FC-10 auto antenna tuner and £299 for the FP-800 PSU inclusive of VAT. Our thanks to Yaesu Europe for the loan of the review model.

MANUFACTURER'S SPECIFICATION

GENERAL

Receive frequency range	100kHz to 30MHz
Transmit frequency range	10m to 160m Amateur Bands
Frequency stability	+/– 10ppm (or +/– 500Hz FM), from
	0°C, and +/– 2ppm (or 300Hz FM) from
	0°C to 50°C with TCXO–4 option
Emission modes	USB, LSB (J3E), CW (A1A), AM (A3E),
	FM (F3E) with optional FM Unit–747
Antenna Impedance	50Ω nominal
Operating temp. range	–10°C to +50°C
Supply voltage	13.5VDC +/– 10% negative ground
Power consumption (approx)	1.2A Rx (no signal), 20A Tx (100 watts)
Dimensions and weight	238 x 93 x 243mm (WHD). 4.5kg (approx)

TRANSMITTER

Power output	Adjustable up to 100W (25W AM carrier)
Modulation types	SSB: Balanced, filtered carrier
	AM: Low level (early stage)
	FM: Variable reactance
Maximum FM deviation	+/– 2.5kHz
Harmonic radiation	>50dB below peak output,
	45dB (10 and 18MHz)
Spurious radiation	>40dB below peak output
SSB carrier suppression	>40dB below peak output
Undesired sideband suppression	>50dB below peak output,
	at 1.5kHz modulation
Audio response (SSB)	Not more than –6dB from 400-2600Hz
3rd Order IMD	–25dB at 100W PEP, 14.2MHz
Microphone impedance	500 to 600Ω

RECEIVER

Circuit type	Dual conversion superheterodyne.
Intermediate frequencies	1st: 47.055MHz
	2nd: 8.215MHz
	3rd: 455kHz (additional FM IF)
Sensitivity	10dB S/N, 1.8–30MHz:
	SSB/CW: Better than 0.25µV
	AM: Better than 1.0µV
FM sensitivity	Better than 0.5µV at 28-30MHz, 8kHz bandwidth
Selectivity	SSB,CW: 6dB >2.2kHz, 60dB <5.0kHz
	Narrow CW: 6dB >500Hz, 60dB <1.8kHz (optional filter)
IF rejection	60dB or better (1.8-30MHz)
Image rejection	70dB or better (1.8-30MHz)
IF shift range	+/– 1.2kHz
Clarifier tuning range	+/– 1.25kHz or +/– 2.50kHz selectable
Max. audio power output	At least 1.5W into 4Ω at <10% THD
Audio output impedance	4 to 8Ω

RADCOM TECHNICAL FEATURE

Experimental Magnetic Loop Antenna

by C R Reynolds, GW3JPT

I HAVE CONSTRUCTED many magnetic loop antennas, all of which were made from 22mm copper tubing or strip aluminium. These loops were quite small, being only three metres in diameter and were designed originally for the higher frequency bands. I wanted to operate on the lower frequency bands and I found that it was possible to tune a 3m loop to top band using a very large 1000pf capacitor.

This caused two problems. At 160 metres the efficiency is rather low and on 40 metres tuning is rather tricky. The reason for this tuning problem is because it only takes a few picofarads to tune the whole of the 40m band. This represents a very small percentage of 1000pF, requiring only a fraction of capacitor rotation to cover the band.

I decided to try a different design of a practical loop antenna for the 160, 80 and 40 metre bands. This uses a much larger loop of a size shown in **Fig 1**. If this were to be made from copper tube it would be very heavy so I used a 64ft length of plastic covered wire. This antenna requires a tuning capacitor of 250-300pF.

The radiation pattern of a loop antenna has two null points. If the loop is made rotatable these nulls are useful for minimising some types of electrical interference or interfering signals.

The antenna could be made as a triangle. This would allow the antenna to be constructed without the top element support but would require a larger spreader at the bottom. Alternatively, the bottom spreader could be dispensed with and the shape maintained using insulators and guy wires but it would not be easy to rotate such a structure.

Various experimental loops with the LF version on the right.

The Faraday coupling loop is shown in **Fig 2**. It is close coupled for about 30in each side of the centre of the triangle section of the element.

This wire loop will also work on 40m. This is done by using a relay or a switch to disconnect the capacitor at points A and B, see Fig 1. The loop is then tuned by the stray capacitance of the switch or the relay. Because this stray capacity cannot be varied, the antenna element length is adjusted for correct matching using an SWR meter.

The antenna and mast can be fitted to a good ground post. It does not need any guys and can be raised or lowered easily. For portable use it can be erected in a few minutes using three or four guy wires.

CAPACITOR DRIVE MOTOR

THERE IS A reasonable range of motors available suitable for rotating the loop capacitor. The cheapest, and one of the best I could find was a barbecue spit motor. Although this is already geared down it does require extra reduction using a 6:1 or 10:1 epicyclic drive for more precise tuning.

The motor will rotate slowly if energised by a 1.5V battery. With 3V applied the motor will run much faster. By switching from 1.5 to 3 volts a fast or slow tuning speed can be selected. This switching is shown in **Fig 3**. The positive lead of the 3 volt battery is connected to H and the positive lead of the 1.5V battery is connected to L. The negative leads of both batteries are connected to D.

The direction of rotation is achieved using a two-pole, three-way switch. When the switch is set to the centre position the motor is disconnected from the battery (OFF position). The battery polarity to the motor is selected by the two other positions of the switch and should be labelled DOWN or UP.

The drive mechanism must be electrically

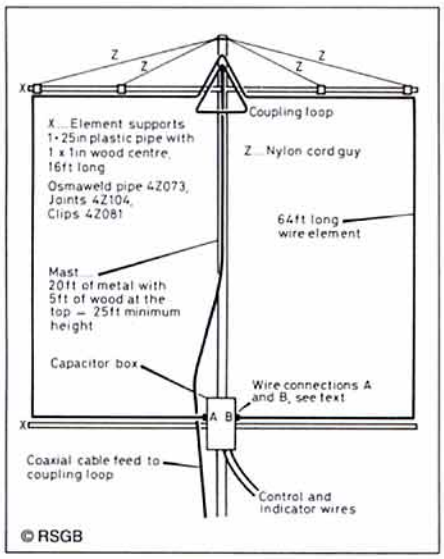


Fig 1: Overall view of the LF band magnetic loop.

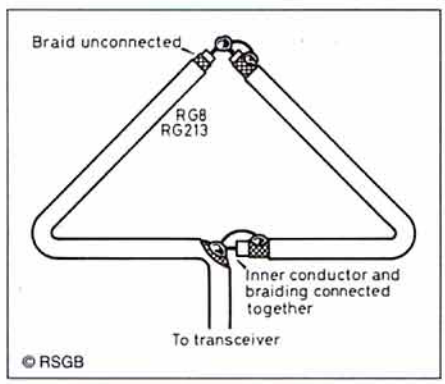


Fig 2: The Faraday coupling loop.

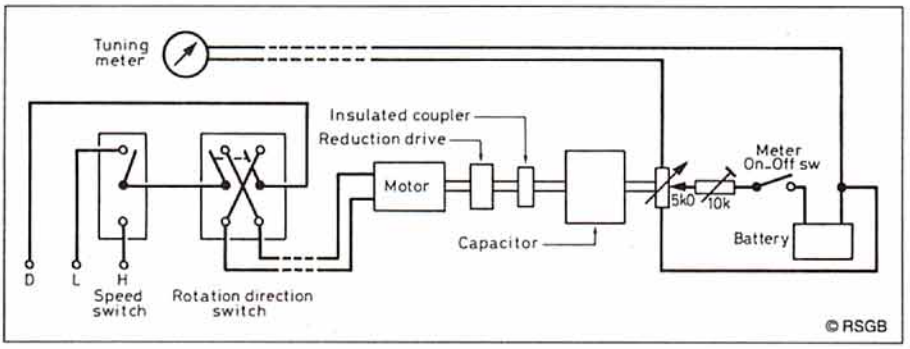
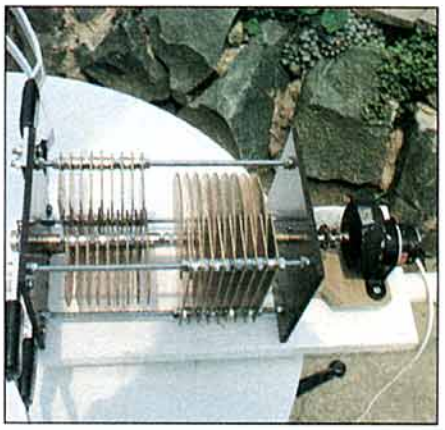


Fig 3: Control and inductor systems for the magnetic loop antenna.



Construction of the home made capacitor.

isolated from the high RF voltages present at the capacitor. An insulated coupler can be made from plastic petrol pipe. This pipe size should be chosen so that it is a push fit on to the drive mechanism and capacitor shafts. The pipe can then be fixed to the shafts by wrapping single strand copper wire around the ends of the pipe and tightening with a pair of pliers.

All the capacitors I have made have the spindle extending both sides of the capacitor. One spindle is used to couple the capacitor to the drive mechanism. The other is used to connect the capacitor to a position indicator (Fig 3). This indicator circuitry must be electrically isolated from the capacitor as described above.

The control unit is housed in a plastic box. The fast/slow and rotation direction switches are fixed to the front, together with the capacitor position meter.

CAPACITOR UNIT HOUSING

ONE OF THE main problems of constructing any electrical circuits associated with antennas is protecting them from wind and rain.

One option is to try and find some sort of suitable plastic housing and then organising the components to fit, but I prefer to make the tuning housing from exterior plywood. The bottom and sides of the box are fixed together using 1in square strips of timber. Glue and screws are used to make the joints waterproof. The top must, of course, be made so that it can be removed fairly easily. Paint or varnish the box as required.

CONSTRUCTION OF CAPACITORS

THE CAPACITORS FOR tuning loop antennas are very difficult to come by so I make my own. I have used various methods and materials to make capacitors, including aluminium and double-sided circuit board for the vanes. I use nuts and washers for the spacers and various types of insulation board for the end plates.

The capacitor illustrated on this page can be made as follows. The centre spindle and spacing rods are constructed from 6mm threaded plated steel rod.

Make the 3 x 3 inch end plates first, see **Fig 4**. These can be taped together back-to-back for marking and drilling. The same can be done with the vanes. Masking tape is used so the surface is not scratched around drill holes which are drilled to clear 6mm with the centre hole acting as a bearing.

The length of the 6mm spindle is dictated by the number of vanes required. For double-sided board I use washer/nut/washer spacers so that there is no need to bond the copper sides, resulting in a spacing of about .25ins.

The first capacitors I made used the conventional shape for the moving vanes, but this is very difficult to cut out and fragile to use. The shape illustrated in **Fig 4** can be cut out with all straight lines using a hacksaw, or cut with a jigsaw.

The fixed vane is a simple rectangle which can be modified to reduce the minimum capacity. (dotted line Fig 4c). For the size shown six pairs of vanes with 0.25in spacing work out to about 150pf. I have had units using both printed circuit board and aluminium vanes in use for over two years and they are both still in good working condition.

OPERATION

Tuning of the loop needs to be adjusted precisely for minimum SWR, which should coincide with maximum power out. This tuning is critical; a few kilohertz off tune and the SWR will rise dramatically. The best way of finding the correct position of the tuning capacitor is to listen for maximum noise, or signals, whilst tuning the loop. Then fine-tune using an SWR meter.

The performance of this antenna on 80M was at least as good as my G5RV. It tuned all of top band and gave quite good results as compared with local signals on the Club nets.

COMPONENT SUPPLIES

THE SWITCHES AND SLOW motion drive can be obtained from components suppliers such as Maplin. The threaded rod, nuts and washers can be obtained from any hardware supplier.

WARNING

HIGH RF VOLTAGES exist at the capacitor when the transmitter is on.

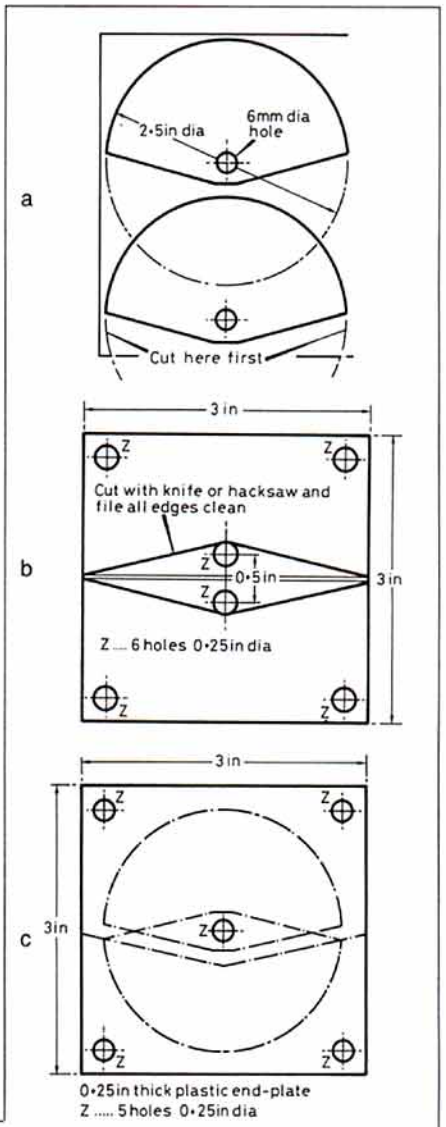


Fig 4: Details of the home made capacitor.

The Christmas Crossword Answers and Winners

THE FOUR LUCKY PRIZE WINNERS picked out of the 'hat' to receive one of these super battery chargers and four AA size Millennium rechargeable batteries are:

Mr P R Eggleton, G3XMQ, Farnham, Surrey

Mr A E Pickup, G3XLF, Runcorn, Cheshire

Mrs J Shardlow, G4EYM, Darley Abbey, Derby

Mr R P Neave, G4DAN, Manningtree, Essex

Congratulations to all winners who should be receiving their prizes in the post any day now.

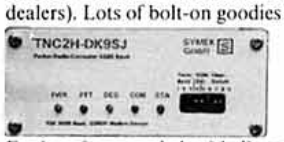
● Information on Millennium can be obtained from Oakes-Bacot Ltd, 58 Queen Anne Street, London W1M 9LA. Telephone: 071 224 0994.

SISKIN ELECTRONICS IS PLEASED TO ANNOUNCE THE MARRIAGE OF COMPUTERS AND AMATEUR RADIO .....

The growth of Digital Communication in Amateur Radio over the past 10 years has been quite staggering yet many people are still wondering what all the fuss is about! If you haven't got a clue what all those funny buzz words are but would like to join in the fun we would like to help you get going as painlessly as possible.

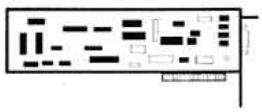
TINY 2 MKII

The UK's best selling TNC now includes FREE ready-made computer and transceiver cables for YOUR set up when ordered from Siskin direct (this offer may not be available through other dealers). Lots of bolt-on goodies available too. Just **£139.00** (plus £4 P&P).



TNC2-H 9600 BAUD

At last TNC designed specifically for 9600 baud at a sensible price. Superb German Engineering coupled with licensed G3RUH 9600 technology makes the TNC-2 H the ideal power house for OSCAR 22 & high speed trunking etc. **£179.00** including ready made computer cable (plus £4 P&P).



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We offer a range of PC Packet cards for a variety of applications. One of the advantages of a PC card is that you do not lose a precious COM port.

☐ The PC-320 supports VHF and HF operation + Personal Mailbox which can be run even while the PC is switched off! The list price of the PC-320 is £179 but at Leicester we'll be offering it for just **£159** including a ready made cable for your transceiver(s) and of course free software.

☐ The Thor RLC-100, a full size card offering two or 4 VHF/UHF ports for more serious applications such as Network Nodes, BBSs and DX Clusters. 2 port version **£165**, 4 port version **£285**, both supplied with BPQ software.

☐ The BayCom USCC 4 port card — card packs a lot of punch including 1200, 300 and 9600 (G3RUH compatible). Supplied with G8BPQ and BayCom terminal software. **£269** (all cards are £4 P&P).

ICS FAX III

This superb PC software/hardware package produces quite stunning Radio Facsimile reception with up to 16 Grey levels on a VGA Screen. Other modes supported include RTTY, Navtex, FEC & now CW. Send a formatted 1.44PC disk for a demo of the program or you can order the demo by credit card for just £2.50 incl. postage (redeemable on purchase). Available now **£139.95** (plus £2.50 P&P).

PK-GOLD & KA-GOLD

Since we first mentioned Interflex's PC software in RadCom over 150 amateurs have "switched" to Gold, this program virtually sells itself! The features seem endless but perhaps the most interesting aspect is its ability to run in true multi-tasking installations such as Windows 3.1, O/S and Deskview allowing you to transfer ASCII or binary files (including .PKZIP and YAPP formats) whilst you carry on with other non-radio tasks. A demo version of the program is available free of charge by simply mailing us a formatted disk or if you really can't wait you can order the demo for just £2.50 by phone with your credit card (refundable on purchase of the complete program of course). In stock now from just **£69** (KAM/PK-232 version) (plus £1.00 P&P).

YOU'VE READ OUR AD, NOW WATCH THE MOVIE.

Well, not quite. CQ Magazine have produced a superb video entitled *"GETTING STARTED IN PACKET RADIO"*. This professionally produced video includes the basic steps to setting up a Packet station, gives simple step by step instructions about accessing Packet bulletin boards and the DX Cluster and even a taste of satellite communications (if you look closely you can even spot Roddy G3CDK in it!). This video would make an ideal contribution to a club library or perhaps a good grounding for Packet lectures on cold winter nights. To tempt the newcomers we are including a £10 discount voucher with every video redeemable against any TNC or multimode product we sell. Available now — **£19.95** (plus £1 P&P).

VISA RSGB

SCRATCHING YOUR HEAD?

We at Siskin are very much aware that climbing on the Digital band-wagon can be somewhat daunting. We recognise the fact that you will probably need help somewhere along the line and this is reflected by the fact that as far as we are aware we are the ONLY company in the UK Packet Radio business to offer an after hours sales and support line when most of the other dealers have gone home. Siskin staff are generally available on our regular office number from 8am to 8pm Monday to Saturday.

We also hold the largest selection of ready-made TNC-TO-COMPUTER and TNC-TO-TRANSCEIVER cables in Europe and cater for a wide variety of computers, not just the PC. In many cases we actually supply leads FREE with a TNC or Multi-mode purchase. We also supply FREE software with every unit purchased directly from us and what's more if you change computer at a later date we'll ensure you have suitable software at no extra charge.

HOT OFF THE PRESS...

"A PRACTICAL GUIDE TO PACKET RADIO IN THE UK" - revision 6. Now up to 230 pages with updated sections on BBS maps, BBS commands, Hierarchy forwarding and AMTOR. Available now ... £9.95 (plus £2 P&P).

"NOS INTRO" by Ian Wade G3NRW. A layman's Guide to TCP/IP over the radio. One of the most difficult topics ever approached in the amateur press written in plain English and professionally produced. £11.50 (plus £1.50 P&P).

"BEYOND THE BROADCAST BANDS" by Richard Wilmot GW3RRI. Yes indeed, Packet is just the tip of a bloomin' enormous iceberg in the world of digital communications and Richard's book goes a long way to plugging the gaps. Topics covered include FAX, RTTY, AMTOR, CW, SSTV and er ... yes, it covers packet too. Available now ... £12.95 (plus £1.00 P&P).

WHAT ABOUT THE LEICESTER EXHIBITION?

Yes, we'll be manning stand E17 with a full complement of staff and lots of goodies to tempt you. If you are considering upgrading to a multi-mode such as the KAM, PK-232 or PK-900 then please visit our stand first. We will be supplying all the usual SISKIN FREE extras such as ready-made cables and software and for Leicester only we'll be giving away a free copy of Jo Kasser's book *"BASIC PACKET RADIO"* normally on sale for £19.95! (Don't forget, just buying one book at Leicester could save you the cost of the entrance fee).

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This Month's Book Choice

Reviewed by Pat Hawker, G3VA

CODEBREAKERS

The inside story of Bletchley Park. Edited by Professor F H Hinsley and Alan Stripp with some 30 contributors who served at BP during the Second World War.

Published 1993 by Oxford University Press. 322 + xxii pages (hard covers). ISBN 0-19-82 0327-6. £17.95

MANY NOW AGEING, or sadly already departed, British radio amateurs spent all or part of the 1939 – 45 war as intercept operators, either for the inter-Service Y-service including the Foreign Office intercept stations at Sandridge (manned by Post Office operators) and from 1943 at Ivy Farm, Knockholt or for the Radio Security Service (Voluntary Interceptors, Post Office stations until 1942 and SCU3/4).

The high-grade enemy traffic they struggled to copy from usually weak, interference-prone signals ended up at Bletchley Park (known variously as BP, Government Communications Bureau, Station X and 'Room 47' of the Foreign Office). There a remarkably high percentage of enemy traffic was 'broken' by the cryptanalysts of the Government Code and Cypher School (GC&CS), assisted by large numbers of WRENs and WAAFs, and with the aid of mechanical 'bombes' (Enigma) and 'Heath Robinsons' and later the Colossus special purpose electronic digital computers ('Fish' traffic from the Lorenz SZ40/42 on-line RTTY cipher machines). BP's success with Enigma, which produced most of the Ultra intelligence, also owed much to early assistance by the Poles and the French special services.

Staff at BP rose from under 100 in September 1939 to over 8000 (including a number of American signal-intelligence specialists) by 1945. BP was regarded as 'the most secret place in Britain' although it is now recognised that there was significant unauthorised leakage of information to the USSR through John Cairncross and Anthony Blunt and possibly others. BP was responsible also for training members of the Intelligence Corps etc as cipher clerks and also handled the ciphering and deciphering of traffic for MI6 and the Resistance Groups.

A staff member of GC&CS throughout the inter-war years and until his death in December 1941 was Leslie Lambert, G2ST, better known to the public as A J Alan, the star BBC story-teller.

It was not until the 1970s that any information on the work and importance of BP began to filter into the public domain with the most revealing insider book on BP 'The Hut Six Story' by the late Gordon Welchman who after the war emigrated to the USA. Dilly Knox (who led the team attacking Enigma) died during the war but his successor Peter Twinn is one of the contributors to this book, and describes the important differences between the Enigma machine used by the Abwehr (German Military Intelligence) to the models used by the other German services. Alan Turing bit into his cyanide-covered apple in 1954. Oliver Strachey who was responsible for 'breaking' the high-grade hand-ciphers (double-Playfair) as used, for example, by the Abwehr and RSHA security police (SD and Gestapo) died many years ago, as did Alistair Denniston the Director of BP until 1942 but who after the war became a schoolmaster to eke out a far from generous pension.

This book concentrates on the codebreaking and makes no attempt to cover the work of the intercept stations or the work of BP for SIS/SOE etc. It briefly notes that the FO Wireless Station (set up about 1927 with Kenyon Secretan, ex-5LF as Chief Operator) moved briefly to BP in 1939 but soon afterwards responsibility for FO radio traffic and Ultra distribution to Overseas Commands was given to Colonel (later Brigadier [Sir]) Richard Gambier-Parry, ex-2DV at Whaddon Hall. Secretan's group moved to Beaconsfield where it became concerned primarily with monitoring German News transmissions, including the Hellschreiber traffic, until handed over to the BBC Monitoring Servgice in 1942 (Stan Cook, G5XB was one of those concerned with Hellschreiber traffic at Beaconsfield).

There is an introduction describing how Ultra influenced the course of WW2, by F H Hinsley. Part 1, the production of Ultra intelligence, contains ten contributions including work in Huts 3 and 4, Naval Section VI, Anglo-American signal-intelligence cooperation etc. Part 2 deals with the Enigma machine, the work of Huts 6 and 8, and a section on the Abwehr Enigma. Part 3 deals with the Fish RTTY traffic and the important Tunny attack. Part 4 on the lower-grade German field ciphers and tactical codes as well as recollections of some BP outstations including Cairo. Part 5 deals with Japanese codes. An Appendix by Bob Watson describes how BP buildings took shape.

Perhaps time has softened memories of the sometimes bitter feelings and back-biting within BP, although this is hinted at in an amusing 'Recollections of temps perdu at BP' by Carmen Blacker.

● Kris, G8AUU, wants any circuit diagrams and/or handbooks for a **Courier Communications CTR-1** SSB Tcvr and matching PSU/LS unit CPS-1, both manufactured in London in the 1960's. Any information would be appreciated. Write to Kris, G8AUU, QTHR or tel: 081 977 7325.

● A Repair Manual is needed by Mike, G3VQQ – and/or information on fault finding for a **Hewlett Packard HP35743B** 14 inch colour monitor, Serial No 8742J28355. Any information to Mike, G3VQQ, QTHR.

● Ron Parsons, GI3HXV, is trying to trace the history of the Blind Approach Beacon System **(BABS)** for aircraft. If anyone has any knowledge of its development, locations or of any published reports and is able to help, then please contact Ron on 0247 818191 or write to him QTHR.

● A circuit diagram for a **Racal Mini-cal**, a portable HF Set, 2 – 10MHz is required by John, G0OVP. He is also looking for any other technical information and a possible source of components. All expenses will be reimbursed. Please ring any information through to John tel: 0244 381593 or write QTHR.

● Alan, G7HZZ, wants details of any modifications to a **Yaesu FRG9600** – particularly ones to improve image rejection performance. This service was provided by RayComm – does anyone else currently do this? All costs will reimbursed. Any information to G7HZZ who is QTHR, or tel: 0602 212857.

● **Aeradio** – Can anyone help with the origin of this word, which was used for aeronautical radio communications service from the 1930's until superseded by the Air Traffic Control (ATC) System? If any early members of the Marconi Company or International Aeradio Ltd, or any one else can help, then please write to Mr R C Meyer, Hon Secretary, The Australian Civil Aviation Historical Society, GPO Box 1733P, Melbourne, Australia 3001.

● Karl, DK6NC, wants any information – but preferably a copy – of VE3CTP's article 'RX 78', published in the late seventies or early eighties in a Canadian or US radio magazine, Not *QST*. Expenses to be refunded. Please send any information to Karl David, Postfach 2012, D-91514 Ansbach, Germany.

● George, G0FRK, wants a full service manual for a **Racal RA117E**, also circuit diagrams and operating manual for the Marconi Sig/Gen TF2002B. Original or good photocopies acceptable. All expenses reimbursed. Contact George on 0925 728253.

● Mike, G0TTD, is looking for a service manual, handbook for a **Burndept PMR** Transceiver Type 468/25/10/12 and any technical information on how to re-align to 144MHz. All costs will be refunded. Any information to Mike Smith, 5 Glendon Close, Lincoln, LN5 9TS.

● Anthony, DJ0MC, is trying to trace the handbook for the **Taylor Valve Tester** type 45A and the **Marconi** Test Set type TF1064 and TF1065. All letters answered and postage refunded. Please send any information to A E Trayling, o/t Ihme-Roloven, Hannoversche Str 6, 30952 – Ronnenberg, Germany.

● Service manual for the **National NHU** Receiver and **Panda Transmitter** urgently required by Douglas, G3KPO, for use in the Wireless Museum. Any information to G3KPO, QTHR or tel: 0983 567665.

A QRP CW Transceiver for Experimenters

continued from page 17

ple characteristics will be to a degree unpredictable, the shape factor and overall performance should challenge that delivered by the CW filters made for commercial HF transceivers. The filter requires terminating impedances of 220W and these are provided by R3, which doubles as one of the collector load resistors for IC1, and R10.

IC2 contains two IF amplifiers which are cascaded to provide a maximum gain of 50dB, and also a balanced mixer that is utilised in this design as a product detector. Unfortunately, the IF amplifiers generate a significant amount of background noise and this limits the effective sensitivity of IC2 to roughly 5μV. Although the mixer provides a modicum of voltage gain, this must be set against the small losses inevitably introduced by the input and IF filters. The net result is that the signal voltage developed across R10 will be similar in magnitude to that at the antenna socket. Clearly, unless some low noise amplification is introduced prior to IC2, the receiver is likely to prove somewhat 'deaf'.

MOSFET TO THE RESCUE

THE CAVALRY CHARGE is provided courtesy of TR1, a dual gate MOSFET. The IF pre-amplifier built around TR1 has an untuned drain load, RFC1, and is biased for linear operation by the potential divider R8, R9. TR1 provides a gain 15-18dB; adequate to lift weak signals out of the noise. R13, placed in series with the signal path to the input of IC2, helps prevent instability in the IF pre-amplifier; it should therefore be soldered close to the junction of RFC1 and TR1 drain.

Although IC2 contains its own AGC system, this is primarily intended for AM operation, and at IF frequencies below 2MHz. Manual IF gain control, which has in practice proved an entirely satisfactory alternative, is therefore provided by RV1. The carrier oscillator drives the product detector via R16, which acts as a simple attenuator. IC2 requires a supply voltage of 5V and this is generated by IC3, a miniature 3 pin regulator.

The signal level provided at the output of the product detector (IC2, pin 8) is insufficient to drive the audio power amplifier, IC5, fully. The AF pre-amplifier, based on one half of a dual Op-Amp, IC4a, is therefore employed to provide additional voltage gain of about 26dB (ie the audio signal is boosted by a factor of 20). The other half of IC4 is unused.

IC8a, which is one of four analogue switches contained within the CD4066, acts as an audio gate. This remains closed on receive and allows the output from IC4a to reach the AF gain (volume) control, RV2. IC5 is operated from an 8 volt supply provided by the voltage regulator, IC6. The maximum audio output into an 8Ω loudspeaker is around 250mW. Headphones may be used as an alternative and these are driven via a series resistor, R27, which attenuates the background hiss generated by IC5 and also prevents the 'phones being driven at an excessively high level. JK1, a two circuit jack socket, is fitted to suit normal stereo headphones and this has a cut-out contact to mute the loudspeaker.

VARIABLE FREQUENCY OSCILLATOR

THE VFO IS BASED ON another standard text-book circuit; the series-tuned Colpitts, or Clapp, oscillator. The active device, TR2, is a junction FET (Field Effect Transistor) and voltage regulation – important to promote frequency stability – is provided by IC7. Tuning over the required range of 100kHz is achieved with a variable capacitance diode, D3. The reverse bias voltage, and hence capacitance, of D3 is controlled by a ten turn wire-wound potentiometer, RV4. The use of a ten turn pot obviates the need for a reduction drive and provides a convenient tuning rate of approximately 10kHz per revolution.

The VFO is calibrated using a either a frequency counter loosely coupled to its output, or a general coverage HF receiver with a short wire antenna placed nearby. After allowing the VFO to warm up for at least ten minutes, first adjust the plastic foil trimmer C49 (remembering to wind RV4 fully clockwise in order to provide 8V at D3's control pin) to set an output frequency of 9.673MHz. RV4 is now turned fully anti-clockwise and R29 adjusted for 9.563MHz. Throughout this procedure, both R31 and RV5 are left at mid travel.

The transceiver now tunes 13.995 to 14.105MHz, which ensures that the lower band edge and a range of at least 100kHz above it remains available – irrespective of minor frequency drift. Most of the drift which is encountered occurs because the values of L1 and that of the capacitors, vary with temperature. L1's inductance will tend to increase as the temperature rises, thus causing the VFO to drift lower in frequency. This may be compensated for by making C48, C50 and C51 polystyrene types. Capacitors with this dielectric material normally possess a negative temperature coefficient – ie their capacitance falls as the temperature rises, thus counteracting the effect of increased inductance.

NETTING

IN ORDER TO ACHIEVE correct netting, the transmit frequency must be around 700Hz higher than the receive frequency. This offset is obtained by arranging for the VFO frequency to be automatically shifted upwards following the first depression of the key. The offset is controlled by pre-set R31 which works in conjunction with R30, RV5 (Receiver Incremental Tuning – RIT) and IC8b. Before setting R31, the VFO should be tuned initially to 9.598MHz (remember to leave RV5 at mid-travel). The off-set varies depending on the VFO frequency, but providing it is set at around 9.598MHz, which corresponds to a receive frequency of 14.03MHz, satisfactory operation should be obtained over the range 14 to 14.07MHz. In the interests of simplicity, there is no provision for switching the RIT control out of circuit, so the operator must remember to return it to the mid-travel position after use.

IC9, a CMOS hex invertor, forms the heart of the transmit/receive changeover system. On key-down, the output of IC9a (pin 2) goes high and C60 is discharged. This causes the output of IC9b to go low and remain in this state until the key has been released for a sufficient time to allow C60 to re-charge via RV6 (changeover delay) and R41. IC9c and IC9f invert the output of the changeover timer to control the relay drivers, TR4 and TR5. R42 and C61 (a polyester type) smooth the keying waveform which then drives the control pin of the keying switch, IC8c. On transmit, RLA2a grounds the output of the 14MHz bandpass filter so as to prevent any feedback from the RF power amplifier reaching the mixer input and causing instability. At the same time, RLA2b couples the output of the keying switch to the mixer input so that the keyed carrier oscillator signal can be mixed with the VFO output. CW at 14MHz is extracted from the second mixer output (pin 3 of IC1) and fed to the RF power amplifier.

The NE555 sidetone oscillator (IC10) is enabled via IC9d and IC9e. IC8d closes on transmit, thus allowing the sidetone to drive the AF output stage via level control RV3. R54 and C69 form a low pass filter to attenuate the harmonics of the 700Hz square wave generated by IC10 – this makes the tone more pleasing to listen to.

Nearly all of the circuitry shown in Fig 2 has been assembled on a single piece of Veroboard. The only problem so far encountered is a weak receiver birdy at around 14.03MHz caused by the 6th harmonic of the VFO beating with the 13th harmonic of the carrier oscillator. This could almost certainly be eliminated by enclosing the VFO components in a screened box. Partial screening has been provided for TR1 and IC2 in order to prevent breakthrough of strong broadcast signals. Empty aluminium drinks cans provide a suitable source of material for DIY screening covers.

REFERENCES

[1] 'To Key or Not to key', *RadCom*, Dec 93. Sidebar 'Perceived benefits of Morse Code'.

[2] *Radio Communication Handbook*, RSGB.

[3] *Handbook for Radio Amateurs*, ARRL.

[4] *Solid State Design for the Radio Amateur*, ARRL.

. . . to be continued

NEXT MONTH

In the concluding part, Steve Price describes the RF power amplifier, use on other bands, a tuning meter, a crystal calibrator and a PSU.

RADCOM USER REVIEW

AKD 6001 6m FM Transceiver

A user review by the *RadCom* team

WITH SUNSPOTS rapidly declining, and the number of Novice licensees rapidly increasing, the 6 metre band seems likely to undergo something of a personality change over the next few years. The AKD 6001 offers an effective way of exploring the band, which should particularly appeal to newly licensed Class B Full and Novice licensees.

EASY TO DRIVE

DESIGNED AND MANUFACTURED in the UK at the AKD factory in Stevenage, the transceiver is light in weight, and measures just 185mm(W) x 57mm(H) x 203mm(D) including knobs and rear heatsink. Two holes on either side of the case provide fixing points for the optional mounting bracket. The front panel is far less cluttered than most similar VHF rigs, and this is a definite plus for mobile operation. On the left is a small but powerful, forward facing speaker. A 3.5mm external speaker jack is provided at the rear.

In the centre of the front panel is a two-digit green LED display, which indicates the channel number. AKD have devised a simple system of channel numbers which divides the 6 metre band between 50MHz and 52MHz into 100 channels, spaced at 20kHz intervals. Obviously, not all channels are suitable for FM use but AKD provide UK bandplan details in the manual.

Below the channel display are three buttons. The left changes the operating frequency in a downward direction, either one step at a time or at a fast rate if the key is depressed for more than half a second. The button on the right changes channels in an upward direction.

Right of the display are the usual squelch and volume controls, and below these the power selection (High/Low) and On/Off switches. In the lower right hand corner is a 4-pin mic socket, with one of the pins providing a 400mV audio output into 47kΩ impedance. The SO-239 socket sits alongside the extension speaker jack, at the back.

The manual is clear and helpful, giving a list of important points to consider when installing the transceiver in a vehicle, and has a diagram giving mic/audio connections should you wish to use an alternative microphone or configure the unit for packet. Hints on TNC interfacing are also included and AKD can provide versions of the 6001 which power up on a packet (or other) channel; the default on the standard rig is channel 75. Circuit and block diagrams are also provided.

Using a sloping dipole, about 12m high, the 25W output produced some useful contacts over a 40-mile radius. Receive sensitivity was very good, and reception of the *GB2RS* broadcast on 50.53MHz was excellent over a difficult 30 mile path.

Reports indicated excellent audio quality on transmit, and on receive the small speaker produced a good sound, with low distortion even at high volume. No problems were experienced with spurious signals, and the squelch has just the right amount of hysteresis. Should repeaters start to appear on the band, a low-cost upgrade will be available from the manufacturers to allow repeater shift.

It's particularly gratifying to find a manufacturer who will supply the radio modified for 3 watt Novice operation at no extra charge, and then change it to the full 25W/5W spec when the purchaser gains a full license.

CONCLUSIONS

AKD HAVE PRODUCED a useful no-nonsense rig, with a high level of performance. As the sole FM-only 6m rig it appears an ideal choice for local nets, Raynet and packet use. It comes with a mobile Push-to-Talk (PTT) mic and the rig is covered by a 2-year guarantee. AKD can also supply versions for the 2m and 4m bands.

The 6001 costs £193.74 inc VAT. When ordering, state whether the Novice version is required. It is available from dealers or direct from the company (add £5 p&p) - AKD, Unit 5, Parsons Green Estate, Boulton Road, Stevenage, Herts SG1 4QG, tel: 0438 351710. Our thanks to them for the loan of the review model.

MANUFACTURER'S SPECIFICATION

GENERAL	
Modulation	FM
Frequency range	50 – 52MHz
Supply voltage	13.2V +/– 10%
Channel spacing	20kHz
Speaker	8Ω internal
Operating temp range	–10°C to +50°C
Frequency stability	10ppm over operating temp. range
TRANSMITTER	
RF output power	25W (High), 5W (Low) Novice version (3W) also available
Supply current	3A (High power), 1.5A (Low power)
Conducted harmonic content	–70dBc
Audio distortion	Less than 3%
Audio response	6dB/octave over range 300Hz to 3kHz
Deviation	+/– 4kHz
RECEIVER	
Sensitivity	Better than 0.25µV for 12dB SINAD
Adjacent channel sensitivity	56db (for 6dB degradation)
Blocking	90dB
Image response	70dB
Audio response	6dB/octave de-emphasis over audio range
Audio output	2 watts
Supply current	130mA (squelch on)
CONNECTIONS	
Antenna	SO239
DC Supply	In-line fused (5 amp)
PTT Mic	4-pin front panel socket

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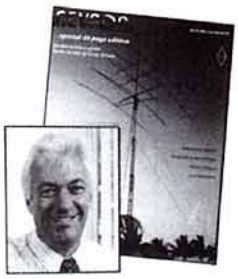

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RADCOM USER REVIEW

DSP Versus The Insect

A Review by the *RadCom* team

REDUCING QRM AND pulling that elusive DX station out of the noise, has been the aim of many amateurs over the years. Using a modern SSB transceiver without a CW filter during the CQ Worldwide contest, for instance, can result in something like a dozen CW stations within the passband, and it often needs a great deal of concentration to work anything at all.

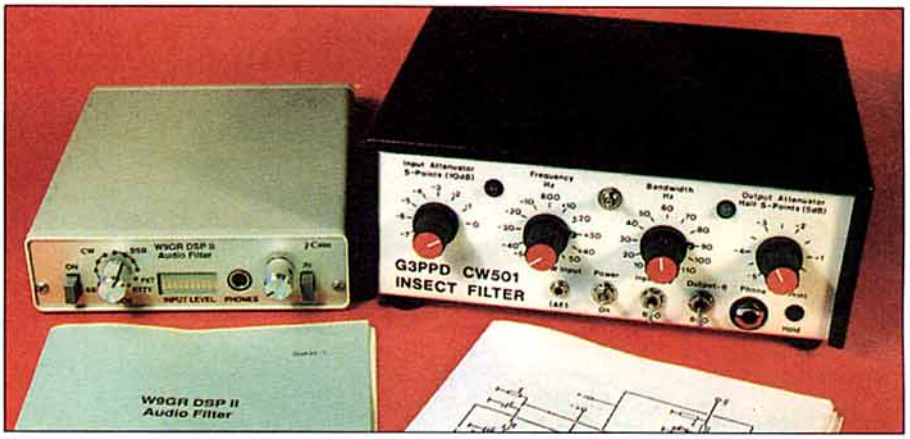
SELECTIVE SOLUTIONS

MANY RIGS HAVE THE OPTION (at a cost) of a CW filter operating at the transceiver's IF frequency, and most DX operators wouldn't be without one. Usually, this has either 250Hz or 500Hz bandwidth and the centre frequency is fixed. To improve things still further, there is the possibility of adding an external audio filter and this month we look at two of the latest products on offer. The first is a fairly conventional filter based on tried-and-trusted analogue techniques, and the second is one of the 'new breed' of filters using digital signal processing techniques to improve QRM rejection and increase signal readability.

Tests were carried out using two quite different rigs – a Yaesu FT-747 transceiver and the 'Yearling' 20/80m receiver described in *RadCom* (Jan '94). The results were most interesting, and although both filters have found their own niche in the market place, they were found to be very different.

INSECT INVESTIGATION

VISUALLY, THE INSECT Filter CW501 from G3PPD is the one which grabs the attention



first. It comes in a black case 208(W) x 86(H) x 164mm(D). The front panel has four calibrated dials, with switches for input and output level (6-way and 11-way respectively), and variable controls for centre frequency and bandwidth. In addition there are toggle switches for power On/Off, Input matching (8 or 600Ω), Output matching (8 or 600Ω), and direct or filter operation. The computer version of the filter also has a Print/Hold switch.

A headphone socket (0.25in jack) is located on the front panel, and the rear panel has the 12V power connections, plus a 7-pin DIN socket (computer version). This has connections for various data communications interfaces such as RS232 and audio tones. The input signal to the filter is connected by means of a 3.5mm jack, located on the lower left of the front panel. The Insect Filter is available either ready-built or as a kit, and the suppliers have a 'get you going' service to reduce the risk of problems for home constructors. According to the manufacturer, the filter is designed to pull out signals of such a low level that "you will be able to listen to the insects talking to one another".

BEATING THE BUGS

THE INSECT FILTER was connected up and tuned to the CW sector of 20m. The input level was adjusted as instructed in the manual, so that the red LED started to flicker on signal peaks. Centre frequency was adjusted to 800Hz, and the receiver tuned to a relatively weak signal.

It was at this point that a shortcoming of the filter became apparent. The bandwidth could be reduced to less than 80Hz with no prob-

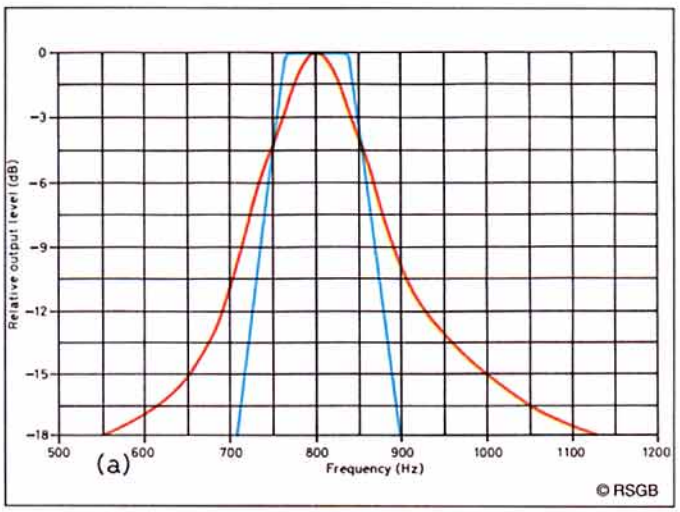


Fig 1: A linear phase response reduces ringing effects from the DSP filter. These are more noticeable with analogue filters.

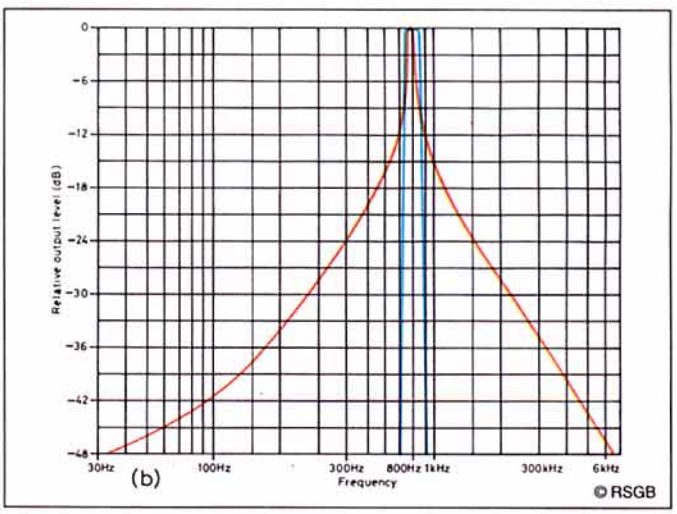


Fig 2: The Insect Filter provides its best selectivity at the peak of the response curve, although the W9GR has best shape factor.

lem, but as soon as a strong signal arrived at the filter input, the unit started to oscillate. Widening the bandwidth by means of the front panel control stopped the oscillation, but careful adjustment of the input attenuator was needed for best results. The LED certainly helped in achieving this.

At reasonably slow CW speeds the Insect Filter proved useful for rejecting adjacent channel QRM, and usually managed to pick out a weak signal surrounded by a number of strong ones. The number of front-panel controls made it easy to tailor the filter's response to the operator's preference.

The filter output is suitable for headphones or a speaker, with plenty of volume provided by a TBA820M output stage. Users may prefer the computer version, which can be interfaced directly with CW/RTTY decoders and any computer with an RS232 interface. Literature provided with the Insect Filter is most comprehensive and includes plenty of tips to ensure you get the best from the instrument. Instructions are also provided to modify the unit for a frequency other than 800Hz.

DSP – A DIFFERENT BALL GAME

DIGITAL SIGNAL processing has been hailed as the key to the future of telecommunications. We were anxious to see whether the W9GR DSP II Audio Filter lived up to its expectations and were not disappointed. Like the Insect Filter, the W9GR operates from a 12V supply but apart from having variable audio input and output sockets, the similarities end there. The components are contained in a tiny metal box (140 x 40 x 165mm), and the front panel controls are simple and straightforward.

The main On/Off control on the left sits alongside a function control, which selects one of a range of pre-set centre frequencies, bandwidths and facilities. Input level is registered on a 10-segment bargraph display, and to the right of this is the 0.25in headphone socket for either stereo or mono 'phones. To the right is the audio output (volume) control, and filter bypass switch. The rear panel has a circular 12V power connector, plus 3.5mm audio input and output jacks.

In use, the W9GR was little short of sensational. Wanted signals were crystal clear, and in most cases the QRM disappeared completely. The W9GR DSP has been pre-set for SSB, SSTV and Packet operation as well as CW as shown in **Table 1**.

Each of these functions is explained in detail in the instruction book. Hints and tips on using the filter are given, along with details of external power and audio connections, and a full circuit diagram. Relatively little can be gleaned from the circuit diagram, as the stunning performance of the W9GR is primarily derived from some clever software algorithms applied to the Texas Instruments TMS320C10 series DSP processor.

TESTS AND MEASUREMENTS

THE RATHER 'LOW-KEY' looks of the DSP filter belie it's effectiveness, and the graphs in **Figs 1 and 2** demonstrate the 'brick wall' characteristic of the filter when tested on the 800Hz (100Hz bandwidth) position. It is interesting to compare its response with that of the Insect Filter. The nose selectivity of the two units is shown in Fig 1, with skirt selectivity in Fig 2.

Tests on both filters were carried out at an input level of 840mV RMS. This was enough to provide a full-scale level indication on the W9GR's bar-graph indicator, and the input attenuator of the Insect Filter was adjusted to prevent overload. Due to the way in which DSP data is processed, signals outside the wanted band do not appear as lower-amplitude replicas of the input, as is the case with analogue filters such as the Insect. The sampling and quantization process means they are output as wideband noise, and although in some situations this noise could be heard it was not unpleasant and has practically no effect on readability.

Speech waveforms have a number of characteristics which enable the W9GR to discriminate most effectively against unwanted signals, noticeably when the SSB 'de-noiser' functions were selected. The automatic notch filter was especially useful for eliminating QRM from those who insist on tuning up on a busy channel.

For CW use, it would have been nice to have variable controls for both bandwidth and centre frequency on the DSP unit. These are provided on the Insect Filter, but the range is rather limited – many owners might prefer a centre frequency of 400-500Hz. With the DSP filter it was possible to copy slow CW in a bandwidth of 30Hz without fatigue.

CW OPERATION
(a) Centre frequency: 800Hz Bandwidth 200Hz
(b) Centre frequency: 800Hz Bandwidth 100Hz
(c) Centre frequency: 800Hz Bandwidth 30Hz
(d) Centre frequency: 400Hz Bandwidth 100Hz

SSB OPERATION
(e) SSB – Combination de-noiser and automatic notch filter
(f) SSB – Optimized de-noiser
(g) SSB – Optimised automatic notch filter
(h) SSB – Weak signal automatic notch filter

OTHER MODES
(i) HF Packet bandpass: 1550–1850Hz
(j) RTTY bandpass: 2075–2345Hz
(k) SSTV bandpass: 1150–2350Hz

Table 1: Switched options on the W9GR DSP Filter.

HORSES FOR COURSES

AN EXPERIENCED CW operator found that neither filter would produce readable signals where none existed without it, a claim often made for audio filters. However, the brain has its own very sophisticated 'audio filter' which isn't taken into account when looking at theoretical improvements. Although no tests were done with data modes, both filters would undoubtedly improve reception and it is here that the theoretical improvements can really be approached.

When used with a transceiver, some disadvantages appeared. Neither was able to reproduce the CW sidetone predictably; an internal sidetone generator with RF sensing might have fixed this. The Insect Filter reacted rather badly to local RF, too. Remember that no amount of post-detector filtering will prevent the AGC responding to signals within the IF pass band, and this produced some un-nerving effects using the DSP filter. These filters offer two approaches to improving signal readability, and in performance terms the W9GR DSP filter wins hands down. However, it is considerably more expensive than the Insect Filter which would give a useful improvement to a simpler receiver or one without a narrow bandwidth IF filter.

The W9GR DSP filter is priced at £299.00 plus P&P, with the G3PPD Insect Filter at £80.00 (kit) and £95 (ready built) plus £5.00 P&P. Our thanks to the following for loan of the review models: Waters and Stanton Electronics (W9GR DSP filter), tel: 0702 206835; and RS Dodson, G3PPD (CW501 Insect Filter), tel: 0502 732322.

IAN WHITE, G3SEK
52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP – or @ GB7AVM

DEVIATION ADJUSTMENT: YET MORE

*I TRIED TO USE G3RUH's method of deviation adjustment (*In Practice, November 1993*) but the oscilloscope readings don't make sense.*

IT DEPENDS EXACTLY WHERE you connect the oscilloscope at the output of the FM discriminator in your particular receiver. Thanks to LA8AK and G4EPX for the following tips.

First of all, if you look back to Fig 1b in the November 1993 column, point A on some IC discriminators may well be 'live' to RF. If so, attaching a physically large 'scope probe may radiate sufficient signal back to the input of the high-gain IF chip to set the whole thing into oscillation, making your measurements totally meaningless. This will probably be shown by a thickening of the 'scope trace when the timebase is set to display the expected audio frequencies, and if you speed up the timebase an RF waveform will be revealed at the IF frequency. The solution is to connect the 'scope via a fairly short coaxial lead, with the inner soldered directly to the test point and the shield connected by a short lead to the ground-plane of the IF board, somewhere near to the output of the IC. There still may be some residual RF on the signal, and you may have to experiment to find a grounding point which keeps the IF amplifier 'tame'.

THE DEVIATION ON MY 'high' packet tone seems much smaller than on the 'low' tone – is there a problem with my TNC?

PROBABLY NOT. It's much more likely that you have connected the probe to a point beyond the de-emphasis network. Almost all FM transceivers are designed for speech communication, and to improve the signal/noise ratio on the higher frequencies the transmitter applies a boost or pre-emphasis. To restore a level audio output response, the receiver contains a de-emphasis network. This is usually a simple RC lowpass filter (**Fig 1**) with a time constant (R in ohms multiplied by C in farads) of about 0.015, ie 15 milliseconds. Typical values might thus be R = 68kΩ and C = 220nF. In some receivers – including much Pye PMR equipment – these two components are none other than R1 and C2 (Fig 1, November 1993). If you connect the 'scope to point C on such a receiver, the DC signal will be measured correctly when you offset the unmodulated carrier frequency between the transmitter and the receiver; but when you apply audio modulation the de-emphasis network will produce progressively lower readings at higher modulating frequencies.

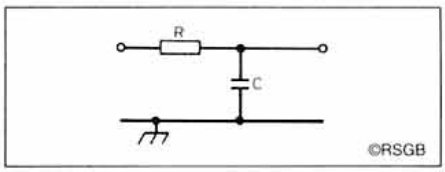


Fig 1: RC de-emphasis network. Typically R (ohms) x C (farads) = 0.015 (15 milliseconds).

So check the component values, and if you encounter anything looking like a de-emphasis network – ie any RC circuit like Fig 1 with an R x C product of about 15ms – you need to connect the 'scope to some point closer to the output of the FM discriminator.

Finally, a third pitfall – you can't use an ex-PMR receiver designed for 12.5kHz channel spacing to adjust an amateur FM transmitter for use with 25kHz channels. The discriminator is unlikely to be linear at double the originally intended deviation.

WHAT DEVIATIONS SHOULD I use for speech and packet radio?

G3RUH MENTIONED A PEAK deviation of ±3kHz for packet systems operating in 25kHz channels. The corresponding peak value for speech in 25kHz channels is ±5kHz. For 12.5kHz channel spacing – including 70MHz packet – those values should be halved.

In all the above cases I really do mean *peak* deviation – the value which is never exceeded, even for an instant. All commercial FM transmitters incorporate audio limiting (speech clipping) to prevent excessive deviation, and most have two internal preset audio gain controls (**Fig 2**): the one which we'll call MIC GAIN is between the microphone and the limiter; and the other, which we'll call DEVIATION, will be somewhere between the output of the limiter and the input to the FM modulator. The controls may be called something different in the manual for your rig, but they shouldn't be too difficult to identify correctly. Even if you're presently intending only to use the transmitter for packet, it's still advisable to adjust the internal controls for correct deviation on speech; the reasons for this will become clear later.

Here's how to do it. (If your transmitter is already properly set up for speech – which you hope will be the case on a commercial rig – then skip this section and rejoin us when it comes to setting-up packet radio. On the other hand, if you suspect – or know full well – that your rig has been 'tweaked' without benefit of test equipment, you'd better read on.)

1. Connect the transmitter to a dummy load. You're going to generate some unsocial signals before these adjustments are complete.
2. Referring back to the instructions in the November 1993 column and the additional notes above, attach a 'scope to the discriminator output of your test receiver and determine what peak-to-peak audio signal you'd expect for a peak deviation of ±5kHz (or ±2.5kHz for 12.5kHz channelling).
3. Turn the MIC GAIN control to maximum – we'll come back and adjust it properly later, but it's important that the audio limiter is being driven hard for the next step.
4. Talk quite loudly into the microphone, and adjust the DEVIATION control for the required peak deviation – and make sure that level is *never* exceeded. Don't touch the DEVIATION control any more after this.
5. Talk into the microphone at the same volume as you'll be using in practice. If it's a mobile rig, remember that you'll probably be speaking more loudly than you would indoors. Slowly turn down the MIC GAIN control; if the audio limiter is doing its job properly, you should find that the peak deviation won't change much at first, but the average level will gradually reduce. You're aiming for the point where much of the speech waveform is causing deviations below the maximum, but is being limited to the peak level for about 10-20% of the time.
6. Put the rig on the air and do some 'sound checks'. If you're a whisperer you may need more MIC GAIN, while excessive MIC GAIN will lead to complaints of "too much background", especially in mobile use. But don't touch the DEVIATION control when you're doing this!

OK, so that's the way to set up the deviation on speech. For packet radio, you need less deviation and also the audio limiter should not be operative on either tone. To achieve this, you simply need to turn down the audio output from the TNC, as described in November 1993 column – don't touch any settings in the transmitter itself. Remember that the TNCs receiving your transmissions strongly prefer an under-deviated packet signal to one that's over-deviated and distorted.

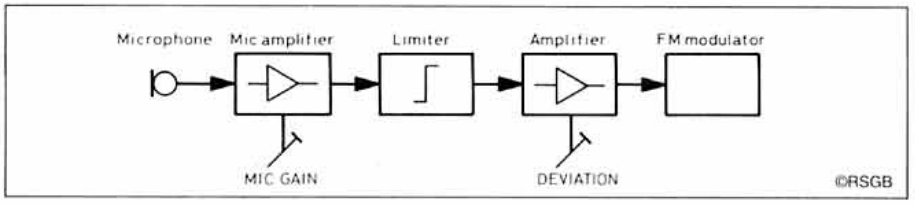


Fig 2: How to locate the two preset controls affecting deviation in an FM transmitter. The MIC GAIN control is the first in the audio chain, ahead of the limiter. The DEVIATION control is between the limiter and the FM modulator.

HALF-WAVE ANTENNAS – RF ON THE COAX

I HAVE JUST INSTALLED a half-wave base-fed vertical antenna for 70MHz, and was told that no counterpoise or radials are required. The VSWR looks good, but I am measuring a lot of RF on the outer of the coax. What's wrong?

THIS QUESTION AROSE on packet from Don, G0PAN. He continued: "The antenna is mounted directly to a bracket, so the only conductor attached to the coax outer at the

antenna end is the short tube carrying the coax socket. The coax runs more or less directly down from the antenna to the radio."

A half-wave antenna presents a high impedance at its end (high voltage but low current) so it has to be fed from 50Ω coax via a matching network. With a little ingenuity, this can be as simple as a tapped coil acting as a step-up auto-transformer (**Fig 3a**); the capacitance required to resonate the coil at the operating frequency is obtained by lengthening the antenna a little. The suggestion that no counterpoise or radials are needed arises from the fact that relatively little current is flowing at the feedpoint, compared with the maximum current at the centre of the half-wave; the current profile superimposed on the drawing of the antenna in Fig 3a illustrates this. Even so, whatever kind of matching unit is used at the base of the antenna, there will always be some current flowing away from the outside end of the coax.

This current has to go somewhere. In most installations it will generally flow away down a metal mast, without seriously disturbing the operation of the antenna; witness the many thousands of successful end-fed commercial and amateur half-wave antennas – not to mention all those CB 'Silver Rods'. But in Don's case there isn't any mast, so the current went down the outer surface of the coax braid instead. (Remember that owing to the skin effect, which confines RF currents to the surfaces of conductors, entirely independent currents can flow down the inside and the outside of the braid.)

One way to deal with this is to wind the coax into an RF choke, a λ/4 down from the feedpoint. In effect this is making the outer of the coax act as a radial for the first λ/4, and hopefully preventing RF currents from running any further down the rest of the cable. If the feedline is dropped straight downwards, the current profile will look something like **Fig 3b**. The first λ/4 of feedline has thus become a deliberate part of the antenna, although in this case its contribution will be relatively minor; the same principle has been developed much further by G2HCG as 'controlled feeder radiation' [1].

An alternative would be to deliberately fit a metal mast to give the RF currents somewhere to go, and wind the coax into a choke right up at the feedpoint. In either case, if the choke fails to reduce the RF currents on the outer of the coax to a tolerable level, additional chokes may be required further down the cable and/or at the rig itself.

Respondents on packet to G0PAN's enquiry suggested a wide variety of alternative forms of choke. Recommendations for coiling the coax into a simple air-wound choke suitable for the low VHF region ranged from 6 to 12 turns, with diameters up to about 15cm – I suspect that it isn't critical. There are several possible variants involving ferrite: winding the cable on a rod or toroid, threading it through large ferrite beads, or using clip-on RFI suppression cores (Maplin Electronics stock code BZ34M or similar). G0PAN himself developed yet another solution based on linear resonators or parallel-tuned 'suck-out' traps. The basic idea is described in G6XN's *HF Antennas for All Locations* (RSGB) [see *Book Case* page 94 – *Ed*].

It is easiest to envisage as shown in **Fig 4a**,

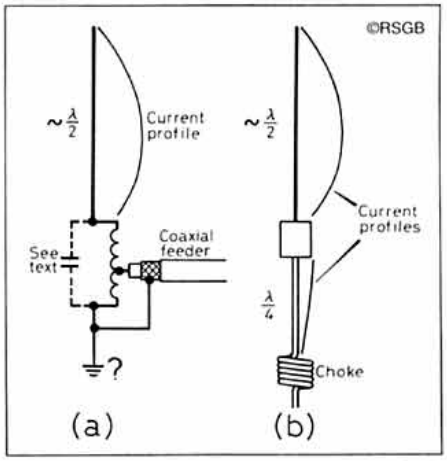


Fig 3: (a) Typical half-wave base-fed vertical, showing step-up matching network. (b) 'Controlled feeder radiation' solution to RF on the coax outer; further chokes may also be required – see text.

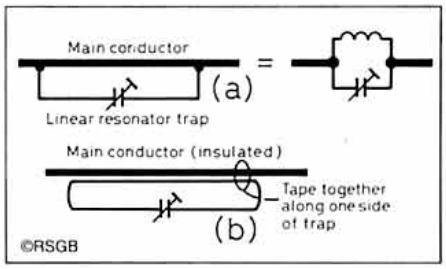


Fig 4: (a) Principle of a linear resonator trap. (b) Non-contact alternative, with one leg taped on to the outer insulation of the coax.

where the trap is directly connected to the conductor which is to be choked off. A suitable value of capacitance brings the loop to a parallel resonance, creating a high impedance which effectively isolates the sections of conductor on either side of the trap. To apply this technique to the outer of a coaxial cable, you'd have to strip off the insulation and make two weatherproof joints on to the braid; not an inviting prospect. Fortunately this isn't necessary, because **Fig 4b** shows a much simpler alternative. The trap is 'floating', with one leg taped on to the outside of the cable without removing any insulation, and capacitive coupling provides the desired effect.

G6XN gives indicative dimensions for use at HF, and G0PAN's dimensions for 70MHz and 144MHz resonators are as follows. 70MHz: 30in of 14g copper wire in a 12in x 3in rectangular loop, resonated by a 30pF trimmer capacitor. 144MHz: 20in of the same wire in an 8in x 2in loop, resonated by an 8pF or 30pF trimmer. Don used the 'Philips' or 'beehive' trimmers, which make fine adjustment relatively easy, but many other types would be suitable. Likewise, the type of wire is not critical; similar (though lower-Q) traps can even be made using pieces of 300Ω ribbon feeder. Having solved his original problem with the 70MHz half-wave antenna, G0PAN fitted an identical trap to his HF feedline to eliminate breakthrough into the 71MHz first IF of his HF transceiver, and added a 144MHz trap for good measure.

To resonate the traps and to indicate their degree of success, G0PAN used an ordinary field-strength meter with its whip antenna closely coupled to the outer of the coax. Adjusting the trimmer caused a marked dip in the meter reading. However, Don also pointed out that a more appropriate method would be to use the clip-on current meter featured in the April 1993 *EMC* column; this again is based on the Maplin BZ34M split ferrite core. You can find further ideas for RF current probes in *Technical Topics*, October 1992.

You'll notice that many of the RF-choke techniques described above are identical to those used for cleaning your own RF signals off the outers of the coax downleads to nearby TVs and FM radios; they are also very similar to those which I recommended in the May 1993 column for removing RF from the feedline of an HF quarter-wave vertical. Although the basic principles are simple enough to grasp, when dealing with real-life installations you'll almost certainly need to experiment with different types, numbers and locations of chokes.

Many thanks to Don, G0PAN, for generously sharing his experiences with what proved to be quite a common problem.

PAINT FOR ALUMINIUM

HOW CAN I PAINT and waterproof an aluminium enclosure for use outdoors?

I CAME ACROSS THIS problem myself a few weeks ago. For weather-proofing outdoor metalwork I strongly recommend a good thick coat of 'Hammerite', and the steel parts of my antenna system had already been painted in an eco-friendly shade of deep green. Unfortunately the aluminium parts fared less well: the instructions on the can warn that *Hammerite* will not stick to aluminium, and neither does so-called 'universal' metal primer, I discovered. The last item to be painted was the home-built coaxial power divider, which is made from 1in square aluminium alloy tubing with ordinary 4-hole N sockets bolted on to the outside. With several hundred watts flying around inside this component, it was particularly important to prevent rainwater from creeping in underneath the flanges of the sockets.

A good answer is an epoxy-based metal primer called 'Bonda Primer'. Being almost as thin as water, Bonda Primer penetrates and seals any potential leakage paths, and then dries to form a very tough coating with excellent adhesion to aluminium. If you and your neighbours find red-oxide a pleasing colour, a single coat will last for years outdoors. Alternatively you can follow on with Hammerite or probably most other types of outdoor-grade paint. Mike Walters, G3JVL, originally discovered the virtues of Bonda Primer for antennas, and like him I've found it to be the only readily-available type of paint that really sticks to aluminium and provides good waterproofing into the bargain. You'll find this in car accessory and repair shops – it's not cheap, but it's really good stuff.

REFERENCE

[1] 'Controlled feeder radiation revisited'. B Sykes, G2HCG, *RadCom*, July 1991.

UNTIL NEXT MONTH

IF YOU HAVE new questions, or any comments to add to this month's column, I'd be very pleased to hear from you by mail or by packet. But remember that I can only answer questions through this column, so they need to be on topics of general interest.

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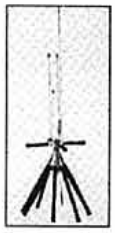

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REV GEORGE DOBBS G3RJV
St. Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE

IN MY LAST COLUMN, (December 1993), I mentioned several interesting companies in the USA supplying kits and parts for the home constructor. In recent years I have obtained some very interesting items from a small company called Dan's Small Parts and Kits. Danny Stevig, KA7QJY, is an enterprising 'one man band' trader, who over the years has managed to produce some real bargains in radio components, some of which appear at quite amazing prices for the UK radio amateur. Although it is perhaps not viable to buy small numbers of individual components from the USA, he has recently produced a small range of kits at very competitive prices.

The best bargain appears to be a 20 metre CW Transceiver kit from a circuit by Dave Benson, NN1G, which appeared in the American *QRP Quarterly*. This is a superhet transceiver and the kit includes the printed circuit board, all board mounted components and controls and is priced at $49.65. Other kits include the Little Joe Transmitter, a Two Transistor Transmitter for 30m from *QRP Classics* and the Neophyte direct conversion receiver from *QST*. I am not sure what overseas shipping arrangements KA7QJY has, but he does issue a six page list of parts and kits and can be contacted at Dan's Small Parts and Kits, 1935 S 3rd W #1, Missoula, MT 59801. USA. As with all American companies I would advise the sending of IRCs or perhaps a dollar bill to cover return postage on information sent to you.

I received a letter from Reinhard Birchel, DJ9DV, chief editor of *beam-Verlag*, an interesting German magazine. The May 1993 issue featured an SSB QRP Transceiver design by Siegfried Hari, DK9FN (I know Siefried as a member of the G QRP Club). The T-20-P is a full feature 20m SSB and CW Transceiver with an output of 3W PEP. Lacking in the 'gift of tongues' I had trouble with the German text but the circuit is impressive.

Siegfried has produced kits of parts for the boards which make up the T-20-P Transceiver. The kits also include optional LED Frequency Readout, a 50 watt Power Amplifier and a CW Filter. Further information can be had from Siefried Hari, DK9FN, Postfach 1224, W-6453 Seligenstadt, Germany. Tel: from 1800 to 2100UTC is 06182 – 26402 or FAX 06182 – 200283. Information on *beam-Verlag* can be had from their offices at Postfach 11 48, 3550 Marburg/Lahn, Germany.

OWN A KENWOOD TS-50?

THE KENWOOD TS-50 mini HF Transceiver certainly captured the imagination when it first appeared. It has three output power levels : Low – 10W, Medium – 50W and High 100W. Some QRP operators have bemoaned the fact that the low power level is 10W, too high for the required 5W for QRP contests and awards.

Peter Meier, WK8S, writing in the *Five Watter*, the journal of the Michigan QRP Club, suggests that it is easy to convert the low power level to the appropriate QRP power. Three power adjustment potentiometers are located on the Tx-Rx Unit just below the top cover of the radio.

These are Low (VR15), Medium (VR16) and High (VR14). By lifting the speaker bracket out and moving the speaker to one side, WK8S was able to adjust the Low Power control for about 4 watts using a dummy Load and Wattmeter. The adjustment applies to both CW and SSB modes.

A NEW COMMERCIAL SSB QRP TRANSCEIVER

ONE OF MY FAVOURITE American amateur radio companies is MFJ Enterprises. They produce a diverse range of amateur radio equipment and accessories with a high level of design and construction. Martin Jue, the President of MFJ, seems to have a keen eye for market needs and usually manages to fill the gaps with keenly priced equipment. Some time ago I reviewed their little QRP CW Transceiver, the MFJ 9020. This transceiver was designed by Rick Littlefield, K1BQT, a well known technical writer in American amateur radio magazines. Rick has designed another small QRP transceiver for MFJ, the 20 Meter SSB Travel Radio.

Designated the MFJ-9420, this transceiver covers from 14.150 to 14.350MHz and delivers 12 watts PEP from a small 2.5" x 6.5" x 6" case. The 9420 is designed for portable or home station use and draws only 2.2A peak from 13.8V on transmit. It is said to include a double balanced mixer front end, an eight pole IF Filter and what MFJ call their exclusive "Constant Current™" RF Speech Processing. The 9420 is a dedicated SSB transceiver, although MFJ supply a plug-in CW adapter which takes the transceiver to the low end of 20m and includes semi break-in change over, sidetone generator and CW/SSB switch.

This is yet another new product I would like to 'test drive'. The MFJ-9420 sells for $219.95 in the USA, and I feel sure it will appear in the UK very soon.

THE 10TH YEOVIL QRP CONVENTION

IT IS HARD TO BELIEVE that the firm favourite in the QRP Calendar, the annual Yeovil QRP Convention is now in its 10th year. The tenth convention is on Sunday, 8 May 1994 at The Preston Centre, Monks Dale, Yeovil.

Last year's change of layout proved to be very popular and these arrangements will be repeated again this year. There will be four talks which will include propagation, construction and other QRP related subjects.

The event also hosts the Fun Run (a 'fun' contest leading up to the event) and the Construction Challenge.

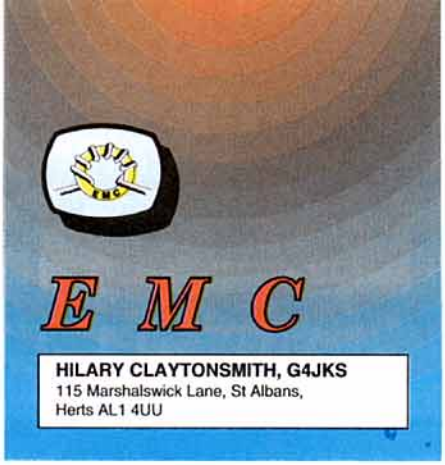
THE CONSTRUCTION CHALLENGE

The 10th Convention Construction Challenge will have as its theme the figure '10'. The challenge is for you to construct and bring to the Convention an 80 Metre CW Receiver (regenerative or heterodyne) using only 10 electronic components – no IC's, providing an audio output between 10Hz and 10kHz across a load resistance of 10KΩ. This audio voltage will be measured using an oscilloscope across our 10KΩ load, one side of which must be connected to the receiver's 0 volts line. Provision must be made to connect our load to your receiver. Your battery supply voltage must not exceed 10 volts.

The RF source will be a replica of the Yeovil Club's first transistorised transmitter of 1954 (see this month's *News & Reports* pages and *World at Their Finger Tips*, Page 254). The output from this transmitter will be adjusted to provide 100μV across 50Ω which will be directly connected to your receiver through suitable isolation circuits.

Adjudication will take place during the lunch break at the Convention. In the event of a tie the source voltage will be gradually reduced until a winner is apparent. Further information can be had from Peter Burridge, G3CQR, 9 Quarr Drive, Sherborne, Dorset DT9 4HZ. Tel: 0935 813054.

The QRP Station of Robert Van Der Zaal, PA3BHK, a fine mix of commercial and home built equipment: (from left to right) an 80m DSB/CW Transceiver on top of a home built 2m 3W FM Transceiver, a T-Match ATU, the small box on the FRDX500 contains converters for 50, 144 and 432MHz, the large box underneath the TenTec Argonaut II is a home-made 2m AM/FM/DSB/CW 4W transceiver, a transverter from this unit gives 3W on 10m, above the power supply on the right are a 15W linear for 2m and a varactor tripler for the 432MHz band.



HILARY CLAYTONSMITH, G4JKS
115 Marshalswick Lane, St Albans,
Herts AL1 4UU

AT A RECENT MEETING between the RSGB and the Radiocommunications Agency, Laurence Green was asked if he would write a piece for the EMC Column stating the RA's policy in relation to interference to non Wireless Telegraphy apparatus. The following text was supplied by him and states the position quite clearly:

NON-RADIO EQUIPMENT AND THE RADIO AMATEUR

"Responsible amateurs know the importance of EMC and do their best to avoid causing interference to their neighbours. When problems occasionally arise, they try to sort them out and I would commend the RSGB's publication *The Radio Amateur's Guide to EMC*. As a long-stop, the amateur licence contains the usual provision about not causing undue interference with what is described in legalese as 'wireless telegraphy'. It is generally appreciated that, if transmissions interfere with broadcast reception, the Radiocommunications Agency is likely to become involved in inspecting the amateur station if the two sides cannot resolve matters amicably.

"There seems to be less certainty, however, about what happens if transmissions interfere with non-radio equipment such as telephones or computers, possibly because cases involving them are less frequent. But they are capable of being affected by radio and the Agency cannot wash its hands of the matter simply because the 'victim' is not a radio, television or video recorder. This is reflected in Note (l) to the Amateur licence which refers to electronic equipment in general.

"There also seems to be some confusion about the Agency's charging policy. If the complainant nominates a suspected source of interference, the Agency will investigate that free of charge as part of its regulatory duties. However, if the complainant wants a detailed assessment of his or her own televison or radio installation, that is another matter and the Agency charges a fee (currently £31). Ministers have said that this is really work for the private sector and that the Agency should provide the service only if dealers cannot solve the problem. All this is explained in the Agency's free leaflet *Advice on Television and Radio Reception* (RA179). The paid service does not extend to non-wireless telegraphy equipment."

WE ARE ALL IN THIS TOGETHER

FOLLOWING ON FROM the IARU Region 1 EMC Working Group Meeting at De Haan, I contacted the new Chairman Christian Verholt OZ8CY and asked him to outline the EMC scene in Denmark. His text which follows raises some interesting points as well as showing us how the Danish national radio society deals with this subject.

1. AT THE POLITICAL LEVEL

"We in Experimenterende Danske Radioamatører (EDR), consider the EMC problem as a technical problem. That means that we wish to solve the technical aspects of the problem rather than to have regulations telling us who is responsible and who is not. Only if an EMC problem is solved technically, so that it no longer exists, will everyone be happy.

"This implies that we want the manufacturers to produce equipment with good immunity or to retrofit the equipment with the necessary filters/decoupling in the case of complaints. The costs should be paid by the manufacturers.

"This situation does not exist at the moment. We are in the transitional period just before the practical implementation of the EMC Directive. Our legislation states that radio amateurs must not cause unacceptable interference to other equipment."

2. HOW EDR WORKS WITH EMC

"Our EMC work is divided into four parts.

a) Education of Radio Amateurs: We do not have a large official EMC organisation but we have tried to educate two amateurs in each of the local EDR societies to make them 'local experts'. They are capable of solving the ordinary problems where you typically use external filters to solve the problem. EDR has provided them with a 'first aid kit' including samples of filters for TV and stereos. The education takes the form of a one day course covering both theory and practical issues. The Authority (Telestyrelsen) has participated in the courses. We have planned a new series of courses to be held in Spring 1994.
Another part of the education process is the publishing of various technical articles. When 50MHz became available to radio amateurs, we published an article on how to avoid interference to TV Channel E2 in Band I (Vision 48.25MHz, sound 53.75MHz).

b) Assistance in Difficult Cases: If the interference problem appears to be technically difficult, or of a principle nature then the radio amateur is free to contact the EDR Technical Committee for further help. This is usually done over the telephone. It is only necessary to take direct practical action to help solve a problem in approximately 10 cases per year. Some of the cases require contact with the authorities, manufacturers or importers, etc and we do that on request.
We have prepared some letters, eg a letter which the radio amateur can send to a cable TV network operator asking them to minimise the use of Channel E2 in Band I.
EDR has achieved a very good relationship with the authorities' interference inspectors and solved most problems in fine agreement.

c) Development and Marketing of EMC Measures: EDR has a sales organisation and sells filters etc to the radio amateur. We have developed some special filters to be installed between tape recorders and amplifiers as these were not available from any supplier. Besides this, we make measurements on existing filters and publish the results.

d) Commenting on EMC Standards, Legislation, etc: EDR is an active member of the Danish National Standardisations Committee and participates by commenting on EMC standards. We have been accepted as an interested party on an equal basis with other organisations such as industrial companies."

3. OTHER EMC ISSUES

"In Denmark, there is no fee for filing a complaint, Telestyrelsen investigates all complaints free of charge and if possible, they solve the problem.

"Telestyrelsen have recently established a practice where they substitute the equipment suffering interference with equipment that complies with EN 55 020. If this equipment demonstrates no interference, then they inform the owner that his equipment is obsolete and should be replaced.

"This practice is fine *if* the owner actually buys new equipment and *if* the new equipment has adequate immunity. If this is not the case then the radio amateur will become very unpopular. This of course is not what we want!"

It is interesting that the Danes' *modus operandi* is similar to our own which in a way is quite reassuring. I have written to other countries' national societies asking for information on how they are tackling the problem and hope to report in future EMC columns. If you are reading this abroad and are a member of your national society's EMC Committee, I would be interested to hear from you.

QRM FROM ALARM SYSTEMS

ANOTHER ALARM SYSTEM EMC problem which we have come across is that some systems radiate significant levels of interference in the amateur bands. The alarm control panel normally contains a microprocessor and the cables from the panel to the sensors, bell box, etc. can act as radiating antennas.

Paul Beaumont, G4SXU, lives opposite Harrogate Grammar School where a scanning fire alarm system was installed. In this system, which is about 100 metres from Paul's antenna, the sensors are polled by the control unit. Paul, who has a high-gain 2 metre antenna system with a pre-amp, reported many signals between 144 and 146MHz at levels of S9 + 20dB to S9 + 60dB when the antenna was pointing towards the alarm system. As well as affecting the 2 metre amateur band, the alarm system caused detectable interference on UHF TV and local FM radio stations including BBC Radio York. As broadcast reception was also affected, Paul contacted the Leeds office of the Radiocommunications Agency who were helpful and suggested RF grounding the cable screens. They also said that they could pay a visit if necesary.

The fire alarm system was manufactured by Morley Electronics Fire Systems of North

Shields and was installed by a company which went out of business before the installation was complete. They were then taken over and the work was completed by Stirling Cristal of Leeds. The alarm wiring was run in 'Pyro' mineral insulated cable which is excellent from an EMC point of view as it has a solid copper sheath and no RF can escape. The problem in this case was that the wires ran across the back of the processor board in the alarm control box and there was coupling from the PCB to the cables only half an inch away. This was allowing RF onto the cable sheaths and although they were all connected together and earthed, good earthing at 50Hz doesn't necesarily mean good earthing at 144MHz!

Paul contacted Stirling Cristal who were very co-operative and came back several times, took the control box off the wall, screened, filtered and earthed everything. This greatly reduced the level of the QRM but Paul still can't hear weak signals when beaming towards Denmark or Sweden although other beam headings are all right. He also reports lots of whistles from various unidentified sources in the 144.845 – 144.990MHz beacon band. Recently, another source of strong RFI has appeared in the 2 metre band and Paul has not yet traced its source. Having put a lot of time and effort into getting the school fire alarm QRM reduced, he wonders whether serious 2 metre DX operating is worth the effort nowadays.

CORDLESS ALARM SYSTEMS

IN THE JUNE 1993 *EMC* Column, it was reported that an amateur had found that his cordless burglar/smoke alarm, the ATI 6000 from Advanced Technology Industries of Bristol, emitted signals at 50kHz intervals across the 2 metre band. Since then, an ATI maintenance engineer has spent a couple of days at the QTH of Ted, G6TKR, in Cheddar, Somerset. Ted says that the engineer made a good effort, fitting the control unit into a metal box, running screened cable to the power unit and to the outside bell box and even putting cables in earthed metal conduit. Now the signals are detectable on only a few spot frequencies in the 2 metre band but Ted can also detect signals from the unmodified ATI 6000 systems in neighbouring houses.

The ATI 6000 system, like many others conforms to the Radiocommunications Agency MPT 1344 specification which allows an ERP of up to 1mW on 173.225MHz. The signals in the 2 metre band are probably from digital electronics in the control unit, not from the radio transmitter part of the alarm system. Some other types of cordless alarm system conform to MPT 1340 which allows 250µW on 417.9 – 418.0MHz. Remote control keys for car alarms and central locking also conform to MPT 1340. A recent amendment to MPT 1340 also allows 10mW on 433.720 – 434.120MHz. The background to this has been reported in a 1993 *RadCom* page, but remember that 430 – 440MHz is a secondary allocation to the amateur service. Fortunately, the PIR sensors in cordless alarm systems are battery powered so they transmit only when they have something to report.

VEHICLE EMC

MONSTER MESH

When car electronic ignition systems and electronic engine management systems started to come into use, there were cases of cars misbehaving near radio transmitters. In the UK, there was one particular car which would come to a grinding halt on certain roads near Daventry, but in Germany, there was a much bigger problem at the Europawelle Saar 1422kHz 1200kW medium wave transmitter at Heusweiler, North-West of Saarbrücken where cars kept breaking down due to the inadequate immunity of car electronics. To remedy this, it was necessary to build a Faraday cage over the road. This is shown in the photograph below which was kindly supplied by Dipl-Ing Günter Reichl, DL8WV. It is interesting to note that the mesh has quite large holes in it but it is still effective because the gaps are only a small fraction of a wavelength.

MOBILE CRYSTAL CALIBRATOR

In the Feb 1992 *EMC* Column, we mentioned harmonics from a Vauxhall Cavalier alarm and a Fiat Panda clock. We recently heard from Sid Ainsworth, G0HTP, of Ellesmere Port who has a Fiat Tipo (registered Jan 1991). When operating mobile, Sid reports QRM across the 2 metre band but particularly on 144.175, 144.700, 145.225 and 145.750MHz which he has traced to the dashboard clock. He can even detect signals on his 2 metre equipment in his shack when the car is in the garage. Sid wrote to Fiat Auto UK Ltd reporting the problem and asking whether they would supply a replacement clock free of charge which did not radiate unwanted signals. He didn't get one and describes Fiat's reply as "rather frosty".

So, EMC Committee member Dave Lauder, G0SNO thought he would check this out. Finding a parked 'F' registration (1988/89) Fiat Tipo he parked next to it and, sure enough, there were signals on the four frequencies mentioned above which were strong enough to open the squelch of his IC280E. The signals were frequency modulated with a rough whine.

Tuning around the 88 – 108MHz FM broadcast band revealed similar signals at various quiet spots on the band such as 104.850MHz and 104.325MHz although these would only interfere with weak and very marginal FM broadcasts. A few minutes with the calculator revealed that the frequencies mentioned are close to harmonics of 524.288kHz, for example, the 199th harmonic falls at 104.333MHz, the 278th at 145.752MHz. But why 524.288kHz? This frequency can be divided down by a 19 stage binary counter to give 1Hz. Some clock chips use a 4.194304MHz crystal and it could be that it is being divided by 8 and getting out.

GETTING A BUS INSIDE A CAR

Many European car manufacturers are toying with the idea of using multiplexed data buses for carrying signals to control various functions within the car environment. These can range from controlling high-speed engine and gearbox functions down to activating indicator lights. The basic idea of a bus is that instead of a large bundle of wires, one for each circuit, there are just two, a substantial 12 volt supply cable and a control line which tells the various units when to switch on or off. Although multiplexed high speed data buses have already been used in specialist vehicles in France and Germany, they have not been considered for the mass market until now. Ford could be one of the first UK manufacturers to make use of this 'high-tech' system. The data bus requires transceivers and protocol controllers thus the level of electronics in the car will be greatly magnified. Needless to say there is also the increased risk of interference from external RF sources as well as possible QRM generated by the added electronics.

However, this has brought about a need to define a special 'in-car' EMC environment with high levels of immunity. Work is going on in the motor industry to define suitable standards and we shall continue to monitor the situation.

LIGHTING UP TIME

IN THE NEXT *EMC* column in **April**, the theme will be lights – compact fluorescent lights, the Philips QL light and PIR operated security lights. If you have any useful information on any of the above, particularly PIR security lighting, please write to me QTHR to arrive by **14 February**.

This huge Faraday screen protects car electronics from the Europavelle Saar 1.2MW MW transmitter.

Emergency!

GREG REILLY-COOPER, G0MAM
PO Box 98, Northwich, Cheshire CW9 5SZ.
Telephone: 0606 783270.

PERHAPS IT'S BECAUSE of the recent increase in the volume of Raynet traffic over the packet network, or maybe it's just a sign that 'the times they are a-changing', but I have received several requests for information about Raynet during the last few weeks from potential new members. Great! Raynet volunteers are amateurs just like every other amateur and in reply to the question "Is there a place for me?" – Yes, yes, yes! There's almost certainly a group near you which would be delighted to hear from you so if you can't find it, contact me, I'll be delighted to put you in touch.

GROUP INFORMATION

TO THOSE OF YOU already working with Raynet – a big thank you for all your help over the past few weeks. The ECO database is taking shape at last. I am still looking for information from a number of groups though and I'd be grateful if every Raynet member would just ask his Group Controller to check that the group's details have been sent in to me. The information is held here for operational purposes only and is not for release so there shouldn't be any worries about confidentiality. It does also help to build a useful overview of 'RAYNET (UK)' and I hope to be able to publish something about that before too long. Incidentally, don't hang back just because you may be Company-affiliated! I have no interest in who you pay your subs to, so if you're happy, I'm happy. I just need to know how to contact you directly if I need to, please.

EXERCISE VIKING

IN PREPARATION FOR the occasions when Raynet is needed in an emergency, we often train ourselves by taking part in crisis management exercises organised by the County Emergency Planning Officer. One such exercise – a big one – took place in Moray, Scotland, on Sunday, 7 November 1993.

Exercise Viking was a major incident exercise planned by Grampian Regional Council Emergency Planning Department and involved no less than 60 different agencies, including the usual blue-light services, local authority and voluntary services. In all, about 800 people took part!

The scenario was a railway accident in which a crowded passenger train had failed on the main-line in a railway-cutting. Vandals had tampered with the hand-brake on a stabled goods train so that the goods train ran away down the line and collided with the rear of the failed passenger train.

The rear carriage over-turned and there were many fatalities and serious injuries. Casualties were wandering around nearby woodland and on the beach, disorientated and in a state of shock. All casualties were suitably 'made-up' by the British Red Cross make-up team and both looked and behaved as if they had truly been involved in a major accident.

Raynet was on site from 0630 to 1600UTC and provided extensive communications. At the crash site we had a Mobile Control Centre relaying messages to and from Raynet Control adjacent to the User Service Controls, and operators were stationed at Dr Gray's Hospital, Moray College and the Hopeman School which was being used as a Rest Centre, thus linking them all directly to Raynet Control at the scene.

Mr David McIntosh (Grampian Regional Emergency Officer) said afterwards that he was very happy with the response of all the User and Voluntary Services. Further exercises, including some 'on paper' would follow to further fine-tune the coordinated response to major incidents.

I am sure all readers will wish to join me in sending a very warm "Well Done" to the members of Moray Raynet Group, for representing our abilities so professionally. Those of you with packet facilities may like to read a more detailed report of the exercise, which is available from the Raynet topic on CLIVE @ GB7CHS (select file 31). Readers without packet facilities may obtain a full copy by sending a SASE envelope (minimum size 4.5" x 9") to the ECO.

RAYNET ON PACKET

MORE GROUPS ARE using packet during exercises and training and it seems from reports received that, with very little effort, it can be a run-away success. If your group has encountered any problems, let's hear about them. Even if you have solved them, you can bet there will be another group somewhere else going through the same learning-curve so let's be friends and help one another out.

I have, with your considerable help, now established a thriving network of PPOCs (Packet-Points-of-Contacts) among those

PHOTOGRAPH COURTESY OF *THE NORTHERN SCOT* NEWSPAPER

Moray Raynet Group provided communications for Exercise Viking.

Raynet Groups which have at least one member using the mode. The volume of information which is now regularly exchanged via packet is very much greater than previously and I would like to encourage any Raynet Group which is currently "not QRV" to please think about trying it. I do so very much want to help Raynet improve its inter-group communications but I know as well as any of you how expensive telephone calls and postage stamps are. Using packet is a fine alternative as many of us already use it anyway so the cost of sending a few additional messages is infinitesimal.

To you packet-players who are not Raynet members, thanks for your tolerance of all this extra traffic. I know from messages you have sent to me that many of you do enjoy reading about us and some of you have joined us by now. Welcome! To the users of GB7CHS for their patience while G0MAM mail delays their own messages, and to Ken, G3WCS (SysOp), a special word of thanks for all his help.

MISSISSIPPI FLOODING

WHILE MUCH OF South East England is at this moment under water, so a short while ago was the midwest region of America. The worst flooding occurred along the Mississippi and Missouri rivers and EOC (Emergency Operations Coordinators), provided the organisation behind what became one of the longest emergency amateur radio rescue operations.

PHOTOGRAPH BY *THE ULTIMATE CHOICE*; REPRODUCED COURTESY OF ARRL

Many bridges and highways were put out of action by the flooding Mississippi and Misouri Rivers.

MARTIN'S PACKA

With more choice, more stock and better prices than ever before, there is only one place to shop in 1994 - MARTIN LYNCH

"If you see the package you want advertised cheaper elsewhere, I'll match it **and** give you peace of mind buying from MARTIN LYNCH"

DIAL 081 - 566 1120

PACKAGE PRICE PROMISE

ALINCO SUPER WEEK-END!

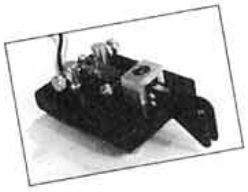
Starting in February, a major manufacturer will be invited to show the latest in his product range at the largest showroom in Europe - MARTIN LYNCH. We kick off with Jeff Stanton from W&S, demonstrating the famous ALINCO brand of FM TRANSCEIVERS. The complete range will be on show and Lombard Tricity Finance will be on site to ensure you get the very best FINANCE deal. There will be lots of "freebies", giveaways, stickers, leaflets and info sheets on all the Alinco equipment, so come on down to the store on Saturday the 26th of February and meet Mr ALINCO himself, - "Uncle Jeff"!

AKD FM Range Save £10.00!

As reviewed by Radcom, the exciting low cost 25W FM transceivers from AKD are unbeatable in specification and price. Better still we've knocked over £10.00 off the price.

AKD 6001 6M 25W FM transceiver. Price only £179.95 incl. VAT.

Kent Keys



At last! the full range is available at our new showroom.

Solid Brass Morse Key £45.95
Twin Paddle Morse Key £64.95
Single Paddle Morse Key £47.95

Morse Classes at Martin Lynch

From the first of December 1993, George Eddowes G3NOH, (as featured on BBC TV), will be holding Morse Classes every Thursday evening from 19:00. Spaces are strictly limited, so get your names down early. There will be 10% discount on that new H.F. rig for those of you who pass first time after George's tuition!

Packet Demonstration in new shop!

See the full range of DECODERS and PACKET terminals on demo at Northfields. For those of you who want a budget system or a full spec computer based set up, give us a ring. Better still, pop in and see us!

MID TO UPPER RANGE USER

Yaesu FT990DC

Buy a brand new FT990 100W HF base station and we'll throw in a matching MD1-CB BASE MICROPHONE! - and let you pay for it OVER A WHOLE EIGHTEEN MONTHS, FREE OF INTEREST!!

Deposit only £468.00, with eighteen payments of £79.50, total £1899. ZERO APR.

Kenwood TS-850S

With or without Auto ATU and three years after it's introduction, read Rob Mannion's report in this issue to see why the men at KENWOOD are pleased with themselves. Similar spec. to the Yaesu FT990, the choice is yours - they're both excellent! Add £149 for the auto atu.

Deposit only £439, with 18 payments of only £70.00. Total £1699. Zero APR.

Ideal for the starter or second station

Yaesu FT840

The latest HF all band transceiver from Yaesu. Looks like an FT890, without a few of the trimmings. *free Yaesu microphone included in this one!* Include a good 13.8V supply and a VCI antenna tuner plus a 1/2 size G5RV antenna and you are away!

Deposit only £325, with only twelve payments of £66.25. Total £1120.00 ZERO APR.

MID RANGE HF OPERATION

Icom IC737

I said it was good before Peter Hart & Rob Mannion did. If you want names, I've got plenty. Satisfaction comes guaranteed with this one. 100W of pure HF power and a synthesiser that's smoother than Roger Halls head! With a free matching SP21 speaker worth £65 !!

Deposit only £409, with twelve payments of only £95.00 Total £1549.00 Zero APR

Kenwood TS-690S

Either with or without six metres, the TS450/TS690 is the ideal mid-ship package. Offered with a 13.8V 20A power supply, you can have one in your shack soon!

Deposit £439.00 with twelve payments of only £105.00. Total £1699. Zero APR

MOBILE & PORTABLE H.F.

Kenwood TS-50S

It broke all records when it was introduced and it still has no competitors. The TS-50S really does push out a cool 100W, covers 500khz-30mhz and operates on all modes. Buy one during December & January and we'll include the carriage - free!

Deposit £195, with twelve payments of only £66.66. Total £995.00 Zero APR.

Icom IC707

Yes, you're right, Yaesu did have a 707. But that was 11 years ago and that was an FT. For simple operation on H.F. with Icom's unrivalled performance, try the NEW IC707 for size.

Deposit £195, with twelve payments of only £50.00. total £895.00. Zero APR.

DUAL BAND VHF

Yaesu FT530R

The very best in Dual Band Handie operation. The only thing to change on this one is the price. YAESU U.K. have bought it DOWN!! So now I... Dual RX, extended receive, auto repeat, it's got it all including CTCSS. Buy one on FREE FINANCE and claim your FREE YAESU EXTRA ACCESSORY worth loadsa money!!!

Deposit £99.00 with twelve payments of only £33.33. total £499.00 Zero APR

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For those of you that don't like all the buttons, then maybe the IC-W21E, (without KeyPad), is the one for you. Lots of trick functions and easy to operate. Excellent value for money.

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Kenwood TH78E

Still one of the best selling Dual banders, the TH78E comes complete with nicads, charger & antenna. The only Handie with "Alpha-Tag" for memories.

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Alinco DJ-580

Setting the standard for dual-banders, Alinco have helped keep the prices down and given you more features at the same time! Free case and INTEREST FREE?

Deposit £79.95 with twelve payments of only £33.33. Total £479.00 Zero APR.

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NEW!!

Yaesu FT-11R & FT41R

The very latest on the single band scene, Yaesu have introduced two new Handies for either 2M or 70CM. These include full "paging" facilities, extended range, (with AM AirBand RX for the FT-11R) and a host of other features. Truly palm size, these two will set the standards for other one banders.

Deposit £39.00 with twelve payments of only £22.50. Total £309.00 (FT-11R)

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Telephone 081 566 1120
FAX: 081 566 1207

Alinco DJ-180

Still leading the field in simple to use "I should own a 2M handie" bracket. No frills just great value. C/W Nicads & charger etc.

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Icom IC-2iE/4iE

Still the smallest single bander on the market next to the TH-22, this machine really is the size of a packet of cigarettes!

Deposit £48.00 with twelve payments of only £16.75. Total £249.00 (IC-2iE)

Kenwood TH-22/44

The very latest in "pocket" two way. Remember the TH-21? this is the nineties version. No fiddle bits, just 100% FM Communication.

Deposit £38.00 with twelve payments of only £16.75. Total £239.00 (TH-22)

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Yaesu FT5200

The only Dual bander with a quick release front panel. Down in price and up in spec! All FT5200's sold in January will have wide band receive and a free remote mounting kit! Plus Interest Free!

Deposit £148.00 with twelve payments of only £41.75. Total £649.00 Zero APR.

Kenwood TM-732E

Sells faster than Brenda used to hand out her coffee! A Dual Bander with everything, including remote panel facility. Free wide band RX. (If you talk to Chris or Tony nicely)

Deposit £158.00 with twelve payments of only £44.25. Total £689.00 Zero APR.

VHF MULTI-MODES

Yaesu FT-736R

We sold hundreds last year and that's no wind up. With or without muTek, I'll offer you a deal on this one that will make your BNC's drop off! You thought the mob down south were giving you a deal - forget it! For genuine buyers call into the shop. I won't quote a price on the phone, so get travelling.

Deposit £ to obscene to print. Monthly payments £ complete bewilderment!

Kenwood TS-790E

The favourite amongst DX'ers. Dual band 2/70 with a 23CM option. It's full 45W output on 2/70 is first rate as is the receiver.

Deposit £469.95 with twelve payments of only £115.00. Total £1849.95 Zero APR

Icom IC970H

When Icom build something to beat everyone else, they sure do it in style! You may have to trade in the kids, but who cares! You want the best? Then you can have it and pay me over a whole 18 MONTHS - FREE FINANCE !!

Deposit £670.00 and eighteen payments of only £110.00. Total £2650 Zero APR

Yaesu FT290R mk11

I remember when these 2.5W transportable 2M multi-modes were the starter's dream. Then someone jacked the price through the roof... well it's back down to earth again and I'm giving FREE Nicads & charger and FREE FINANCE!!

Deposit £99.00 with twelve payments of only £33.33. Total £499.00 Zero APR.

Yaesu FT790R mk11

Just like the FT290, if you're a NOVICE and want the ultimate in 70CM multi-mode communication, Yaesu and my new price is a real winner! O.K. so you'll still get FREE NICADS & CHARGER in the deal!

Deposit £110.00 with twelve payments of only £40.75. Total £599.00 Zero APR.

Icom IC-275H/475H

The best in single band 100W base stations! A deal offering you either on a specially extended 18 month free finance offer for January only!

Deposit £389.00 with EIGHTEEN payments of only £55.55. Total £1389 (IC275H)

RECEIVERS

Yaesu FRG-100

Remember when Yaesu introduced this excellent "second receiver" for the shack and then the price shot up? Well I've got fifteen pieces at a give-away price AND you can still buy on FREE FINANCE!!

Deposit £99.00 with twelve payments of only £33.33. Total £499.00 Zero APR.

THE NEW TS RANGE OF MOBILE AND BASE ANTENNAS

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The new exclusive range of **MyDEL** VHF/UHF antennas are now avalable from stock. Costing some 20% less than other well known brands, compare the quality and prices yourself!

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TSM-1005	2m 7/8th	5.2dbi	1.89m long	£39.95
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TSM-1310	2m/70cms	2.1/5.0dbi	0.80m long	£29.95
TSM-1326	2m/70cms	2.1/5.0dbi	0.77m long	£29.95
TSM-1332	2m/70cms	4.5/7.2dbi	1.50m long	£44.95
TSM-1607	2m/70cm/23cms	2.8/6.0/8.4dbi	0.78m long	£49.95

MyDEL BASE RANGE

TSB-3002	2m (2 section)	6.5dbi	2.87m long	£44.95
TSB-3003	2m (3 section)	7.8dbi	4.50m long	£69.95
TSB-3303	2m/70cms	3.0/6.0dbi	1.15m long	£49.95
TSB-3302	2m/70cms	4.5/7.2dbi	1.79m long	£69.95
TSB-3304	2m/70cms	6.0/8.4dbi	2.15m long	£69.95

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CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest News* January 1993

HF RESULTS

COUNTY ROUND UP CW CONTEST 1993

Judging by the number of entries Sunday seems more popular than Saturday for contesting . . . . or maybe it was the lure of CW? Conditions were poor and variable on 40m but 80m got things off to a good start for many. Nice to see so many counties active, despite one entrant (who shall remain anonymous) mis-logging a station with a GW prefix in Tayside! Well done to G0IVZ with just a few extra QSOs taking the lead from G4BWP. Thanks to GW0KZW, G0OXT & G4SYC for their checklogs. *G4IFB.*

Soapbox: "My first entry in a contest with multipliers" (GD0LQE) [NB total score = (sum of QSO points on each band) x (sum of counties on each band)]. "Had to break off to go to RSGB exhibition at NEC" (G0MRH). "40m died!" (G0RSA). "I was itching to try out a new antenna, beaming N/S on 80m and high/low-angle on 40m" (G3HEJ). "40m very poor, long skip" (G3JSR & others). "I may be near the foot of the list but hopefully not the last!" (GM3UM). "I thought everyone had gone back to 80m" (G4WYG). "40m lousy!" (G4XPE). "Impossible to copy the high-speed boys - PSE QRS!" (G4ZYF).

Pos	Call	3.5MHz QSOpts	Mults	7MHz QSOpts	Mults	Eqpt*	Score
1	G0IVZ+	177	39	204	39	4C15/4Y26	29,718
2	G4BWP+	156	39	201	39	3C14	27,846
3	G3TBK+	159	37	183	37	4C16/4C15	25,308
4	G3HEJ	150	37	177	36	4W22/4W42	23,871
5	G3GLL	120	34	198	39	4C13	23,214
6	G3IZD	153	35	138	32	3C12	19,497
7	G3KAF	153	38	129	29	4C1?	18,894
8	G4OGB	165	37	120	27	3C15/3C12	18,240
9	G3VYI	135	34	138	30	4G3	17,472
10	G3RSD	138	35	129	29	3C13	17,088
11	G4KGK	123	33	129	27	3C1?/3C1?	15,120
12	G4IOM	132	31	126	27	3W1?/3C1?	14,964
13	G3YAJ	123	31	123	27	3C1?/3C1?	14,268
14	G0LZL	147	37	96	21	3C13	14,094
15	G0IDE	132	31	114	26	3Q1?	14,022
16	G3MPB	93	24	153	32	3C1?	13,776
17	G3JJG	129	33	102	26	3C11/4C11	13,629
18	G3JSR	138	31	105	25	3W1?/3C1?	13,608
19	G3KNU	135	35	93	23	3C1?	13,224
20	G4IFB	135	35	84	23	3G13	12,702
21	G4WYG	132	35	84	22	3C1?	12,312
22	G2HLU	147	34	72	18	3C12	11,388
23	G3BPM	102	25	117	26	4G16/4C1?	11,169
24	G0ADH	108	28	90	24	3C1?	10,296
25	GW3WWN	105	27	90	24	3C12	9,945
26	G5MY	120	28	60	17	3G13	8,100
27	G4PTE	63	21	99	27	3G13	7,776
28	G4XPE	120	30	48	14	3C11	7,392
29	G4XRV	90	24	78	19	3C1?/3G1?	7,224
30	GM3UM	84	22	80	22	3W1?	7,216
31	G0RSA	78	21	52	13	4C1?/4G1?	4,420
32	G0TDB	57	17	57	17	3C13	3,876
33	G0CGB	38	11	66	18	4Q1?	3,016
34	GD0LQE	51	15	51	13	1C12/1W12	2,856
35	G3GMM	93	26	0	0	3C1?	2,418
36	G4KDL	66	19	0	0	3C1?	1,254
37	GM0GNT	12	4	36	15	1C1?	912
38	G4ZYF	0	0	42	12	3C1?	504
39	G0MRH	39	11	0	0	3C12	429

* Where different equipment was used on each band, codes are given for 80m/40m.
\+ Certificate winners.

COUNTY ROUND UP SSB CONTEST 1993

The HFCC is pleased to report a higher entry than the last two years with more G0s than ever and over 135 UK stations active from three-quarters of the possible counties. Congratulations to G3NLY who made excellent use of both bands and took a clear lead with a massive x90 multiplier - that is quite a target for next year! Thanks to G0OXT and G4KGK for their checklogs. *G4IFB*

Soapbox: "I started again at 001 on 40m before I realised my mistake" (G0ADH) [serial numbers should increment on each QSO regardless of band]. "Remarkable that BYLARA net continued through it all!" (G0MRH). "Saturday shopping took its toll" (G0RSA). "Thanks for organising a fine contest" (G3BPM). "Thoroughly enjoyable contest" (G3IZD). "Good conditions on 80m but long skip on 40m" (GW4FCV & others).

Pos	Call	3.5MHz Pts	Mults	7MHz Pts	Mults	Eqpt*	Score
1 +	G3NLY	261	39	282	51	4C1?/4C1?	48,870
2 +	G3SEM/P	195	34	294	45	4C12	38,631
3	G3TBK	171	34	303	44	4C16/4C15	36,972
4	G0IVZ	159	35	249	41	4C15/4Y26	31,008
5	G3IZD	159	33	207	36	3C12	25,254
6	GW3WWN	111	26	204	40	3C12	20,790
7	G3BPM	93	21	246	39	4G16/4C1?	20,340
8	G4XOP	90	22	234	37	4C1?	19,116
9	G3RSD	117	27	185	33	3C13	18,120
10	G0RSA	99	22	204	37	4C1?	17,877
11	G4IQM	96	23	201	37	3W7?/3C1?	17,820
12	G3FFH	126	27	162	29	4C15	16,128
13	G0JQI	126	26	126	31	3C1?	14,364
14	G0ADH	90	24	132	31	3C1?	12,210
15	G2HLU	129	30	93	24	3C12	11,988
16	G4KDL	72	19	165	31	3C1?	11,850
17	G0TDB	63	19	135	28	3C13	9,306
18	GW4FCV	117	24	81	22	3C1?	9,108
19	G3YCH	45	12	123	27	3C1?	6,552
20	G4PTE	6	2	165	35	2G1?	6,327
21	G0MRH	33	9	54	17	3C12	2,262
22	G3PRI	33	11	51	15	3G1?	2,184
23	G3GMM	27	9	45	14	3C1?	1,656

Where different equipment was used on each band, entries show 80m/40m.
\+ Certificate winners.

SSB FIELD DAY 1993

This year's entry in the Open Section was down on 1992, but in the Restricted Section the number of entries were almost exactly the same as last year. Whilst the points scored in both sections were similar to last year, the multipliers worked were far in excess. In the Open section Gravesend RS found the most multipliers with 212 and in the Restricted section Plymouth RC 'A' had 129.

A close examination of the logs reveals that most of the leading Open section groups start on the highest Open band and then move down as conditions change, whereas Restricted section entrants commence on the lower bands.

Presentation of the logs was generally good, but there are still those who persist in using programs which do not conform to the printed format specified in the rules. Even with the penalties as they are, several entrants still submitted logs with unmarked duplicates, maybe those penalties are not enough of a deterrent! One club in the South of England, who shall remain anonymous to save embarrassment, will notice a drastic reduction in their score - they submitted a log for 1.8MHz with some 40 contacts and 6 multipliers, its a wonder they didn't suspect something was not quite right when they hadn't worked a G portable.

Lichfield ARS, G3WAS/P, took the honours in the Open Section with their B station, G3VHB/P, gaining second place and Gravesend RS, G3GRS/P, third. The South West of England was successful in the Restricted Section with Plymouth Radio Club, G3PRC/P, winning the battle against Torbay, G3NJA/P, for first place with Stratford RC, G0SOA/P, taking third place.

Equipment used by leading stations was -
G3WAS/P - TS940S, ALI200 Amplifier, TH7 at 80', 402CD at 90' and an 80m Delta loop at 80'.
G3VHB/P - FT1000, Titan Amplifier, TH5 at 80', 3 element 7MHz Yagi at 70' and an 80m Delta loop at 70'.
G3GRS/P - TS850, AMP Amplifier, TH5 at 70', TB3 at 40', 402 CD at 50', 3.7MHz dipole at 60'.
G3PRC/P - FT1000, Diamond loop at 50'.
G3NJA/P - TS950SD, Trapped dipole at 45'.
GOSOA/P - TS850, 274' Doublet at 48'.

It would seem that the use of beams on 40m is commonplace in the Open section, but to be a success in the Restricted section you only need simple antennas like the trap dipole.

Soapbox: "Used Supa-Dupa for the first time, a great help. Conditions poor, pressure on 7MHz, it was not for the faint-hearted (G4RFR/P). "Much rejoicing when the generator arrived complete with electric start. A pure luxury for the team of 'getting on a bit in age' operators. No packet or computer logging" (G3WAS/P). "Our first attempt but we didn't have a spotting rig. Next time we will, great fun though!" (G6YB/P). "A thoroughly enjoyable event. We took the opportunity to familiarise operators new to the contsets scene" (G4FOX/P).

Thanks to those who took the trouble to submit check logs. *G3KDB*

OPEN SECTION

Posn	Call	Club	3.5	7	14	21	28	Pts/Mlts	Score
1	G3WAS/P	Lichfield 'A'	904/28	1060/46	1684/63	427/49	143/19	4128/205	864690
2	G3VHB/P	Lichfield 'B'	972/23	1057/47	1473/54	439/59	68/21	3973/204	810492
3	G3GRS/P	Gravesend RS	989/29	977/38	1325/62	386/60	120/23	3797/212	804964
4	G6YB/P	Bristol CG	1035/22	1061/36	1951/52	158/23	103/15	4308/148	637584
5	GM0TXX/P	Windy Yett CG	1144/27	737/20	1397/48	440/23	104/17	3822/135	515970
6	GW4CC/P	Swansea ARS	1011/20	845/21	1244/50	658/22	54/10	3812/123	468876
7	G4HRS/P	Horsham ARC	776/17	511/13	1054/44	351/36	117/16	2809/126	353934
8	G4IRC/P	Ipswich RC	1158/24	938/25	519/37	104/18	18/ 5	2737/109	298333
9	GW3EOP/P	Port Talbot RS	705/16	363/ 1	1233/39	562/24	60/10	2923/100	293000
10	G3ASR/P	Edgware RS	698/16	831/28	853/36	149/23	50/ 5	2581/108	278748
11	G4FOX/P	Melton Mowbray	580/14	840/18	1158/39	174/23	2752/ 94	258688	
12	G4RSE/P	S Essex ARS	583/11	397/22	1265/48	139/17	12/ 2	2396/100	239600
13	GU3HFN/P	Guernsey ARS	505/14	393/13	1018/40	361/15	2277/ 82	186714	
14	GM0GMN/P	Clyde Coast	219/10	679/13	1219/32	217/11	2334/ 66	154044	
15	G0JJN/P	Hucknall RR	629/14	255/15	849/34	86/ 9	9/ 3	1828/ 75	137100
16	G4FUR/P	Coulsdon	75/ 5	568/12	580/30	96/17	40/ 7	1359/ 71	96489
17	G3VGG/P	Bromsgrove	373/ 9	286/ 7	399/29	133/11	59/ 9	1250/ 65	81250
18	G4FUH/P	Scunthorpe	487/13	394/16	355/19	45/10	15/ 3	1296/ 61	79056
19	G3GHN/P	Clifton ARS	364/12	352/13	285/24	95/17		1096/ 66	76692
20	GM0IBM/P	IBM Greenock	536/12	287/ 9	235/19	210/ 6	2/ 1	1270/ 47	59690
21	G4GXP/P	Kidderminster	232/ 9	103/ 9	223/13	119/11	9/ 3	686/ 45	30870
22	G0MEG/P	11th Hour Group		136/ 9	231/26	93/12	51/11	511/ 58	29638

RESTRICTED SECTION

1	G3PRC/P	Plymouth RC	658/12	607/25	938/42	319/33	68/17	2590/129	334110
2	G3NJA/P	Torbay ARS	972/17	769/20	848/35	261/28	34/ 9	2884/109	314356
3	G0SOA/P	Stratford	800/18	429/16	676/34	192/27	85/13	2182/108	235656
4	G2XP/P	Sutton & Cheam	875/13	531/20	593/30	177/23	64/ 6	2240/ 92	206080
5	G3ULT/P	Reading RS	710/19	471/13	574/29	137/21	99/18	1991/100	199100
6	G4RFR/P	Flight Refuelling	700/16	277/11	936/41	93/14	38/11	2044/ 93	190092
7	G4AYM/P	Gloucester	335/11	539/14	846/35	107/15	51/13	2078/ 88	182864
8	G3IZD/P	Barrow in Furness	948/12	393/11	846/28	221/14	28/10	2436/ 75	182700
9	G3SEM/P		591/14	611/24	402/32	60/17	19/ 6	1683/ 93	156519
10	G3YDD/P	Hereford ARS	810/17	463/14	682/25	79/ 9	21/ 6	2055/ 71	145905
11	G4HRC/P	Havering DARC	880/17	793/19	207/19	67/14		1947/ 69	134343
12	G6QM/P	Queen Mary ARCG	931/16	542/15	421/25	38/11	9/ 2	1941/ 69	133929
13	G4JBR/P	Exmoor RC	553/14	326/10	368/28	250/24	28/ 7	1525/ 83	126575
14	G0BRC/P	Bredhurst	992/17	198/11	413/24	151/18		1754/ 70	122780
15	G4RKO/P	Thatcham ARCG	879/14	516/13	46/22	50/ 9		1991/ 58	115478
16	G0TUQ/P	Leiston ARC	770/19	315/11	423/27	20/ 7	21/ 4	1549/ 68	105332
17	G5LK/P	Reigate	348/10	524/15	255/23	168/19	53/ 9	1348/ 76	102448
18	G0CRW/P	Crowborough	432/ 8	198/16	302/30	174/31	42/ 4	1148/ 89	102172
19	G3JRM/P	Lowestoft ARC	985/12	196/15	218/20	74/16	11/ 3	1484/ 66	97944
20	G0TQT/P	Plymouth'B'	451/12	197/12	675/26	235/10	10/ 2	1568/ 62	97216
21	G4CDD/P	Denby Dale	541/10	489/15	552/22	105/ 6	8/ 2	1695/ 55	93225
22	G3XRT/P	Ilford Group	563/13	472/14	302/22	33/ 7	8/ 2	1378/ 58	79924
23	G4VRS/P	Aylesbury Vale	793/17	215/ 7	174/11	53/14	9/ 3	1244/ 52	64688
24	G3UES/P	Echelford	567/14	177/ 9	352/25	29/ 5		1125/ 53	59625
25	G4FBS/P	Horndean DARC	535/12	180/11	361/19	47/ 9		1123/ 51	57273
26	G6OI/P	Stourbridge ARS	639/12	236/12	227/17	14/ 4	5/ 1	1121/ 46	51566
27	G3BPK/P	Wigan Douglas V	712/15	276/11	105/6	71/ 7		1164/ 39	45396
28	GI0LIX/P	Carrickfergus	314/10	102/ 8	318/16	151/ 9		885/ 43	38055
29	G0TSI/P	N Sefton	357/11	118/ 7	109/15	79/ 9	16/ 4	679/ 46	31234
30	G4LCQ/P	Atherstone	844/17	221/10		5/ 1		1070/ 28	29960
31	G3WQK/P	Southdown ARS	92/ 5	169/ 7	255/20	47/ 9	13/ 5	576/ 46	26496

Check logs received from: G0STU, G3WRR, K3ZO, LZ1BJ, SP4SKW,YU7SF.

HF RULES

LOW POWER

1. The General Rules for RSGB HF contests (*RadCom* January 1994) apply.

2. Date and Time: 0700 - 1100UTC, Sunday 17 April, 1994.

3. Frequencies, mode and power: 3.510-3.560MHz and 7.010-7.040MHz, CW only. Maximum power: 5W RF output.

4. Exchange: RST + serial number (commencing at 001) + output power eg: 559001 3W

5. Scoring: Each QSO with a QRP station: 15 points; All other QSOs: 5 points. The same station may be worked for points on both bands.

6. Equipment: The transmitter or final power amplifier stage shall not be capable of RF output power in excess of 15 Watts. A description of any method of power reduction to comply with the contest rules and details of the equipment used to measure power MUST accompany each entry.

7. Awards: The 1930 Committee Cup to the winner. Certificates of merit to the second and third-placed stations and to the highest-placed entrant using completely 'home-brew' equipment. A further certificate to the highest-placed entrant using 1 Watt (or less) RF output power.

NATIONAL FIELD DAY 1994

This is a portable contest for RSGB members operating in groups or as individuals.

The rules are unchanged from last year with the exception of the date which will be 1500UTC Saturday 4 June 1994 to 1500UTC Sunday 5 June 1994. A QRP section will again be included.

Groups intending to participate must send details of the site to be used, including a National Grid Reference, to D L Hill, G4IQM, 14 The Garrones, Worth, Crawley, West Sussex RH10 4YT by 23 April 1994.

Please include an SAE if rules and stationery are required

VHF RULES

70MHZ FIXED/SWL

Date: 27 March

Time: 0900-1300UTC

General Rules apply & rule 24 (1994).

Sections: Single Operator; M Multi operator; L Listeners

Adjudicator: A Cook, G4PIQ, Fishers Farm, Tendring, Clacton-on-Sea, Essex CO16 9AA

1ST 23CM & 13CM FIXED/SWL CONTESTS

Date: 10 April

Time: 1700-2100UTC

General Rules apply.

Scoring: Radial rings.

Sections: For each contest - F Fixed Station single operator; M Multi operator fixed; L Listeners.

There are two separate contests running concurrently, separate cover sheets and logs please, summary sheet *not* required.

Adjudicator: A Cook, G4PIQ, Fishers Farm, Tendring, Clacton-on-Sea, Essex CO16 9AA.

432MHZ TO 24GHZ

Date: 7/8 May

Time: 1400-1400UTC

70CM TROPHY

Date: 7 May

Time: 1400-2200UTC

General rules apply to both events.

Sections: 24 hour. S Single op stations (same call each band); M Multi op; L Listeners; F Single Operator Fixed; P Single Operator Portable; O All Others.

The **70cm Trophy** will run for the first 8 hours, stations can enter both the trophy and the 24 hour event but please send a separate copy of 427 for each entry.

Scoring: Radial ring 432 and 1296, 1pt per kilometre all other bands.

Adjudicator: D Johnson, G4DHF, 65 West Street, Bourne, Lincs PE10 9PA.

144MHZ AND SWL, SINGLE / ALL OTHERS

Date: 21/22 May

Time: 1400-1400UTC

General rules apply. Rule 14a applies. County & Country Multiplier

Sections: F Single Operator Fixed; S Single Operator Portable; O Others; L Listener.

Subsection: Single Operator Fixed (SS) (operation for any continuous six hour period, (no breaks, continuous six hours) starting at any complete hour ie 1400-2000 or 0000 to 0600 not 0823 to 1423!). Only one such entry per station. Entry to both the full 24 hours and 6 hour sections is not allowed, choose one or the other, *not* both.

Adjudicator: Bryn Llewellyn, G4DEZ, 110 South Avenue, Southend, Essex SS2 4HU.

1ST BACK PACKERS 144MHZ

Date: 22 May

Time: 1100-1500UTC

See separate rules

Adjudicator: G4DHF.

'A new series of contests for 1994', *Contest Classified*, January.

50MHZ TROPHY

Date: 4 June

Time: RSGB 1400-2200GMT

Sections: M Multi-Op Fixed or Portable; S Single Op Fixed or Portable; L Listeners

Rules: General rules and Rule 14b applies.

Awards: The Telford Trophy will be awarded to the highest scoring entrant. The SMC 6m Cup will be awarded to the highest placed single operator station.

IARU 50MHZ

Date: 4/5 June

Time: IARU 1400-1400UTC

Rules: Only the first four characters of the locator need be exchanged ie IO91 JO01, however scoring is made a little difficult in that you can only claim to the nearest point of the distant locator ,it's up to you to work out what that is. Don't blame the VHFCC, they are not our rules! Separate cover sheets and logs for the IARU event.

Adjudicator: I Pawson, G0FCT, 3 Orion, Roman Hill, Bracknell, Berks RG12 4YX,

70MHZ CW

Date: 12 June

Time: 0800-1100UTC

General rules apply.

Full QTH and QRA required to be exchanged. Rule 24.(1994)

Scoring: radial ring

Sections: S Single Operator Fixed; O All others; L Listeners.

Adjudicator: D Johnson, G4DHF, 65 West Street, Bourne, Lincs PE10 9PA.

NOTES FOR CONTESTERS:

All entries must be postmarked at the latest by the 16th day after the end of the contest, ie if contest ends on a Sunday (say 1 Octember) then the entry must be postmarked on or before the third Tuesday after that Sunday (17 Octember). For VHF Field Day an extra week is allowed, ie the fourth Tuesday. Any late entries can only be accepted at the discretion of the adjudicator.

No recorded delivery or registered post.

Entrants can obtain a proof of posting certificate from the Post Office which we will honour if an entry has been delayed in the post.

QTH information to be exchanged on 70MHz only. However not all 70MHz contests require this information, see individual rules and General Rule 24 (1994).

General rules: 1 through to 9, 11,12,13,15 to 23,25,26, apply to all contests. Any changes will be noted in individual contest rules.

Adjudicators will not normally enter contests which they are adjudicating. However if the adjudicator does wish to enter then his entry will be vetted by a subcommittee before final adjudicated list is published.

VHF RESULTS

TROPHY 1993

A very good turnout this year, with a few surprises. Most people liked the good weather although Spalding and District didn't like the wet wintry weather of Scotland; stop complaining, you won! I liked the information on the cover sheet from the Channel Island station GJ6MXL/P "20 metres of UR67 (all battery powered)" is this a new low noise, gain inducing feeder cable, that makes all Channel Island stations so loud? if so, where can we get it? Congratulations go to GM4DSP/P for first place and the Trophy, and to G6SRC/P for second place in the Open section, to G3SKR and G3NAQ for gaining first and second places in the Single Operator Fixed section. Certificate also to G3NKS for highest placed single operator station running 25W or less to single antenna. The first thing I always check in everybody's log is their claimed 'best DX', and again this year somebody lost their best DX due to incorrect callsign being copied, it always happens! Finally I must doubly congratulate two new stations to 4 metre contests (and maybe to VHF contests as a whole), G3SKR who on his very first entry *wins* the Fixed Station section by a large margin, and to G6SRC/P, who on their first entry come Second in the Open section beating such groups as Northern Lights and that old 4 metre stalwart G3TCU/p. I have always said that in time new groups will take over from the old band leaders. I look forward to seeing more new calls in the future.

Bryn Llewellyn, G4DEZ, VHFCC Chairman.

SINGLE OPERATOR FIXED SECTION

Psn	Call	Pts	Qso's	Mult	Loc	Pwr	Ant	Best DX	Km
1	G3SKR	23422	78	49	IO91	100	8/8	GM4DSP/P	417
2	G3NAQ	18490	64	43	IO91	90	8	GM4DSP/P	423
3	G3FDW	16613	49	37	IO84	90	8	LOG	
4	G3BPM	14440	52	38	IO80	50	4	GM4DSP/P	466
5	G0NFH	13520	55	40	IO81	80	4	G0EHV	387
6	G3NKS	10915	49	37	IO81	20	3	GM4DSP/P	365
7	G0EHV	9792	34	32	IO94	40		HB9CV	-
8	G3JYP	9600	30	32	IO84	35	8Q	G8DDY/P	449
9	G4AFJ	9100	42	35	IO92	50	8	GJ6MXL/P	384
10	G4FOH	7050	35	30	IO83	25	5	G6SRC/P	329
11	G4LDR	6897	33	33	IO91	25	5	GM4DSP/P	453
12	G3APY	6630	35	30	IO93	30	2D	G4SSD	349
13	G4OUT	6562	35	34	IO92	10	6	GJ6MXL/P	403
14	G4KLX	4888	32	26	IO93	50	5	G3TCU/P	307
15	G6WOI	3956	34	23	IO92	15	5	GJ3YHU	370
16	G3JDM	2622	22	23	IO82	15	4	GM4DSP/P	273

OPEN SECTION

1	GM4DSP/P	49320	80	45	IO74	160	2/8	GJ6MXL/P	647
2	G6SRC/P	41350	81	50	JO01	100	13	GM4DSP/P	530
3	GD4GNH	37459	68	47	IO74	50	5	GJ6MXL/P	577
4	G3TCU/P	29430	74	45	IO80	160	6'6	G0EHV	494
5	G8LNC/P	27408	78	48	IO90	60	12	GM4DSP/P	483
6	G4SDD	22140	66	41	IO90	25	9	GM4DSP/P	503
7	G8EIK	21758	68	43	IO91	50	8	GM4DSP/P	416
8	G3WSC	19393	62	43	IO91	125	9	GM4DSP/P	499
9	G6MXL/P	9860	30	29	IN89	40	5	GM4DSP/P	642
10	W0GZQ/P	7140	27	28	IO72	20	5	G6SRC/P	402

AMENDMENT

144/432MHZ March, '94

Section F is replaced with Section S (single op, fixed or portable). Low power stations (25W) will be classified separately.

Every contest is open to foreign entrants who will be listed separately from UK stations, certificates will be issued to section winners (and runners-up, if enough entries).

RSGB 1994 VHF/UHF CONTESTS CALENDAR

23/30 Jan	70MHz Cums (Dec 93)
6 Feb	432MHz Fixed/AFS/SWL (Dec 93)
13/27 Feb	70MHz Cums (Dec 93)
5/6 Mar	144/432MHz (Jan 94, Feb 94)
13 Mar	70MHz Cums (Dec 93)
27 Mar	70MHz Fixed/SWL (Feb 94)
10 Apr	1st 23cm & 13cm Fixed/SWL (Feb 94)
7 May	70cm Trophy (Feb 94)
7/8 May	432MHz to 24GHz (Feb 94)
21/22 May	144MHz/SWL/Single/All Others (Feb 94)
22 May	1st Back Packers 144MHz (Jan 94)
4 Jun	50MHz Trophy (Feb 94)

For details of rules for European contests, contact G4PIQ, QTHR.

HF CONTESTS CALENDAR

4 Feb	LF Cums 1.8MHz (Dec 93)
6 Feb	LF Cums 3.5MHz (Dec 93)
12/13 Feb	1st 1.8MHz CW
12/13 Feb	*PACC* (Feb 94, p19)
19/20 Feb	*ARRL CW* (Feb 94, p19)
25/27 Feb	*CQ WW 160m (SSB)*
26/27 Feb	7MHz DX (Sep 93)
26/27 Feb	*REF SSB*
26/27 Feb	*UBA CW*
5/6 Mar	*ARRL SSB*
12/13 Mar	Commonwealth (Oct 93)
19/20 Mar	*Bermuda*
19/21 Mar	BARTG Spring RTTY (rules de G4SKA)
26/27 Mar	*WPX SSB*
2/3 Apr	*SP-DX SSB*
10 Apr	ROPOCO-1
17 Apr	Low Power (Feb 94)
23/24 Apr	*Helvetia (Mixed Mode)*

DIRECTION FINDING

RESULTS OF RIPON AND DISTRICT HF QUALIFYING EVENT

Competitors gathered at the start on a somewhat cloudy day which threatened rain. From the start, locally known as Shipbridge on the York map, competitors received two reasonable signals. The station favoured by most competitors was Station 'A', G4IUF/P, manned by Mike and XYL Sandy. This station was located south of the start in Mortly Wood, in the village of Micklefield. A nearby dog kennel proved most useful here as the occupant seemed to be most helpful in pointing out the whereabouts of the Tx crew! However, Station 'B', G4SJM/P, with Gerald and Jason operating the Tx, proved a different site altogether. To the east of York they laid in wait in Allerthorpe Common covered by various branches and twigs. The aerial ran down the side of the wood for 300m and terminated on a wire fence which seemed to radiate rather well.

The game was up at 1557 as Andrew Mead spotted a ring glinting on a finger in the undergrowth (having had no luck at first with Fred the dummy who flatly refused to sign anything). Tea was served at the WI Hall at Copman Thorpe where the Ripon trophy was presented to the winner. Thanks go to the WI for a splendid tea, all the Tx crews, to Fred and 'our Henry' for their hard work on this event.

RESULTS

Pos	Name	Club	Time of Arrival at Transmitters A	B
1	A Mead	Colchester	1557	1436
2	G Blomley	South Manchester	1557.30	1438
3	R Goodearl	Mid Thames	1558	1435
4	Brian Bristow	Mid Thames	1558.30	1434
5	G Whenhan	Coventry	1604	1435
6	D Holland	South Manchester	1432	1610
7	C Plummer	South Manchester	1616	1457
8	T Gage	Mid Thames	1630	1458
9	C Boyce	Mid Thames	1427	-

Andrew Mead and Ray Goodearl qualify for the National Final to be run by Banbury Radio Society in September.

RESULTS OF TORBAY HF QUALIFYING EVENT

The DF start at Orley Common near Ipplepen, Devon, saw nine teams assembled under a pure blue sky ready for the first transmissions. Two good signals were heard and that's where the problems started for most teams . . . .

Station 'A' made use of Devon's major attraction and was hidden on the steep side of a valley cut into the moors by the river Dart. The aerial design made use of two earth stakes to deceive those who made it to the site and proved their worth. The main difficulty encountered by nearly all teams was that the steep valley caused bearings taken to be significantly in error. This caused all but one team that found the station to undertake a considerable hike over very difficult terrain.

Station 'B' used the river Dart too, but much further downstream below Totnes on the west bank. To equalise the difficulty of the sites the aerial system used was much more complex and the wood was filled with aerial wire, earth stakes and dummy aerials.

The poor bearings taken by most competitors during the afternoon was reflected in the results with only two teams finding both stations even though the sites were reasonably close. The enjoyable afternoon's hunt was then rounded off with a Ploughman's lunch and a pint at the Church House Inn, Torbryan.

RESULTS

Pos	Name	Club	Time of Arrival at Transmitters A	B
1	Brian Bristow	Mid Thames	1437	1612
2	M Hawkins	Colchester	1430	1624
3	C Wells	Mid Thames	1531	-
4	R Brocks	Colchester	1535	-
5	G Nicholls	Banbury	1545	-
6	W Pechey	Mid Thames	1546	-
7	A Collett	Colchester	1603	-
8	T Gage	Mid Thames	1614	-
9	G Foster	Mid Thames	1616	-

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Ads for CB equipment will not be accepted. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Amateur Callbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition of *RadCom*.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

FOR SALE

ALINCO DR599E VHF/UHF D/band Mobile with remote Head kit, 3 months old: £499. Bearcat 210XL Desktop Scanner: £45. 2m Linear 10W i/p, 80w o/p: £40. BNOS PSU 12A, metered: £50. IBM PS/1 Colour PC with 40Mb HDD, Mouse, Joystick, S/ware: £399. 3.5inch DS/HD Floppy Disks, £5 per box of ten, or 10 boxes for £45. Laurence, G1SWL, QTHR. Eves or Mobile 0831 543164. (Fleet, Hants) 0252 624028.

FT709R H/held 70cm, mint, boxed, new Nicad and charger: £125. BNOS 6m Linear 10 in, 50 out, Preamped, boxed: £80. Panasonic KXP1170 9 pin Printer, mint: £75. PC Clone 286 16MHz 20Mb Disc, 1Mb Ram, Mono VGA Monitor, DOS3.3, lots of S/ware: £195. (Bolton) 0204 594235.

IC-Micro 2AT 2m H/held: £110. Amstrad 386 notebook Computer: £495. PCW8256 5.25 Disc Interface: £15. Cased BSX1-TNC(internal PSU): £45. Portfolio pocket Computer plus Interfaces, memory card and extra RAM. Call for more details. Alan, G1AOL, QTHR. (Bracknell) 0344 50387.

ICOM IC-2SRE H/held 144MHz Tcvr/scanner: £350. Cushcraft R7 Vertical Antenna, one year old: £295. GW3UO. (Carmarthen) 0269 845900.

KENWOOD R2000 Communication Rx, all mode, 150Khz-30MHz. Virtually unused, boxed, cost £600 asking: £450. (Gillingham, Kent) 0634 379140.

KENWOOD TS940SAT CW filter fitted, IF10B Computer Interface, Spkr, Star Masterkey electronic Keyer, mint: £1600 ono. Compaq Colour Monitor: £80 ono. G0TCY, QTHR.

LOWE HF150 HF Rx, ex condx, boxed with Nicads, PSU, Keypad. Only: £250. Mike, G6DHU. (Bath) 0225 444700 (daytime) or 336838 (evening).

SSTV? HANDYCAM Sony 8mm model CCD/M8E/K (PAL). Superceded, colour, no Monitor. With batteries, charger, VGC, useful experimentation, suggest: £99. (Gillingham, Kent) 0634 379140.

VALVES BRAND NEW, All £1 each. DAF91, DF96, DK91, DL96, EB91, EBC81, ECC81/2/4, ECL84/5, EF42/80, EF85/89, EF91/95, EF183/184, EH90, EL32, EL81/85, EM87, EZ81, PL36, 6C4, 6AR8, 6AS6, 6BH6, 6BN6, 6BR7, 6BQ7A, 6CH6, 6CS6, 6F1, 6U4GT, 6SL7GT, 6BK4, 6CD6G, 6AS7G, KTZ63, SP41, SP61, H63, KT67, KT81 and OC3. Please add £2 Postage. Cheques to:- K. Bailey, 40 Seymour Close, Selly Park, Birmingham, B29 7JD.

YAESU FT208, FT708, 2m and 70cm, H/held Tcvrs, both fitted with YM24A Spk/Mic and new batteries. Also NCB base charger, PA3 car adaptor, Revco gutter 5/8 2m 70cm Colinear Antennas, NO SPLIT: £330. Desktop Scanner Regency MX4000 60-950MHz with gaps: £145. Thurlby Labtype PSUs RS611-969 variable voltage 4.5-15.5, current limiting 0-4Amps, abandoned project, unused: £60 each. Both £110. Buyer collects. Limited distance delivery negociable. G4MUI. (High Wycombe) 0494 439646.

ALINCO DJ180, Nicad, charger, Rubber Duck, plus 1/4 Wave, 5/8 THS Whips, boxed: £155. SEM Transmatch plus Noise Bridge: £55. Osker SWR200 SWR Bridge: £20. Adonis AM508 Comp Mic, boxed: £65. RAF Type D Morse Key: £15. G3CDC, QTHR. (Notts) 0777 871062.

AMSTRAD RS232C Serial Interface: £30. Commstar RS232C Communications Interface: £40. Suitable Amstrad Computers. 6XY Antenna, new: £35. G1OIO. (Seaford, Sussex) 0323 893278.

ATLAS 210X late serial no: £275. Mobile mount: £25. Datong FL2 Audio Filter: £50. G3MBM, QTHR. (Cambridge) 0223 860178.

BBC MASTER COMPUTER, twin 5.25inch DD 40/80T, Colour Monitor, LX800 Epson Printer, leads, books etc, VGC, seldom used: £200. G1XAJ, QTHR. (Nr Colchester) 0255 862249.

BOOKS: ARRL - Specialized Communication Techniques 1975, VHF Manual 1968, Novice Antenna Notebook 1988. W6SAI - Better Shortwave Reception 1968. Camm - Wireless Constructors Encyclopaedia 1935. RSGB - Amateur Radio Handbook 1961. Kings - TV Servicing Handbook 1967. Davis - TV Faultfinding 1966. Newsweek - Photojournalism. Fincher - Photojournalism. Angel - Nature Photography, Izzi, Nature Photography. Wilson - Nature Photography. Haller - Collecting Old Photographs. Hodgson - Photography for Profit. £5 each. Cocking - Wireless Servicing Manual 1963. Mansfield - Practical Guide to Packet. Dickens - ZX Spectrum Advanced Guide 1985. RSGB - 1990 UK Callbook. Penfold - Most from Printer, How to Oscilloscope. Bradley - Electronic Novelties 1960, Transistor Circuits 1959, Electronic Gadgets 1960. Marston - 110 IC Projects 1971. Judd - 2m Antenna Handbook 1983. Scott - Complete ZX Spectrum 1984. Moxon - HF Antennas, £3 each. Mullard Data Book 1961/62 and 1971/72. Paul - You and Your Tape Recorder 1962. Bernards - 1 Valve Receivers No99 1958, 3 Valve Receivers No 104 1958, Amateur Transmitters 1947. Warring - Single Channel R/C 1969. Sinclair - ZX Interface and Microdrive Handbook 1983, £2 each Plus £1 towards Postage on all Books. G0KTN, QTHR. (Melksham) 0225 703726.

BUTTERNUT HF5B 5 Band 2 ele Beam: £175 or Exchange for HF6V or Gap DX-VI Vertical. Buyer collects. G0HZG, QTHR. (Leicester) 0455 824238.

CAPCO SPC300 ATU matches Long wire and Coax, all bands: £115. Capco 4:1 Balun for balanced Feed: £15. Tony, G0MDZ. (Nottingham) 0636 830005.

COLLINS 30L1 HF Linear, 1000W from 4 x 811A with 75w drive. Some spares and CC2 carrying case: £500. G3ONU, Not QTHR. (Swindon area) 0793 782604.

COMMODORE 64 S/ware for PK232 and PK88 Terminals: £25. Psion series 3 Pocket Computer 256K as new: £100. Des, G4NEK, QTHR. (Bedford) 0234 852865.

COMPUTER C128, D/drive 1571, Printers MPS 801, MPS802. COM-IN 64 (RTTY/CW/SSTV) Board etc, VGC:£200 ono. FTV901R Modules, 70cm: £140 ono, 6m: £100 ono. Lowe TX40, 10FM with Repeater shift: £50 ono. Letter preferred in first instance. GM4MOA, QTHR. (Buckie) 0542 32093.

COMPUTERS 2x IBM Compatibles, 43Mb H/Drive, 3.5 Floppy, VGA, Colour, 386: £495. XT: £225. G0FDV. (Dunstable) 0582 606173 or 0831 476210 anytime.

DAIWA AUTO ATU CNA1001: £95. TS120 Ext VFO: £45. FRT7700 Tuner: £45. FRA7700 Active Antenna: £45. (Nr Leicester) 0455 273042.

DATONG FL2 Filter: £70. Jones Paddle: £40. Dewsbury Supa-Keya Keyer: £50. Vibroplex Single Paddle: £50. G4HZV, QTHR. (Guildford) 0483 810942.

DIGITAL VT240 Terminals, (2) comprising of two Keyboards, 2 Monitors, 2 Systems (CPU's) Boxes PDP-11 Memory module, Epsom RX-80 Printer, all cables, £700 worth of Software manuals, - Offers, anything considered. Preferably for HF. Buyer must collect. GM4VJV. (Cockburnspath) 0368 830410.

DRAKE FILTERS for 7 Line 6.0, 1.8, 0.5: £35 each. AUX7 Board: £25. SP75 RF Speech Processor: £50. WH7 Wattmeter: £70. CS7 Coax Switch: £100. Other Drake bits available. Cushman CE6 Comms Monitor, DC - 1GHz, H/books: £150. Wanted Drake RR3 MSR2. (Shrewsbury) 0743 884858.

DRAKE TR7, PS7, RV7 service manuals, extender Boards, 250Hz, 500Hz AM filters fitted: £600. G3HUX, QTHR. (Hereford) 0432 318412.

DXPEDITION. Have one of your own in paradisiac comfort at Great Harbour Cay, Berry Islands, Bahamas (IOTA NA54) as a guest of "The Burmuda Triangle Club". Rent: £400 per week. G4AML, QTHR. (Milton Keynes) 0908 668169. (+) (44) 908 668169.

EDDYSTONE 1650 10KHz-30MHz current model, 100 channel Memories, 7 filter, Auto/manual Tuning, sweep, scan, built-in processor. Exc performance, well built, many features. Offer over: £1000. Exchange possible Rx only. Wanted Collins 6790 Rx Gen Coverage, Collins 391 or 392. (London) 081 813 9193.

FT101Z, Six Band version, VGC: £295. Will deliver. (Birmingham) 021 414 8045.

FT200 HF TCVR, bargain, with Desk Mic, manual, new PA's: £195, ex condx. Good reason for sale. (Coventry) 0203 450476.

FT690 R2 with Mic, Nicads, charger and manual, pristine condx: £250, postage at cost. Should appeal to Novice Licence holder. (Londonderry) 0504 352804.

FT70G 0.5-30MHz Manpack Style Tcvr, AM/SSB, VGC: £345. MMT 28/144MHz linear Transverter: £45. Both ono. G3VQQ, QTHR. (Wakefield) 0924 263902.

FT890 +FP800. Both 100% clean and perfect, 2KHz Filter: £994, plus carriage. Reason for sale, have FT990. G3CCX. Peter Craw, 117 Sea Lane, Russington, West Sussex BN16 2RU. (Russington) 0903 850859.

FV-102DM, mint condx, Second VFO for FT102, also SP102 Speaker with filter: £250 for pair. Buyer collects or split Securicor. (Gloucester) 0452 617145.

G2DAF MK2 Tx and PSU. G2DAF Rx. Both 898 Dials. AR88D Rx. All complete and in gd condx. Offers Please. (Stafford) 0785 284388.

H/BREW QRO TUNERS; Orig Z match: £70. VK Single Coil: £105. ASTU suitable Half size G5RV or Tribander 40m to 10m: £125. Johnson matchbox 300W, wants respray: £150. 160m series tuned: £45. W2DU balanced i/p T match 160m to 10m: £195. All balanced output, except Nevada SPC: £95. Post £5 each. All cased. Good quality capacitors. G3RHM, QTHR. (W London) 081 423 2329.

HF6V VERTICAL 10-80 and Radial Kit. New March 1993: £150 with instructions. Buyer collects or Pay Post. (Congleton) 0260 274418.

HF6V VERTICAL and Radial Kit, cost £268 March: £130. (Congleton) 0260 274418.

ICOM IC211E 2m M/mode Base Tcvr, xtal filter, H/Mic, manual, VGC, original box, c/w IC-RM3 Computerised Remote Controller: £300 ono, OR Swap for FT290 Mk2. Nevada TC50DX 6m Linear, GWO: £15. HF 100w PWR/SWR Meter: £8. All postage paid. (Great Yarmouth) 0493 853089.

ICOM IC730 Tx/Rx 10-80m + WARC, all filters fitted: £450. Kenwood TW4100E 2m/70cm Dual Band, 50W o/p: £250. Vectronics VC300 ATU 30/300w: £75. Lowe Shortwave Rx HF150: £250. GM4UJZ, QTHR. 0383 820011(day/evening). (Dalgetty Bay) 0383 823305(night).

ICOM IC761, immaculate, 2 manuals, Mic, box, any test: £1095 incl carriage UK. Johnson matchbox 300W: £150. G3RHM, QTHR. (W London) 081 423 2329.

JUNKER MORSE KEY. Aluminium housing, Fully adjustable, precision mechanism, VGC: £37. Bucknell, 7 Cavendish Drive, Clowne, Chesterfield, Derbys.

KENWOOD 450SAT Tcvr with Auto ATU, little used, purchased June 92. Immac condx, orig packing and manuals: £1000. G0RAN, QTHR. (Bury) 061 796 5296.

KENWOOD ATU AT230, boxed with manual: £125 ono. Tel: (Plymouth area) 0752 339738.

KENWOOD model R1000 Communications Rx, 0-30MHz, gd condx: £180 ono. (Uffculme, Devon) 0884 841663.

KENWOOD R600 Short Wave Receiver with Datong Active Antenna, VGC: £150. Ferrograph series Five Reel Recorder: £50 ono. Buyer Collects. (Southwell) 0636 813767.

KENWOOD TM441E 70cm Mobile 35w, current UHF model, hardly used, complete, boxed, mint, reluctant sale, almost new. Offers around: £250. (London) 081 653 9001.

KENWOOD TS440S, Auto ATU with Revex PSU, only used for Radio 4: £900 ono. Phone: 0689 831616(day). (London) 081 299 6755.

KENWOOD TS520SE HF Tcvr, 200W PEP, VGC: £290. Eltec 48 Volt 20 Amp PSU, fully metered and Stab: £20. Buyer collects above items or may deliver Manchester area. Prism Modem for Spectrum 1200/75: £10. Motorola MT700 70cm H/held, working: £30. G8HXE, QTHR. (Manchester) 061 747 5099.

KENWOOD TS850SAT, internal tuner, filters DRU plus PS30 PSU: £1250. Alex, G0JZE, QTHR. (Chippen Norton) 0608 643585.

KW2000A mint condx, handbook, spare valves: £175. (Melton Mowbray) 0664 64678.

KW2000A with PSU and Mic, GWO: £140. G3IVZ, QTHR. (Basingstoke) 0256 474578.

LMW 2m-23cm Single Board Transverter kit, latest design, unopened: £85. EHT Txfmr 1700 - 0 - 1700 @ 550ma RMS, oil filled, new: £50 (heavy). Tel: David. (Bourne) 0778 425367 12-1pm, 5-7pm.

MINTAC IBM Compatible PC, 8088, 5.25 FD, 20Mb HD, DOS 4.01, VGA Colour Monitor, Mouse, Word Processor and Drawing packages. Bargain: £290 ono. (London) 081 950 0382.

PACKET J+P Electronics Modem and Spectrum+3: £100. Fax Rx and RTTY Tx/Rx for Spectrum 48K: £10. (Derby) 0332 703778.

PACKET RADIO System. Amstrad 640K, two Disk Drives, PCC/PK88 TNC, two spare new PPC LCD Screens: £200. Consider Split. (Nr Ely) 0353 722466.

QRM ELIMINATOR Sem Mk1, not needed at new QTH, with data: £50 + P&P. (Gillingham, Kent) 0634 379140.

QRO VALVES new boxed, type N6964A, 7 off, Offers. Type AH238, 7 off, Offers. Will sell separately. (Isle of Wight) 0983 566066.

R1155N COMPLETE ORIGINAL. Not modified. Still has DF installed. Also manual covering operation servicing and installation: £80. (Chessington) 081 397 3614.

RA117E and RA98D Sideband Adaptor with manuals: £200 the Pair. G3BNE, QTHR. (Sidcup) 081 302 0206.

RADCOM Complete Volumes, 76 to 92. Offers. Codar Preselector PR30, VGC: £25. Yaesu FT230R 3/25w 2m Swap for Gen Cov Rx. Contact GW0ESU, QTHR. (Bodffordd) NO TEL NUMBER.

REDIFON GR406 Linear, 2-18MHz, 50w i/p, continuous Kilowatt RF output. 2 X 4/400 PA. Do not buy this unless you know what you're doing - 3000 volts PSU. Weighs 120lb. As new condx, with Manual. Buyer collects: £500. G3JKV, QTHR. (Dorking) 0306 884359.

SCANNER UNIDEN Bearcat UBC 20XLT, excl condx, 200 chan, 10 bands, including charger, bargain: £135 ono. 2m Antenna 5/8 over 5/8 Vertical: £20. G4EOW, QTHR. (Romsey) 0794 512475.

SEM QRM Eliminator Mk 1: £30. SEM VHF Transmatch: £20. Maplin active Aerial and notch Filter: £25 each. World Clock/Alarm Desk: £10. BARTG ST5C RTTY Terminal unit: £20. Tascopy Screen Copy Program for ZX: £10. G0KTN, QTHR. (Melksham) 0225 703726.

SILENT KEY SALE(G3BW). TS830S: £500. IC251E: £400. CDE H-W CD45-11 Rotator: £150. Super Memory Keyer and Paddle 6-990 WPM: £40. Muter SLNA144S RF 100w: £18. TS2200GX 144MHz FM, Mic: £50. DRAE PS 13.8V 4A: £20. Advance OS25B D/trace Scope: Offers. Heathkit IM5228 VTVM: Offers. T/deck 9282MSS (Swedish) for M/S Work, 15 x 10 x 5inches: Offers. Icom 251E 2m Multi, 1200LPM Key: £400. Enquiries G8RZ, QTHR. (Harrington, Cumbria) 0946 832764.

SILENT KEY SALE, for XYL, G3YJH. Some HF, VHF items still available, SAE Dennis, G3AYJ, QTHR. (Birmingham) 021 354 5783.

SILENT KEY SALE. Kenwood TS680S, fitted narrowband crystal Filter, Mic, PS430 PSU, manual, in mint condx with original packing: £725 ono. View S Hants. (Nr Fareham, Hants) 0638 751682.

SONY 2001D AM/CW/SSB, FM Airband Re-

ceiver. All Accessories, mains unit and manual, boxed: £175. G2FQG, QTHR. (Maidehead) 0628 27302.

SPECTRUM ANALYZER Tektronix 1401A, 1-500MHz, Portable: £400. Tektronix 491 1.5-12.4GHz, Portable: £350. Both with manuals. G3VXZ, QTHR. (Maidenhead) 0628 27350.

SPY RECEIVER type 3/2, complete with two power supply units, 3-15MHz. WW2 vintage. Any offers? G4WCE, QTHR. (Warrington) 0925 755959.

STANDARD C528 2m/70cm H/held Tcvr, full Duplex, boxed, manual: £300 as new. G0BOM, QTHR. (Gainsborough) 0427 617923.

STODDART Aircraft Radio Co. inc NM52A Radio Interference/Field Intensity Meter, covers 375-610-1000MHz. Class A, Cat A Instrumentation Mil-Spec I-16181 and others, with matching 91923/3 PSU and leads, excl cond, working but NO info: £250. Avo CT38 VVM: £40. Gertsch FM-3 Direct Reading Freq Meter 20-1000MHz/0.001% with graphs: £45. Marconi TF1331 D/beam Scope, with handbook, faulty, repairable, hence: £30. All+Carr. (Cheltenham) 0242 524217.

TEKTRONIX 1401A S/state Portable Spectrum Analyzer 1-500MHz with H/book: £500. (Ayr) 0292 441481.

TEN-TEC OMNI 5 Tcvr, 3 years old, Club rig, only little use: £900 ono. Details from Steve, G3OAG. (Manchester) 061 881 1850 6-9pm.

TINY 2 Mk 2 TNC, as new, bxd, leads etc: £95. Kent straight key, never used, bxd: £25. Mutek 2M receive preamp for shack use, bxd: £25. Daiwa RS40X PSU rated at 32 Amp continuous 40 Amp max, bxd: £110. Nick, G7IYG (Uxbridge) 0895 236397.

TOKYO HY POWER Amps, 2m, 6m and 70cm, all 10w i/p - 60w o/p, all with Pre-amps; Mod HL66V 6m: £80. HL62V 2m: £90. HL60U 70cm: £130. Or exchange for 17/12 metre Cushcraft Yagi A3WS or HD Rotator. Prefer buyer collects. Steve, G0NXT, QTHR only. (Ashby de la Zouch) NO PHONE Number.

TRIO JR599 TX599 Pair, excl condx with handbooks and service manuals. Rx has 144MHz and 50MHz converters fitted. Tx never used on HF. Dual VFO working. Transverter o/p 28MHz: £300 ono. Can deliver Leics, otherwise plus carriage. (Leicester) 0533 882618.

TRIO TS700G 2m Tcvr M/mode AM/FM/SSB, Ex condx: £280. 081 317 1717 x220(w) (Chelmsford) 0245 266027.

TRIO/KENWOOD TS530S WARC, CW filter, new PA valves and overhaul by Lowe, Mic, operating manual, boxes: £375. GM0PSQ, QTHR. (Dundee) 78559.

TRIO520S. Good reliable Rig, Shure 444 Desk Mic, manual: £285 ono. Bremi Switched Attenuator: £6. Wanted KW2000B Circuit, spares. (Coventry) 0203 307272.

TS440S +ATU +VK88SN +SP430 Spkr, Mic, manual, boxed, all VGC: £800. Peter, G0NDL, QTHR. (Nr Bristol) 0275 852216.

TS440S, Auto ATU plus SP430 +CW(400Hz) Filter option fitted. Complete with Mic. Two years old, ex condx: £800. (St Helens) 0744 57471.

TS530S, WARC Bands, SSB filter, MC50 Mic, handbook and maintenance manual, boxed: £475. Welz SWR plus Matching Network: £40. Transistor Checker: £10. Sinclair Freq Meter PFM200, with mains adaptor: £40. All plus postage or buyer collects. GW4PRP, QTHR.(Port Talbot) 0639 890260.

UNIVERSAL M4000 Decoder, mint and as new, genuine reason for sale: £325. ICS FAX1 Decoder, ex condx: £190. G3KZU, QTHR. (Oxford) 0865 63000.

VARIACS (New) 'Regavolt' 0-275V 15A: £40. EHT Transformer 240V i/p 6.35A 650V o/p 2.31A: £20. High Current Power Supplies (Metered & Protected): £50 - £100. G4KDZ, QTHR. (Essex) 0375 390268.

WORK DX! KW1000 Linear including two good spare valves, VGC: £250. Hygain 205BA 5-Element 14MHz Mono-Bander with handbook: £190. TA33 Tribander: £120. Buyer collects. G3FYF, QTHR. (Ashburton, Devon) 03643 319.

YAESU FC902 top quality ATU. Three Coaxial, one wire, Switchable Outlets. Ten Bands and through position. SWR and Forward Power Meters. Complete with comprehensive instruction manual: £170 ono. New Rig has internal ATU. G4PVV, QTHR. (Truro) 0872 79922.

YAESU FL2100B 1KW Linear, ex condx, new spare lamps, manual: £375 ono. GW4IUY. (Aberdovey) 0654 767367.

YAESU FRG7 Receiver 0.5-30MHz. Ex condx: £55 ono. (Coulsdon) 081 660 4490.

YAESU FT101ZD Mk3, FM, fan, filters, manual, Mic: £425. FC902 ATU: £150. SP901 Spkr: £25. FT75 10W 5 Band Tcvr, plus FV50C VFO, all solidstate, manual, Mic: £150. M/M 144/28MHz Tvtr: £35. Tokyo 2m-HF Tvtr 5 Bands 40w: £150. Thandar Counter: £85. (Fareham) 0329 230737.

YAESU FT290 Mk2 2m All mode Tcvr, boxed, complete as new: £300. (Gloucs) 0452 412390 evenings.

YAESU FT221R + Mutek: £330. Yaesu FT230R Mobile FM: £150. Trio TS130S with SSB Filter: £350. All perfect. G0IMK, QTHR. (Clows Top) 0299 832279.

YAESU FT470 D/band H/held with 12v(5w) battery, NC18C charger and FBA-10 battery case, boxed: £255. NC-29 Quick charger: £40. FNB-12 Battery: £25. MH-12A2B Spkr-Mic: £20. All plus carriage. G2FQG, QTHR. (Maidehead) 0628 27302.

YAESU FT4700 D/band Tcvr model RH, mobile, fixed, little used, failing eyesight reason for selling: £340 ono. G4PDN, QTHR. (Newcastle on Tyne) 0661 872950.

YAESU FT767-GX Immac with intermod modification by SMC, c/w all VHF/UHF Modules: £1400. FL7000 Linear, just serviced, c/w Masthead Aerial Switch: £1100. Pair for: £2300 ono. Zetagi B300P 2-30MHz Linear: £100 ono. BNOS LPM50-10-100 and LPM 144-10-100 Linears, both immac: £185 ono each. Hyundai 286 Lap-Top PC with 20Mb HDD, Case, Battery and PSU: £700 ono. Nick, G7EQM, QTHR. 0742 751031(work). (Sheffield) 0433 651572.

YAESU FT767GX fitted with 2m Module, VGC: £950 ono. G3HUB, QTHR. (Bodmin) 0208 872162.

YAESU FT767GX HF Tcvr with 2m fitted, immac condx, hardly used: £975. G4MH Mini Beam, GC: £40. 6M HB9CV: £15. House purchase forces reluctant sale. Will deliver depending on milage or buyer collects or pays postage. Karl, G0SKN. (Mansfield, Notts) 0623 649124.

YAESU FT767GX with 2m and 6m Modules: £950 ono. Tokyo HyPower Model HC200 HF All Band 1KW Antenna Coupler: £275. Yaesu SP102 Spkr: £75. Yaesu MD1 D/Mic: £70. Kenwood MC60 D/Mic: £60. Amstrad CPC464 with Disc Drive and terminal for RTTY/CW: Offers. (Devizes) 0380 840731.

YAESU FT890 as new, boxed, little used, never on transmit, no Mic: £900. Keypad for FT890: £50. Yaesu FT212RH 2m Mobile 40w boxed: £200. Diamond SWR Power Meter 1.8-200MHz, boxed: £50. Nick, G7IYG, QTHR (Uxbridge) 0895 236397. Check if sold.

YAESU FT902DM HF Rig, fitted narrow CW filter plus Mic: £450 ono. Phone George, G0MHC. (Hartlepool) 0429 264735.

YAESU YS500 VHF/UHF VSWR Bridge/Peak Wattmeter: £60. Microwave Modules 30W Linear Amp: £60. H/held Digital Freq Counter: £40. EK150 Iambic Keyer: £60. TET 14 ele 2m Beam: £30. 2m Two-way Splitter: £30. 70cm Collinear: £20. 14AVQ Vertical Antenna: £50. Coutant 13.5V PSU: £30. Nigel, G4NRR. (Solihull) 021 744 8672.

WANTED

AP1086 issue 1 (RAF Radio Stores Ref No's) Also Air Publications relating to Radio, Radar equipment. Exc price offered. Would purchase Post-War to current Magnetrons, Klystrons, T/R cells, Photo-Multipliers, Microwave and special CV types. Required Static or Rotary Inverter, AC or DC I/P with O/P of 80/115v 1500/2000Hz. Also Rx Type R1355 10D/13032 unmodified. Please phone any time. (London) 071 511 4786 or 071 790 2846.

COLLINS KWM380 Required. Other Collins equipment may also be of interest. Ivan Morris, GD3CKO, QTHR. (Douglas) 0624 629742.

IC402 IC202S working or not. Also IC3PS PSU, leather carrying cases, Mobile Mounting bracket, 12v battery charger and Nicads BC-20, IC20L/IC30L Linears. Tel: David. (Bourne) 0778 425367 12-1pm, 5-7pm.

IC475E or IC475A. Must be in VGC and Unmodified. State Price required please. G8APZ, QTHR. (Brentwood) 0277 211126.

SHIMIZH SS105 Transceiver, complete with FM, in gd wkg order. Harry, G4ZJB. Evenings preferred, 0742 746464 (day). (Sheffield) 0742 746671(eve).

STRUMECH VERSATOWER Trailer, suitable for a P60 Tower. G0TIL, QTHR. (Royston) 0763 243570.

23CM TRANSCEIVER or SSB Electronics Transverter. 23CM Masthead Preamp. Modern Dual Band Tcvr. Magnetic Loop. Inexpensive 70CM FM Tcvr. (Norfolk) 0328 710641.

ARGONAUT 509 in GWO. Also QRP ATU. For Sale Viewport VGA Colour SSTV System and Realistic Scanner. Mike, G0CVZ. (Peterborough) 0733 222588.

ATLAS Working, broken, 180/215 AC, 220-CS PC-120 MT-1. Atlas Digital Base HF ??? info. Anything Atlas related phone G3RCQ, QTHR. (Romford) 0708 374043.

AVO PANEL Meter for Valve Characteristic Meter Mk4 in GWO. Replies to: E Jackson, Thule, Gidleigh, Chagford, Devon TQ13 8HT.

BENDIX DFA 70B-1 ADF Rx manual, circuit diagram, any information will copy and return. Also a Marconi 2002B Signal Generator service manual required, buy or copy and return. All expenses paid. (Wakefield) 0924 870866.

BUG KEY Vibroplex or similar. Alvin, GW4ODN. (Milford Haven) 0646 693991.

COSSOR 105 Radio Telephone as fitted to Police Motor cycles in the 1960s. Complete or just handset with Control panel. (Hemel Hempstead) 0442 211220.

DRAKE DSR2, MSR2, RR3 Rxs, info on whereabouts. Part complete/faulty 1770 or 1790 Series Racal Rxs. Also looking for 1988 onwards Rxs by Collins, Harris, Sunair, WJ, Dansk or similar WHY?. KVG 9MHz Filters also wanted. Thanks G3YFK. (Shrewsbury) 0743 884858.

EDDYSTONE 960. Have good Eddystone 840 for Sale: £85. Also R107 in case: £30. Anthony, GW4RYK. (Montgomery) 0686 630255.

EDDYSTONE RECEIVERS, Speakers, etc wanted by Collector for cash. Particulary EC10 Mk2, 358, 960 or 870A. Scrap sets £10 offered. Lepino. Fax 0372 454381 or phone (Surrey) 0374 128170.

EPROM PROGRAMMER with S/ware for Amiga or PC. G0LGJ. (Dereham) 0362 691099.

HW16 by Heathkit, Wanted. Dead or Alive. Write condx and price to Marris, 35 Kingswood House, Farnham Road, Slough SL2 1DA.

LF/HF SIGNAL GENERATOR. Prefer Digital Readout. Reliable 50 Ohm Attenuator necessary. Also Marconi TF2000 Audio Oscillator, dead or alive. Collection possible. (Crawley) 0292 885701.

MAINS LEAD or Connector for TF144H Signal Gen or mains Adaptor TM6263. Also clean Hallicrafter SX28 or SX28A "Super Skyrider". Also Tandy Micronta meter glass 2inch x 1.625inch. Also Yaesu FV101E Remote VFO for FT101E. Thank You. Chris, G8JFT. (Portsmouth) 0705 596836.

MARCONI TF2015 or Similar AM/FM/CW Sig-Gen, must cover 70cm. Starphone Boards; Rx/RF Rx/Osc or complete Unit FM10 HB. G3WDY, QTHR. (London) 081 653 4738.

MICRODRIVE for Spectrum, Datong FL3 Filter, CW Filter for TS520S. (Holt) 0263 712372.

MODE SWITCH for Yaesu FT101E, in gd condx. (Millisle) 0247 861091.

PLEASE HELP - Original Mains Transformer for AR88D Wanted. Roger. (Colwyn Bay) 0492 545325.

RACAL TABLETOP Cabinet for RA17 in gd condx. Also free to good Home, Murphy B41 Navy Receiver for restoration. (Alfreton) 0773 831562.

RF BRIDGE or Impedence or Admittance Meter, eg GR1606, Wayne Kerr 801, HP250 or WHY? (Glos) 0452 812951.

SIGNAL R535 Air Band Rx, need not be working. Jake Adamson, Woodend, Victoria Road, Kingsdown, Deal, Kent CT14 8DY. (Deal) 0304 373788.

SPY & CLANDESTINE Radio Equipment from WW2 and since. Wanted by Private Collector, complete or incomplete Units. Good price paid. (London) 081 505 0838 after 6pm.

TL922 2KW Linear Amp, in VG condx, plus manual. Preferably with a spare set of valves. Also wanted, MFJ989C 3KW Roller Inductor Tuner ATU, gd condx, with manual. Please call Brendan, G0UCT, QTHR. Fax 081 651 6224 or phone (London) 081 651 1424.

TRIO DIGITAL Readout DG5 for TS520. Also other accessories like 2m/6m Transverters or Monitorscope. G4FMO, QTHR. (Burton on Trent) 0283 840667.

TRIO/KENWOOD PS430 and AT250 also FM430; FM Unit(board) for TS430S. G3NJK, QTHR. (Stamford) 0780 410022.

VALVE TESTER TV10 CT160 or similar Wanted. Must be complete with full technical deta. Also TCS6/12 Manual. (Castle Cary) 0963 24319.

WANTED, ROUND EKCO's and other interesting Domestic vintage radio's wanted by private collector. Good price paid for mint examples. Also donations of components accepted for vintage wireless museum. Phil, G1CNN, Answerphone. (Ealing) 081 9934946.

YAESU FL7010 Linear (10 Watts) for Yaesu FT790 Mk1. Contact John, G7MHL. (Liverpool) 051 487 5911.

YAESU FT77 Must be in VG Condx. Please contact Bill, G0TYC. (Dereham) 0362 692930.

EXCHANGE

PENTAX CAMERA P3on MF SF7AF c/w Lenses, Flashguns, various other Lenses, Converters, Accessories, all in ex condx. Wanted: FT690, FT790. G1OPW, QTHR. (Bath) 0225 462282.

CLUB NEWS

DEADLINE - Items for inclusion in the April 1994 issue must be sent to HQ marked 'Club News - DIARY', to be received by 21 February latest. If news is received by the published deadline, it should appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

RSGB CITY OF BRISTOL GROUP - 28, History of Portishead Radio by Bernard, G7GHB. Details G4NKT 0272 672124.

SHIREHAMPTON ARC - 4, Chat night; 11, 'Neural Networks' by G0FGZ; 18, Club CLOSED (Half-term); Mar 4, Wonderful World of Weather Satellites, G4NAQ. Details 0272 770504.

SOUTH BRISTOL ARC - 2, 10 Metres Activity evening & Committee meeting; 9, Demonstration of HF Operation; 16, Demonstration of Practical Morse; 23, Soldering Techniques and their use; Mar 2, 15 Metres Activity evening. Details 0275 834282.

BEDFORDSHIRE

SHEFFORD & DARS - 3, Members activity night; 10, Top Band DF, a talk by Stewart, G3RXQ; 17, Members activity night; 24, Annual General Meeting. Details 0462 700618.

BERKSHIRE

BRACKNELL ARC - 9, Bring & Show evening. Details G8IBP, QTHR.

MAIDENHEAD & DARC - 3, talk 'What has happened at the RSGB recently' by Neil, G6HIU; 15, Space, the risk business by Geoff Hall; Mar 3, Quiz against Reading DARC at home. Details 0628 25952.

NEWBURY & DARS - 23, The Junk Sale. Details 0635 46241.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 2, Foreign QSO's by Liz Cabban, G0ETU; 16, TDB by Richard Bitcliffe; Mar 2, Quiz with Chesham & DARS at Chesham. Details 0296 81097.

CHESHAM & DARS - 2, Discussion evening; 9, CW Practice evening; 16, Construction evening - Wire Aerials with G8AHS; 23, Talk 'The Work of the RSGB in 1994' by Hilary, G4JKS. Details Ian, G0RTF 0494 676391.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 4, Talk 'Drive by Wire' by Murray, G0PFG; 11, Rally Preparations, All members please attend; 13, Club Rally at Addenbrookes; 18, Speaker from the Royal Greenwich Observatory; HF Operating evening. Details 0763 243570.

CHESHIRE

CHESTER & DARS - 8, Law & Radio Amateurs by Johnathan, G0KCT; 10, Radio Waves in Medicine (High resonance Scanning); 22, Surplus Equipment Sale by G3EWZ. Details 051 608 3229.

MID-CHESHIRE ARS - 2, Construction/On-Air night; 9, 'Ask the Expert' night; 16, Pancake night; 23, Video night. Details 0606 331210.

STOCKPORT RS - 4, Computer Group meeting - Turbolog by G0JQI; 9, Digital CQ Caller for SSB by Dr David Yorke, G4JLG; 11, Comp Group meeting - Packet Radio by G3SHF; 25, Comp Group meeting - Computer hardware/software by Firstec Ltd. Details 061 439 4952.

WIDNES & RUNCORN ARC - Novice RAE Course starting early February. Details G0SPH 0928 701096.

CLWYD

RHYL & DARC - Club meets every 1st and 3rd Monday of each month, WRVS Centre 116, Vale Road, Rhyl at 8pm. Details 0745 351362.

CO ANTRIM

CARRICKFERGUS ARG - 8, Talk 'Amateur TV' by Tommy Martin at the Downshire Sec School, Carrickfergus. Details 0960 351807.

CO DOWN

BANGOR & DARS - 4, Construction evening, with Crawford, GI0EZD. Bangor Tech, room A13, Ground floor at 8pm. Every one welcome, especially new members interested in the hobby. Details Keith, GI0SSA 0247 883315.

CO DURHAM

BISHOP AUCKLAND RAC - (**NEW VENUE**) Now meets at 1 High Road, Stanley, Crook, Co Durham DL15 9SM. Details Mike, G0PRQ 0388 766264.

CORNWALL

POLDHU ARC - Regular meetings, Tuesdays & Fridays 7.30pm. Visitors welcome. HF Net

Wednesday 7.30pm, 3.75MHZ - GB2GM and GX0PZE. Details 0326 290638.

SALTASH & DARC - 4, Computer night, talk and demo by Andrew & Phil; 18, HF rig operation and demonstration - get to know the Club rig; Mar 4, Visit to local Airport ATC. Details 0752 844321.

CUMBRIA

EDEN VALLEY RS - Club meets, odd months at BBC Club, Penrith. Details 07683 52106.

DERBYSHIRE

BOLSOVER ARS - 9, Quiz Night. Details 0246 822856.

BUXTON RA - 8, Shack Design; 22, QSL Card night. Details Derek, G4IHO, 0298 25506.

DERBY & DARS - 2, Surplus Sale. Details Hayley, G7PXA, 0773 856904.

DEVON

APPLEDORE & DARC - 21, Talk 'Satellite Communication' by Dennis, G0FCL. Details 0237 477301.

EXETER ARS - 14, Skittles evening. Details 0392 214204.

EXMOUTH ARC - **New Meeting Place** The Moose International Centre, Blackboy Road, Exeter. Mar 14, Construction Competition. Details 0392 78710.

TORBAY ARS - 18, Annual General Meeting. Details Walt, G3HTX on 0803 526762.

DORSET

SOUTH DORSET RS - Meets 1st Tuesday of every month. New members and visitors welcome. Details from Mike, G7HNY 0305 773860.

EAST SUSSEX

CROWBOROUGH & DARS - 24, Antenna Design in miniature by Eric, G3TXZ. Details 0892 661807.

HASTINGS E&RC - 16, Security Alarms by Peter Firmin; Mar 16, AGM. Details 0424 830454.

ESSEX

CHELMSFORD ARS - 1, talk 'Cellular Communications - Part 1' by Colin, G4IIK; Mar 1, talk 'Telemetry at Anglia Water' by Alan Sargeant. Details 0245 256654.

COLCHESTER RA - 10, talk 'HF Construction' by Peter, G0DZB; 24, 'Rallies and Practical Wireless' by Rob Mannion, G3XFD. Details 0206 764034.

LOUGHTON & DARS - 4, Using an Oscilloscope by Jack, G3OPA; 18, Meccano: Its history and present popularity by Alan Curtis; Mar 4, Packet radio update by John, G8DZH. Details 081 508 3434.

VANGE ARS - 3, Junk Sale; 10, Aerials - Noise phasing by Robin, G3JWI; 17, Home Brew, hints & tips; 24, Annual General Meeting. Details 0268 552606.

FIFE

DUNFERMLINE RS - 10, HF Operating evening(Operating experience for Class B); 17, Talk 'Moon Bounce' by David, GM4JJJ; 24, Construction evening - Top Band DF equipment; 31, Ten-Tec night A review of the Scout and other Ten-Tec rigs. Details GM0GNT, QTHR.

GRAMPIAN

MORAY FIRTH ARS - Club meets every Thursday at 7.30pm. Details 0343 86395.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - 15, Kit Building for Beginners. Details 081 749 9972.

BROMLEY & DARS - 15, Talk 'Raynet' by Phil, G6AQP. Details 081 777 0420.

CLIFTON ARS - **NEW VENUE** Kidbrooke House Community Centre, Room 9, 90 Mycense Road, Blackheath, SE3 7SE. (between Blackheath and Greenwich) - 11, What's in a Computer; 25, Film evening. Details 081 859 7630.

COULSDON ATS - 14, Radio Control of Model Aircraft by Mike, G8AAI. Details 081 684 0610.

CRAY VALLEY RS - 3, Talk 'Fine Tuning a DXpedition' by G0LUH; talk 'Penguin night! VP8SSI' by Bob Treacher; Mar 3, Annual Construction Contest. Details 081 850 1386.

CRYSTAL PALACE & DRC - 19, Annual General Meeting and Construction Contest. Details 081 699 5732 or 0737 552170.

EDGWARE & DRS - 10, Talk 'WAB' by Rob, G4OBE; 24, Morse training plus Station on Air. Details 081 204 1868.

SILVERTHORN RC - 4, On Air evening; 11, On Air evening; 18, Preparation for Thinking Day on the Air; 19, GB4CBG - TDOTA Station and Activities; 25, On Air evening. Meets every Friday at 7.30pm. Details from The Sec, Silverthorn RC, Chingford Adult Educ & Community Centre, Friday Hill House, Simmons Lane, Chingford E4 6JH.

SOUTHGATE ARC - 10, 'Introduction into 24cms ATV' by Adrian, G0OJY; 24, Club On The Air Activity. Details 081 360 2453.

SURREY RCC - 7, 'Home Construction of test Equipment' by Bob, G3OOU; Mar 7, Surplus Sale. Details 081 660 7517.

SUTTON & CHEAM RS - 17, Construction Contest. Details 081 644 9945.

WIMBLEDON & DARS - 25, Desert Island Radio. Details G3DWW 081 540 2180.

GREATER MANCHESTER

ECCLES & DARS - 1, Discussion 'Club stand at the Norbreck Rally'; Mar 1, Lecture 'Wordprocessing using Word Perfect' by G8KRG. Details 061 773 7899.

TRAFFORD ARC - 3, Introduction to TCP/IP by Terry, G0CRF; 17, 'Preparation for G/MEX Rally' by Graham, G1IJK. Details G0BHP, QTHR.

GWYNEDD

DRAGON ARC - 7, Talk 'Noise Bridges and their Uses' by Stewart, GW0ETF; 21, A talk(own choice) by Bob, GW3CGN. Details 0248 600963.

HAMPSHIRE

FARNBOROUGH & DRS - 9, PMR Systems by G4WGX; 23, Introducting to Contesting by G3HEJ. Details 0252 715765.

HORNDEAN & DARC - 3, Junk Sale. Details 0705 472846.

ITCHEN VALLEY ARC - 12, Open meeting & natter night; 25, Visit by Rob Mannion, G3XFD; Mar 12, AGM. Details 0703 732997.

HEREFORD AND WORCESTER

BROMSGROVE & DARC - 11, Waseley County Park. Talk/slides 'St Kilda' by Stuart Lamb. Visitors + XYL/YL welcome. Details 0562 710010.

BROMSGROVE ARS - 8, Noise Bridge Construction by Derek Pearson of Jandek; 22, RSGB Night. Details 0527 542266.

DROITWICH SPA ARC - Meets 1st Tuesday in the month, the Droitwich Spa Community Hall at 8pm. Details 0905 771571.

HEREFORD ARS - Club meets on first and third Friday of each month. Details G4MET, QTHR.

REDDITCH RC - 10, Annual General Meeting. Details 0789 762041.

VALE OF EVESHAM RAC - 3, Magazine Swap night. Details 0386 41508.

HERTFORDSHIRE

CHESHUNT & DARC - 2, Natter nightt & Members Forum; 9, 'DX from Andorra' by Chris, G0AMG; 16, Natter night; 23, The Lonny Wormhole by Julian, G4NQO. Details 0992 464795.

DACORUM AR&TS - 15, Talk 'Amateur Radio Licensing in the future' by Stephen Harding, G4JGS. Details 0582 766973.

HODDESDON RC - 17, Visit by Waters & Stanton Electronics, come ans see the latest amateur radio products. Details 081 804 5643.

STEVENAGE & DARS - 1, Hints & tips(round robin help-line); 8, HF/VHF on Air & CW practice; 15, Video evening(choice of videos to be announced, contact Ralph, G7HFD for video list); 22, 'The Coast to Coast Walk' by Ralph, G7HFD. Details 0438 350882.

HUMBERSIDE

BRIDLINGTON & DARS - ***New Venue*** The Ship Inn, Flamborough. Meetings fortnightly, chat nights alternating with technical talks. Details 0262 671268.

HORNSEA ARC - 16, Lecture 'Phasors' by G0TPS; 23, Lecture 'PAL Colour TV' by G8EOZ. Details 0964 534283.

GRIMSBY ARS - 3, Talk & slideshow 'The British Antartic Survey' by Richard, G4MOE; 17, Barry's Construction evening, PCB's and layouts. Details 0472 825899.

NORTH FERRIBY ARS - 4, Club Dinner; 11, On Air evening; 18, Members problems & Tips; 25, Annual General Meeting. Details 0482 650410.

KENT

EAST KENT RS - 3, Talk 'TV from the Goodwin Sands' by Brian, G8ZYZ at Parkside; 17, Short talk 'How I became a Radio Amateur' by George, G4AOE at Icom, 8pm; Mar 3, No Novice class, Annual Junk Sale at Parkside. Details 0227 364606.

HILDERSTONE RS - 11, Talk 'History of the Service & the Channel Navigation Information Service' by Eric Musson, HM Coastguards, Dover; 18, Construction evening - High Pass Filter; 25, First Aid & Resuscitation by Ken Bailey, St Johns Ambulance Brigade. Details 0843 869812.

MEDWAY AR & TS - 11, Construction Contest (Any item relating to radio); 25, Annual General Meeting. Details 0634 710023.

WEST KENT ARS - 4, informal; 18, Video night, showing some of the latest videos from the RSGB. Details 0892 664960.

LANCASHIRE

BURY RS - 8, Medical Electronics by Kevin Haylett of the Medical Engineering Group at M/Cr Royal Infirmary; 15, Operating evening; 22, RSGB video. Details 0204 883212.

FYLDE ARS - 8, Packet Demo/NoA, G7HJQ/G7CUL; 22, informal; Mar 8, Prep for NARSA Rally. Details G7CUL, QTHR.

NORTH SEFTON ARC - Meets 2nd Wednesday of each month. Details G1DFT on 0704 579017.

ROCHDALE & DARS - 21, Talk by the Rev George Dobbs, G3RJV. **New Secretary** John, G7OAI. Details G7OAI on 0706 376204.

THORNTON CLEVELEYS ARS - 7, Auction of Surplus Equipment; 14, Construction & Fix-it evening; 21, Planning of stand at Norbreck Rally; 28, Discussion 'Band Plans etc'. Details from G4BFH, QTHR.

LEICESTERSHIRE

CHARNWOOD ARCC - 6, Antenna's for 160 meeting; 20, Contest Planning; 25/27 CQWW 160 Contest. Details 0509 232927.

LOUGHBOROUGH & DARC - 1, 'Audio' by Barry, G0LCU; 8, Talk 'The Other Mans Shack' by John, G4CCI; 15, HF evening; 22, Video Editing by Derrick, G7OXA. Details 0509 218259.

LINCOLNSHIRE

GRANTHAM RC - 1, talk 'Sine waves, Decibels and falling off 'Logs'' by Mike, G3PJR; 15, Overcoming EMC problems by G4OUB; Mar 1, Club Quiz. Details 0476 65743.

LOUTH & DARS - meet on 3rd Tuesday in month at The Wellington, Louth . . . . Details G1XWD, QTHR.

MERSEYSIDE

LIVERPOOL & DARS - 1, Licencing Interpretation(Discussion); 8, GX3AHD On the Air; 15, Debate 'Place of the computer in Amateur Radio'; 22, Surplus Sale. Details 051 722 1178.

WIRRAL ARS - 2, Talk 'History of Wirral Transport' by Glyn Parry. Details 051 644 6094.

NORFOLK

FAKENHAM ARC - 1, HF Open Forum & On Air night; Mar 1, ATV Demonstration by Mark, G0LGJ. Details 0485 528633.

NORFOLK ARC - 2, NARC Film Archives by Jack, G3NJQ; 9, Construction, QRP, NoA; 16, Sicence for All by Arnold, G3PTB; 23, Construction QRP NoA. Details 0603 618810.

YARMOUTH RC - 3, Informal (LT Junk Sale); 10, Codes & Cyphers; 17, Informal; 24, Tapes for the Blind. Details 0493 721173.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 3, NoA; 10, Talk '2m DF Foxhunt - with a Q and A session' by Ed, G0INA; 17, Surplus Equipment sale with Dave, G3YUT auctineer; 24, Construction/activity night. Details 0602 501733.

MANSFIELD ARS - 14, Talk 'Are we being Conned?' by Charles, G4ZZG. Details 0623 755288.

SOUTH NOTTS ARC - 4, Junk Sale; 11, Visit to Nottingham Urban Traffic Control Centre, meet at Trinity Square; 18, Open forum; 25, Visit from Nunsfield House ARC. Details 0602 216342.

NORTH YORKSHIRE

DENBY DALE & DARS - 2, A day in the life of the Wakefield Coroner - David Hinchliff; 16, Preliminary meeting for the 1994 Rally. Details 0484 532371.

HAMBLETON ARS - 3, RAE Course; 10, Talk 'The Novice Licence Discovered' by Liz Whelan(Novice Examinee); 17, RAE Course; 24, Practical/Ops night. Details 0609 776608.

OXFORDSHIRE

OXFORD & DARS - Club meets on the 2nd and 4th Wednesdays of the month. Details 0865 863526.

SHROPSHIRE

SALOP ARS - 10, Quiz, between SARS and Powys RC at Oak Hotel, Shrewsbury 8pm; 24, A demonstration on FAX & SSTV software driven Tx/Rx by Clem, G0ALV. Details 0743 361935.

TELFORD & DARS - 2, Equipment night; 9, The New Club Computer; 16, Radio Connectors by G6UDX; 23, Under a fiver Construction Competition. Details 0952 588878.

SOMERSET

TAUNTON & DARC - 4, Talk & discussion 'The G5RV Antenna' by Graham, G0GTR; 18, Talk 'The Development of the Air to Air Guided Missile' by Doug Hall OBE, G5JJ. Details 0823 680778.

WINCANTON ARC - 7, Talk 'Worked All Britain' by G1THG; 21, Open evening. Details 0963 34360 or 0747 51381.

YEOVIL ARC - 3, The Worked All Britain Awards by G1THG; 10, Development of a Ballistic missile by G5JJ; 17, The Club's 'Original' Semi-Conductor Transmitter by G3MYM; 20, SES GX3CMH on the Air to Commemorate 40th Anninersary of the First Skywave QSO using Transistor Tx over 90 miles; 24, Club Station on Air. Details 0258 473845.

SOUTH GLAMORGAN

CARDIFF RSGB G - ***NEW SECRETARY*** GW4HWR, QTHR. 14, Introduction to Computers by John, GW4HWR. Details 0222 810368.

SOUTH YORKSHIRE

SHEFFIELD ARC - 1, Raynet meeting at Sheffield Univ 197 Club; 7, Eliminator round one for the inter Club Quiz; 14, Talk 'JOTA & Scouting' by the South Yorkshire's Scouts Communication Officer; 21, Construction & HF operating evening; 28, Demonstration on the Club's Packet station. Details 0742 446282.

STAFFORDSHIRE

CANNOCK CHASE ARS - 3, Lecture 'Radio Control of Model Aircraft' by John Duller. Details 0543 262495.

STRATHCLYDE

MILTON OF CAMPSIE ARS - Meets every 2nd Wednesday at Milton of Campsie Cummunity Hall, 7.30pm. New members and visitors invited. For details of events and dates of meetings, please contact Alan, GM7PGT 041 779 1444.

SUFFOLK

FELIXSTOWE & DARS - 7, Practical Satellite Operating Demonstration led by Ken, G4RHR; 21, Computing Workshop led by Paul, G4YQC; Mar 7, talk 'Weather & Propagation' by Jim, G3YLA (Open Meeting: Remember Names to Sec). Detail 0394 273507(evenings).

IPSWICH RC - 2, Talk & slideshow 'Poland' by Dr Grazyna Mirkiewecz; 16, Talk/demo 'Antennas' by Frank, G3FIJ; 23, CW evening; Mar 2, Construction Contest. Details 0473 742072.

LEISTON ARC - 1, Talk 'Communications in Space' by Prof John Allen. Details 0986 874800.

SUDBURY & DRA - 1, Talk 'Measurements in the Shack' by Frank, G3FIJ; Mar 1, Talk 'PCB Computer Aided Design(CAD) by Colin, G0PAO. Meets on 1st Tuesday of the month at Wells Hall Old School, Great Cornard. Also on 3rd Tuesday at the Five Bells Public House, Gt Cornard. Details 0787 313212.

SURREY

DORKING & DRS - Meets normally every 2nd & 4th Tuesday. Details 0306 631236.

HORSHAM ARC - 3, Talk 'Amateur Radio 1949 way' by Brian, G3GDU. Details 0737 842150.

THREE COUNTIES ARC - 2, A talk about Amateur Radio Astronomy by John Smith; 16, The history of Dunsfold aerodrome (1940 to present day) by Paul McCue; Mar 2, Talk 'RAYNET' by Bob, G4VWP. Details 0428 606298.

TAYSIDE

DUNDEE ARC - 1, Lecture 'Oliver Heaviside' by Leslie, GM0TGG; 8, Construction night; 15, Lecture 'Computers in your Amateur Radio Station' by Allan, GM4ZUK; 22, Construction night. Details from GM4FSB, QTHR.

S - on Wednesdays Details from Stuart, G0BEV 091 281 0999.

WARWICKSHIRE

STRATFORD UPON AVON & DRS - 14, Test Equipment evening(Pref given to homebrew or converted equipment); 28, Junk(Sorry Surplus!) Sale. Details 0608 682495.

WEST GLAMORGAN

SWANSEA ARS - 3, Video 'Weather Satellite Picture Reception' by GW3SIY; 17, Planning for 'Thinking Day on the Air'. Details 0792 403527.

WEST MIDLANDS

ALDRIDGE & BARR BEACON ARC - ***NEW NAME & NEW MEETING PLACE*** (Was the Bar Beacon ARC). New venue Aldridge Central Community Association Hall, Middlemore Lane, Aldridge, Walsall WS9 8AN. Meets 1st & 3rd Mondays in the month. Details G7NOL, QTHR.

SOUTH BIRMINGHAM RS - 2, Present Day Receivers by Gordon, G3LEQ; Mar 2, PMR by Bill, G3TZM. Lectures 1st Wednesday of month. Meeting in own shack Monday, Thursday & Friday, 8pm. Details 021 474 3784.

SOLIHULL ARS - ***New Secretary*** Paul Gaskin, G8AYY, QTHR. Details 021 783 2996.

STOURBRIDGE & DARS - 7, On Air evening; 21, Annual Constructor Competition. Details 0384 374354 or G7HEZ @ GB7PZT.

WEST BROMWICH CRC - Meets every Sunday evening at 'The Sandwell' Public House, High Street, West Bromwich. Details 021 561 2884.

WEST SUSSEX

WORTHING & DARC - 2, Discussion evening; 9, Packet by G8VEH; 16, Phase Lock Loops by G0SWH; 23, Discussion evening; Mar 2, Computers by G7OBD & G7OBE. Details 0903 753893.

WEST YORKSHIRE

DENBY DALE ARS - 2, 'A Day in the life of the Wakefield Coroner' by David Hinchliff; 16, Preliminary meeting for the 1994 Rally. Details 0484 429238.

HALIFAX & DARS - 15, Junk Sale. Details 0422 202306.

KEIGHLEY ARS - 3, Discussion night; 10, Navagation by G0BWY. Details 0274 496222.

NORTH WAKEFIELD RC - 3, Junk Sale; 16, Visit to Wakefield Police Control; 24, Talk by Charlie Newton, G2FKZ. Meets every Thursdays, other Thursdays, OTA and natter nights. Details 0924 362144.

SPEN VALLEY ARS - 3, Construction Clinic - bring your Projects!; 17, Decorative Paint Finishes by Russell, G0FOI; Mar 3, Visit to British Gas, NB.**(Maximum of 12 persons only)**. Details 0924 49767.

WHITE ROSE ARS - 9, A talk by John, G3TDZ, designer of the White Rose Transceiver about the circuitry and tips with construction. Club meets every Wednesdays at 8pm, Moortown RUFC, Far Moss, Alwoodley. Details from G3AAS, QTHR.

WILTSHIRE

SALISBURY R & ES - 1, Talk 'A Radical new Licence Procedure' by G7GWF. Details 0722 330971.

TROWBRIDGE & DARC - 2, Surplus equipment Sale; 16, Open Evening. Details 0225 864698(evenings).

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

6 FEBRUARY

SOUTH ESSEX ARS Radio Rally - The Paddocks, Long Road, Canvey Island, Essex. (The Paddocks is located at the end of the A130.) Doors open 10.00am. Features trade stands, bring and buy and home made refreshments. Free parking with space outside main doors for disabled visitors. Talk-in on S22. Admission 75p. Details from Ken, G0BBN, 0268 755350.

13 FEBRUARY

BARRY MOBILE Rally - Barry Leisure Centre. Same venue as last year. Doors open 10am, 9.30 for disabled visitors. All usual facilities available. Details from Mike, GW8CMU, phone/FAX 0446 711426 or Mobile 0860 840647.

CAMBRIDGE & DARC Radio and Computer Rally - Addenbrookes Hospital Ambulance Station, Cambridge. (Easy access from M11, Jn 11 & the A45 via the Ring road.) Doors open 10.30am, entry £1. Trade stands, bring & buy. Refreshments, Talk-in on S22. Bookings and further information from George, G0OEL on 0954 719273.

NORTHERN CROSS RALLY - Rodillian School, on the A61 between Leeds and Wakefield, near junction M1/M62. Doors open 11am, 10.30 disabled and bring & buy. Usual trade stands, bring & buy. Morse Tests on demand, bring two passport-type photographs. Bar and refreshments, ample parking. Talk-in S22. Details Dave on 0532 827883.

20 FEBRUARY

RSGB VHF Convention - Sandown Park Exhibition Centre, Esher, Surrey. Comprehensive trade exhibition, specialist groups and a full lecture programme. Presentation of Trophies. Details from Geoff Stone, G3FZL 081 699 6940. Stand bookings from Les Hawkyard, G5HD, 0409 281342.

TRAFFORD Rally - G-MEX Manchester. All usual traders and attractions. bring & buy and new traders. Refreshments and hot & cold food. Doors open at 10.30am for all classes, with a disabled persons priority queue. Talk-in on S22 via GB1GMX. Trade enquiries and details G1IJK on 061 748 9804.

26 FEBRUARY

9th RAINHAM Radio Rally - ***NEW VENUE*** Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent. (From M2, jun 4 take A278 or A2 from Rainham, well signposted, follow the RRR arrows). New venue more space, more traders, ample parking, bring & buy, refreshments and snack area with tables & chairs. All on one level, easy access for disabled. Admission £1, children under 16 free. Talk-in on S22 via GB4RRR. Further information from G7JBO 0634 365980 any reasonable time.

TYNESIDE ARS 8th Annual Rally - The Temple Park Centre, John Reid Road, South Shields. Accessable from the A1, A19 both north and south and A69 from west. Doors open 11.00am, 10.30 disabled visitors. Features the usual trade stands, bring & buy stall. Comprehensive catering and leisure facilities at the centre. Ample car parking. Talk in on S22. Details from Jack, G0DZG on 091 265 1718.

27 FEBRUARY

7th TAW & TORRIDGE Rally - Bideford Halls on the Quay, Bideford, North Devon. Doors open 10.30am. Features trade exhibitors, bring & buy stall. Refreshments available all day. Plenty of parking space. Details from Mike, G3PGA, QTHR.

12/13 MARCH

RSGB LONDON AR & Computer Show - Lee Vally Leisure Centre (Same venue - new name), Picketts Lock Lane, Edmonton, London, N9. Doors open 10am on both days. Disabled facilities. Large trade presence. Lectures, Special Interest Group sections. Plus a bring & buy stall. Morse Test on demand, need two passport size photographs. Talk-in on 2m and 70cm. Details 0923 893929.

13 MARCH

9th WYTHALL Radio Club Rally - Wythall Park, Silver Street, Wythall. (Near Birmingham, on the A435, just 2 miles from Jn 3 on the M42). Event occupies three hall and a marquee. Doors open 10.30am. Features the usual traders, bring and buy stall, run by the club. Refreshments available. Talk-in on S22. Admission £1. Details Chris, G0EYO on 021 430 7267.

20 MARCH

NORBRECK AR Electronics & Computing Exhibition - Norbreck Castle Exhibition Centre, Blackpool. Details G6CGF on 051 630 5790.

TIVERTON SOUTH WEST ARC Mid Devon Rally - Pannier Market, in the middle of Tiverton. Easy access, only minutes from Jn 27 on the M5. Doors open 10am. Features two halls of trade stands, bring & buy and a mobile snack bar. Further displays and full refreshments facilities in the Club room bar, open through. Talk-in on S22 by G4TSW. Trader details from G6SMG 0884 257009 or from G4TSW, Mid Devon Rally, PO Box 3, Tiverton, Devon.

27 MARCH

BOURNEMOUTH RS 7th Annual Sale - Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open 10am. Amateur radio and computer traders, Club and specialized groups. Refreshment available. Admission £1, including free raffle ticket. Talk-in on S22 via G1BRS. Details Ian, G2BDV, QTHR or 0202 886887.

MAGNUM Rally - Magnum Leisure Centre, Irvine, organised by Cunninghame & DARC. Details GM0DEQ 0563 40048.

PONTEFRACT & DISTRICT ARS, 14th Annual Components Fair and Spring Rally - The Carleton Community Centre, Carleton, nr Pontefract. Doors open 11am, 10.30 for disabled visitors. Trade stands, bookstall, Morse Tests (Usual requirement, two passport size photographs), bring & buy stall at ground level. Refreshments. Details Colin, G0NQE 0977 677006

3 APRIL

LAUNCESTON 8th AR Rally - Details 0409 221624 or 0566 775167.

28th WHITE ROSE ARS Rally - Submit Morse Test applications to RSGB HQ. Details G7ELS on 0850 690189.

4 APRIL

CENTRE OF ENGLAND Rally, Satellite Computer & Electronics Show - Sports Connection Centre, Leamington Road, Ryton. On Dunsmore, Coventry A45/A423. Doors open 10.30am. Admission £1.50, Senior Citizens £1. Held in two large halls. Over 80 traders, bring & buy. Talk-in on S22. Bar & hot food all day. Ample parking. Details Frank, G4UMF 0952 598173.

10 APRIL

SWANSEA ARS Rally - Details 0792 404422.

16 APRIL

SPRING ALL MICRO Show, Radio Rally and Electronics Fair - Bingly Hall, Staffordshire Showground, Weston Road, Stafford. (A518 Stafford/Uttoxeter Road) Signposted from Jn 14 on M6. Doors open 10am. Features many trade stands covering the computer spectrum. Also accessories, S/ware, books, components, shareware, media, hardware. Radio & satallite and a bring & buy stall. Refreshments, free parking. Details 0473 272002 or Fax 0473 272008.

17 APRIL

BURY RS Radio Rally - Details 061 762 9308.

MARSKE-BY-THE-SEA Radio Rally - Details 0642 475671.

23 APRIL

INTERNATIONAL MARCONI Day - Details G3KPO, QTHR or 0983 567665.

23/24 APRIL

IRISH R & T Society Dinner/AGM - Details Ken, EI4DW, QTHR or Tel: 074 31109.(UK 010 353 74 31109)

1 MAY

11th ANGLO-SCOTTISH Rally - Tait Hall, Kelso. Details GM4UFP, 0750 200006 after 6pm.

BRITISH AMATEUR TELEVISION CLUB (BATC) Rally. ***NEW VENUE*** The Sports Connexion, Leamington Road, Ryton-on-Dunsmore, Coventry. Details Tel: 0788 890365 or Fax 0788 891883.

2 MAY (MONDAY)

DARTMOOR Radio Rally - Yelverton, Devon. Details 0822 852586.

MID-CHESHIRE ARS Rally - Details G4XUV on 0606 77787.

8 MAY

MARS/DRAYTON Mobile Radio Rally - Details G6DRN on 021 443 1189.

10th YEOVIL QRP Convention - Details G3CQR, QTHR. Tel: 0935 813054.

22 MAY

The 37th NORTHERN Mobile Rally - Details G0MKK. Tel: 0423 507653 eve.

22/23 MAY

INTERNATIONAL KITE FESTIVAL - Details G3KPO, QTHR or 0983 567665.

29 MAY

EAST ANGLIAN Radio & Computer Rally (ESWR) - The Maidenhall Sports Centre, Ipswich, Suffolk. Details 0394 271257.

PLYMOUTH Radio Club's Rally - Details G7LUL 0752 563222.

6 JUNE

D-DAY EXHIBITION - Details G3KPO, QTHR or 0983 567665.

12 JUNE

The 25th ELVASTON CASTLE National Radio Rally - Elvaston Castle Country Park, nr Derby. Details Ken, G3OCA, 0332 662818. Trader enquiries to Keith, G1ZLQ, 0332 662896.

ROYAL NAVAL ARS Annual Mobile Rally - HMS Collingwood, Fareham. Details Clive, G3YTQ 0705 3327621(daytime) 0329 234143(eve).

19 JUNE

DENBY DALE & DARS Annual Mobile Rally - Details 0484 644827.

NEWBURY Boot Sale - Details on 0635 863310

26 JUNE

37th LONGLEAT Amateur Radio Rally - Prices to both visitors & trade will be frozen at 1993 levels. Details Shaun, G8VPG on 0272 860422 (office hours), 0225 873098 (eve & weekends), FAX 0272 869387.

NORFOLK RAYNET BARFORD Rally - Book your pitch now, contact G4TWT, 0603 427008.

2/3 JULY

HAMFEST-UK - The County Showground, Weston Road, Stafford. Details 0923 893929.

3 JULY

KINGS LYNN Amateur Radio Club, 5th Great Eastern Rally - Cattle Market, Hardwick Narrows, Kings Lynn. Details 0553 765614.

YORK Radio Rally - Tattersall Building, York Racecourse, Knavesmire, York. Details 0904 790079.

9 JULY

CORNISH Rally - Details G0OOP on 0872 222605.

10 JULY

SUSSEX AR and Computer Fair - Details G8VEH, QTHR Tel: 0903 763978 or 0273 415654 office hours.

24 JULY

COLCHESTER Radio & Computer Rally - Details Frank, G3FIJ, QTHR 0206 851189.

28/31 JULY(THURSDAY-SUNDAY)

AMSAT-UK Colloquium - The University of Surrey, Guildford. Details from Ron, G3AAJ 081 989 6741.

7 AUGUST

RSGB WOBURN Rally - Details from Norman Miller, G3MVV, 0277 225563.

29 AUGUST(MONDAY)

SCARBOROUGH AR Electronics and Computer Fair - Details Ross, G4ZNZ, QTHR.

3 SEPTEMBER

ANNUAL WIGHT WIRELESS RALLY - Details G3KPO, QTHR or 0983 567665.

4 SEPTEMBER

BRISTOL Radio Rally (Incorporting Bristol Computer & Electronics Market) - Details G4YZR 0275 834282.

PRESTON Amateur Radio Society 26th Annual Rally - Details George 0772 718175 or Godfrey on 0772 253810.

TELFORD Radio Rally - Details 0743 249943.

VANGE Amateur Radio Society Rally - Details Doris 0268 552606.

11 SEPTEMBER

BARTG Rally - Details Peter, G8VXY 021 453 2676.

25 SEPTEMBER

THE THREE COUNTIES Rally - Details G4POZ 0905 773181.

NORTH WAKEFIELD Radio Club Rally - Details G4RCG 0924 362144 or G0EVT 0924 825443.

7/9 OCTOBER(FRIDAY/SUNDAY)

RSGB INTERNATIONAL HF & IOTA CONVENTION.

12 NOVEMBER(SATURDAY)

THE ALL MICRO Show - Details 0473 272002.

20 NOVEMBER

BISHOP AUCKLAND Radio & Computer Annual Rally - (**NEW VENUE**). Details G0PRQ 0388 766264.

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

EA7DGA	Mr R (Stan) Robinson	27.10.93
G0MUE	Mr E Asquith	31.10.93
G1UMB	Mr F E E Conti	02.03.93
G3BY	Mr J W C Cropper	25.11.93
G3BYC	Mr E H Major	Nov 93
G4HZO	Mr R W Dye	
G4KDV	Mr J E Annakin	
G4QB	Mr H G Wood	12.11.93
G6HRT	Mr A D Wade	16.11.93
G6HZQ	Mr T O'Connor	
G6MOR	Mr B D Bailey	13.11.93
G8DA	Mr P Malvern	07.10.93
G8DOJ	Dr I F R Sutherland	Nov 93
G8VZ	Mr J Redrup	
GD3JAE	Mr J Corlett	
GJ2LU	Mr H (Bert) Chater	13.11.93
GM7NAB	Mr A Wallace	06.11.93
GW4KUT	Mr K Davies	23.11.93
GW4RRL	Mr J B Williams	26.09.93
GW7EMU	Mr F Borlase	15.12.93
GW8UCX	Mr R A H Taylor	29.11.93
PA0TP	Mr A Geesink	
RC2CB	Mr M S Terentev	04.10.93
RS6449	Mr C W Thorpe	12.11.93
RS95495	Mr H W Willacy	08.11.93
TA1/W6KG	Mr L D Colvin	14.12.93

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 19 February. It was taken from the HQ computer on 12 February. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

29 JANUARY

GB2RB	Robert Burns

1 FEBRUARY

GB0BWD	Batley Wilton Division
GB0SWG	South Woodham Guides
GB0THG	Taplow & Hitcham Guides
GB2SCB	Scouts Communication Badge
GB4CGG	Chelsfield Girl Guides
GB6CG	Checkefield Guides

6 FEBRUARY

GB2RAF	Royal Air Force

7 FEBRUARY

GB2BDS	Blackburn Division Scouts
GB2WGC	Woodlands Guide Camp

12 FEBRUARY

GB5TT	PACC Contest

17 FEBRUARY

GB0CG	Chester Guides

18 FEBRUARY

GB2GG	Gellilydan Guides
GB4BDG	Barnard Castle District Guides
GB8HG	Havering Guides

19 FEBRUARY

GB0CDG	Cockermouth District Guides
GB0NGG	Northwood Girl Guides
GB1GMX	G-Mex, Exhibition Centre
GB1OGG	Orpington Girl Guides
GB2MGA	Malmesbury Guides Association
GB2MMG	Melton Mowbray Guides
GB2SGS	Suffolk Guides
GB4CDW	Charmandean District Worthing
GB4CWG	Cambs West Guides
GB4SBG	Second Boston Guides
GB6SD	Selsdon District

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	3EL2	(7dBd/boom 0,8m)
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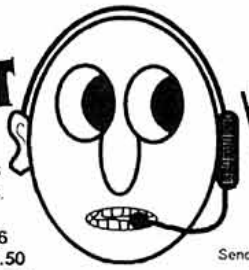

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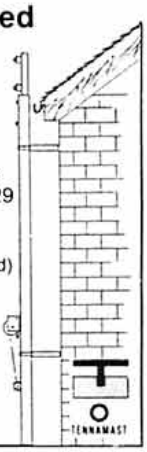

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RSGB Policy Matters (Zonal Council member):

See *RadCom*, January 94.

For general advice and details on local clubs, or if you don't know who to contact:

RLOs (A-I) appeared in last month's At Your Service.

ORKNEY (Zone G) – G M Christie, GM7GMC, Burnbank, Hillside Road, Stromness, Orkney KW16 3HR. Tel: 0856 850270.

OXFORDSHIRE (Zone D) – Post vacant – refer to Zonal Council Member.

POWYS (Zone E) – Paul Essery, GW3KFE, 287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1AR. Tel 0686 628958.

SHETLAND (Zone G) – Post vacant – refer to Zonal Council Member.

SHROPSHIRE (Zone B) – David Whalley, G4EIX, 1 Lees Farm Drive, Madeley, Telford, Salop TF7 5SU. Tel 0952 588878.

SOMERSET (Zone D) – Post vacant – refer to Zonal Council Member.

SOUTH GLAMORGAN (Zone E) – Mike Adcock, GM8CMU, 7 Channel Close, Rhoose, Barry, S Glamorgan CF62 3EH. Tel: 0446 711426.

SOUTH YORKSHIRE (Zone A) – Mr A Whitehead, G4JKW, Laburnum Cott, 3 Darley Yard, Worsbrough Dale, Barnsley, S Yorks S70 4SB. Tel 0226 299031.

STAFFORDSHIRE (Zone B) – Ken Parkes, G3EHM, 41 Goldborn Avenue, Meirheath, Stoke-on-Trent, Staffs ST3 7JQ. Tel 0782 397240.

STRATHCLYDE (Zone G) – **NW:** Alan Foulis, GM7PCT, 12 Richmond Gardens, Chryston, Glasgow G69 9PA. Tel: 041 779 1444. **SE:** Gordon Hunter, GM3ULP, 12 Airbles Drive, Motherwell, Strathclyde ML1 3AS. Tel: 0698 253394.

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SURREY (Zone C) – Post vacant – refer to Zonal Council Member.

TAYSIDE (Zone G) – Post vacant – refer to Zonal Council Member.

TYNE & WEAR (Zone A) – Post vacant – refer to Zonal Council Member.

WARWICKSHIRE (Zone B) – see under Northamptonshire.

WESTERN ISLES (Zone G) – Post vacant – refer to Zonal Council Member.

WEST GLAMORGAN (Zone E) – Mr E Hays, GW3RGL, 23 Edgemoor Drive, Upper Killay, Swansea SA2 7HH. Tel 0792 207822.

WEST MIDLANDS (Zone B) – Post vacant – refer to Zonal Council Member.

WEST SUSSEX (Zone C) – Post vacant – refer to Zonal Council Member.

WEST YORKSHIRE (Zone A) – Mr D W Allan, G0RZP, 283 Cliffe Lane, Gomersal, Cleckheaton, W Yorks BD19 4SB. Tel 0274 872244.

WILTSHIRE (Zone D) – I L Carter, G0GRI, 12 Bobbin Lane, Westwood, Bradford on Avon, Wilts BA15 2DL.

RSGB Liaison Officers (O-W) Committees, and EMC Coordinators

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focussing on a different section of the volunteer workforce, whilst still giving brief details of the main office-holders. See also the Information Directory section of the *RSGB Call Book*.

Antenna Planning:

Need for permission and how to apply – booklet free to members from the Amateur Radio Dept at RSGB HQ.

Planning application refused – RSGB Planning Panel, via RSGB HQ.

Planning Advisory Committee Chairman: Geoff Bond, G4GJB, QTHR.

Awards:

For contest awards, refer to the appropriate contest committee.

For other awards, enquiries and applications go to either:

HF Awards Manager – Bill Ricalton, G4ADD, QTHR.

IOTA (Islands on the Air) Awards Manager – Roger Balister, G3KMA, QTHR.

VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT, QTHR.

Band Plans and operating practices:

See the *RSGB Call Book* or March 93 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman. See *RadCom*, September 93.

Beacons:

HF Beacon Coordinator – Prof Martin Harrison, G3USF, QTHR.

VHF Beacon Coordinator – John Wilson, G3UUT, QTHR.

Microwave Beacon Coordinator – Graham Murchie, G4FSG, QTHR.

RSGB Contests:

First contact the contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman:

HF Contest Committee – Chris Burbanks, G3SJJ.

VHF Contest Committee – Bryn Llewellyn, G4DEZ, QTHR.

ARDF (direction finding) Committee – Brian Bristow, G4KBB, QTHR.

EMC:

Advice on solving breakthrough and other electromagnetic compatibility matters:

Committee Chairman: Robin Page-Jones, G3JWI, QTHR.

Local EMC Coordinators:

L J Parry, G8AMK, **Bracknell**, 0344 423704

C G Barry, GW3BUT, **Cardiff**, 0222 628430

R P Harrison, G4UJS, **Nantwich**, 0270 627620

R P Smith, G3SVW, **Sale**, 061 9693999

A Armstrong, G0FBW, **Peterlee**, 091 586 4500

G Halse, G3GRV, **Hemel Hempstead**, 0442 214972

A D Maish, G4ADM, **Worcester Park**, 081 337 2123

R M Allsopp, G1YFT, **Leicester**, 0533 833714

D A Hopkins, G0MXI, **Hull**, 0482 210763

P Daly, G0GTE, **Stevenage**, 0438 724991

L K Ayre, G3DPR, **New Milton**, 0425 615676

K Hendry, G0BBN, **South Benfleet**, 0268 755350

R Sykes, G3NFV, **Leatherhead**, 0372 372587

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S O'Sullivan, G8VPG, **Bristol**, 0225 873098

Mrs S Morley, G0MCV, **Loughborough**, 0533 374999

S M Wood, G4OWI, **Newark**, 0636 72625

G Brooks, GM4NHX, **Caithness**, 084 783570

Rev S Bennie, GM4PTQ, **Stornoway**, 0851 703609

D W Smith, G3LIS, **Ormskirk**, 0695 77960

R Adam, GM4ILS, **Elgin**, 0343 545842

N Carr, G0JHC, **Preston**, 0772 742710

C Barnes, GW4BZD, **Bangor**, 0248 351151, ext 2750

D Morris, GM3YEW, **Perth**, 073 885533

J Lawrence, GW3JGA, **Prestatyn**, 0745 853255

Emergency Communications:

Emergency Communications Officer – Greg Reilly-Cooper, G0MAM. Tel: 0606 783270, QTHR.

Exhibition & Rally Committee:

Chairman: Norman Miller, G3MVV, Tel: 0277 225563, QTHR.

Honorary Historian:

George Jessop, G6JP, QTHR.

IEE:

Liaison Officer – Prof Peter Saul, G8EUX, QTHR.

Licensing:

Licensing Advisory Committee Chairman – Peter Chadwick, G3RZP, Three Oaks, Braydon, Swindon, Wilts SN5 0AD.

Renewals – Subscription Services Limited, PO Box 885, Bristol BS2 8RH.

New Licence Applications – Subscription Services Ltd, PO Box 884, Bristol BS2 8RH. SSL Help Desk – 0272 258333.

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Membership Liaison Committee Chairman – Peter Sheppard, G4EJP, QTHR.

Morse:

GB2CW Coordinator – David Pratt, G4DMP, QTHR.

Chief Morse Examiner – Roy Clayton, G4SSH.

Novice Licence/ Project YEAR:

Hilary Claytonsmith, G4JKS, QTHR.

N.B. For details of training courses and examinations, please write direct to RSGB HQ, quoting your postcode.

Packet Radio:

Datacomms Committee Chairman – Tom Lilley, G1YAA, QTHR.

President:

Peter Chadwick, G3RZP, 'Three Oaks', Braydon, Swindon, Wilts, SN5 0AD.

Propagation:

Propagation Studies Committee Chairman – Charlie Newton, G2FKZ, QTHR.

QSL Bureau:

Outgoing cards – PO Box 1773, Potters Bar, Herts, EN6 3EP.

Incoming cards – your QSL sub-manager (see *RSGB Call Book*).

Liaison Officer – John Hall, G3KVA, Corfe Lodge, Ipswich Road, Long Stratton, Norfolk NR15 2TA.

Repeaters:

Repeater Management Group Chairman – Geoff Dover, G4AFJ, QTHR.

Spectrum Abuse:

Amateur Radio Observation Service Coordinator – Geoff Griffiths, G3STG, QTHR.

Technical Queries:

Technical and Publications Committee Chairman: Dick Biddulph, G8DPS, QTHR.

Training and Education:

T and E Advisory Committee Chairman – John Case, GW4HWR, QTHR.

Radio Amateur's Examination – George Benbow, G3HB, QTHR.

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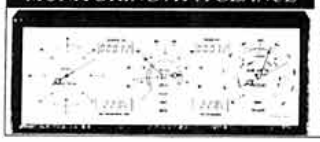

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The LAST WORD

ABUSE WATCH

I read Peter Kirby's *Leader* column (*RadCom*, January 1994) with concern but without surprise. I too have heard this sort of behaviour on 80m. Peter's correspondent is to be congratulated for confronting these offenders but the verbal abuse he suffered only serves to confirm to the vast majority of us just how reprehensible this behaviour is.

So what is to be done about these amateur radio 'yobs'? Suffer them in silence and hope they will go away? I thought about this for a long time and on reading Peter's comments again, one sentence suddenly leapt out from the page:

"The Amateur Radio Service is self policing, therefore it is up to all of us to take the necessary steps to clean up our act.'

There is the answer! Let's start policing for ourselves. For many years as part of its organisation, the RSGB has had an Intruder Watch which monitors and reports on non-amateur transmissions in the exclusive amateur allocations. Why not create an Abuser Watch? (I draw a parallel here to the thousands of Neighbourhood Watch schemes throughout the country). Instead of Peter's correspondent taking the verbal flak alone, let us all approach this problem in a properly structured and organised way which will (a) clearly identify the offenders, (b) protect our anonymity and (c) use the good offices of the RSGB in its role of representing the best interests of amateur radio. I note that the Amateur Radio Observation Service (AROS) has ceased to function while the Council reconsiders its role (see *News and Reports*, January). It seems a fortuitous opportunity to re-define its function as an Abuser Watch Committee which would coordinate and take action on reports sent in by members as suggested below:

1 Whenever we hear the use of profane language on the air by UK operators, details are noted of date, time, frequency, callsign and a quote of the phrase or sentence in which the profane language is used, and this report is sent in to the RSGB.

2 Assuming that the Society receives reports from several amateurs, the Abuser Watch Committee would then cross-check these to confirm their accuracy and, if satisfied, would then send a cautionary but politely worded letter to the offending amateur detailing the incident(s). Whether the amateur is an RSGB member or not is irrelevant.

3 If the offending amateur persisted and further reports were sent into the Abuser Watch Committee, then the matter would be taken up to a legal level and reported to the Radiocommunications Agency.

If this scheme could be set up then we could really say that we were 'self policing and cleaning up our act'. These offenders would very quickly learn that they were being monitored and reported on, and the risk of losing their licences would effectively curb their tongues.

I feel somewhat dismayed that after 46 years as a radio amateur, I find myself writing a letter such as this. Maybe it is a comment on today's society as Peter's correspondent suggests. I recall with nostalgia my early years in the hobby when one met nothing but friendliness and courtesy on the air. I take some comfort in that such courtesies are still largely in place but they are certainly under threat from the reprehensible behaviour of this deviant minority. I offer my ideas for what they are worth. Peter's correspondent say something needs to be done. The worst thing good men can do is to do nothing!

I wonder what other members think?

John V Hoban G3EGC

[It may surprise you to learn that the AROS has for many years functioned in exactly the way you describe, though this activity has tended to be lower profile than tackling repeater abuse. No doubt the Council will appreciate your arguments for it to continue – Ed]

CW ON FM RIGS

On the subject of encouraging new blood into both the hobby and the Society (*RadCom Leader*, October), surely part of the reason for the dearth of newcomers is the cost of RAE classes.

The planned RAE class for September 1993 at my local college was under-subscribed and did not run. The class cost was £132 for 28 two-and-a-half hour sessions with no discounts for youngsters. An 'A' level course over three terms in mathematics, psychology, law or a language, costs £80. We will not attract youth in this climate.

Paul Collett G0BQF

[A number of radio clubs have solved this by running their own courses - Ed]

TOWER INVITATION

I am very sorry that Norman was unable to visit our Club during his stay in Sestri Levante ('CQ Italia – An I-Land Fling' by Norman Bennett, GM0IYL, *RadCom*, December 93). If he had asked through the local repeaters how to contact the responsible people of the Club, a visit to the Tower could certainly have been arranged. If someone wishes to visit the Tower he can apply to Giorgio Dasso, I1TKB, c/o ARI Club, POB 5, Sestri Levante, Italy. He or myself will be glad to arrange the visit to the Marconi Tower.

The Marconi station with a special call IY1TTM is activated during special events like International Marconi Day organized by the Cornish Radio Amateur Club in Truro. The station can be also activated by visitors provided that they have a regular Amateur Radio Licence for HF. The rig in the Tower consists of a Drake C Line with a SB200 amplifier, a triband rotary beam antenna and dipoles for 40 and 80 metres. The location is excellent for DXing and when we activate the station a big pile-up immediately results due to the rarity of the special call.

Roberto Craighero I1ARZ,
Vice President of the Marconi Tower Club

ALL KEYED UP

My heart's in CW.
My heart's not up here.
Can't hack it on sideband,
My inside feels queer.

This mike is the trouble.
When I squeeze PTT
My vocal chords freeze,
I go weak at the knees.

I've tried elocution
And drinks laced with gin.
But they only worsen
The state that I'm in.

So I'll quit vocalising,
Take my bug-key in hand.
And prowl through the Hertz
At the foot of the band.

D Harris G4LSB

GREAT ASSISTANCE

David Lauder is to be congratulated on writing 'Filters and Ferrites in EMC' (*RadCom*, December '93 and January '94).

His explanation of Differential and Common Mode TVI as applied to the AKD range of filters will be of great assistance to many amateurs tackling this problem.

John Reid G2FKP

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. We reserve the right to edit letters for publication. All letters are acknowledged and may be passed to the relevant department or committee.

LOOKING FOR MR SHAW

I have been hoping all along to take over my grandfather's callsign which he last used in about 1929, although he lived into the 1960's. The trouble is, nobody in the family knows what his call was! Extensive enquiries have been made of local 'old timers' and other knowledgeable folk, including G2CVV and members of the 80m Old Timers' net, but so far without success.

His name was John W Shaw and he was Fire Chief at Baillie Street/Alfred Street, Rochdale, living on site at the fire station at the time. In the late 1920s he was responsible for the introduction of two-way radio between fire engines and base. His particular friends Arnold Whiteley, G6QA(?) and Bert Clare are now silent keys, and of all the local amateurs, the only one we can find who remembers him at all is Ted Scott, G3BN, who is no longer active on radio. It is possible that John W Shaw never held a 'G' callsign, which would probably signal the end of my quest, but I would dearly like to know.

If any members can throw light on this problem, I would be glad if they would write to G0MRL who is QTHR and will pass on any information. May I thank all those who have done their best to help unravel this mystery, and thank in advance the readers of *Radcom* for any future assistance.

Lynda Jopson G7PUS
PS I have now passed my Morse

KEEP HIGH STANDARDS

As a new member of the RSGB and potential 'ham' (Novice exam in three days time and looking to do the full RAE in May), I must add my tuppence-worth to the Morse debate (I missed the survey).

The difficulty of entering amateur radio, and particularly access to the HF bands should be at least maintained. Morse code may or may not be entirely relevant but it is a barrier to a free for all.

Having done a bit of listening on HF and VHF, it is obvious to me that operating procedures are almost universally adhered to.

A thing that is open to everyone without effort is worthless and soon becomes regarded as such. This is reflected in the arrogance and foul language that is CB today.

As a further example, the driving test is relatively easy to pass and driving has come to be looked on as a right and not a privilege. One only needs to venture on the roads to sample the selfish aggression and contempt for the *Highway Code* that is the norm for today.

I'm fleeing CB for the courtesy of amateur radio, so for my sake and for everyone else coming into the hobby, *please* keep it difficult to maintain the relatively high standards that are prevalent on the amateur bands.

S C Taylforth RS95547

ZERO INFLATION

The more I read the *Members Ads* section of *RadCom* the more mystified I become at the prices of second-hand transceivers – especially HF transceivers, and specifically, those manufactured between 10 and 20 years ago!

It seems to me that sellers' prices are not reflecting spares availability. and not only that, most want as much for their cast-offs now as what they cost originally! Are we all one strawberry short of a punnet for paying these crazy prices, or what?

What happens if the next owner were to keep his purchase for 5 or 10 years? So, perhaps the question we have to ask ourselves if we intend buying second-hand HF rigs is this: "What is the future fate of these transceivers?" mediocre receivers or doorstops? Probably the latter!

Ray J Howes G4OWY

CW ON FM RIGS

When I became licensed in 1988, I did what I would guess many newly-licensed hams do - I rushed out and bought a 2m FM mobile rig. However, 2m 'Funny-Mode' soon lost its appeal and I went QRT. Recently, over the last couple of years, I have become active on HF using CW. A ham friend has been trying to get me to try CW on 2m, but I'm not really interested in SSB and can't justify the purchase of a multi-mode 2m rig just to attain 2m CW capability.

The question is this: in these days where all 2m FM mobile rigs appear to be the same, why haven't the radio manufacturers tempted us 'CWers' by building FM rigs with CW capability? I'd be inclined to rush out and buy one of those.

Mark Davis G0KHB

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MISCELLANEOUS

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ADVERTISERS INDEX

NEXT COPY DATE

The display advertisement copy date for our April 1994 issue will be 9th February, 1994

ADVANCED HANDHELD TECHNOLOGY

IC-2GXE 2m FM
Handheld Transceiver

IC-T21 2m FM handheld
plus 70cm receive
IC-T41 70cm FM Handheld
plus 2m receive

IC-X21ET 70/23cm FM
Dual Band Handheld
IC-W21ET 2m/70cm FM
Dual Band Handheld

IC-2GXET 2m FM Keypad
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IC-ΔIE 2m/70/23cm FM
Tri Band Handheld

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"What a great price! Terrific features, high performance – and within my budget."

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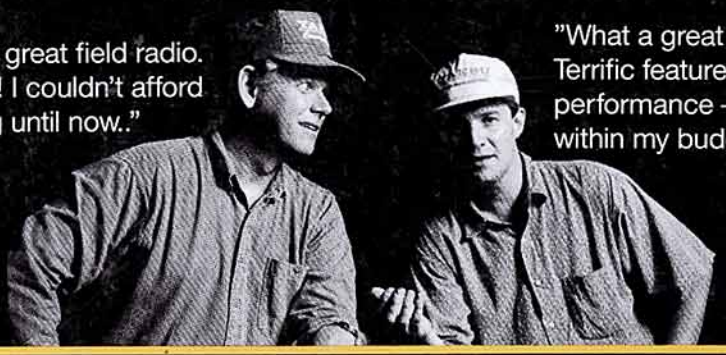

FT-840
Compact HF Transceiver

- Direct Digital Synthesis (DDS)
- Frequency coverage:
  RX: 100 kHz-30 MHz
  TX: 160-10 m
- IF Shift
- 100 Memory Channels (Independent TX/RX per memory)
- Twin Band Stacking VFOs
- FM Repeater Operation Automatic 10-Meter Repeater Offset w/Selectable CTCSS Encode
- CW Reverse Feature
- Choice of Two Optional Antenna Tuners:
  FC-10 Matching External Antenna Tuner
  FC-800 External Remote Antenna Tuner
- **Accessories:** Contact your Dealer for full details.

It's a small price to pay for such a wealth of features.

If you're trading up from an older rig, but have a budget, you want the most you can afford in top-notch HF. Then the FT-840 is for you. It's right on the money! Considering a mobile HF or field radio and doubt the quality and features of tiny HF rigs? Then the FT-840 is for you. It won't disappoint you!

Built to handle rigorous field operation, the new intense LCD display affords sharp visibility in bright sunlight. Die-cast heat sink and internal thermally switched fan keep the FT-840 running cool. Modular design circuit boards ensure operating efficiency – manufacturing excellence you'd expect in much higher priced radios.

For high performance, the FT-840 features a low noise front end that uses the latest in FET RF amplifier design. Two DDSs and magnetic encoder for silent, smooth tuning and fast switching. Twin band-stacking VFOs. And, automatic 10-m FM repeater offset with selectable CTCSS. Even two optional external antenna tuners to customize your rig.

Top of the line quality and features at a remarkably low price. Just what you'd expect from Yaesu! For high-tech performance, and a wealth of features that won't break your budget ask your dealer about the FT-840.

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Performance without compromise.℠

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.