Radio Communication

The Journal of the Radio Society of Great Britain

April 1991

Volume 67 No 4. Price: £3.50

THE VOICE OF AMATEUR RADIO FOR 78 YEARS

Are you going to the NEC?
Did you buy a lottery ticket?
Will YOU be driving this car home?

The review said it all

"What a lovely transceiver" said Chris Lorek when he reviewed the TS-850S recently. He wasn't just talking about its appearance, he was referring to the obvious lead in performance which is evident when you use a TS-850S for the first time and the supreme ease of use which is one of the hallmarks of Kenwood design.

Intended to fit the market between the TS-440S and the TS-950S, the TS-850S is another landmark in top performance transceivers for the operator who knows what he wants and can appreciate the real performance advantages which come from owning Kenwood equipment.

In a major new transceiver there are so many features and subtle details of operating convenience that it is quite impossible to describe them in a few words. Suffice to say that 1Hz tuning rates from an advanced DDS driven synthesiser and a +24dBm intercept point will give you a flavour of receiver performance, whilst a transmit output power of 100W and an optional Digital Signalling Processor (DSP) will put you in top place on the bands.

New Product Information sheets are available on request and of course the TS-850S will be on show at your nearest Kenwood Approved Dealer. We are happy to talk about and demonstrate why we sincerely believe that the TS-850S will satisfy your operating needs, whether these are keeping in touch with friends on 80 or chasing some rare DX on 20.

The TS-850S; Kenwood have taken you another step forward. See it soon.

John Wilson G3PCY

TS-850S £1,295.00
AT-850 Auto ATU £144.82

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Radio Communication

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NEWS AND REPORTS

TECHNICAL FEATURES

COVER PICTURE:

This shiny new Ford Fiesta could be yours for one pound! And you could be helping recruit young people into amateur radio.

See pages 8 and 9.

REGULAR ARTICLES

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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

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UK associate member under 18: £12.75. Family member: £11.95
UK students over 18 and under 25: £19.20 (Applications should give applicant's age at last renewal date and include evidence of student status)
Novice Member: £11.95. Affiliated club or society/registered group (UK): £30.00 (including *Radio Communication*): **£17.95** (excluding *Radio Communication*) (Subscriptions include VAT where applicable)

Membership application forms available from RSGB HQ

From the Secretary's Office

DX CLUSTERS

FOR SEVERAL DECADES, groups of keen DXers have been alerting each other to rare DX stations operating on the HF bands. Traditionally this has been done on phone on a convenient VHF band, usually with omni-directional antennas so that hopefully everyone could hear each other.

Just over a year ago, modern technology started to take over when the first experimental (attended) DX Cluster node was put on the air by Ian Shepherd, G4LJF. Many more nodes have since joined the Cluster, and a national network is now beyond the embryo stage.

To understand the operation of the UK DX Cluster system, some of the jargon needs to be explained. The Cluster itself consists of a number of computers spread around the UK linked together by digital radio using AX25 (packet radio). Each computer in the Cluster is referred to as a 'node' and each node (at present) can support up to 32 end users, all connected at the same time.

When one DXer spots a DX station, he types its frequency and callsign a computer terminal which in turn sends the information to the node. At present all of the DX Clusters operate on 70.325 MHz, though this frequency is beginning to get very crowded. The node sends a message to all the other users connected to the node; it also tells its nearest neighbour node and, by this means, all the users from Kent to Cornwall to Yorkshire receive the DX 'spots', usually within a few minutes. Potentially a very large number of stations can connect to the Cluster at once. Another advantage of the Cluster is that you only have to beam at the node to be able to communicate with all the other users.

The sharing of DX information is in the very best spirit of amateur radio. Indeed, you frequently hear users calling the DX station *after* they have alerted the other users; a very sporting gesture. Of course, as with practically every other aspect of amateur radio, if this type of operating is not for you then you are free to leave it alone.

It is worth mentioning some of the many other facilities that the Cluster has to offer. You can send brief messages in real time to any station connected to your local node or any other node. You can also send messages to other Cluster users BBS style, but you are encouraged to keep such messages brief. There is far more: each node acts as a database providing a host of information from prefixes to QSL information, from propagation to bearing and distance advice.

It is not only HF enthusiasts who are using the Cluster network. VHF operators have been alerting other users to VHF openings, and Microwavers are intending to use the network this Summer to arrange tests.

There are currently eight Cluster nodes in the UK located at: Nottingham - GB7BPQ; Cheltenham, Glos - GB7DXC; Wokingham, Berks - GB7DXI; Ansty, Sussex - GB7DXS; Hemel Hempstead, Herts - GB7DXH; Chandlers Ford, Hants - GB7SMC; Crediton, Devon - GB7WDX and Wetherby, Yorks - GB7YDX. New nodes are currently planned for central London and Cambridge.

Clusters represent another of the myriad of facets within amateur radio and, as technology expands horizons within the service, are well worth a try. Good DX.

David Evans, G3OUF

NEWS & REPORTS

The first day of the RSGB NEC91 show, Saturday 27 April, sees a double celebration.

HQ News

MEMBERS WILL have now had a chance to digest the accounts for the half-year to 31 December 1990 published last month. I have had one or two queries which need an explanation.

The Annual Meeting did not eventually cost £10,408, as reported in these accounts. To produce half-year accounts promptly for reporting in *RadCom*, I have to make provision for expenditure which has been incurred, but for which precise amounts are not known. I based my provision for the AGM on the previous year's meeting which included that year's Presidential Installation. As a result, I over-provided by £4,912, leaving an actual cost of £5,496. Committee, Regional and Council meetings include the cost of the 29 separate committees, their members' travelling expenses and venue costs. A budget is decided at the beginning of each year and the chairman of each committee is charged with keeping his expenditure within that budget. Credit card charges are those incurred for the processing of those receipts that come in from credit card users.

To continue the financial theme, Council has appointed a new Honorary Treasurer, Peter Tucker, FCA, ATII, who will further strengthen the financial management of the Society's affairs.

The role of Secretary, which has previously encompassed several roles, has now been rationalised. David Evans will concentrate his energies as The Secretary, Amateur Radio. To discharge the legal and administrative responsibilities of the Society, Council has appointed John Hall, OBE, G3KVA, as Company Secretary. John has many years of experience in administration at a high level and will help substantially with my objective of improving the efficiency and response time of HQ.

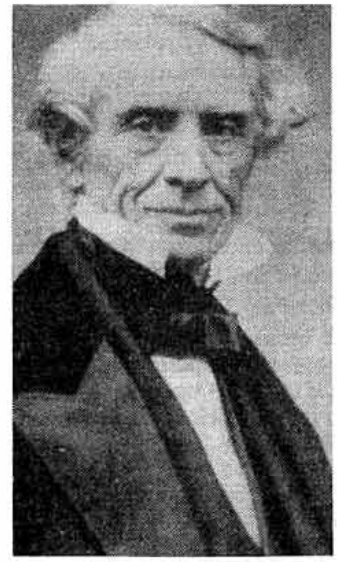
We are rapidly approaching NEC Exhibition time and much effort is going towards making it a really exciting show this year, despite the recession. Most Council members will be there to talk to members, and senior members of Headquarters staff will be in attendance to answer questions and help man the stands. Most of this effort is voluntary and will not cost the Society overtime payments. This demonstrates our tremendous enthusiasm and commitment to set the RSGB back on the road to surplus. On a final cheerful note, my negotiations with the Customs & Excise have borne fruit to the extent that the deemed VAT content of the Subscription has been reduced substantially. This will provide a benefit to the Society in a full year of approximately £50,000. A claim has been made in respect of previous years which is being considered by Customs & Excise as I write. I will report on developments next month.

Philip Smith
General Manager

Marconi and Morse

TWO HUNDRED years ago on 27 April, Samuel Finley Breese Morse was born. The inventor of the code still widely used in both amateur and commercial circles was born in Massachusets in 1991 and died in 1872. He was a pioneer in electromagnetic telegraphy - by wire as he was a little early for radio.

The 27th is also International Marconi Day. Born in Bologna in 1874, Marconi (who later became an RSGB member) established wireless communication over more than a mile in 1895. He proved radio could follow the curvature of the earth by spanning the Atlantic from Poldhu, Cornwall, in 1901 and establishing communication with Australia in 1918. Marconi, who was arguably the first radio amateur, was awarded the Nobel Prize for Physics.



Both occasions are marked by special events and special stations, see this month's *HF News* and *SWL News* for details.

New Reciprocals

RECIPROCAL LICENSING agreements have been reached between the UK Government and the governments of Kenya and Vanuatu. In each country, there is only one type of licence, equivalent to our Class A.

Cheshire RLO

FEBRUARY'S *RADCOM* gave incorrect details of the RLO for Cheshire. Correct information is:- Dave Glover, G1VJP, 216 Alder Street, Newton-Le-Willows, Merseyside, WA12 8HS. Tel 0925 225445. Apologies to Mr Glover for any inconvenience caused.

Repeater charges

THERE IS A LIVELY discussion going on regarding the Society starting to recover from repeater groups a percentage of the cost of maintaining the national repeater network. A full explanation of the costs involved and the reason for making the chanrge will appear in *RadCom* as soon as space permits.

AGM Report

WE REGRET THAT space does not permit publication this month of the second part of our report on last December's RSGB Annual Meeting.

ARDF Championships

THE FIFTH Amateur Radio Direction Finding (ARDF) World Championships took place last September in Strbske Pleso, Czechoslovakia. The event was organised by the national society, CRCC.

236 Competitors from 19 national societies from IARU Regions I and III participated. For the first time, the RSGB was represented - by G8UKT who competed in the old timers category.

The top three in all 16 categories came from only seven countries: Korea, China, the Soviet Union, Bulgaria, Czechoslovakia, Switzerland and Hungary.

More RSGB Successes

Do you remember our headline last September ?

Now turn to page six . . . .

Remember . . . . you saw it **first** in *Radio Communication*.

NEWS & REPORTS

400W CW to be permitted on HF bands

There is an anomoly whereby ... her power is permitted on SSB ... is measured in peak ... power output, than on ... ner power is used. ... dBW (400W) ... respectively. ... hat this ... be rectified when the major licence revision took place two years ago, but it could not be approved at the time. Following further representations from the Society, the Radiocommunications Agency acknowledges that the anomoly exists and is hopeful that the higher power can be made available to CW operators shortly. This really is good news for HF CW operators, bringing UK licence conditions into line with those in many other countries.

VLF possible

...dio amateurs may soon be ... experimental work at Very ...uencies (VLF). The ...long sought an ... fascinating part ... at a recent ... was ...iment.

Vertical on six

To avoid possible interference to a vertically polarised Belgian Band I TV station, horizontal polarisation was a condition of allocating the 50MHz band to UK amateurs. Now that this TV station is no longer significant, the Radiocommunications Agency expects to permit the use of vertical polarisation by amateurs later this year. It is ...s likely that mobile operation ...ermitted, including the ...d portables. This will ... use of 6m for the ...ets which ... space on ... will be

UK Licence Changes Effective 5 April 1991

WE UNDERSTAND that a Gazette notice is to be published by the Radiocommunications Agency which will further enhance the conditions of the UK Amateur Radio Licences (A) and (B).

This is in response to proposals put to the RA by the RSGB over a considerable period of time. Many of the changes were detailed in *RadCom* last September when the RA agreed them in principle.

The main improvements are:

- **Clarifies the position of messages sent to packet radio Mailboxes.**
- **Increases the power available to CW operators to that in the old 'PEP' column,** ie 15dBW on the 1.8MHz band, 26dBW on the bands 3.5 - 28MHz inc, 20dBW on 50-52MHz, 22dBW on the 70MHz band, 26dBW on the 144MHz band, 16dBW on 430-432MHz, and 26dBW on the bands 432MHz and up. SSB power is not affected.
- **Clarifies identification requirements for net operation**
- **Permits vertical polarization on the 50-52MHz band**
- **Permits mobile operation on the 50-52MHz band**

The Gazette notice is expected to read as follows:-

The Secretary of State gives notice pursuant to subsection 1(4) of the Wireless Telegraphy Act 1949 to all those who are licensed under Amateur Radio Licence (A) or (B) which have been issued and remain in force, that, from 5 April 1991, each of such licences shall be varied so as to read as follows::-

1. Sub-clause 1(7) shall be deleted and replaced with the following:

1. (7) The Licensee may send Messages to individual amateurs but shall not send Messages (whether directly or for onwards transmission by another station) for general reception by licensed amateurs other than:

(a) initial calls; or

(b) to groups of licensed amateurs as long as communication is first established separately with at least one licensed amateur in any such group; or

(c) to licensed amateurs who participate within a net and subject to the identification requirements provided for in sub-clause 7(1a) below; or

(d) messages transmitted via a mailbox or bulletin board for reception by all or any licensed amateurs who have the facility to transmit and receive RTTY or Data Transmissions.

2. In sub-clause 2(1)(b) the words "and fifth columns" shall be deleted and the word "column" substituted.

3. In sub-clause 2(1)(c) the word "sixth" shall be deleted and the word "fifth" substituted.

4. In sub-clauses 2(4)(a)(i); 2(4)(a)(ii); 2(4)(b); 2(4)(c)(i); and 2(4)(c)(iii) delete the words "carrier or".

5. Sub-clause 2(7)(b) and 2(7)(c) shall be deleted and the following sub-clause substituted:

2(7)(b) with a peak power level which exceeds the Peak Envelope Power (PEP) level specified in the fourth column of the Schedule.

6. In sub-clause 2(9)(c) the words "Marine and" shall be deleted and the word and symbols "Marine, &c, " substituted.

7. In sub-clause 7(1), there shall be inserted at the beginning thereof, the words "Subject to sub-clause (1A) below".

8. After clause 7(1), there shall be inserted the following sub-clause:

7(1A) Where the Licensee is intending to operate within a net pursuant to subclause 1(7)(c), the Licensee shall observe the following requirements in relation to the transmission of his call sign:

(a) he shall transmit his call sign when he first joins the net and on leaving it;

(b) subject to sub-clause 7(c) below, whilst participating in the net, he shall not be obliged to transmit his call sign when making contact with other participants;

(c) whilst participating in the net, he shall transmit his call sign;

(i) when 15 minutes have elapsed since the last transmission of his call sign; or

(ii) if he has not transmitted speech before 15 minutes have elapsed since such transmission, on the first occasion thereafter on which he transmits speech.

9. Column four of the Schedule shall be deleted and column five renumbered as column four and column six renumbered as column five.

10. In the Schedule, the entries for column two for frequency bands 50.00 - 51.00MHz and 51.00 - 52.00MHz, delete the following words:

"with horizontal polarisation only" and

"Mobile or"

11. Note (a) in the Notes to the Schedule shall be deleted and the following note substituted:

(a) Maximum Power refers to the rf power supplied to the antenna. Maximum power levels will be specified by the peak envelope power (pep).

12. Notes (e)(i) and (e)(iv) in the Notes to the Schedule shall be deleted and note (e)(ii) renumbered (e)(i): note (e)(iii) renumbered (e)(ii); and (e)(v) renumbered (e)(iii).

Licence Fee

The fees for the Amateur radio Licences A and B have been at £12 for several years. A proposal to raise the fee to £15 from 1 April is awaiting Parliamentary approval at the time of writing. This is normally a formaility.

Propagation Committee Vacancies

THE PROPAGATION STUDIES Committee has two vacancies for Full members. Anyone interested is invited to apply.

Applicants should give details of their qualifications experience and interests. The successful candidate would be expected to participate in the developing programme of PSC research, or suggest a project of his own; to attend conventions on behalf of the committee; and to attend committee meetings, usually held in London five times per year. One of the accepted candidates must also be prepared to act as Minutes Secretary.

Write to: Chairman PSC, Geoff Grayer, G3NAQ, QTHR.

VK3 QSLs

A LETTER HAS BEEN published in some UK amateur radio magazines suggesting that there is something wrong with the QSL Bureau for the VK3 district run by the Wireless Institute of Australia. The same letter was sent to *RadCom* but, on checking with our sister radio society the WIA, we were immediately assured that the bureau was working fine and that the letter was completely inaccurate.

A WIA official statement says: "All amateurs are assured that the WIA Victorian Division Inwards QSL Bureau is operating efficiently within IARU guidelines. Cards for both members and non members are accepted."

GB2RS on Six

RSGB's NEWS service, GB2RS, is read each week by a nationwide network of volunteers on a number of frequencies and modes.

From 7 April, transmissions will commence on the six metre band. The following will transmit on 51.530MHz at the same time as their existing news transmission (144MHz or 3.5MHz):- GM0ILB, GM0JKF, GM1YZW, GM3JIJ, GM4ILS, GM4PLI, GJ0JSY, GU0ELF, GU1HTY, GI4AHD, GI8AYZ, G1DWA, G2HDR, G3LEQ, G3MEH, G3NPB, G3SMT, G3SPX, G4AFJ, G4LAA, G4RKK, G4XBT, G6HZV, G6NB, G8BQH, G8CKN, G8LVC, and G8SC. The callsign GB2RS will be used.

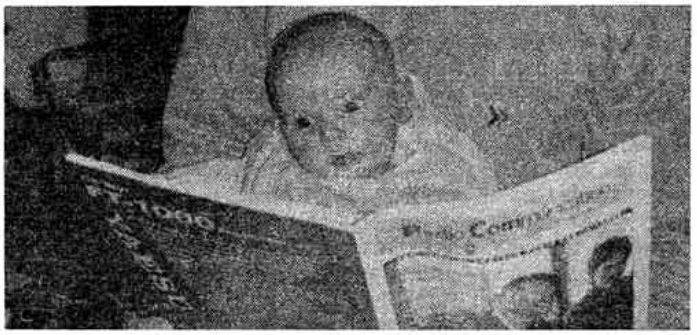
Stolen

From Milton Keynes, late January:- Trio TS-830S, s/n 4040242; Kenwood VFO 240; s/n 1100086; Kenpro KR400 s/n SFC291 and several other items. Contact G4DRS, Biggleswade Police on 0767 312222, or any police station if you have information on this equipment.

A Starphone receiver AOR2002 s/n 09423 was stolen from Derby between 23 and 24 Feb. Anyone with information should contact John Arnold, G4NPH, on 0353 741354.

Landline to Christian Amateurs

Affiliated Society, World Association of Christian Radio Amateurs and Listeners, reports a lively response on the nets following our news story (page 6, March). However, their Membership Secretary, Derek Chivers, G3XNX, has pointed out that his address 'fell off' the end of the article. Our apologies. G3XNX is at 51 Alma Road, Brixham, TQ5 8QR; tel 0804 54504.



Pictured seated on the lap of Bob, G6ERI, three month old Rebecca Short is probably *RadCom's* youngest 'reader'. Rebecca, daughter of Mary, G7CMS, and John, G8OQN, obviously couldn't wait to find out details of the Novice Licence. She is frequently heard on the air, usually signalling a rapid end to her Mum or Dad's conversation.

Radio Amateurs to the Rescue

'DRAMA AT SEA - Couple rescued from sinking yacht' ran the headline in the Cape Times of 3 Jan 1991. This told the story of a Danish couple, Michele and Suzanne Debie, who owe their lives not only to the professional rescue service but also to the alertness of Alistair Campbell, ZS5MU, and Roz Nelson, ZS1JS.

Roz herself takes up the story in a letter to *RadCom* sent via RAIBC President Johnny Clinch CBE, G3MJK:-

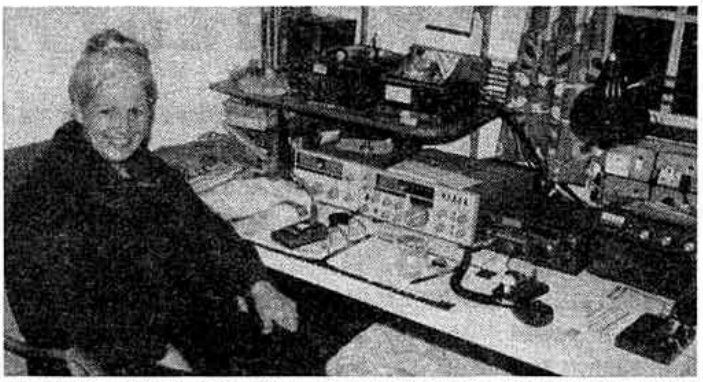
"When I joined the Durban Maritime Net as a relay station, I never dreamed of hearing a 'Mayday' call. That sort of thing is reserved for Tony Hancock with a broken pencil and no change for the electricity meter. But on 1 January 1991 it happened - what a way to start the New Year!

"The 1130Z session of the 14,316MHz net is controlled by ZS5MU, Alistair Campbell, from Umzumbe, 60 miles south of Durban. I was having a chat with ZS2SM, ZS4CB and Alistair, when a lady's voice broke in with 'Emergency, Emergency'.

"Alistair responded and she told him their yacht had been knocked down three times and rolled 360° once; they were taking water and their position was 38°11'S and 30°45'E. As her signal was 57 with me, Alistair asked me to take over. She told me her name was Suzanne, and the yacht was the Danish registered *Scoop* en route from Cape Town to Australia, with Suzanne and her husband, Michele aboard. Michele had sustained a minor head wound, but apart from that they were both well. "Their plan was to find the leak and then run to the nearest port, and we were asked to keep a listening watch on the frequency in case they needed further assistance. This I readily agreed to and Suzanne signed clear. In the meantime, Alistair had been on the telephone to the Durban Port Authorities to report the emergency call.

"The position given put the *Scoop* approximately 360 miles SE of Port Elizabeth, and Alistair was asked to notify Port Elizabeth should we receive another call from the yacht.

"Back on 14MHz, we chatted and we waited, and waited and chatted. Then at 1340Z: 'Mayday, Mayday, Mayday'. Alistair said 'Take it Roz, I can't hear her'. My stomach felt somewhere down around my boots and I was shaking, but as soon as I started talking I was OK.



Roz Nelson, ZS1JS, who used amateur radio to save the lives of a couple shipwrecked 360 miles from the nearest land.

"Suzanne gave me their present position and said the yacht was very low in the water; the water was up to the batteries and they were taking to the life raft. She confirmed they had an Emergency Position Indicating Radio Beacon on 121.5MHz, and they were abandoning *Scoop*.

"She said 'I have to go now, goodbye'. I said goodbye and wished her luck, the radio went silent and I had a feeling of complete inadequacy. I felt terrible, Suzanne and Michele were climbing into a rubber liferaft, 360 miles from the nearest land in a raging gale and all I could do was wish them 'Good Luck'.

"By this time, Alistair was on the telephone to Port Elizabeth Port Captain and had passed on all the relevant information.

"The amateur radio part of the drama had now come to an end but, of course, the rescue operation was just beginning. Search and Rescue operations are coordinated by the South African Navy and Port Elizabeth passed on all relevant information to them. Within an hour of the Mayday being reported, the deep-sea Salvage Tug the *Jon Ross* left Port Elizabeth, steaming at 20 knots, and expecting to reach the search area in 17 hours. Hercules C130 aircraft would be despatched to the area to begin the search at first light.

"The signal from the beacon was heard and the liferaft sighted at approximately 1300Z on 2 January, and Suzanne and Michele were picked up by the *Jon Ross*. They arrived back in Port Elizabeth early afternoon on 3 January, in good spirits and physically none the worse for their experience.

"Both Alistair and I received 'thank you' telephone calls from Suzanne and gleaned the following information.

"Suzanne and Michele were told of our net whilst in South America, and had been regular listeners during their trip across the Atlantic to Cape Town. Their yacht *Scoop* was a 40ft Beneteau, equipped with Satnav and all modern conveniences for comfortable and safe cruising. They left Cape Town on 26 December, bound for Melbourne and, when they called 'Emergency', had been hand steering in 50-60 knot WSW winds for 48 hours.

"The sea that rolled them over they estimated to be 25m high. During the roll, the pressure cooker had slammed into the radio severely damaging it. Michele had worked on the radio for one-and-a-half hours using copious quantities of sticky tape and string. They first called on all marine bands and received no reply and then, knowing it was during our net time, turned to 14,316MHz - eureka! - the radio was working.

"During the knock-downs and roll, the yacht took on a lot of water. When Suzanne called 'Mayday' the water was almost at the top of their last battery and she said she was terrified she would not be able to get out of the water-filled cabin.

"When the life-raft was spotted, they were just 25 nautical miles from the position given. The radio beacon was their saving grace as they were well off the normal shipping lanes and the next stop was Antarctica to the south, South America to the west and Australia to the east.

"On the amateur radio side, many were listening and heard the Mayday, but thanks to good discipline and training, everyone just listened and waited. I waited for Alistair, as net control, to pick up the call; when he could not, he handed over to someone he knew could copy the signal. If I had needed assistance I knew it would be there and waiting for the call."

The last words go to Suzanne Debie: "The real heroes of the story - the ones who saved our lives - are Alistair and Roz".

Going to the NEC? Staying overnight? Turn to page 10 for a booking form.

Gulf Support

THE SOCIETY recently sent the following letter to the Royal Air Force Amateur Radio Society, The Royal Signals ARS and the Royal Naval ARS:-

At the recent RSGB Council meeting, I was asked to write to express our hopes for the success and safety of those of your members currently on active service on behalf of the forces in the Gulf.

Radio amateurs have always played their part in providing appropriate technical support to the armed forces, and I am confident that those amateurs involved will give of their best, unstintingly, until peace and justice prevail.

Please convey to your members the best wishes and hopes for their safety and well being from the RSGB.

John Case, GW4HWR, President.

WAB Contests

THIS YEAR'S events are as follows: LF phone, 19 May 0900-1800GMT; 70MHz phone, 9 Jun 1400-1800; 144MHz Phone QRP, 30 Jun 0900-1700; 144MHz phone, 15 Sep 0900-1700; 50MHz Phone, 6 Oct 1200-1800; LF CW, 3 Nov 1400-1700; HF phone, 30 Nov-1 Dec 1200-1200. Further info: G4SKQ, QTHR.

Ham Radio Today

UNDER ITS new Editor, Sheila Lorek, G8IYA, *HRT* is actively supporting RSGB's Project YEAR initiative. In a number of positive articles, *HRT* has praised the RSGB video *Amateur Radio for Beginners* and is ready to cater for newcomers to our hobby. A particular speciality is identifying low-cost routes into amateur radio.

Next Month's *RadCom*

will be **extra** special:-

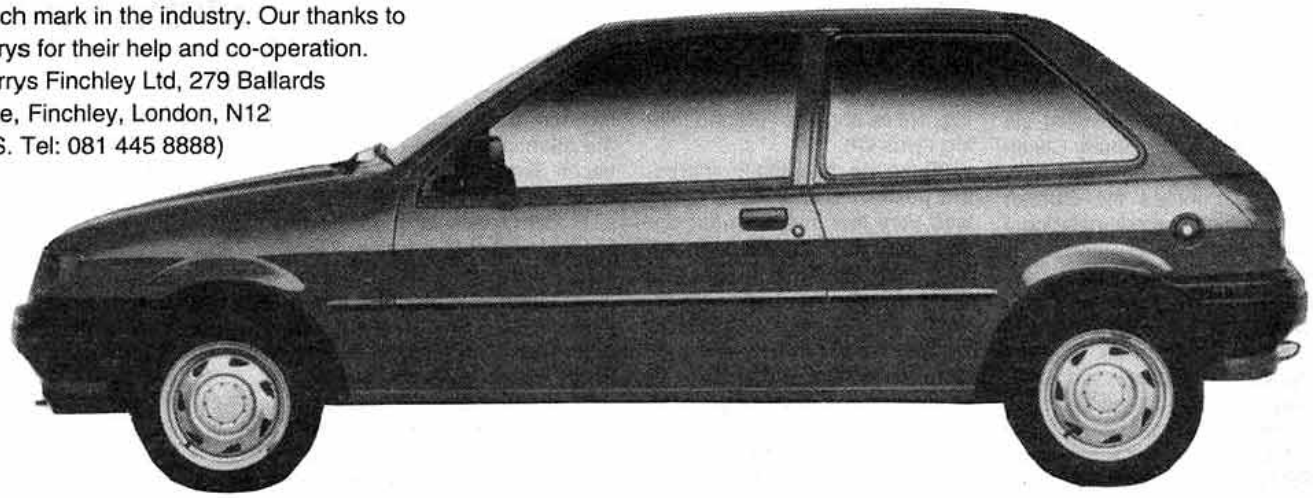
- Better quality paper
- Better printing
- A colour section
- Launch of a new magazine
- Featuring Kits, the Novice Licence, Direction Finding and the first UK amateur in space.

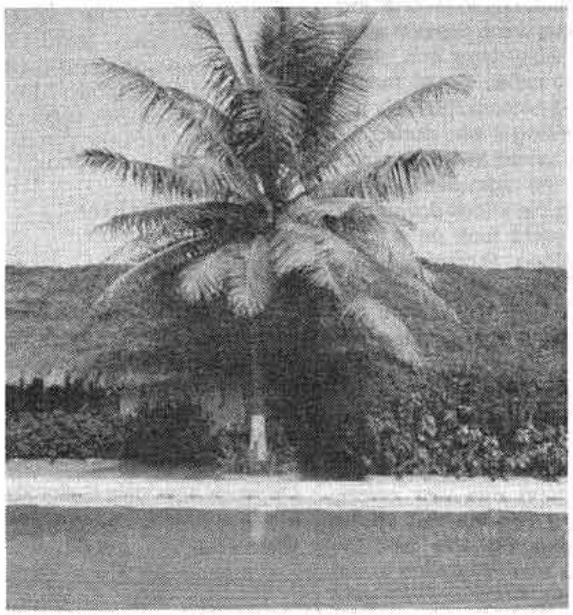
RSGB PROJECT YEAR LOTTERY 1991

The 1991 lottery has been run in order to raise much needed funds for Project YEAR and the promotion of the Novice Licence.

The RSGB has, itself, provided some very fine prizes for this lottery and we have been very lucky in obtaining support from some of our advertisers for the rest. Full details of prizes are as follows:

● **1ST PRIZE - A BRAND NEW FORD FIESTA POPULAR PLUS**, supplied by Perrys of Finchley, at a very competitive price. The Perry Group of Companies has been selling, servicing and generally taking care of motor vehicles since just after the turn of the century, and their reputation for quality and care has, over the years, been regarded as a bench mark in the industry. Our thanks to Perrys for their help and co-operation. (Perrys Finchley Ltd, 279 Ballards Lane, Finchley, London, N12 8NS. Tel: 081 445 8888)





● **2ND PRIZE - ONE WEEK'S EXOTIC HOLIDAY FOR TWO IN THE GAMBIA (C5).** The lucky winner will spend one week at "Bunkoyo" The Gambian Radio Guest House, which is situated a short stroll from the beach, as guests of Ernie (C53GS) and Anna Sumption. However if the winner is not a radio amateur then it certainly doesn't matter as the Guest House caters for both amateurs and non-amateurs. We would refer readers to our very successful Gambia Competition in June 1989 Radio Communication, where this location was featured. Serenity Holidays (The Gambia Experience) have generously agreed to donate the accommodation expenses, and RSGB will pay for the air tickets. Enquiries for this and other holidays in The Gambia to: The Gambia Experience, Serenity Holidays Ltd, 17 Bell Street, Romsey, Hampshire, SO51 8GY (tel: 0794 514646).

● **3RD PRIZE - AMSTRAD VIDEO/TV OR EQUIVALENT**

● **THE PRIZE TO THE SELLER OF THE HIGHEST NUMBER OF TICKETS** will receive a Kenwood TM-241E 2m 50W Mobile Transceiver. Kenwood's latest 2m transceiver packs a mightly punch, yet it is a compact size and a real lightweight. Featuring switchable power levels, tone alert, a 'time-out' timer, 21 memory channels and multi-function scanning. Recommended price is £289. Our sincere thanks to Lowe Electronics for their superb prize!

● **THE SELLER OF THE WINNING TICKET** will receive a Kenpro KT22E 2m Handheld Transceiver, complete with nicad charger, fully synthesized vfo, thumbwheel turning with 10MHz cover on receive, tone burst and repeater shift. Worth £139, we are indebted to ARE Communications for this splendid offering.

Runners up prizes include:

- **Chrome on marble base pump key:** G4ZPY Paddle Keys International have presented a magnificent pump key, a truly precision instrument for the CW fans. Many thanks to Gordon Crowhurst, G4ZPY, for this excellent donation.
- **Morse Tutor:** Datong Electronics Ltd have most generously donated one of their ever popular morse tutors recognised as an invaluable aid to aspiring licensees.
- **QRP SWR Meter:** Lake Electronics Ltd have kindly provided one of their QRP SWR meters, sensitive at a 1/2W from 1-30MHz.
- **Mobile Operator's Microphone:** Heatherlite Communications Ltd have come up trumps with one of their new world-famous mobile operator's microphones.
- **Pocket size Digital Multimeter:** Cirkit Distribution Ltd are to give a pocket size digital multimeter, the popular TM5315B with AC & DC voltage ranges. DE up to 10A . R to 2000Mohms and a diode test facility.
- **Soldering Kit:** Antex Electronics Ltd have sent in one of their 240v/25W soldering kits, containing their latest iron and a spring stand.
- **Barker & Williamson 2m Band Pass Filter:** RF Engineering Ltd have donated this filter, conservatively rated at 200W continuous, or 300W PEP.

Again, our grateful thanks to all these companies for their support and generosity.

MAKE SURE YOU VISIT THE RSGB BOOK STAND AND BUY YOUR TICKETS ANY TIME UP UNTIL 6PM ON SATURDAY 27 APRIL.

DRAW TAKES PLACE 3.30PM SUNDAY 28TH APRIL

The draw will be made by Jim Bacon, G3YLA, star of the RSGB Project YEAR video *Amateur Radio for Beginners*. Jim is probably better known to people as the Anglia TV "Weatherman", and we are very grateful for his help and co-operation in this Project YEAR venture.

The Master of Ceremonies at this event will be Ron Broadbent, G3AAJ, of AMSAT-UK.

APPLICATION FORM

I enclose a cheque/PO for £.....

to cover the cost of ..... books of raffle tickets at £5 per book, or please charge to my credit account below

VISA/ACCESS/RSGB CREDIT CARD

EXPIRY DATE

CARD NO.

Name ..... Call Sign: .....

Address: .....

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..... Post Code: .....

Signed: ..... Date: .....

Please fill in this section and return also, but *DO NOT* detach from the application form

Call Sign:

Number of tickets purchased:

.....

Value £ .....

RADIO SOCIETY OF GREAT BRITAIN AT THE NEC, BIRMINGHAM ON 27/28 APRIL, 1991

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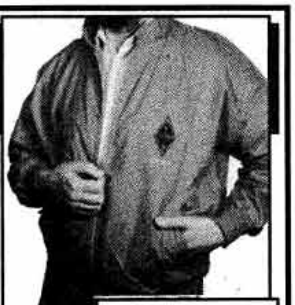

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EMBROIDERY STUDIO
TOP MARQUES

RSGB LOTTERY

It has been brought to our notice that somebody has been selling tickets issued for the previous lottery in 1988, and stubs have been received here at RSGB HQ recently. Anyone identified as being guilty of this fraudulent act will be prosecuted, and we urge members to check their tickets are dated correctly at the bottom of the ticket to the effect that the "draw takes place 28 April 1991".

It is VITAL that you send back the ticket stubs, even if you have purchased the tickets for yourself. The address is:

'Lottery', RSGB, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE.

Do you have a query? Do you want an expert answer?

If so, here's who to contact:

Who do you contact for an answer? In most cases there is no need to consult anyone, as 90% of the answers to your questions are to be found in the 130 page Information Directory which forms part of the *RSGB Call Book*

However, if you feel a letter is the only way to get a definitive answer, are you writing to the best person? To ensure an expert response, we suggest you contact one of the following:-

• General advice and details on local clubs, or don't know who to contact:-

Your RSGB Liaison Officer. See the *RSGB Call Book* , Jan/Feb *RadCom* or your membership card.

• RSGB Policy Matters (Zonal Council member):-

Zone A (North of England):

Geoff Smith, G4AJJ, 'Greenacres', Sawdon, Scarborough, North Yorks, YO13 9DY. Tel: 0723-859845.

Zone B (Midlands):

John Allen, G3DOT, 4 Philip Avenue, Waltham, S.Humberside, DN37 0QD. Tel: 0472-825899.

Zone C (SE England and East Anglia):

John Greenwell, G3AEZ, 'Eastfield', Henfold Lane, Beare Green, Dorking, Surrey, RH5 4RW. Tel: 0306-77236.

Zone D (SW England):

Peter Chadwick, G3RZP, 'Three Oaks', Braydon, Swindon, Wilts, SN5 0AD. Tel: 0666-860423.

Zone E (Wales):

Clive N Trotman, GW4YKL, 19 Park View, Dolau, Llanharan, Pontyclun, Mid Glamorgan. CF7 9RZ. Tel: 0443-226198.

Zone F (Northern Ireland):

Terry Barnes, GI3USS, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Tel: 0247-473948.

Zone G (Scotland):

Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire., ML6 0QG. Tel: 0236-65937.

• Antenna Planning:

Need for permission and how to apply - booklet free to members from Membership Services at RSGB HQ.

Planning application refused - RSGB Planning Panel, via RSGB HQ.

• Awards:

For contest award winners, please refer to the appropriate contest committee.

For other awards, enquiries and applications go to either:

HF Awards Manager - Steve Emlyn-Jones, GW4BKG, P O Box 20, Bridgend, Mid Glamorgan, CF35

IOTA (Islands on the Air) Awards Manager - Roger Balister, G3KMA, La Quinta, Mimbridge, Chobham, Woking, Surrey, GU24 8AR.

VHF and Microwave Awards Manager - Ian Cornes, G4OUT, 6 Haywood Heights, Little Haywood, Stafford, ST18 0UR

• Band Plans and operating practices:

See the *RSGB Call-book* or March 91 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum committee chairman:

HF - Dr Bob Whelan, G3PJT, 36 Green End, Comberton, Cambridge, CB3 7DY.

VHF - Peter Burden, G3UBX, 2 Links Rd, Penn, Wolverhampton, WV4 5RF.

Microwave - Mike Dixon, G3PFR, Woodstock, Gazebank, Norley, Warrington, WA6 8LL.

• Beacons:

HF - Alan Taylor, G3DME, QTHR.

VHF - John Wilson, G3UUT, QTHR.

Microwave - 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 - Dave Lawley, G4BUO, QTHR.

VHF Contest Committee - Bryn Llewellyn, G4DEZ, 110 South Avenue, Southend-on-Sea, Essex, SS2 4HU. Home: 0702-460747.

Direction Finding Committee - Brian Bristow, G4KBB, QTHR.

• EMC:

Advice on solving breakthrough and other electromagnetic compatibility matters:

EMC Co-ordinator (see Feb 91 *RadCom* page 55)

Committee Chairman: Bob Peace, G8SOZ.

National helpline: 0537-593449.

• Exhibition & Rally Committee:

Organises trade shows at NEC, VHF Convention and Woburn Rally.

Chairman: Norman Miller, G3MVV, 'Avon', Gardiners Lane, Crays Hill, Billericay, Essex, CM11 2XA.

• Intruder Watch:

Non-amateur service operation in exclusive amateur radio bands.

Acting Co-ordinator - Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge, CB4 1SQ

• Licensing:

RSGB Policy - John Bazley, G3HCT, 'Brooklands', Ullenhall, Solihull, Warwickshire, B95 5NW

Government policy/licence conditions and interpretations - Amateur Radio Section, Room 613, Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London, SE1 8UA. Tel: 071 215 2316.

Renewals and payments - Radio Amateur Licensing Unit, Post Office Counters Ltd, Chetwynd House, Chesterfield, Derbyshire, S49 1PF. Tel: 0246 217555/ 217699.

• Membership Liaison:

Committee Chairman - Ian Suart, GM4AUP (see Zone G above).

• Morse Practice Transmissions (GB2CW):

Co-ordinator - Mike Thayne, G3GMS, 14 Tynedale Avenue, Monkseaton, Whitley Bar, Tyne & Wear, NE26 3BA. Tel: 091 252 6138.

• Novice Licence/ Project YEAR:

Hilary Claytonsmith, G4JKS, 115 Marshalswick Lane, St Albans, Herts, AL1 4UU. Tel: 0727 59318.

N.B. For details of training courses and examinations, write direct to RSGB HQ. It is essential to quote your postcode.

• Packet Radio:

Mailboxes - Neil Lasher, G6HIU, 40 Farm Road, Edgware., Middx, HA8 9LT

Nodes - Dave Hough, G4WRW, 1 Foxe Rd, Frampton, Cotterell, Bristol, BS17 2AE.

General enquiries - Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire., ML6 0QG. Tel: 0236 65937.

• Propagation Studies Committee:

Chairman - Geoff Grayer, G3NAQ, 'Bagatelle', 3 Southend, Brightwalton, Newbury, Berks, RG16 0BE. Tel: 0235-446511

• QSL Bureau:

Outgoing cards - RSGB, PO Box 1773, Potters Bar, Herts, EN6 3EP

Incoming cards - your QSL sub-manager (see p44 June *90 RadCom*)

See also page 6 Feb 90 *RadCom* for a description of how the Bureau works.

• Raynet:

Group Information - Mike Barker, G8CAC.

Zonal Co-ordinator & Talk-through permits - Ian Jackson, G8RWH.

Emergency Planning & Vice Chairman - John Witts, G6BBW.

Press Officer - Ronald Cowan, GM4SRL.

Public Relations - Trevor Emery, G3KWU.

Chairman - Philip Howarth, G3YAC, 1 Clay Close Lane, Impington, Cambridge, CB4 4NE.

• Repeaters:

All repeater enquiries should be referred to the Repeater Zonal Co-ordinator in which the repeater is sited, as follows:-

North of England - Phil Coates, G0COA. Tel: 0924 848803.

Midlands - Alan Marwood, G8SSL. Tel: 0602 202562.

SE England and E Anglia - Mike Hastings, G8ASI. Tel: 0923 265734.

SW England - Fergus McGilp, G8URB. Tel: 0635 201453.

Wales - Dave Brown, GW4NQJ. Tel: 0686 640814.

N Ireland - Dr David Hutchinson, GI4FUM. Tel: 0849 464672.

Scotland - Colin Dalziel, GM8LBC. Tel: 0698 281847.

Special Projects - Dave McQue, G4NJU. Tel: 0908 378277.

TV Repeaters - Graham Shirville, G3VZV. Tel: 0525 290343.

Chairman - Geoff Dover, G4AFJ, 31 Newbold Rd, Kirkby Mallory, Leics, LE9 7QG. Tel: 0455 823344.

• Spectrum abuse:

Amateur Radio Observation Service Co-ordinator - Geoff Griffiths, G3STG, 11 The Grove, Asfordby, Melton Mowbray, Leics, LE14 3UF.

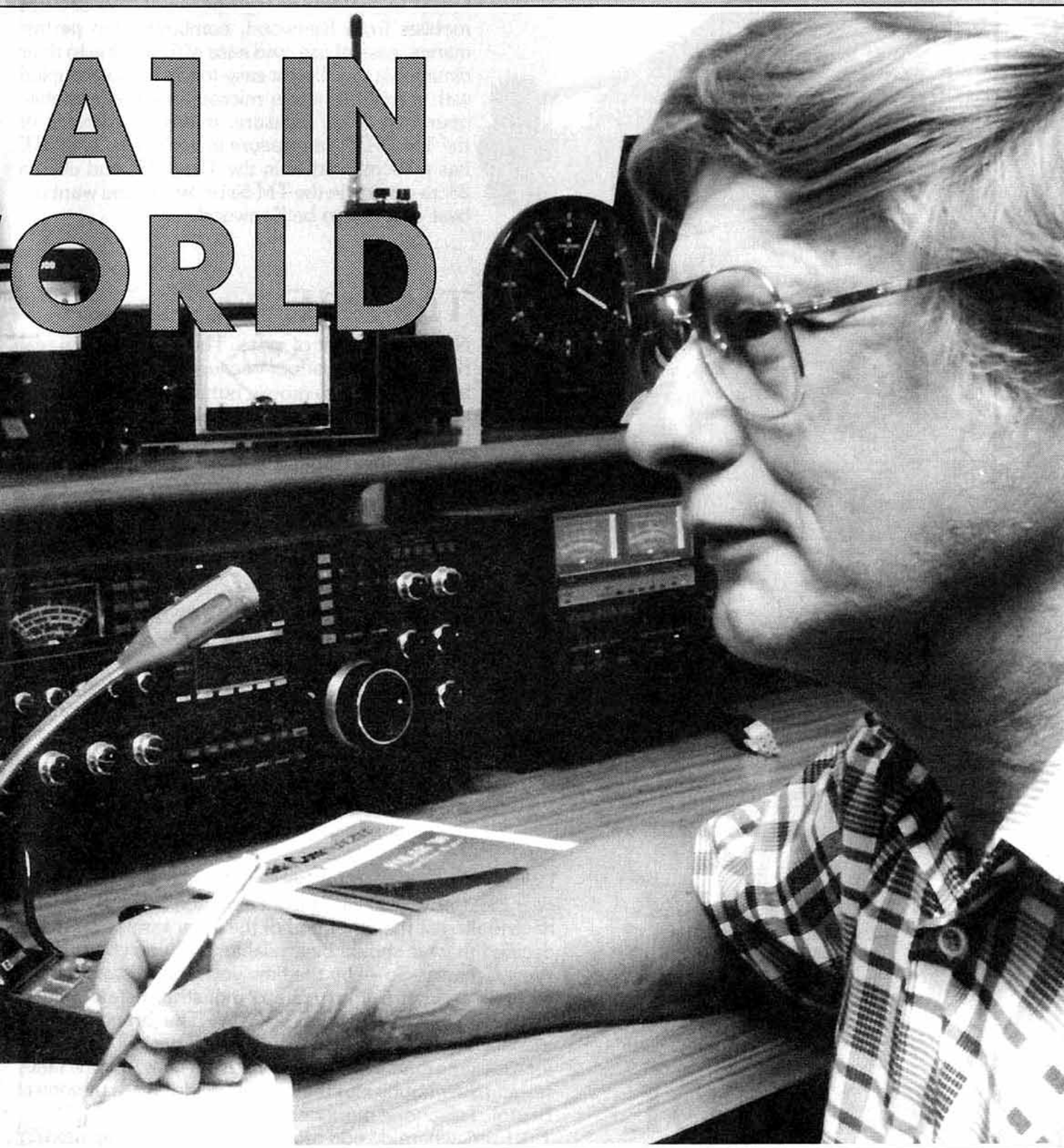
• Technical queries:

George Benbow, G3HB, 81 Anglesmede Crescent, Pinner, Middlesex, HA5 5ST.

• Trophies:

Mrs Hilary Claytonsmith, G4JKS, (see Novice above).

Count on us!

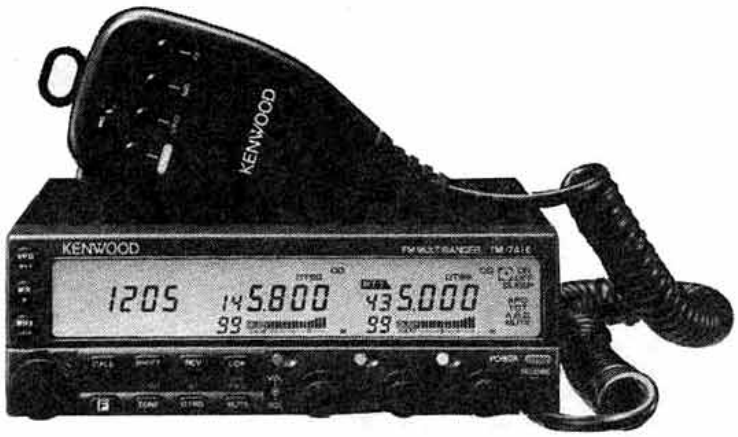


Icom (UK) Ltd.
Dept RC, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155

LOWE ELECTRONICS LTD.

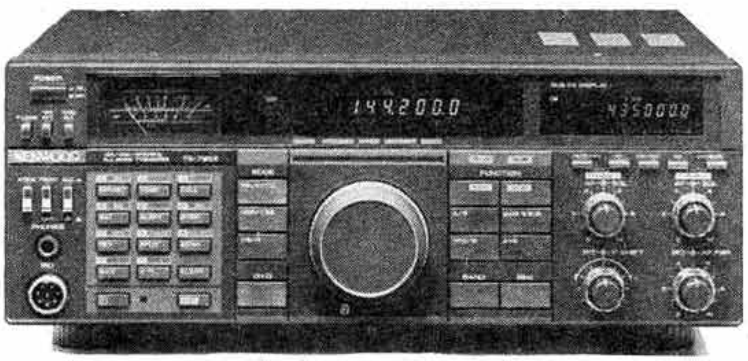
TM-241E £289

Latest in the line of high power (50W) 2M FM mobiles from Kenwood, combining top performance, ease of use, and ease of fitting due to their diminutive size. Bright easy-to-see display coupled with a multi function microphone make mobile operating a real pleasure. Indeed, ownership of the TM-241E is a pleasure in itself. The TM-241E has a 70cm brother in the TM-441E, and even a 23cm version in the TM-531E. When you want the best — it has to be Kenwood.



TM-741E **Price to be announced**

Now here's a bit of news. The TM-741E is a real Kenwood innovation, because it comes as a two band (2M/70cm) mobile but with a slot inside for optional third band units. Select from 23cm, 6M or 10M as the third band, and make the TM-741E into a mobile tri-band station. Three band receive at the same time. Cross band repeater or three band repeater with two bands in and one out. It is a real step into the future with the TM-741E.



TS-790E £1,495

The ultimate two band multi-mode base station with 2M/70cm bands as standard, with optional 23cm internally fitted unit for three band operation. The TS-790E is accepted as being way out in front as far as performance is concerned and facilities are there to match that performance. Matching the new TS-850S HF rig, the TS-790E completes the station to perfection.

LOWE DOCKS AT BRISTOL

Following the successful opening of our newest branch near Heathrow (200 yards from Junction 5 of the M4), we have looked at the other end of the great tarmac strip and decided that we should be available to all you chaps in the West Country. So — by the time you read this, we should be open at Unit 6, Ferry Steps Industrial Estate, Albert Road, St Philips, Bristol BS2 0XW. The branch will be managed initially by Dave G6CXA, but we will be looking for a full time manager to take over from him. Anyone fancy turning their hobby into their job? Call in and see us soon at Bristol. Telephone number is 0272 771770.
'Ere Fred, where do you reckon Lowe will turn up next???

HEAD OFFICE & MAIL ORDER: Chesterfield Road, Matlock, Derbyshire DE4 5LE
Shops in **BOURNEMOUTH:** 0202 577760 **CAMBRIDGE:** 0223 311230 **DARLINGTON:** 0325 486121 **GLASGOW:** 041-945 2626

Packet radio from KANTRONICS —

the acknowledged leaders

Packet radio has been expanding quickly in the past two years, and there now exists a national and international data trunking system for automatic forwarding of information. This is open to every radio amateur who has equipped himself with a personal computer and a small box of electrickery called a TNC, which goes between the computer and his amateur radio transceiver. Once in use, personal mail messages can be sent from one radio amateur to another, across the country or around the globe. In addition to this, bulletins and items of general interest can be sent and received, ranging from local club activities, through to AMSAT, RSGB, or ARRL news. This can all be done on an unattended basis, but you can also sit at your mighty Wurlitzer and conduct real time QSOs as in RTTY or AMTOR.

In the field of packet radio terminals, Kantronics has always led, and they are constantly pushing forward the advanced ideas which such a medium demands. The beauty of Kantronics terminals is that software upgrades can be incorporated by EPROM changes and these come complete with all documentation at a fraction of the cost of a new terminal, so you can keep the system right up to date.

The terms used to describe the specification are new to many amateurs, so I won't try to baffle you. Suffice it to say that packet radio is intriguing, exciting and needn't cost a great deal of money to enjoy. By purchasing Kantronics equipment you are guaranteed to get the best, and it will remain the best for years to come. For more detail, just ask for a copy of our "Packet Guide", written by Richard Hillier here at Matlock. If you want to ask questions, Richard will be happy to provide the answers.

All Kantronics units are made to the highest standards and designed for lasting satisfaction. If you want to "Go Packet", you cannot do better than to choose Kantronics and join in the world wide enthusiasm for this exciting method of communicating.

The Kantronics range

KPC2. £165. Single port TNC for HF/VHF/UHF, 300 and 1200 baud operation. The ideal starter.

KPC4. £242. Dual port TNC for HF/VHF/UHF 300 and 1200 baud operation. Simultaneous operation on two bands using one computer. Gateway facility between bands.

KPC2400. £224. Single port for HF/VHF/UHF operation at 300, 1200, and 2400 bps. The 2400 bps is achieved by bi-phase operation thus giving much faster traffic rates between KPC2400s. A PC file transfer programme is supplied free of charge.

KAM. £285. The famous Kantronics All Mode TNC. Dual port HF/VHF/UHF operation on two bands using one computer. All mode operation through the HF port includes 300 baud packet, together with AMTOR, ASCII, RTTY, CW, and We-Fax. The VHF/UHF port supports 1200 baud packet, but you can also connect the HF port to a VHF/UHF transceiver and have true all-mode on 2 and 70. Gateway between ports, and superb performance from digital filtering of input tones.

DVR2-2. £199. A truly neat idea in the shape of a specially designed 2 metre FM transceiver for packet radio users. Housed in the standard Kantronics case, the DVR2-2 provides crystal controlled stability on transmit and receive (supplied on 144.65) together with ultra fast switching times for high speed data transfer. 2 watts output, and needing only 12 VDC to operate. You can even plug in a microphone and use it as a talk box.

DATA ENGINE. £328. The "Next Generation" TNC, and typical of the Kantronics ability to be one step ahead of your needs (and one step ahead of the competition). Featuring dual-radio ports, high speed capability, it can also accommodate two internal or external modems. Supplied with AX-25 firmware and one 1200 baud modem installed. This product really needs a 200 page book to describe all it can do, so ask us about it.

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HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

THIS IS THE great month for all CW enthusiasts! I quote the first part of a special news release from *Morsum Magnificat* - the speciality magazine for CW enthusiasts. (Its special Spring issue looks like being very worth having and I recommend contacting Morsum Magnificat, 8A Corfe View Rd, Wimborne, Dorset BH21 3LZ, for details about this and updated information on special events.)

"Amateur CW stations around the world will celebrate the 200th anniversary of the birth of Samuel F B Morse, on Saturday 27 April 1991, honouring the memory of the great man, and demonstrating that amateur morse is still alive and well. The idea is simply for as many CW stations as possible to be operational that day, to exchange fraternal greetings, and generally enjoy some time on the key. If it is possible to use old-time keys or other equipment for the event so much the better, but this is not essential.

"Over the weekend, and later, a number of special CW stations or activities will be heard which will add to the interest of the occasion and the following examples will give some idea of what can be expected: K2KN will be a special station at Locust Grove, Pougnkeepsie - Morse's country home from 1847 to 1871. It will be on from 1400 to 2000 on 27 April within 10kHz of 3.710, 7.110 (?), 14.050, 21.110, and 28.110MHz. Special QSLs will be issued via the ARRL bureau. A meeting at Maassluis will activate PA6MMD on the 27th. The 'Friends of S F B Morse' have a Morse Memory Day running all day (information from DJ4FP, Kaunitzstr.3, D-6682 Oestereiden, Germany)." This is, of course, not all that is being arranged . . . .

To commemorate the 200th anniversary of the birth of Samuel Morse, the First Class Operator's Club (FOC) will hold a special Jubilee activity period in which all are invited to take part. It is *not* intended to be a pure contest - more of a celebration of morse code and its use in world-wide communication. It will run from 0000, 27 April (the actual anniversary date), until 2400, 5 June, and will involve all bands 1.8 to 28MHz (except WARC bands) CW only.

All licensed operators are invited to join in and contact as many FOC members as possible during the period. Send RST, and if you are a member of a CW club its initials as well (e.g 599 GQRP). The score is the total number of QSOs and any convenient log sheets may be used. Entries must reach Peter Miles, G3KDB, P.O.Box 73, Lichfield, Staffs, WS13 6UJ, by 5 July 1991.

A specially engraved paddle will be the prize for the station who contacts the greatest number of FOC members in the 40-day period.

CONTESTS

THE YURI GAGARIN CONTEST

0000 to 1600 14 April

This year's contest marks the 30th anniversary of the first flight into space by Yuri Gagarin. CW only with activity confined to the band segments 3.510 - 3.560, 7.005 - 7.100, 14.000 - 14.060, 21.010 - 21.150, and 28.010 - 28.200MHz. Single operator multi or single band, and multi-operator multi-band single transmitter sections. Exchange RST plus ITU zone. QSOs with own continent count one point, with others three. The multiplier is the sum of ITU zones from all bands. Logs must be sent by 1 June 1991 to Contest Committee, Radio Sport Federation of the USSR, PO Box 88, Moscow.

SP DX CONTEST

1500 6 April - 1500 7 April

1.8 to 28MHz CW only. Note that on 3.5 and 14MHz activity must be confined to the IARU Region 1 contest-preferred segments (3.500 - 3.560 and 14.000 - 14.060MHz). Send RST, plus serial QSO number from 001. Polish stations will send RST, plus two letters indicating their province. QSOs with Polish stations count three points. Each province counts as a multiplier - but only once irrespective of the band. Final score is total QSO points multiplied by provinces worked. Single-operator single and multi-band, and multi-operator multi-band sections, as well as a listener category. Send logs to PZK, SPDX Contest Committee, P.O.Box 320, 00-950 Warsaw, Poland, not later than 30 April 1991.

ARI INTERNATIONAL CONTEST

2000 4 May to 2000 5 May

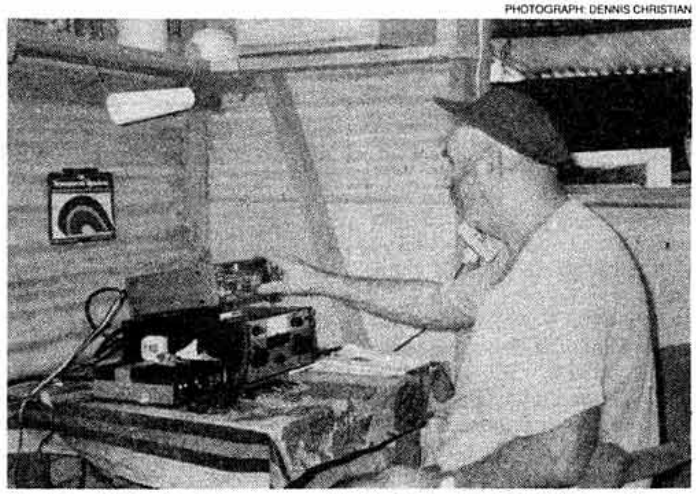
Worldwide - single-operator CW, SSB, and mixed, multi-operator single (mixed) and listener (mixed) classes. 1.8 to 28MHz (no WARC bands) obeying IARU bandplans. You must stay for a minimum of 10 minutes on each band used. Send RS(T) plus serial number. Italians send RS(T) and two letters to show their province. Multipliers are Italian provinces (95 in all) and DXCC countries (except I and IS) per band. Usual log requirements and declaration sheet should be sent within 30 days to ARI Contest, Via Scarlatti 31, 20124 Milano, Italy. European entrants working at least 250 Italian stations receive a special T-shirt! I have copies of rules (SASE please). In the 1990 contest, **G4PKP** was the only UK entrant and scored 455,312 points in the single-operator SSB section.

MORSE MEMORY WEEK

0000 20 April until 2400 26 April

Another 'special' this time from AGCW-DL. CW only using hand-keys, bugs, and electronic keyers but **not** keyboards. Normal QSOs (not contest type) exchanging RST, QTH, and names, and each counts five points. If you score 40 points or more you will receive a special QSL, and for 200 or more a special award. Post logs no later than 20 May to Stephan Forka, Jochstrasse 13, D-8100 Garmisch-Partenkirchen, Germany.

PHOTOGRAPH: DENNIS CHRISTIAN



Jim Russell, G3OKQ of Surrey, operating VR6JR and VR200PI/JR from Pitcairn Island. Jim logged close to 13,000 contacts from Pitcairn from January to June 1990, including the first VR6 operation on 6m.

EAST TO WEST QRP WEEKEND 1990

This event, held on 28 to 30 September 1990, proved to be an outstanding success with more than 50 logs received and many more QRP stations than that active. The organisers - the OK QRP and G-QRP clubs, were particularly pleased to receive logs from every country in eastern Europe, showing that the aim of bringing east and west Europe together in QRP friendship had been fully achieved.

The leader in Area A - eastern Europe - was UA3MBJ, the runner-up SP5SDA (using a single 14.060MHz crystal), and the third place went to OK2BMA. The leader in Area B, western Europe, was G3JFN, who received the key paddle kindly donated by G4ZPY Paddle Keys. Runner up was SM6BSK, and third place went to DK5VD.

Many very useful suggestions were received from entrants, and these will be acted on in preparing the rules for the 1991 event, which will reflect the advent of a much more united Europe, and also cater for DX contacts to and from stations outside Europe and Asiatic Russia. The dates will be 27 to 29 September, 1991, and the revised rules will be published shortly. Any station prepared to use 5W or less of CW can take part in the event, which is designed to show the close unity of QRP operators throughout the world. The joint organisers are OK1CZ and G8PG.

DX NEWS

WF1N (TOGETHER with NT1I, K1SCN, and KA1DIG) will be on the air from the island of Martha's Vineyard from 12 to 15 April. They will be on SSB only. Martha's Vineyard is in Dukes County, Massachusetts and if you are an IOTA fan it is NA-46. KV4AD is now in **Saba Is** as PJ8AD and is on both 18 and 24MHz.

VP8CFM is located on **S Orkney Is** and seems to like list operations on 14.256MHz in the late evening. He should be there for two years or so. The 32nd

Japanese Antarctic Research Expedition left for Antarctica last November for a two year tour of duty. Eleven are licensed amateurs, and they expect to be on the air from Syowa Base as 8J1RL and 8J1RM from Asuka Observation Base. Most likely time for them to be on the air is between 0930 and 1030 and most likely bands 7, 14, or 21MHz. OE8NOK/ZL5 was located on the Ross Islands in Antarctica but has now moved to Gondwana Station near Terra Nova Bay. 4K1ADQ will be in Antarctica until 31 January next year. According to the *Long Island DX Bulletin* ZS7ANT often shows on the low end of 10MHz from 1200.

VQ9AY will be in the **Chagos Is** for a few more months and is often to be found on 14.188MHz at 1800 on Wednesdays. Former RSGB HF committee member G4JVG is now in **Papua New Guinea** and will be there for several years. At the time of writing, his callsign is not known but it may be P29BL or P29DC. Steve will probably be found near 3.798, 7.085, 14.185, 21.285, or 28.495MHz. In spite of the many problems in **Lebanon**, OD5SK manages to keep a regular sked with KB5RA on 28.510MHz at 1200 each Saturday.

According to *DX'press* an American-Soviet team will be going to **Franz Josef Land** between 4 and 29 April - no other details given. 7S3OWG is a special call given to promote the city of Ostersund for the 1998 Winter Olympic Games. Another special call will be 3A200SM which will be on CW this month from **Monaco** joining in with the Samuel Morse celebrations.

At the time of writing, W4IBB was on from **Ethiopia** as ET2A. He was scheduled to be there for two months and may just still be on the air. He appears to be properly licensed. If you are looking for **Togo** or **Central African Republic** try 21.360MHz at 1315 on Monday, Wednesday, or Friday when 5V7SA and TL8HW meet their QSL manager WB4LFM. They listen for others after they have finished their business. G4ZYQ says that they sometimes QSY to 28.610MHz and that Steve, 5V7SA, will give CW QSOs on request. If you hear C9MKT, this will be SM7DZZ who is going back to **Mozambique** and already has equipment available there and a promise of a licence. The latest on FT4WC (**Crozet Is**) is that he appears every Friday first on 14.115MHz at 1700, and then at 2000 on 14.160 or 14.260MHz. On Sundays he uses 14.143MHz at 2100.

DXPEDITIONS

THERE IS A rumour of action from **Clipperton Is** in the near future. *RSGB DX News Sheet* quotes the Japanese lady operator who recently appeared as T31KY as saying that she hoped to be there in April and *QRZ DX* as mentioning an expedition going there during May.

A group of Japanese amateurs is likely to be on **Christmas Is** between 2 and 9 April on all bands 1.8 to 144MHz SSB and CW. Callsigns will be VK6BFU, BFV, BFW, BFX, BFY, and BFZ all with the /VK9X suffix, and VK9AG.

News of Kirsty and Jim Smith's current movements unfortunately arrived too late to be included in last month's column. When Jim telephoned me in late February he said that arrival in Dacca was expected to be on 10 March. If all has gone according to schedule, the two week stay should be over. However, delays do occur so it may still be worth looking for him from **Bangladesh**. The next move might be to **Bhutan** where they should arrive by 1 May and again stay for two weeks. An important point raised by Jim, particularly with reference to his S2 visit, is that he does *not* appreciate multi-band multi-mode QSOs and is more interested in giving more people a new country. Those who make needless duplication of contacts may find difficulties with QSL cards . . . .

Not really a DXpedition but an unusual activity - this time from a raft sailing from Calcutta to Indonesia and back via the Bay of Bengal, Andaman Sea, Malacca Strait, and Indian Ocean. The trip is due to begin on 17 February and should last about 120 days on its 5,000km journey. Its aims are to "spread the message of goodwill and amity amongst the people in general and more particularly amongst the people of India and South East countries". It will also investigate ocean and sea currents. The raft is called the *Sarathi* and the venture is being organised by the Barrackpur ARC - VU2NSA. VU2MFY and VU2NSA/MR will be the operators and the frequencies to be used 7.050, 14.150, and 21.225MHz (plus or minus 5kHz).

PY5AKW, PS7KMN, PS7AB, of the Natal DX Group, together with DJ9ZB, PT7AA, and JH1AJT, are planning an expedition to **St Peter and Paul Rocks** probably early in May. PY1BVY may be going there a little earlier.

F6BQV, FE1JCG, FD1LGV, FC1MPQ, FC1MUT, and FC1RAM will be on **Molene Is** off the west coast of France between 4 and 12 May. They will have the special callsign TW3M, and will be on 3.5, 7, 14, 21, 144 and 432MHz on CW and SSB. Cards go to FE1JCG.

DEADLINE

ONCE MORE, I have to thank *DX'press* (PA3CXC), *DX NL* (DL3RK - who I am sorry to say is ill), the *Long Island DX Bulletin* (W2IYX), *RSGB DX News Sheet* (G4DYO), and the *Lynx DX Group Bulletin* (EA2KL).

Please let me have everything for **June** issue by **24 April**. Thanks.

BBAND REPORTS

A good response this month and thanks therefore to G2HKU, GM3CSM, G3's GVV, ING, KSH, GW3WWN, GM4CHX, G4DXW, GW4KGR, G4's MUW, NXG/M, XAH, and ZYQ, G0's DUS/M, JZA, KDS, and NLM, and the UK DX Packet Cluster (with the help of G4PDQ). CW stations in italics.

1.8MHz
0100 *OY9JD, 9L1US*

7MHz
0300 XQ0X
0800 *K5MA, VK9LM, ZK1YL*
2300 S01A, *9M6UY*

14MHz
0400 T31KY, VP5DM, XQ0X, ZL
0600 T30DQ, XF0C
0800 A35KB, FO0IGS/
0900 ZK2XA, *OE8NOK/ZL5, 4K4POL*
1200 VY2VN
1400 *BV4QA*
1500 SV2ASP/P, *T30DS*, 9M8FH
1600 *BV2CR, J28NU, T21CE*
1700 BY1QH, *KL7PJ*
1900 BZ1AB, FK8FB, *T30CT, T31AF*, 4K2/UV3CC
2000 T30RD, VK9LM, 9Q5QL
2100 BZ4AA, KH2N, *LU/G3POI*, ST0DX, *ZD8VJ*
2200 KL7GU, ST0DX, ZW0MI
2300 VE7GCK/A7, VP8CEX, ZS8MI, *9M6UY*

21MHz
0800 BY1PK, FO4DL, 3X1SG, 9M6HS
0900 FK8DH, *ZK1s XD, XX, 3D2s AG, QB*
1000 AL7KC, J5CVP/P, VS6UK, ZY0RK
1100 BZ4DFJ, JD1BFQ (Iwojima), *VK9LM*, 5W1IU
1300 *BV2TA*
1400 AP2JZB, *UT0U/UB4MN*
1500 XW8KPL
1600 ET2A, S79KMB, 7Q7RM
1700 D68JM, *T30DS*, VQ9AY, ZD9s BV, CO, 3C1EA, 9U5QL
1800 A41JR, AH6HB, ZD9CS
1900 *HK0/N3JT*, KL7GU, VP8CEO, 9M6GB
2100 HF0POL, KL7/N6FM, PJ9LS, TL8FL

28MHz
0800 A61KR, JH0BBE/JD1 (Ogasawara), JT1BG, RAOFA, ZK1XX
0900 BV2AL, BY5RA, C56/G3VPW, H44MB, 8J8WUS
1000 BY4AA, HL5QY, XU0CW, 9L/HB9BEI, 9U5QL
1100 A71AL, P43AM, T30DR, VK6ADP, YK1AO
1200 *C9EC, JT1BG*, ST0DX, XW8KPL, 4K2/UV3CC
1300 BV2s AL, AV, FB, BZ4DFJ, HH2JR, J6LQC, 5V7SA
1400 VE3FNL/A7, JW9VDA, ZW0MI, 7X5VBK
1500 A22AA
1600 AP5H, HS0AIT, KL7HGY, OX3KN, *VK9LM*
1700 FH5EJ, AA5LY/KH4, PY0FF, TA3D, TY2LS, W6-W7
1800 C56/G3YJH, FO4NR, KL7XD, NH6WZ, V29DA, XF0C, ZD8DX
1900 D68AM, FO0FGS, XQ0X, ZF2QC
2000 All W districts

QTH CORNER

A92	QSL Bureau, PO Box 22381, Muharraq, Bahrain.
BV2TA	PO Box 112116, Taipei, Taiwan.
C9EC	via DF3EC, Achim Rogman, Frankenstr.34, D-4190 Kleve, Germany.
ET2A	WB2WOW, 625 Ratzer Rd, Wayne, N.J, 07470, USA.
JD1BFQ	JA4BTY, Tohshi Kurokawa, 8053-2 Hara, Hichihonmatsu, Kamo, Hiroshima, Japan.
T21CE	DJ9ZB (see below).
T30DS	DJ9ZB, F.Langner, Carl Kistnerstr 19, D-7800 Freiburg, Germany.
V51KG	PO Box 1232 Swakopmund, Namibia.
WF1N	Anthony Spino, 47 Madison Av, Waterbury, CT 06706, USA.
YI1BGD	ON7LX, Carina Ramon, Zeidijkweg 3, B-8021 Loppem, Belgium.
9Q5QL	(see 9U5QL)
9U5QL	YASME Foundation, Box 2025, Castro Valley, Calif, 94546, USA.

1991 28MHz COUNTRIES TABLE

G0JZA	144	(SSB)	G4YNG	32	
G4MUW	86		G4XAH	27	(RTTY)
G4DXW	70		G4ZYQ	20	
GM4CHX	58		G4NXG/M	20	
G0DUS/M	54				

Propagation NEWS

Compiled from reports supplied by G3FKM, G3FPK and the Propagation Studies Committee

THE PROPAGATION Studies Committee would like to thank all those who wrote to John Spurling, G4AQI, expressing their views on the two formats for the monthly frequency prediction data, published in the November and December issues of *RadCom*.

52% wished the numeric format to remain, 37% wished to change to the new graphic format, 7% were happy with either presentation, and 4% were happy with neither presentation. The main points which emerged from the responses were: the graphic presentation was too small to convey the desired quantitative information, as well as being optically disturbing to some readers, although it did provide 'at-a-glance' information; the numeric presentation was used by many for furthering their understanding of propagation phenomena, some by plotting graphs relative to time and solar cycle, etc., although it was admitted that the presentation could be improved by returning the print size to a full page and re-introducing the three colour presentation.

In response to the wishes of the majority, the PSC has decided to continue with the numeric presentation, although ways for improving this presentation will continue to be sought.

HF

THIS MONTH, G8KG says "Just when it began to look as though the steady rise in average solar indices in late 1990 and early this year was about to level off, there was a dramatic increase late in January which took the provisional daily solar flux values to a peak of 367 sfu on 30 January. This was the highest value so far recorded in Cycle 22 and was only exceeded on one day (10 November 1979) during Cycle 21, and for only a very few days in the past 45 years. In due course the active area responsible for this peak passed behind the Sun but by 24 February; the daily values were again above 300 sfu and the 27-day running average had risen to 251, the highest value for more than thirty years.

During this same period the geomagnetic field continued in the rather stable phase which emerged in the latter part of 1990. In January, the average of the daily Boulder A-index remained below 8 and the increase during February has so far been very small. As a result, MUFs were high and there were good to excellent propagation conditions on the HF bands on most days.

It remains to be seen how long this pattern of behaviour will last - it is not unusual for there to be a subsidiary peak in the cycle sometime during its fifth year. At all events it looks as though the 1990/91 DX season will prove to have been one of the better ones.

50MHz

THE JANUARY REPORT from Ray Cracknell, G2AHU, confirms that it was a quiet month geomagnetically, the 25th being the only day with good auroral propagation. However, minor auroral events were reported by GM3WOJ on 8, 11, 15 and 24th. He suggests: "This was surprising as solar activity towards the end of January increased markedly." One explanation could be that the interplanetary magnetic field was of a north polarity, as mentioned in the *GB2RS* news broadcast on 3 February.

By 28 January, the sunspot count at Boulder, Colorado, reached 418; the highest value so far this cycle, up to the middle of February. This brought some fine F-layer openings to the Americas; eg G6KP worked across the Atlantic with just 4W and a dipole on the 24th.

During January, neither Z23JO nor ZS6LN reported any signals being received from the British Isles. A few Mediterranean beacons were copied on rare occasions. G2AHU comments: "There is nothing unexpected in this which is a seasonal effect at the height of summer in the southern hemisphere." Propagation over this path should have improved by the time these notes are being read, as the vernal equinox will have passed.

HF F-LAYER PROPAGATION PREDICTIONS FOR APRIL 1991

The time is represented vertically at two-hour intervals 00(00)GMT for each band, ie 00=0000, 02=0200, 04=0400 etc.
The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1.8MHz openings are indicated by a plus (+) sign in the 28 and 3.5MHz columns.

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	....123332..	...1345554..	...36777873.	..1677788862	435766667897	876433334689	863111.12478	53.....4+
MALTA	....233333..	...14565551.	...377888841	211688888973	755876667898	998643445799	986311112578	++4.....25+
GIBRALTAR	.....11111..	....1233331.	....4566673.	...267778862	432677777897	987754445799	998532112478	++52.....24+
ICELAND	..........1..	.....122331.	....1444564.	2..156667985	754554445678	887532222357	5+52.....24	
** ASIA								
OSAKA	....122.....	...13441....	...25543211.	...253334331	....31.14674	1462	.....13.	.....
HONGKONG	...1345542..	...2556664..	...25556773.	1..133346862	2....1.14786	1.....1475	252	.....2.
BANGKOK	...2456653..	...35667751.	..1245558841	1..113337873	4.....14787	3.....1477	1.....255	22
SINGAPORE	...3566663..	...45777761.	..1245558841	2..123337874	4.....14788	3.....1478	255	22
NEW DELHI	...3566641..	...45677621.	..2335557541	212113336774	63.....14788	62.....1478	4.....257	24
TEHERAN	...46677641.	..166677862.	1.35445688853	425322337886	864....14799	852.....1578	73.....257	4.....24
COLOMBO	...45777641.	..146777872.	1.2335568863	421113337886	73.....14799	71.....1578	4.....257	24
BAHRAIN	...56777751.	..1666778731	214533558874	535211237887	974.....4799	861.....1588	73.....257	4.....24
CYPRUS	...46777761.	..1688888841	213887888974	646766778997	987543446899	985211113689	862.....1368	+3.....35
ADEN	...57788863 1	211666778853	534533458987	866211236899	985.....4799	972.....1488	74.....257	4.....24
** OCEANIA								
SUVA/S	...........,	.....11221..	....2333441.	...23323563.	..1531.1363.	...41...14..	...1.....1..	.....
SUVA/L	42.231....75	5414521..186	444773211485	235863222662	..373...264.	...4.....41.	...1.....1..	.....
WELLINGTON/S	....111.....	....123311..	...23444432.	..1453335641	..2631.14651	..13....143.	...1.....1..	.....
WELLINGTON/L	32.11.....24	54232.....46	664641....77	456751...275	12573....562	..241....43.	...1.....1..	.....
SYDNEY/S	...234531...	...4566531..	..167555642.	..2663346652	...431.14774	...1....1462	.....23.	.....
SYDNEY/L	....2.....12	11..41....34	3222631...67	322463111187	1.1541..2474	...21....351	.....12.	.....
PERTH	...46773....	..1577742...	1.247555421.	312263335541	51..3..14784	3.....1576	254	.....2.
HONOLULU	...........,	.....211.	.....211442.	....2311551.	..2331..34..	..341....1..	..11.....	.....
** AFRICA								
SEYCHELLES	...566776531	211666778754	534433558887	865211236899	984.....4799	961.....1488	73.....257	4.....24
MAURITIUS	1..576888742	311667778865	644534558988	875212236899	984.....3799	961.....1479	83.....257	5.....24
NAIROBI	2..577888854	421666778976	854633458999	986411136899	9961.....3799	984.....1479	861.....257	54.....24
HARARE	31.578888865	631666788987	874743458999	997611136899	9983.....3799	996.....1478	873.....157	54.....24
CAPETOWN	2..378889975	4..687778988	72.865557999	95.842236899	99361....3799	8973.....478	7751.....157	442.....24
LAGOS	42.377889975	751586678998	985763337999	997841115899	99861....2799	8974.....478	6751.....157	452.....24
ASCENSION Is	32..78677754	652287667886	885575335899	997762113899	99973....689	89741....378	7751.....57	442.....24
DAKAR	22.167888874	542287667986	875575334899	997763112799	99973....589	99741....268	7751.....47	442.....4
LAS PALMAS	46777741	11.168888873	432488888996	764687777898	998865545799	998642212489	88731....258	++4.....25
** S. AMERICA								
Sth SHETLAND	1888974	1....2778986	51...4557998	731.13235889	986331..2678	89741....346	6851.....14	352.....
FALKLAND Is	21....3888873	4311.5778886	774425557898	997633235689	999731..2368	89741....137	7752.....14	452.....
R DE JANEIRO	11....7866873	431117766885	774446534698	997753212489	999731....169	98741.....48	8752.....16	542.....4
BUENOS AIRES	11....5887863	331116777785	664435554588	987643232379	99974.....58	99741.....27	8752.....4	552.....
LIMA	....1.666652	1...32776664	432253553357	764463331137	998641....16	79741.....3	5752.....1	252.....
BOGOTA	1555652	1...13665664	321134543356	654353311137	898641.....6	89741.....3	5752.....	252.....
** N. AMERICA								
BARBADOS	5666652	1...26666674	432146533377	764454311158	998641....27	89741.....5	7752.....2	452.....
JAMAICA	444541	1555553	31..23543346	642233321127	887541.....5	79741.....2	4752.....	.52.....
BERMUDA	2444541	3555663	31..14543466	642234321257	887541....26	89741.....4	5752.....1	252.....
NEW YORK	123331	1344552	2....2443465	521113232247	875431....16	68741.....3	4752.....	.42.....
MEXICO	123331	244442	2....1.344333	421121232113	675431.....1	37741.....	1552.....	.22.....
MONTREAL	.....12233.	233442	2....2344465	421.12232356	775321....26	68741.....3	3652.....	.42.....
DENVER	.........1.	1121	1.....12233	31.....23123	55431...1..1	36741.....	.352.....	..2.....
LOS ANGELES	.....11.	2221	1.....14332	21.....24212	34322...2...	14741.....	.252.....	..2.....
VANCOUVER	...........,	...........,	1111	11.....2112	23322...21..	.3641.....	.141.....	.....
FAIRBANKS	...........,	...........,	....1.111...	21112211	122331..3311	.1341.....	..11.....	.....

The provisional mean sunspot number for February 1991 issued by the Sunspot Data Centre, Brussels was 167.5. The maximum daily sunspot number was 223 on 21 February and the minimum was 117 on 6 February. The predicted smoothed sunspot numbers for April, May and June, were respectively: (classical method) 124, 122, 120; (SIDC adjusted values) 115, 112, 110.

VHF/UHF NEWS

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

THROUGHOUT THE many years that I have been writing VHF columns, I cannot recall such a long period when there was no major opening to report. Activity has reached an all time low and the arctic weather in the first half of February probably kept many operators out of their shacks, particularly those who use lofts, garages and garden sheds.

Nevertheless tropospheric openings do occur, often along weather fronts, but few people seem to take advantage of them. Distant beacons appear at reasonable strengths for an hour or two, but CQ calls in their directions rarely result in QSOs.

REPORTING

IT SEEMS THERE have been complaints of not enough DX content in this column. Leaving aside 50MHz, there are three points here: (i) If tropo conditions are very poor, average stations will not be able to work very far. (ii) If nobody bothers to come on when there is a lift there will be no activity to report, and (iii) if operators do not report any DX QSOs they did manage to make, I cannot publish anything.

Reports are very valuable, even in long periods of poor conditions. For example, we need to record that, on a particular day for a certain period, beacon DL0PR on 144.910MHz was 10dB above its usual strength in London, even if nobody worked any German stations in that area.

It is excellent practice to note in your log the weather conditions at such times, eg "Warm front from northern OZ to Cornwall, moving east." When similar conditions occur in the future you will be better prepared to listen for a possible, if fleeting, opening.

When there is a big opening to, say, Poland and Czechoslovakia, it is not necessary to send a list of every station contacted. But if it is more convenient for you to send photocopies of your log pages, then highlight the better, best or unusual QSOs. Examples might be a rare square, a station running very low power or one outside the main area of the opening. This last is particularly useful when reporting Sporadic-E events.

Reports are always welcome and avidly read, all the more so if they are unambiguously presented, so here are a few suggestions. Always write your name, address and callsign on the first page and your callsign on any other loose sheets. Report separately for each band; not necessarily on separate sheets, just different paragraphs or blocks. To avoid confusion when submitting table entries, always give your current totals.

REPEATERS

THE SPRING EDITION of *FM News*, the publication of the Central Scotland FM Group, is a neat, A5 production edited by Dennis Cram, GM3NIG. The contents include the minutes of last year's AGM, the group's constitution and accounts, some technical and humorous contributions, a list of the committee members and some adverts.

As an outsider, I would like to know what repeaters the group operates, where they are and on what channels. A diligent search through its 24 pages failed to reveal these data in this issue - apart from a reference to callsigns in an agenda item of the 1991 AGM. There were no current status reports on any of their repeaters so one assumes they were all working normally? The Secretary of the group is Alasdair Fraser, GM3AXX, who is QTHR.

DX NEWS

BRUNO MONTEL, FC1MPQ, has sent brief details about a proposed DXpedition. He wrote: "We are a group of OMs from Mantes-la-Jolie, near Paris, and we will be on Molene Island in the far west of France during the period 4 to 12 May." The rest of the team consists of FC1MUT, FC1RAM, FD1LGV, FE1JCG and F6BQV and they will use the special call TW3M. Operation will be on 144 and 430MHz and HF. The QSL manager is FE1JCG. I cannot find this island in my atlas and no locator was given.

METEOR SCATTER

IN THE FEBRUARY *VHF/UHF News* I reported the demise of the British Meteor Society but have since received a letter and information about the International Meteor Organisation (IMO) from its Vice-President, Alastair McBeath. Founded in 1988, the IMO ".... has set up six Commissions to encourage and coordinate data collection and analysis for all types of meteor observation worldwide." These include Radio and Computer categories, the Director of the former being Jeroen Van Wassenhove from Nazareth in Belgium.

The IMO publishes a bimonthly journal called *WGN* accumulating to 220 pages in the year, and an annual Meteor Shower Calendar. Its administrative office is in Mechelen, Belgium and if anyone wants further information, drop me a line with an SASE. Mr McBeath mentioned a book *Meteor Showers - A Descriptive Catalogue* by G W Knonk (Enslow Publishers Inc., 1988).

The next major meteor stream is the Lyrids which the IMO and BMS calendars suggest should peak on 22 April. The RA (Right Ascension) of the radiant is 271°, the DEC (Declination) is +34° and the stream velocity at atmospheric encounter is 49km/s. The ZHR (Zenithal Hourly Rate) is variable, anything from 30 to 113 being reported this century.

Suggested prime times for the usual four directions are: NE/SW around 0200 and 0930; E/W around 0400; NW/SE around 2300 and 0700 and N/S around 0000 and 0800, all times UTC. The radiant is above a middle UK horizon from 1830, through midnight to 1400.

The Eta Aquarids, associated with Comet Halley, is a useful stream which is at its best from 3-5 May. Its RA/DEC are 336/-2° respectively and it hits the atmosphere at 66km/s. The radiant rises/sets at 0200/1300 and suggested best times are: NE/SW around 0600; E/W around 0800; NW/SE around 0930 and N/S around 0500 and 1100.

NOCTILUCENT CLOUDS

MR McBEATH noticed the paragraphs on noctilucent clouds in the February *VHF/UHF News* and mentioned a book, *Noctilucent Clouds* by M Gadsden and W Schroder (Springer-Verlag, 1989). He also referred to a shorter paper about them by Gadsden published in the *Quarterly Journal of the Royal Astronomical Society*, vol 27, pp 351-366 in 1986.

MOONBOUNCE

MOST VHF/UHF operators have to wait patiently for spells of good conditions before they can work some real DX. These frequently occur at inconvenient times, so we miss them; this is particularly true of short Es events and auroras and in any case, they tend to be rather unpredictable.

If you are really determined to work some DX, there are two modes which offer opportunities to try by advance planning. The first is by MS communication, which occurs via the E-layer at around 90-100km altitude, so it doesn't much matter what is happening in the troposphere. Skeds can be made to suit the convenience of the two partners, choosing times and dates, particularly in major showers, to give the best chance of completion.

The second is via EME, using the moon as a passive reflector. Computer programs enable us to locate our satellite to within a few degrees and calculate when it is nearest to Earth, ie at perigee. We can also compute the path losses under normal conditions to see if a QSO is possible.

Recent correspondence has revealed a growing interest in EME mode by amateurs with well engineered stations, so I make no apologies for devoting space to it. There are several specialist publications dealing exclusively or partially with EME. One of the best is the *2 Meter EME Newsletter* published by John Carter, K0IFL, whose QTH is: PO Box 554, Union, MO 63084, USA. (Tel: 0101 314 742 4879). The quarterly *Dubus* magazine has an EME section, too; see note on page 21 in the January *RadCom*.

2M Direct, published by Mark Turner, G4PCS, includes EME information and the February issue features the second article in his 'The ups and downs of EME propagation' series. This episode covers apogee and perigee, libration and Doppler shift, although his calculation of the latter at 144MHz is somewhat adrift!

All the activity reported in the February issue was on 144MHz. The following QSOs were completed, (r) indicating random ones: On 19 January, Andy Cook, G4PIQ (JO01MU)/W5UN. 20th, Calum MacPherson, GM0EWX (IO67UL)/WC2K; Keith Kerr, GM4YXI (IO87WI)/KB8RQ(r). 21st, GM0EWX/SP5EFO; G4PIQ/K2GAL. 23rd, GM0EWX/KA5AIH; GM4YXI/K2GAL(r); Nick Peckett, G4KUX (IO94BO)/K2GAL(r). 24th, GM4YXI/W5UN(r); G4KUX/W5UN(r); G4PIQ/W5UN and K2GAL.

On 25 Jan, John Regnault, G4SWX (JO02PB), reported quite good conditions but not much activity. He completed random QSOs with K2GAL, ZS6ALE, W7HAH, UA9FAD,

SM2CEW, N1BUG, SM5FRH and PA3FOC. GM4YXI worked W7HAH in just six minutes. Next day G4SWX reported lots of one-way propagation and random QSOs with UA1ZCL, SM5CFS, HB9CRQ and KB8RQ; G4PIQ/KB8RQ; David Law, G0LBK (IO93JK)/K9MRI, K2GAL and KB8RQ(r); Martin Platt, G4XUM (IO82AX)/SM5FRH, N1BUG and KB8RQ, all (r).

On 27 Jan, G4SWX found conditions very difficult with a two hour 'black out' and rapid fading, the only complete QSOs being with N1BUG(r) and HB9SV; GM0EWX/DL5MAE; GM4YXI/UA1ZCL and HB9SV; G0LBK/KI3W, KD8SI and PA0JMV. 28th, G4SWX/N1BUG(r) and K2GAL on SSB. 30th, GM0EWX and GM4YXI both worked IN3TWX. 31st, GM0EWX/PA0JMV. 1 Feb, G4XUM/OK1MS (r). 2nd, G4XUM/KB8RQ (r) and WB5LBT(r). 3rd, G4KUX/KB8RQ in 15min.

50MHz

THE 28TH ISSUE of *Six News* which I mentioned last month, includes a 'Gripes and Groans' page wherein UK Six Metre Group members air their grievances. Roger Horne, G4HBA, suggests trying FM nets for local QSOs when there is no DX on the low end. He complains about those who use 50.110MHz for MS working and suggests they use the allocated frequencies. These are 50.300 and 50.350MHz for CW and SSB respectively.

Elsewhere in this issue it is stated; "...that 50.150MHz is being proposed by the VHF Committee..." for MS use. This is absolutely untrue and Chairman Peter Burden, G3UBX, confirms it has never been proposed or discussed. More disinformation via packet radio?

Congratulations to Geoff Brown, GJ4ICD, who I believe to be the first European 50MHz operator to complete his DXCC. His 100th country was PT7NK (HI06) worked at 1118 on 1 Feb. Since then, he has worked two more; KG6UH/DU1 (PK04) at 1002 on the 6th and TL8MB (JJ94) at 1052 on the 10th. The PT7 is QRV daily, 1100-1200UTC on 50.105MHz.

Geoff reports the 9L1 beacon being received daily from mid-January. On the 30th, 1044-1225, the FY7 beacon was S4; 1200-1345, PZ1AP, PT7NK, VE1YX and W1-4, 8 and 9 stations were heard. On 1 Feb he worked KP2A, 9Y4VU and PZ1AP. On the 2nd, the ZD8, 9L1, ZS5SIX and PT7 beacons were copied in the morning, also 3X1SG and 6W1QC.

Video on 46.171MHz from VK4 was copiable for an hour in the morning of the 3rd with TR8CA worked and other Africans heard. On the 4th he worked PY0FF (HI36) at 1218; Africans were heard later. VK3OT and VK3AMV(?) were heard under the QRM on the morning of the 5th and a pile-up was heard on VK3OT on the 8th. Next morning at 0830, KE9A/DU3 (PK05) brought square number 436.

Paul Turner, G4IJE (ESX) added 3X1SG, KG6UH/DU1 and TL8MB for new countries in February but hadn't worked PT7NK by the 16th. He often calls CQ on 50.200 SSB when the band is dead but gets few replies. He wonders why people seem to prefer to listen to white noise on 50.110MHz? He notices that newcomers to the band assume 50.110MHz is a local calling channel whereas it is the *intercontinental* calling frequency.

Paul Newcombe, G6YZC (YSS), wrote that all QSLs for his ZB0W operations last June have been despatched. Between 17 and 31 Jan, GI8YDZ (ATM) made 259 transatlantic QSOs, proof of the huge advantage of having an ocean over which to propagate. Terry Chaplin, G1UGH (SFK), reported a short opening to the USA on 3 Feb, 1540-1600 and worked 9L1US (IJ38) for a new country and square at 1218 on the 16th.

The opening to VE and eastern USA on 9 January seemed confined to GI8YDZ and GJ4ICD, nobody else hearing anything. GJ4ICD suggests this phenomenon is due to the marine aspects of these stations. G2AHU reports that: "Similar effects were noted with TEP (transequatorial propagation) from Zimbabwe to the Mediterranean when working 5B4WR in Limassol on the sea front, SV1DH in Athens and F9BG in Marseilles. It was ascribed to marine ducting of signals falling short of the land and which were only received for a short distance inland, with a clean cut off at about 50ft above sea level."

70MHz

G6YZC LEFT HIS 70MHz transverter, 100W amplifier and 6-element Yagi with ZB0T last summer. If you work Mark on 50MHz, it might be worth a QSY to 70MHz in the summer. Ian Cornes, G4OUT (SFD), operated in the 27 Jan and 10 Feb legs of the Cumulatives. He worked GI4SJB/P in the first leg but he was not heard in the second. No EIs, GDs or GMs were heard.

144MHz

FROM REPORTS in *2M Direct*, auroras were recorded on 18, 20, 24, 25 and 31 Jan and 1 and 2 Feb. On 18 Jan, GM4YXI copied the GB3LER, OY6 and SK4 beacons at up to S8, 1940-2000. On the 20th, Tony Jones, GW4VEQ (GDD), worked GMs, 1849-1903. On the 24th, G4KUX contacted GMs around 1737 while Andy Steven's, GM4IPK (SLD), best DX were OH3VJ (KP21) and OH1NC (KP10) from 1710 at QTEs 25-30°. Other areas worked were DL, G, GM, LA, SM6 and SM7.

On the 25th, Andy contacted OK1GEH (JO65) at 1803 using 5W, while G, LA, OZ and SM stations were heard, 1800-1900. On the 31st, GW4VEQ worked GMs, 2138-2203, and next day Tony reported an event 1900-0200 in which he worked GMs and SM4KYN (JO79). G4KUX worked LA0FX (JP40) at 1830, and from 0000 on the 2nd Nick contacted ES2XM (KO20), OZs and SMs.

There was some tropo at the end of January. 23rd, G4PIQ worked HE7SNR (JN36) at 1938. 25th, GM4YXI copied beacons GB3VHF, DL0PR and OY6VHF at 1930. 27th, G4KUX worked into JN03, 06 and 37, 1120-1515, while G4SWX contacted stations in JN03, 16 and 59. 28th, GW4VEQ worked over to JO20, 21 and 30, 2147-2304 and on 2 Feb, G4XUM worked FF6KBF (JN18) at 1506.

DEADLINES

THAT'S ALL THERE'S room for I'm afraid, so please note the deadline for **June**, which is **25 April** and for **July**, **30 May**.

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
G4RGK	121	311	145	52	629
G1LSB	73	176	144	-	393
G3IMV	319	446	125	51	941
GJ4ICD	437	264	119	59	879
G4XEN	66	301	115	6	488
G6HKM	269	224	112	48	653
G4TIF	222	204	111	-	537
G4PIQ	-	278	105	-	383
G1KDF	309	184	104	39	636
G0GMB	-	198	103	-	301
G4SSO	-	261	98	-	359
G4MUT	142	155	94	34	425
G8ATK	74	144	94	52	364
G8LHT	113	185	93	14	405
G1GEY	-	170	92	22	284
G0CUZ	-	350	73	-	423
G4DEZ	116	249	62	54	481
G1SWH	201	166	62	9	438
G0EVT	142	213	57	-	412
GJ6TMM	109	151	52	-	312
G6MXL	52	97	48	20	217
G6ODT	-	29	47	-	76
G1WPF	20	114	37	-	171
G8PYP	206	120	34	-	360
GM4CXP	50	201	32	-	283
G6MEN	67	54	27	3	151
GM0GDL	-	88	23	-	111
G0NFH	113	78	18	9	218
G1CEI	11	77	18	-	106
GW6VZW	238	143	6	-	387
G1TCH	99	95	6	-	200
G4IJE	385	338	5	2	730
G7CLY	-	100	2	-	102
G6HCV	309	233	-	-	542
G0OFE	264	152	-	-	416
G0JHC	332	48	-	-	380
G4SWX	-	347	-	-	347
GM4YXI	-	340	-	-	340
G4DHF	-	331	-	-	331
G4YTL	-	269	-	-	269
GU7DHI	187	68	-	-	255
G0HVQ	176	71	-	-	247
G3FPK	-	244	-	-	244
GW4VEQ	-	241	-	-	241
GW4FRX	-	232	-	-	232
GM0GEI	224	-	-	-	224
G8XTJ	101	121	-	-	222
G1SMD	115	106	-	-	221
G4DOL	-	219	-	-	219
G1UGH	112	94	-	-	206
GW4VVX	81	120	-	-	201
G4XBF	-	172	-	-	172
GM1XOG	145	-	-	-	145
G4TGK	-	139	-	-	139
GM1BVT	92	23	-	-	115
GM1ZVJ	35	48	-	-	83
GM0CLN	-	81	-	-	81
GW7EVG	-	22	-	-	22

No satellite, repeater or packet radio QSOs. 'Band of the month' 430MHz.

SWL NEWS

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

FOR LISTENERS interested in radio teletype (RTTY), the British Amateur Radio Teledata Group (BARTG) have advised that their VHF contest will be on Sunday 14 April from 0900-1400. Logs should go to G4SKA.

SAMUEL MORSE

TO MARK THE 200th Anniversary of the birth of Samuel Morse on 27 April, there are several events planned of interest to listeners who specialise in the reception of CW (see also page 17). The First Class Operators' Club (FOC) will be holding a special all band Jubilee Activity period on 27 April. G3KDB will, I am sure, receive listener logs with interest.The European CW Association's 'Worked EUCW' Award will be launched on 27 April, with a certificate depicting the map of Europe at the time of Samuel Morse. The requirements for listeners are confirmation from 100 different stations who are members of EUCW clubs, over three different amateur bands, with a total of 20 stations heard on each band. The total must include at least three members of six different EUCW clubs. To encourage activity on Bicentennial Day, up to 40 stations heard on 27 April will count as double. Full details of the Award can be obtained by sending 2 International Reply Coupons (IRCs) to the Awards Manager, Gunther Nierbauer, DJ2XP, Illingerstr 74, D-6682 Ottweiler, Germany.

MARCONI DAY

THIS YEAR, the event will be held from 0001-2359 on 27 April. I am aware of 14 stations that will be specially active which will have a particular Marconi connection, or will be operated from sites used by Marconi and his associates in the early days. The special stations will be: K1VV/IMD, VE1IMD, VO1IMD, E12IMD, IY4FGM, GB0IMD, GB4IMD, GB2IMD, IY0TCI, IY1TTM, ZS6IMD, DA0IMD, GB2MDI and GB4MDI.

Last year, 16 listeners successfully applied for the associated Award. This year, it will be necessary to log 10 of these 14 stations. All claims must go to PO Box 100, Truro, Cornwall TR1 1RX with a £1.50 fee (£2 for licensed amateurs). Usual log data will be required, but listeners must ensure that they log the time heard and the stations being worked.

Activity is promised on all bands from 3.5 through to 144MHz. Members requiring more information can write to the Cornwall Radio Amateur Club (GX4CRC) at PO Box 100, Truro.

XMAS QUIZ

I ONLY HAD a few entries for the quiz this year, perhaps because it wasn't as straightforward as it seemed. One entry in particular, from Philip Davies G1EMD, deserves a mention. He spent a great deal of time researching the answers, and presented them in tabular form which I have reproduced. Different sources quote different details, but the DARC list tends to quote dates' . . . . up to the last day of . . . .', while the Geoff Watts list quotes' . . . . prior to the 1st day of . . . .'. As Philip said in his letter, the break-up of FF8 and FQ8 is anything but straightforward with subsequent changes in country name and prefix to add to the confusion. The only answer Philip really had trouble with was the date for Minerva Reef. My source has the date as 16 July 1972, so I have used that one.

HF NEWS

GOOD TO HEAR this month from Stan Porter ORS45992/CT. More established readers will remember reports from Stan while he was at his listening post in Malawi. Stan enters a table score for 1990 of 568, with his All Time score standing at 1162. He now uses an FRG8800 with a 144MHz converter. It appears that the CW part of getting a licence in Portugal has been scrapped, but full CT citizenship is required. Stan is applying at the first opportunity.

Another sending a 1990 table score is Philip Davies G1EMD. He offers a score of 497 (perhaps I published the final 1990 table a month too soon). Albert Tideswell, BRS48462, writes after a lengthy absence to update his loggings on 3.5MHz. Albert is now up to 296 All Time, with the latest ZS9S, PY0FF HL1SX, K4SXT/DU3, YA0RR, VQ9CQ and TL8CK.

Lastly on HF, let us take a quick look at what's been on in the last month. Most of the following is courtesy of Robert Small BRS8841. The best on offer appear to have been: 28MHz - VE7BGM/A7, C9EC, FR4AE, WU0Z/HZ, TR8GL and 8Q7CR. 21MHz - seemingly the best band in the last few weeks - BZ4CJ, JF2POF/JD1, VQ9AY, VS6TW, 5W1IU and 9Q5US. 14MHz - had been showing signs of improvement - VE3SNL/A7, FR5BT, T21CE, VK0KC, Y90ANT, ZL0ADN/ZL7, 3DA0BX and 9U5QL. Nothing of any great note has been reported on 7MHz, but 3.5MHz has seen good openings to the USA with strong signals heard from mid-evening until after sunrise. W6s have been heard after 0000.

VHF NEWS

FIRSTLY, THANKS TO Ela, G6HKM, for writing to reveal that the station I had heard on 50MHz on 21 November was 3X1SG. 50MHz has stirred with some interesting F2 and TEP propagation during the month in review. Mick Toms BRS31976 caught several openings - 3X1SG on 2 February, K1LKQ, VE3CTT (FN07), KJ4E, K8EFS (EN72), K0BI/8, WA4LOX (EL87), all between 1505 and 1615 on 3 February; and TU4DH and 9L1US on 10 February.

FINALE

NEWS AND VIEWS for the **June** issue should be with me no later than **Tuesday 9 April**. Photographs of shacks, or anything photographed by listeners which would interest listeners would be most appreciated. It appears that most of the photographs sent in recently have not been of sufficiently good quality to be reproduced.

THE ALTERNATIVE QUIZ ENTRY RECEIVED FROM PHILIP DAVIES, G1EMD

OLD PREFIX	OLD COUNTRY	LAST DATE OLD PX (DARC)	FIRST DAY NEW PX (G.WATTS)	NEW PREFIX	NEW COUNTRY
AC4	TIBET	31 MAY 74	31 MAY 74 (1.6.74)	BY0	CHINA
CN2	TANGIER INTERNATIONAL ZONE	30 JUN 60	01 JUL 60	CN2	MOROCCO
FF8	FRENCH WEST AFRICA	06 AUG 60	07 AUG 60		
	1. DAHOMEY		01 AUG 60	TD8/TY	DAHOMEY/BENIN
	2. UPPER VOLTA		05 AUG 60	TV8/XT	VOLTA/BURKINA FASO
	3. FRENCH SUDAN		20 JUN 60	TZ	MALI
	4. NIGER		03 AUG 60	5U	NIGER
	5. SENEGAL		20 JUN 60	6W	SENEGAL
(FT4)	6. COTE D'IVOIRE		07 AUG 60	TU	COTE D'IVOIRE
(FF7)	7. MAURITANIA		20 JUN 60	5T	MAURITANIA
FQ8	FRENCH EQUATORIAL AFRICA	16 AUG 60	17 AUG 60		
	1. CONGO MOYEN		15 AUG 60	TN	CONGO
	2. GABON		17 AUG 60	TR	GABON
	3. UBANGUI CHARI		13 AUG 60	TL	CENTRAL AFRICAN RP
	4. TCHAD		11 AUG 60	TT	CHAD
15	ITALIAN SOMALILAND	30 JUN 60	01 JUL 60	T5	SOMALI REPUBLIC
KR6	RYUKYU ISLANDS (US)	14 MAY 72	15 MAY 72	JR6 (AA-NZ)	JAPAN
KS4	SWAN ISLANDS (US)	31 AUG 72	01 SEP 72	HR6	HONDURAS
PK4	SUMATRA (DUTCH)	30 APR 63	01 MAY 63	YB & YC 4-5-6	INDONESIA
UN1	KARELIA (USSR)	30 JUN 60	01 JUL 60	UA1-N	RSFSR (RUSSIA)
VO	NEWFOUNDLAND & LABRADOR	31 MAR 49	01 APRR 49	VO1 VO2	(NEWFOUNDLAND) (LABRADOR) PROVINCES OF CANADA
VS9H	KURIA MURIA ISLES	30 NOV 67	30 NOV 67 (1.12.67)	A4	OMAN (SULTANATE OF OMAN)
ZC5	NORTH BORNEO (BRIT)	15 SEP 63	16 SEP 63	9M6	SABAH EAST MALAYSIA
ZC6	PALESTINE (after 14.5.48 was Jerusalem Demil Zone & also Gaza)	01 JUL 68 (30.6.68)*	01 JUL 68	4X & 4Z (Golan Hts - /YK)	ISRAEL (Gaza - /SU)
1M	MINERVA REEF	15 JUN 72	16 JUL 72	A 35	TONGA

NB * To be consistent dates shown in brackets would be more appropriate.

Novice NEWS

Correspondence c/o the Editor, Novice News at RSGB HQ.

SENIOR INSTRUCTORS LIST UPDATE

(See February 1991 Novice News for the full list)

County	Name	Callsign	Home Tel No.
Avon	Mr G J Bennett	G4LJO	0934 843507
Berks	Mr R J Redding	G3VMR	0628 24929
Cornwall	Mr A H Hammett	G3VWK	0726 882758
Cambs	Mr G M Phillips	G0KRB	0954 781813
Devon	Mr P W Thornhill	G6ZKQ	0364 43433
Dyfed	Mr A J Jones	GW4VPX	0559 35485
E Sussex	Mr R C Gornall	G7DME	0424 444466
Gtr Manchester	Mr F Delaney	G4GKT	0942 894182
Hants	Mr P Steed	G6GTM	0705 371677
Herts	Mr J Wedderburn	G4JOV	0582 765821
Kent	Dr K L Smith	G3JIX	0304 812723
Leics	Mr D J Harries	G4WYN	0530 417307
Norfolk	Mr D J Buddery	G3OEP	0493 662323
Northumberland	Mr M Stott	G0NEE	0661 32020
Notts	Mr K C Simmonds	G1NBL	0602 810785
Suffolk	Mr C Muddimer	G1GPD	0787 77004
W Sussex	Mr P G Howard	G0AFN	0243 543399
Wilts	Mr A Anderson	G0BFM	0380 812450

THE BOOKLET detailing how to become a Novice Licence Instructor can now be obtained from RSGB Headquarters. Write to:- Sylvia Manco, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE, enclosing an A5 SAE with 27p in stamps.

CALLING THANET YOUTH

ROSS COLLINS writes to inform readers of an Electronics and Radio Club for Youth which has been going for some years on the Isle of Thanet in East Kent. The leader is Dr Ken Smith, G3JIX, one time member of the RSGB's Education Committee, and now Senior Novice Instructor for Kent.

The average age of members is 13 and activities include building direction finding receivers [*see next month's RadCom for a feature on DF - Ed*], and studying for the Radio Amateurs' Examination and the Novice RAE.

A number of Club members went on a Youth Hostels cycle tour round the New Forest and Isle of Wight where they visited the Wireless Museum at Arreton Manor.

The club newsletter is called *TECnician* [*send me a copy please Ross - Ed*], and anyone interested in joining or helping should write to Ross Collins, 37 Royal Rd, Ramsgate, Kent.

GB2BHS

A SPECIAL EVENT station which will be on the air from Balshaw's High School, Leyland, on 27 April as part of the school's Annual Spring Fair. This is an important date, being the 200th anniversary of the birth of Samuel Morse, inventor of the famous code, *and* International Marconi Day.

The school, first established as a grammar school in 1782 by Sir Richard Balshaw, is now a mixed comprehensive with 850 pupils aged 11 to 16.

Amateur bands at LF and HF will be used as well as 144MHz FM from 11am. The operators would like to make as many contacts as possible, particularly with ex-pupils and ex-staff, or other schools. Accurate and useful Short Wave Listener (SWL) reports would be particularly welcome. A special QSL card is being printed bearing the school crest.

PHOTOGRAPH: ISLAND PHOTOGRAPHICS

One hundred Isle Of Man scouts recently held a 'Go For a Million' camp at Peel City campsite and amongst the activities was an amateur radio station, GB2MSR, set up by Denys Hall, GD4OEC. An interview with Denys and the scouts was broadcast on Manx Radio, and the Isle of Man Courier printed this photograph.

DAYTON SCHOLARSHIP

THE DAYTON Amateur Radio Association in Ohio grants annual scholarship awards worth $1500 to licensed amateurs graduating from high school. Eight awards are available and there are no restrictions on licence class or planned course of study.

SCOUT/GUIDE RADIO OFFICERS

BOTH SCOUTS and Guides have strong connections with amateur radio. John Hughes, G4KGT, is the Scout Association's National Adviser for Amateur Radio. His address is 74 Fairacres, Prestwood, Gt Missenden, Buckinghamshire, HP16 0LF. A scout net can be found on Saturday mornings on 3.740MHz.

The Girl Guide Association's Amateur Radio Coordinator is Jennifer Jackson, G8WWO, Castle Lodge West, Halifax Road, Todmorden, Lancs, OL14 5SQ.

K2BSA

THE NATIONAL Headquarters' station of the Boy Scouts of America, K2BSA, is to have a new station at Camp Wisdom in southwest Dallas County. The site is the highest in the area and several aerial towers are planned. Thanks to sponsorship, a high powered station will be built capable of using a wide variety of frequencies and transmission types.

The log cabin style building will be large enough to hold educational events involving scouting and amateur radio. The station will be the centre of an amateur radio network of 29 scout associations throughout the world.

PUBLICATIONS

RSGB's PROJECT YEAR (Youth into Electronics via Amateur Radio) involves, amongst other things, a series of books. The first three of these are: *Getting Started in Amateur Radio* by Victor Brand, G3JNB; *Novice Licence Examination - Sample Questions and Answers*, by Esde Tyler, G0AEC, and the *Novice Student's Notebook*, by John Case, GW4HWR.

Getting Started will be available for the first time at our National Amateur Radio Exhibition (see centre section this month). It provides an introduction to amateur radio, then describes electronic components and how to build a simple radio, finally leading the reader into how to go about becoming a short-wave listener, and deciphering the jargon of amateur radio. The book refers to the various ways in which to gain more information, for instance by buying *Practical Wireless*, or *Ham Radio Today*, and how the RSGB can help the budding licensee or SWL.

Questions and Answers will be on sale shortly, possibly at the NEC show. It should prove invaluable both for Novice students and their Instructors.

The *Student's Notebook*, the official text book of the RSGB Novice Licence Training Course, can be obtained already from RSGB Sales (see pages 78/79) and will be on sale at the NEC.

More books are planned and we will bring you news of them first in *Novice News*.

Watch next month's *RadCom* for details of an exciting new RSGB publication aimed at beginners of all ages.

CALLING ALL SCHOOLS

RSGB's PROJECT YEAR (Youth into Electronics via Amateur Radio) Coordinator, Hilary Claytonsmith, G4JKS, has compiled a list of schools interested in Amateur Radio. Some have been active for many years; others are newcomers. If you know of any other schools which are not on the list below, and which run school Radio Clubs, please contact Sylvia Manco at RSGB HQ.

Belfast Royal Academy, Belfast. Contact - Noel Moore, GI7CMC, 164 Ardenlee Avenue, Belfast, BT6 0AE. Club call GI7DAW.

Oulder Hill Community Sch, Rochdale. Contact - Chris Jenkins, G7BIG, QTHR.

Brookwood F&M Sch, Woking. Contact - Peter Irwin, G0KLR, QTHR. Club call G0NIW.

Park High School, Colne. Contact - Mike Crawshaw, G4BLH, QTHR. Club call C4CPS.

Bigyn CP Sch, Llanelli. Contact - Rowland Rees, GW7EPO, QTHR.

Donaldsons Sch for Deaf, Edinburgh. Contact David Milne, GM1YXM, QTHR.

The Blue Coat C of E Sch, Coventry. Student contact - Simon Glanville, G7DCY, QTHR.

Looe Sch, East Looe. Contact John Bond, G1ZHH, QTHR. Club call G6RLS.

King's Sch, BFPO 113. Contact - Paul Budge, GW0MGO/DA1GP (not in Call Book). For forces personnel children stationed in Germany. Club call DA1KI.

Frensham Heights Sch, Rowledge, Surrey. Contact - Dick Jones, G0EUV, QTHR. Club call G4FHR.

Harrogate Ladies Coll, Harrogate. Contact - Richard Horton, G3XWH, QTHR. Club call G0HCA.

Marshlands Primary Sch, Old Goole. Contact - Richard Sugden, G0GLZ.

Royal Grammar Sch, Guildford. Contact - Frank Bell, G7CND, QTHR.

Barlborough Hall Sch, Chesterfield. Contact - Rev. Peter McArdle, G0DAG, QTHR.

Brunel Coll of Technology, Ashley Down, Bristol, BS7 9BU. Contact - D R Heald, G0KJI, Mahe, School Lane, Chew Stoke, Avon, BS18 8UY. Club call G5FS.

Alford Academy, Alford, Aberdeenshire, AB3 8JE. Contact - Iain Reid, GM0MYV, QTHR.

Orwell Park Sch, Ipswich. Contact - Paul Whiting, G4YQC, QTHR

Bidbury Middle Sch, Fraser Rod, Bedhampton, Havant, Hants, PO9 3EF. Contact - Brian Cracknell (not in Call Book).

Strathallan Sch, Forgandenny, Perth, PM2 9EG. Contact T S Goody, GM0MXZ, QTHR.

Penrhos Coll, Colwyn Bay, LL28 4DA. Contact - H McCook, GW7FTG, QTHR.

Earlsheaton High Sch, Dewsbury. Contact - Ian Jones, G4MLW, QTHR. Club call G0HSE.

Box Hill Sch, Dorking. Contact - Nick Perfect (not in Call Book).

Lampeter Comp Sch, Lampeter. Contact - Allan Jones, GW4VPX, QTHR.

Pindar Sch, Scarborough. Contact - J C Thompson-Woollons, G10SP, QTHR.

Warwick Sch, Warwick. Contact - Ted Walker, G0KAQ, QTHR.

King Edwards Sch, Birmingham. Contact - D C Rigby, G4SKE.

Old Swinford Hospital Sch, Stourbridge. Contact - C S Williamson, G4CVK (not in Call Book)

Canterbury High Sch, Canterbury. Contact - A Beaumont, G7FWF (not in Call Book).

Downside Sch. Contact G0NFU (not in Call Book)

Tonbridge Sch, Tonbridge. Contact - R J Hughes, G4AJS, QTHR.

John Kitto Sch, Plymouth. Contact T J Field, G0MQD, QTHR.

Keith Grammar Sch, Keith, Banffshire. Contact - L Alexander, GM0MGV, QTHR.

Preston Sch, Yeovil. Contact - C Douglas, G0HDJ.

Long Croft Sch, Beverley. Contact - Duncan Heathershaw, G4MFG.

● QTHR = Address can be found in the latest RSGB *Call Book*.

Simon Kahn (RS89043), passed the Radio Amateurs Examination last year when he was aged 11. A pupil at The Manchester Grammar School, Simon operates on packet radio and HF SSB whilst supervised by his father, Keith, G3RTU. He hopes to start a Novice course soon with his brother Daniel (aged 9) so that he can operate without supervision until he reaches 14. Daniel is already learning morse code.

BELFAST ROYAL ACADEMY

THE BELFAST Royal Academy Amateur Radio Club is the only school club in Northern Ireland affiliated to the RSGB. It came into existence following the success of three pupils and their teacher Mr Moore, (now GI7CMC), in the May 1988 Radio Amateur's Examination.

Interest in amateur radio increased so that membership of the club soon reached double figures. The school's own callsign, GI7DAW, arrived in January 1989.

Most lunchtime meetings of the club involve FM and SSB operation on the 144MHz band, but this has proved somewhat restricting since few local amateurs operate at lunchtime. HF operation would, of course, solve this problem.

Other club activities include constructional work, computer assisted Morse tuition and expeditions.

Requests for donations of equipment have been made amongst local amateurs, in local newspapers and in the amateur radio press, but this has met with limited success. The school has assisted with the purchase of radio textbooks, magazines and the annual licence fee.

The three licensed pupils have now progressed to further education, pursuing engineering courses. It is expected that their interest in radio will continue to assist them with their studies.

Mr Moore supports the RSGB's Project YEAR and has no doubt that amateur radio can promote an interest in electronics which can not only benefit the individual, but in time, the electronics industry.

If any member can assist the Academy, they should contact Mr Moore at Belfast Royal Academy, Cliftonville Road, Belfast, BT14 6JL.

NOVICE NUMBERS

JUDGING BY the number of people enrolled on RSGB Training Courses, it seems likely that over a thousand novice licences will be issued in the first year. Most students are young, though all age groups are represented. The first callsigns - prefixed by the number '2' - should be heard within three months.

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STR11	HF6V Radial Kit	33.50	3.00
MPS	Mounting Post HF6 & HF2	6.00	2.00
20MRK	HF2V 20M Add on Kit	33.50	2.00
30MRK	HF2V 30M Add on Kit	33.50	2.00
TBR160S	160M Add on Kit for HF6 & HF2	64.48	3.00
SC3000	30-512MHz Scanner Vertical	63.99	4.00
2MCV	3dB 2M Colinear	53.99	3.00
2MCVS	5dB 2M Colinear	63.99	3.00
HF5B	5 Band Mini Beam	234.15	—

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154CD	Cushcraft 15-4CD 4El 15M Beam	181.57	8.00
203CD	Cushcraft 20-3CD 3El 20M Beam	238.91	—
204CD	Cushcraft 20-40CD 4El 20M Beam	328.70	—
215WB	Cushcraft 15El 2M Yagi Antenna	98.99	8.00
4218XL	18 Element 2M Boomer	121.90	8.00
A3SS	Cushcraft 3 Ele Tribander SS	324.02	—
A4S	Cushcraft 4 Ele Beam Antenna	391.95	—
A50-6	Cushcraft 6M 6 Ele Beam Antenna	182.51	8.00
AP8	8 Band Vertical	164.76	8.00
ARX2B	Cushcraft VHF Vertical Antenna	45.59	3.00
ARX450B	Cushcraft VHF Beam	42.84	3.00
AV3	Cushcraft AV3 Trapped Vert Ant	75.00	8.00
AV5	Cushcraft AV5 Trapped Vert Ant	151.80	8.00
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D3W	10, 12 & 17M Dipole	159.01	4.00
LAC1	Cushcraft Lightning Arrestor	6.58	1.00
LAC2	Cushcraft Lightning Arrestor	6.58	1.00
R45K	R4 to R5 Conversion Kit	35.01	4.00
R5	Cushcraft ½ Wave Vert 10-20M	259.01	—
TEN3	3 Element Monobander	115.03	4.00
A3WS	Cushcraft 3Ele 18/24MHz Yagi	246.87	—

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MFJ1274	Packet Radio Terminal	204.25	3.00
MFJ1278	Multi Mode Data Controller	228.49	3.00
MFJ16010	Random Wire Tuner	45.08	2.50
MFJ1701	6-way Antenna Switch	39.30	2.00
MFJ1704	4 Position Ant Switch	66.41	2.50
MFJ202B	RF Noise Bridge	63.20	2.00
MFJ204B	Antenna Noise Bridge	84.31	2.00
MFJ250	1KW Dummy Load	56.21	3.50
MFJ260	300W Dummy Load	32.57	2.00
MFJ401B	Econo Keyer Kit	59.21	3.00
MFJ407B	Electronic Keyer	78.73	3.00
MFJ422B	Electronic Morse Key Bencher	146.25	3.00
MFJ422BX	Electronic Morse Keyer W/O Bencher	76.46	3.00
MFJ482B	Grandmaster Memory Keyer	92.77	3.00
MFJ484C	Grandmaster Memory Keyer	162.32	3.00
MFJ722	CW/SSB Filter	76.46	2.50
MFJ723	C/W Filter	48.54	2.50
MFJ752C	Tunable Filter	104.42	3.00
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MFJ901B	200 Watt ATU	70.05	2.50
MFJ910	Mobile Matcher	22.30	2.50
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MFJ945C	Versa Tuner 11 Mobile	97.37	3.50
MFJ949D	De Luxe 300W ATU	168.82	3.50
MFJ962B/C	1.5KW ATU	258.84	—
MFJ986	1.5KW Roller Inductor Tuner	279.62	—
MFJ989C	3KW Roller Inductor Tuner	368.17	—

LOADS & SWITCHES

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T100	Toyo 100W 1-500MHz Dummy Load	45.00	2.00
T200	Toyo 200W 1-500MHz Dummy Load	64.00	2.00
DL1	Texpro 1.5KW 160-10M Dummy Load	75.00	2.00
KS2	Koyo Coaxial Switch 2 way 1.0KW	28.89	2.00
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SA450M	Toyo Coaxial Switch 2 way 2.5KW 1-500MHz S0239	18.50	2.00
SA450N	Toyo Coaxial Switch 2 way 2.5KW 1-500MHz 'N'	26.00	2.00
DRAE UHF	UHF 3 position Antenna Switch 'N'	24.15	2.50
DRAE VHF	VHF 3 position Antenna Switch 'SO239'	18.69	2.50

VSWR/PWR METERS

W160	Koyo 15/60W 2M In-Line VSWR/	32.91	2.00
W544	Koyo 7/40/400W 140-460MHz	107.00	2.00
W560M	Koyo 3/20/200 1.8-520MHz	99.90	2.00
W570	Koyo 5/20/200 1.8-1300MHz	124.75	2.00
K20	Koyo 15/50W 2M	24.60	2.00
K100	Koyo 2KW 1.8-60MHz	79.98	2.00
K200	Koyo 200W 1.8-60MHz	61.55	2.00
K400	Koyo 200W 140-525MHz	63.65	2.00
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IC-726	HF All Band, General Coverage Rx +6M	989.00	—
IC-725	HF All Band, General Coverage Rx 12V	759.00	—
IC-505	6M Transceiver, SSB/CW 12V	529.00	—
IC-2SE	2M FM Handportable with Nicad/charger	275.00	—
IC-2SET	2M FM Handportable Keypad entry DTMF	295.00	—
IC-2CE	2M FM Handportable with Nicad/charger	265.00	—
IC-228E	2M FM Mobile 25W 20 Memo 12V	365.00	—
IC-228H	2M FM Mobile 45W 20 Memo 12V	385.00	—
IC-290D	2M SSB/FM/CW 25W 5 Memo 12V	559.00	—
IC-275H	2M Transceiver SSB/FM/CW 100W 12V	1,039.00	—
IC-4SE	70CM FM Handportable inc Nicad/charger	310.00	—
IC-4SET	70CM FM Handportable Keypad entry DTMF	310.00	—
IC-4GE	70CM FM Handportable inc Nicad/charger	299.00	—
IC-R100	Wideband Receiver	499.00	—
IC-R71E	General Coverage Receiver	855.00	—
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IC-AT500	Automatic Antenna Tuner 500W	529.00	—

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TS6805	HF/6M TX General Cover RX	985.00	—
TS440	9 Band TX General Cover RX	1,138.81	—
PS50	H/Duty PSU	222.49	—
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TT219	9.0MHz 250Hz Filter	60.00	2.00
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TT705	Ten Tec Electret Desk Microphone	65.00	2.00
TT238	Ten Tec ATU 2.0KW 'L' match 160M-10M	361.69	—
TT254	Ten Tec ATU 200W 'T' match 160M-10M	153.33	3.50

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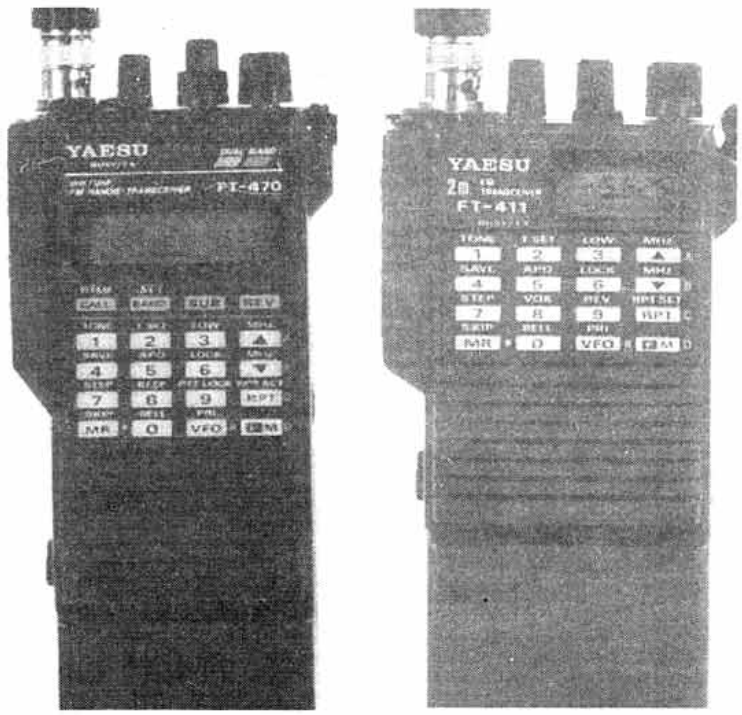

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28HS-2HB	10m HB9CV 2 Element	£65.00	C
VHF/UHF			
DSC 770	Discone 70-700MHz	£24.95	C
TW435D	Discone 400-1200MHz	£46.00	B
D130	Discone 25-1300MHz	£75.00	C
2HB6	6m HB9CV 2 element	£35.00	C
HS-GP62	6m 2step collinear	£64.95	D
ABC23	2m 3 x 5/8 collinear	£63.97	C
GP23	2m 3 x 5/8 collinear	£45.00	C
GPV5S	2m 2 x 5/8 collinear	£45.49	C
SQ144	2m Swiss Quad (Vert. Pol)	£67.95	C
GP714	70cm 14 step collinear	£88.20	C
WX1	2m/70cm 4 5/7 2dB collinear	£54.99	C
WX2	2m/70cm 6 0/8.0dB collinear	£75.00	C
WX4	2m/70cm 7 8/10.8dB collinear	£99.00	C
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SMC17SE	17m Foldover	£18.75	B
RSL28b	10m Foldover	£13.95	B
PL20M	20m Fixed	£22.43	B
PL40M	40m Fixed	£22.43	B
PL80M	80m Fixed	£23.58	B
PL160M	160m Fixed	£23.58	B
HELI5	10/11/12/15/20m two section	£48.88	C
FLEXI10	160-10m	£80.39	C
VHF/UHF			
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2NE	2m 5/8 wave foldover	£13.25	B
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78B	2m 7/8 wave ball	£15.00	B
88F	2m 8/8 wave	£18.00	B
268E	70cm 2 sect collinear	£32.80	B
358	70cm 3x 5/8 wave	£33.73	B
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CA2X4MB	2m/70cm 4 5/7.4dB	£37.75	C
CA2X4KG	2m/70cm 2 x 5/8 + 4 x 5/8 wave	£39.95	C

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SMCSOCAL	Cable Ass. 6m SO239/PL259	£7.20	B
HS-TMK	Trunk Mount H.Duty c/w cable	£18.50	B
SOMM	Mag Mount c/w 4m cable	£12.75	B
SMCGCD	Gutter Clip only	£6.45	B
BSD	Bumper Strap	£11.50	B
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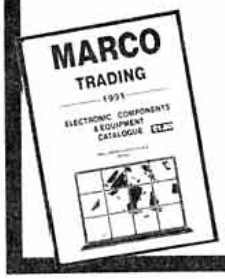

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TOPICS

PAT HAWKER G3VA

ANALYSING GROUND-PLANE AND SLEEVE ANTENNAS

TT, NOVEMBER 1987, pp836-837 included an item 'The groundplane dissected' that referred to the computer (NEC) study by Melvin Weiner of a "Monopole element at the centre of a circular ground plane whose radius is small or comparable to a wavelength" (*IEE Trans on Ant & Prop*, May 1987). This indicated the vertical radiation patterns of quarter-wave elements with varying forms of circular (radial) ground planes, introducing the novel concept of a GPA with a groundplane of zero-extent.

The zero-extent concept was followed-up by Dr Brian Austin, G0GSF, who ran it to earth (no pun intended) in the book *Monopole Elements on Circular Ground Planes* by M M Weiner *et al* (Artech House, 1987). This resulted in *TT* (March 1988) reproducing a diagram of the Weiner form of zero-extent GPA, showing the use of lossy ferrite toroids (beads) around the coaxial feeder cable, providing a choke against the flow of outer-braid current. This description, unfortunately, left unanswered the question of the return current, and I received no further comments on this potentially interesting form of antenna until recently Peter Chadwick, G3RZP, mentioned the Artech book as a source of reference.

The GPA, particularly for VHF, remains of considerable interest not only to radio amateurs (for whom it provides one of the most popular simple antennas on HF) but also for professional users. This interest is reflected in 'Sleevve Antenna with Ground Wires' by Mitsuo Taguchi *et al* (*IEEE Trans Ant & Prop*, January 1991, pp 1-7). This presents a detailed mathematical and experimental analysis of a sleeve antenna, a monopole antenna with ground wires (ie the GPA with wire radials) and a sleeve antenna with ground wires.

Among the information presented in this paper is some useful information on the input impedance of a GPA with the radials at different sloping angles (**Fig 1**). The authors note that the input impedance depends on the length of the ground wires (radials) and their inclination, making it easy to match the antenna to a 50Ω feeder by adjusting these parameters, adding: "Since the input resistance of this antenna with inclined ground wires decreases considerably for some feeder lengths, the mismatch of impedance with the feeder and degradation of radiation characteristics arise."

The sleeve antenna is much less popular with amateurs than the GPA although long featured in the handbooks. It normally consists of a monopole with a quarter-wave extension surrounding the feeder cable; the idea of adding radials to the sleeve, as described in the IEEE paper, is new to me, but it is concluded that a sleeve antenna with ground wires combines the advantages of both a sleeve antenna and a Brown GPA: "The input impedance of the sleeve antenna with ground wires can be easily changed by adjusting the length, inclination angle, and position of the ground wires. The directivity is not sensitive to these parameters when the lengths of the ground wires are less than 0.2λ.

"The input impedance is 50Ω and the actual gain is about 2.1dBi when the length of the sleeve is 0.2λ, the length and inclination angle of the ground wires are 0.1λ and 0°, and the distance of the ground wires from the feed point is 0.025λ. The current induced on the feeder of the sleeve antenna can be reduced at the design frequency of the *sperrtopf*."

The experimental UHF (340MHz) model antennas used by the Japanese authors include a 'quarter-wave *sperrtopf*', to suppress or reduce the RF current feeding back down the outer braid of the coaxial feeder cable. This appears to be some form of tuned, coaxial stub forming, in effect, an RF choke on the outer braid. Unfortunately, no details of the construction of such a *sperrtopf* is given in the paper, but the reader is given a reference to the Japanese-published book *VHF Antennas* by H Uchida and Y Mushiake, Tokyo 1955, p192. Of the sleeve antenna without ground wires, it is considered difficult to match this antenna to a 50Ω feeder, so that it "is usually constructed with a matching circuit such as a coaxial impedance transformer." **Fig 2** shows details of the 340MHz test antennas.

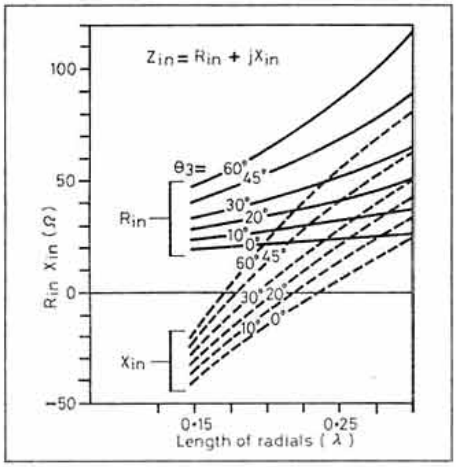


Fig 1: Calculated input impedance of a quarter-wave ground-wave type antenna with varying lengths of radials for different downward inclinations.

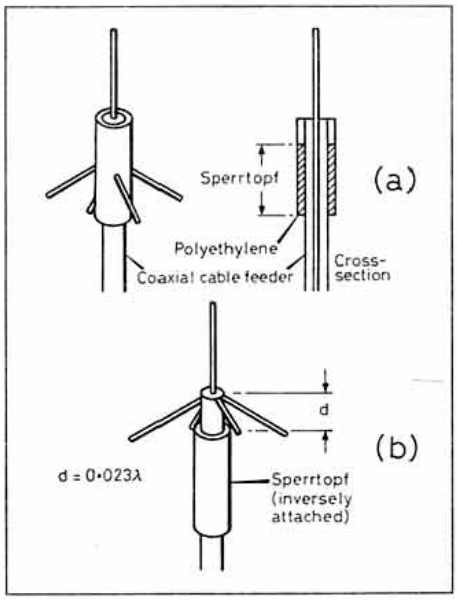


Fig 2: Test antennas as used by Mitsui Taguchi *et al*. (a) Sleeve antenna with ground wires (radials). (b) Monopole with ground wires (i.e. GPA). the *sperrtopf* appears to be a form of coaxial stub arranged to suppress RF currents on the outer-braid of the coaxial cable feeders.

Of the quarter-wave monopole with ground wires in the horizontal direction, it is concluded that the input resistance is near 20Ω even if the length of the ground wires is increased up to 0.3λ: "It increases as the ground wires are inclined below horizontal and their lengths are increased. The input reactance varies towards inductive as the lengths of the ground wires are increased.

The so-called Brown antenna (ie the ground-plane antenna as originally described in the 1930s by Dr George Brown of RCA - G3VA), which is a monopole antenna with quarter-wavelength horizontal ground wires, has a directive gain of 1.61dBi. The gain increases slightly as the ground wires are inclined in the downward direction. When the angle of inclination is 60°, the gain increases to 2.11dBi, which is about the same gain as a half-wave dipole.

The antenna can be matched with a 50Ω feeder if the ground wires are about 0.17λ long and are directed 60° downwards. The gain is then improved by about 0.5dB compared with the horizontally directed quarter-wavelength ground wires. However, the current induced on the surface of the feeder is not small compared with the current on the antenna. Without a *sperrtopf*, the input resistance seems to depend on the length of the feeder, and is smaller than the value calculated by neglecting the effect of feeder if the ground wires are inclined downwards. This creates an impedance mismatch and results in performance degradation." I wonder if any reader can provide fuller details of the (clearly useful) *sperrtopf*?

IF-DERIVED AGC WITH PLESSEY ICS

JAN-MARTIN NOEDING, LA8AK, has in the past not used the well-known Plessey 600/1600 series of integrated-circuit device because of his dislike of AF-derived AGC. He belieeves that Plessey adopted this system because of the excessive broadband noise produced at the IF-output when, for example, three SL612 (1612) devices are connected in series. This noise tends to 'overload' a normal AGC circuit. G8LRH referred to this effect in *DUBUS* (1983) in connection with the ICOM IC402 transceiver, and SM6HYG encountered the problem when using three SL612 devices in series.

He cured the broadband noise problem in one of his receivers by fitting an extra crystal filter in front of the last IF stage - an excellent solution that has been advocated several times in *TT* in reference to the Drake R4C receiver (see August, October 1984, July 1986 etc). Professional communications receivers often tackle the problem of broadband noise produced in the IF chain by using a 'roofing filter' early in the chain and the

placing the main SSB/CW filters further down the chain.

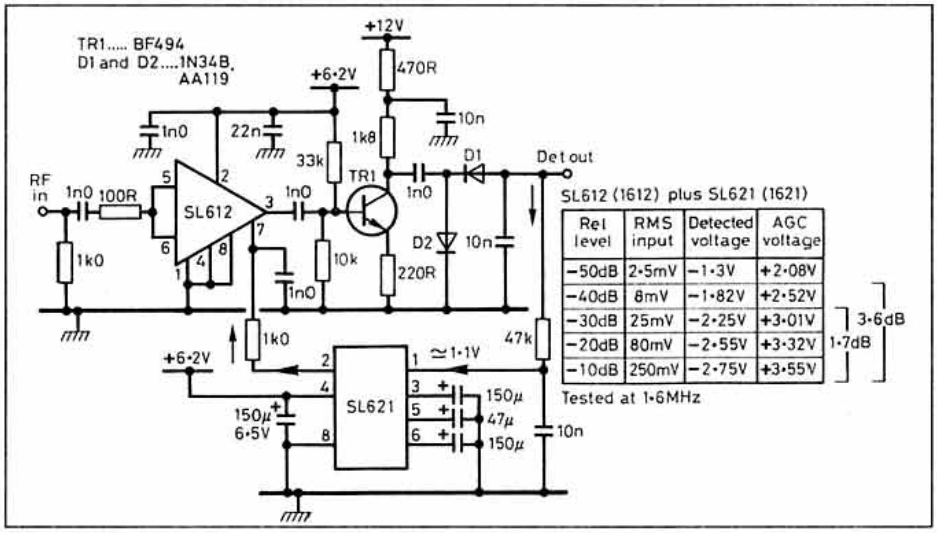
LA8AK comments: "I suspect that the same problem of IF broadband noise found in the Drake R4C receiver exists also in the ICOM IC735 and IC740, and possibly many other receivers, since friends with these transceivers tell me there is a background noise which does not disappear even when the incoming signals are strong. But I wonder why such problems are apparently seldom, if ever, mentioned in the equipment reviews in the amateur-radio periodicals? Too often, they appear to be trying to help the manufacturers sell their equipment rather than helping the discerning amateur decide which equipment to buy". *[An accusation which cannot be directed at RadCom's top reviewer, Peter Hart, G3SJX - Ed]*

LA8AK has since written further on the problem that manufacturers tend to persist in retaining circuit techniques that can result in less-than-ideal and even mediocre performance in successive models extending over a number of years. I hope to digest his comments another month.

But to return to the topic of IF-derived AGC and an arrangement that, even though an SL621 is fed from a DC signal, control is directly detected from the IF signal. Old-time valve designers may recall that a double-diode valve was commonly used to provide separate audio envelope detection of AM signals and IF detection in order to provide delayed-AGC. In contrast, the usual SL621 AGC device is controlled only from the product-detected audio signal.

LA8AK writes: "Recently, I needed a simple circuit to use with my FT-902 transceiver to give an indication of the signal-to-noise ratio. The circuit functions of the SL620/621 were studied and it seemed worth trying another approach to using this AGC-generator device. My circuit is shown in **Fig 3**. Results seem fairly good, about what might be expected from a circuit with AGC control on only one stage.

"To obtain a higher output voltage swing and additional gain, an extra transistor buffer amplifier is used. I am puzzled why nobody else seems to have thought about using a similar arrangement since it enables the SL621 to be used for AM, FM and CW/SSB, which I feel is an important consideration. Instead of using this negative-going envelope-detector, the AGC-generator may be connected to some positive detector circuit, with the current mirror-connected to the input of the SL621 (SL1621) in which case the input (pin 1) stays at about +1.05 to 1.1V for varying RF input levels."



Rel level	RMS input	Detected voltage	AGC voltage
−50dB	2·5mV	−1·3V	+2·08V
−40dB	8mV	−1·82V	+2·52V
−30dB	25mV	−2·25V	+3·01V
−20dB	80mV	−2·55V	+3·32V
−10dB	250mV	−2·75V	+3·55V

Fig 3: LA8AK's method of obtaining IF-derived AGC with Plessey SL600/SL1600-series of receiver ICs.

LOW-RESISTANCE EARTHING

IN COMMENTING ON THE 'lazy man's multibander' HF-antenna contributed by George Cripps, G3DWW, (*TT*, January 1991), I expressed surprise at the absence, in the diagram he sent along, of an earthing point at the antenna end of the coaxial feeder cable. In this type of quarter-wave inverted-L type of antenna, the real earth provides the missing quarter-wave section. I also emphasised that the loss-resistance of such an earth not only reduced radiation efficiency but could also result in a misleadingly low VSWR on the feeder.

KEYING A QRP TRANSMITTER

THE NUMBER OF PUBLISHED designs for compact QRP CW transceivers, with outputs ranging from about one to ten watts, has increased recently with *TT* featuring some of the basic circuitry for both receiver and transmitter sections. It is also possible to use such rigs to provide the drive for higher power amplifiers such as those based on low-cost switching FETs. However, an essential feature of such equipment is to provide the necessary control circuits needed to provide shaped keying waveforms, sidetone and transmit/receive (T/R) switching. *TT* has included (March 1991) the superhet receiver section of the 14MHz 5W transceiver described by Gary Breed, K9AY in his two-part article in *QST*, December 1990 and January 1991. The transmitter section in Part 2 uses an NE602 to convert the common VFO to signal frequency, followed by an LM6321 as buffer amplifier, 2N3866 as driver and the popular MRF475 bipolar transistor as power amplifier. His control circuits (**Fig 4**) are built on the transmitter board, providing sidetone, shaped keying of the LM6321 and 2N3866 and the T/R switch. Such control circuits could find other applications in this general class of equipment.

K9AY describes the functions as follows: "T/R switching is done by keying a 2N3906 transistor (TR4) which drives an RC network through a blocking diode. The rapidly charged RC network turns on TR5, pulling in the T/R relay. The discharge time of the RC network is controlled by a trimmer pot (DELAY) that can be set for the desired hold-in time. The relay is a small DIP-outline DPDT unit. One set of contacts switches the antenna and the other feeds power to the NE602 (transmitter) and the receiver-muting circuit.

"Keying begins with two sections of a CD4001 CMOS quad NOR gate (IC3). Its 12V output drives a TIP110 Darlington-pair power transistor (TR3) that switches DC to the LM6321 buffer and 2N3866 driver stages. A series-R, shunt-C network to ground from the keying transistor's base shapes the keyed waveform . . . . The sidetone is generated in IC3A and IC3B which form a keyed square-wave oscillator. The component values shown yield a roughly 800Hz note with a 12V supply which assists in zero-beating incoming signals. Some variation in pitch occurs with different CD4001s and changing supply voltage. The oscillator's high output level is attenuated by a 470K resistor in series with the 5K SIDETONE LEVEL control."

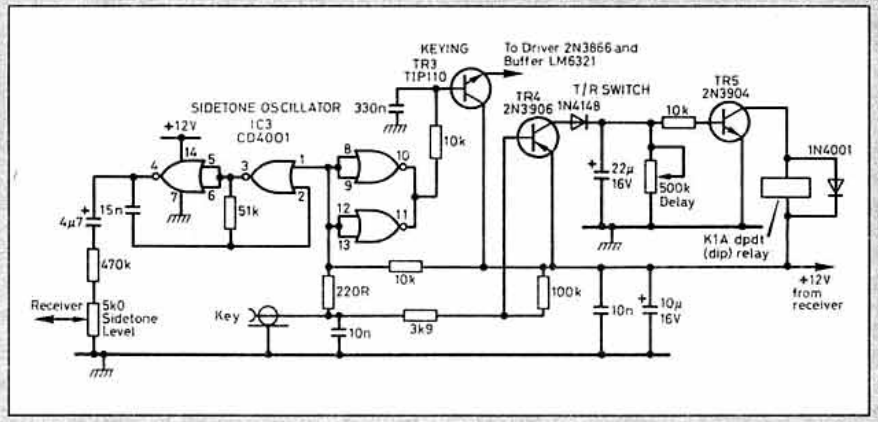


Fig 4: Control circuits of K9AY's QRP transceiver providing sidetone, shaped keying waveform and T/R switch.

In the follow-up letter, G3DWW agreed with my comments but added that in fact he does have a good RF earth connection at the antenna end of the feeder, though he omitted this in his diagram. His earth comprises a spike about 2ft from the end of the coaxial cable, paralleled to three 4ft earth spikes at the end of 20ft radials buried about 2in under his lawn. One radial runs directly under the horizontal run of the antenna.

Even so, he has measured the DC earth resistance as roughly 20Ω, which he assumes could be limiting the radiation efficiency to roughly 50% - a quite reasonable and practical figure for such a simple multiband antenna. This assumes that the RF loss resistance is the same as the DC resistance, an assumption that is probably pessimistic in view of the presence of the radials; in practice the efficiency may be appreciably higher than he suggests. Incidentally, it is yet another indication that the use of elevated quarter-wave-resonated radials (possibly much reduced in size by the use of inductive loading as suggested by G6XN, or by the adaption of DL1VU's 'sardine tin opener' folding technique as a counterpoise rather than a top-loading system; see G4LQI's *Eurotek* column in the February *RadCom*, p45) is likely to prove superior to the use of earth spikes alone. It may, however, still be advisable to earth the system to reduce damage from nearby lightning strikes.

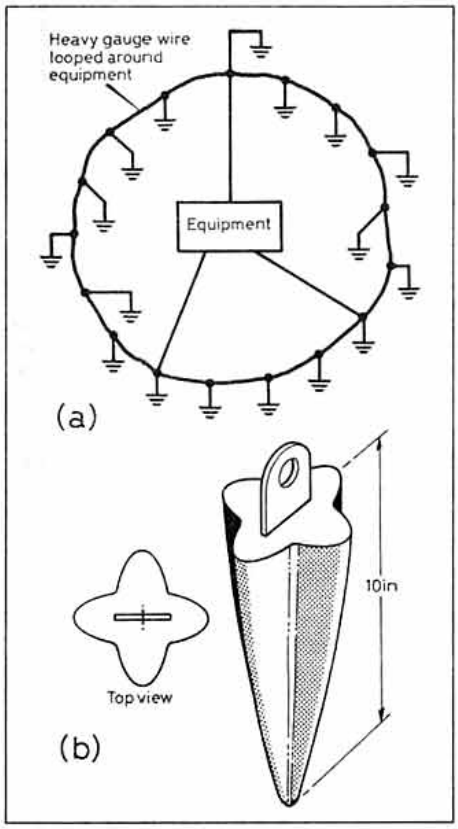


Fig 5: Surface-wire-ground (SWG) system as used by US Army. The SWG wire is looped around the equipment and earthed at 15 to 18 points, using the 10in ground stakes of cruciform shape with connecting bolt at top as shown in (b).

In practice, a DC earth resistance of 25Ω probably represents a better than average figure for amateur radio earthing in typical residential areas. A useful item on 'improved grounding techniques' appears in the new column by Bill Orr, W6SAI 'Radio Fundamentals; things to learn, projects to build and gear to use' which started in *CQ*, December 1990, p85. This is based on an article in the American military-communications magazine *Signal* (March 1988), brought to W6SAI's notice by George Riddle, W6FMZ.

Signal reported earth measurements made by the US Army Materials Systems Analysis Activity outfit in various parts of the USA. They found that measurements using a single 6ft earth rod (of the type used by the US military for over 50 years) ranged from 13Ω in moist soil at Fort Story, Virginia, to over 7000Ω at Fort Lewis, Washington. The US military regards 10Ω as the upper limit of acceptability, presumably requiring the use of multiple earth rods for virtually all installations.

The W6SAI item continues: "Continued testing on various grounding schemes led to the surface-wire-ground (SWG) technique. The early SWG consisted of a number of 6in-long stakes used to secure a 100ft-long, 1/8in dia, cable to the earth in a straight line. In the final design, the wire length is reduced to 70ft, the wire being grounded along its length by 15 stakes, each 10in long. The wire is looped around the equipment, and three heavy connecting wires ground the equipment to the SWG as in **Fig 5**.

"The short ground stake is a tapered, star-shaped design (**Fig 5(b)**) that provides enhanced soil contact and can easily be inserted into or removed from the ground.

"The SWG has been tested against a conventional 6ft ground rod in a number of locations in the continental United States, Alaska and Germany. In all cases, the SWG offered improved performance, with values ranging from 2:1 to 10:1 better than the ground rod."

144MHZ HAND DOPPLER DIRECTION-FINDER

UK AMATEURS SEEM TO have rather lagged behind those of some other countries in developing direction-finding equipment for VHF rather than for 1.8MHz "ground-wave" signals. *TT* (September 1990, p34) included details of a compact highly directional "miniature electromagnetic-coupled foxing (MEF) antenna, intended to be implemented as a gun-type hand-held system for use with a 'straight' field-strength-type receiver (*TT*, March 1991) as a 144MHz 'sniffer' system developed by John Williscroft, ZS6EF, and originally described in *Radio-ZS* (February & March, 1990).

More recently, ZS6EF has described (*Radio-ZS*, combined November/December 1990 issue) a very different form of 'ultimate 144MHz direction-finder' for which he claims the following advantages: (1) simple to build; (2) high accuracy; (3) works with any 144MHz receiver/transceiver; (4) does not need attenuators; and (5) takes you right to the transmitter.

He believes that "this piece of equipment is very close to the ideal direction-finding tool." It works with any FM hand-held receiver (factory-built or home-made) or transceiver (provided this is not used in the transmit mode with the doppler D/F antenna) without requiring an S-meter or any connections to be made inside the receiver. It can be used at night without lights and without adjustment of controls. ZS6EF considers that it is the most accurate VHF D/F equipment he has yet seen and also the most simple to build: **Fig 6**.

Unlike the more usual form of direction-finding based on swinging a directional antenna for minimum or maximum signal strength, his system represents a hand-portable adaption of the doppler D/F system which depends on the slight difference in path lengths from a hidden transmitter to two similar antennas connected to a receiver via an electronic change-over switch: **Fig 7**.

The switch connects each antenna to the receiver in turn at a rate of about 500Hz. Provided the whole system is balanced with equal feeder paths, when the path lengths are the same, **Fig 8(a)**, the signals from each antenna will be identical in frequency and phase. But only a very small swing of the doppler antenna structure, **Fig 8(b)**, will result in the signals presented to the receiver input being delayed and advanced at the switching rate. In effect, the receiver then 'sees' a frequency (phase) modulated signal and emits a 500Hz audio tone, which vanishes when the path lengths are identical. ZS6EF points out that the null point is very accurately defined, although as with a 1.8MHz loop without a sense antenna, the bearing does not indicate whether the transmitter is in front or behind the observer. However, the user need take only a few steps to the right or left, again find the null resulting in a heading a little to the left or right of the first heading, from which the direction as well as the bearing can be deduced.

How far it is necessary to walk sideways to establish a 'base line' depends on the distance from the transmitter, but ZS6EF suggests this need not be more than about 12 or 15 metres even if the transmitter is up to 40km distant, though this seems to me incredible with such a simple hand-held antenna and I wonder if this was a misprint for 4km. If the receiver tone is not a clean one but appears to contain a wobble or a high tone superimposed on the switched tone, this is an indication of multipath reflections; it will usually be possible to overcome this (except possibly in urban areas) by moving a short distance to a new position.

The electronic switch together with two broadband FET pre-amplifiers are built on a small piece of double-sided PCB (**Fig 9**) and fitted inside a standard electric-wiring junction box, taking care that the whole system is balanced. Mark/space ratio of the switch is adjusted by R3 (20K trimpot) preferably using an oscilloscope but quite possible by using a local transmitter.

While the antenna elements could be full-size half-wave dipoles, this would result in a rather bulky unit. ZS6EF shortens his element lengths from 1000mm to about 450mm by spiral winding the elements on 6mm dowel, making it easier to run through bushes or store the antenna in a car boot, as well as providing a convenient form of balun transformer.

The structure is made using two 20mm-diameter conduit T-pieces with inspection covers; one 20mm round junction box with an outlet each side and one on the bottom in the

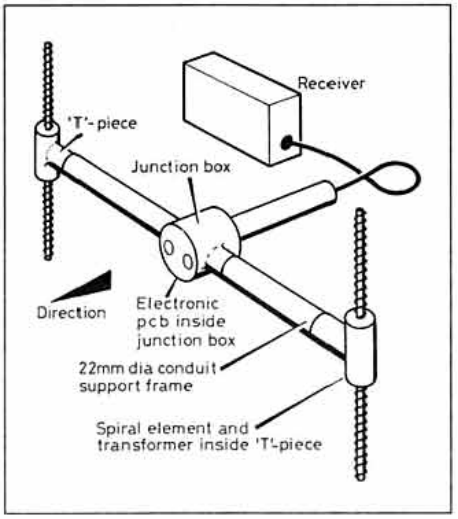


Fig 6: ZS6EF's hand-held 144MHz doppler direction finder.

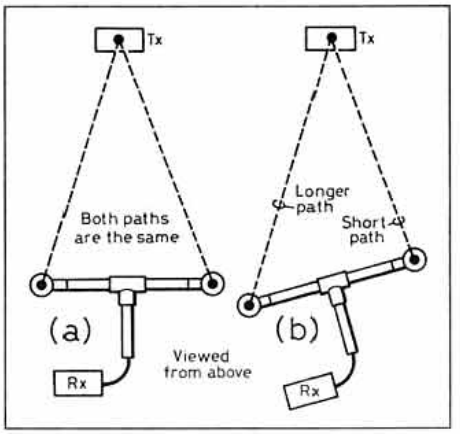
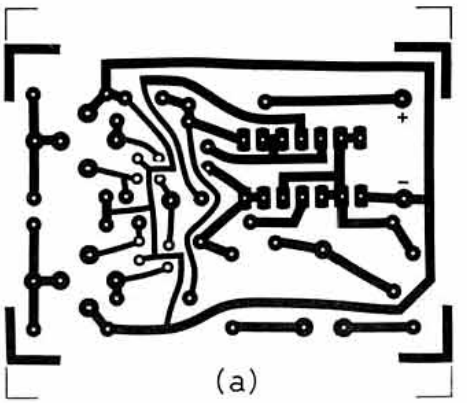


Fig 8: Principles of the doppler D/F. (a) Equal path lengths to the transmitter produce no 500Hz tone in the FM receiver, providing an accurate 'null'. (b) When the path lengths differ, even only slightly, the receiver 'sees' a phase-modulated signal and produces 500Hz tone.



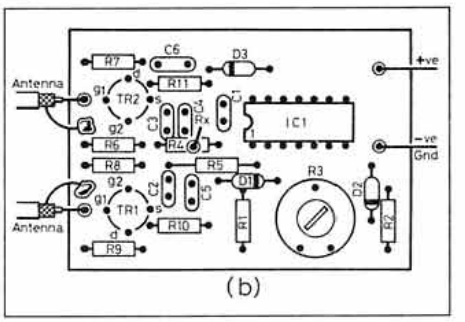


Fig 9: (a) Solder side of the PCB looking from the top. This is produced on double-sided board leaving the component side as a ground plane. Solder all ground pins on both sides of the board. The coaxial feeder cable is connected to component side (b).

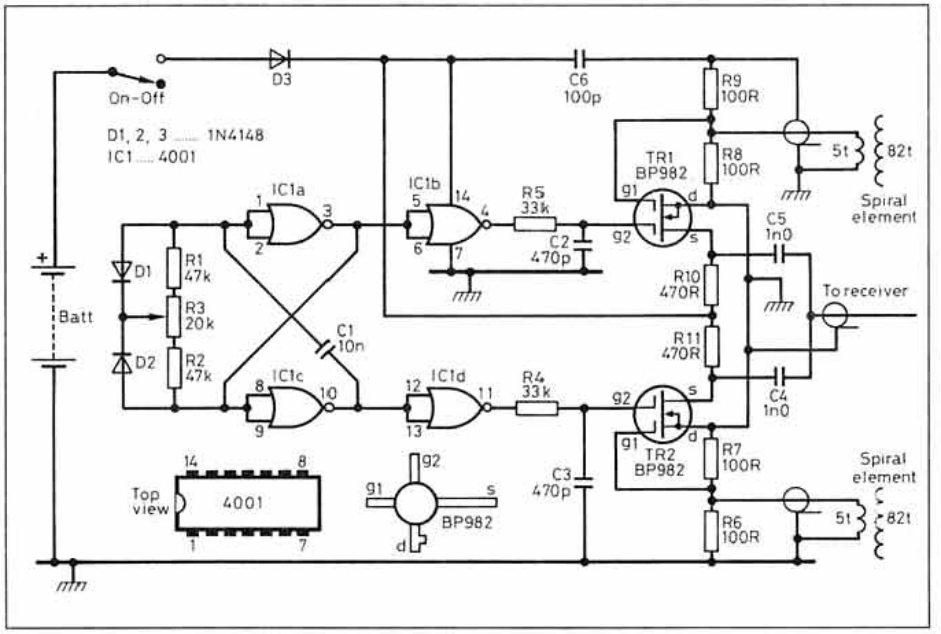


Fig 7: The 500Hz electronic switch and FET pre-amplifiers contained within the junction box of the doppler D/F.

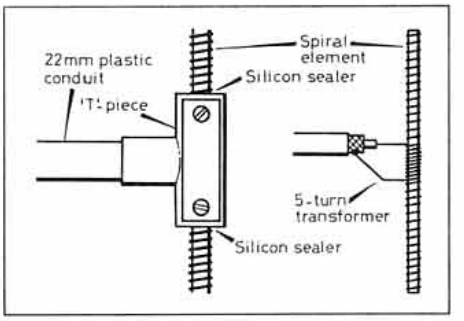


Fig 10 Constructional details of the spirally-wound antenna elements and coupling transformers (which must be wound over the electrical centre of the dipole elements).

middle; one round junction box to be used as a lid; three pieces of 20mm conduit tube each 300mm long; two lengths of 6mm dowel 450mm long; 1.5m of 50-ohm 6mm coaxial cable; a BNC coax connector; two 5mm by 40mm brass machine screws; four metres of 0.8 or 1.1mm copper wire for the antenna elements; one double-sided PCB; plus the electronic components.

The two elements are made by winding 82 turns of 0.8 or 1.1mm wire onto a 6mm wooden dowel 450mm long evenly spaced. Larger dowel will not resonate correctly as the ratio of interturn capacitance and the inductance must be correct. Elements must be balanced, the spiral construction allowing a transformer to be easily wound around the centre. The transformer consists of 5 turns around the exact centre of the element: **Fig 10**. Exact tuning of the elements to the required frequency is necessary to optimise the efficiency of the spiral elements. This can be accomplished by taking a grid dip meter exactly in the physical centre of the element and adjusting the turns until the element is on 145.5MHz (or the required frequency). Antenna elements will cover the whole 144MHz band if dipped at the centre of the band. Cover the elements with varnish once the complete unit has been tested and found satisfactory.

WIDEBAND AMPLIFIERS AND A WARTIME NFD

ONE MURKY AFTERNOON in mid-November 1941, I arrived at Hanslope Park where the 'special intercept station' of Special Communication Unit No 3 then comprised half-a-dozen HRO receivers in the corn bins of a small granary, plus a few nondescript random length wire antennas (plus one low quarter-mile or so long Beverage antenna pointing towards Norway). I had been unwillingly plucked out of 'Box 25 Discrimination', to which I had been originally assigned, on the grounds that I had been one of the first of the new VI special enlistments unwise enough to have passed the 'A' (25WPM) Morse reception test on entry. Hence, it was deemed that I should face the discomforts of the 'country farmyard', as the Park was known, rather than live in billets in Barnet.

The granary soon gave way to the Lodge. Meanwhile, the large receiving station (demolished only a few years ago) was still being built. It finally became operational in May 1942, furnished with a magnificent set of rhombic antennas (8 - 16MHz), vee beams (4 - 8MHz) plus a set of drooping wire antennas suspended from catenary wires on four poles placed around the building. Each of the rhombic/vee-beam antennas, which together covered all points of the compass, was fed into a unique-design of wide-band amplifier, each with ten outlets that each could be patched into any of the 66 HRO receivers. The amplifiers and patching sockets were all assembled in the centre of the building in a metal structure that many years later was destined to be condemned to destruction on the grounds that it resembled a French street pissoir.

The antenna farm was largely the creation of Robin Addie, G8LT, as a member of Major Keen's SCU3 Engineering Section, aided by 'Digger' Buick, G3XJ, and his riggers. The

wide-band amplifiers were the pride and joy of Dud Charman, G6CJ, who obtained leave of absence from his professional work at EMI to design and build the initial models at the Park, assisted by Jimmy Mathews, G6LL. It should be remembered that at the time only very limited experience had been gained in the design of highly-linear wideband amplifiers for radio engineering, although G6CJ had been involved in pre-war pioneering work on the distribution of TV signals over cable. The WBAs he developed used 807 transmitting valves as small-signal amplifiers to achieve the required linearity and isolation between the receivers. The HRO had a particularly strong HF local oscillator voltage that leaked out via its antenna terminals and could cause interference problems when a number of receivers were operated in close proximity.

G6CJ's WBAs proved extremely successful, so much so that I believe that the Canadian Professor Bayly, who had been brought secretly to the UK to advise on radio communications and cryptology, tried to persuade Dud to join him in North America after the war.

G6CJ, in describing his work on the WBAs in *OT News*, No 20, January 1991, writes: "With the filter amplifiers the maximum gain-bandwidth is determined by the input and output capacitances of the valves. About 15pF for the input and 3pF for the output. The filters incorporate such capacitances in the shunt elements and enabled an impedance transformation to get a little extra gain. A gain of about 10dB per stage could be achieved from Long Wave to about 15MHz in the amplifiers developed for the TV distribution system. An ordinary receiving valve could cope with the input from a large antenna over this band, but a power valve was needed to feed a large number of outlets without interaction or cross modulation products.

"The popular 807 did this job very well . . . Within the specified two months, the design work was done for three octave-band amplifiers and construction well under way . . . . They even improved the signal-to-noise ratio of the HRO receivers (the use of maximum possible impedance at the grid of the first stage meant that the stages had *optimum noise factor* although that phrase was yet to be invented) . . . . The whole system was screened and no complaint was ever heard about interference between the receivers (provided they were connected to the beam antennas through the WBAs, see below - G3VA), or about (spurious) signals that 'weren't there' . . . . In 40 years of radio engineering this was the job which gave me the most satisfaction".

What G6CJ may not have appreciated was that each operator was given key switches that connected one of the drooping wire antennas to his receiver directly. But let Gerry Openshaw, G2BTO, take up the story. He was another of the 100-plus pre-war amateur Voluntary Interceptors who spent many months at the 'country farmyard'. He later departed for the buried metal tanks, of the Special Communications network of Alcock-type HF D/F stations to which the special intercept stations passed the signals of the Geheimen Funkmeldedienstes (Secret Radio Reporting Service) of the German Abwehr. A fuller description of his wartime experiences with SCU3 'Wartime NFD' appeared in *OT News*, No:15, October 1989. He writes:

"Some 100 pre-war radio amateurs, plus Post Office and ex-marine radio officers, took over the first SCU purpose-built intercept station (in May 1942) and brought it to life. Each operating position contained two HRO communication receivers, with a control panel enabling different antennas to be switched in, receiver outputs parallelled or divided one to the left and the other to the right earpiece. It could also be fed througgh to the D/F network linked by land lines to stations as far apart as Thurso in the far north of Scotland, St Erth near Penzance in Cornwall, Belfast, and Wymondham in Norfolk.

"For less demanding use, each set had its own 'long wire' antenna which comprised some 30-ft of wire or so passing through window ducts and then slanting upwards at about 45° to the supporting wires slung between the poles, thus comprising many antennas in close proximity, producing an interference problem that we soon learned to turn to our advantage.

"The local oscillator in the HRO radiates well when the set is directly connected to an antenna. By using the selector switch on the bay's control panel as a Morse key it was soon found that operators on the same shift could 'work' one another late at night when the Abwehr operators were safely asleep. It was 'real DX' to make contact with one of the operators at the opposite end of the station, 'locals' were the neighbouring bays. One HRO provided the 'transmitter', tuned to 455kHz below the frequency to which the 'receiver' HRO was tuned; then call TEST (UK amateurs were forbidden to call CQ from about 1925 until the resumption of activities in 1946). At around 0300-hours, with few 'skeds' and the higher frequencies 'dead', the 28MHz band would spring to life. In June 1942, one genius, realizing that in peacetime he would be at NFD, called Test NFD, and soon others joined in with their own callsigns or, if not pre-war amateurs, taking on the role of the DX stations. I well remember working a 'W6' and, then, the shift over, finding a home-made QSL card on the pillow of my bunk!"

G2BTO does not mention one cruel but possibly justified practical joke played on one bumptious young operator whose many excesses included boasting that he could copy anything the German or Italian operators could send. Keyed tone from a Morse key on the 'concentrator' console, (normally used to communicate with the D/F network) could be fed into the operators' headphones.

VFO TEMPERATURE COMPENSATION WITH THERMISTORS

JOHN BEECH, G8SEQ, in a note also prepared for *Sprat*, describes a practical way he hit upon a couple of years ago to compensate for temperature drift of free-running oscillators. This is based on the use of an NTC thermistor (resistor showing a steep reduction in ohmic value with increasing current/temperature) rather than the usual NP0 ceramic capacitors (or, if you are lucky enough to have one, the rather expensive Oxley Tempatrimmer, nominal capacity 6.5pF with temperature coefficient variable from + to - 2000 parts per million, or the less costly Oxley Thermo Trimmer with a nominal capacitance of 2.5pF with temperature coefficient variable from + to - 1000ppm).

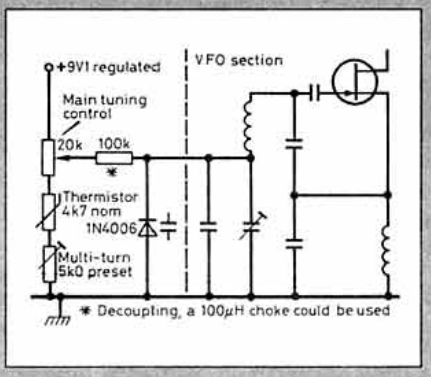


Fig 11: G8SEQ's temperature compensated VFO using an NTC thermistor to adjust the voltage across the electronic tuning diode.

G8SEQ shows that for varicap (electronic tuning diode) tuned VFOs, an NTC thermistor can be arranged to overcome either positive or negative frequency drift by controlling the voltage applied to the diode (**Fig 11**). For oscillators not tuned by varicaps, it is still possible to use the technique by fitting one across the tuned circuit. He writes: "As the temperature increases, the resistance of R_c decreases, thus reducing the voltage at point A. This causes the varicap to increase its capacitance, thus reducing the frequency of the tuned circuit and correcting *positive drift* (ie where the oscillator drifts higher in frequency with increasing temperature).

"To correct negative drift, the thermistor and preset should be connected in series with the top half of the potentiometer forming the main tuning control. the action is then reversed.

"The preset resistor is used to adjust the amount of effect that the thermistor has on the tuned circuit. If the correct thermistor is chosen, the drift can actually be reversed within the range of the preset resistor; ideally the turnover point should be about the mid-range point of the multi-turn preset.

"I used a Spectrol ten-turn pot and a disc-type thermistor (Farnell KED 4721C7) to compensate an 8.3MHz VFO which was tripled and then doubled to 50MHz. Originally this drifted at the rate of about 100Hz per second at the output frequency with an almost imperceptible temperature increase. After compensation the frequency only changed by about 30Hz in a five minute period."

G8SEQ wonders whether this is a genuinely new idea. He has never seen it described in print and such an application is not mentioned in the Mullard (Philips) Technical Handbook 3, Part 1f, dealing with thermistor applications. He would be interested to discover if he can claim originality or whether he has only re-invented a wheel already used in TV tuners or somesuch!

Late one night, the operator in the bay next to the victim pretended to tune into a priority service and then claimed that the CW was too fast for him to copy. He passed over his headphones to the unsuspecting victim, with other participants standing by either to take their turn at sending the spurious 'traffic' or to snatch each message from the hapless victim as soon as it was complete, ostensibly to rush it to the teleprinter room for transmission to Bletchley Park, but in reality to fall about laughing as the concentrator 'station' continued for several hours to bat out a long series of messages. The victim was so bemused that he did not even twig what was going on when finally the QTCs lapsed into plain language such as 'Roses are red . . . . etc". I never learned when the penny finally dropped.

RF AFFECTS TEST METERS, ELECTRONIC REGULATORS ETC

RECENTLY, I DECIDED to check the dynamic regulation of the external 300V PSU that powers the buffer/frequency-multiplier stages of my ancient Labgear LG300 CW transmitter with the aid of a conventional (analogue/Russian-made) multi-testmeter. To my surprise, when I pressed the Morse-key, the volts dropped steadily downwards virtually to zero volts - yet the transmitter showed its normal PA current and usual RF output. It took time for the penny to drop. I use an end-fed 'long-wire' antenna with the ATU located a few feet away from the transmitter with the result that there is a good deal of RF floating around (though not, I hope, sufficient to constitute a serious health hazard).

Eventually, I realised that the meter leads were picking up enough RF to affect greatly the measurements made on a fairly sensitive meter. This was quickly confirmed by repeating the measurements while running the transmitter into a dummy load (electric light bulb, suitable for CW but not for SSB because of the large difference in resistance between cold and hot filaments). This showed the PSU regulation was reasonable for the application.

At the time, I felt this was an unusual problem unlikely to affect many others. However, in *QST*'s *Hints & Kinks* (January 1991, p36), Charles P Baker, W2KTF, draws attention to this problem. On his 144MHz mobile transceiver, the nominal 12V reading dropped by nearly a volt when he keyed the transmitter on. Convinced that this was not actually happening, he by-passed his multimeter for RF and it then indicated the correct 12V when the transmitter was on or off.

W2KTF writes: "A multimeter can give strangely erroneous readings in the presence of an RF field, or when ultrasonic audio energy is present in the DC or low-audio circuit under test. This effect can be especially severe when the meter test leads pick-up RF energy. Modern multimeters include protective diodes across the terminals of their meter movements. This arrangement can allow rectification even when the meter rectifier is disabled (as when the meter selector switch is set to a DC voltage or current range). Indication of an abnormal voltage change, such as (false) evidence of poor voltage regulation in a well-regulated supply, is one possible result of this. If the multimeter includes a protective solid-state circuit-breaker 'RF in the meter' may cause the breaker to false.

"A by-pass capacitor - a component that allows RF to pass while blocking DC - across the multimeter's test-lead terminals is an almost certain cure for these problems. Try 0.01µF at HF, or 0.001µF at VHF (be sure the working voltage of the capacitor is greater than the voltage expected in the circuit under test). Repositioning the multimeter test leads may also help where direct RF pick-up is a problem."

David Newkirk, WJ1Z, the *Hints & Kinks* editor, adds: "The high-gain sensing circuitry in electronically regulated power supplies may also be RF sensitive, so if you measure unexpectedly weird shifts in regulated-supply output with transmitter keying, your voltmeter may not be at fault. Trying a meter of different design (or a passive voltage/current indicator, such as a lamp or LED, capable of indicating relative level shifts) can help you determine whether the fault lies in the instrument or the circuit under test."

As mentioned above, the traditional electric light bulb can no longer be considered a satisfactory form of low-cost dummy load except for ancient transmitters. However Lorin Knight, G2DXK, has discovered a practical, if unusual, low-cost substitute for a high-power 50Ω dummy load in the form of an old Morphy Richard electric iron discarded from its usual domestic chores.

He writes: "All I had to do was replace the three-pin plug with a PL259 plug, taking the brown wire to the centre pin and the blue and green/yellow wires to the body of the plug. On test, the measured VSWR proved to be: 3.7MHz - 1.3:1; 7.1MHz - 1.8:1; 14.2MHz - 1.1:1; 21.2MHz - 2.3:1; 29MHz - 1.0:1. Not quite as good as a Heathkit 'Cantenna' but a lot cheaper!

"It is advisable to turn the knob on the iron to 'hot' in order to prevent the thermostat cutting out when the iron starts to get warm - however it takes a continuous two or three hundred watts of RF to make the iron really hot." But watch out if you're caught dashing away with a smoothing iron that has not been discarded, if I can be excused what these days might be construed as a sexist remark.

TIPS & TOPICS

Prevention of Corrosion in Antennas

Contact between copper and aluminium, for example in an antenna, can result in corrosion and, therefore, a poor electrical connection. According to Karel Barton (*Protection against atmospheric corrosion*, published by John Wiley, 1976), "contact between copper and aluminium should be avoided at all costs!". However, the author goes on to say that stainless steel causes no trouble. I suggest that a stainless steel washer between the copper cable and the aluminium of an antenna element may well reduce the likelihood of corrosion, especially if used with a stainless steel bolt. It is wise to add other precautions such as the application of grease, lanolin (my favourite) or RTV silicone rubber. If RTV silicone rubber, use the type that does **not** give off acetic acid (vinegar-type) fumes. - *Dick Biddulph, G8DPS.*

100W UHF Power FET

Although there are state-of-the-art bipolar power transistors capable of providing 200W output per device up to about 850MHz, it has proved extremely difficult to develop such high power VMOS FETs for frequencies above about 100MHz. However, Hitachi have introduced a 2SK1640 device which can deliver 100W up to 860MHz with a drain power efficiency of the order of 48%, and a typical gain of 8dB (compared with 5-6dB for UHF power bipolars). The 2SK1640 is being marketed for UHF TV broadcasting and professional communications, rather than amateur-radio budgets. Nevertheless, it is interesting to note that the device is based on a proprietary lateral, rather than a VMOS-type vertical, structure of the drain substrate and thus represents a development which may come to influence lower-cost device. It is claimed by Hitachi that lateral structures have inherently superior high frequency characteristics and that the simple source grounding is particularly useful in common-source push-pull configurations.

Feedback

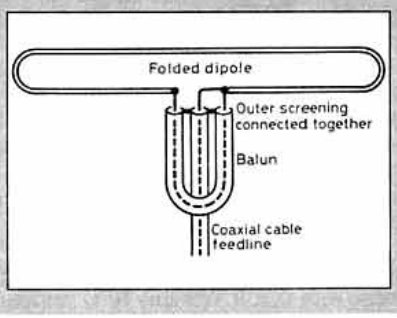
Some errors crept into recent *TT* items: In Fig 7 (February), C2 for the ceramic resonator oscillator of the QRP transmitter should have been a 375pF variable capacitor (as in Fig 6) and not a 30pF trimmer in order to achieve the pulling range 3.52 to 3.59MHz. The text and caption to Fig 11 (February) suggested that VK2BRD's heavy-current 28V PSU could deliver over 30A but a more realistic continuous load would be the 20A shown on the diagram.

TT, January, p34, wrongly showed a field strength of 0dBu as equal to 1mV/m instead of the correct 1µV/m.

Apologies also to those readers who have submitted interesting but still unpublished items over recent months. Pressure on space (and time) frequently makes it necessary to delay preparing material, particularly longer items with a number of drawings that would lose value by drastic pruning. Also, over the past year, our long-suffering Editor has been forced to hold over or omit quite a few items prepared for publication. Quarts and pint bottles.

ERRATUM

IN THE MARCH issue of Technical Topics (page 32) we inadvertently gave the wrong diagram for Fig 9. We apologise for this and show the correct diagram below.



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Antenna to Ionospheric Matching

By Vladimir Ademov

THE AUTHOR HAS made an academic study of amateur radio antennas and has come to the following conclusions.

1. The antenna should be efficient, enabling communication with any part of the world using the lowest attenuation which path propagation conditions will allow.
2. The antenna should be able to operate on any of the high frequency bands allocated for amateur radio.
3. The antenna should be unobtrusive because most amateur radio operation is from suburban sites.

THE PROBLEM

EXISTING METHODS of obtaining antenna efficiency is to use a horizontal antenna as high as possible. This produces multiple vertical lobes, some of which have a low enough angle to match into long distance ionospheric propagation conditions; this results in a considerable waste of radio frequency energy. The author has observed the most commonly used method of overcoming this inefficiency is to use a gain array, normally a Yagi-Uda. This in turn makes the antenna large and obtrusive. Further, designing such a structure to operate on more than one frequency band results in compromise. Another method is to use a vertical antenna. Although the angle of radiation of a vertical antenna is low, it has only one lobe and will only match a limited set of ionospheric conditions. In addition, a considerable proportion of the radio frequency energy is absorbed in the surrounding earth and nearby metal objects. Vertical antennas are also more susceptible to man-made noise.

HYPOTHESIS

THE AUTHOR HAS noted that the vertical angle of radiation is determined by interaction with the ground. The horizontally polarized image in **Fig 1** is in antiphase and cancels the radiation along the earth's surface. At appreciable wave angles the path length from the image is greater by a distance of:

$$2h \sin \theta$$

resulting in a phase difference of:

$$4h \sin \theta/\lambda \text{ radians.}$$

The image of a vertically polarized antenna (**Fig 2**), is in phase and supports radiation along the surface.

Matching the transmitter to the antenna is well documented. However, matching the antenna to the ionosphere has been ignored in the literature, or dismissed as insignificant. All that is required is an antenna system whose main vertical angle of radiation is controllable.

How can this be done? In the case of vertical polarization over a hypothetical perfect earth, the 'optical' nature of these waves can be clearly seen. The author believes that this earth/antenna interaction can be exploited to match the antenna optimum ionospheric propagation. This hypothesis is testable as follows:

1. Modifying the profile of the earth where the earth currents are greatest.
2. Modifying the profile of the antenna.
3. Adjusting the height of the antenna to operate in conjunction with 1 and 2. The hypothesis predicts that the exact angle of radiation can be produced to suit the ionospheric propagation path in use to exploit the chordal hop propagation phenomenon.

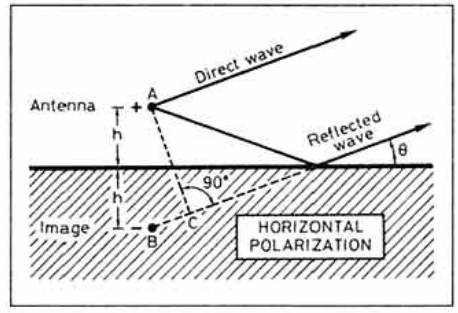

Fig 1: Horizontal polarization.

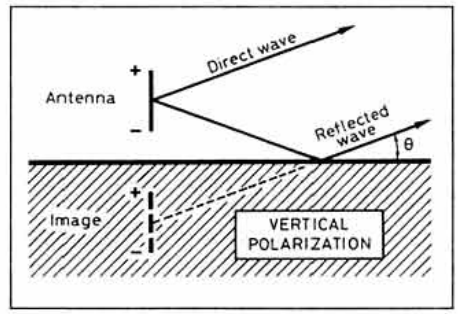

Fig 2: Vertical Polarization.

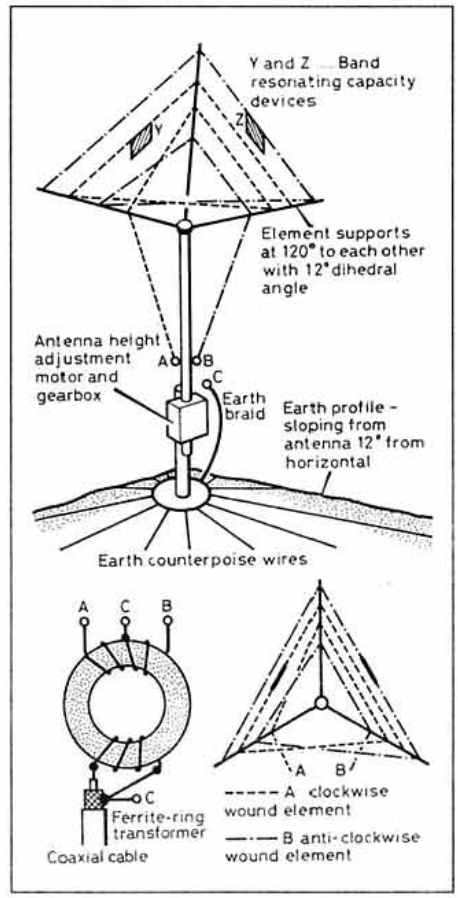

Fig 3: Antenna construction details.

SOLUTION AND DESIGN METHODOLOGY

THE DESIGN EVOLVED BY the author is illustrated in **Fig 3**. It comprises two counter-clockwise triangular coil configurations on the same support. Although most of the element length appears horizontal, the polarization is vertical because the elements are in fact large diameter coils; the same principle as the DDRR antenna. The system is made to resonate on the appropriate bands by the use of capacity elements; often referred to as 'hats' in literature but the author found the devices illustrated more effective.

The elements are fed by a matching system, invented by the author, and known as Y-front matching. The Y, formed by V wires connecting the elements and the braid to the counterpoise, is connected using a ferrite ring transformer illustrated in Fig 3. For the purpose of experimental work a wire earth system was arranged. A manual system of height adjustment was devised with suitable counterweights to allow easy adjustment. The maximum field strength at specific vertical angles could then be measured.

RESULTS

THE ANTENNA WAS ENERGIZED using a transmitter/receiver sounding system devised by the author. A pulse of radio frequency energy was transmitted and any returned energy was displayed on an oscilloscope. As expected, short range signals were reflected back from the ionosphere when the antenna's height was low.

As the height of the antenna was increased these short range signals disappeared. At one critical height a weak signal was observed having a 77mS delay, and is illustrated in **Fig 4**.

This weak signal was found to be the transmitted signal having travelled round the world in a chordal hop mode with very little at-

continued on page 52

The Fifth-Method Stabilised Oscillator

The conclusion of a two part article by Klaus Spaargaren, PA0KSB.

A BRIEF EXPLANATION is given below of the main circuit blocks; descriptions of conventional frequency divider chains etc are not given.

SAMPLE-AND-HOLD PHASE DETECTOR (FIG 3)

A bridge with four Schottky diodes is used as a switch driven by nanosecond-wide pulses derived from the 10kHz reference frequency. To obtain the fast pulses, the positive edges of the output of an HCT fast-CMOS circuit are differentiated by an RC network at the base of the BFR96 transistor which amplifies the resulting short pulses. Ferrite transformer T1 is used to provide voltage isolation and feeds the bridge in the correct phase. The RC circuit in series with the drive signal serves a dual purpose: it supplies a negative bias voltage for the bridge, shortening its conduction time still further. The 47pF capacitor forms the hold capacitor.

In a sample-and-hold circuit the sampled voltage must remain constant until the following sample; the sample capacitor must be small enough to be quickly charged in the short time available; on the other hand a relatively large value is to be preferred with respect to the 'hold' requirement. The solution used here was originally applied some 25 years ago in sampling oscilloscopes; the first fast sample-and-hold circuit is followed by a slower second one which stores the buffered voltage of the first stage in a much larger value capacitor. The arrangement shown has been found to work very well; the pulses are short enough to permit operation up to 50MHz while operation is still satisfactory with sampling frequencies below 100Hz.

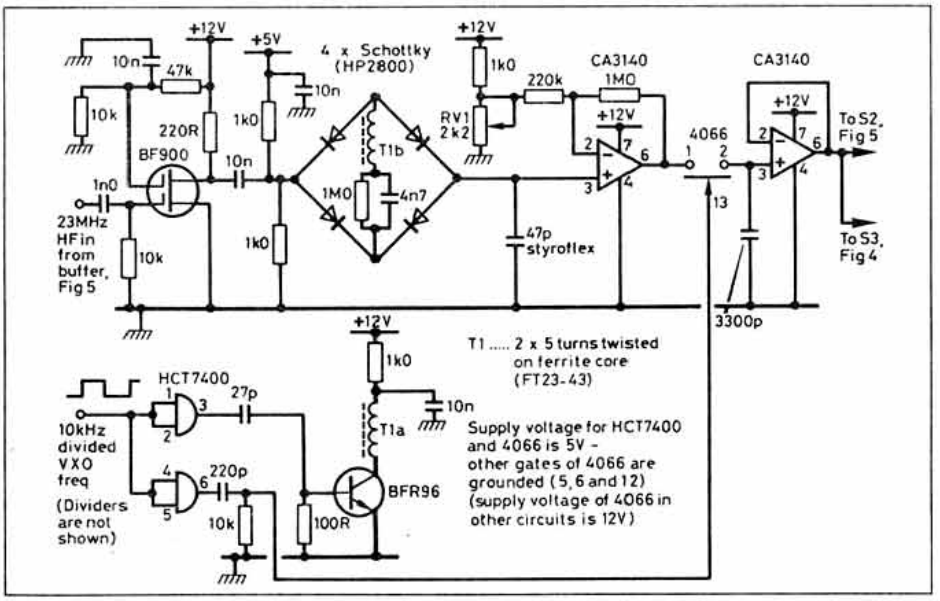

Fig 3: Circuit diagram of the sample and hold arrangement

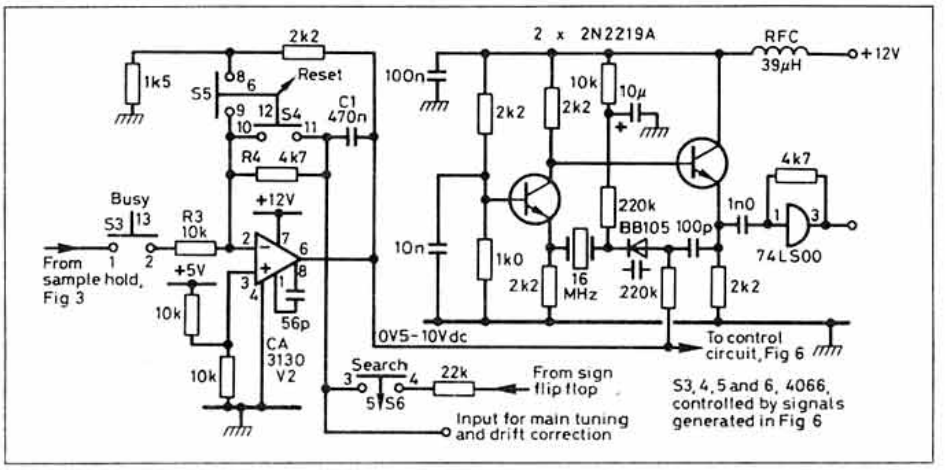

Fig 4: The 16MHz VXO and controller V2

THE VXO AND V2 CONTROLLER (FIG 4)

I achieved good results with a circuit analogous to the well-known Butler overtone crystal oscillator circuit. The crystal operates here in series resonance at its fundamental frequency and can be 'pulled' by some 15kHz by means of a BB105 variable-capacitance diode. Cheap 'computer crystals' with fundamental frequencies between about 15 and 20MHz have been found to work well. In the hold mode, the output of the V2 controller can be adjusted by feeding current into the hold capacitor C1. This current is in the form of short 'up' and 'down' (positive and negative-going pulses) derived from an optical light interrupter used as the main frequency tuning control. Other functions of this circuit block should be clear and will not be described further in this article.

23MHZ VCO AND V1 CONTROLLER (FIG 5)

Conventional oscillator and buffer circuits are used in this section. The signal power output is sufficient to drive the balanced mixer of a 14MHz receiver. Two varicaps are used to control the frequency. CV1 has a range of about 30kHz and forms part of the actual PLL loop. CV2 can vary the frequency over a range of some 500kHz (or more if required); it is fed by an integrator that obtains its input from the same source that drives CV1 and can change the frequency only slowly. The result is that in steady-state operation the voltage on CV1 is 5V so it operates always at the same point of its non-linear characteristic. This means that the gain of the VCO (voltage to frequency relationship) does not change much over the full range, with the result that the dynamic PLL control characteristics are similarly more or less the same over the tuning range.

The circuitry associated with the zener diode around V1 avoids 'reset wind up' of the integral term of the P + I controller after start up.

CONTROL CIRCUITRY (FIG 6)

In case the VXO control voltage exceeds 10V, one of the detectors reacts and the 4013 indicates to the flip-flop stores whether this happened at high or low output. This enables the search circuit to be steered in the opposite direction so avoiding finding again the same locking point that has just been left. Also a timer with a 4017 counter is started, driven by a 4011 gate used as a free running oscillator at about 50Hz. This stops always in the '9' position; its decoded outputs are used to control CMOS switches in other parts of the circuit to obtain the desired functions.

DRIFT CORRECTION (FIG 7)

As indicated earlier, a huff and puff stabiliser can meet this requirement. Here, however, drift correction is provided by means of a 'D' flip-flop. Readers who have previously experimented with D flip-flops and have observed their behaviour on an oscilloscope will have no difficulty in understanding their operation. Those without that experience often require lengthy explanations; here I will be brief:

Clocking takes place at 20Hz derived from a crystal oscillator (not the VXO). When the 20Hz is not exactly 'in phase' with the 23MHz signal on the D input, the output will be a difference frequency that can vary between 0 and 10Hz. The circuit can be considered as a digital version of a sample-and-hold circuit. However, no phase information is available so that only frequency control can be applied. Diode pumps at both outputs of the flip-flop operate as simple frequency-to-current convertors; another pump operates at 20Hz and generates a signal with opposite polarity. The analogue signals are fed into the hold capacitor, C1 in Fig 4.

A stable operating point is obtained when both analogue signals are equal, which occurs at about 5Hz. So drift correction of the 23MHz frequency takes place at 20Hz intervals. In practice, the arrangement shown is dimensioned such that stable operation results; the residual ripple frequency modulation of the VCO is so small that it cannot be heard. A huff and puff type stabiliser always swings a small amount around its stable point; this circuit does not.

CONCLUSIONS

I USED THE 23MHz OUTPUT from my experimental system as the injection signal for a 14MHz receiver having a balanced front-end mixer. I found it one of the best oscillator systems that I have ever used for that purpose. It has excellent stability with only a minimum of unwanted effects. The fact that the tuning rate can easily be adjusted between only a few and many kHz per knob revolution is an additional feature not found in many other systems. I hope that many experimenters will become just as enthusiastic as I am once they have tried and perhaps further developed the system. ❑

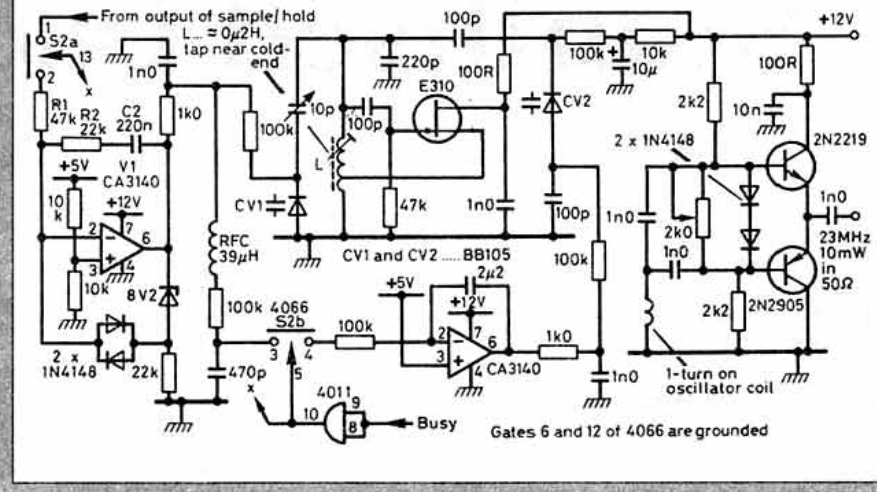

Fig 5: The 23MHz VCO and controller V1

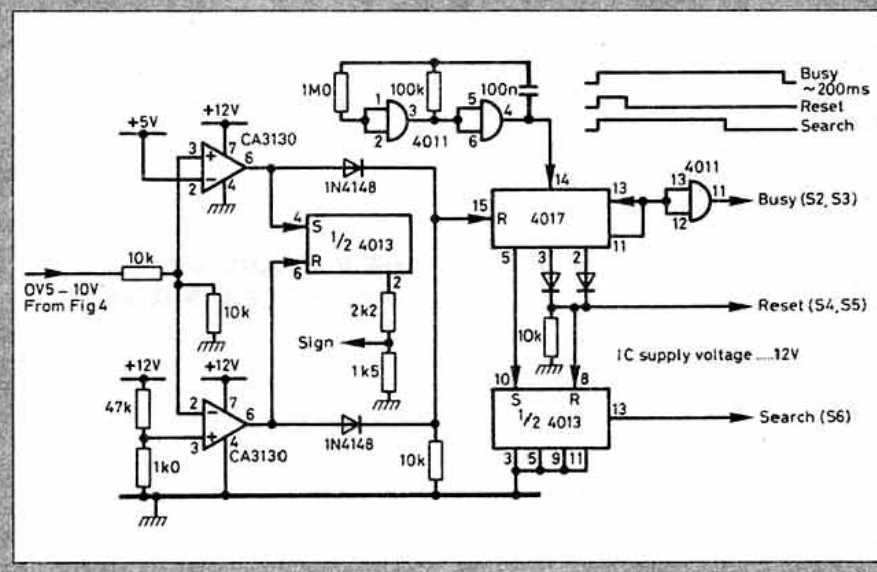

Fig 6: Control circuitry

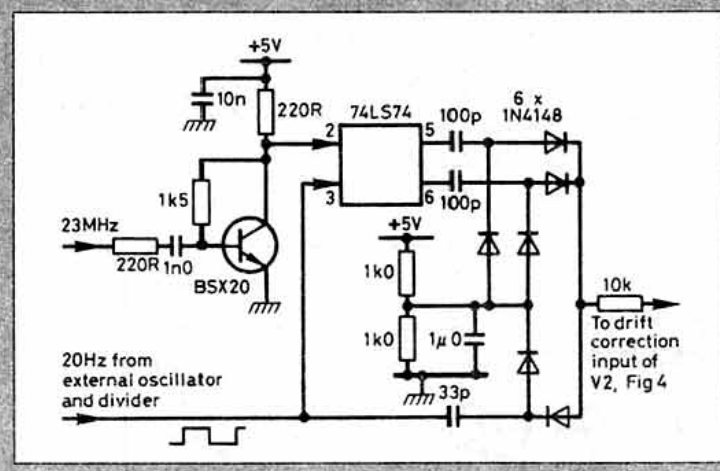

Fig 7: Drift control circuit using a D flip-flop

Improving Direct Conversion Receiver Design

by Nic Hamilton*, G4TXG

SEVERAL YEARS AGO, the Shefford and District Amateur Radio Society started a club project to build a 2m direct conversion (DC) transceiver. This article is the one I would have liked to have had when we started work. It explains the various ailments that can afflict the DC Rx, and suggests some cures. DC receivers are not toys: G3WRJ managed to work Finland, 2000km away, using the club project rig on 144MHz. The KISS principle [1] has much to recommend it, and many designs for DC receivers work well. However, given some attention to design, the DC receiver can rival the performance of the best communications receivers.

Please do not look at this article's length and think "If there's that much in the DC receiver that can go wrong, I'm not building one." DC receivers are fun and simple to build. However "you don't get owt for nowt", and, for a given level of performance, the fewer components you use, the more critical to the design each component becomes. Quite apart from this, the superheterodyne receiver is not without its own selection of complex ailments. A quick look at a dual conversion superhet's spurious signal mixing chart will be quite enough to convince you of that. The problems of DC receivers can be divided into the following categories: bandwidth, local oscillator radiation, hum and microphony. Each of these will be treated in turn, and finally some suggestions for mixer designs and their attendant diplexers will be made.

BANDWIDTH

FOR SIMPLICITY'S SAKE, the single mixer detector is the best choice for the radio amateur DC receiver. This gives an 'IF' bandwidth twice that of the equivalent superhet; RF input signals both higher and lower than the local oscillator frequency cause an audio output. This degrades the noise figure of the Rx by up to 3dB when receiving SSB or CW signals, and gives a rather peculiar effect when tuning through a crowded HF band. However, this is not a problem on VHF where the bands are usually sufficiently clear.

The double 'IF' bandwidth also means that Double Sideband (DSB) signals such as AM are difficult to receive, though it is possible to phase lock the local oscillator (LO) to the incoming carrier if the receiver is DC-coupled. A quadrature phase-locked DC Rx would work well for AM broadcast reception on HF.

By using complex phasing techniques, 'genuine' SSB reception is possible, and the best demodulator choice for this seems to be the Weaver method [2]. Unfortunately, this demodulator puts a narrow notch in the middle of the audio passband, and this, with its attendant phase distortion, means that the best demodulator for CW reception probably uses the phasing method.

Making simple DC receivers for use on FM is not easy. I once built one which was quite successful at demodulating local 2m repeaters, but it definitely did not like fluttery signals from mobile stations; the PLL would drift off and sulk for long periods during the contact. My advice is to stick to SSB. And that's my personal bias out in the open.

HUM DUE TO THE AF AMPLIFIER

IN THE SUPERHET, MOST of the gain is in the IF stages which pick up no hum. By contrast, the AF amplifier of a DC Rx is very sensitive to mains hum (**Fig 1**) because it has a voltage amplification of 100,000 (100dB). It should be designed with its own 300Hz - 3kHz filtering which will prevent the amplifier from picking up much of the 50Hz fundamental, but will not filter out harmonics above 250Hz. Power supply rectifiers generate harmonics of 50Hz, so good supply decoupling is essential around the first few stages of the audio amplifier. The mixer and the first audio amplifier should be mounted on the same board, and the connections between them should be as short as possible.

This is how to find the source of hum in receivers with diode mixers. First stop the local oscillator; either pull the crystal out and check that the oscillator stops, or disconnect the LO supply. With no LO drive, the mixer will go high impedance which will leave the audio amplifier without an input load. Simulate the mixer in operation by connecting a 50Ω resistor across the mixer AF output. If the hum stops, the fault is RF hum and does not lie in the AF amplifier. If the receiver carries on humming, add more supply decoupling components and try to eliminate any earth loops.

Suspect any inductors in the low pass filter between the mixer and the first AF amp, especially the ones with inductances in excess of 0.5mH. Try rotating inductors for minimum hum. As a last resort, try Mu-metal screening.

The easiest way out of hum problems is to run the receiver from an external power supply or, preferably, a battery. Toroidal mains transformers tend to have less flux leakage than the conventional types, so they are preferable for internal mains power supplies. If the AF output from the receiver is to be connected to any other equipment, for example a modem, use an isolating audio output transformer. This will help avoid earthing troubles.

MICROPHONY DUE TO THE AF AMPLIFIER

MICROPHONY IS THE tendency of component parts of the Rx to act like a microphone. A typical DC Rx, when tapped lightly on the chassis with a screw-driver, will give a loud crackle or a booming noise in the headphones. This is why most DC Rxs use headphones rather than a loudspeaker: the vibrations in the receiver cabinet caused by a loudspeaker are too great for feedback to be prevented. This would manifest itself as a

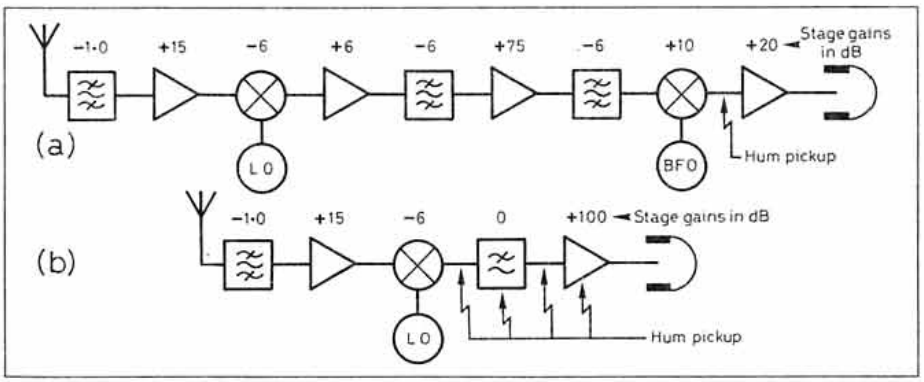

Fig 1: Gain distribution in VHF receivers: (a) Superhet; (b) DC

loud whistle from the speaker if the volume control were turned up to anything louder than a whisper. Using headphones eliminates the mechanical feedback path and has the secondary advantage of requiring less AF gain, making it easier to keep the audio stages stable. The other problem is that loudspeaker coils produce quite a high AF magnetic field which can couple directly back to the first AF stage and so cause feedback by a magnetic path. Microphony on DC Rx audio boards is easy to track down. Stop the LO and put a 50Ω resistor across the mixer as above, and tap each component in turn while listening to the Rx output. If none of the components is microphonic, the cause is RF microphony, and the fault does not lie with the audio board. Otherwise, the components usually at fault are the largest value capacitors or inductors between the mixer and the input of the first AF amplifier transistor or IC.

Ceramic capacitors are completely unsuitable for this job; the dielectric is slightly piezoelectric. This makes the capacitor work as a surprisingly good microphone; in fact this is exactly how crystal microphones work. Moulded polycarbonate capacitors (eg the PMC2R series available from STC) are more suitable, being only very slightly microphonic. Tantalum bead capacitors perform quite well, but have wide tolerances on the nominal capacitance. Ferrites are slightly magneto-strictive; this means that their magnetic field varies when they are vibrated. So, to avoid microphony, do not use cores with high inductance factors.

For inductors of more than 0.1mH, use screened air-cored coils if the magnetic hum field is low enough. RM series inductor cores can be used with caution, and are less likely to pick up hum (but are relatively expensive). Do not attempt to use toroids to make inductors of 0.5mH or greater; they are either too microphonic or else require an impossibly large number of turns.

LOCAL OSCILLATOR RADIATION

LOCAL OSCILLATOR radiation is the big problem of DC receivers. In a superhet, the LO is prevented from reaching the antenna by the selectivity of the RF input stage (**Fig 2a**). In a DC receiver, the LO is running at the same frequency as the incoming RF from the antenna, so it is impossible to filter it out (**Fig 2b**).

Here's an example of what can happen. I knew one of two amateurs who were friends, they both built 80m DC Rxs using kits of a popular brand. The LO radiation from these was so strong and distinctive that each could tell when the other was listening to the band and, of course, they could tell what the other chap was listening to. You may look on this with an indulgent smile, until I tell you that they lived over a mile apart.

On VHF, the problem is just as bad; a powerful and continuous carrier radiated within 2kHz of a calling frequency will not be popular with local radio amateurs. Apart from a requirement to be kind to your neighbours, a radiating LO will degrade your own receiver's performance; more about that later.

There are two ways the LO can escape to the antenna: by conduction or by radiation.

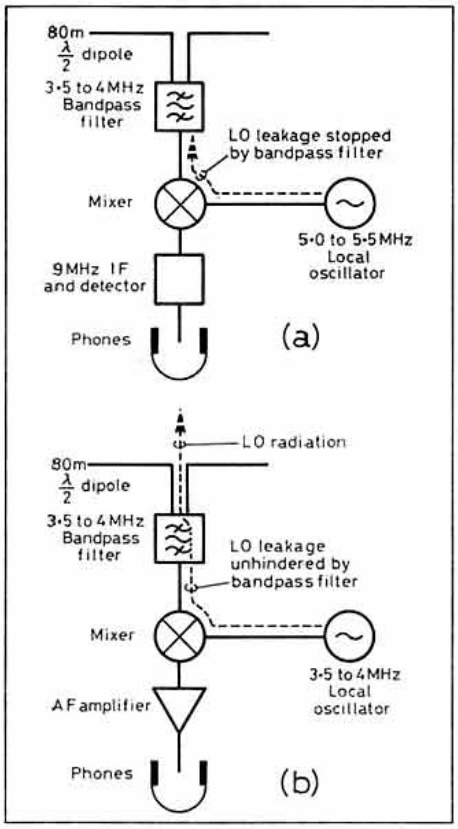

Fig 2: (a) LO leakage, the superhet receiver; (b) LO leakage, the ring mixer DC receiver

Conduction

No mixer is perfect, and manufacturers usually specify 30 to 40dB isolation between the LO and RF connections. If there is no preamplifier, this signal is conducted back through the filter to the antenna, as in figure 2b. If there is a preamp, the leakage is attenuated. Unless special designs are used, the attenuation of the leakage depends on the feedback circuit determining the amplifier's gain.

This can be either an actual circuit, or just the internal feedback capacitance of the active device (transistor or IC). In either case, the reverse attenuation is usually only a few dB greater than the amplifier's forward gain. This relationship is important, and will be mentioned later. Reference 3 discusses the reverse signal leakage of various types of amplifier. One way to reduce conducted leakage would be to insert an isolator between the preamplifier and the mixer. As ferrite isolators are expensive at VHF and unobtainable for the HF bands, the best solution is to use a grounded gate high-current FET stage (**Fig 3**).

With this circuit, instead of the forward gain being determined by feedback, it is determined by the severe mismatch between the transistor's high drain impedance and the drain load of about 100Ω. The result is that the gain of this circuit is zero forwards and –40dB backwards. This allows the RF from the antenna to reach the mixer, but will reduce the level of conducted mixer leakage reaching the antenna. Another advantage of the circuit is that it offers a broadband 50Ω termination to the mixer's RF input connections up to 300MHz.

The circuit's third order intercept point of +20dBm/tone is high enough for most applications. Note that the specification for the

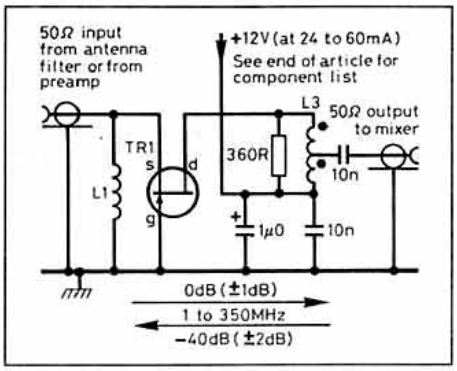

Fig 3: A broad-band 'isolator' to reduce LO radiation from the antenna.

FET allows the drain current to be between 24 and 60 mA. At 60mA, the power dissipated by T1 would be 0.72W, which exceeds the 0.5W maximum specified for the device. I have not blown a FET this way yet, but the squeamish can, if they like, put a resistor in series with L1 to reduce the drain current to 42mA if necessary.

Radiation

Some local oscillator power will be radiated from the LO compartment, the connections to that compartment, and the connections to the mixer. Some of this power will escape directly from the receiver, and some will be received by the high Q tuned circuit(s) at the Rx input. From there, the signal can be conducted to the antenna. The only cure for this is sensible receiver layout and attention to screening.

The LO must be mounted in a separate box. Use feed-through filters or capacitors for all non-RF connections to the LO board. The LO connection to the mixer must be kept short. If RF connectors are not used on the LO box, the outer of the LO output coax should be connected to the LO compartment wall at the point where the cable passes through. It may be necessary to use double-screened or solid-outer coaxial cable for the RF connections. To make extra screening for coax cable: remove the outer braid from a thicker coax cable and thread the thinner cable inside, stretch the extra screen tight and solder it to the connector body at both ends. This works for RG174 (use UR43 outer) and UR43 (use UR67 outer).

RF MICROPHONY

MOST OF THE MICROPHONY problems of DC receivers stem not from the audio board, but from the RF components, and specially any high Q tuned circuits in the path between the antenna and the mixer. Some of the LO power arriving here by either conduction or radiation will pass back to the mixer. This LO leakage signal is mixed with the original LO signal, and this gives a standing DC (direct current) voltage on the output of the mixer. Typical values for the leakage power and resultant DC voltage at the mixer output are shown in **Fig 4a**. Note that the values of DC voltage are for the reflected leakage component only; the actual voltage measured at the mixer output will generally be larger than the values shown.

Suppose that the front-end tuned circuit is now knocked with a screw-driver. The wobble of the coil in the tuned circuit will cause its

resonance frequency to wobble, and so the amplitude of the leakage signal at the pre-amplifier input will change in sympathy. This causes a wobble in the standing voltage at the mixer output, which is passed through the audio amplifier and appears as a loud clang in the headphones. Because mixers also work as phase sensitive detectors, microphony is caused by both phase and amplitude variations of the LO leakage.

An alternative way of looking at the problem is that the LO leakage appears to the Rx as a carrier at exactly the LO frequency, and with a signal strength 60dB or so above the noise floor. Knocking the input tuned circuit will phase and amplitude modulate this carrier slightly, and, though the resulting sidebands are many decibels below the carrier level, the carrier is so strong that the sidebands have enough energy to rise well above the receiver noise floor, and thus appear as a clang in the headphones. The effect is the same as tuning an AM receiver to a strong signal from a crystal calibrator, switching the BFO off, and turning the RF/IF and AF gain controls fully up. Those that have used AM on HF will remember that this generally results in a deafeningly loud shriek from the receiver due to mechanical feedback from the loudspeaker. The crystal calibrator output of the AM receiver was giving the same effect as the LO leakage of the DC Rx.

The only way to reduce this effect is to reduce the LO leakage somehow. For microphony due to LO radiation, screening is the only answer. For microphony due to conducted LO leakage, use the FET 'isolator' shown in figure 4, from which it can be seen that, although a preamplifier reduces LO radiation from the antenna, it is of little use in reducing RF microphony.

If there is a significant radiated component to the LO leakage, any modulation of the RF field inside the DC Rx will affect the LO leakage at the mixer, so any of the wiring inside or near the Rx can seem to be microphonic. Intermittent connections of any sort will cause a loud crackling noise in the headphones. Examples of intermittent connections are loose circuit-board fastening screws, or the intermittent connection of the screw to the chassis due to the paint-work not being scraped away underneath the screw-head. It is better to earth circuit-boards with a proper earth wire and to use insulating circuit-board supports.

Tuned circuits are most prone to microphony when they resonate at the LO frequency. Other contributory factors are high local oscillator leakage, high circuit Q, and poor mechanical stability of the components. In a DC receiver it is very noticeable that the sensitivity to microphony reaches a peak at the resonance frequency of the tuned circuits. The phase variation due to a mechanical shock is at a maximum here, as is the circuit's ability to receive or radiate energy from the LO. (Tune for maximum microphony, and you won't be too far off!).

The electro-mechanical performance of a tuned circuit can be improved by providing the coils with a tight-fitting former; for VHF inductors, wind the coil on a mandrel with a slightly smaller radius than the final former. Use plenty of varnish to hold the turns in place and fix the coil former firmly to the board. Air-spaced trimmer capacitors are preferable to the foil or ceramic types. (Remember microphony can also be caused by an oscillating pre-amplifier!).

If all that I have said about RF microphony sounds a bit far-fetched, do the experiment I did to convince myself of its reality. Dig out your old DC receiver. Make a series resonant tuned circuit for the band that the receiver works on. Connect the tuned circuit by a length of coax to the receiver's antenna socket. Switch the receiver on and tap the tuned circuit. The higher the receiver frequency band, the more probable it is that the receiver will make the tuned circuit microphonic. I expect that over 50% of all DC receivers will have this fault.

RF HUM

THE ORIGINS OF RF HUM are explained in Reference [4], which lists the characteristic faults of DC Rxs. The LO radiation leaks from the Rx into nearby wiring. Because this wiring is connected either directly or indirectly to power rectifiers that are switching on and off, the RF impedance of the wiring varies throughout the 50Hz mains cycle. This modulates the LO radiation, giving it 50Hz sidebands. The radiation then finds its way back into the receiver front-end. The signal is then demodulated, causing a 50Hz related buzz in the headphones.

The cure for this is to stop LO signal radiating from the receiver cabinet. All connections to the Rx, such as the power supply and the headphones, should be RF grounded to the receiver case using decoupling capacitors appropriate to the LO frequency.

To find the source of RF hum, make a probe as in **Fig 5**. This is a screened loop. When the diode is conducting, the loop is made. When the diode is not conducting, the loop, to RF eyes, does not exist. It therefore makes RF hum at the AF oscillator frequency. Wave the probe around in the receiver. Where the whistle is loudest, the leakage is greatest.

One other possible problem is included here because its mechanism is the same as RF hum, even though it sounds different. If the decoupling of the headphone lead is insufficient, its RF impedance can vary with the audio waveform, and this can cause the Rx to oscillate at audio frequencies (**Fig 6**). This effect is easily mistaken for AF amplifier instability. In receivers with AGC, it manifests itself as a slow plopping noise. An isolating audio output transformer will help to cure this.

On VHF, LO radiation from the antenna feeder can be a cause of hum, so use a high quality low leakage feeder from the Rx to a point well away from mains supplies; from that point to the antenna, cheaper cable can be used. If cable screening is a problem, the coaxial socket on the Rx should be an N-type

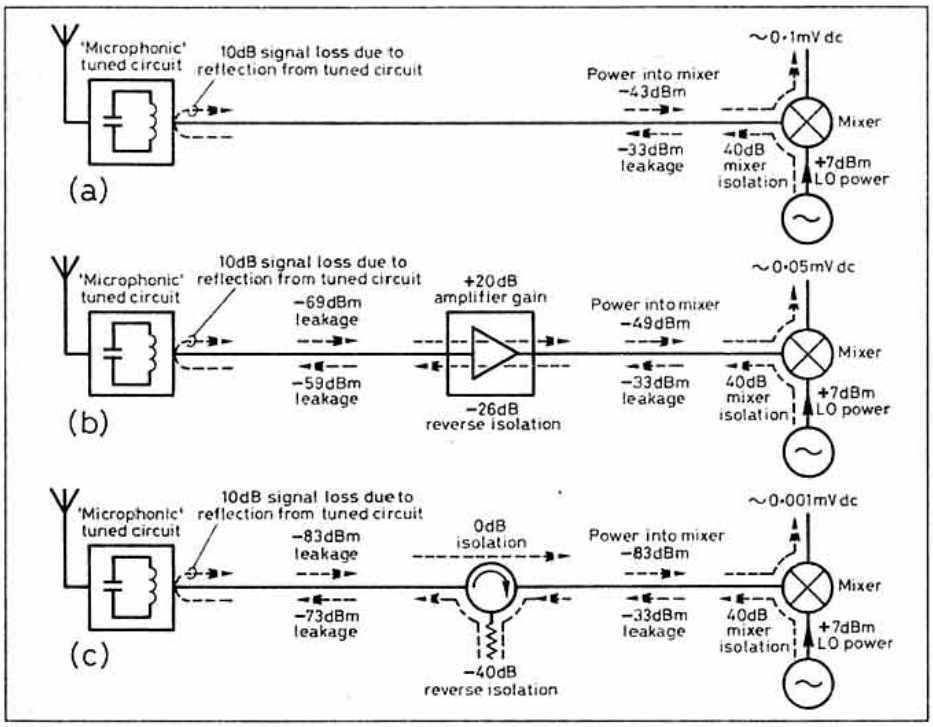

Fig 4: (a) High LO leakage gives RF microphony; (b) Poor RF microphony suppression by a preamp; (c) RF microphony suppression with an isolator.

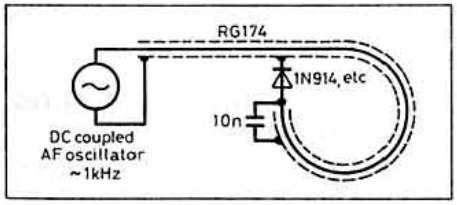

Fig 5: Probe for tracing RF hum.

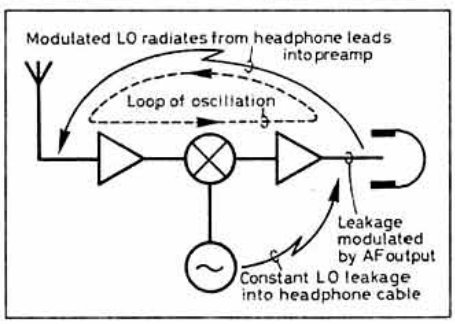

Fig 6: RF feedback causing apparent AF instability.

or TNC. Because of the RF hum problem, DC Rxs do not work well on the higher frequency bands (20m and up) with either set-top antennas, or long-wire antennas connected directly to the back of the set. If the mixer balance is poor, hum can be caused by direct demodulation of LO hum sidebands; make certain that the LO power supply is ripple-free.

MIXERS FOR DC RECEIVERS

USE A BROAD-BAND MIXER to avoid microphony: mixers using high Q tuned circuits should be avoided. In addition, the mixer should have a high second order intercept point. If this is not high enough, high-powered HF AM signals will be rectified directly to AF, and the Rx will operate as a broad-band AM detector [5] of both the RF and LO inputs. Our first VHF receiver was very good at this; it picked up all the stations on the 7MHz broadcast band at the same time.

This limits the choice of mixer to those with some inherent balance. Do not even attempt to use a mixer with a single bipolar/FET/diode. Trying to make a satisfactory DC receiver with a self-oscillating mixer would probably be a passport to madness. Circuit balance cancels out second order distortion; push-pull power amplifiers cancel out their second harmonics using this effect.

Of course, the broadband AM detector effect is not apparent in the superhet because the AF component is removed by the IF filter. Beam deflection mixer valves are certainly worth some experimentation. One way of avoiding LO radiation is not to make the frequency in the first place.

This the main advantage of the sub-harmonic anti-parallel diode mixer as propounded by RA3AAE [6]. This mixer has its oscillator drive at half the standard LO frequency; the LO leakage can then be stopped by the input bandpass filter. Of course, the second harmonic of the oscillator is now at the RF frequency, so the sub-harmonic mixer reduces LO radiation and all its attendant problems by an amount equal to the suppression of the second harmonic with respect to the fundamental.

Unfortunately, the RA3AAE sub-harmonic mixers do not have as good a strong-signal handling performance as ring mixers. The other disadvantage is that the ratio of RF-in to wanted-product-out, known as the conversion loss, is very dependant on LO drive level, and also depends slightly on the shape of the LO waveform. The rectifying action of the diodes in a sub-harmonic mixer generates harmonics of the LO. So, unless care is taken with diode balance, the level of leakage at twice the LO frequency appearing at the RF port can be similar to that of a ring mixer. A variant [6] of the RA3AAE type of switching harmonic mixer is shown in **Fig 7**. Its conversion loss is about 6.5dB. This is similar to the figure obtained with the narrow-band mixers of Reference 7, which operate in a similar way. The third order input intercept point of the mixer in Fig 7 is about +3dBm/tone.

Using transmission line transformers gives the mixer a wide bandwidth, and a high degree of balance is achieved by using the Siemens surface-mounted BAS40-04 dual diode (the size is only 3 by 1.4mm, so be careful not to lose them).

With a perfectly balanced circuit, all even order harmonics of the LO cancel, and there would be no LO leakage at the RF frequency. In practice, the leakage at the RF frequency due to the LO is smaller than -50dBm. The 'AF' bandwidth is 0 to 1MHz.

The rise in conversion loss at high frequencies is mostly due to the diode capacitance: this can be reduced by using four BA481s; by doing this, and by using higher frequency transformers, the conversion loss at 70cm is reduced to 7.5dB, but the circuit balance is not as good as with the BAS40-04s. One of the quad (meaning four diodes in a single package) mixer diodes, such as the HP 5082-2830 from Farnell, can also be used in this circuit.

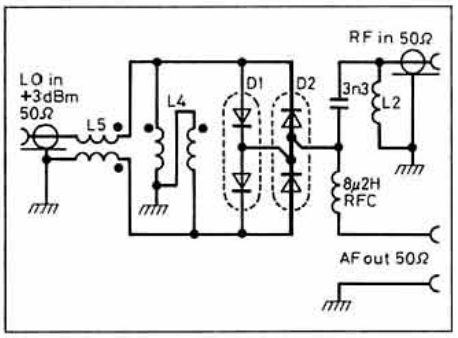

Fig 7: A broad-band sub-harmonic mixer; conversion loss is shown in Table 1.

Frequency (MHz)	Conversion Loss (dB)
1.9	6.5
30	6.9
70	7.4
144	7.8
432	11.6

Table 1

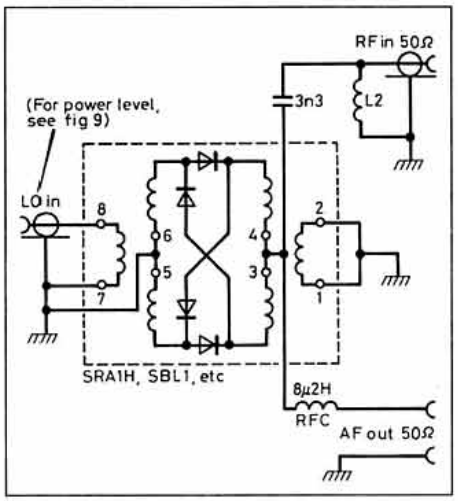

Fig 8: A broad-band sub-harmonic mixer using the SBL1 or SRA1H

For those that do not wish to wind transmission line transformers, or solder surface-mounted devices, help is at hand. It is possible to make a half-frequency sub-harmonic mixer using standard diode ring mixers of most types, eg SBL1 or SRA1H. They work well, provided that the maximum reception frequency is less than 200MHz. The circuit is shown in **Fig 8**, which can be used as a replacement for Fig 7.

The circuit works because pins 1 and 2, which would normally be connected to the RF input, are shorted to earth. The shorted primary winding has the effect of shorting all the connections of the transformer secondary together. A little thought, and mental shuffling of diodes, then suffices to show that the mixer is now the equivalent to the circuit of Fig 7.

Above 200MHz, the mixers in Fig 8 work to a degree, but the amount of LO drive required varies wildly from one frequency to the next. This is probably due to the fact that the shorting of the transformer primary does not produce a very good short on the secondary at high frequencies, and some resonance effects start to creep in.

For use above 200MHz, the mixer in Fig 7 is much more reliable. As has been mentioned before, the LO drive power for sub-harmonic mixers must be carefully optimised to provide minimum conversion loss. **Fig 9** shows a graph of the drive levels required to achieve a conversion loss of 8dB for the mixer in Fig 7, and for either an SRA1H or an SBL1 when used in the circuit of Fig 8. Within the upper and lower contours, the conversion loss will be less than 8dB.

AF FILTERING FOR DC RECEIVERS

THE AF FILTERING IN A DC receiver provides the selectivity, in effect performing the same function as the crystal filter in a superhet. To protect the AF amplifier from large unwanted signals above 4kHz, this filtering should be done as soon after the mixer as possible.

When viewed from this aspect, the ideal place to put the AF filter is between the mixer and the first audio amplifier. In this position, the filter must be a passive inductor-capacitor (LC) type, because resistor-capacitor (RC) filters are too lossy. Unfortunately, high value inductors & capacitors in this position tend to pick up AF hum and microphony.

Filters after the first AF amplifier can, of course, be either active or passive. There is thus an engineering tradeoff to be made, based on the number and power of the signals within about 100kHz of the wanted signal. On the lower HF bands, adjacent signals are large, so good filtering is important. On VHF, unless the next-door neighbour uses the same band as you, adjacent signals are smaller. This allows the designer to concentrate on achieving lower levels of hum and microphony by putting more of the filtering after the first AF amplifier. For similar reasons, either the SRA1H or SBL1 used as a conventional ring mixer is a good choice for the lower HF bands; both have good strong signal handling capacity. In contrast, the sub-harmonic mixers with their lower leakage, but lower signal handling capacity, are good choices for the VHF bands.

DIPLEXERS FOR THE MIXERS OF DC RECEIVERS

IN GOOD RECEIVER DESIGNS, all the connections to the diode mixer are properly terminated. This prevents signals being reflected

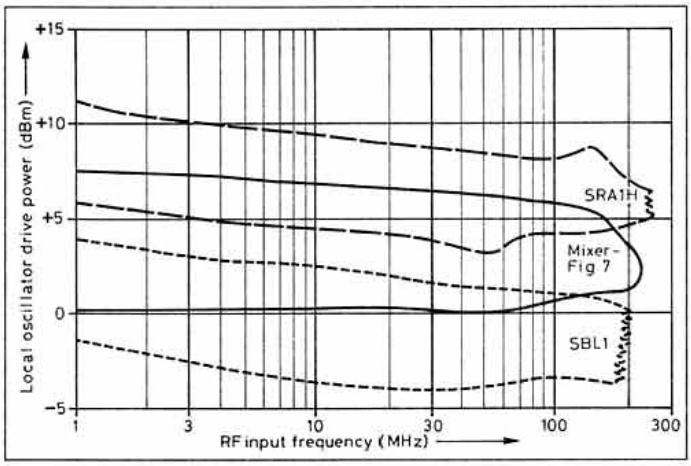

Fig 9: LO drive power requirement of the various sub-harmonic mixers.

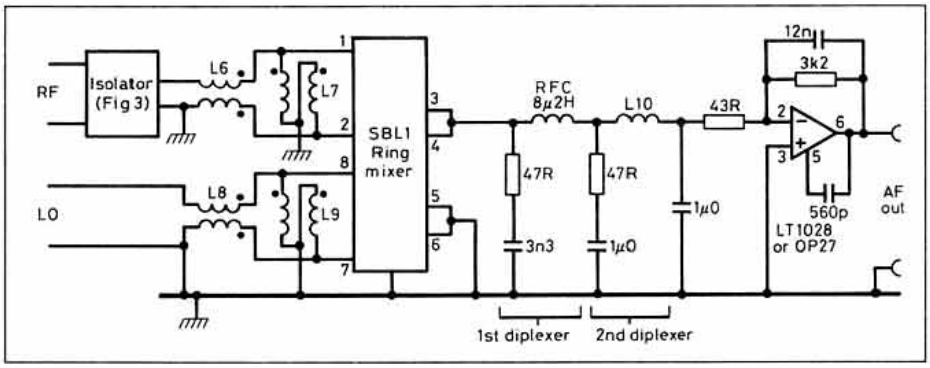

Fig 10: Mixer, diplexers and first AF stage for an HF receiver.

back into the mixer which would spoil its intermodulation performance. Although a completely broadband termination is desirable, it is especially important that two frequency bands at the mixer IF/AF output are terminated. They are LO + RF and LO - RF.

Take, as an example, a 7MHz DC Rx with an RF filter having a 0.5MHz bandwidth centred on 7MHz. For this receiver, the two important frequency bands for termination at the output of the mixer would be 13.5 to 14.5 MHz (LO+RF) and 0 to 0.5 MHz (LO-RF). Unfortunately, we wish to put our audio filter in this part of the circuit, and the filtering falls within the mixer's termination sensitive zone of 0 to 0.5 MHz. Consequently, if a filter is to be used between the mixer and the first AF amplifier, it must be of the sort called a diplexer. This is a network of various lossless filters which, if correctly terminated, gives a constant input impedance at one or more of the network's connections. This constant input impedance side is connected to the mixer output.

Each of the sub-harmonic mixers in Figs 7 and 8 uses a diplexer to separate the 'AF' out from the RF in. This is the simplest form of diplexer, and consists of the 8.2µH RF choke and the 3.3nF capacitor. More complicated diplexers can be designed from the information in Annex A.

Fig 10 shows a mixer/first AF stage for use on HF. It has an SBL1 mixer, two diplexers and an AF amplifier. The first diplexer uses the same components as the sub-harmonic mixers. It ensures a good match for the LO + RF frequencies and has a crossover frequency of 1MHz. The second diplexer has a crossover frequency of 4kHz to provide AF filtering. The capacitor between L10 and the 43Ω resistor is included to provide extra filtering. It does causes an impedance mismatch at 5kHz, but this is not too serious when compared to the difficulty of winding the extra inductor that would be required to give a perfect diplexer.

The transformers on the LO and RF ports of the SBL1 reduce the LO leakage by providing extra mixer balance. As long as the AM noise on the LO is low enough, the LT1028 (Maplin) will provide a lower noise figure than the OP27.

CONCLUSION

THIS ARTICLE HAS A MORAL for the designer of direct conversion receivers: "Keep your local oscillator under control on a short lead at all times, and never let it out in public." The higher the Rx frequency, the more the effort that must be made to achieve this. This frequency dependence is due to two effects. Firstly, the amount of signal radiated by short wires increases with increasing frequency, so causing increased LO leakage at high frequencies. Secondly, the noise power from the antenna decreases with increasing frequency; so that, for a given level of LO leakage, hum and microphony sidebands will be more apparent above the noise at higher frequencies, because the antenna noiise is less there.

To reduce LO leakage, use a separate well screened LO compartment with properly filtered supply and control lines. Use a non-resonant balanced mixer and an isolator stage to keep the mixer's LO leakage away from tuned circuits in the pre-amp or input filter. To reduce the hum level, use an external power supply unit and try to stop LO leakage from radiating from the receiver's case.

To help stop microphony, use a solid style of construction, and mount all RF circuitry on double sided printed circuit board. You will find that the DC receiver is one of a very select group of radio circuits that actually works better in a box than when it is bird's-nest built. Finally, there is the coward's way out; use a preamp with 40dB gain. This will drown microphony and hum in a flood of front-end noise. It will also degrade your receiver's dynamic range by 30dB or so.

ACKNOWLEDGMENT

THE AUTHOR THANKS THE other members of the club project team for their help. They are Dick G3WRJ, Hugh G0LGV and Pete G8EMJ.

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[1] 'Keep it Simple: Direct-conversion HF receivers', Pat Hawker, G3VA, IERE Conference on Radio Receivers and Associated Systems, *IERE Proceedings* No.40 July 1978, pp137-148

COMPONENT LIST

Note: Ls 1 to 10 are wound using 38SWG wire. Use 'Road Runner' wiring pencil wire, Farnell order code 148-730. This is a pack of 4 colours of self-fluxing polyurethane coated wire; prolonged heating with an iron will burn through the insulation. DO NOT INHALE THE FUMES! It is thus much easier to solder than the traditional enamelled sort, where the insulation must be scraped off. The Scientific Wire Co. sell bifilar red/green flat twin in 38SWG with an unspecified characteristic impedance close to 50Ω. Use of this wire simplifies the winding of small transformers.

D1,D2 Siemens BAS40-04 dual Schottky diodes (Electrovalue)

L1,L2 10 turns of wire on a Siemens B64290 K36 X83 toroid (Electrovalue). Space turns evenly round the core.

L3, L4, L5,L6, L7, L8, L9 Bifilar winding; two strands of wire twisted together to about 1 complete twist per mm. 8 turns on same former as L1 & L2. Use two colours.

L10 2.5mH; 157 turns of wire random wound on Philips former 4322-021-34510 (replaces old Mullard DT2467); DC winding resistance 4.2Ω for 38 SWG. Use core type 4322-022-75240 (replaces old No. LA4148) and two DT2498 core clips (all from STC). No adjuster is used. Hold turns in place with varnish after final assembly.

TR1 Siliconix U310 (from Piper Communications). Solder transistor can to circuit board ground-plane as a heat-sink. The can is internally connected to the gate, so the gate lead can be cropped off.

[2] 'Direct conversion SSB receivers', SR Al-Araji & W Gosling, *The Radio & Electronic Engineer*, March 1973, pp209-215

[3] 'A new negative feedback amplifier', Victor Koren, *RF Design*, Feb 1989, pp54-60

[4] *Handbook for the Radio Amateur*, ARRL, 1986, p12.8

[5] *Radio Receivers*, W Gosling, pp177-178, Pub. Peter Peregrinus Ltd. 1986 for IEE

[6] *Technical Topics*, G3VA, *Radio Communication*, April 1977, pp290-291, based on article by RA3AAE

[7] "Twin-diode mixer - a new microwave mixer", Jim Dietrich, WA0RDX, *Ham Radio*, October 1978, pp84-86

[8] 'Matching Circuits for Schottky Ring Mixers', J.Kestler, DK1OF, *VHF Communications*, 1/1976, pp13-18

ANNEX A:

The design of HP/LP diplexers with more than two components

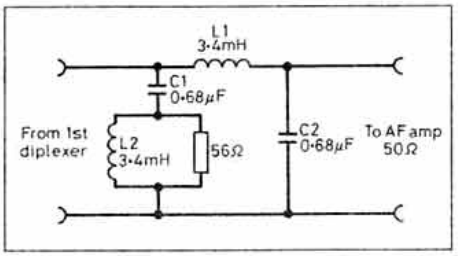
The standard formulae used until now by the radio amateur in designing diplexers are given in Reference 8. This gives the design data for LP/HP diplexers using one inductor and one capacitor. These have the disadvantage that the transition between the passband, through the crossover frequency, and into the stopband is rather slow. For example, if a simple diplexer has a crossover frequency of 4kHz, the loss due to the filtering of the lowpass side is still 1dB at about 2kHz.

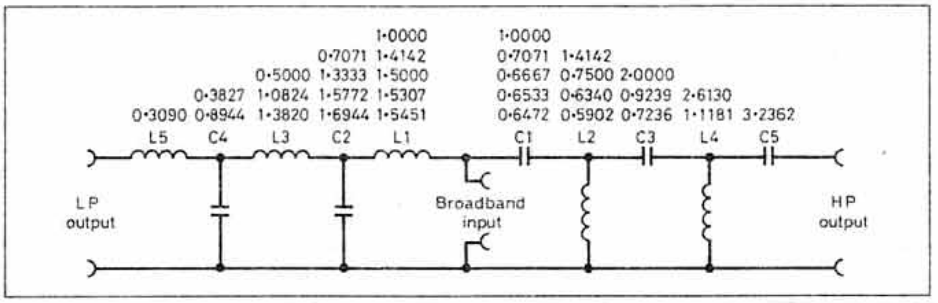
Much more rapid transitions can be achieved by using HP and LP filters with more than one component each. These diplexers can be designed from the standard tables of LC filter element values contained in Al Zverev's *Handbook of Filter Synthesis* (1967) which have been reproduced by almost every subsequent book on filters. The trick is to use the values for Butterworth T filters with a source impedance of zero Ohms. Some of these data are shown below; from them HP/LP diplexers of up to 10 components can be made. Bandpass/bandstop filters could also be made by applying the usual transformations.

To denormalise, multiply all capacitors by C and all inductors by L.

eg. Design a perfect four-component diplexer to replace the second diplexer in **Fig 10**.

choose fc = 3.3kHz and Ro = 50,
so calculate C = 0.965 F and L=2.41mH
from the table
C1 = C2 = 0.7071C = 0.68μF
and L1 =L2 = 1.4142L = 3.4mH
so the circuit for the diplexer is:





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IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

RFI-PROOFING THE VCR IN MY OWN HOME from articles by Hans-Joachim Brandt, DJ1ZB, originally in *cq-DL*, of June 1989 and October 1990

WE LIVE IN A HOUSE with two floors plus loft. The transmitting antenna is a 21m (69') wire stretching from the 11m (36') high chimney-top feedpoint to a 5m (16') pole in the back yard. The counterpoise consists of wires from the feed point along each rafter down to gutter level on the opposite side of the house. The inner of 3m (10') of 120Ω coax is connected to the antenna, the outer to the counterpoise. The coax is fed by an all-band ATU in the loft-level shack. The VCR is located on the first floor, below the counterpoise.

The NEC VCR had proved bothersome from the day my son brought it into the house. When I was on 80 and 40m, the picture was distorted on play-back and 10m RF switched the machine off completely, both from record and play-back. I took it as a challenge to make the monster RFI-proof, not only for my usual 2W but for the more common HF output of 100W.

FIRST SUCCESS

THE 10m INTERFERENCE entered the VCR through the SCART cable. Pulling this connector eliminated the effect. With a braid breaker at the VCR antenna socket and the mains filter installed, there was no RFI from Tx outputs of up to 2W on 40m, 10W on 80m and 100W on all bands 10 - 30m and on 160m (75W into the antenna on 1.8MHz).

After the SCART cable had been wound several turns through a large ferrite core, it could be reconnected without ill effects on 10m, though not reliably so at 100W. Coiling the coax from the VCR to the TV through a similar core also helped.

DIRECT PICK-UP

DURING PLAY-BACK, the antenna coax is not used. When pulled out, RFI was reduced, but only if the cable was removed more than 5 to 10cm (2 - 4") away from the VCR. This convinced me that direct pick-up of the RF field, in spite of the metal VCR cabinet, was the source of the remaining problem. Articles by Pauli and Schwarzbeck, DL1BU, suggested that better shielding was the key to further improvement. I designed a U-shaped aluminium shell corresponding to the top, bottom and back panels of the VCR. Through holes made in the back panel of the shell I inserted two bulkhead coax connectors and an IEC-style three-wire mains connector with integral mains filter. I also made holes for additional cables. Inside the shell I installed two coax jumpers to the VCR antenna input and output sockets and a mains socket connected to the output of the filter.

Two facts emerged. Firstly, the braid breaker was useful only when used outside the shell. Secondly, the integral mains filter, which did not have a choke in the earth lead, did not do any filtering unless the mains earth lead was disconnected *[don't leave it that way! - G4LQI]*. So the IEC connector/filter was discarded and replaced by three 120µH 2A ferrite-rod chokes installed inside the shell, which was connected to mains earth on the VCR side of the earth lead choke. *[Warning - insulation and connectors must be suitable for 240V mains wiring! - G4LQI]*. With this mains filtering, I could finally transmit on 80 and 40m at 100W with only a minor effect on the picture. On 80m the braid breaker was no longer required.

I replaced the 120µH units with a single bifilar 2x2.5mH choke in the live and neutral leads, and a 2x7mH unit with its windings in parallel in the earth lead. At 100W on 40m, the picture now was completely clean without the braid breaker; on 80m very slight streaking remained. Touching the controls on the front panel of the VCR, however, spoilt all: the picture just collapsed!

In order to operate the Tx and observe the picture at the same time, I locked my automatic keyer to send very slow dots. That way I alternately got pictures with and without RFI.

To eliminate the streaking on 80m I tried a braid breaker and mains filtering on the TV receiver, but without success. What finally did the trick was the addition of PCB side panels to the shell. They reach from the front of the shell two-thirds toward the back panel, permitting hand access to the space between the back panels of VCR and shell. *[Again - beware of the mains voltage - G4LQI]*.

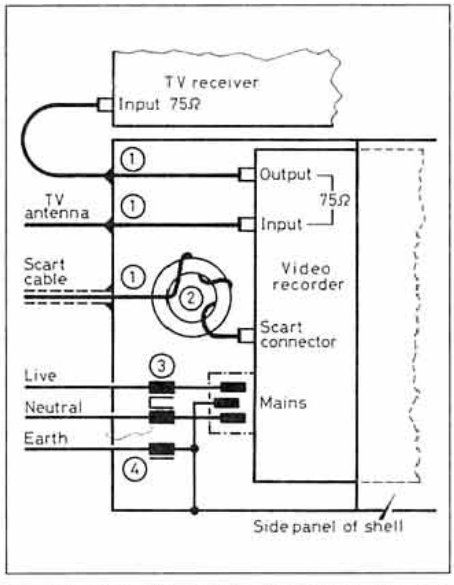

Fig 1: The important spots on the back: (1) Good contact between braid and shell. (2) Ferrite ring choke for the SCART cable. (3) Bifilar mains choke. (4) Earth lead choke.

POSTSCRIPT

AS MY SON AND HIS VCR have moved out again, I could not finalise the shielding of the SCART cable. I had intended to retain the ferrite ring between the back panels, and to screen the cable outward from where it passes through one of the extra holes in the back of the shell (with the braid connected to the shell at that point).

Later, I used a calibrated field strength meter to measure over 15V/m on 80 and 6V/m on 40m, ie much higher than the latest German EMC specs of 3V/m in the critical 2 - 8MHz range. Note that field strengths can change drastically simply by adding, removing or re-routing extension flexes or lamp cords. This is one explanation why RFI can come and go for no apparent reason. Also, structural steel, mains wiring, TV antenna cables, even CH radiators and rain gutters with their down spouts can pick up and re-radiate RF; this was worst on 160m where up to 80V/m was measured near the ends of such parasitic field disturbers.

A HAPPY SEQUEL

THE HAM GRAPE VINE does work and industry has taken notice; the Sanyo Company sent me a VCR, their model VHR-5200G with the request to test it where my son's VCR had been!

At 100W Tx output, it was unconditionally clean on all bands except 80m where the field strength was highest. On that band the VCR behaved like a loop antenna; an orientation could be found where there was no RFI; swivelling the unit 90° either way produced considerable RFI. The orientation coincided with maximum pick-up in a real receiving loop when the plane of the loop was parallel to the side panels of the VCR. To eliminate all RFI, I had to resort to the external shell and cover at least one-third of the VCR's front panel with a metal shield connected to the shell.

To test the susceptibility of the SCART connector I touched, while transmitting, a 4m (13') pick-up wire to each pin in turn. There was no effect. Play-back through the SCART cable was also RFI-free. However, when transmitting on 10m the cable picked up energy which affected the picture. Two pairs of split ferrite blocks (Amidon 2X-43-151) were installed on the cable, one turn on each block, near the TV's SCART connector; that cleared the problem.

CONCLUSIONS

THESE EXPERIMENTS yield some indication of what it takes for VCRs to be compatible with HF transmitters: a metal cabinet with good contact along the seams; good contact of UHF and SCART cable braids where they pass through that cabinet, and adequate filtering of mains leads. Some of the latest VCRs incorporate these features. Others can benefit from the fixes described in this article.

RADCOM CONSTRUCTION FEATURE

The TFH Antenna

by Richard Q Marris, G2BZQ

THE CONVENTIONAL short vertical helical HF Antenna is well documented. It is usually 6-8ft high and helically-wound. Invariably it has an umbrella type top hat, of several feet diameter, and an elaborate groundplane system is required. There is an even distribution of voltage/current throughout its length, and it is a very efficient short radiator.

However, you do not get something for nothing, so let us look at the drawbacks:-

1 It is invariably a single band affair.
2 It is very narrowband, but very efficient within that narrow band.
3 Having a very low impedance it requires a matching unit located at its base.
4 It requires an extensive λ/4 diameter radial groundplane system, which usually means a lot of digging up of lawn and garden to accommodate it.
5 Since the antenna with its ATU must be situated in the middle of the groundplane, it will be located out of doors, whilst you are comfortably located indoors with the Tx/Rx, the two being joined together with coax.
6 Because of 4 & 5, above, any ATU adjustment means rushing out of doors, and back indoors repeatedly to make normal loading adjustments.

So what is the answer? Well, the ideal seemed to be a short vertical helically-wound HF antenna, between six and eight feet high, using a normal ground system, usable over several HF bands, not narrowband, and with loading adjustments carried out near the operating position. In addition, an even current/voltage distribution throughout the whole antenna, which the conventional short vertical has proved to be effective.

The TFH fulfils this specification. It is a multi-band antenna; can be used indoors on a single simple base, or discreetly erected on the wall outside, with wall pipe clips. It is ideal for portable use or can be taken on holiday, with a small rig.

Fig 1 shows the antenna configuration. L1 is the short helical winding, and L2 is the single wire feeding from the ATU. The ATU,

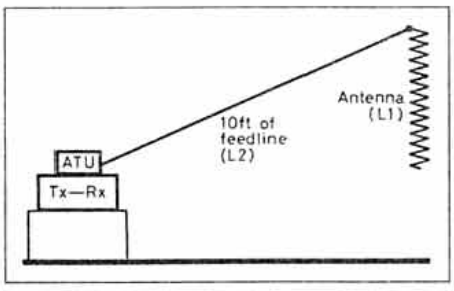

Fig 1: Basic configuration of the top loaded helical antenna.

The TFH (Top Fed Helical) is a multi-band HF TX antenna only 2 metres long, designed for indoor, discrete outdoor, portable or holiday use.

(**Fig 2**) is an 'LC' type. It is invariably used in the configuration shown, with the option in certain cases of reversing it to CL configuration. The ground system I use is a convenient waterpipe. A metal window frame has been used as an experiment.

CONSTRUCTION

Antenna

The antenna is wound on a 2m length of 2in inside diameter (i/d) (2.25in outside diameter (o/d)) grey polypropylene downpipe using 106ft of single strand 1/0.6mm grey PVC-covered 1.2mm o/d wire.

At the top of the pipe, fit a 4mm socket as shown in **Fig 3a**. Drill a small hole adjacent to the socket, push through the wire end and solder to the socket. Wind the wire, evenly spaced, to a total winding length of 45in using approximately 4 turns per inch. It is convenient to put pieces of tape around the coil at intervals to hold the wire temporarily. The last few turns at either end should be secured to the pipe with cyanoacrylate adhesive. *This adhesive should be handled with* ***extreme*** *care, as it sets in about 3 seconds, with an indestructible joint.* After final testing, the pieces of tape are removed, and the turns coated with a clear lacquer.

The simple wooden base (Fig 3a) is made of 12in x 12in x 0.5in heavy wood with a 12in long square section 'prong' on which the antenna pipe can be slipped. For outdoor use, the wire turns should be coated with marine varnish, and the 4mm socket replaced with an insulated hard soldered connection. For mounting on a wall outside a window (**Fig 3b**), two plastic pipe brackets are used, making an inconspicuous antenna.

The ATU

The ATU consists of a tapped coil and 500pF variable capacitor as Fig 2. This is mounted inside a convenient metal case.

The inductance L3 is wound on a 4.5in length of 1.25in o/d paxolin tube using 95 turns of 18 gauge enamelled copper wire, tapped at 12 - 12 - 12 - 12 - 20 - 12 - 5 - 5 - 5 turns. The taps on the prototype are adjusted with a clip, but a rotary switch could be used, or the tap soldered for monoband use. Good clearance is required between the coil and the metal box, but otherwise the layout is not critical. A short length of RG58 50Ω coaxial feedline connects the ATU to the Tx/Rx.

The feedline L2 is a 10ft length of PVC covered 24/0.2mm stranded wire. One end is terminated with a 4mm plug (to antenna), and the other a coaxial plug (to ATU).

OPERATION

THE ANTENNA SHOULD BE located clear of metal objects, and electricity supply wiring. It should be in a position to enable feedline L2 to be taken in the clear to the ATU, eg the centre of the room. If mounted on pipe brackets outside the window, as Fig 3b, it should be kept clear of any metal pipes or in-wall metalwork.

The antenna is usable on 80, 40 and 20m over the whole of each band. It has been loaded successfully on 160m though not tried on the air.

It is essentially a low power device (up to 25W or so), and in the interests of safety it is suggested that a maximum of 10W output should be used indoors.

In operation, connect the ATU in the LC mode; select the band, and then adjust L3 tap and C1 for maximum received signal strength. Only a minor adjustment of C1 may be necessary on transmit for Tx loading.

The antenna has been used mostly on 80m CW, obtaining excellent results with a 10W transmitter using a Pi output.

Setting up at 3550kHz gives a usable bandwidth of over 100kHz, from 3500 to 3600, without readjustment of C1. Further small adjustments of C1 enable the whole

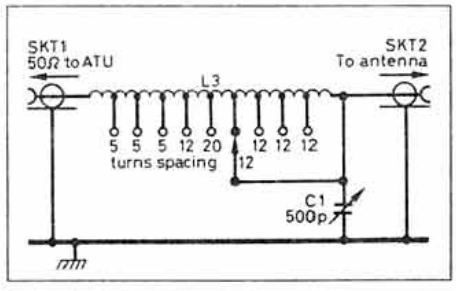

Fig 2: A simple 'LC' or 'CL' aerial tuning unit, which is invariably used in the configuration shown.

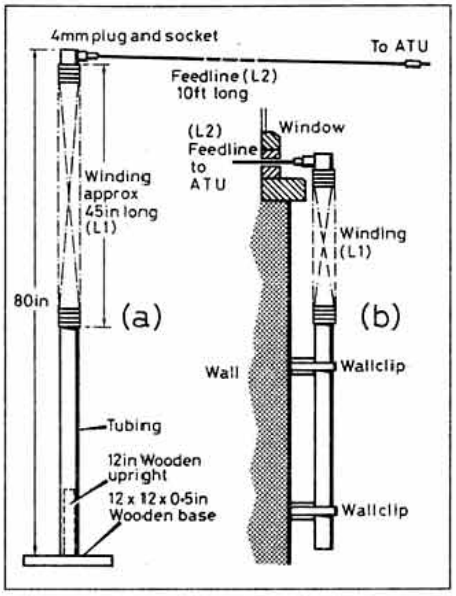

Fig 3: Construction details of the TFH antenna (a) self supporting or (b) wall mounted.

band 3500 - 3800kHz to be used in approximately 100kHz segments. No harmonic content or TVI has been detected.

Careful checking indicated that the voltage/current distribution on the helical coil L1 is even over the whole length, as per target specification, and this holds good on 80, 40 and 20m. On 160m, the ATU should be tried in both the LC or reversed CL modes.

The antenna is a very low cost, convenient, transportable device breaking down into Helical L1; wood base and plug-in feedline L2, plus ATU. It takes only a couple of minutes to set up or break down. High rise building dwellers, with antenna restrictions or difficulties, should find the configuration of Fig 3b useful, with the rig and ATU just inside the window. If the window frame is metal, it can be tried as the ground (it worked at this QTH), or a convenient water pipe could be used. Otherwise, a $\lambda/4$ insulated counterpoise lying on the floor would suffice. Metal gas pipes or electric conduit should not be used as a ground. An existing good HF all band ATU can be tried in lieu of Fig 2.

PARTS LIST

L1 Single strand 1/0.6mm PVC covered 1.2mm o/d wire. (eg 1 kV RMS, 1.3 amps - grey - Marco Trading CBL/EW1/Grey) wound on 2m of polypropylene downpipe 2 inch i/d, 2.25in or 57mm o/d, (eg grey - OSMA 20MF282 or similar)

L2 10ft of 24/0.2mm PVC covered stranded wire 2mm o/d

L3 18-gauge enamel covered wire, wound on 1.25in o/d x 4.5in long paxolin former

C1 Airspaced good quality 500pF variable capacitor with knob

Optional Wall Clip Pipe brackets, (eg grey OSMA 20MF281 or similar)

SK1/SK2 Coaxial sockets (identical)

4mm plug and socket.

Book Reviews

WIRELESS THE CRUCIAL DECADE (History of the British wireless industry 1924-34)

by Gordon Bussey.

Volume 13 in the IEE's History of Technology series. Published 1990 by Peter Peregrinus Ltd, 125 + x pages (hard covers). Price £29.

THIS NEW BOOK well outlines (but without circuit diagrams) the development of domestic wireless sets, primarily for medium and long waves, from a time when crystal sets, earphones, ebonite panels, triode valves run from accumulators and HT batteries, with readily available (if high cost) components encouraging home construction, through a decade to an era of mass-produced sets with a stamped out metal chassis, selective receivers based on superhet circuitry (though many British and European firms were still marketing 'straight' sets in 1934), multi-electrode valves, moving-coil loudspeakers (often mains-energised) running from the electric supply mains (still often DC mains). The author is well-known in the growing volume of nostalgic publications featuring early (rather than vintage) radio sets. In this volume, he draws very heavily on the editorial and advertisement columns of the once-weekly Wireless World. Virtually all the illustrations consist of advertisements reproduced from that publication.

Gordon Bussey shows clearly that most of the important developments came to Europe from America, gradually forcing down the very high prices of equipment produced in garage-type workshops paying (or avoiding paying) the original 'BBC' patent royalties, until, by the mid-1930s, production was in the hands of the large electrical firms with wooden cabinet furniture firms as sub-contractors. Surprisingly, no reference is made to the restrictive influence of the then all-powerful BVA (British Valve Association) which kept the retail price of British valves so high - and led us in the following years to welcome, as soon as import restrictions were lifted, the appearance of American valves and American communications receivers at more reasonable prices. There is disappointingly little on the commercial history of the industry.

He does, however, show that in 1926 the average price of a four-valve (triodes) battery set was £38, with a replacement valve costing say £1.50, at a time when a skilled worker was lucky to earn perhaps £5 per week.

For those of us who first became aware of the wonders of wireless in this crucial period, this book (despite its very high price) provides an interesting and informative read. It is perhaps fitting, in view of the recent history of the late-lamented British radio-manufacturing industry that this book has been printed (to high standards) in Singapore. ***G3VA***

UHF COMPENDIUM Parts 3 and 4

Edited by Karl Weiner, DJ9HO

403 pages, published by DARC Veriag, ISBN 3-88692-010-0

THE UHF COMPENDIUM is a monumental effort by DJ9HO to compile the best of West Germany's amateur VHF, UHF and microwave knowledge into print. Originally a private venture, publication has now been taken over by DARC, the West German National Radio Society. The series appears initially in German as UKW-Unteriage, with subsequent English translations. The combined Parts 1 and 2 have been available for some years, and the latest English-language volume combines parts 3 and 4.

The UHF Compendium does not contain instructions for building exact duplicates of complete items of equipment. With a few exceptions, it is primarily a source of ideas for circuit modules based on the direct experience of the original developers. Although there is plenty of information in the form of circuit diagrams, sketches, photographs, PC layouts and text, you are still expected to work out the less important details for yourself. This is a realistic approach, because most experimentally-inclined amateurs like to use materials that are to hand, and seldom attempt to duplicate a design in exact detail.

Newcomers to VHF, UHF and microwave construction would probably feel in need of a little more information than the UHF Compendium provides. Even so, the series is well worth buying as a source of information, and for its many examples of electronic and constructional techniques. From the photographs, it soon becomes clear that equipment doesn't need to look pretty to work well!

The most enjoyable way to read this book it to flip the pages until something catches your attentions. Among the huge variety of VHF, UHF and microwave designs and ideas, notable items include: a large family of power amplifiers for 144MHz and particularly 432MHz, based on the 2C39 and similar triodes in ones, twos and threes; many ideas for pre-amplifiers transverters and power-amplifier chains for the middle microwave bands; equipment for receiver intermodulation testing on 144MHz and 432MHz; a relatively simple spectrum analyser for 0-1.8GHz; a trailer-mounted mini-shack (why not?); and an astonishing 10GHz SSB transverter built into the battery compartment of an IC202.

We British are often unaware of technological developments in countries using languages other than English, so it is a particular pleasure to see such a mine of information coming from a country other than Britain or the USA. Unfortunately, the English-language volumes of the UHF Compendium appear 2-3 years after the original versions in German, and thus are not quite so state-of-the-art. As a result, many British amateurs who have become fans of the series are already struggling through UKW-Unteriage Tell 5, German-English dictionaries in hand - and a good thing too. After having caught up with Parts 1-4 in English, you may want to do the same. ***G3SEK***

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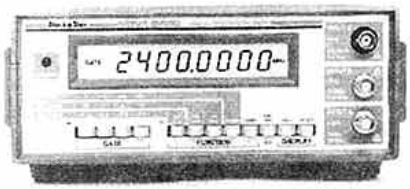

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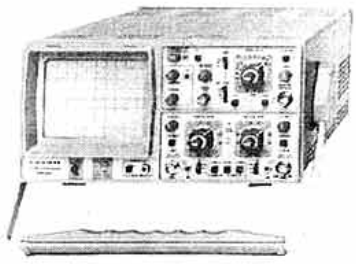

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VISA

A Digital Frequency Display for the Modular Transceiver

by Mike Grierson, G3TSO

SOME THREE YEARS AGO I developed a Modular Transceiver for the amateur bands [1]. One of the major problems encountered in such a project is that of presenting the actual frequency of operation. In years gone by, the use of an Eddystone 898 dial may well have partly solved the problem, but it still had to be accurately calibrated; an arduous task to say the least. With the advent of digital electronics, the digital frequency display has become commonplace on almost all commercial designs providing the ability to read off the frequency to an accuracy of at least 100Hz.

Since publishing my article on the Modular Transceiver, over 180 amateurs have started to construct the project and many have asked for the details of the digital frequency display shown on the photograph of the original equipment. The prototype counter used a mixing process where the 9MHz carrier oscillator (CO) was mixed with the local oscillator (LO) output, and filtered to produce a signal at the actual operating frequency. This signal was amplified and prescaled before being counted in a commercial FC177 digital frequency display module.

During the development of the transceiver, the prescaler IC became obsolete with no suitable alternative available. For this reason, the digital display design was not published at the time.

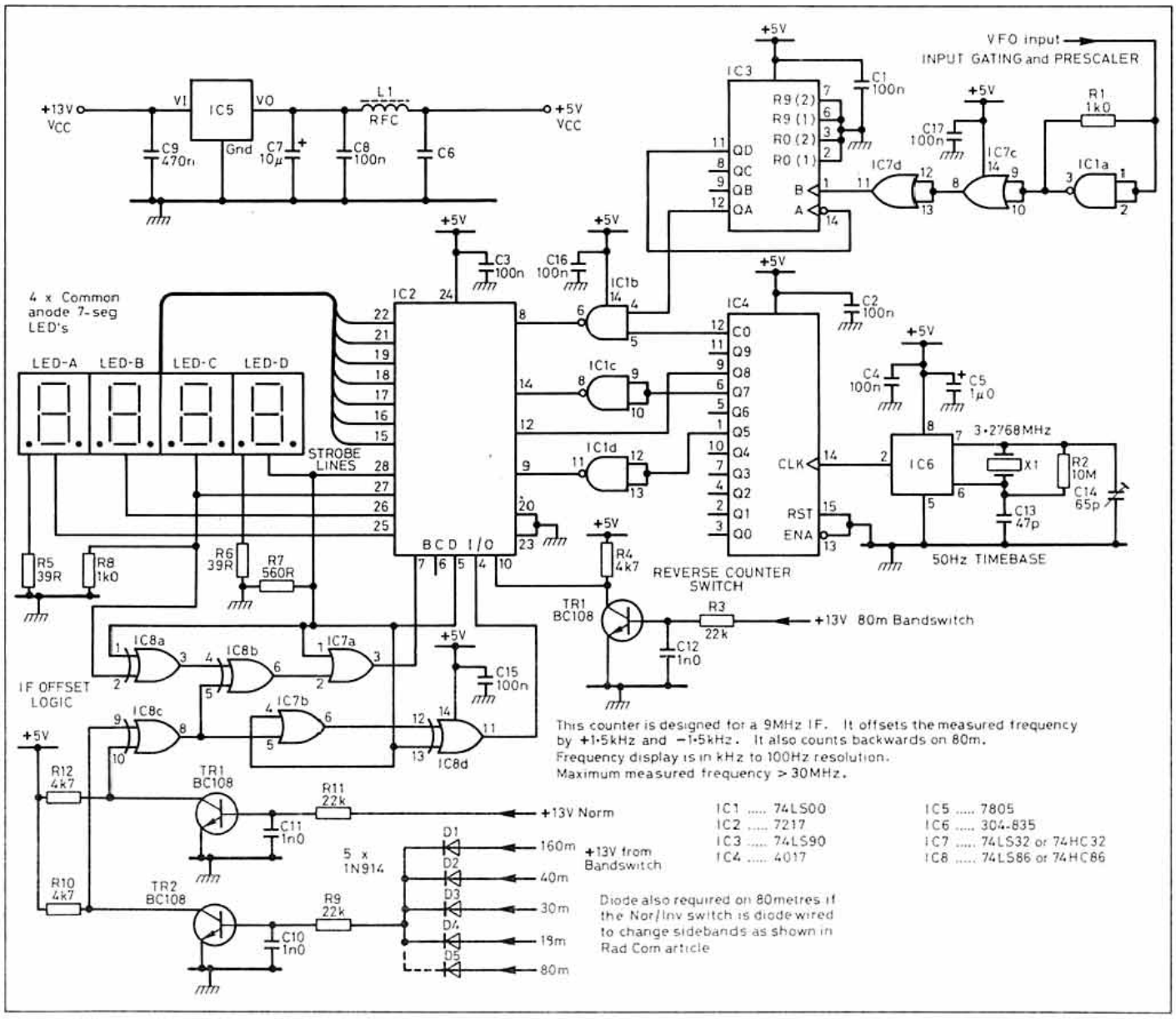

Fig 1: Digital Frequency Display unit for the G3TSO Modular Transceiver.

The mixing type display is not very elegant in electronic terms and proved something of a nightmare to build, so an alternate system was sought. Ideally by reading the LO frequency directly, and either adding or subtracting the IF frequency, it is possible to display the operating frequency by reference only to the LO frequency. In commercial equipment this is commonplace.

However, the offset programming is usually achieved with a dedicated counter chip made specifically for the equipment that it is to be used in, and the IF offset data held in ROM (read only memory). For home constructors this can present an insurmountable problem.

There are several dedicated counter ICs readily available, and it was an article in the US magazine *Ham Radio* [2] which made me aware of an Intersil IC that could be externally programmed to offset the displayed frequency. One major shortcoming is that it is only a four bit counter with a quoted upper frequency of 2MHz, though it will typically work up to 5MHz.

As it can only display four digits, and we require to display to an accuracy of 100Hz, then the display will only be capable of displaying up to 999.9kHz. On reflection, surely this is all we require? The analogue dial on the famous FT101 was only calibrated in kHz, the MHz being determined by reference to the bandswitch. After all, if we don't know which band we are on, resolution down to 100Hz is meaningless!

The Intersil 7217 is available in the UK from Radiospares [3] and Farnell; the price is quite reasonable at slightly less than £10. There are two versions of the IC available, the 7217 which drives a multiplexed common anode display and the 7217A which is the same IC, but capable of driving a common cathode display. The only major difference is the pin connections. Radiospares only sell the 7217, whilst Farnell sell both varieties.

CIRCUIT DESCRIPTION

THE FREQUENCY DISPLAY UNIT is illustrated in **Fig 1**. The timebase is supplied by a Radiospares 50Hz timebase IC comprising a 3.2768MHz oscillator and a divide by 2^{16} divider, IC6.

The 50Hz signal is fed directly to IC4, a 4017 decade counter which provides the outputs to drive the Store, Reset and Load Counter inputs of the 7217, IC2. IC1, a 74LS00 quad Nand gate is used to buffer the outputs. The count input is gated with the output of IC3, a 74LS90 decade counter. IC3 acts as a prescaler increasing the frequency range of the 7217 by a factor of 10, ie to 20MHz, but typically up to 50MHz.

In the G3TSO Modular Transceiver, the highest frequency to be read is 21MHz, or 27.5MHz if the WARC bands have been included. The local oscillator is fed directly to IC1a, a Nand gate wired as an inverting buffer. This was initially fed directly to the prescaler, but it was discovered that further buffering was required in order to read the higher frequency signals. If the counter fails to operate on 10 metres it is most probably due to insufficient LO signal.

Two gates were left over on the IF offset logic, so IC7c/IC7d were inserted in series with the input signal. This had the effect of increasing the sensitivity and hence frequency range of the counter. In extreme cases some extra amplification may be required and the use of a SL560 may solve the problem.

The display is a common anode LED display and can be made up from four, 7-segment LEDs, or can be a complete four bit multiplexed display unit; the Radiospares low current 0.3in discreet displays made by Hewlet Packard are ideal. The displays are wired in parallel with a strobe line activating each display in sequence.

The current consumption of LEDs is high (around 250mA) and may not be very attractive for portable operation, in which case an LCD type display may be substituted as shown in **Fig 2**. This requires the addition of a 7211AIPL interface IC available from Farnell costing a little under £4. It is fed from the BCD output pins 4-7 on the 7217 and buffering of the logic with 20k resistors is recommended in the data sheet.

The Modular Transceiver, in common with any equipment having a 9MHz IF and a 5MHz VFO, suffers from the problem that the VFO will tune backwards on 80 metres. This is because the VFO is subtracted from the IF rather than added to it. Fortunately, the 7217 is provided with the ability to count in either direction, up or down. By arranging the counter to count down, the frequencies on 80 metres will be correctly displayed. This is achieved by taking pin 10 on the 7217 to ground using Q1 a switching transistor, turned on by the +13V signal from the 80m position of the bandswitch.

IF OFFSET SWITCHING

THE MAJOR ADVANTAGE OF the 7217 is the ability to program a frequency offset anywhere in the counter range. As the counter is only going to display kHz one may wonder why we should even wish to offset the IF, as the 9MHz will not appear on the display. In fact, if the IF were exactly 9MHz (**Fig 3a**) there would be no need to apply any offset at all. However, whilst the IF centre frequency is 9MHz the actual carrier frequencies are 9.0015 and 8.9985 MHz requiring an offset of 1.5kHz either side of the centre frequency. 1.5kHz can be added to the counter but cannot be subtracted, so it is necessary to add 998.5kHz instead to achieve the correct display.

Programming the 7217 is achieved by providing a binary number at the BCD input port, (pins 4, 5, 6 and 7). This is normally achieved by hard-wiring diodes from the strobe pins to the BCD input pins as illustrated in **Fig 3**. For simplicity, a diode placed between pin 28 and pin 7 will add one to the count on the Least Significant Bit (LSB) - hundreds of Hz. A diode between pins 28 and 6 will add two, pin 5 will add four and pin 6 will add eight. In-between numbers can be obtained by wiring two diodes from the strobe pin to say, pins 7 (+1) and pin 5 (+4), the total addition being 1 + 4 = 5. Any offset can be programmed in, in this way.

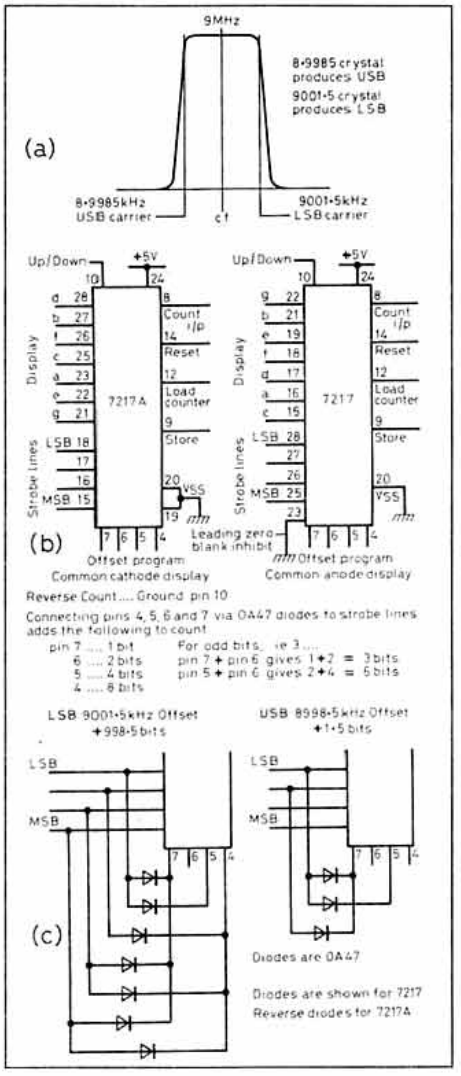

Fig 3: a) USB and LSB oscillator positions b) 7217 pin connections c) 7217 diode logic

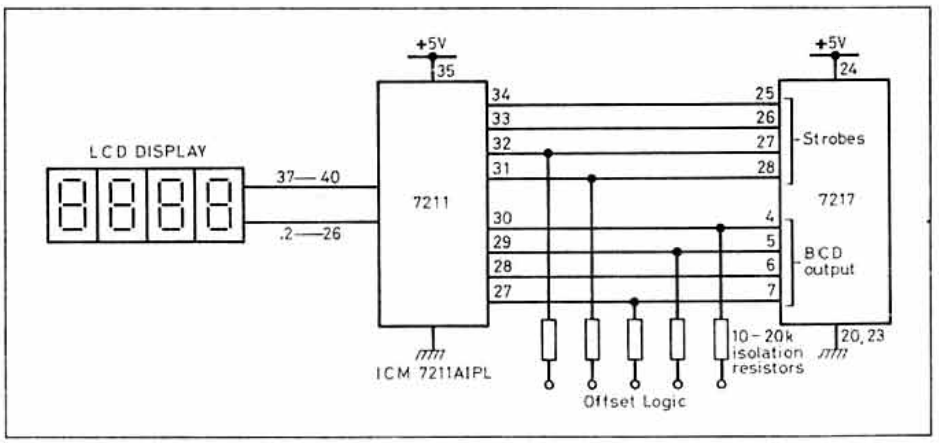

Fig 2: LCD display interface for the Digital Frequency Display.

	Band	NORMAL Output	IC8c pin10	IC8c pin 9	IC8c pin 8	f c offset	INVERT Output	IC8c pin10	IC8c pin 9	IC8c pin 8	f c offset
	160	LSB	0	0	0	LSB	USB	1	0	1	USB
*	80	USB	0	1	1	USB	LSB	1	1	0	LSB
	40	LSB	0	0	0	LSB	USB	1	0	1	USB
	20	USB	0	1	1	USB	LSB	1	1	0	LSB
	15	USB	0	1	1	USB	LSB	1	1	0	LSB
	10	USB	0	1	1	USB	LSB	1	1	0	LSB
WARC Bands	30	LSB	0	0	0	LSB	USB	1	0	1	USB
	18	LSB	0	0	0	LSB	USB	1	0	1	USB
	12	USB	0	1	1	USB	LSB	1	1	0	LSB

Normal = +13V USB
Invert = +13V LSB

* Diode logic was shown on G3TSO Modular transceiver to change sidebands on 80m making normal = LSB

Table 1

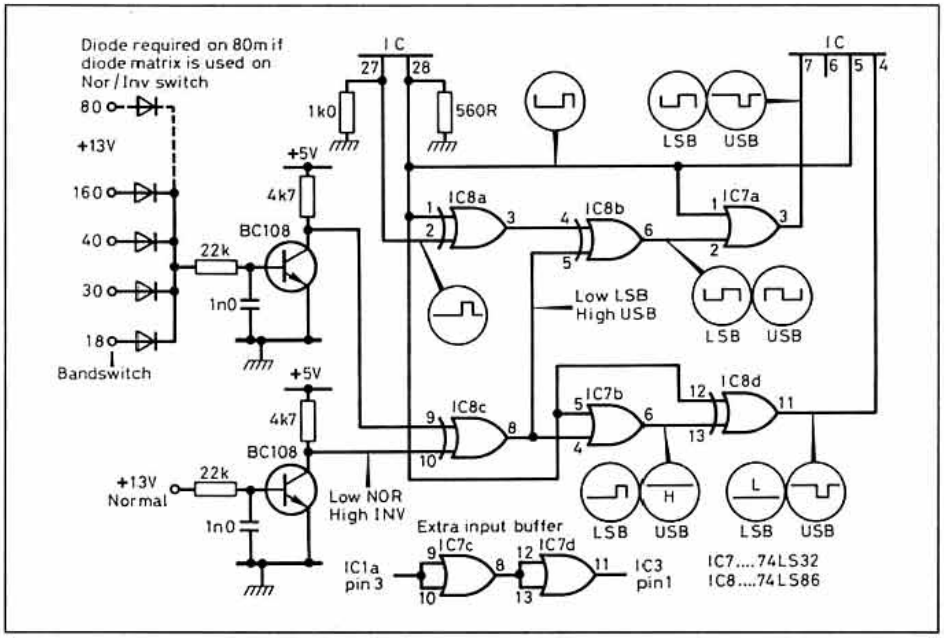

Fig 4: Logical generation of IF offsets for programming the 7217 IC

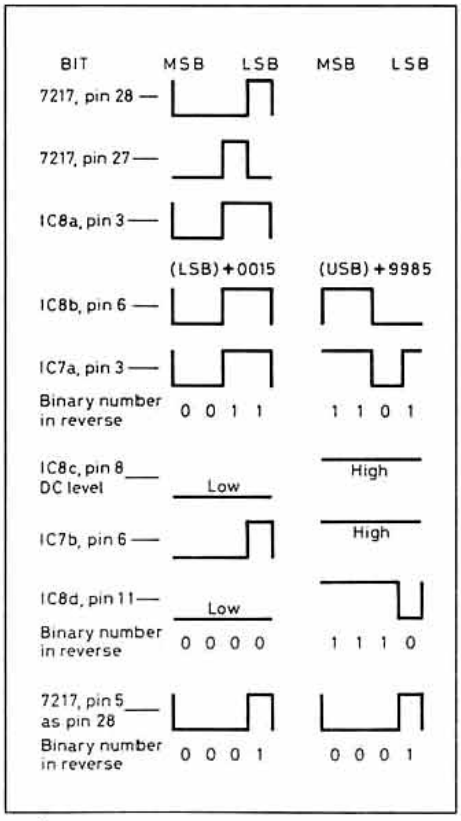

Fig 5: Timing diagram showing combination of strobe signals to generate binary numbers.

	Pin	4	5	6	7		
	Bit	3	2	1	0		
Digit	0	0	1	0	1	= 5	
	1	1	0	0	0	= 8	Decimal Offset 9985
	2	1	0	0	1	= 9	
	3	1	0	0	1	= 9	
Digit	0	0	1	0	1	= 5	
	1	0	0	0	1	= 1	0015
	2	0	0	0	0	= 0	
	3	0	0	0	0	= 0	

Table 2

Diode matrices are shown for both USB and LSB operation. In practice it is necessary to switch between offsets and this can be accomplished in one of two ways, either the diodes can be switched by miniature relays, or a combination of logic gates can be arranged to swop two binary numbers applied to the counter BCD input.

Table 1 illustrates the sideband switching logic necessary to determine which IF offset is required. This may seem somewhat complicated, but it should be borne in mind that the sideband selected on the exciter is not necessarily the one that is transmitted, due to sideband inversion in the mixing process. Table 1 also shows which sideband is transmitted for a given band and the setting of the Normal/Invert switch, which switches the sideband CO signals.

The +13V signals from the bandswitch are fed to the base of Q2 on those bands where sideband inversion occurs, in order to change the offset. The +13V Normal signal is fed to the base of Q3 causing a change of offset when this signal is removed in the Invert position. The logic levels obtained from Q2 and Q3 are fed to IC8c, an Exclusive OR (EOR) gate, which produces either a low output for the USB offset or a High for the LSB offset. This ensures that the correct offset occurs whatever position the transceiver switches are placed in.

Table 2 shows the binary numbers which must be loaded into the counter in order to achieve the correct offsets. The 'BITS' correspond to pins 4 to 7, the BCD input ports, whilst the DIGITS correspond to the strobe lines on pins 25 to 28. A timing diagram is shown at **Figs 4 & 5**, illustrating how the strobe signals are combined and gated to produce the binary count necessary to offset the counter. The bit pattern can be observed on a double beam oscilloscope at pins 4, 5 and 8. Synchronisation is taken from pin 28 at the trailing edge of the LSB strobe. The scan commences with the MSB strobe, digit 3, and finishes with the LSB strobe, digit 0.

IC8a combines the timing strobes from pins 28 and 27 of the 7217, whilst IC8b combines the resultant signal with a level shift from the sideband logic circuit, the final bit pattern at pin 7 is determined by ORing in IC7a the outputs from pin 28 and IC8b.

Pin 28 is also fed to IC7b where it is ORed with the offset shift signal before being recombined with the same signal in IC8d, it then feeds pin 4 on the 7217. Pin 5 requires the same binary signal on both offsets and is coincident with the LSB strobe signal, it is therefore connected directly to pin 28. Pin 6 remains unconnected as it requires a zero input for both offsets. Resistors R7 and R8 serve to pull down the strobe lines to ensure that they return to a logic 0 level. R7 is lower in value as it pulls down pin 28 and pin 5. These resistors may not be necessary if IC7 and 8 are the 74HC series CMOS devices.

The logic is more difficult to explain than to construct. The tables and illustrations serve two purposes, if the offset switching does not work first time, its operation can be followed through, in order to determine where the problem lies. Secondly, the experimenter who may wish to derive different offsets for his particular design, can develop a feel for the way it works and modify it to suit his own particular requirements.

CONSTRUCTION

CONSTRUCTION OF THE counter can be largely left to the individual, as the space available may vary considerably. In most cases the display will be mounted vertically whilst the counter logic may be mounted at right angles directly behind the counter. A suitable PCB layout is shown at **Figs 6 & 7**, where all the components have been placed on a PCB measuring only 3.25in by 2in.

A double sided board is used with the groundplane on the upper surface which makes decoupling easier and may reduce noise. All ICs should be decoupled with a

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Antenna to Ionospheric Matching

continued from page 36

tenuation. Obviously, this angle of radiation only has to be modified slightly to allow communication with any part of the globe.

The final design will have the height remotely controlled by an electric motor and gear box. The control unit for this height system can then be calibrated in terms of distance, with appropriate corrections for propagation conditions, of course.

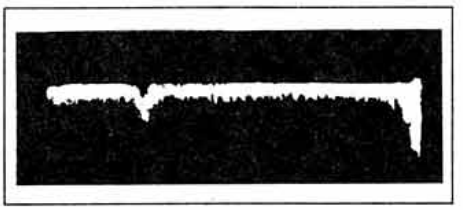
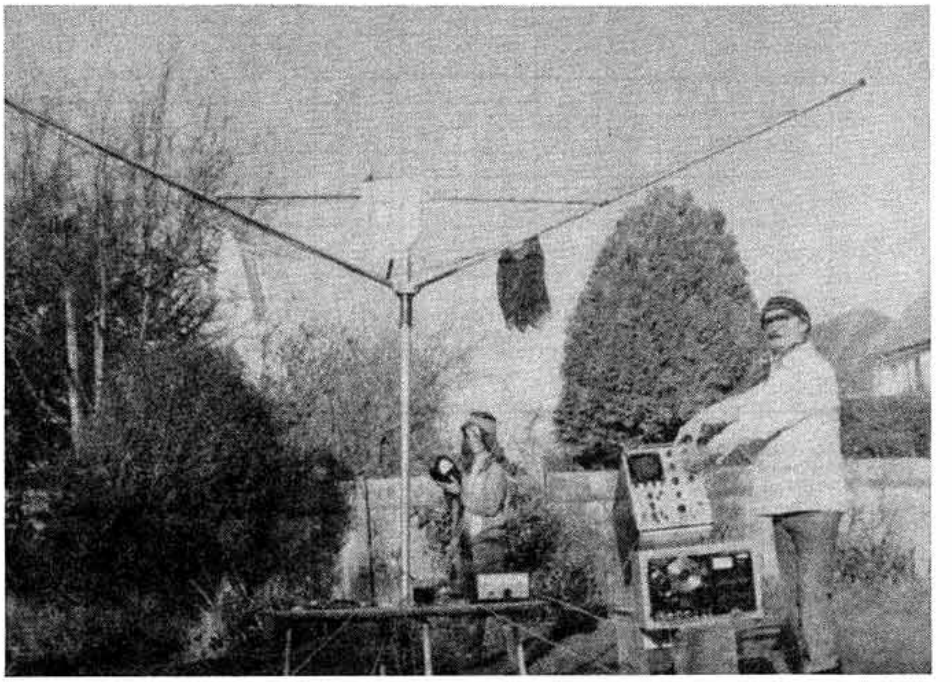


Fig 4: Oscillogram of echo signal.

CONCLUSIONS

THESE EXPERIMENTS PROVED completely the author's hypothesis and a patent for the antenna design has been applied for.



The author and his assistant demonstrating the use of his equipment in the back garden of his home.

The reader will note that no data is given regarding feed impedance, relative polar diagrams and antenna dimensions following normal practice in some literature describing experimental work. If the reader feels that this has raised more questions than it has answered then he should be philosophical; there is still a wide open field for the experimenter.

ACKNOWLEDGEMENTS

THE AUTHOR USED THIS hypothesis to complete his BA (FFLED) at the Academy of Ionospheric Research (AIR), Bionik. MASS, ably assisted by Miss Con StRude MA(y) BE and IV Shotitov, L'Accademie des Sciences de Sans Serif.

An Assembly of Constructors

PHOTOGRAPHS: G3XKD

G3JFH, Chairman of Cheltenham Amateur Radio Association, presenting the winner's cup to Peter, G4ENA. L to r: G3JFH, G3VKV and G4ENA.

CHELTENHAM Amateur Radio Association is fortunate in having amongst its members some very good designers and constructors, ensuring that the annual constructors' contest is always a delight to those who like to see 'home brew' at its best.

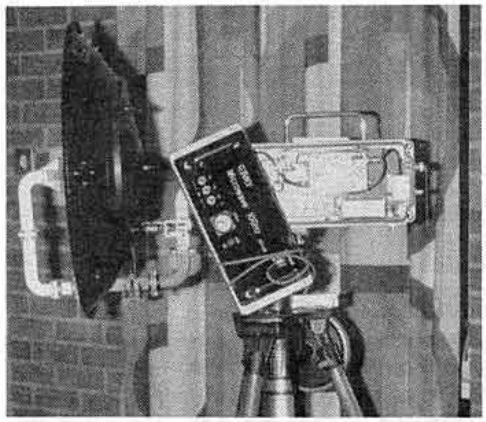
Last year's contest was no exception. Among the entries were offerings from Mike Grierson, G3TSO, and Peter Asquith, G4ENA, whose designs will be familiar to readers of *Radio Communication*.

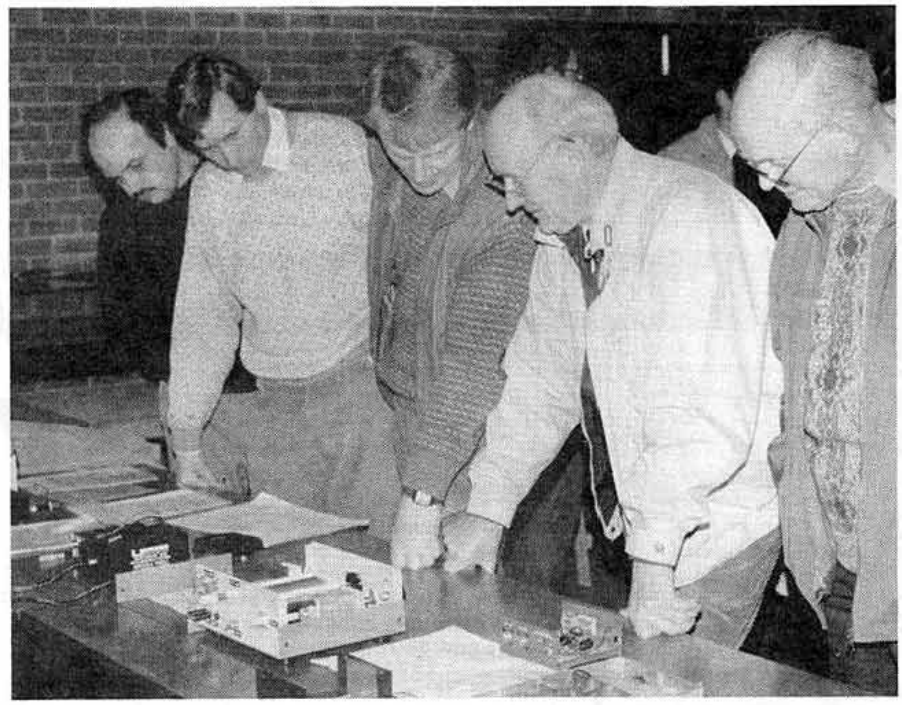
The contest was won by Peter, G4ENA who exhibited a spectrum analyser. Second was Mike, G3TSO with his miniature 3.5MHz transceiver, while in third place was Graham Jones, G3VKV with a 10GHz portable transceiver.

G4ENA, making an adjustment to his spectrum analyser while G3TSO and G8JAY look on.

Left: G3VKV, demonstrating the finer points of his 10GHz portable transceiver (L to r: G3VKV and G3NKS).

Bottom left: Inside the G3VKV 10GHz transceiver.





G3TSO (centre), discussing entries with G3JFH. From left to right: G8JAY, G4ENA, G3TSO, G3JFH and G4OVB.

A Digital Frequency Display for the Modular Transceiver

continued from page 51

100nF capacitor at the 5V VCC pin. Leads should be kept to a minimum length especially between the counter and display units. IC5, the voltage regulator, gets very warm and must be mounted on the main chassis for good heat dissipation. For low power or portable operation the consumption of the display can be greatly reduced by using a LCD readout in conjunction with a suitable interface IC. The Intersil ICM72112AIPL available from Farnell at about £4 is ideal and is fed from the strobe lines and the BCD output port. It may be necessary to insert series resistors of between 10 and 20k ohm between the offset logic and the BCD input port when using the 7211.

COMPONENTS LIST

Qty	Reference		Part
1	IC5		LM7805
1	C9		470n Ceramic
1	C7		10µF Tant
9	C1,C2,C3,C4,C6,C8		
	C15, C16, C17		100n Ceramic
1	L1		RFC 1mH approx
1	LED	See text	7 seg LED (Hewlet Packard)
1	IC2	See text	7217 (Radiospares)
1	IC1		74LS00
1	IC7		74LS32/74HC32
1	R1		1K .25W
1	IC6	50Hz Timebase	304-835 (Radiospares)
1	X1		3.2768MHz
1	R2		10M .25W
1	C13		47p Ceramic
3	C12,C10,C11		1n Ceramic
3	R3,R9,R11		22K .25W
3	Q1,Q2,Q3		BC108
3	R4,R10,R12		4K7 .25W
1	IC8		74LS86/74HC86
2	R5,R6		39R .25W
1	R7		560R .25W
1	R8		1K .25W
1	C5		1µF Tant
1	IC3		74LS90
1	IC4		4017
5	D1,D2,D3,D4,D5		1N914
1	C14		65pF Trimmer

CONCLUSION

THE COUNTER described was developed primarily for the G3TSO Modular Transceiver to provide a simple but accurate frequency readout. Its simplicity makes it suitable for other home construction projects, or even for adding to older commercial designs. The LED displays consume quite a lot of current, but for lower power consumption it is possible to feed a LCD display from the 7217, provided a suitable buffer is inserted between the display and the counter.

Considerable help has been received from other amateurs during the testing of this design and special thanks go to Jim, G4KKF, who designed and tested the logic circuit for the generation of the offset data. Reports from those amateurs who have already installed the counter into their transceivers, indicate that it is not noisy, provided the supply line is adequately decoupled.

The cost of building this project is likely to be less than £20 representing a saving over the cost of a mixing type counter combined with the price of a FC177 module. The use of a LCD display will only add a small additional cost of about £5, but produce a considerable saving in power.

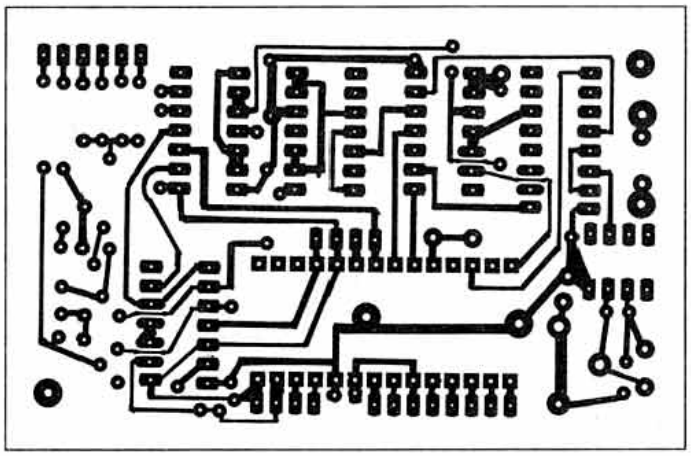


Fig 6: PCB layout for the frequency counter unit.

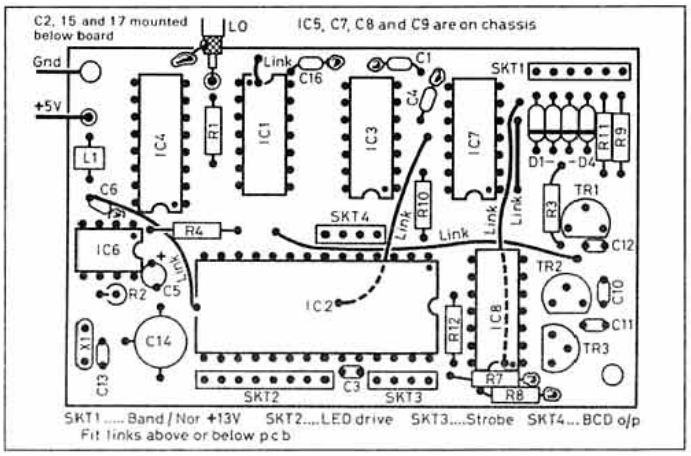


Fig 7: Component layout for the Digital Frequency Counter.

REFERENCES:

[1] Modular Multiband Transceiver, M J Grierson, G3TSO, *Radio Communication*, Oct/Nov 1988

[2] The Pepperdyne Receiver, *Ham Radio*, Nov 1988

[3] Radiospares data sheet 307 - 749

● Badger Boards have the kit and components available for this project at £32 inc VAT and p&p. The pcb is available at £4. As the display type may vary considerably, no design has been produced for a display board. Please contact Badger Boards at the address on page 52 for further details.

EMC

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AMAZING HOW PRESSURE PAYS OFF ISN'T IT?

FOLLOWING A MEETING held in Brussels in December 1990 between representatives of the European Commission (DG111) and Member States, the Commission is likely to propose that there be a number of amendments to the EMC Directive (89/336/EEC). The most amazing of these is that there is likely to be a transition period of 4 years ending on 31 December 1995! I am sure the news was greeted with whoops of joy by a large number of people in the electronics industry who have adopted an ostrich-like stance since the mention of the dreaded 1992 date. However, the reaction of those in industry who have diligently planned and redesigned with the aim of meeting the required standards by the prescribed date can probably be surmised.

What will happen during this 4 year period? Obviously some electronics industries will think that this gives a few more years to do nothing. However, the more enlightened will start to take the whole concept of EMC and the need for control seriously.

Manufacturers will, during this period, have the option of conforming to the Directive which comes into effect from 1 January 1992 or to continue to comply with existing national regulations. All products which conform to the Directive and which carry the CE mark (**Fig 1**) should be allowed to circulate freely throughout the community. During the transition period, the regulations which pertain in each member state prior to 1 January 1992 will continue to apply until 31 December 1995, when they will be repealed. Those products which do not conform with the Directive, but comply with the regulations of the country of origin, will be required to comply with the regulations of the countries in which they are being marketed.

CE

Fig 1: EC EMC Directive mark.

One thing is certain: 1 July 1991 still remains the date for the adoption and publication of the legislation to implement the Directive. The Commission (DG111) should by now have produced a text for submission to the Council of Ministers, together with an explanation as to why the amendments are necessary. The European Parliament is expected to give it its first reading in May/June 1991 followed by a second reading in Autumn, in time for the Council's adoption of the amending Directive by December 1991.

AUDIO AND VIDEO OUTLOOK

THE PROFESSIONAL audio and video industry is considering special electromagnetic compatibility standards for its range of products. A feasibility study group is being set up to discuss the possibility of special standards, as they believe that the generic standards proposed are not suitable for studio, concert and broadcast equipment.

CANCELLATION TECHNIQUES

INTERFERENCE FROM local noise sources is an old problem which has been gradually increasing in importance over recent years, as computers, games machines, and switch mode power supplies have added their contribution. Traditionally, the only avoiding action available to the radio amateur apart from siting his antennas to minimise interference pickup, was to use a noise limiter or, more recently, a noise blanker. Both these devices will only work where the interference is impulsive, such as noise from car ignition or motor commutators.

All devices for reducing the effects of interference depend on there being some difference between the interference and the wanted signal, which can be exploited to reduce the effect of the interference without degrading the wanted signal. It is a matter of common knowledge that limiters and blankers have only a certain amount of success, because the interference is often not in a form which is amenable to these techniques. So far as HF is concerned, there is another way of reducing interference, and that is by cancelling it out. In this case, the difference which is exploited is not the envelope shapes of the wanted and the unwanted signals, but the difference in their phases.

The principle behind cancellation is quite simple. If a signal is received at two different antennas located some distance apart, each signal will have a specific phase and amplitude. If the signals are adjusted so that the amplitudes are exactly the same and the phase difference is exactly 180 degrees, when the two signals are added together they will cancel, leaving virtually no residual signal. The key to the practical canceller lies in the word 'exactly'; if the phase and amplitudes are not just right, most of the cancelling effect is lost. This is very similar to a loop antenna used for DF - the null is very sharp, but away from the null the signal strength does not change much. In practical cases, particularly on HF (where wanted signals can arrive in three dimensions, but interference usually comes along the ground), it is most unusual for the null of one signal to be exactly the same as that for another. In other words, we can cancel out one signal leaving the other largely unaffected. The phase and gain are varied using two knobs which are adjusted together, until the unwanted signal disappears - this requires a little practice, but is not really difficult.

Assuming that the canceller permits adequate gain and phase adjustment, then with a few exceptions, all interfering signals will be capable of being cancelled. By the very nature of the technique, however, a deep null can only be achieved on one interfering signal at a time. How much the wanted signal will be affected depends on the relative directions of the wanted and unwanted signals, and on the distance between the antennas. As a very rough rule of thumb, spacing should not be much less than a quarter wave for good results. Further information can be found in 'Electrical Antenna Null Steering', *QST* Oct 1982, which also contains a circuit for a home brew canceller. In practice, the lower HF bands are so noisy that some loss of effective antenna performance on receive is not a serious problem, so it is quite easy to compromise. In many cases, if the interference is local, it is only necessary to string up a very simple second antenna, making sure that it is positioned to pick up the interference as well as possible.

The EMC Committee recently borrowed a canceller from a firm which has been advertising such a device in *RadCom* for some time. It is not actually called a canceller, but it uses a cancellation technique. The intention was not to carry out a formal review of the device but rather to see if it worked as a practical solution to the received interference problem.

In general, it was found to do a good job, and a reasonable compromise seems to have been made between covering the whole of the HF band and the need for simple adjustment. Very deep nulls were obtained on simulated local interference, permitting signals which would otherwise have been completely drowned by the interference, to be clearly copied. The intermodulation performance was adequate and is unlikely to cause any problem in normal operation.

PCB HIGH PASS FILTER

THIS PARTICULAR type of filter (**Fig 2**) made from double clad printed circuit board is extremely effective for most cases of interfer-

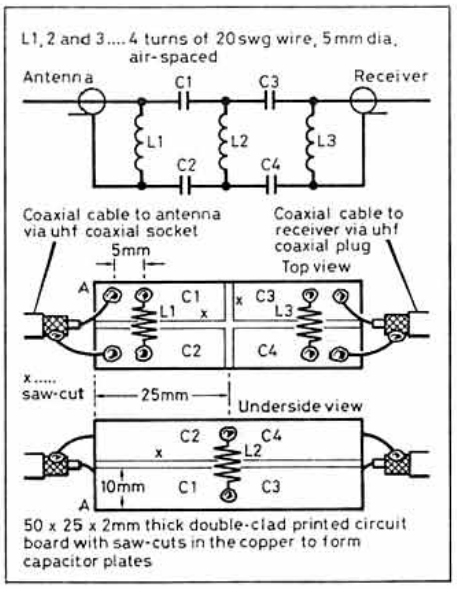
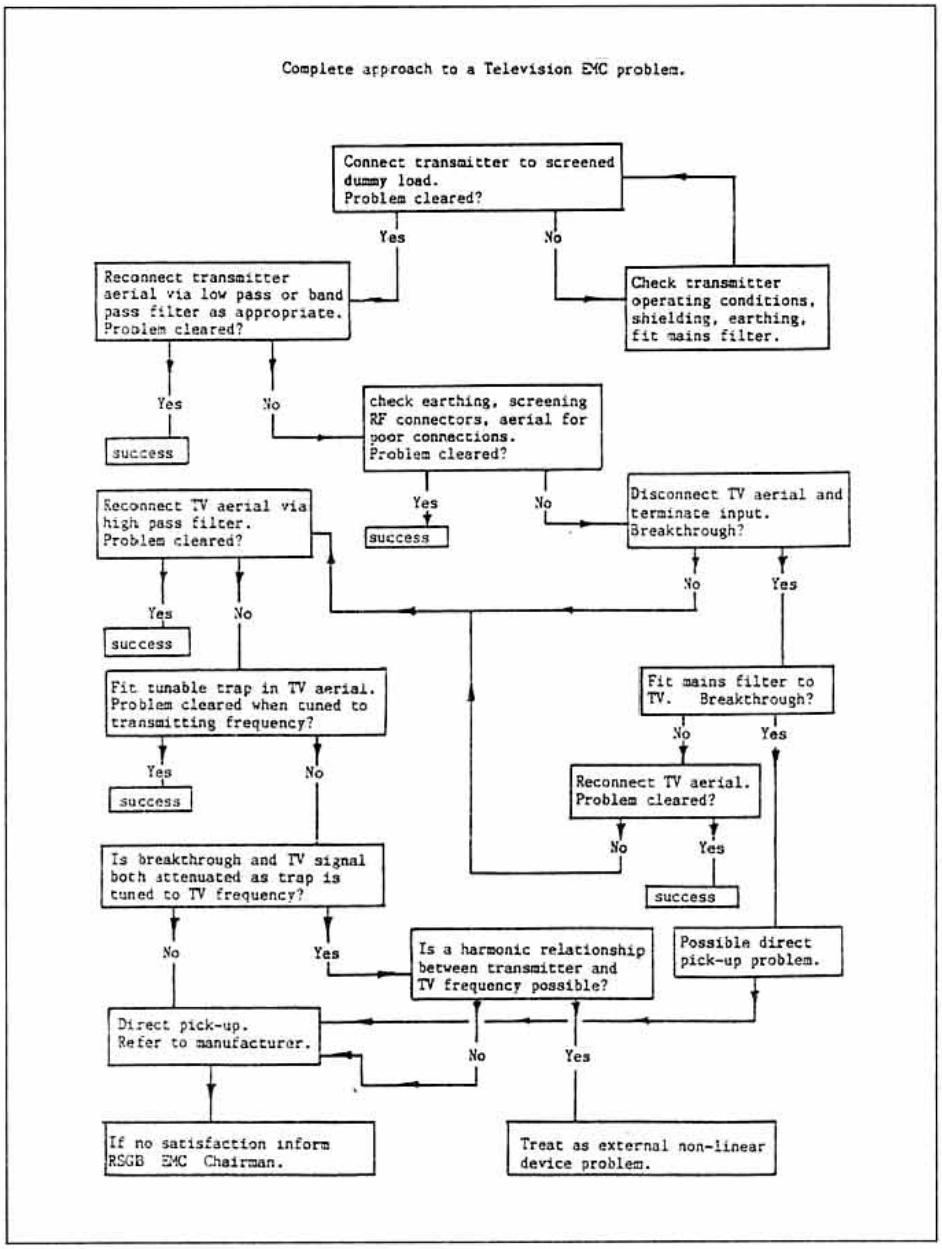


Fig 2: PCB high pass filter.



ence caused by signal pick-up on the aerial or downlead. I can vouch for the efficacy as my neighbours sport such filters on their TVs.

PICTURES SPEAK LOUDER THAN WORDS

THE FLOW DIAGRAM (above) is a handy reference point when problems with TV breakthrough occur. It speaks for itself. Other flow charts to come in future columns are: RF breakthrough in audio equipment, and RF breakthrough on MW/LW/AM radios.

TEST ANTENNAS FOR MEASURING FIELD STRENGTH — PART 3

WHEN INVESTIGATING breakthrough, it is useful if the field strength in the vicinity of an amateur station can be measured. This can give an indication of whether an HF antenna system is generating excessive field strength in neighbouring premises, for example, due to radiation from the feeder or due to RF coupling to mains wiring.

Existing designs of amateur 'field strength meters', such as the one in the ARRL Handbook suffer from the disadvantage that they only give a relative indication of field strength, not an absolute reading in volts per metre. Although an amateur field strength meter could be calibrated against a professional field strength meter, few amateurs have access to such an instrument. What is required is a receiving antenna which gives a predictable output in a given field strength. This avoids the need for antenna calibration, as described in the Aug 1990 *EMC* column. Such an antenna could then be used with a receiver whose 'S' meter has been calibrated in dB relative to 1uV at the receiver's antenna input.

For an E-field measuring antenna, the *Antenna Factor*, (Fa), is equal to:

$$20\log_{10}(E/U)$$

where E is the field strength in volts per metre, and U is the output voltage of the antenna into its designed termination, such as 50Ω.

For example, an antenna with an Fa of 20dB would give an output of 0.1V RMS in a field of 1V/metre if aligned for maximum pick-up. A *lower* antenna factor implies a *more* efficient antenna.

For a half wave dipole with a lossless 1:1 balun feeding a 50Ω load, Fa is approximately:

$$20\log_{10}(7.66/\lambda)$$

For bands below 144MHz, where a half wave dipole is not conveniently portable, a 'short' dipole may be used as a measuring antenna. A graph giving antenna factors for short dipoles with a 1:1 balun and 50Ω load is given in BS727:1983, fig.7.

Fa is the sum of two quantities, Fa1 and Fa2. If the overall length of the dipole is x, Fa1 = 25dB if x = 0.2λ.

For dipoles of 0.1 λ or shorter:

$$Fa1 = 20\log_{10}(4.2\ \lambda/x)$$

while for any dipole up to 0.5 λ,

$$Fa2 = -20\log_{10}(x)$$

The above formulae are for length x, which is 30 times the diameter d of the elements. The x/d ratio has a significant effect on Fa for short dipoles. For x/d = 100, add 3dB to Fa; for x/d = 300, add 5db and for x/d = 1000, add 7dB.

For example, a dipole with a length of 1m and elements 33mm diameter would have Fa2 = zero. Fa1, and therefore Fa would be 33dB at 28MHz, 39dB at 14MHz, 45dB at 7MHz and 51dB at 3.5MHz. Reducing the element diameter to 15mm would make the antenna less efficient, adding about 2dB to Fa.

The above figures assume a load of 50Ω. Any departure from 50Ω will affect Fa. An electrical short dipole with a 50Ω load has predictable characteristics over a wide range of frequencies, but is somewhat insensitive. This restricts its application to the measurement of relatively high field strengths. A reduction of Fa by about 6dB can be achieved, however, by using a 4:1 balun which presents the dipole with a 200Ω load.

SPREADING IT ABOUT A BIT

IN THE US, wireless packet radio products based on the technique of spread-spectrum are emerging as viable alternatives to cabled Local Area Networking (LANs). PCs in the internal office network are linked by radio waves rather than by hard-wired coax or twisted pair cable. The wireless network is based on technology which splits a radio signal into multiple channels, thus encompasing a wider bandwidth at a lower energy level than that of normal radio signals. In other words it spreads a thin 'film' over the radio spectrum. The signal is collapsed back into its original narrow frequency band at the dedicated receiver end. The system works over a 100 metre distance indoors and up to 1km outdoors. Obviously, wireless networks (LAWNs) offer the major benefit of eliminating the installation of cabling throughout the office building or at exhibition centres. Can anyone think of the disadvantages . . . ?

BITS AND PIECES

THE EMC COMMITTEE would like to hear from any members who have experienced any form of malfunction of controls of their cars from external RF sources. There has been some disturbing press recently on the subject.

Q R P

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

THAT POPULAR ANNUAL event, The Yeovil QRP Convention, has now reached its seventh year. This year it is on Sunday 12 May with the doors opening at 9am for a 10am start. The venue is the Preston Centre in Monk Road, Yeovil with 2m talk-in by GB2LOW from 0830. The event includes a Bring and Buy, Traders Stands which concentrate on home construction and kits, a Construction Display, and a QRP Station with the offer to try homemade equipment on the available antennas. Food and soft drinks are available throughout the day.

The programme of lectures includes G3MYN on 'Greyline Propagation', G3ZOM on 'Kits and Kit Construction', G3PCJ on 'Simple SSB/CW Receivers' and G3GC on 'Pre-War QRP and Operating Techniques'. Leading up to the Convention is the Yeovil QRP Fun Run providing a light-hearted operation competition. This has prizes which are awarded at the convention and other prizes which can be claimed by post. Details may be had from Peter, G3CQR, on 0935 813054.

The E = 0.5m 3W Challenge provides the lunchtime diversion. The idea is to bring along an 80m transmitter complete with its own antenna, both of which must be contained in an imaginary cube whose sides do not exceed 0.5m in length. The transmitter should be on 3560kHz (+/- 10kHz and the overall DC i/p should not exceed 3W. The only mode allowed is A1A. The transmitting system will be fed from a provided, metered, supply which can be adjusted from 9 to 20V, and operated some 50ft from signal measuring equipment. The transmitter producing the highest received signal will win a prize. Further information on the convention and its associated events can be obtained from G3CQR, G3GC or G0HDJ all of whom are listed in the RSGB *Call Book*.

RECIPROCAL ARRANGEMENTS

FOR MANY YEARS, there have been strong links between the G-QRP Club and the equivalent American QRP ARCI, the two largest QRP Clubs in the world. American members of the G-QRP Club can now pay their renewal fees in dollars to Luke Dodds, W5HKA, 2852 Oak Forest, Grapevine, Texas 76051. This costs $12.00 and cheques are made out to the QRP ARCI. It is now also possible to join the QRP ARCI in the UK and pay in Sterling. The joining fee and first year's subscription is £7.00 and subsequent annual renewals are £6.00. Application forms may be had for an SAE from Dick Pascoe, G0BPS, 3 Limes Road, Folkestone, CT19 4AU.

The G-QRP Club also has arrangements for overseas members to pay their subscriptions in local currencies in countries other than the USA. Currently, overseas members may pay local representatives in France, Germany, Holland and New Zealand. The club also maintains a limited number of sponsored memberships for radio amateurs in countries where currency exchange is impossible. These sponsorships are from members in the UK and USA who pay the subscriptions for radio amateurs otherwise unable to pay because of currency problems.

Another overseas QRP Club which accepts British members is the Australian CW Operators QRP Club. The club produces a lively little journal called *LO-KEY* and runs a full programme of awards and operating events. Membership is open to overseas members for 14 Australian Dollars a year. Applications for membership should be addressed to Kevin Zietz, VK5AKZ, 41 Tobruk Avenue, St. Marys. SA 5042, Australia.

NOT ANOTHER "LOOK WHAT QRP CAN DO" REPORT?

YES, I'M AFRAID SO. Some radio amateurs will not believe what can be done with low power levels on the HF bands. So I am going to tell you some snippets from stories of the G-QRP Club Winter Sports 1990/91. This is the annual activity period when stations using 5W of RF or less, come onto the bands between Boxing Day and New Year's Day and simply try to work as many other QRP stations as they can find. The event is about two-way QRP working.

This year's Winter Sports produced QRP activity from over 40 countries in all continents and two-way QRP DX contacts on every band from 3.5MHz upwards. 3.5MHz produced a remarkable number of contacts between the USA and the UK, some with simple equipment. Colin, G3VTT, tried a single valve, 1940's replica, transmitter on the band and worked W3TS, WA8TXT and EA8QO; all two way QRP.

The limited power was sometimes coupled with other limited resources. Bill, G4KKI, in the middle of Manchester, put a diamond shaped 8ft loop in the loft of his terraced house. His first two QSOs were with American QRP stations. When he found he could load it up on 3.5MHz, he promptly worked an LA QRP station. HB9AMZ used a 2W HF handheld transceiver with a short whip to work several European QRP stations and then used 5W to a mobile whip to raise QRP stations in the USA. GM3KPD made 11 Transatlantic two-way QRP contacts using an indoor W3EDP antenna. G3LHJ used an OXO transmitter board to make 23 transatlantic two-way QRP QSOs, including one on 7MHz. The OXO is a tiny 3 transistor VXO controlled Tx designed by GM3OXX. A kit version had just been made available by Kanga Kits, who will send details for an SAE to Kanga, 3 Limes Road, Folkestone, Kent.

Naturally, the QRP 'big boys', those with 5W and a good outdoor antenna, enjoyed a lot of DX activity. Randy, AA2U, and Mike, W3TS, seemed to specialise in working some UK stations on five or even seven bands. G3XJS had two-way QRP contacts with ZS, PY, W and VS6. Brazil featured in the event this year with several UK stations making contact with either PY7FNE or PY4ZO. There were plenty of countries to be worked two-way QRP. Even I, with very limited time, managed to work 32 countries in the week.

The Winter Sports has always been a good event to introduce operators to QRP operation. This year, FOC members were invited to reduce power to 5W and join the event. Perhaps the best story comes from Kev, VK6LW. Not having tried QRP operating before, he turned down his power to 5W at about 1420GMT on 30 December. By 1500GMT, he had made two-way QRP contacts with G8PG, PA3ALX, G3PDL, GU4VPM, HB9CGO, OK2BMA and G3VIP on 14.606MHz. A promising start in QRP operation. If you have never tried QRP, perhaps you might like to join us next year?

THE QRP WRITING CONTINUES

IN THE PREVIOUS two columns, I have reported on new books published by the ARRL: *QRP Classics* and the *W1FB Design Notebook*. Many people will already know the excellent *W1FB QRP Notebook*. The two QRP books are available from the RSGB Sales Department (see pages 78/79).

I would also like to commend another Doug DeMaw book for use by Novices. The book *First Steps in Radio* (ARRL) is designed to help newcomers to the hobby understand the basics of radio components, simple circuits, antennas, electrical safety and setting up a beginner's station. It was originally published as a series of articles in *QST* in 1984 and 1985. It is an entertaining 'foothold on theory' book of the 'what goes on behind the front panel' type. With lots of photographs and diagrams, the book provides an easy reader for the beginner. It is also available from RSGB Sales. Although written for the American Novice Licence, I suspect would-be holders of the new UK Novice Licence would find the book both useful and entertaining.

Recently, American magazines have been publishing a lot of QRP constructional material. *QST* has featured a 14MHz Portable QRP CW Transceiver by K9AY in Dec 90 and Jan 91. The Sept 90 *QST* published an update on the Cubic Incher Transmitter by W1FB.

CQ magazine (Sept 90) features the QRP-15 CW Transceiver, a compact superhet running 5W RF o/p, by Rick Littlefield, K1BQT. This is an updated version of his 20m CW Transceiver which appeared in the now defunct *Ham Radio* in Jan 89. K1BQT has become well known in the USA for his circuits and miniature layouts for QRP transceivers, the more recent examples using the NF602 oscillator/mixer IC. Photographs of his Travelradio Transceiver, from *Ham Radio* June 1987 were recently shown in this column. Most of these projects have been converted into kits by RadioKit in the USA. They would probably supply details of the latest projects available from RadioKit, Box 973, Pelham, New Hampshire 03076, USA ❑

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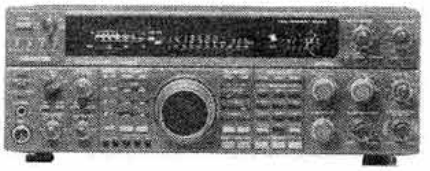

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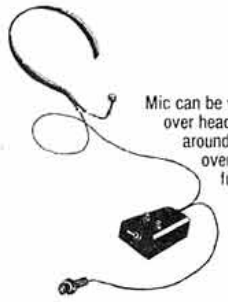

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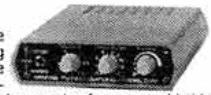

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CONTEST NEWS

All rules should be read in conjunction with the General Rules published in December 1990 (VHF/UHF/Microwave) and January 1991 (HF)

HF RULES

21/28MHZ TELEPHONY CONTEST 1991

1 The General Rules for RSGB HF Contests, published in the January 1991 edition of *Radio Communication* will apply.

2 Eligible entrants: Overseas (which includes EI) - all licensed amateurs. British Isles - as per General Rules.

3 When: 0700 to 1900GMT, Sunday 13 October 1991.

4 Sections:

(a) British Isles

(b) Overseas

(Single-operator and Multi-operator entries will be accepted in each section.)

(c) British Isles Receiving

(d) Overseas Receiving

5 Frequencies/Mode: 21150 - 21350kHz and 28450 - 29000kHz, Telephony only.

6 QSY (10 minute) Rule: An entrant who QSYs from one band to another and makes a scoring contact may not change bands again until at least 10 minutes have elapsed since the last scoring contact on the original band.

7 Contest Exchange: RST and serial number, commencing with with 001. UK stations must also send their County Code as published in January 1991 *Radio Communication*.

8 Scoring:

(a) British Isles stations work only Overseas stations. Each completed contact counts 3 points. Multipliers as per General Rules.

(b) Overseas stations work only British Isles stations. Each completed contact scores 3 points. Multipliers: 1 for each British Isles County worked on each band.

Total Score- The number of QSO points on each band are added together. The total number of multipliers on each band are added together. The final score is the total QSO points multiplied by the total multipliers.

NOTE : *The same stations may be contacted on both bands for QSO points and Multipliers.*

9 Logs: Separate logs are required for each band. Overseas entrants are invited to use the stationery provided by their national Society. British Isles entrants are referred to the General Rules. Checklists ("Dupe Sheets") are requested where more than 80 QSOs are made. Please don't forget the list of multipliers.

10 Address for logs: RSGB HF Contests Committee c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF, ENGLAND.

11 Closing date for logs: British Isles entrants, postmarked by 4 November 1991. Overseas entrants, delivered by 2 December 1991.

12. Awards:

UK Single-operator Section: The overall UK winner will receive the Whitworth Trophy with Certificates of Merit to the Second and Third placed entrants. The Powditch Transmitting Trophy will be awarded to the entrant with the highest score on 28MHz.

Overseas Single-operator Section: Certificates of merit will be awarded to the three leading entrants.

Subject to the decision of the RSGB HF Contests Committee, additional certificates may be awarded to the leading entrant from each continent/country, *provided that a score of at least 50 per cent of that of the overseas winner is achieved.*

Multi-operator Sections: A Certificate of Merit to the highest placed Group in each section.

RECEIVING SECTION

Rules as for the transmitting section except where specified below. Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

8 Scoring: British Isles SWLs may log only Overseas stations in contact with British Isles stations participating in the contest. Overseas SWLs may log only British Isles stations in contact with Overseas stations participating in the contest. Scoring and multipliers as for the transmitting section.

9 Logs: Columns to be headed: time GMT; callsign of station heard; report/serial number sent by that station; County Code sent by that station(if applicable); callsign of station being worked; multiplier (if new); points claimed.

NOTE. In the column headed "station being worked" the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

12 Awards: The Metcalf Trophy will be awarded to the leading UK entrant. The Powditch Receiving Trophy will be awarded to the leading British Isles entrant on 28MHz (subject to there being sufficient entrants on this band). Certificates of Merit to the stations being placed second and third in the British Isles and to the three leading overseas entrants.

21MHZ CW CONTEST 1991

1 The General Rules for RSGB HF Contests, published in the January 1991 edition of *Radio Communication* will apply.

2 Eligible entrants: Overseas (which includes EI) - all licensed amateurs. British Isles - as per General Rules. Single-operator entries only will be accepted.

3 When: 0700 to 1900GMT, Sunday 20th October 1991.

4 Sections:

(a) British Isles
(b) Overseas
(c) British Isles QRP
(d) Overseas QRP
(e) British Isles Receiving
(f) Overseas Receiving

QRP stations may use 10W RF OUTPUT or less.

5 Frequency/Mode: 21MHz CW only. Entrants are requested not to operate in the band 21.075 - 21.125MHz.

6 Contest Exchange: RST and serial number, commencing with with 001. UK stations must also send their County Code as published in January 1991 *Radio Communication*.

7 Scoring:

(a) British Isles stations work only Overseas stations. Each completed contact counts 3 points. Multipliers: as per General Rules.

(b) Overseas stations work only British Isles stations. Each completed contact scores 3 points. Multipliers: 1 for each UK County worked.

The final score is the total of QSO points times the number of Multipliers worked.

8 Logs: Overseas entrants are invited to use the stationery provided by their national Society. British Isles entrants are referred to the General Rules. Checklists ('Dupe Sheets') are requested where more than 80 QSOs are made and please don't forget the list of multipliers.

9 Address for logs: RSGB HF Contests Committee c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF, ENGLAND.

10 Closing Date for logs: British Isles entrants, postmarked by 18 November 1991; Overseas entrants, delivered by 16 December 1991.

11 Awards: The leading British Isles station will be awarded the T E Wilson G6VQ Trophy. Certificates of merit will be awarded to the second and third placed British Isles stations, and to the leading three Overseas entrants. Additional certificates may be awarded (at the discretion of the HF Contests Committee) to the leading stations from each Overseas continent/country.

RECEIVING SECTION

Rules as for the transmitting section except where specified below. Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

7 Scoring: British Isles SWLs may log only Overseas stations in contact with British Isles stations participating in the contest. Overseas SWLs may log only British Isles stations in contact with Overseas stations participating in the contest. Scoring and multipliers as for the transmitting section.

8 Logs: Columns to be headed: time GMT; callsign of station heard; report/serial number sent by that station; County Code sent by that station(if applicable); callsign of station being worked; multiplier(if new); points claimed.

Note: In the column headed "station being worked" the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

11 Awards: Certificates of merit will be awarded at the discretion of the HF Contests Committee to the leading three entrants from the British Isles, and to the leading entrant from each Overseas country.

If no adjudicator is shown for HF contests, logs should be sent to Steve Knowles, G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF.

HF RESULTS

21MHZ CW CONTEST 1990

Although the solar forecast for the weekend was good, things did not work out quite as expected, and entrants' comments on conditions ranged from "what a disappointment" to "just plain ****** atrocious". It would seem that conditions to real DX were fair, but the short-skip paths to Scandinavia and Central/South-Eastern Europe were severely attenuated, and there was also a pronounced 'North - South Divide', particularly during the first two or three hours of the contest, which left the northern UK stations out in the cold.

Overseas entries were very substantially down, the very gratifying *increase* in the numbers of entries from JA being unable to compensate for the missing EU support. The QRP'ers found life particularly difficult . . . . Y23TL who last year made 60 QSOs was able this time to manage only *one*! Plaudits, therefore, to the staying power of the UK operators whose determination allowed the QRP Section entry to drop by only two, and kept the QRO Section entry the same as last year!

The introduction of UK Counties as multipliers proved to be a Curate's egg: whilst a number of those overseas entrants who had complained about a lack of prefixes to work in previous years expressed satisfaction with the change, it was obvious that HFCC publicity had not reached all its targets, and a large number of overseas logs had to be completely rescored. Sadly, several operators failed to record any of the county codes sent to them, and their entries have had to be included in the check logs. It must be a good idea to record anything a contester sends you; - it's a fair bet that he won't waste his time sending it unless you need to receive it! There were no objections from UK operators, and it is planned to continue the experiment next year.

There were even more error-free logs than usual this year (possibly due to the lack of QRM), thus maintaining the high standards which have become a tradition of this event. However, it is a shame to spoil a perfect log by poor arithmetic . . . . those UK operators whose score has *increased* please take note when working out your totals!

Finally, congratulations to Al Slater, G3FXB, for taking the T E Wilson G6VO Trophy (even though I managed to dock him a few points this year!!!) and to all the certificate winners. Well done, and look forward to receiving your logs next year.

G3UFY

UK TRANSMITTING QRO

Posn	Callsign	QSOs	Mults	Checked Score
1	G3FXB	534	84	132048
2	GW8GT	511	83	122259
3	G3NKC	463	81	111456
4	G3TXF	447	81	108135
5	G3RTE	450	77	103950
6	G3JKS/P	441	77	101409
7	G4CNY	441	74	97902
8	G3NKS	414	74	91908
9	G3TBK	426	69	87975
10	G3MXJ	392	74	87024
11	G4BYG	377	73	82563
12	G4BUO	344	69	71208
13	G4NOK	355	63	67032
14	G4FNL	325	68	66300
15	G3GLL	308	71	65604
16	G3UFY	289	70	60410
17	G4ZVJ	283	70	59430
18	G3SQX/P	301	65	58695
19	G2QT	289	66	57024
20	G0VZ/P	302	59	53454
21	GM3VOR	256	67	51456
22	G4IQM	208	58	36192
23	G5MY	201	53	31906
24	G3BBR	194	52	30264
25	G4KGK	166	51	25398
26 =	G0CGV	141	49	20727
26 =	G3MPB	147	47	20727
28	G3VYI	138	46	19136
29	GD3RFH	175	34	17850
30	G4XRX	147	36	15984
31	G4UZN	124	41	15252
32	G3DBJ	111	44	14520
33	G3ESF	120	39	14040
34	GM3CFS	119	38	13566
35	G3PMR	116	38	13224
36	G2AFV	116	38	13110
37	G4GLC	128	32	12192
38	G3ZDW	94	30	8460
39	GM4SID	80	33	7920
40	G3KAY	77	29	6699
41	G4PTE	73	28	6132
42	G3WKL	75	25	5625
43	G3LIK	62	29	5394
44	G0LZL	65	26	5018
45	G3GMM	60	24	4320
46	GM4WLN	65	19	3648
47	G3KKQ	55	21	3465
48	G3JSR	57	17	2873
49	G2HDR	46	18	2466
50	GM0GNT	40	17	2040
51	G3ZGC	18	12	648
52	G4FX	6	5	75

UK TRANSMITTING QRP

1	G4GIR	252	59	43719
2	G4BUE	227	61	41114
3	G4BKI	159	40	19040
4	G4EWU	128	32	12384
5	G4ARI	113	29	9831
6	G3DYY	117	27	9477
7	G2HLU	84	25	6300
8	G4CZB	86	23	5934
9	G3HJF	73	27	5913
10	GM4HQF	68	25	5100
11	GW3SB	35	19	1995

OVERSEAS TRANSMITTING QRO

1	9H1GI	206	60	36780
2	LZ3YY	171	56	28672
3	K3ZO	170	56	28280
4	N2KW	158	60	27900
5	UC2OL	158	57	27018
6	ZD8LII	164	54	26568
7	UA6AF	147	56	24360
8	UT5JAJ	168	52	23348
9	UA9AO	155	51	23256
10	UA3DPX	137	52	21216
11	UB4FWW	132	50	19550
12	LZ1ZX	135	49	19453
13	K7QQ	131	51	19431
14	EA8ZY	113	54	18306
15	LZ1MG	197	52	16900
16	UA3PUG	109	47	15134
17	K2LE	111	45	14265
18	K2SX/1	103	48	14208
19	RA3DEV	103	45	13680
20	UJ8JA	92	44	12100
21	UA6EDW	90	45	12060
22	K1JKS	88	48	12000
23	UB3MW	91	44	11968
24	JA7SN	93	41	11070
25	G4WYG/ST2	85	43	10965
26	UB5ZL	83	39	9711
27	EA7CZR	75	36	7416
28	YU1LJ	76	36	7200
29	V2/G6QQ	60	39	7020
30	VE3JKZ	63	37	6993
31	UZ3QYA	67	35	6790
32	UA3TAM	72	33	6765
33	RB5QW	59	32	5600
34	VE3NYT	48	36	5112
35	UL7FCW	50	34	5100
36	VE3YBH	51	34	5066
37 =	VK2BJ	52	32	4992
37 =	UA1OLL	53	32	4992
39	K2PF	52	32	4928
40	YV1OB	49	33	4785
41	PY2OU	54	29	4408
42	UA9OPI	50	29	4263
43	LZ2TF	47	29	4002
44	OH2EJ	40	34	3978
45	RW9UN	47	30	3900
46	SP9FXO	43	30	3840
47	YU7SF	41	29	3538
48	ZM2RN	42	27	3348
49	RA3DGP	75	23	3289
50	UA4QK	43	25	3075
51	JI1CQA	40	24	2664
52	ZM1HV	36	23	2484
53	W5EU	35	24	2448
54	VK2AYD	32	24	2280
55	VU2FTT	33	23	2231
56	VK4TT	32	23	2208
57	JA9CWJ	35	21	2205
58	OK1TW	36	21	2184
59	N0FFZ/9	33	23	2162
60	OH3MC	32	23	2139
61	JA1WYQ	32	22	1958
62	JH2BCN	37	19	1957
63	OH2MPO	28	24	1944
64	JH1BBT	33	20	1920
65	OM6KZ	29	22	1914
66	JA4CSH	30	17	1479
67	ZL1AXM	27	18	1440
68	JI6DMN	25	19	1406
69	JA1JGP	22	18	1134
70	HB9KC	21	15	900
71	JA6RIL	21	15	855
72	JP1JFG	20	14	840
73	JA6QDU	18	15	810
74	N6JM	17	14	714
75	OK1FPG	18	13	702
76	OH7NW	15	11	484
77	JO1QZI	14	11	462
78	OH5RZ	21	11	451
79 =	JA3UWB	11	10	330
79 =	LA1IE	11	10	330
81	JH5OXF	11	9	297
82	JA8HBO	11	9	279
83	JA3ARM	10	8	240
84	JG2IGY	5	4	60

OVERSEAS TRANSMITTING QRP

1	RA3SU	113	50	16900
2	YT5G	111	44	13860
3	RA3AUU	71	37	7696
4	UB4LSF	62	33	6072
5	UV6LIP	50	32	4800
6	YO6ADW	36	27	2808
7	SP9NLI	38	24	2712
8	K3JXO/LU	33	27	2673
9	OK2PAW	25	17	1258
10	JG1BSB	12	8	264
11	UA0QGQ	3	3	27
12	Y23TL	1	1	3

UK RECEIVING

1	BRS1066	150	50	22500

There were no entries for the Overseas Receiving section.

Multi-operator entries from UZ3AWR, UB4JWO, and UB4JWP were excluded

Checklogs are acknowledged with thanks from: G3KZJ, G3SXW, G3VDL, G4ZME, GM3UM, N1AFC, OH3BI, OH6RC, PA3BTH, RA3DJA, RA3XA, RT5UE, UA3LAR, UA3TJW, UA9XS, UL7BAY, UV3DN, VO1CA, VK2AYK, WA3WSJ, YB2FEA, 7Q7RM.

HF CONTESTS CALENDAR - 1991.

Apr 7	Ropoco 1 (Jan 91)
Apr 14	28MHz Cumulative (Feb 91)
Apr 21	Low Power (Feb 91)
Apr 22	28MHz Cumulative (Feb 91)
Apr 27/28	*Helvetia CW/SSB (p17, Mar91)*
Apr 30	28MHz Cumulative
May 8	28MHz Cumulative
May 11/12	*CQ-M CW/SSB*
May 16	28MHz Cumulative
May 18	County Roundup SSB (Mar 91)
May 19	County Roundup CW (Mar 91)
May 25/26	*CQ WPX CW*
Jun 1/2	National Field Day (feb 91)
Jun 15/16	*All Asia DX SSB*
Jun 22/23	Summer 1.8MHz

VHF RULES

3.4 - 24GHZ SUMMER CUMULATIVE CONTEST

21 April, 26 May, 16 June, 14 July, 18 August, 15 September, 20 October: 0900 - 2100GMT

This year there will be separate contests on each of the bands 3.4 to 24GHz concurrently. There is no combined score, and a multiband summary sheet does not have to be submitted. The rules for each band are the same and are given below. Except where modified below, the general rules for VHF/UHF/SHF contests apply.

The **total score** is the sum of the three highest scoring days for 10GHz, two for the other bands. Entrants unable to be active for enough periods are encouraged to send in their logs as a record of their activity, but will not be eligible for an award. Such logs will be included in the tables of results.

Entries from outside the UK will be accepted, whether or not they are from RSGB members. Stations operating from within the UK must state on their logsheets the national grid reference of the sites used.

There is no limit to the number of antennas used.

On 10GHz there will be two **sections**, wideband and narrowband, which will be scored separately. Stations may operate in both sections if they wish. A given station may be contacted twice, once on each mode. In the case of cross-mode contacts the contact should be included in the section appropriate to the equipment in use at your end. On 3.4, 5.7 and 24GHz there will be only one section for each band.

The **contest exchange** shall consist of both callsigns, signal reports and serial numbers, QTH and IARU locator. Serial numbers start at 001 and advance by one for each contact, irrespective of section.

Awards will be made to the leading station and runner-up in each section, and additional awards will be made to the leading foreign station and fixed station. The overall winner of the 10GHz contest (sum of wideband and narrowband scores) will receive the G3RPE memorial trophy.

During each activity period a station may change its **location** once. For the purposes of this contest the location is defined as any point within a 5km radius of a fixed point. Contestants may start from a new location for each activity period.

Contacts will be **scored** at one point per km. Half points may be claimed by both stations for a crossband contact if two-way communication cannot be established on the scoring band. A full contest exchange must take place for a crossband contact to be valid. All crossband contacts must be clearly marked as such in the logs and a note made of the other band used.

Please do not send in **logs** until after the last event. All entries and checklogs to: The VHF Contest Committee, c/o P Suckling, G4KGC, 314A Newton Road, Rushden, Northants, NN10 0SY.

The typeface in *Contest News* has been reduced at the request of the HF Contests Committee in order to do justice to the large amount of contest information requiring publication, whilst retaining the same page allocation.

VHF RESULTS

MAY 144MHZ & SWL CONTEST 1990

Activity for this contest was generally found to be high which, combined with very good North/South conditions, accounted for the good DX that was worked by all. If anything, conditions were better on the East and South coasts (as usual I hear you cry!).

The format for the contest is well liked and the more remote stations obviously enjoyed the 'rare' status that the multiplier system gives to them.

Please note there is only one Humberside!

Congratulations to Parallel Lines Contest Group (G4LIP/P), 1st in the multi-op section, and to the runners up by a narrow margin the Victory Contest Group (G8LNC/P). Congratulations also to the winner of the single-op section Allan Duncan (GM4ZUK/P) and to the runner-up Andy Cook (G4PIQ). Certificates also go to the Reading and District ARC (GM3WGV/P) for the taming of Ben Nevis (in 4 ft of snow!) and for being the leading GM, M Toms (BRS31976) for winning the SWL section and Frank Laanen (PE1EWR) for the overseas entry.

[This event was adjudicated by the 'Northern Lights' who did not enter the contest and were therefore not eligible for a certificate.

Just how many points would they have got if they had taken the contest seriously? Many thanks to them for all their hard work. G4DEZ].

Thanks to G0CLP/P and G2FWX for their checklogs.

G4UJS and The Northern Lights.

MULTI-OP SECTION

Pos	Call	PTS	QSO	Mult	Cnt	Best DX	Km
	G4APA/P	1519698	1016	102	YSN	DF6IY	869
1	G4LIP/P	950520	897	89	LCN	OK1IBL	893
2	G8LNC/P	93124	873	86	IOW	DK2GR	867
3	GW4GFX/P	733490	752	82	GWT	LA9RAA	944
4	GW4ZAP/P	703416	792	79	GWT	DC2OC	876
5	G0MCG/P	653280	801	80	DYS	DK5OZ	778
6	G4RFR/P	634283	677	81	DOR	DC2OC	861
7	G4ERG/P	626069	631	83	YSN	F1FHI	798
8	G3EFX/P	586125	717	75	SXE	GM4IPK	1008
9	G6WVG/P	366644	527	71	YSN	F6CGT	691
10	G0KYW/P	363902	512	77	WLT	DL2OM	693
11	GM3WGV/P	356319	271	83	HLD	FC1BHB	916
12	G4VAT/P	347820	520	85	BFD	DF2UQ	716
13	GM4TMS/P	306560	273	80	CTR	FC1MOZ	928
14	G4CRA/P	284080	445	67	ESX	DK2GR	764
15	G6CTU/P	266844	460	75	SRY	GM1TBW	720
16	GM4CCC/P	256410	239	74	SCD	F6EDK	929
17	G3XVA/P	198800	390	73	OFE	DL2OM	648
18	GW1ORA/P	149880	306	71	PWS	F6GCT	626
19	G0KYS/P	103562	192	53	DVN	DG4BE	830
20	GI4VHT/P	74816	111	56	ATM	G3EFX/P	568
21	GM0MOC/P	72904	157	52	SCD	GJ7DNI/P	765
22	G8YEO	31777	150	43	SOM	GM4ZUK/P	681
23	G3TCTP	6576	43	24	DVN	G4APA/P	509

SINGLE OPERATOR SECTION

1	GM4ZUK/P	553189	372	91	GRN	F6DKW	966
2	G4PIQ	494640	666	72	ESX	GM4IPK	910
3	G0MTV/P	238524	335	66	YSN	FC1OOG	721
4	G1XOW/P	229951	447	73	DYS	DH4YAS	713
5	G4WKN	202176	416	72	NHM	DC0HD	582
6	G7ENF	199376	353	68	DYS	DL0WAE	678
7	G4HGT/P	196632	321	72	YSW	DJ6LV	653
8	G1OGY	104640	254	60	ESX	GM4ZUK/P	618
9	G7FDC	95056	186	52	DVN	GM4ZUK/P	747
10	GM8ORG/P	75366	127	53	DGL		
11	G1CSR	64120	206	56	LDN	GM4ZUK/P	633
12	G8ZRE	56280	169	56	CHS	GJ7AOG/P	425
13	G1YIY	39829	161	53	WKS		
14	G6GAU	37692	136	36	SFK	GM4TMS/P	549
15	G7ARK	31776	102	48	BFD	GM3WGV/P	618
16	GJ7DNI/P	29982	82	38	JER	GM4ZUK/P	870
17	G1HSK	24056	85	46	YSN	GJ7DNI/P	509
18	G0HKT	6475	44	25	DOR	G4APA/P	418
19	G3JJZ	3087	31	21	LDN	G4APA/P	336
20	GM4UYZ	1349	19	19	LTH	GW4GFX/P	476
21	GM4ASN	544	6	8	HLD	G4APA/P	460

SWL SECTION

1	BRS31976	32568	100	46	ESX	GM3WGV/P	682
2	BRS52543	10715	50	33	LNH	G3EFX/P	382
3	BRS28198	6888	31	24	SXE	GM4TMS/P	630

OVERSEAS SECTION

1	PE1EWR	32768	49	32	PA	GM4TMS/P	703

RSGB VHF CONTESTS CALENDAR - 1991

7 Apr	50MHz Trophy Fixed/Single/Multi (Feb 91)
14 Apr	1st 1296MHz Fixed/SWL (Feb 91)
4/5 May	432MHz to 24GHz (Feb 91)
18/19 May	144MHz and SWL Single/All Others (Feb 91)
2 Jun	1.3GHz Trophy (Feb 91)
2 Jun	2.3GHz Trophy (Feb 91)
22 Jun	432MHz FM Fixed and Open (Feb 91)
22 Jun	432MHz CW Single/Multi Op (Feb 91)
23 Jun	432MHz Trophy/SWL (Feb 91)
6/7 Jul	VHF Field Day
27 Jul	144MHz Low Power/SWL (Feb 91)
28 Jul	432MHz Low Power/SWL
25 Aug	432MHz Fixed/SWL
4 Sep	144MHz CW Cumulatives
7 Sep	144MHz CW Cumulatives
7/8 Sep	144MHz Trophy/SWL
20 Sep	144MHz CW Cumulatives
22 Sep	50MHz CW
29 Sep	70MHz Trophy/SWL
5/6 Oct	432MHz-24GHz SWL and IARU
8 Oct	1.3 & 2.3GHz Cumulatives
15 Oct	432MHz Cumulatives
20 Oct	70MHz CW
23 Oct	144MHz CW Cumulatives
24 Oct	1.3 & 2.3GHz Cumulatives
27 Oct	2nd 1296MHz Fixed/SWL
1 Nov	432MHz Cumulatives
3 Nov	144MHz RSGB CW
2/3 Nov	144MHz CW Marconi/RSGB 24 Hour
8 Nov	144MHz CW Cumulatives
9 Nov	1.3 & 2.3GHz Cumulatives
17 Nov	432MHz Cumulatives
25 Nov	1.3 & 2.3GHz Cumulatives
1 Dec	144MHz AFS & Fixed & SWL
3 Dec	432MHz Cumulatives
10 Dec	1.3 & 2.3GHz Cumulatives

A full list of 1991 RSGB VHF Contests appears on page 65, December 1990 *RadCom*. Dates of publication of rules in *RadCom* are shown in brackets.

144 MHZ LOW POWER JULY 1990

The total of entries for this year was slightly down, with the exception of the Listener Section where the number doubled! The most commented on event during the contest was the aurora which was reported as giving good DX or causing low scores depending on whether the contest station was located to the North or South.

The accuracy of logged information was generally very good. However many points were lost by callsigns being received (or recorded) incorrectly. One entrant reported hearing a station work several others in a row without giving his own callsign, just calling QRZ? These contacts would of course be invalid. However, as it was reported by only one entrant, the allegedly offending station did not lose points, (it was noted on his 'MOT'). If any members of the VHFCC had heard such a practice both stations involved in the contact would have lost points.

The 'MOT' scheme has proved popular with many stations requesting one. Not as many stations as expected requested a certificate of achievement to record their position in the contest. Perhaps not everyone was aware that they are available?

Congratulations to GW4VEQ/P, GM0CLN/P, BRS25429 and PE1EWR who won their sections and also to G8LNC/P, G4PIQ and BRS28198 who receive certificates as runners-up in their sections. GI4KSO/P was the leading GI. A special mention goes to 15 year old Alan Owen, G7HEK, who receives a certificate for being the highest placed entrant operating during the first year of his licence. Many thanks to G(W)3LNR for the checklog.

G4OUT

MULTI-OPERATOR SECTION

Pos	Call	Pts	QSO	Mult	Loc	Best DX	Km	Ant
1	GW4VEQ/P	176240	252	80	IO73	DK9HN	931	8
2	G8LNC/P	161700	291	70	IO90	GM3WOJ	819	4X19
3	G3UAX/P	128590	262	70	IO91	DL4KCU	586	2X17
4	G0KYW/P	119350	218	70	IO81	GM3WOJ	750	2B,17
5	GW0JSB/P	112398	243	66	IO83	DL3LAB	882	8
6	G1WBZ/P	92943	248	69	IO92	GM0ILB	829	4X9 2X15
7	GI4KSO/P	90459	118	57	IO74	DG1BCU	1011	9
8	G4DDC/P	89713	205	67	IO91	OZ1KLU	779	2X11
9	G4TDL/P	85188	193	62	IO80	GM4AFF	691	2X17
10	GW0HAS/P	81344	157	62	IO72	PE1EWR	530	12
11	G6WVG/P	61722	170	54	IO84	FC1DBN	521	2X9
12	G1VDF/P	50232	148	56	IO82	GM4AFF	553	19
13	G8ARC/P	48604	162	58	IO92	GM6WBV/P	421	19
14	GI4SJB/P	38984	83	44	IO74	FC1FQM/P	625	13
15	G1SAS/P	36795	129	55	JO02	GM4AFF	575	14
16	G4WKN	31899	129	49	IO92	GM3WOJ	604	2X9
17	G8MNY/P	21534	143	37	IO91	G0HXO/P	352	4X17
18	G0MUD/P	21294	102	42	JO01	GI4KIS	524	10
19	G0EGX/P	21040	100	40	JO01	DL6YBE	492	9
20	G4IRC/P	16761	78	37	JO02	GW4VEQ/P	369	8
21	G4CAR/P	15040	142	47	IO92	F6CBH	397	17
22	G4SLH/P	10430	73	35	JO01	GM0CLN/P	463	9

SINGLE OPERATOR SECTION

Pos	Call	Pts	QSO	Mult	Loc	Best DX	Km	Ant
1	GM0CLN/P	221112	235	74	IO84	SM1BSA	1422	2X14
2	G4PIQ	113338	193	61	JO01	SP4MPB	1323	2X19,14
3	GI4KIS	73829	100	53	IO64	F6CKZ	775	8X9
4	G1POD/P	68040	195	54	IO90	GI4SJB/P	561	9
5	G0CLP/P	51764	186	46	IO93	PE1MJU	576	8
6	G1YNR	47430	131	51	IO93	FC1LJA	455	8
7	G0MTV/P	42390	124	45	IO94	DL4KCU	668	18
8	G1DWQ/P	38097	135	51	IO80	PE1LCL	487	9
9	G4LDR	30926	104	47	IO91	GM4AFF	654	14
10	G6HEF/P	27170	90	38	IO84	G1CHM/P	490	12
11	G8ZRE	26273	113	47	IO83	FC1FQM/P	405	8
12	G4DEZ	25065	83	45	JO01	GM4DGT	581	17
13	G3MEH	22440	112	44	IO91	DL4KCU	534	9,9
14	G0GVI	21980	97	35	JO01	GI4SJB/P	537	9
15	G3YDY	19721	86	41	JO01	GI4KIS	558	9
16	G1UYE	11594	77	34	IO92	PE1EWR	356	5
17	G6HXU	9735	51	33	IO83	FC1FQM/P	406	6
18	G8DOH/P	8850	49	30	JO01	GW4VEQ/P	406	HB9CV
19	G0HXO/P	7370	43	22	IO70	GI4KIS	490	14
20	G4PDP	7290	49	30	IO92	GM0CLN/P	376	5
21	G8MMG	7072	45	32	IO81	GI4SJB/P	388	8
22	G3ORX	6840	38	30	IO81	G0MTV/P	339	10
23	G6GAU	6720	53	21	JO02	DL4KCU	430	14
24	G1SPZ	5954	50	26	IO91	GW6LUT	315	14
25	G0EIY	4264	35	26	IO82	GI4KIS	316	11
26	G8WWC	2147	48	19	IO91	G0MCG/P	202	16
27	G7HEK	1204	18	14	IO83	G8LNC/P	309	8

LISTENERS SECTION

Pos	Call	Pts	QSO	Mult	Loc	Best DX	Km	Ant
1	BRS 25429	9150	46	30	IO93	GM0ILB	714	8
2	BRS 28198	1148	14	14	JO00	G0KYS/P	323	10

OVERSEAS SECTION

Pos	Call	Pts	QSO	Mult	Loc	Best DX	Km	Ant
1	PE1EWR	8844	39	22	JO11	G0KYS/P	531	10

DIRECTION FINDING

OXFORD QUALIFYING EVENT

Date: 21st April

Map: 164 (Oxford)

Assembly: 1300 for start at 1320 BST

Location: West end of Shotover Plain, 3 miles east of Oxford, NGR 564062.

Competitors requiring supper should notify Robin Pearce-Boby, College Farm, Pinchgate, Bletchingdon, Oxon, OX5 3DY; tel 0869 50767, no later than 14 April.

COLCHESTER & CHELMSFORD QUALIFYING EVENT

Date: 12th May

Map: 167 (Chelmsford)

Assembly: 13.00 for start at 13.20 BST

Location: Eves Corner, Danbury, NGR 783051.

Competitors requiring tea should notify Alan Williams, 7 Bower Hall Drive, Steeple Bumpstead, Suffolk, CB9 7ED; tel 0440 730727, no later than 5 May.

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4CX250 linear amplifier ARRL design PSU in bits, 700mA HT plus spares: £30. Home brew 13.8V PSU: £50. Spec on request, must be collected. G1YLH (Nr Sheffield) 0909 567561.

4M **TNSVTR** Spectrum Communications TRx 42l (144/70MHz) plus TA4S1 25W linear amplifier: £90. Pye Westminster boot mount converted 4m-FM complete: £40. 2m linear amp m/m 144/50S: £65. Yaesu desk mic MD1 slight damage: £35. SWR/PWR meter Hansen S3: £18. G1GQL QTHR (Hants) 0425 654946.

70cm linear amp Tokyo Hy-Power model HL-30U input 0.2-5W output 2-35W power consumption 7A max 13.8V DC FM/SSB/CW, gd cond: £70. Also Canon AL1 5LR camera 50mm lens, bounce zoom flashgun, case and strap: £125. PX/swop for FT208R h/held or similar. (Tamworth) 0827 58004.

70cms complete station. Incl Icom IC-4GE h/held, Cushcraft ARX450B antenna, Hansen FS711U SWR meter, plus Icom battery pack, charger and 12V adaptor. All in truly mint cond: £250. No offers, no split. Prefer buyer inspects and collects. G1BLB not QTHR. (Maidstone) 0622 861508.

A1 Absolutely everything must go: Valve tester, vintage TV, "old" valves, new relays, contactors, motors inc new geared, new stepper etc. trnsfrmrs, BNC plugs from 15p, video monitors, ex-IBA 4 Ch TV trnsmttr, new valves, 100,000 components R's, C's, semis, storage boxes, co-ax new from 10p/M, CRTS, cable, wire, nuts, bolts, metal sheet, and s/h junk at unbelievable prices. Free gifts! (Birmingham) 021 472 3688.

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AERIALS Sandpiper 3x5/8 2M: £25. 4x4M/3x6Mm dual band: £35. 6M 3el: £20. Jaybeam 6Y 2M/12Y70 dual band: £30. Oscar mobile 2m 7/8 boxed: £20. Telo-mast 30ft with rigging: £35. Two VHF rotators complete: £35 each. Spectrum 128K: £80. VTX5000 modem: £25. G1GQL QTHR (Hants) 0425 654946.

AMSTRAD 6128 colour computer with second disk drive and DMP 2000 printer: £250. G3LBG QTHR (Torquay) 0803 313318.

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ANTENNAS etc. 2m Jaybeam 4-ele quad and collinear, vgc: £15 ea. Two 5amp PSUs: £10 ea. Wavemeter: £15. SWR/power meter: £12. Some brackets/poles etc. G7ABT QTHR (Leicester) 0533 778626.

ANTENNAS Tonna 20655 55ele 23cm assembled unused: £25. Jaybeam MBM48/70 48ele 70cm: £10. 4Y/4M 4ele 4m: £10. Lattice tower 30ft and rotator telequipment D76A double trace 25MHz oscilloscope: £45. Yaesu FT726 tsvr 6m/2m/70cm satellite: £950. All ono. Handbooks. G8FMH QTHR (Basingstoke) 0256 23979.

AOR 2001 scanning Rx 25-550MHz no gaps 20 memories: £120. RN Electronics 144/50MHz 25W trnsvtr. All ex cond: £100. G4GPX QTHR (Lancing) 0903 753893.

APPLE Macintosh SE computer, 2.5MB Ram, 20MB internal hard disk with good Ham s/ware: £750. Peter G3ZSS (Cobham) 0932 863552

APRICOT ptble, IBM emulator, 256K, LCD, plus monitor: £180. Ampex230 terminal: £30. Fortop TVT 435/R: £105. Yaesu FRDX400: £120. Sommerkamp FLDX500: £95. Noise figure meter, inc manuals: £60. TEK plugins E,G,M: £15 each. Motorola green monitor: £30. All ono or swap. G8EUX (Towcester) 0327 53522.

AR2001 scanner: £125. Telereader decoder Morse/RTTY Sitor CD660: £125. Scope calscope super 6: £75. All vgc. (Littlehampton) 0903 724805.

AR88D (LF) HF Rx + spkr and copy of manual, gwo: £100. Prefer buyer collects or pays carr. KAM TNC m/mode incl WEFAX V2.85 h/ware and Smart socket, P.Domain s/ware can be provided for BBCB micro, vgc in exchange for good quality o'scope single/dual channel, value related. G1ASR/VP8BLE. (Hereford) 0432 761835. after 6pm only please.

ARGONAUT 515 mobile base station qrp rig, mic, PSU, h/book, perfect: £280 or exchange 2m m/mode. Aircraft band Tx/Rx mains or 12V, no mic or h/bk, vgc: £35 or exchange WHY? All plus carriage. Jim GM4WKO (Elgin) 0343 547299.

ATC shack clearance. Complete T1509 HF Tx. L/B T27/30's reporters etc. P/X for UHF h/helds considered. Other goodies too! Ian G6BJJ 0752 561075.

AUTOMATIC antenna tuner FC757AT with cables manual and box, gd cond: £250. YAESU FT757GX1 with cables manual mic box m/mount etc: £525. FDK multi 700AX 2M FM 25W 144-148MHz: £145. All for quick sale. David G0KJP QTHR (Stone, Staffs) 0785 818422.

BBC "B" computer, cassette deck plus joystick and 15 games, complete with operating manual and bxd, ex cond: £150ono (Nr Bristol) 0454 773688.

BBC-B 40/80 track Watford double drive, wordwise Rom, no manuals or s/ware: £150 or exchange HF gear. G4GZM QTHR (Newton Abbot) 0626 61403.

BBC-B computer Wordwise, RTTY roms installed, daisywheel printer, monochrome monitor, cassette recorder, all cables, in ex cond: £325ono. G0CDF QTHR (Woking) 0483 766397.

BBCB 40180 disk drive, Roms:- Comms (Packet, RTTY & Modem) WP, Spreadsheet, disk doctor, printmaster, spell & others, mouse & ROM, RTTY Decoder, Prism Modem, Collection of 5.25 disks: £300. (Thornton Heath) 081 771 4769.

BBCB computer 8271DFS 40 track drive APTL ROM board fitted AMRAC TNC driver ROM 16k sideways Ram: £200. Cirkit 6m trnsvtr 10m IF Spectrum preamp, 10W amplifier: £70. 4 x 9ele Tonnas stacking frame and cables, only used on one contest: £115. Palm I fitted RB0,2,4,10,11 and SU20: £55. Seagate hard drives ST225/MFM STX38N/SCS1: £35 each. Printer suit Quen data: £75. Cash needed to support BBS. Julian G6LOH (Towcester) 0327 857766.

BC221M Wavemeter separate PSU: £20. Pair 6JS6C's Toshiba, new: £30. Four QQVO3-10's, new: £24. Prop pitch motor - offers please. G3WEX (Birmingham) 021-354 4265.

BRUEL & Kjaer precision sound level meter type 2206, 30-130dB's + 4230 sound level calibrator incl accessories & manuals: £60. John G6PFD (Rotherham) 0709 374747.

BUTTERNUT HF5B mini-beam: £80. Carr extra (about £10). SMC Oscar 10m FM incl repeater shift: £35. G2FSR QTHR (Brighton) 0273 503958.

C/W AT230 ATU: £650. Yaesu FTV707 144MHz tvtr, modified for use with TS430: £50. Addonis AM303 desk top mic: £20. KDK FM2030 144MHz FM Tx/Rx: £120. Mirage B1016 160W linear amp with remote lead: £100. Broad Band HF mobile linear model SL250DX: £60. G4BLX QTHR 07918 4711.

CAMBRIDGE electrodynamic AC test set 0-500V and 0-25amps in 5 each ranges: £60. BC221D AC: £12. (Saffrdon Walden) 0799 30763.

COLLINS KWM-2 with 516F-2 PSU: £475. Kemp G4TMO (Kingston) 071-218-0834 (day) or 081-549-1427 (after 8pm or wkends).

COLLINS KWM2A 516F2 P|SU: £500. Buyer inspect collect. G2ACZ QTHR (Mablethorpe) 0507 473233.

COMMODORE 64 + datarecorder: £50. DocctorDX DDX-64 CW simulator: £40. Masterfile 8000 for 8256/8512: £10. 3in disks 6 new: £5. Plus postage. (Romford) 04023 74043.

COMPLETE FR100-B, FL200B, FL1000: £370. FRDX400: £85. Valves, meters, xtals, trnsfrmrs, many items. (Bridgwater) 0278 455613 late pm/evening.

COMPONENTS clearout! semiconductors, crystals, capacitors, resistors, inductors. Much more. SAE for lists. G4EZA, PO Box 2, Mablethorpe, Lincs, LN12 1ND.

COMPUTER hobbyists here's your chance! Tandy TRS-80 level II micros and peripherals incl 4 computers, 2 monitors, 3 disk drives, 1 expansion interface, 1 quick-printer, 2 data-rec cassettes, hi-res graphics, lots of books, s/ware (basic course) etc and games too! Haggle around £250 for all or split to two working systems. Deliver 50 miles or help costs. Les (Bristol) 0272 611093.

CT1600 2m h/h with BS25 linear: £160. Diamond D-70 active antenna 500kcs 1500Mhz: £60. Daiwa NS660P meter: £85. John G4YDM (Washington) 091 4162606.

CUSHCRAFT tribander beam, only 6 weeks use, stainless steel hardware, cost £340, accept £175. Dr Adair (Santon, IoM) 0624 622342 evenings.

DAIWA 144MHz ATU 200/20W range model CNW-919 2 antenna inputs, new, unused, bargain: £70. Also R/N Electronics tcvr 144/50, 25W: £120. (Royston) 0763 262443.

DATONG FL-3 m/mode audio filter, 5 months old, used twice, like new, genuine reason for sale: £129ovno. 0222 465463.

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DETACHED 3-bed house in quiet cul-de-sac, Birmingham/Walsall/Sandwell border. Convenient for M5/M6/A34. Full dble glazing and central heating. Utility room. 60ft rear garden. 475ft asl. Gd VHF location. Wkd OK/OZ/LX/EI on 2m with 10 watts. Attractive park 300yds. Good neighbours: £75,000. G4NCE QTHR (Birmingham) 021 357 6139.

DRAKE TR7 PS7 RV7 four filters NB: £900. R7 matches above general coverage WARC five filters: £750. Collins "S" line: £550. Collins KWM2A PM2 312B5 remote VFO round emblem late model: £750. Henry 1KD5 1200W linear one 3-500Z: £600. G4LW QTHR (Trowbridge) 0225 753166.

DRESSLER D200S 2m PA, new 4CX350: £525. FT707 FP707: £250. IC24S: £200. TS700: £200. MM432/28 trvtr: £100. MM70/144 trvtr: £70. MM432 100W amplifier: £180. MM432/28 receive cnvtr: £20. MM1296/28 receive cnvtr: £25. 2 x 2C39 water cooled PA: £50. 1 x 2C39 air cooled PA: £40 (no PSU's) Base plate for BP60 versatower: £25. 8877 PA for 2m, spare valve, console mounted: £1500. G3XBY (Solihull) 021 744 8675.

EDDYSTONE 830: £85. Eddystone 740 + spkr: £45. AR88LF: £45. 19SET: £45. 38SET: £35. SAT-TV system with 6ft!! dish: £85. (Northants) 0933 56768.

EIGHTY FIVE PF85/PFX batteries. 9.6v 500mAL version. These are below 80% rated capacity but are probably recoverable: £3 ea, 4 for £10 plus p/p or collect. Quantity available. Redifon GR410 ATU: £20. 88mH toroids suitable for audio filters: £1 ea. G4NCE QTHR (Birmingham) 021 357 6139.

EQUIPMENT sale 2x17ele 144MHz Tonna Yagis, spare elements: £80. 5ele 50MHz Tonna Yagi: £30. G3WPO 50MHz tvtr 28MHz IF, H/B QQV0640 PA and PSUs: £100. Incomplete 144MHz linear project most component, cabinet and circuits - offers. Akai 4000DS reel to reel stereo tape machine: £40ono. Trio TS430S with FM board, AM filter narrow SSB filter and service manual.

ERA MkII microreader, new January 1991, very little use: £115 plus postage. (Altrincham) 061 941 6443.

EUROPA 4m trvtr, EMSAC TX4 TX2 CN4 PS2. All little used. All in wkng order. All for £50. (Plymouth) 0752 774405.

FREQUENCY counter module 4-digit LCD. .5in figures. 0.1kHz to 999.9kHz, with 455kHz IF offset (alterable). 6V @ 2mA with full circuit & info: £15. David G7GOP (Penryn) 0326 74962 evenings.

FT-102 pristine cond: £550. Icom IC551 6m tcvr m/mode also pristine: £425. G3FXA (Cheltenham) 0242 228471.

FT101E tcvr, CW filters, mic, spare valves: £240. Sure 444D mic, black: £25. Gem quad spider and spreaders: £150. G3RVM (Newbury) 0635 74006.

FT101E wkshop manual copy 2 used 2 new 6JS6C valves 500v brown megger in leather case. Best offer, collected. G3EJA (Reading) 0734 588503.

FT101EX tcvr with ATU, SWR meter, mic, key, phones, complete working station: £250ono. G3YJJ QTHR (Southampton) 0703 894200.

FT101Z all bands, fitted CW filter plus spare set unused PA valves: £350. Scarab RTTY TU

with Commodore 64 program on cassette: £45. G3ISL QTHR (Scarborough) 0723 369127.

FT101ZD fan, recent new valves: £375. G6LUZ (Crewe) 0270 811373.

FT101ZD MkIII FM all bands fan mic: £400. HH701: £20. 4080 trap dipole: £10. (Melksham) 0225 704565. Leave message or phone no.

FT107M with FTV107R 160/80/40/20/15/10m plus 2/70 CW/SSB/FM/AM, very reliable, vgc: £625. IBM PC clone with 32MB hard disk, 5.25in drive, green mono VDU, DOS 3.2 plus various s/ware: £375. Amstrad DMP3160 printer: £75. All ono. Mike Gathergood G4KFK (Slough) 0753 40520.

FT201 5-band 240V/12V tcvr with homebrew FM, spare PAs and driver, Europa 2m tvtr, Sure 401 mic and homebrew second VFO, gwo, C/W manuals, best offer over £245 secures. Buyer collects. Would consider exchange FT290R and linear. G4LBH QTHR (Luton) 0582 415846.

FT290R Mutek nicads charger carry case rubber duck. FL2010 linear original packages: £295. FT707E + mobile power lead spare valves manual: £300. 2m 5/8 whip gutter mount unused: £6. SEM tranzmatch + easytune: £80. Realistic power SWR meter: £20. Vince G0JNC QTHR (Chadderton) 061 652 9127.

FT290R Mutek, nicads, charger, ERC: £220. FT790R, nicads, charger, ERC: £230. FL7010 linear, new: £60. YM49 spkr mic: £25. Slide mount - missing screws: £10. Mutek TVHF230C tvtr 2m to HF nine bands 10W output: £200. Mutek preamp masthead SBLA144E: £50. Datong FL3: £70. Datong Morse tutor: £35. Alinco 70cm linear 1/10W: £35. Wanted: SM220 with pan adaptor for TS830. G4UDT (Wembley) 081-902 5995.

FT290R, soft case, nicads charger 1/4 wave, helical aerial: £200. Alinco 230DII linear amplifier 3/5W input 30W out: £50. PRO 2004 scanner 25-1300MHz, 300 memories, as new: £190. All items boxed with h/books. (Halifax) 0422 354635.

FT470 VHF/UHF dual-band FM h/h tcvr, mint cond: £330. FT23R VHF h/h tcvr: £140. Both have extended coverage, nicad packs and accessories. NC29 quick charger base for either rig: £40. G4KUR QTHR (Solihull) 021-743 6701.

FT7 10W 80-10, bxd, manual, mint cond: £240. FT200 matching PSU 80-10, manual, gwo: £160. (Windsor) 0628 22352.

FT707 100W solid state, WARC bands, FV707DM digital VFO, twelve memories, scanning, both in immac cond: £470. FC700 ATU: £80. Datong ASP: £50. Jim G4ONN (Bournemouth) 0202 557631.

FT707 HF tcvr: £350. FT107 HF tcvr: £325. FC757AT auto ATU: £185. FT290R11 2m m/mode, new cond, mobile mount, nicads: £350. Would consider P/X for Kenwood 440. Dave G0BCK (Scunthorpe) 0724 711039.

FT707 manual YD844A desk mic MMB2 mobile bracket: £290; FC700 ATU power meter: £90. FP707 20A power supply spkr: £90. FV707DM VFO memory: £40. Free desk rack and 10% off if you buy the lot. (Brighton) 0273 686694.

FT707 with CW filters, FP707 PSU, FC707 ATU and FTV707 fitted with 2m C/W mic, manuals etc: £675ono. Dave G0OFC (Northampton) 0604 37769 (days) 0327 842141 (evenings).

FT70G 12V 10W USB/LSB AM/CW 6 digit t/wheel frequency selection 100Hz resolution, receive 0.5-30m xmit 2m-30m continuous fist mic: £225. FT470 2m/70cm h/held FNB10 nicads, SMC28 mains charger, PA-6 DC-DC adaptor charger: £250. FC700 antenna tuner 150W dummy load: £95. KW 20m traps: £10. Bricomm 1:1 balun: £10. HK707 Morse key: £15. All items little used, mint cond. G4BGE QTHR (Bracknell) 0344 421502.

FT727R dual-band h/held, FNB4 nicad, FBA5 case, charger, soft case: £275. IC30A 70cm 10W mobile "oldie" only £70. Yaesu FT202R 2m h/held, 6Ch's, no crystals C/W nicads, charger, leather case: £45. Peter G0JEW (Lutterworth) 0455-552449.

FT767GX HF tcvr with 6m module, plus matching SP767 spkr, plus MH-1 mic. All bxd, as new: £950. G4SUA (Bishops Stortford) 0279 658965 after 7pm.

FT790: £180; BNOS LPM 2m 180W linear: £200. Standard C500 2m/70cm many accessories: £400. Datong speech processor: £40. CA-2x4 Max 2m/70cm collinear: £75. ATV colour electronic test card: £30. HT PSU kit parts 1500V: £150. Colour video camera: £100. Coax H100 25m length 6 off: £15 each. Televerta CM7122 VHF in VHF out: £30. Aerial bearing 1.5 mast: £15. 16ele ZL special 2m beam: £20. Tonna 19ele 2m beam: £10. P. Haworth, G6OWI 120 Ormerod Street, Accrington, Lancs BB5 0QG 0254 382423.

FT790R 70cm ptble/mobile, ex cond, bxd with manual, r/duck, mic etc: £250ono. Zettagi 25-30MHz 1kW transmatch: £25. 6m 3ele Yagi: £15. Sinclair Spectrum Plus with printer int/face, manual, PSU leads and SSTV etc Tx prog: £50. Dave G0OFC (Northampton) 0327 842141 evenings only.

FT980 HF tcvr: £1000. IC740 HF tcvr: £500. Mics manuals boxes, both mint condx. Wanted Icom IC761/5 (or Trio TS940S, TS440S HF tcvr, only mint condx with inbuilt ATH + mic manuals boxes, buy or PX + cash. GW4RLP QTHR (Caernarfon) 0286 5264.

FTDX401 tcvr, pristine, one owner, little use since revalve, can deliver NW but prefer inspect and collect: £250. G4AHC (Manchester) 061 448 1745.

FTDX401 txcr with matching spkr and external VFO FV401 CW filter, mic, spare valves, in daily use: £195. G4DIY QTHR (St. Helens) 0744 57471.

G3RUH 9600 baud modem boards, built to professional standards, fully tested, with RUH PCBs, EPROMS and data: £45 each, or £80 the pair. (Glasgow) 041 357 2158.

GOOD condition V2000 video recorder, incl many tapes + VHF/UHF tuning: £40. Unfinished project: Spectrum Commucations TRC 4-2H 144/70MHz trnsvtr plus TA4S1 25W linear (kits) Yours for £55 or £146 from Spectrum. Also available at £25 for the lot a decade (1980's) of RadComs. Prefer buyer collects. Steve G8XPZ (Nottingham) 0602 389911 after 6pm or weekends.

HAND mics High Z: £5 each. Scope homebrew: £20. 500PF twin gang: £3 each. EL84: 50p. EF80: 50p. Harvard: £20. Icom: £20. (Barking) 081-594 8675.

HEATHERLIT explorer linear, works all bands, 2 x 400 tubes grounded grid. Free carr: £725. (Hessle) 0482 648092.

HEATHERLITE explorer linear works all bands 2 x 400 tubes grounded grid, free carriage: £725. (Hessle, Nr Hull) 0482 648092.

HEATHERLITE Explorer, mint cond (almost unused): £750. Icom IC2GAT CW mobile adaptor, charger, AC charger, 5/8 whip, mobile mag mount and 5/8 whip: £220. (Only two months old) G4RAY (Wells-Next-Sea) 0328 710872 after 18.30.

HEATHERLITE Hunter HF linear amplifier, mint condx, approx two hours use from new: £750. Prefer buyer collects. G4WXF QTHR (Hereford) 056884-580.

HEATHKIT digital techniques course ET3200 trainer: £30. Microprocessor course ET3400 trainer: £45. Voltmeter IM18: £25. Rx RA-1: £35. Minimitter cnvtr: £15. BC454 with power pack: £20. R1155 coil pack: £8. T1154 variables 160pf 1.5kv: £8. G3BAC QTHR (Gravesend) 0474 812049.

HEATHKIT HW101, good cond, with matching PSU/spkr: £120. Also modified AR88D with circuits: £20. G0GQH QTHR (Milton Keynes) 0908 583392.

HF Three ELL 10.15.20 Mustang, vgc: £100. Unused 2M quad, as new: £25. (Newark) 0636 **71324.**

HRO-M full set of coils in wooden case with 21MHz band spread spares, gwo, with stab PSU 240V, original h/book: £170. 19 set variometer, no mods: £12. (Sth Croydon) 081 651 5147.

HYDRAULIC 35ft pump up/electric telescopic mast, fully operational, heavy, needs painting: £90ono. Buyer removes. Peter G0KMM QTHR (Merseyside) 051 678 1811.

IBM luggable upgraded 10MHz motherboard 10MB hard disk 640K incl manuals carrycase spare monitor and PSU: £600. Zenith laptop twin floppy 512K PC compatible mains adaptor and case bttry pack poor: £225. EGA screen and adaptor: £245. ACGPOINT 286-20 20MHz 2MB RAM 50MB hard disk VGA screen trackerball keyboard: £1250. Token ring adaptor: £95. Ian G8DUW QTHR (Stourport on Severn) 02993 78693.

IC22A 2m Txcvr: £65. Sony 200D Rx: £165. Trio 70cm Txcr 1W: £65. G4PDV (Sevenoaks) 454722.

IC24ET extended Rx + talkthru: £299. LC66 soft case: £6. AD14 battery charge adaptor: £7. BA11 bottom cap: £2. Homebrew earphone/mic: £5. PB84 7.2V 1000mAH battery (case damaged): £35. BP90 battery case: £7, or the complete outfit for £349. G6GPK (Newcastle) 0563 26732.

IC725 bxd, immac c/w CW filter FM board: £575ono. Alan G0KMC (Aylesbury) 0296 29342 evenings, wkends.

ICOM 02E h/held: £120. Spectrum computer with Morse transceive program: £50. Realistic DX comms Rx: £50. G0IFP 051-648 2492.

ICOM 251E 2M base station 10W multimode Mutek l/end, vgc, manual and orig packing: £425. (Grantham) 0476 77453.

ICOM 251E Mutek front end, wkshop manual, vgc: £460. AR800E V-UHV scanner: £120. Spectrum 144/50MHz trnsvtr 3W o/p: £45. Nevada 50MHz amp 3W in 10W out: £10. Tokyo/50Mz HL66V 10W in 60W out: £80. Yaesu PSU 13Amp: £35. CAPCO 2m ATU: £15. Daiwa Cross Needle PEP Wattmeter measures up to 1500W on 144MHz: £85. G6NWF not QTHR (Birmingham) 021 471 3243.

ICOM 271H 2m multimode, 100W, inbuilt PSU, Mutek front end, desk mic, as new: £675. (Southend-on-Sea) 0702 612948 (weekday evenings only).

ICOM 275H 2M all mode base 100W Icom serviced: £895, might PX dual/band 2M/70 Kenwood standard mobile. Malcolm G0HOG (Ruislip) 0895 676919.

ICOM 275H 2m m/mode base station: £750. No offers. 18 months old. (Runcorn) 0928 715604.

ICOM 3200E dual band 2m, 70cm, mobile, ex cond, complete with mic, manual, box and mobile mount: £325. G4PHC QTHR (Minehead) 0643 706936.

ICOM 505 6m tcvr SSB/CW 12V, as new, with MM 100W solid state linear: £499 plus carr. (W Sussex) 024 365 312.

ICOM 72S, new, still in box. Silent Key sale. With FM and mic: £550. 061 320 6941.

ICOM 751, with internal PS. Icom AT500 auto tuner. IC SP3 external spkr. IC SM6 desk mic. IC HM7 hand mic: £1000 complete. Yaesu 2m FT203R h/held tcvr with M1112 spkr/mic and NC-15 bench charger. Boot mount 2m ant: £180 complete. Shure mic 201: £10. Electronic keyer EKISO: £30. SWR-25 meter: £5. HF5-band ant: £25. Cooling fan: £5. (Wakefield) 0924 257476.

ICOM 751A + internal PSU, CW filter FL63A + FL53A + stability crystal CR64, one year old, mint cond: £1100. Also Trio SM220 st. monitor with BS8 pandisplay ex cond: £200. Superb Datong FL3 auto notch filter: £60. Yaesu FP757HD PSU 20 amp, ex cond: £180. Yaesu SP102 spkr: £20. (Coventry) 0203 313109.

ICOM IC 900E C/W UX49E 70cm module UX29E 2m module UT29 tone and squelch, vgc: £450ono. (Rugby) 0788 560384.

ICOM IC-3210E 2M/70cm dual band FM mobile tcvr, 25W output, mint condx: £370. G7EHV QTHR (Canterbury) 0227 721541 after 6pm.

ICOM IC-3210E dual band 2m/70cm FM tcvr, 25W output, mint cond: £370. Chris G7EHV QTHR (Canterbury area) 0227 721541 (after 6pm weekdays, anytime wkends).

ICOM IC-475H 70cm all-mode base stn, 75W, 500Hz CW narrow filter, high stability xtal unit. As new, with orig packing: £830ono. Bruce G4WVX not ' QTHR (Bucks) 0628 664415 or 0831 135604.

ICOM IC-726 HF + 6m: £890. Yaesu FT-102 HF tx/Rx: £485. IC-228H 45W 2M fm, bxd: £260. IC-3210 dual band 25W: £360. IC-U4E 70cm h/held, bxd: £150. Hallicrafter SX62 g.c.rx: £75. G4AFY (Kidderminster) 0562 747480.

ICOM IC-R7000 Rx, remote control, voice synthesiser, original cond: £695. Yaesu FRG8800 Rx, as new: £495. G1NAX QTHR (Plymouth) 0752 775375.

ICOM IC290D late model all mode 1/25W: £375. Two 813 with Fil.XFMR: £15. John G2HHV QTHR (Batley) 0924 470667

ICOM IC730 HF txcvr & CW filter, tvtr opt, service manual, ex cond: £475. PS15 matching 12v PSU as new: £110. IC202 2m SSB txcvr full xtals good cond: £100. Tonna 4x9ele stacking frame 'X' config: £25. Tonna 70cm 21ele: £15. RADCOM 1983-1990 complete: £40. SPRAT ISSUES 20-50: £20. David (Lincs) 0778 425367 6pm - 7pm.

ICOM IC740. FM board internal PSU SP3 spkr. Fist, desk mics, mint: £595. KW207 Supermatch ATU built-in dummy load: £80. Koyo SWR/PWR meter 1.8/200MHz, brand new: £35. Yaesu FT726/R Sat. board, boxed, unused: £100. Wood and Douglas ATV1 70cm ATV-TX 3W o/p: £50. Boot mount Wessie HiBand FM ideal Packet: £15. Spectrum interface One: £35. (Bolton) 0204 594235.

ICOM IC751 with 250Hz CW filter, hi-stab reference and speech synthesiser, service man, gd cond: £875. IBM clone (80286/16) 5.25in 1.2m/360k drive 3.5 144m/720k drive, two 40mbyte hard disks, vga card, 80287-10 coprocessor 2x serial ports & parallel port 2m RAM card: £750 (needs monitor MDA EGA/VGA). Gould 083000 40MHz dual timebase scope with manual and two X10 probes: £100. Robert, G0MYX QTHR (Oxon) 0367 710723.

ICOM IC781: £3000. No offers. Carr £15. G3FPD QTHR (Horsham).

ICOM M700 HFSSB tcvr, 2-24MHz: £780. Icom AT120 automatic ATU: £210. Tokyo HL2K HF linear: £750. Yaesu FT70F ptble HF tcvr: £165. FC70P ATU: £90. NC70 charger/PSU: £80. 10MHz, 2ele Yagi antenna, Deecom: £165. All equipment new, boxed, used few hours only. GW8AWM QTHR (Usk, Gwent) 02913 2466.

ICOM, 271H and 471H, both mint: £650 each. 4x2ele Tonna, 70cm, stacking frame, splitter: £100. SSB products gasfet masthead, 70cm: £45. 3x9ele Tonna, 144MHz: £10 each. Tonna 2-way splitter, 144MHz: £15. Altron SM30, head unit: £150. K400RC: £60. G4SLN QTHR (Bedlington) 0670 824788.

JRC Allwave Rx model NRD515 JRC memory unit model NDH-518 Datong active receiving antenna model AD370: £750. (Manchester) 061 445 3775.

JRC NRD-515 communications receiver with remote keypad, memory unit, filters, spkr incl Datong notch filter, w/p blanker, original cartons, manuals, mint cond: £625. Geoff G6FLQ (Notts) 0636 813946.

JUPITER wide band scanner: £210. Ten-tec 705 electret table mic: £25. G4ZPY paddle: £45. D/L Mk.2, all as new. Carr extra. G6RJ QTHR (Bedale) 0677 70480 after 8.30pm.

KDK 2025 FM 2M tcvr: £150. M40FM converted 10M plus 25W PA: £50. G.whip multi mobile: £10. Collect carriage extra. John (London) 0831 564 789 between 6.30 and 11pm.

KENT twin paddle Morse key: £38 post free; Datong FL2 audio filter: £75 post free. George G6VS QTHR (Liverpool) 051-733 6415.

KENWOOD 140S, approx 6 months old: £700ono, includes MC435 mic. Also AR1000: £190. Alinco DR110 2m mobile: £190. Hi-Mound Mk702 manipulator: £20. HiMound HK702 straight key: £10. Buyers collect. Charles G4WIE QTHR (London) 071-987 2296.

KENWOOD SP940 spkr: £40. Jaybeam VR3 trap vertical 10-15-20, clean condition: £35. (Stony Stratford) 0908 566266.

KENWOOD TH26E 2M h/held, as new, bxd with case. Includes extended receive: only £180ono. G1PCZ (Harlow) 0279 432214.

KENWOOD TH77E 2m/70cm h/h tcvr, less than six months old, case, charger etc: £345. May consider deal on 2m/70cm mobile, eg. Kenwood 4100A. G6YBY (Stoke-on-Trent) 078 139 2442.

KENWOOD TL-922 linear amp: £900. TS830S tcvr: £500. Kenwood VFO/230: £80. Tokyo Hy-Power HC-2000 antenna coupler: £150. Shure 526T: £30. Richard G0BLB QTHR (Nr Bristol) 0761 52854.

KENWOOD TR2600E 2m h/held complete with soft case spkr mic external bttry pack KMCC mobile mount 30W amp: £195. Kenwood MSI mobile stand TR2500/TR3500: £15. Icom IC255E 2M FM tcvr 25W: £160. MMSI Morse talker: £65. All ex cond. G0ABM QTHR (Tunbridge Wells) 0892 541473.

KENWOOD TS-830S HF tcvr, VFO240, AT230 and MC50 mic, ex condx: £750. Cushcraft R5 HF Vert antenna, new and unused: £225. John G0NAJ (Dukinfield) 061-338 8731.

KENWOOD TS440 C/W auto ATU plus matching PS50 power supply: £950. KAM TNC: £195 Disconne 25-1300MHz. All ex cond. Peter (Exeter) 0392 432675.

KENWOOD TS440S built-in AT440 with CW filter and VSI unit SP430 spkr and MC80: £950ono. 0860 260917 (mobile).

KENWOOD TS440S tcvr, fitted with internal auto ATU CW filter, SSB filter, voice synthesizer unit. Also original Kenwood service manual, DC power cable, matching Kenwood PS-50 PSU and SP-30 spkr. All in vgc and in original bxs: £1200 or offers. Paul 0752 251330. Viewing in Plymouth or London.

KENWOOD TS440S, 3 months old, CW and extra SSB filters fitted, bxd, as new cond: £1050ono. (Hereford) 0432 850244.

KENWOOD TS530S tcvr with 1.8kc SSB and 500Hz CW filters, DFC230 digital VFO with memories, allows split operation: £550 or make an offer. Comes with a mic wired for 110v and a 110/220 trnsfrmr. Kelly, G0MKT not QTHR (Newmarket) 0638 666596.

KENWOOD TS530S, immac cond, one owner, original packing and manual: £550. (Romford) 0708 749175.

KENWOOD TS830S, VFO230 digital remote VFO, both narrow CW filters, SP230 spkr, wkshp manual, orig packing, immac: £800. G3VBL QTHR (Preston) 0772 612289.

KENWOOD TS940S with internal automatic antenna tuner, with matching SP940 spkr and mic, hardly used, unmarked, as new, bxd: £1500. (Northampton) 0604 881971.

KENWOOD TS950S, under warranty, as new cond: £1995. G3RWQ QTHR (Worcester) 0905 54303.

KW Vanguard Tx scope telequipment Type D43 TS520ES digital display 2m FM rig Maplin 14MHz DCR Howes 3.5MHz DCR old Eddystone Rx, also Codar and ex WD Kent keyer, 12V QRP PSU DP meter, open to offers. G4RIP (Spalding) 0775 87236.

KW600 linear: £250ono. BBC-B with double disk drive: £280. GD4EIP QTHR (IoM) 0624 801353.

LINEAR Amp home built 4CX250B Eimac valve brand new, 6m band C/W PSU: £125ono. Jaybeam VR3 vertical ant: £40. (Halifax) 0422 320094.

LOGIC Analyser LA160 3 variable voltage probes, 4 grabber sets, RS232, 40-pin test probe, new: £400ono. Signal generator LSG-17, to 450MHz, new: £75ono. Baby Eddystone Rx: £75ono. "Type Z" sound level meter, new: £175. Chris Robinson QTHR (Lyndhurst) 0703 282366.

LOOK! Sony MDR500 h/phones: £5 inc. Boots

padded phones: £4 inc. RS488-876 test lead set (unused): £7 inc. ZX81+16K, PSU, leads, overlay k/board: £12 inc. AVO8 test leads: £5 inc. 7in comms spkr: £3.50 inc. Metal edged case 18inWx6inHx13inD (ideal camera + lenses): £10+pp. KS065 Kenpro support bearing (rotator): £7+pp. Various Swiss-made side cutters etc - offers. DX Master 3600 10m all-mode + 50W linear: £110+pp. Car alarms: £22.50 inc. Mark (Gillingham, Kent) 0634 30822 evenings.

LOWE SRX30 general coverage HF Rx, vgc, incl manual, will deliver reasonable distance: £100. Nick G8XUB not QTHR (Redditch) 0527 24493.

MARCONI TF2002 MF/HF AM signal generator complete with digital synchroniser Type TF2170B: £300. Walker & Leach VHF/UHF calibration rec complete with tuners 57MHz to 440MHz: £80. All in gwo. (Bicester) 0869 244166.

MARINE D/F Rx h/held with compass, Seafix, used twice, Wavemeter W1252, copper lined case 22-33MHz, mains input, large Muirhead dial - offers. WANTED mechanical bug key, compact frequency counter to 150MHz. G3AJV QTHR 0765 6159.(Ripon) 0765 6159.

MATSUI MR4099 PLL SW Rx: £45. 2 Datong 4096 Codecalls: £10 each. Pair 6146B, brand new: £10. SL1640: £2. SL1611: £2. SL1610: £2. Model RC Helicopter NFA Sport 500 with engine and all RC: £150. G5RV: £5. 2 PF9 Tx: £15. 1 PF9 Rx: £7. IC-SM5: £15. 200 TTC IC's: £10. ARRL Callbooks: £15. ARRL Handbooks 1985-74. 50m UR67, new: £25. (Sandbach) 0270 761978.

MFJ-1278 m/mode data controller 5 modes, MFJ-1284 terminal program with MFJCOM, MFJVU and utilities for IBM and compatibles + RS232 lead: £160. 10FM CB York: £30. Wanted PK232 or KAM TNC. G4SSX QTHR (Eastcote-Pinner) 0895 630627.

MICROWAVE modules MML 144/50-S 144MHz 50W linear amplifier, 10W drive, inbuilt preamp: £45 or swap for bass guitar. (Nr Walsall) 0922 51504.

MODEM, Dacom Unity, 2/3 PC card V21, 23. Autodial, Autoanswer: £55. G7ABT QTHR (Leicester) 0533 778626.

OSCILLOSCOPE Tektronix 581A with 5 plug-in modules, lead, manuals: £150ono. Marconi signal generator 10-480MHz: £40ono. (Eastleigh) 0703 695144.

PAIR Eimac 4Cx350A valves, offers. Icom EX309x2 interfaces plus JT603 BBCB interface with programs: £120ono. G3LDI QTHR (Swardeston) 0508 70278.

PC compatible, ideal for packet, dual floppy drives, green monitor, C/W manual, bargain: £225. IMatsui MR4099 ptble Rx: £50. MMC435/600 ATV convertor: £20. Wood & Douglas ATV2 Tx/Rx: £80. Sinclair microvision model MTMB TV: £30. Buyer inspects and collects or pays carr. G0DLF QTHR (Northampton) 0604 831061.

PCB equipment, bubble etcher, precision drill, guillotine, presense, fibreglass board, process camera A3 size (scruffy but superb Schneider lens). Will split. All cheap. Alan G4GQL 081 550 3610 evenings.

PHILIPS 2531 4-valve 1930's Rx: offers. Rowbotham, 19 Carisbrooke Road, Bushbury, Wolverhampton 0902 781726.

PK-88: £75ono. Daiwa EK-150 keyer: £25. MFJ versa tuner MkII 941D: £70. Belcom LS102 10m m/mode: £180ono. Yaesu FT-470 dual band handie c/w 2xFNB-12 nicads, desk charger, spkr/mic, soft case, PA-6 car adaptor: £450ono. (Kilsyth) 0236 824167.

PYE boot mount Westminster control cables included one 2m one 70cm: £20 each. Pye spkr mics: £1.50. Dragon 32 plus RTTY Packet s/ware and moderns: £100. Ferguson monitor: £25. FT208R spkr mic mobile PSU many extras: £150. MM 100W 2m linear, needs attn: £50. Yaesu FT150DX HF Tx, needs attn: £50. Spectrum 128K many extras: £100. Many other items, sae for list. (Nottingham) 0602-731036 after 6pm.

PYE Europa MF5FM 6CH hi-band ex-pmr sets, converted to 2m CW mobile mount, mic and power lead: £30. G0CPR QTHR (Seaford) 0323 898929.

PYE P5000 L/B AM hand ptbles, l/case, r/mic, batts: £15 each. Olympic L/B AM: £20. BC29 batt charger 10-way: £20. John G8MUX (Stockport) 0663 762707.

QRO HF linear Trio TL911: £250. FT201 260pep HF tcvr: £175. FC301 HF 500pep ATU: £45. KW air-cooled dummy load 1000W max: £25. Mike (Hinckley) 0455 212811 after 6pm weekdays or anytime weekends.

R1000 Ex C/W FM and DC mods: £235. TR2500 h/held 2m C/W fist mic, spare bat, bat holder, case, mobile stand: £175. Yaesu spkr mic: YM24A: £10. Yaesu DC power adaptor: £8. All vgc. Carr extra. G3OJI QTHR (Nr Rugby) 0926 812621.

R1116 comm. recv. Offers. G8KKQ (High Wycombe) 024024 3153.

RACAL MA79 drive unit, full working order, ex cond: £150. Rotator CD" '45 with controller, new ring gear fitted: £60. Tatung colour monitor: £50. 2M valve linear 400W (two 4Cx250B): £300. Spectrum 48k computer, brand new in box: £30. Trio TS930S HF tcvr, mint cond, bxd: £970. G0DUF QTHR (Oxford) 0491 612279.

RADCOMS, immac cond, Feb 83 - Feb 91 (97 copies): £15. Buyer collects or I will deliver locally. G0CKY QTHR (Leeds) 0532 609456.

REALISTIC Pro-34 scanner, as new, bxd, nicads, telescopic antenna, instruction bk: £130. List £249. G0NSH (Welwyn GC) 0707 331340.

RTTY/CW terminal ST5MC Amstrad CPS8256 RS232, plus COM 1 s/ware, all as brand new: £100. No offers please. G4RFL (Cheltenham) 0242 862939.

SATELLITE antenna system less than 8 months old. Jaybeam 10ele cross Yagi with phasing harness: £55. Two x 16 turn helicals 70cm excellent performance: £65. Very strong stainless steel box construction tiltover tower 9ft high ideal for satellite array or dish: £55. Yaesu A2/ele rotor G-5400B: £260. Landwehr masthead preamp MAS145: £85. Mirage 100W 70cm linear 25W drive: £160. Datong speech processor: £40. (Shropshire) 0691 623728.

SHACK clearance Icom 275E 2m base/mobile, bxd, manual: £700ono. Icom IC32E h/held, almost new: £320. Icom PS55 P/S: £135. 2m/6m KcS trvtr: £150. Icom 505 mobile/ptble all mode 3/10W, manual: £350. Yaesu FTV901R trvtr 2m/6m 70cm with Repeater shifts manual: £320. ERA microreader CW/RTTY decoder: £95. G7GMD (Brighton) 0273 440600.

SHIMIZU 105 QRP tcvr, no mods, gwo: £250. G4UUK QTHR (Birmingham) 021 770 3054 evenings.

SILENT Key G6RYT equipment sale Trio TR9130: £300. Yaesu FT780R: £275. Trio R2000 + VHF convtr: £300. Rotator HD9508 Channel Master: £40. (Shrewsbury) 0743 722863.

SILENT KEY sale ex-GW8IH. Icom 735 with mic and manual, little used: £600. Ten-Tec Argosy Trx, with Ten-Tec keyer, homemade power supply & antenna tuner, SWR meter - complete station: £400. Selection of Morse keys and high speed paddles. Also homebrew 500k/c's marine CW Trx. Quantity electronic test gear, incl Pye galvanometer, Cambridge millivolt meter, AVO transistor analyzer, Philips oscilloscope crystal calibrator and many others, mostly homebrew. Also huge asstmt components and h/ware. More info & viewing (Newcastle Emlyn) 0239 710841.

SILENT Key sale. G0JTS John Goodwill. Kenwood TS830S: £650. Kenwood 230 ATU: £125. Kenwood SP230 spkr: £45. Kenwood HS5 h/phones: £10. Kenwood TH205E H/H: £130. Kenwood MC50 desk mic: £35. Kenwood TR7625 2m Tx: £100. BNOS PSU 12/12A: £70. G.Comm PSU 12/5A: £10. MM Amp 144/30 LS: £70. Datong Filter 3: £70. Datong Morse Tutor: £38. Kent Paddle Key: £35. Kent Electronic Keyer: £38. SMC Power Bridge T3-170L: £10. MVT Scanner 5000: £155. R210 Rx c/w power pack: £50. Butternut HF2V: £80. Hy Gain 12 AVQ: £50. Jaybeam Collinear: £40. Mobile 7/8 whip: £15. These items in ex cond. They are held by G0GXB QTHR 0865 890461.

SONY 2001D Rx, 4.5V DC: £165. Commodore CBM64/128 computer disk drive cassette joystick: £250. Disks Morse tutor, CW RTTY TXCV interface: £40. IC22A needs LS: £65. Trio TR3200 70cm , perfect: £65. UHER tape recorder 7.5/3.75/1 **(AND SEVEN EIGHTHS)** 10 tapes mic: £120. National Panasonic 18in TV colour working: £50. Buyer collects, postage extra. (Sevenoaks) 454722.

SPECTRUM based word processsor with Citizen 120D printer: £175. Seiko 50 printer Spectrum compatible plain paper roll: £35. 2M 8-el Yagi with rotator, controller, cables. Buyer collects: £75. G6TPQ QTHR (Oldham) 061-633 3895.

SSTV/FAX WRAASE SC-1 decoder with keybd: £300. Timestep weather sat, 137MHx Rx with scanner: £100. G4LQD QTHR (Weybridge) 0932 854393.

STANDARD C528 spkr mic mobile bracket soft case DC lead with 2 cellcases, all bxd: £380. Minolta autofocus camera outfit 2 camera bodies 5000 7000 2 AF zooms flash gun, all in gadget bag: £360. Could split or consider FT23 as p/exchange. G7EXZ QTHR (Gillingham, Dorset) 0747 85639.

STANDARD C528 twin band h/h 144/430 FM 1 receive 130-175 330-470 820-960, complete with case, nicads, manual and charger: £325ono. G1GSM QTHR (Stockport) 061 449 9176.

STRUMECH 60ft tower with base plate MT but no head unit: £200. Navico AMR1000 2m 25W mobile: £150. Sony Betamax recorder: £30. Pye 3-ch Europa with 5 tone selcall module wkg on 2m: £30. Motorola UHF FM MT700 2-ch h/held with mobile adaptor, OK for 70cm: £45. DMS memory unit for FT107: £30. Enterprise sailing dinghy C/W sails + launch trolley: £500. Ian G8KQW (Basingstoke) 0635 33462 evenings 0256 790101 daytime.

TECTRONIX 545 scope, dual channel, plug-in preamp, also Cossor 1049, OK but for focus fault, diagrams available. Offers. G3LOA QTHR (High Wycombe) 0494 438843.

TEKTRONIX 545B (all valve) oscilloscope dual beam (DC to 33MHz at 3dB down). Two type 1A2 dual trace plug in unit CH1 and CH2 0.05 V/cm - 20V/cm AC/DC rise time 11nS: Type H plug in unit 0/005V/cm - 20V/cm AC/DC rise time 23nS: probes various x 1 and x 10: Oscilloscope trolley with stowage for two plug ins and accessories draw: R, C & L bridge type TF1313 Marconi, 0.25% accuracy. The lot with manuals: £100ono. Buyer collects or sensible arrangements. (Horsham) 0895 426084 (daytime) 0403 66723 after 7pm.

TEKTRONIX 7603 readout scope with three plug-ins and matching trolley in excellent wking order: £395. Buyer collects. (N London) 081 888 1909.

TEKTRONIX. Large selection Tektronix scope and probe, plug in, manuals, all genuine editions. G1RLA (Oxon) 0608 643558.

TELEQUIPMENT D755OPT66 oscilloscope: £220. Advance OS2000R oscilloscope: £190. Eddystone 770R VHF Rx: £120. RCA AR88D: £60. Marconi CR100: £35. BC1031 panadaptor: £70. Redifon GK2000 two-tone convtr: £40. Marconi TF2400 frequency cnvtr: £20. 9in monitor: £20. ATE bandrate cnvtr: £20. Plessey TDMS70: £25. (Oxford) 515143.

TEN TEC Argosy with matching PSU: £330. Yaesu FRG965 VHF/UHF scanner with AKD HF cnvtr and FC-1300 UHF cnvtr which give 100KHz to 1300MHz continuous all mode coverage (not prepared to split): £450. SEM Tranzmatch with built-in Ezitune 160-10m: £80. Buyer inspects and collects. Bob G4MSS QTHR (Chatham) 0634 405837.

TEN-TEC Paragon tcvr, Ten-Tec power supply, 1.8kcs filter, ex cond: £1700. (Leicester) 0533 674112 after 6pm.

TEN/TEC tcvr Century 22 low pass filter key PSU CW: only £250ono. G3IUL QTHR (Bedfont) 081-890 7091.

TONO Theta 5000E sender/decoder CW/RTTY/AMTOR keyboard terminal with built-in monitor, boxed, mint cond: £350. G4TDR QTHR (Wolverhampton) 0902 765374.

TRIO 530SP, as new, all filters, little use: £575. Sommerkamp FR100B FL200B: £120 the pair. Also IC251 with Mutek: £450. FL902 ATU: £130. Tono 90W Amp-Preamp: £90. (Clowstop) 029 922 279/298.

TRIO 7010 ssb/cw tcvr + PSU, manuals incl: £75. 2m Tono linear amp FM/SSB 10-30 out 2m coverage: £40. (Colerne) 0225 743306.

TRIO 9130 2m/m-mode 25W, as new, with box, never used. Mobile + collinear: £300 or P/X for TS430. G0IJJ (St Austell) 0726 813226.

TRIO R2000, ex cond: £350. (Glasgow) 041 334 2811.

TRIO TR2300 nicads etc, bxd. KPC2 Packet TNC with IBM s/ware and all cables, wired for TR2300. Sharp laptop computer DOS 3.21, twin 720k drives charger etc, bxd, unmarked, as new: £650 the lot or exchange FT757 etc. Dave G4WBB (Rotherham) 0742 465145.

TRIO TS-430S, ex cond, orig packing, CW filter incl but not fitted: £650. GM4SEH QTHR (Forfar) 0307 67712

TRIO TS-430S, vgc, with FM SSB AM filters, bxd: £595ono. Pref buyer inspects collects. G7FHV QTHR (W Sussex) 0444 417509.

TRIO TS-520 with 2m TV-502 tnsvtr, Kenwood SP-520, mic, operating manual, spare valves, vgc: £525. (Stevenage) 0438 359427.

TRIO TS510: £120. ND1 HC1400 2m FM tcvr: £100. 9ele Tonna incl rotator mast + brackets: £100. G4NMR QTHR 0905 20002.

TRIO TS530S perfect cond, MC50 desk mic, spare 6146B's, narrow SSB filter: £565. SEM wideband VHF/UHF preamp: £28. Nigel G4PJJ QTHR (Gloucester) 0452 75542.

TRIO TS530SP with CW filter, vgc: £400. Icom IC28E 2m 25W mobile, ex cond: £190. G3STB QTHR (Preston) 0772 35049.

TRIO TS711E multimode. immac cond: £625. Also Airband Rx R-5375: £45. G4SKX QTHR (Stockton) 0642 676477.

TRIO TS780 2m/70cm m/mode, ex cond: £600. Dave G0OIL QTHR (Sheffield) 0742 529975 (work) 0246 414995 (home).

TRIO TS830S plus MC+60 Tok-yo hy-power HG400L matcher coupler, no splits. Buyer collects: £650. Datong FL3 filter, mint, bxd: £110. (Sheffield) 0742 320008.

TRIO TS930S, gd cond, no mods, gwo: £1000ono. Also Henry 2KD classic HF ZKW linear amp, little used, unmarked: £1000ono. FT230 25W FM mobile with bracket and mic, ex cond: £210ono. Silent key sale. (Gwent) 0633 880146.

TS130S FC707, PS30, plus Yaesu desk mic, all bxd, mint cond: £600ono. Liner 2 2m SSB: £50. Pye Cambridge 2m FM: £25ono. DX7 keyboard - offers? (Warwick) 0564 782702.

TS440S auto ATU, SSB CW narrow filters: £900. TS770E 2m/70cm m/mode: £475. TW4000A 2m/70cm FM: £300. All vgc. Ron (Oswestry) 0691 831111.

TS530S fitted narrow and CW filters: £550. Drake MN2000 ATU: £300. Both super condx. Drake W4 wattmeter: £65. Astatic D104 desk mic: £35. Buyer inspects and collects. (Cambridge) 0954 210374.

TS530SP with filters: £550 incl carr. GM4SVM QTHR (Stirling) 0786 75834.

VALVES QQVO6-40A and QQVO3-20A, four of each, brand new, bxd, Mullard, offers? 0875-33-291.

VERSATOWER P40 less post. Head unit, auto brake, winches: £300ono. Buyer helps dismantle, collects. G4BKE QTHR (Winchester) 0962 861133.

YAESU 690, bxd, new cond: £295ono. Inspect Yateley, Surrey. 0252 874380.

YAESU 726R with 2m, 70cm, 6m Sat Board d/mic, complete with Kenwood SWR/power meter Mdl SW-200, all leads & power heads, Yaesu spkr Mdl SP767. This eqpt is as new, not marked, in orig bxs, with manuals: £1000. Delivery could be arranged. G1UTS QTHR (Manchester) 061 336 0452.

YAESU FL2100Z 9-band 1200W linear. Any trial: £450. G3UGK not QTHR (Bournemouth) 0202 525740.

YAESU FL2100Z linear amp 1200W 160 to 10m incl WARC bands: £475. 0705 265101.

YAESU FRDX400 Rx 160m - 10m +6m +2m and matching spkr. FLDX400 Tx 80m - 10m with matching mic, Datong RF speech clipper, both with manuals: £195. Roger G4CGU not QTHR (Birmingham) 021 4228477.

YAESU FRG7700 Rx, gd cond, with manual: £220. M.M. 2m amplifier 1-3W in 100W out, little used: £125. Datong FL2 audio filter: £65. Datong AD370 active antenna with PSU: £25. Kenwood MC50 desk mic: £25. G1UET QTHR (Stroud) 0453 766171.

YAESU FRT7700 ATU, bxd, as new: £40. Realistic Minimus 17 extension loudspkr, bxd: £9. Technics GX3 organ with stool, as new, hardly played, PCM stereo, cost £3400 sell - offers. Linguaphone Welsh language course, with Linguaphone personal stereo; all unused, bxd: £95. (Llandudno) 0492 878107.

YAESU FT ONE HF rig, all options, FM, ex cond, service and operators manuals, scanning mic, bxd: £950. Exchange FT-757 or FT-726R plus cash. FV-101DM ext VFO, vgc, bxd manual: £90. Icom 3200E dual band mobile 2/70cm 5/25W output, not used mobile, duplexer, voice synthesizer, bxd, mic, manual: £250. Icom PS-15 20A PSU, bxd, vgc: £90. Western 3ele tribander, vgc: £90. Yaesu FT-211RH 2m 45W, extended cov Rx, good cond, mic, bxd, manual, meter light blowti: £180. Bremi 200 IOM linear 240V, Fan: £40. Yashica TL electro 35mm camera, 1.14 50mm lens, 1.28 135mm lens with case, also Pentacon 4/300 lens (big) 2 light meters, all vgc: £150 or swap radio gear WHY? Ian G7HXI (Stalham) 0692 81663.

YAESU FT ONE, full commercial spec 1.6-30MHz Tx/Rx Ideal Marine, amateur tcvr, vgc: £900. Sony PRO80 HF/VHF scanner 150KHz-108MHz, 118-225MHz 40 mems on HF/VHF, SSB AM FM WBFM, as new, bxd with accs: £200. GM0BVF QTHR (Nr Lockerbie) 057 63 494.

YAESU FT-102 FM/AM 1.8kHz filter MH-IB8 mic, spare new 6146B's FV-102DM FC-102 with FAS-1-4R: £800. No splits. G3BYY QTHR (Staines) 0784 482007.

YAESU FT-2700RH dual band mobile, unused: £350. Icom IC-47E 70cm mobile: £235. Bearcat 200XLT scanner: £185. Fortop TVT 435/R tv tcvr: £80. Icom TV-R7000: £75. Packet/RTTY/CW Dragon system :£99. BARTG ST5 RTTY unit with extras: £45. Could demo/deliver S.East. (Brighton) 0273 582823.

YAESU FT-73R 70cm h/held, fitted CTCSS option, service manual, 4 bttry packs: £150. W2GN 2m amplifier metalwork: £120. QM70 70cm valve PA, 2C39, blower: £20. Prefer buyer to collect. (Birmingham) 021 747 2438 after 7pm.

YAESU FT101 EEX and manuals: £250. SEM transmatch ATU: £50. Kantronics KPC2 Packet equipment and manuals: £100. BBC'B' computer incl Acorn DFS, tool kit, games and manuals: £250. Single disk drive: £50. Green screen monitor: £40. (Abingdon) 0235 820183 evenings.

YAESU FT1012 (all bands) FM-FAN, hand/desk mics, spare new matched 6146's, FT901R trnsvtr (2/6/70) 2m fitted. Both mint, bxd, manuals, may split, little used: £625. FRG7700 gen-covge and ATU: £225. G0KCB QTHR 0449 672726.

YAESU FT101Z HF tcvr fan YD844A desk mic: £350. Realistic PRO 2022 scanner: £150.

D1300 Discone antenna 25-1300MHz: £40. (Bristol) 0272 649257.

YAESU FT101Z, vgc, fan YD148 desk mic: £375. IC260E 2m 10W m/mode: £260ono. Heathkit IP17 PSU: £30ono.

YAESU FT101ZD Mk 1, immac cond, with mic, fan, service manual and spare set of PA valves, one owner, ideal club rig: £350. Will deliver reasonable distance from Andover. Dave G3LSL not QTHR 0264 88579 after 7pm.

YAESU FT101ZD Mk 111 fan 350Hz CW filter, ex cond: £475ono. Alan G0KMC QTHR (Aylesbury) 29342 evenings/wkends.

YAESU FT101ZD Mk3 Fan, CW filter. Matching FC902 ATU and SP901 spkr. Superb cond, boxes, manuals: £550. G4XXT QTHR (Romford) 04024-46174.

YAESU FT102 all modes fitted, as new, still in box, unused last five years: £550. Racal RA17 general coverage Rx in gwo: £125ono. (Warrington) 0925 838331.

YAESU FT102, ex cond, manual, fitted with CW narrow filter. FT225RD, mint, Mutek front end, manual. FT102 circa: £600. FT225RD circa: £500. (Swansea) 0792 362433 after 6pm.

YAESU FT107M HF txcr, 10m - 160m, all solid state 230W PEP: £325. Daiwa PS313II PWR supply, hardly used: £125. (Choppington) 0670 855953.

YAESU FT23, spare nicad pack, wall charger: £170. Yaesu FTV901 trnsvrtr 2m fitted: £160. Ray G6IRY (Uxbridge) 071-227-5223 (work) 0895 37562 (home).

YAESU FT2700RH 2m/70cm dual band FM mobile: £325. Kenwood TS670 all mode H/F quad band c/w matching PSU: £475. Ham LA120 200W peak H/F linear: £90. Daiwa 2m FM search 9 Rx: £45. MM 70cm trvtr 28m IF: £60. MM 4m convtr 28m IF: £18. CAPCO magnetic loop 30/40/80m: £180. Oak commode, ideal contester - offers. P/X considered on main radios. Paul (Birmingham) 0922 723726.

YAESU FT290R 2m m/mode tcvr with nicads, case and charger: £210. ST5TU + Creed 7RP: £35. 4ele 2m QD aerial: £18. G0ISE (Ellesmere Port) 0513 559831.

YAESU FT290R MkII, 2.5W m/mode 2m, Yaesu FL2025 25W linear bttry, case, nicads, charger, mic, whip antenna, soft case and strap, manual, all bxd and in exc cond: £450. Isopole 2m vertical antenna: £30. G0NCV QTHR (Northumberland) 0434 632837.

YAESU FT301D with FP301 PSU: £350. MMT 144/28 trnsvtr: £75. Cambridge antenna noise bridge: £10. Professional 7Amp regulated 12V PSU: £20. Amstrad software supercalc 3.1: £10. Accounts Master: £15. Sage retrieve: £20. All original unused. Costello G3YPP (Beds) 0462 815533.

YAESU FT703R 70cm h/held: £115. 13.8V 35A PSU 45A peak: £50. Gould PSUs 13.8V 10A: £25. 5A: £15. K2RIW 70cm linear with PSU: £285. 4CX250 2m linear with PSU: £265. PSU. Parts available. Chris G4CRF not QTHR (Aylesbury) 0296 714888.

YAESU FT726 with 2m, 70cm and satellite: £775. Buyer collects. G3IMP QTHR (Newport, Salop) 0952 812134.

YAESU FT726R modules 6m: £200. HF Module: £200. Sat Unit: £120. 6m linear 30W: £30. Yaesu noise cancelling mic: £20. 6m preamp: £15. (Halesowen) 0384 65614.

YAESU FT747GX with FM unit FP757GX power supply with hand mic: £549ono. (Broadstairs) 0843 602565.

YAESU FT75 30W HF tcvr 5 band 80-10m with VFO, mic, DC & AC PSU's: £40. Saisho SW5000 general coverage Rx AM/SSB & FM broadcast: £50. No offers please. G0MSC QTHR (St Helems) 0744 88 3547.

YAESU FT757 Mk 1, good cond, bxd with manuals and fist mic: £475. (Romsey) 0794 516007 (evenings).

YAESU FT757GX11 tcvr, hardly used, bxd as new: £750. Also MFJ deluxe versa aerial tuner: £70. G1EVC QTHR (Silsoe, Beds) 0525 60091.

YAESU FT757GXII, mint: £695. FP700 PSU: £110. TB3 6 months old: £250. Yaesu FC757: £250. KW1000 linear: £250. Yaesu FT77: £395. All bxd in mint cond. Getting married! GW3XCR (Swansea) 0792 816088.

YAESU FT767GX fitted 2m bxd as new: £1000. KW-1000 linear with manual and spares: £250. KW-108 monitorscope with manual: £40. MML144/100: £75. Daiwa DK-210 keyer: £25. Panasonic 4-colour penwriter, types and plots graphs: £100. Bang & Olufsen Beomaster 2200 tuner-amp, bxd: £50. Beocord 1900 cassette recorder: £35. All items to be collected. G3MUL QTHR (Newark) 0636 525513.

YAESU FT77 + remote VFO: £400. TET 5-ele tribander: £140. J-Beam 4-ele quad 2m: £15. P40 tower: £150. G0EGB not QTHR (Salisbury) 09856 301.

YAESU FT780R 70cm all mode 10W tcvr: £250. Icom IC202 2m SSB tcvr: £90. Steve G3ILO (Dursley) 0453 833411.

YAESU FT980 HF tcvr, gwo, incl mic and manual. Also FC301 ATU: £850ono. G1GSM QTHR (Stockport) 061-449 9176.

YAESU FTdx560 tcvr, ex cond, new Tx valves and balanced mixer: £180. G0GWP QTHR (Notts) 0602 434457 daytime only.

YAESU FTONE and FT980: offers around £900 each. Buyers collect. G3MND QTHR (Chesterfield) 0246 568435.

YAESU HF linear FL2100Z, average cond, newish valves: £460ono plus carr. (Plymouth) 0752 561245.

YAGI TB3 Jaybeam, tribander. Cost new £350, will accept £200+/-. Milton Keynes collection point. GM0EXN 0908 368148 or 0847 85774.

WANTED

AIWA Rx 20K LW/MW/FM manual, circuit info wanted. Photocopy costs reimbursed. G3CLL QTHR (Bristol) 0275 372193.

AM filter, keyer, etc for FT1. Anyone want a Cushman CE15 spectrum analyser at £1200? Martin G4WJX (Stoke-on-Trent) 0782 330613.

ANTENNA RF noise bridge, HF vertical antenna, HF trnsvtr for FT290RII, Tokyo HX240 or similar, audio filter Datong FLS etc. G0OPG (Wilmslow) 0625 531154.

ANTENNAS for 23 & 13cm, also 2x12m lengths of LDF-4-50A + connectors. Also 13cm linear & preamp. Conrad G6ZTU (Barnsley) 0742 761151 (work) Mon-Fri.

AP1086 Issue one 1938/1952 (RAF Radio Stores 10A-10Z Nos), also any air publications relating to radio, radar equip, exc prices offered. Would purchase post-war to current magnetrons, klystrons, t/r cells, TWTs, photomultipliers, most CV types of EEV M—OV valves wanted. M. Gee, 17 Foxley Close, Mountford Estate, Hackney, London E8 2JN 071-254-9083 or 071-790-2846 anytime.

AP1086 Issue One 1938/1952 (RAF Radio Stores Ref Nos), also any air publications relating to radio/radar equipments, exc prices offered. Would purchase post-war to current magnetrons, klystrons, T/R cells, TWT's photo-multipliers, most CV types and special types of EEV Ferranti Varian RCA valves, Gee R/X type R1355. M. Gee, 17 Foxley Close, Mountford Estate, Hackney, London E8 2JN, 071-254-9083 or 071-790-2846.

BBC B DFS required as teaching aid for mentally handicapped YL at home to support college course. Bob G0ARF QTHR (Leominster) 05447 350.

BOOMLESS quad spider (Lab Gear GEM other). New unused PL519 valves please qty and price. G3DYY QTHR (Nr Huntingdon) 0487 841558.

COAX switch. FT690 + linear - cash or exchange. Olympus OM10 50mm 1.4 lens with cash adjustment. G3LDI QTHR (Swardeston) 0508 70278.

COMMUNICATIONS Rx with MF marine band (400-600KHz). Alternatively obsolete marine Tx/Rx covering top band AM but please no "heavyweights". Gibson G3RCX (Leigh-on-Sea) 0702 521973.

DATONG model ANF auto notch filter in gwo, not FL series, for blind amateur happy to pay going rate. (Biggleswade) 0462 700395.

DRAKE CS7 coax switch or just control box only and CW75 keyer. Also Collins 51S1 6KHz 500KHz IF filter (AM). (Shrewsbury) 0743 884858.

DRAKE L75 linear CW75 keyer 75A4 filters Harris RF625 Waters rejection notch for KWM2. G3YFK (Shrewsbury) 0743 884858.

DRAKE P75 phone patch for Drake Seven Line series. (Ruislip) 0895 633118.

DRAKE receivers SPR4 R4B R4C. Bill Lindsay Smith (Devon) 0823 680 778.

EDDYSTONE EN2 in good cond plus manual. OR National NC-303 Rx. 0473 311665.

ERT Service trader supplement radio service sheets 1930-1940, numbers 101 to 206 inc, 400 to 600 inc, plus 601 604 622 629 634 638 641 646 659 665 666 667 668 682 691 693 to complete collection. Your price paid and post. Please write GJ4ICD, 1 Belmont Gardens, St. Helier, Jersey, CI or phone 0534 67450 anytime

FILM equipmt 16-35mm cameras tripods heads, geared or fluid (MOY). 16mm Bell Howell gun camera (GSAP) WWII. John G0LJS (Chippenham) 0380 859088.

FOR DRAGON 32 computer Add On Disk Drive with cables. GW3FWJ QTHR (Mold) 08243 681.

FRG 7, must be faultless, immac, unmodified, otherwise untouched. Complete with manual. Right price paid for right Rx. (Pocklington, Yorks) 0759 305355.

FRG7700 memory unit, FRV7700 convertors A B C or F. G1FLV (Leigh) 0942 604674.

FT221 PLL board. Would consider scrap FT221 if cheap. Also old physics lab equipment. G3MFW QTHR (St Austell) 0726 73608.

FV200 external VFO for FT200 tcvr. Any condition considered. Ellis GM4GZW QTHR (Edinburgh) 031-667 0968.

GRUNDIG reel-to-reel recorders, especially models 500 and 700. Also any original service info and spares for any model. Service manuals for Marconi mod meter TF2300 and sig gen TF144H/4 Taylor 44 transistor tester and contamination meter No. 1 Mk2 10K log WW pot used on AVO 160 valve tester. Mike G8CTJ (Hinckley) 0455 250570.

HEWLETT Packard 8552A or B IF unit, wking or non-wking. collect anywhere. Geoff (Warks) 0789 294699.

HEWLETT Packard type 435 analogue power meter, HP778D, dual directional coupler, 8484A sensor or similar plus any associate equipment. G3MMJ, Bag End, Pitchley Road. Charlbury, Oxon OX7 3QT. 0608 811156.

HF BEAM antenna preferably compact minibeam HF5B Butterfly or similar. Also GRP MIZUHO 14MHz tcvr. Mobile HF 10M-80M whips/coils. G0OPG (Wilmslow) 0625 531154.

HF minibeam TET 2ele preferred. Consider Butternut butterfly HQ1 with reflector, possible collect reasonable distance. Good price paid. G0NVL (Radcliffe) 061 724 4218.

HF tcvr required for mobile/portable use. Must be gwo and reasonable price. G0NAP (Ivybridge) 0752 667241 (business) 892690 (evenings).

HRO coil Pack F 480-960KHz. If you have one please get in touch. G0IIL QTHR (Stockton-on-Tees) 0642 559845.

HUSTLER HF mobile antenna, complete system, mast + coils, must be gwo. Steve G3/OAG 061-881 1850 (9am - 6pm).

ICOM AT100 automatic tuner in mint cond. Carriage paid if necessary. Please write or telephone Mike Hurley 84 Saint Brendan's Park Tralee County Kerry Irish Republic 01035366 24316 mornings (W).

INEXPENSIVE comms Rx. Anything considered. Case for WS18. "Discomatic" portable juke box. Any juke box technical info. Jim G4XWD (Kidderminster) 0562 823674.

KENWOOD SP230 spkr, HS5 hdphones. MC50 mic, Datong Morse tutor. W.C. Baker G0MGS 5 Hillsboro Road Bognor Regis PO21 2DX.

MANUAL for Rx No. R7020 by C&N Electrical Gosport loan hire purchase badly needed for alignment. G3NGT QTHR (Gosport) 0705 584861.

MSX computer program for Packet RTTY terminal. MSX disk-drive adaptor. Cheap battery Rx for 200-230MHz NFM. GW2HCJ (Gwynedd) 0766 770 637.

PRACTICAL Wireless "Gillingham" S/W Receiver Frequency Readout PW October 1978, or IC AY-5-8100. Tony (Worcester) 0905 641759.

PRE-WAR Pilot, and HMV valve broadcast receivers, especially Pilot U.106 and HMV-469. G3IIN (IoW) 0983 617221.

PSU (ex computer) giving 13.5V @ 40A, must be regulated and in gwo. Carr paid by buyer. GD0EOT QTHR (IoM) 0624 626794.

R1475/88 bench mounting tray Type 656 10A/17535. Your price. All letters answered. Dick Fixter G0DIC, 18 Linley Drive, Boston, Lincs, PE21 7EJ.

RACAL Syncal Tx/Rx or any QRP CW/USB 2-8MHz (continuous) Tx/Rx for school cadet force. WHY? G3XYF QTHR (E.Yorks) 0377-44441.

S METER for Racal RA17 Rx. Ernest Turner 0-200NA model W909. G3UZB QTHR (Redcar) 0642 470623.

SERVICE manual for Pye Olympic. Bob (Wakefield) 0924 277794.

SIMPLE oscilloscope for Rx audio signals only specifically for AEA232 prefer 12VDC. Morgan, Box 9212, Dar Es Salaam, Tanzania, E.Africa.

STEADMAN, Alan? Please ring again if you have R1475 gear to offer. Dick Fixter G0DIC 18 Linley Drive Boston Lincs.

SWAN eqpt. Anything Swan, VOX, VFO, XTAL Units Circuit diagrams, working or not. G3RCO QTHR (Devon) 0297 21016.

TEN-TEC Corsair with PSU SX28 Rx. Red Rangs VFO coil and capacitor with drive mechanism for T1154N. Front panel screw-on labels, plus BFO coil for R1155. Female power connector for Collins Tcs12 Tx. Peter G0DRT QTHR 0795 876277.

TEN-TEC remote VFO, model 263 for Corsair II. Top price paid for as new in original box. GW4BVJ QTHR (Cardiff) 0222 751746.

TOWER crank up 40/60ft. Head unit, with or without rotator etc. G3HTA QTHR (Crediton) 03632 3333.

YAESU 625RD Yaesu 625RD. Send details to G8ZVM QTHR (Helston) 0209 831650.

YAESU crystal filter type XF31A. Also handbooks for Epson LQ500, Advance J1B, Marconi TF1246. G4DYA (Stone) 0785 812784.

YAESU FC-102, SP102P, FV102DM, ant unit, LS, VFO, mic, MD-1B8, dummy load 1000W 50ohms impedance. G3ZJH (Bristol) 0272 691025.

YAESU FC902 ATU. Must be good working order. Any condition. G7HNN (Newbury) 0635 66881.

EXCHANGE

DURST 601 colour and b/w photographic enlarger for Trio TS120, FT301, or dual band h/held also wanted FTV650.

MARCONI 1066 AM/FM signal generator 10-510MHx for violin, Farnell PSU 0-60V, 0-25A, fully variable, professional heavy duty, Tektronix 475 oscilloscope DC-200MHz, in nice cond, exchange for decent HF rig or WHY? Keith GM4TPX QTHR (Prestwick) 0292 78886.

RACAL RA17C Rx: £175. Black Jaguar MkIII scanner: £185. Acorn 280 second processor for BBC-B: £75. Acorn Master 512K board + Watford Co Pro adaptor + s/ware: £120. (Royston Herts) 0763.246062.

YAESU FT ONE HF rig, all options, FM, ex cond, service and operators manuals, mic, bxd, exchange FT-757 or FT726R plus cash. Ian G7HXI (Stalham) 0692 81663. Also exchange FV-101DM ext VFO for FTV-901R tsvtr or similar.

UNUSED ICOM 725 with auto ATU for Trio 440s. Needs to have speech readout facility. (Penmaenmawr) 0492 623672.

CLUB NEWS

DEADLINE - Items for inclusion in the June 1991 issue must be sent to HQ marked "Club News - DIARY", to be received by 15 April 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

BRISTOL ARC - 4, club station on air; 11, computer activity evening; 18, VHF activity evening; 25, visit TBA; May 2, construction clinic; 9, discussion night.

GORDANO ARG - 24, talk "Phase Lock Loops" by Cedric, G3YRN.

SOUTH BRISTOL ARC - 3, Bristol RSGB/Organising Longleat; 10, 70cm activity evening; 17, Jandek; 24, talk "Exocet - Tactics of Modern Warfare"; May 1, anecdotes, 8, computer activity evening. Details Whitchurch 832222 on Wednesday evenings.

THORNBURY & DARC - 3, Annual General Meeting; 17, HF activity; May 1, talk "Power Supplies" by Bob, G8SPC.

BEDFORDSHIRE

SHEFFORD 7 DARS - 4,11,18, TBA; 25, Club project; May 2, constructors contest (Take 21); 4,5, contest: 70cm and up; 9, mobile DF hunt. Details 0763 71149.

BERKSHIRE

BRACKNELL ARC - 10, junkerama; May 8, DF 2. Details 0344 572329.

BURNHAM BEECHES RC - 1, surplus equipment/ junk sale; 15, TBA. Details 0628 25720.

MAIDENHEAD & DARC - 4, talk "Home Counties ATV Repeater" by Gary, G4CRJ; 16, talk "TVI - How to Cure It" by Ian, G3OHX; May 2, talk "Yasme Foundation" by Bob, G0BTY. Details 0628 25952

READING & DARC - 11, RSGB evening; 25, internal quiz/NFD station selection; May 9, HF NFD planning - G3WGV.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 3, talk "Packet Radio" by Paul Taylor, G1PLT; 17, Novice Licence open evening/video/talk, demonstration station on the air. Details 0280 817496.

MILTON KEYNES & DARS - 8, equipment and junk sale, open to all; May 13, talk/demonstration "Amateur TV" by Dave, G4NJU.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 27, Samuel Morse demonstration, Parkers Piece, Cambridge. Details Cambridge 880835.

CHESHIRE

CHESTER & DARS - 9, Cheshire RLO night; 16, HF and VHF Tune Up & Tune In, part 1; 23, TS850 Dennis G3EWZ and Harry, G3MCN; 30, Tune up, part 2. Details 051-608-3229.

CLWYD

DELYN RC - 10, talk "Transverters" by J. Roberts, GW3RBM; 24, talk "Model Engineering" by The Lineshooter; May 8, preparation for monitoring of the Annual Delyn Walk across Halkyn Mountain. Details 0244 819618.

RHYL & DARC - 1, SSTV Fax demonstration, Specy to PC; 15, Easter activity night, home brew construction; May 6, 6 meter lecture. Details 0745 336939.

WREXHAM ARS -2, Short Wave Listening demonstration and Morse practice; 16, talk/slides "A Visit to Zimbabwe with ZS6BEE" by Martin, GW0KYT. Details 0978 261482.

CORNWALL

CORNISH RAC - 4, club night, Annual General Meeting; 8, computer section; 9, activities night; May 2, club night, - talk "Spectrum Analyser" by G3IGV; 7, activities night. Details 0209 820836.

DERBYSHIRE

DERBY & DARS - 3, junk sale; 10, night on the air; 17, talk "The Packet Network and How it Works" by Richard Hillier, G4NAD; May 1, May Day junk sale. Details 0773 852475.

NUNSFIELD HOUSE COMMUNITY ASSN ARG - *NEW SECRETARY* Ken Clarke, G9JKC, 55 Compton Ave, Aston-on-Trent, Derby DE7 2AU, tel: 0332 792004.

DEVON

EXETER ARS - 8, inter club quiz; May 13, Repairing rigs. Details 0392 78710.

TORBAY ARS - 5,19, club nights; 19, monthly meeting and talk - DTI; 26, club night; May 3,10, club nights. Details 0803 526762.

DORSET

PLESSEY CHRISTCHURCH ARS - 11, talk "Wartime Reminiscences" by G5SG. Details 0425 621982.

SOUTH DORSET RS - 2, Annual General Meeting and Constructors Cup. Details Geoff, G4FJO, QTHR.

EAST SUSSEX

SOUTHDOWN ARS - 8, talk & slides "Cellnet". Venue: "Chaseley" Southcliff Bolsover Road East Bourne. Details 0825 763022.

ESSEX

BRAINTREE & DARS - 15, club construction contest; May 20, AGM. Details 0376 27431.

LOUGHTON & DARS - 6, Annual General Meeting - all members please attend; 20, talk "What is PEP". Details 081-504 4581.

GREATER LONDON

COULSDON ARS - 8, talk "Noise Bridge" by George Cripps, G3DWW; May 13, talk "Colossus and the Code Breakers. Details 01-684 0610.

CRYSTAL PALACE & DARC - 16, talk "Basic Electricity" by Ian Daniels, G4VTD; May 18, on the air. Details G3FZL.

DORKING & DRS - 9, informal at Falkland Arms; 23, open meeting; May 14, informal at Falkland Arms. Details 0306 77 236.

EDGWARE & DARS - 4, talk "Kites" by Roy Charlesworth, G4UNL; 7, Special Event Station GB50ATC, venue - ATC, Burnt Oak (provisional); 25, TBA.

SOUTHGATE ARC - 11, annual surplus equipment sale; 25, youth night; May 9, talk "Early Radar" by Stan Woods. Details 081 361 2048.

SUTTON & CHEAM RS - 13, Annual Dinner at the Stoneleigh Inn, Stoneleigh; 18, junk sale; 20, visit to National Remote Sensing Centre, Farnborough; May 16, AGM. Details 081 644 9945 (general), 0737 355271 (membership).

WIMBLEDON & DARS - 12, general activity evening; 26, talk "Keys and Keyers" by Tom Mansfield, G3ESH; May 10, general activity evening. Details 081-397 0427.

GREATER MANCHESTER

ECCLES & DARS - 2, talk "Intercoms in High Rise Flats" by G0KLF; May 7, talk "Packet Radio" by G6FEI. Details 061-773 7899.

SOUTH MANCHESTER RC - 5, talk "Physics and Astronomy for Radio Amateurs"; 12, talk "Beam Antennas" by A. Paterson; 19, talk "Biomedical Electronics" by D. Thomas; 26, talk "Hamming and Hiking in the Orient" by K. Ranger, G0KJU. Details 061 969 1964.

GWYNEDD

DRAGON ARC - 1, Easter Bank Holiday. Normally a chat evening but bring along a folly or tell us about the project that went wrong; 15, talk by Eric Lynn, GW3REY; May 6, May Bank Holiday - surplus equipment sale. Details 0248 600963.

HAMPSHIRE

FAREHAM & DARC - 10, junk sale. Details G0KCG.

HORNDEAN & DARC - 4, talk "RF Health Hazards" by J. Hogan, NRPB; May 2, talk "Air Traffic Control". Details 0705 472846.

THREE COUNTIES ARC - 10, talk "IosLoop HF Antenna"; 24, Annual General Meeting; May 8, talk "The Landscape of the Three Counties". Details 0420 489847.

HEREFORD & WORCESTER

BROMSGROVE ARS - 9, night on the air; 23, antenna construction competition; May 14, AGM. Details 0527 503024

BROMSGROVE & DARC - 12, constructors competition; May 10, TBA. Details 0527 33173.

HEREFORD ARS - 5, RSGB Liaison Officer's visit; 19, annual constructional contest; May 3, talk and demo "RTTY" by Bob Canning, G0ARF. Details Hereford 354064.

HIGHLAND

INVERNESS ARC - 3, construction night; 17, talk "The Law for Consumers" by Graham Watson; May 1, key night. Details 0349 61783.

KENT

BROMLEY & DARS - 16, construction evening - simple top band RX. Details 081-462 2689.

MAIDSTONE YMCA ARS - 12, All About the Butternut Vertical; 26, ATU construction. Details 0622 676776.

WEST KENT ARS - 19, Annual General Meeting at The School Annexe, Albion Road, Tunbridge Wells.

LANCASHIRE

FYLDE ARS - 11, talk "Novice Licence Explained" by S. Williamson, G3WGU; 25, Packet demonstration by Chris McMahon, G6FCI; May 9, equipment browse sale. Details 0772 635464.

PRESTON ARS - 4, illustrated talk "The Ribble Valley" by Mr. Green; 18, illustrated talk "The Abbey Walk" by Mr. Andrews; May 2, slide and demonstration "Bolton Mountain Rescue Team".

WIGAN & DARC - 4, general discussion - Aerials. Details 0942 47416.

LEICESTERSHIRE

LEICESTER RS - 1, night on the air; 8, committee meeting & HF/VHF activity night; 15, talk TBA; 22, constructors competition - trophies awarded to winners!; 29, VHF Contest review, VHF NFD preliminary planning meeting; May 6, HF/VHF activity night. Details G3TQF.

LINCOLNSHIRE

LINCOLN SWC - 24, TV videos by G8VGF; May 8, AGM. Club meets every Wednesday on Waterside South. Details Patrick Markham, G1UBP (new Secretary), QTHR, tel: 0522 522715.

LOTHIAN

LOTHIANS RS - 10, junk sale; 24, TBA; May 8, triple meeting. "Safety and the Amateur, Construction competition & DF Tune up.

NORFOLK

ARC OF FAKENHAM - 2, talk "Scouting Today" by Bob Smith. Details East Rudham 633.

NORFOLK ARC - 3, Annual General Meeting; 10, talk "Designing a QRP 80m/40m Transceiver" by Mike Lemin, G4UUB; 17, committee meeting; 20, poss trip to NEC; 24, "Real Radio" evening & construction contest; May 1, "Where are you?" . . calculating QRA/QTH/NGR etc. Details 0632 850591.

YARMOUTH RC - 11, talk "Practical Food Technology" by G3YYQ; 25, used equipment sale - Lowestoft invited; May 9, Caravan Maintenance Party Bradwell. Details Yh 721173.

NORTH YORKSHIRE

HAMBLETON ARS - meet on Mondays at 7.30pm in Room A5 at Northallerton Grammar School. 8, HF/2m ops night; 22, talk "Aerials" by Wilf Walker, G3BQL; 15,29, RAE course. Details 0609 780476.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 4, Annual General Meeting. Details 0602 733740.

MANSFIELD ARS - 4, talk "Magnetic Loops" by Martin Moss, G4WBK and judging of construction projects. Details 0623 755288.

OXFORDSHIRE

OXFORD & DARS - 25, video "Satellites". Details Oxford 242720.

SHROPSHIRE

SALOP ARS - 11, annual construction competition; 25, talk "The Work of the DTI"; May 9, junk sale, 7.30pm Beauchamp Hotel. Details 0743 790457.

TELFORD & DARS - 3, Annual General Meeting; 10, video show; 17, club equipment demonstration; 24, Using an ATU; May 1, LF station on air. Details Bridgnorth 761203.

SOMERSET

TAUNTON & DARC - 5, talk "HF DX operating" by John Foreward, G3HTA; 19, talk "Electricity Grid" by E. Hayden, G4LZU.

WEST SOMERSET ARC - 2, Annual General Meeting to be held in Old Cleeve Church Hall at 7.30 for 8pm start. Followed by a light-hearted video show. Newcomers most welcome. Details 0984 31197.

YEOVIL ARC - 4, talk "Kirchhoff's Law" by Rob, G3MYM; 11, talk "The Thevenin & Norton Generators" by G3MYM; 18, Annual General Meeting; May 2, talk "Multiband Antennas" by G3MYM. Details 0935 28341.

SOUTH GLAMORGAN

CARDIFF RSGB GROUP - 8, talk "Amateur TV" by Bob Robson, GW8AGI; May 13, talk "Army Radio 50 Years Ago" by Bill Andrews, GW2DHM. Details 0446 773212.

SUFFOLK

FELIXSTOWE & DARS - 22, talk "Novice Licence Instruction in Suffolk" . (Orwell Park School); May 6, night on the air. Details 0473 642595 (daytime).

LOWESTOFT RC - *NEW VENUE* George Borrow Public House, Oulton Broad. 11, visit by J. Bacon, G3YLA; 25, talk "Using Test Gear" by G4TAD; May 9, video. Details 0502 566289.

SURREY

HORSHAM ARC - 4, talk "Navigational Beams (WW2). Details 073784 2150.

SURREY RCC - 8, Annual General Meeting; May 13, constructional contest. Details 081 647 9301.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 9, junk sale; 23, computing 2 - part 2 of the talk by Les, G9BTFF; May 14, antenna analysis with Glen, G8MWR. Details 0926 513073.

REDDITCH RC - 11, talk and demonstration "Microphones" by J. Cluley, G4YIG. WRVS Centre, Ludlow road, Redditch, commencing 8pm.

RUGBY ATS - 9, Annual General Meeting.

STRATFORD-UPON-AVON RS - 8, Annual General Meeting and surplus sale; 22, test equipment (bring your rigs and things!); May 13, talk "Propagation" by Kurt Feldmesser. Details 060 882 495.

WEST GLAMORGAN

SWANSEA ARS - 4, visit to BP Chemicals, Baglan Bay Works; 18, final preparations for the Swansea Rally. Details 0792 818100.

WEST MIDLANDS

BARR BEACON RC - 1,17, Morse tuition; May 6, Morse tuition. Details Walsall 36162.

WOLVERHAMPTON ARS - 9, talk "Prisoner of War Experiences" by R. Soper, G3VJZ; 16, night on the air; 23, junk and surplus equipment sale; May 14, homebrew competition.

WORDSLEY RC - *NEW VENUE* The Vine Inn, Camp Hill, Wordsley, West Midlands, alternative Thursday evenings. 7,'Go for a Million' event, Scout Hut, Holy Trinity, Wordsley High Street; 11, Annual General Meeting; 24, TV and Packet demonstration, 25, indoor bowls evening. Toni-Sue, G0AOX-G0AOW; May 9, film cartoons. Details 0384 873666.

WEST SUSSEX

CHICHESTER & DARC - 2, Annual General Meeting. Details Chichester 573541

WEST YORKSHIRE.

DENBY DALE & DARS - 3, RSGB video "Amateur Radio for Beginners". Details 0484 532371.

HALIFAX & DARS - 16, talk "Satellite TV" by Norman, G3WAH; May 21, talk "CW Operation & Operating Practices". Details Halifax 202306.

KEIGHLEY ARS - 11, selection of personal films by Edwyn Hodgson, 25, junk sale; May 9, night on the air G0KRS.- Details from Kathy, tel: 0274 496222.

NORTHERN HEIGHTS AR&ES - 3, Annual General Meeting; 17, Packet radio update; May 1, talk "America's First 25 years in Space" by Jack Birse. Details 0274 673116.

SPEN VALLEY ARS - 4, Annual General Meeting; 18, talk "Two Years with the British Antarctic Survey" by Ron Smith, VP8LK/G3SVW; May 2, surplus sale. Details 0274 875038.

TODMORDEN & DARS - 15, quiz night. Details 0422 882038.

WILTSHIRE

BLACKMORE VALE ARS - *NEW VENUE* The Stapleton Arms, Buckhorn Weston, Nr. Gillingham, Dorset. 9, Annual General Meeting; 23, 1st D/F Hunt 2m; May 14, talk "Wadley Loops" by Mr. Paul Reeves. Details 0935 442319. (9am to 5pm).

DEVIZES & DARC - 5, committee meeting and on the air; 12, on the air; 19, talk on Mink; 26, on the air; May 3, committee meeting and on the air; 10, on the air.

SWINDON & DARC - *NEW SECRETARY* Bob Freeman, G0LTP, 71 Longleaze, Wootton Bassett, SN4 8AS, tel: 0793 853855.

TROWBRIDGE & DARC - 3, Winchester disk drives with G3RSJ; 17, open evening. Details 0380 830383 (evenings and wkends).

MOBILE RALLIES

This is a list of all rallies, 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'.

7 APRIL

CAMBRIDGESHIRE Repeater Group AR Rally - Philips Radio Communications - Catering Centre, St. andrews Road, Chesterton, Cambridge. Doors open 10.30am, admission 50p, junk sale, bring & buy. Details from G0HEM, tel: 0799 23689.

LAUNCESTON 5th AR Rally - Launceston College. Doors open 10.30am. Bar, hot snacks, bring & buy, traders, official Morse tests (applications through RSGB usual channels), talk-in on S22. Breakfasts for traders from 6am. Details from Maggie, tel: 040921-219 or Rodney & Joy, tel: 0566-775167.

LOUGH ERNE ARC 10th Annual Mobile Rally - Killyhevlin Hotel, Enniskillen. Doors open 12 noon. Talk-in on S21. Special guest Louis Varney, G5RV. Details from Alwyn Magee, GI0BFD QTHR tel: 0365 323802.

WHITE ROSE Rally - Leeds University. Doors open 11am.Details G4DXA, PO Box 73, Leeds LS1 5AR.

14 APRIL

TRAFFORD Rally "The Great Northern Rally" - G-Mex, The Greater Manchester Exhibition and Events Centre, City Centre, Manchester. Doors open 10.30 for all classes (with disabled priority queue), close 5pm. Admittance £1 all classes, young children free. Morse tests (contact RSGB HQ); all usual traders and attractions; bring & buy; ample parking; food, refreshments, licensed bar; free Cash Draw. Talk-in on S22 2m via GB1GMX. Details from Graham Oldfield, G1IJK, tel: 061 748 9804.

21 APRIL

BURY RS Annual Rally - (Changed from 28 April) Castle Leisure Centre, Bolton Street, Bury. Doors open 11am, (earlier for disabled visitors) traders, bring & buy, catering facilities. Details from Lawrence Jones, G4KLT, tel: 061 762 9308

MARSKE-BY-THE-SEA Rally - Marske Com-

munity Centre. Usual traders. Details from G7CBR, QTHR, tel: 0642 480055.
SWANSEA ARS Rally - Swansea Leisure Centre (on the Swansea-Mumbles coast road, A4067). Doors open 10.30am, trade stands, bring & buy, bookstall, HF/VHF demo stations, full catering, licensed bar, talk-in on S22 from GB2SWR. Details from Roger Williams, GW4HSH, tel: 0792-404422.

5 MAY

BATC Rally - Harlaxton Manor, Nr Grantham, just off the A1 (signposted). Usual traders, bring & buy, refreshments and bar, lecture programme, talk-in, demonstrations, flea market and craft corner. Details from Paul, G8MJW; tel: 0522 703348.
KELSO ARS 8th Anglo-Scottish Rally - Tait Hall, Kelso. doors open 11am, usual attractions. Details from GM4UIB, tel: 0573 24654.

6 MAY

DARTMOOR RC Rally - St. Annes Church Hall, Yelverton, Devon (A386). Doors open 10.30am, trade stands, bring & buy, refreshments and parking. Talk-in on S22. Details from Dave, G1YPD, tel: 0752 703101
MID CHESHIRE ARS Rally - Civic Hall, Winsford. Doors open 11am (10.30 for disabled visitors). Full catering and ample car parking. Details from David, G4XUV, tel: 0606 77787.

12 MAY

DRAYTON MANOR Mobile Radio Rally - Drayton Manor Park, Nr Tamworth. Details from Norman, G8BHE, tel: 021 422 9787 or Peter, G6DRN, tel: 021 443 1189.
YEOVIL ARC 7th QRP Convention" - Preston Centre, Monks Dale, Yeovil. Doors open 9am, admission £1.50 to include programme. Usual traders, plenty of refreshments available, lectures. Details from Mr. David Bailey, G0NMM, QTHR as G1MNM.

18 MAY

SWINDON Radio Rally - The Oasis Leisure Centre, North Star Avenue, Swindon. (Leave M4 at jnct 16). Doors open 10.30. Trade stands, grand bring & buy, Repeater Group etc, ample free parking, talk-in by Raynet on S22 from 5am. Details from Jim, G7GEA, tel: 0793 611859 or John, tel: 0793 619014.

19 MAY

DUNSTABLE DOWNS Eighth National Car Boot Sale - Stockwood Park Luton, just off junction 10 on the M1. Talk in on 70cm, 2m and topband. Details from M.J. Spacey (Secretary).
MID-ULSTER ARC "Parkanaur" Rally - Silverwood Hotel, Lurgan, Co. Armagh. Doors open 12 noon. Usual trade stands, bring & buy, bookstall, QSL Bureau etc. Talk-in on S22 145.550. The proceeds of this Rally go to the Stanley Eakins Memorial Fund at Parkanaur near Dungannon. This is a very worthy charity, and we hope to see a really good turn-out of everyone interested in all aspects of radio and electronics. Details from Jim Lappin, GI1YGS, tel: 0762 851179.

26 MAY

EAST SUFFOLK WIRELESS REVIVAL (the Ipswich Rally) - Maidenhall Sports Centre, Ipswich (Note new venue) (Send sae to G4IFF QTHR for free maps). Doors open 10am, entrance £1, car boots £5 (including driver and one passenger), ample free parking. Talk-in on S22 GB4SWR. Details from Paul Whiting, G4YQC QTHR.
MAIDSTONE YMCA Radio Rally. Opens 10.30am (10am admission for severely disabled). Entry £1 per adult. Route: M20 junctions 4, 5, 6 or 7 - then A229 Loose Village, 2 miles south of Maidstone. QSX G8TRF (S22) and G3YSC (10FM & SU22). Exhibition station GX3TRF (on HF). All day video show, etc. for juniors. Refreshments, snacks & ale bar available; diy; bring & buy tables for hire. YMCA sports centre. Details: 0622 743317 for pre-rally camping/caravan facilities. Trade bookings etc 0622 750709. (Alan Judge, before 9.30pm).
NORTHAMPTON RC Car Boot Sale - rear of the Red Lyon public house on the A45 400 yards from jnct 16 of the M1 (Northampton turn). There will be parking for over 500 cars; entrance fee will be 50p per car or 25p per person. Licensed bar open from 12 noon; food all day long; bring & buy; many radio/computer/electronic stalls. If you are selling the fee will be £6.50 in advance or £9 on the day. Bookings to Paul G0HWC on 0327 41267 (evenings).
PLYMOUTH Radio & Electronics Fair - Plymouth Radio Club Plymstock School, Church Road, Plymouth, Devon. Doors open 11am. Usual traders, Morse tests, bring & buy, refreshments, licensed bar, bookstall, Raffle. Talk-in on S22. Details from Jan Fisher, G0IVZ, tel: 0752 340946 evenings/weekends, 0752 262826 (daytime).

27 MAY

BIRCOTES Radio Rally - Bircotes Sports Centre. 10m south Doncaster off A1. Doors open 11am (10.30 for disabled visitors). Details and booking forms Raynet c/o 23 Florence Ave, Balby, Doncaster, tel: 0302 857526.

2 JUNE

SPALDING & DARS Mobile Rally - Springfields Arena Spalding. Also car boot sale. Details from T. Kettlewell, G4TWR, tel: 0775 722940.

9 JUNE 1991

22nd ELVASTON CASTLE Mobile Radio Rally - Elvaston Castle Country Park, near Derby. More than 150 trade stands. Technical Bookstall. Grand bring & buy. Flea market. Craft marquee. DTI Exhibit. Children's entertainments. Full on-site catering. Talk-in on 144 and 432MHz. Car parking £1.20 - coaches £5. Admission to rally activities is free. Details from John, G4PZY, tel 0332 767994 - Trade enquiries to Peter, G3WFU, tel 0332 700265 (evenings)
MID LANARK ARS Annual Open Day - Mid Lanark ARS club premises, Newarthill C.E. Centre, High Street, Newarthill, ML1 5GU. Doors open 11am, usual traders plus some new ones, bring & buy, catering facilities, raffle. Talk-in on S22. Morse tests (applications through RSGB HQ). Details 0698 732403.
NORFOLK Raynet Rally & Car Boot Sale - Barford (B1108) Norfolk, OS map 144, Ref TG113078. Car Boots £5; trade stands, refreshments etc. Talk-in on S22 by G4GLI. Details from Pat Bates, G0IYD, QTHR, tel: 0692 404593 (evenings only).
ROYAL NAVAL ARS Annual Mobile Rally - HMS Mercury, Nr Petersfield, Hants. RSGB, RAIBC, BARTG and RAYNET stands, bring & buy, flea market and car boot sale. Large Arts & Crafts exhibition, radio-controlled power boats, cars and trains, amusements for youngsters, refreshments, two Grand Raffles and many other attractions. Talk-in on 2m and 70cm. Ample space for picnicking and parking, including free buses to and from the Rally site from the car park. Details from Cliff Harper, G4UJR, tel: 0703 557469.
SOUTHEND & DRS Annual Rally and Boot Fayre - Rocheway Centre, Rochford, Southend-on-Sea, Essex. Details from Steve, G1XGP, tel: 0702 712595.

16 JUNE

DENBY DALE & DARS Rally - Salendine Nook High School, Huddersfield. Doors open 11am. Details from J.D. Chappell, Secretary.

30 JUNE

LONGLEAT Amateur Radio Rally. Longleat House, near Warminster, Wiltshire. Over 120 traders and exhibitors; craft fair; camping and caravanning facilities next to the Rally all weekend; extensive catering on site, licensed bar, fast food etc; the largest Amateur Radio Bring & Buy sale in the UK; all the attractions of Longleat near at hand; plenty of free parking; Talk-in on 2m. More details from Shaun, G8VPG, tel: 0225 873098.

7 JULY

KINGS LYNN ARC Radio Rally - The Corn Exchange, Tuesday Market Place, Kings Lynn.
YORK Radio Rally - Tattersall Building at York Racecourse. Details from Dave Moreland, G7FGA, tel: 0904 790079.

13 JULY

CORNISH RAC. Rally - Penair School, St Clement, Truro. Details from Rolf Little, G0NDC, St. George's Hotel, St. George's Road, Truro, Cornwall, TR1 3JE, tel: 0872 72554.

21 JULY

COLCHESTER RA Mobile Rally - Highwoods Sports & Leisure Centre, Brinkley Lane, Colchester. Details from Frank Howe, G3FIJ, QTHR, tel: 0206 851189.
RAIBC Romsey Picnic will be held at its usual location. Further details from John Compton, G4COM, tel: 0703 693017

28 JULY

RUGBY AR Car Boot Sale - venue to be advised. Details from either Kevin, G8TWH, tel: 0203 441590 or Peter, G0JEW, tel: 0455 552449.
SCARBOROUGH ARS Radio, Electronics & Computer Rally - The Spa, South Foreshore, Scarborough. Details from Ian Hunter, G4UQP QTHR, tel: 0723 376847.

4 AUGUST

WOBURN National Rally - Woburn Abbey, Bedfordshire. Trade stands housed in marquee 20,000 sq.ft. Talk-in by Dunstable Downs RC. Usual Woburn Abbey attractions. Trade stand enquiries to Norman Miller, G3MVV, QTHR, tel: 0277 225563. Organised by RSGB Exhibition & Rally Committee.

11 AUGUST

DERBY Mobile Rally - Littleover Community School, Rykneld Road, Littleover, Derby. Details from Martin Shardlow, G3SZJ, QTHR, tel: 0332 556875.
FLIGHT REFUELLING ARS Hamfest 91 - Flight Refuelling Sports and Social Club Grounds, Merley, Wimborne, Dorset. Details and booking forms from John, G0API, tel: 0202 619649 or Rob, G6DUN, tel: 0202 479038.

18 AUGUST

WEST MANCHESTER RC Red Rose Rally - Bolton Sports & Exhibition Centre, Silverwell St, Bolton. Details from G1IOO, tel: 0204 24104.

25 AUGUST

TORBAY ARS Annual Mobile Rally - STC Social Club, Brixham Road, Paignton, Devon. Doors open 10am. Talk-in on S22. Details from W. Hipwell, G3HTX, QTHR, tel: 0803 526762.

1 SEPTEMBER

PRESTON ARS 24th Annual Rally - University of Lancaster. Details from Godfrey Lancefield, G3DWQ, QTHR, tel: 0772 53810.
TELFORD Radio Rally - Telford Exhibition Centre, Telford. Details from Martyn, G3UKV, tel: 0952 255416 or John, G0GTN, tel: 0743 249943.

8 SEPTEMBER

MADLEY SATELLITE EARTH STATION ARG AR & Electronics Car Boot Sale - Madley Communications Centre, Madley, Hereford. Details from David Butler, G4ASR, tel: 087 387 679.
MILTON KEYNES & DARS 5th Annual Car Boot Sale - Cranfield Airfield. Details from Tony, G6WXM, tel: 0908 316435, Mike, G0FMC, tel: 0908 566796 or Ray, G1LRU, tel: 0908 660798.
VANGE ARS Annual Rally - The Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. Details from Doris Thompson, tel: 0268 552606.

14 SEPTEMBER

BALLYMENA Annual Rally - Ballee High Community School. Details from GI4HCN, 154 Galgorm Road, Ballymena.
WIGHT Wireless Rally - Wireless Museum, Arreton Manor, Nr Newport, IOW. Details from Douglas, G3KPO, tel: 0983 67665.

15 SEPTEMBER

BARTG Rally - Surrey Hall, Sandown Park Racecourse. Details from Ian Brothwell, G4EAN, tel: 0602 595261. (This is a provisional date).
BRISTOL Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Details from David Farr, G4WUB, tel: 0272 839855.
PAKEFIELD Radio/Electronics Rally and Car Boot Sale - Pakefield Middle School, Kilbourn Road, Pakefield, Lowestoft. Details from G3WDN, tel: 0502 565986 or 715537.

22 SEPTEMBER

CENTRE OF ENGLAND Autumn Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill nr The NEC, Jct 6 M42. Details from Frank Martin, G4UMF, tel: 0952 598173.

29 SEPTEMBER

HARLOW AR&E Mobile Rally - Harlow Sports Centre. Details from - weekdays: Alf, G7FNY on 0279 418392; evenings & weekends: Mike, G7BNF on 0279 722569.
7TH NORTH WAKEFIELD RC Rally - Outwood Grange School, Potovens Lane, Outwood, Nr Wakefield. Details from Dick, G4GCX, tel: 0532 622139 or John, G4RCG, tel: 0924 362144.

6 OCTOBER

GREAT LUMLEY Radio Rally - The Community Centre, Great Lumley, Nr Chester-Le-Street, Co Durham. Details from Barry, G1JDP, tel: 091 388 5936.

13 OCTOBER

ARMAGH & DUNGANNON Rally - Gosford House Hotel, Markethill, Co Armagh. Details from T.E. Hall, GI0MSJ, QTHR GI6UMR, tel: 0861 523454.
HORNSEA Rally (ELHOEX Electronic Hobbies Exhibition) - The Floral Hall, Hornsea, East Yorkshire. Details from Jeff, G4IGY, tel: 0964 533331.

2/3 NOVEMBER

NORTH WALES 5th Radio & Electronics Show - Aberconwy Conference Centre, Llandudno. Details from N.B. Mee, GW7EXH, tel: 0745 591704.

10 NOVEMBER

BARNSLEY & DARC Rally - Willowgarth Senior High School, Brierley Road, Grimethorpe,

CONTINUED ON PAGE 73

PHOTOGRAPH: G0CTM

A view of the Trafford Amateur Radio Club's Great Northern Rally, at the G-MEX Exhibition Centre (a former railway station) last March. This year's event is on 14 April,1991- see previous page.

HELP LINES

KAMODEN MULTIRANGE METER

Dave Biddle, G7HWW is trying to identify and obtain circuit details for unknown Kamoden multirange meter. Details of the unit are: 100k ohm per volt, AC/DC volts to 1kV with probe, transistor tester, capacitor tester and buzz continuity tester. He can be contacted on Norwich (0603) 745512.

RAF LITTLE SAI WAN

In February *RadCom* we published a Helpline from Tony Bounds, G3KDP, but inadvertently missed out the picture. we apologise for this error and insert it below.

Tony Bounds, G3KDP, in the foreground and Brian Laurence, G3KGX, at the rear. G3KDP, telephone 0736-796495.

MANUAL FOR SIGNAL GENERATOR CT53

Alan Balmforth, G3RKQ, QTHR, is looking for working instructions, calibration charts and circuit diagram for the signal generator CT53, (British Communications CPN.LTD: Ref 105/16160) or photostats of same. He can be contacted on tel: 0742 377321.

John McDonnell, G3DOP is trying to locate circuit diagrams and information of the German Communications Receiver R3. Please telephone him on 0326 290711.

ARAKI MG285

Can anyone help Derek Young, G8ZQJ to trace the importer of Araki aerials or a set of radials for his MG285 5/8 wavelength 145MHz mobile/portable antenna (PL259 base). If you can assist please contact him QTHR.

TASHIKO CD PLAYER

At the 1990 NEC Exhibition Andy Daw purchased a Tashiko 780 CD player. Can anyone assist him with information on this machine, as he appears to have a problem with the laser which does not appear to have any identification marked on it. He really requires a service manual, but if anyone can advise the part number of the laser, this would help. All expenses would be reimbursed, and he can be contacted on tel: 0785 815023. Please leave a message on his answerphone, and he will contact you.

MORE CIRCUIT DIAGRAMS REQUIRED

Mr Keeling, RS92600 has recently acquired a Phillips TMC (FM91AS25) and urgently requires circuit diagrams and a service manual. All costs will be reimbursed, and his telephone number is 025 125 3072 (after 7pm please).

Please can you help Stephen Dyke, G3ROZ obtain circuit information on Saisho Relay 300 (Tectrix C2) cordless phones. He is also prepared to help anyone else who has purchased one of these recently to get their unit operational. Tel: 0767 680828 (evenings/ weekends).

R208 RECEIVER

Mr G White, G0GLW, is looking for paperwork, circuit diagrams on an R208 receiver. This is an old WD set 10-60MHz in 3 bands, and he would appreciate any information on tel: 0344 52601.

CIRCUIT DIAGRAM REQUIRED

Mr Bavister, G1WLE, is looking for a circuit diagram of a BC-221M frequency meter, 125KHz-20MHz which he has recently acquired. Most of the restoration on the heterodyne oscillator is complete, but he is experiencing problems with the crystal oscillator, which has one or two components missing. Also can anyone provide him with a circuit diagram for a Solartron 7040 autorange digital voltmeter. He can be reached on tel: 0462 814574.

Helplines is designed to help put people in touch with each other. If you have a problem, it's more likely there's someone out there who has the solution; if you are looking for an old colleague or amateur friend, there could be a reader who has some news of their whereabouts; if you have solved a particular problem, write and tell the rest of us. 'Helplines' is there to help you and to give you the opportunity of helping others. Write to us marking your envelope 'Helplines' and we'll do what we can to get the message out.

EVENTS DIARY

CONTINUED FROM PAGE 72

Barnsley. Details from Ernie, G4LUE, QTHR, tel: 0226 716339.

24 NOVEMBER

WEST MANCHESTER RC Winter Rally - Bolton Sports & Exhibition Centre, Silverwell St, Bolton. Details from Dave, G1IOO, tel: 0204 24104 (evenings only).

OTHER EVENTS

27/28 APRIL

RSGB National Convention - NEC Birmingham. Details from Norman Miller, G3MVV, QTHR. (See centre pages).

17 MAY

EDGWARE & DARS Straight Key Evening 1991. Band 3.5MHz, around 3.550, Time 1900BST onwards. Call CQ SKE. Details 081 204 1034.

14 JULY

SUSSEX AR and Computer Fair - Brighton Racecourse. Details from Ron Bray, G8VEH, QTHR, tel: 0903 763978 or 0273 415654 (office hours).

25 - 28 JULY

1991 AMSAT-UK Colloquium - University of Surrey. Details from G3AAJ QTHR.

23 - 26 AUGUST

OSCAR VICTOR Activity Group (WAB) Family Fun Weekend - Bent Rigg Farm, Ravenscar, North Yorks. (Midway between Scarborough and Whitby). Details from Peter Austin, G7BXA, QTHR, tel: 0532 563462 or Steve G. Bryan, G1SGB, QTHR, tel: 0709 543747.

8 SEPTEMBER

LINCOLN SWC 10th Lincoln Hamfest - Lincolnshire Showground. Details from Sue Middleton (XYL G8VGF QTHR), tel: 0522 525760.

28/29 SEPTEMBER

RSGB HF Convention - Penguin Hotel, Daventry. Details from Bob Whelan, G3PJT, 36 Green End, Comberton, Cambridge CB3 7

25/26 OCTOBER

LEICESTER ARS Show - Granby Halls, Leicester. All usual facilities. Details from Frank Elliott, G4PDZ, tel: 0533 871086.

SILENT KEYS

WE HAVE BEEN NOTIFIED of the deaths of the following members:

DL6WD	Dr R Fischer	
G0JDT	Mr HT Cullis	04.01.91
G1XCT	Mr RF Murray	26.01.91
G3AYL/KM4CK	Mr GR Pearce	14.11.90
G3BPB	Mr J Pestell	May 1990
G3DUA	Mr C Binks	
G3EQK	Mr C Bolland	29.01.91
G3PVV	Mr A Langfield	15.02.91
G4MDA	Mr BJ Smith	02.01.91
G4NOG	Mr FS Holmes	31.01.91
G4PTM	Mr WS Tuke	09.02.91
G4UWV	Mr DA Stiller	13.12.90
G4XII	Mr E Appleby	
G8EHU	Mr T Legg	03.02.91
G8KCX	Mr AG Hitchings	
G8SNN	Mr NB Wright	02.02.91
G8UCI	Mr J Capell	18.01.91
G8VHD	Mr NA Gibson	
GM0DYA	Mr I Woodburn	29.11.90
GW0KWJ	Mr J Corbett	24.01.91
RS6159	Mr GE Nettle	05.02.91
G1ERP	Mr R Scott	April 1990
VK3WY	Mr RAC Anderson	
XE1FE	Mr VT Dickins	25.09.90

CORRECTIONS:

G0JIP	Mr W J P Rann	05.01.90

(not as printed in November 1990 RadCom)

G4CGJ	Mr B G Clements	Feb 90

(not as printed in February 1991 RadCom)

Reginald Harry Hammans, G2IG

Past President Reg Hammans died on 8 February 1990 after a long period of ill health. A charming and kindly man and a brilliant Engineer.

He had a very successful year as President in 1956 when he did much to weld together the up and coming IARU Region 1.

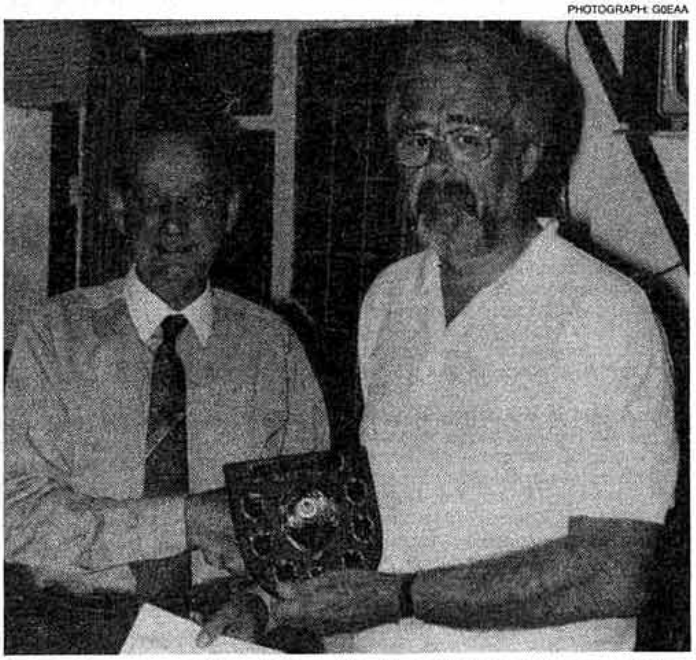
Born in Gillingham, Kent, in 1910, he attended Sir Joseph Williamson Mathematical School in Rochester and later took a course in General Engineering at Medway Technical College. For a time he was with International Marine Radio, a branch of STC and later, for some years, ran a successful radio business in Gillingham with G5JT and was a founder member of the Medway Amateur Transmitting Society. He later joined the technical staff of the BBC and spent much of the war years at their special receiving station at Tatsfield in Kent. Earlier he had been with their OB unit and designed and built a transceiver using miniature valves which for some time was used by them on Outside Broadcasts. For most of the war years and until 1955, he lived in Petts Wood, Kent, and produced the first crystal filter amateur receiver, a three element beam which could be remotely trimmed and a number of other "firsts".

In that year, he was offered a post with the then new Granada TV Co, and later became their Director of Engineering and lived just outside Manchester until his retirement in 1968 when he and his wife moved to Hoveton on the Broads near Norwich. Here he continued his experimental work until shortly before his death.

Reg was a superb lecturer and many will remember his technical talks so well delivered and illustrated. His practical skill was quite unique and to examine and operate equipment he had designed and built was a sheer joy. He put on the air the first amateur-built SSB station in this country, long before the Japanese era. Always helpful and sympathetic, it was a privilege to count him as a friend.

He is survived by a son and daughter; it was due to some difficulty in contacting them that this short tribute has been delayed.

PHOTOGRAPH: G0EAA



George Normanton, G3LUR, (left) receiving the G3YCC trophy from Frank Lee, G3YCC. The award was for members of the North Ferriby United ARS based on a points system for working stations on 144MHz FM. The runner up was Eric Frost, G4KEH.

The Last Word

TESTING TIME

May I start by wishing G0KRB's daughter (*Last Word*, March) the very best for May's RAE. I'm sure she'll do well

I can appreciate his argument as I discussed the same points with John Case when my son passed the RAE aged 11 (see this month's *Novice News* - Ed). It is true that at present there will be a small number of cases with this status.

After consideration, I have decided that the Novice course is the next step to be taken. As John pointed out, this course is not the RAE approach but a practical approach to amateur radio. Whilst appreciating that passing the RAE should allow operating, it certainly doesn't give any practical experience.

The two courses are different in objectives. I tutored my son for the RAE and am now tutoring a Novice course which my son, with the RAE, is taking. I can say he is enjoying it, learning to solder, use a meter, build a small AF amplifier etc.

I would feel troubled if an 11 year old had 100W or more unsupervised, much like them passing the driving test.

You may argue that passing the RAE is sufficient, but nothing replaces experience. My experience from also passing at a young age tells me so.

So lets encourage the youngsters to sit the RAE together with the Novice practical then at 14 we will have the next generation of good amateurs.

Keith Kahn G3RTU

PHONE PATCH?

Why are UK amateurs not allowed to use 'phone patch'? I know it is against regulations, but why? I am sure a lot of other amateurs would like to have this facility.

Mark McIntyre GI3YDH

GERMAN-ENGLISH

As a ham, the *Author of Technical Writing for Radio Amateurs*, and a lifetime lover of the English language, I was struck by the facile clarity of Erwin David's translation of Karl Hille's description of his latest antenna (*Eurotek*, February).

I suspect collaboration between a clear thinking German and an excellent translator has produced what all technical writing must aim for: clarity, brevity, and good style.

Germany has long enjoyed a genre of technical writing which is popular in the best sense of the term; clear to all, without soaring upwards to complication nor downwards to condescension.

Much British writing in this field, alas, alternates between informing professors and entertaining children. Examples of both styles abound and it would be wounding to elaborate!

Perhaps the British technical public is destined to reap rather more from European unity than it is expecting?

Trevor Artingstoll G0JOE
(Novice Instructor)

SPIT-TUNE

Re the letter 'Magnetic Loop Motor' (August), another very suitable geared DC motor is used for turning the spit on a popular home barbecue outfit. Replacements may be obtained costing under £5. This motor is reversible and is powered by a self-contained 1.5V U2 cell which can be removed and fitted in the antenna remote control unit.

I have been using such a motor for 18 months and it has provided excellent service. A Jackson slow-motion drive is fitted between the motor and the tuning capacitor. This increases the gear ratio such that it takes approximately 45s for 180° movement of the capacitor rotor, which is just about right for precise tuning.

I have not fitted interference suppression capacitors on the motor because when tuning up on 'receive', the slight hash it produces reaches a distinct peak at resonance, an extremely useful indicator. When tuning up on 'transmit' a sudden drop in SWR indicates resonance.

These motors are made in Hong Kong and Taiwan, and I can thoroughly recommend them to constructors of magnetic loop antennas.

K W Clark G3WIF

A SWL IDEA

During the last few months, there have been articles and correspondence concerning the need for more young people in amateur radio. As a young person myself (18) who has recently become licensed, I thought it was time I added my thoughts to the discussion.

I believe that RSGB initiatives such as Project YEAR and the Novice Licence are a big step in the right direction, but the campaign is sadly misguided. The problem is that in today's throw-away society people want things quickly, especially the group of people these initiatives are aimed at. They want to go into a shop, buy all the latest and most fashionable gear, set it up at home, and start right away.

Even with the Novice Licence's reduced wait, it takes several months before you are able to transmit. Also, a course has to be taken, homework done and exams passed. Children are not particularly willing to increase their 'schoolwork' voluntarily.

There is, however, one aspect of amateur radio which can be accessed straight away, without the need for courses, exams etc. That is Short Wave Listening. There are many general coverage receivers on the market which can receive AM international broadcast stations and also resolve amateur SSB. There are also many excellent value kits which are easy to build and produce good quality receivers. In schools, SWLing could be linked with geography, history and current events as a powerful educational tool. And, by radio amateurs actively promoting short wave listening as well as amateur radio, people will enter both hobbies.

Having been an SWL myself for a short period of time, and knowing many now licensed amateurs who were SWLS for many years, I can vouch for the natural progression from SWL to transmitting amateur.

David Murray G7HME

EDDYSTONE USERS

As a long time member, I wonder whether I can ask you to mention our group, the Eddystone User Group in a future issue?

We are in no way a competitor to *Radio Communication* as our six times yearly newsletter deals solely with items of interest to owners/users of Eddystone receivers. We now have over 200 members in 14 countries. Subscription is £7.50 a year for six issues, and for this we can offer technical and historical information (courtesy of Chris Pettit, Managing Director of Eddystone Radio Company), readers' contributions, free readers adverts and a featured receiver in each issue.

W E Moore, G7AIR

Please note that the views expressed in 'Last Word' are not necessarily those of the RSGB.

We reserve the right to edit letters and regret that we can no longer acknowledge them individually but will pass them on to the relevant department.

SADDAM NUISANCE

I have been in Saudi Arabia for eight years and have occasionally operated from HZ1AB club station. However, since the invasion of Kuwait, this has been a no go area. I came to the UK for two weeks holiday at Christmas and was looking forward to some long hours of operating. I bought a half size G5RV and temporarily erected this in my postage-stamp garden. After considerable time and effort I managed to get my rig to give an output and was immensely pleased to get into a lengthy contact.

About five minutes after the QSO started (about 3pm), I received the proverbial knock at the door from an enraged neighbour who was getting RFI both on TV and radio. My children were already watching our TV without problems. I closed down and fired up again at 2.30 the following morning but everything was dead from 7MHz upwards. Later in the day I managed to raise a few local contacts on 40 which ended my Christmas operating.

Now I am back in the Gulf being kept awake most nights by sirens warning of SCUDS flying overhead and possible gas attacks. My only form of communication was the BBC World Service (long may it prosper) and CNN. The main advantage of CNN during the nightly raids was that you could see the man on the spot, in Dharhan, Riyadh, Tel Aviv and Jerusalem. Quite often, CNN had given the all-clear before the sirens in my location actually started, and several minutes before the BBC announced anything. It is clear that this kind of immediate communication has to be the medium of the future and may well change to such after all the reports come in when the war in the Gulf has finished.

Although amateur radio is allowed in Saudi Arabia, it belongs to a handful of princes, embassies and a single club station. In these times, amateur radio would be of great benefit and the pile ups would be phenomenal. Imagine my disappointment therefore, when I travelled 2000 miles to a free country and my neighbour thinks that TV at three in the afternoon is more important than a radio-starved ham's final few hours of fun.

Jeff Hambleton G4KIB/5B4YY/KB9EFU

ROOF REPAIRS?

Despite the expenditure of £8,130 for repairs and maintenance to Headquarters, I note that a President's Roof Fund has been opened as £50,000 is required to repair the roof. I presume that a full structural survey was commissioned before the premises were purchased and I wonder what comments were made regarding the condition of the roof at that time.

Name and address supplied.

[There is nothing wrong with the roof of the Headquarters' building. The President's reference to the RSGB's 'roof' was a metaphorical one. He was simply comparing the need for donations to support the Society during the recession with the sort of fund raising associated with a Church Roof Fund. Sorry if we failed to make that clear. - Ed]

PLANNING SUCCESS

Just a few lines to say "thank you" to the RSGB and Raynet for their help and support in our recent appeal to Leeds City Council for permission to erect our antennas. Needless to say, our appeal has been successful and, following completion of the installation work, we would like to mention Brett Rider, G4FLQ, from HQ who pointed us in the direction of Peter Chadwick, G3RZP, Chairman of the Technical and Publications Advisory Committee, who gave us valuable advice. Also Geoff Smith, G4AJJ, Zone A Council Member, who came to our rescue and headed our appeal and, last but not least, Gwenda Wardle, G1UDB, our Raynet Group controller for her help and support, and fellow radio amateurs who were ready to respond to our plea. Our grateful thanks to you all.

N Cappelluto G7GEV / B Cappelluto G7GEW

RIDING HIGH

I wish to add my support to Mr Edward Ball's comments on the East Riding (*Last Word*, October '90).

My *RadCom* and GB2RS News addressed to me using Yorkshire arrives on time. I have helped the Yorkshire Riding's Society promote the three Ridings since 1974. I do not recognise Humberside as a place name or address, and will not enter any contests giving my location as HBS.

J Wresdell G3XYF

THE END IS NIGH?

I dispute that the cause of amateur radio's demise will be its failure to recruit. The cause will almost certainly be the continued and ever more expensive purchase of glossy 'do it all for you' equipment, of the kind seen over the past fifteen years.

The direct result of this is a loss of suppliers, with simple, ie *buildable* and *comprehensible* magazine circuits, which did not cost two arms and legs, which worked at switch on and which kept me at least experimenting.

Today, we have the far from normal case of youngsters, their enthusiasm and pride in their work thoroughly roused, who will shortly be faced with the task of finding upwards of £300 for just a receiver.

I hold no brief for any mode or technology; I deal with modern gear all day at work. However, I believe, and believe I am not alone, that what works well and is easy to build should be published, whether or not the parts are a little hard to find. By building such simple gear, the enthusiasm is kept alive, and another recruit held. Perhaps, later, another engineer will emerge who knows what he (or she) is talking about from experience.

Such equipment does still exist. The suppliers are still there, and I'm working on a few. Anyone who is serious about regenerative receivers, simple superhets (Clubman class of '68 please stand up) and easy AM transmitters can find me and others in the *Call Book*. But if you fail to support the suppliers, look no further than your latest (glossy) catalogue, please don't bother to call; go write the obituary notice, and don't expect to see me among the mourners, I'll probably be building something else.

Peter Brent G4LEG

BE CONSTRUCTIVE

What has become of our hobby? It would appear that in nearly every issue of *RadCom*, one finds one or more letters of complaint about some aspect of the hobby. It would seem that the spirit of amateur radio has completely disappeared. I do admit that on occasions some of the criticisms have been valid, but many others have been trivial.

Many of the complaints are quite simple to resolve just by using a little common sense. If someone is operating in a non acceptable way then he, or she, should be informed in such a way that there is no aggravation caused. That only serves to put the offender's back up. I do realise that there are operators who are twisted in their outlook, and who deliberately set out to cause trouble. I, myself, have suffered this at a personal level on 2m.

With regard to Contest working, it cannot be denied that in many cases, operating standards drop; however, in the main the standard of operating is very high. Let us be honest, it is not only Contests that cause QRM. What about the latest Jamboree on the Air. Some of the signals were atrocious to say the least, and on 40m there were virtually no free frequencies for other users. Frustrating - yes, but the idea is a good one and one can surely put up with the disappointment of not maintaining a regular sked for a short period.

With regard to a recent correspondent who complained about a certain magazine getting free publicity via a Contest. That is a lot of rot. Our own RSGB runs Contests, as does *Practical Wireless*. Personally, I feel that working in a Contest aids the technique of an operator, as well as giving many a rare Dx contact.

Let us stop moaning and get down to enjoying the hobby, and remember that non amateurs also read radio magazines and form their opinions on the hobby from what they read. It is a privilege to hold a licence, but it is only a licence to enable us to train ourselves to become better operators. So let us show the bad operators the proper way to operate, by our own example. Be constructive and not destructive.

DA Dhuglas GM4ELV

SELL RADCOM

Congratulations RSGB for surveying *RadCom* readers about their wishes, but why not consider a more radical move? Couldn't *RadCom* be treated as a separate commercial venture and priced accordingly, so that members could decide for themselves whether they wanted to buy it? A similar arrangement could be applied to the QSL Bureau and other services. Members would then pay a basic subscription to cover RSGB activities in representing radio amateurs, with supplements for the services they individually wanted.

M R Gershon, G4HIM

[This is, of course, a matter for the Council. Ed]

COMPULSORY MEMBERSHIP

I note with interest the letter from G7EHB concerning compulsory membership (*Last Word*, March). I recently made a similar suggestion.

I suggest that (a) the fee be collected on behalf of the DTI by the RSGB and (b) the total fee should be at least £30 of which the RSGB share - £18 - should cover the cost of collection and of full membership privileges.

Contrary to your editorial suggestion, I suggest that privatisation of the collection, plus the principle that everyone should pay for the services they receive, should appeal to the present government.

There would, doubtless, be some reduction in the number of licence holders but that would be a small price to pay for a prosperous society.

H L Gibson G2BUP

A thousand times yes. QSL!!

W S Rees GW0NLB (United Arab Emirates)

I support G7EBH regarding compulsory membership of the RSGB. This would be an excellent thing, even if it only took the form of, say, an annual registration fee of a fiver or so for those requiring nothing more. This would not only improve the Society's strength and standing when dealing with official bodies, but would also make the Council more accountable to those they claim to represent and in whose interests they act.

We are already members of a 'closed shop'. We have to prove our proficiency in the 'trade', pay an annual 'subscription' and undertake not to bring the craft into disrepute by acting outside the conditions imposed by the chiefs. I am, of course, talking about the Amateur Licence.

I suggest the RSGB starts researching the possibilities immediately.

S G Price G0EIY

Over the past three years of my membership of RSGB I have watched with interest and some disdain the comments of fellow hams regarding the cost of running the RSGB, and in particular its QSL Bureau. Many, it seems, are driven by wanting something for nothing, but G7EBH's letter prompted me to write in full agreement. There are some 66,500 Licensees in 'G', each of whom must pay £12 annually to the DTI.

Your half-yearly accounts give a figure of nearly £11,000 to run the Bureau. The annual cost, if equally shared to each licence, would be a little more than 30 pence. There must be a good case for putting this cost directly on the licence. Every ham, RSGB member or not, can then use the bureau.

In this way every licensee gets the bureau, whilst contributing in some small way to the Society which serves them so well. And the DTI goes some way towards recognising the sterling international work done for our country by the Society.

The RSGB earns us the right to enjoy our Hobby, we owe an obligation to support it in some small way whilst not becoming a 'compulsory member'.

R J Lee G0NGV

[These are typical of several letters received on this subject. None has been against the idea - Ed]

RS232 AGAIN

I feel I must write in response to Mr Lambley's letter in August *RadCom*, to point out several inaccuracies, namely that the correct designation of RS-232 is, in fact, RS-232C, the 'C' being the current revision of the interface's specification. The EIA is actually the Electronic Industries of America. The reason the Americans do not use V.24 is because a) they invented RS-232 in the late 1960s and, b) RS-232 and V.24 are electrically identical, and therefore compatible, the only real difference being that in the USA the interface is called RS-232C and in Europe it is called V.24.

J Caswell GW7HQL

IS QRP THE ANSWER?

As we move into the last decade of the 20th Century, may I offer the following hypothesis to our membership, and to our brothers and sisters world-wide.

If a world-wide agreement could be reached to *reduce* the maximum permitted power level on the HF bands to, say, 16dBW (about 40W) carrier, 22dBW (about 160W) PEP, many of the hobby's problems will eventually cease to exist.

I base my hypothesis on the following points which I have categorised to provide some brevity to this letter:

Falling Membership: Many would-be and newly licensed operators are put off by the mistaken belief that high power is required to make a contact across the world. The result being that those who are interested initially cannot afford the cost of such equipment, lose interest and therefore do not join the Society. Those who do join, having purchased such equipment, are faced with problems of TVI etc, lose interest and let their membership lapse.

Unnecessary use of High Power on the HF Bands: the experienced and not so experienced operator who has operated on the HF bands is aware that a communications link can be maintained with far less power currently used by, dare I say it, some 'stateside' stations. Where radio conditions deteriorate on one band, another can be used to complete the contact, from the fine selection we now have. Any legislation which restricts the use of high power can only help to reduce the sometimes chaotic conditions of our bands. Incidentally, I do accept that the RSGB has worked hard to provide the operator with higher levels of RF, but still think it unnecessary.

I foresee the knock-on effect of my proposed legislation resulting in less sophisticated equipment being required, therefore easier on the pocket where it must be purchased or, in the true spirit of the hobby, simple transmitters and receivers will be built. The consequences of this being an upturn in the number of interested individuals who will join the Society which, hopefully, will allow a reduction in the cost of membership.

Consequences of using less power - with operators in each country on a par as regards maximum permitted power, I foresee more practical use made of our nine HF bands with less crowding due to the necessary dispersion of stations in order to maintain a contact between two points. The problems of TVI will rapidly diminish as realisation that high power is not necessary dawns on the many. Towers adorned with stacked monoband aerials need not be the order of the day, together with their planning problems. The uninitiated will be enthralled to find that his neighbour can communicate around the world with a few watts from a tin box and a piece of wire - he, too, may even wish to do the same - let's introduce him to the Society! Falling membership - it won't exist - but this is where I came in!

Let us seriously consider the above. It may be the answer to all our problems. It will take some guts to instigate the required legislation but look at the benefits to be had from it.

RT Morrison G3VZP

RALLY ROUND

We, as with many other traders, attended our first rally at Glasgow on 15 September last (Scottish Convention).

I feel that the organisers should be complimented on their efforts to make their rally a success. I imagine that much of this was due to their Chairman, Tom Hughes, GM3EDZ, who did sterling work. One comment in their favour, and I think that *all* other rally organisers should take a leaf out of their book, not only did their helpers assist us to unload our equipment, but they also helped us load it again *after* the rally.

For this, we would like to say a personal thank you. Some other rally organisers help us unload, and some offer us coffee, for this I am sure we are all grateful. On the other hand, some give no help at all. To these people I say "without traders, you have no rally. Facilities for traders are just as important as those for the punters"!

Gordon Crowhurst G4ZPY

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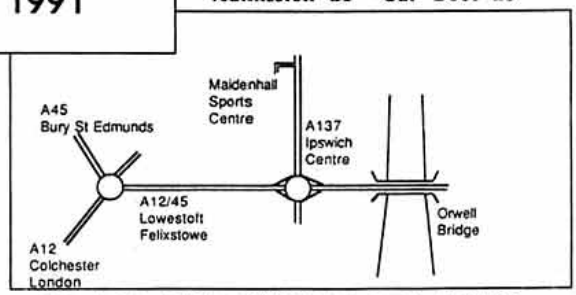

Further details from I G Moffat, G1WCK ; 30 Daimler Road. Ipswich, IP1 5PQ

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73 Martin G4HKS

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(Please wait 90 days before expecting delivery.)

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Raynet News (6 issues per year)	**£7.02**	**£5.97**
6 Metre and Up DXer (monthly)	**£11.05**	**£9.39**

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PCB - G4DDK .002 1152MHz Amplifier	£4.28	£3.64
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All multiples specify PCB size required when ordering		
Capacitor ATC100pF (2/pac) - for DDK004	£2.29	£1.95
Amplifier - Broadband MSA0504/MSA1104	£5.57	£4.75

Prices include UK post/packing. for overseas orders please add 5% (Europe), 10% (rest of world). SAE for full list.

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NON-MEMBERS. Use left hand price columns. Note that members' sundries are only available to members of RSGB.

MEMBERS. Use right hand price columns. It is essential that you quote your callsign or RS number so that you can be recognised as a member.

PRICES. These include postage, packing, and VAT (where applicable) and are subject to change without notice.

AVAILABILITY. Goods are available less postage and packing from RSGB Headquarters between 9.15am to 1pm and 2pm to 5.15pm Monday to Friday. However you are advised to confirm availability of goods by telephone before visiting Headquarters. We attempt to keep ample stocks of all our sales items, however as this list has to be prepared several weeks in advance we cannot guarantee that any item on this price list is immediately available.

PAYMENT. Payment may be made by post enclosing a cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. You may use your credit card for payment by post or by telephone. We accept Visa and Access (Mastercharge) cards as well as RSGBs Credit Card. Our telephone number for orders is (0707) 49855. Our Giro account number is 533 5256.

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Classified advertisements 50p per word (VAT included) minimum £7.00.
Please write clearly. No responsibility accepted for errors. Latest date for acceptance — 5 weeks before 1st of issue month. Cheques should be made payable to RSGB.
All classified advertisements MUST be prepaid.
Copy and remittance to:— **Victor Brand Associates Ltd, 'West Barn', Low Common, Bunwell, Norwich, Norfolk, NR16 1SY.**
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G3LLL's OFFERS C.W. filters and valves + mod kits for Yaesu. New and S.H. equipment commission sales see Dec and Jan adds. Holdings (G3LLL), 45 Johnston Street, Blackburn BB2 1EF. (0254) 59595 — closed Thurs.

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ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Sarah Baylis or Jennifer Lawson. Amateur Radio Insurance Services Ltd. 4a Russell Hill Road, Purley, Surrey CR2 2LA. Tel: 081-660 0820 or Fax: 081 660 9222.

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PC COMPATIBLE SOFTWARE. Large SAE to Charles Crane G4YFN, 2 Pimento Drive, Earley RG6 2GZ.

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THE G4TYF LOG, auto date, band, power, mode, time, TX/RX/RPRT, inputs, callsign, name, QTH. QSL/Log search, label print out 2,000 entries. BBC, Spectrum, Commodore 64, £20. PC de luxe log £25. Enclose callsign. 64 Gurney Valley, Bishop Auckland, DL14 8RW. 0388 607500.

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FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

GULF COAST, TAMPA, FLORIDA. Luxury bungalow, sleeps 6-8, close to all Florida's attractions, £250 per week. Phone Bob G0GHT on 040-928-475 for further details.

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MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, Career and professional examinations, etc) write or phone — THE RAPID RESULTS COLLEGE, Dept JT102, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr answerphone service 081-946 1102 quoting JT102.

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HEATHKIT UK spares and service centre. Cedar Electronics, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham GL54 5NS. Tel: 0242 602402.

HOLIDAY ON RARE DX ISLAND

"If it is good enough for the Square bashers, it must be good enough for you!"
(See March '90 RadCom)

Work the pile-ups from the comfort of our Holiday Guest House situated on GOZO (JM76AB). Included in the price is use of *Fully Equipped Shack. All* travel and accommodation arranged. All paperwork included for your 9H Call Sign. For further details please phone or write to:

T. Menzies, GM/9H5LY, 31 Pentland Terrace, Edinburgh, Scotland, EH10 6HD. Tel: 031-447 3219 Fax: 031-229 3111

MARITIME MOBILE in GR

Just think of it. The ancient Ionian Seas with its dozens of islands and its hundreds of small coves- accessed only by boat - can be your place to holiday with your family in 1991. Swimming, wind surfing, climbing, exploring, diving, walking, sailing or just lazing about in the warm/hot Greek sun can be yours for a fortnight's total relaxation. *Bring the rig, load up the backstay and enjoy yourselves* - **you deserve it.**

See Ithica, the Island home of Homer's Odysseus, the Cave of Nymphs and the Spring of Arethusa, or stay at the Norman town of Fiscardo on Cephalonia. You're NOT a sailor ? After a couple of days on our Mirage 27s, Geoff & Gill, our resident Skipper & Hostess, will make you confident to venture on Ionian seas.

You like good company . Well, why not bring a party from the radio club and, at the same time, qualify for a 10% discount for a group of twenty or more.

You like a good meal out ? Well, whilst Greece is not known for haute cuisine, Geoff & Gill know the places serving the best and Ayos Euphemia boasts the best restaurant/taverna in the Ionian.. Flights are from Manchester, Birmingham & Gatwick and take around three hours, and a free taxi will take you to your boat. Cost ... an unbelievable **£85** for one week's holiday as a party of five in May (including all insurances but plus air fare).

Contact : Ionian Sailing Holidays PO Box 1 ATHERSTONE CV9 1BE

ADVERTISERS INDEX

INDEX TO CONVENTION SUPPLEMENT

NEXT COPY DATE

The advertisement copy date for JUNE is
17th April 1991

ICOM

Count on us!

IC-765 HF ALL BAND TRANSCEIVER

We enjoy listening. It's part of what we do well. So when ICOM heard you talking, our engineers designed a transceiver specially for you – the serious DX enthusiast with worldwide contacts in mind. The result is the new super advanced IC-765, an HF all band transceiver built to expand your HF world.

The IC-765 is equipped with ICOM's exclusive DDS (Direct Digital Synthesizer) System, a fully automatic antenna tuner, an electronic keyer with iambic operation and a full break in function.

Fully Automatic High Speed Antenna Tuner
A built in CPU automatically memorises the pre-set position of each band without pre-set controls. Tuner speed is ultra fast since tuning starts from a preset position. If the tuner cannot tune from the previous preset position, the re-try function changes the preset position and memorises the best position.

10Hz Digit Display
The large fluorescent display shows 7 digits for the operating frequency, the 10Hz digit is displayed.

Band Stacking Register
Each band memorises the last used frequency, mode and IF filter condition (narrow or wide).

Complete System for CW Operators
The IC-765 has many advanced functions for CW operators such as CW pitch control, a built-in electric keyer, a keying speed control and high speed full break-in capability.

New PLL Circuit
The advanced ICOM DDS System ensured high speed PLL lock-up times, clear signal emissions, and high C/N characteristics. A high speed PLL provides very fast CW full break-in performances.

Convenient Miscellaneaous Functions

- 105dB dynamic range
- 10dB preamp and 10, 20 30 dB attenuator
- 99 memory channels
- Split memory on channels 90-99
- Built-in FL32A and FL52A CW narrow filters
- Programmed scan and memory scan
- IF, shift and Notch filter
- Fast/Slow/OFF Selectable AGC
- RF type speech compressor
- Noise blanker
- DATA switch for advanced data communications

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FT-1000 FOR DYNAMIC DX

YAESU

The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed *six* microprocessors and *five* Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.

YAESU

UK Sole Distributor

South Midlands Communications Ltd
S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh, Hants SO5 3BY
Tel: (0703) 255111

Prices and specifications are subject to change without notice

NEC

OFFICIAL PROGRAMME

The RSGB 1991 National Convention and Amateur Radio Exhibition

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NEW HP200 Handheld Scanner

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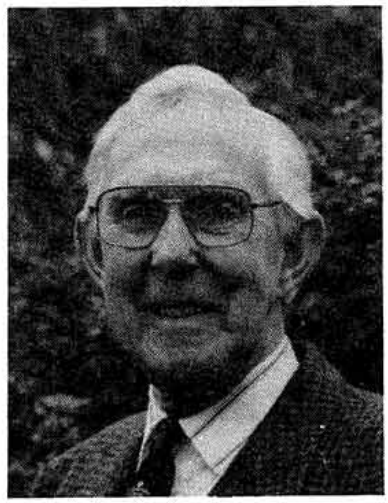

I would like to welcome you to this special RSGB National Convention and Exhibition, here at the National Exhibition Centre, Birmingham.

This year we are pleased to dedicate the whole event to the launch of the Novice Licence. This represents the culmination of years of hard work between the Training & Education Group of the RSGB and the Radiocommunications Agency of the DTI, and is the most important single event to have occurred in Amateur Radio during the last twenty years.

This exhibition is the largest amateur radio event in the UK and, apart from all the main traders who are present, you will have an opportunity to meet many of the RSGB Committees, the DTI, G-QRP Club, AMSAT-UK, RAFARS, BYLARA, RAYNET, Scouts, Guides and the German National Society (DARC). This year we have included, by popular request, a large 'flea market' area, and we know this will be well received. There is also a full lecture programme on Saturday the 27th and large stands incorporating the RSGB Bookstall and the Training & Education Advisory Group. The first prize in the lottery will be on display during the whole weekend, and the draw will take place on Sunday, the 28th at 3.30pm. Don't forget that tickets will be on sale at the RSGB Bookstall right up until 6pm on Saturday the 27th.

Four new RSGB books will be available at the show; the 1991 Callbook, The Beginner's Guide to Amateur Radio, Microwave Manual Vol.II, and the Space Radio Handbook, so be sure to visit the RSGB Bookstand and look for the special over the counter prices.

Enjoy your visit to THE show, and have a safe journey home.

John Case, GW4HWR,
President

WATERS & STANTON

SEE US AT OUR NEC STANDS C12 & D21 — SUPER DEALS

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FIRST IN EUROPE!

2 METRE HANDHELD
+
AM VHF AIRBAND
RX 108MHz-174MHz
850MHz-910MHz

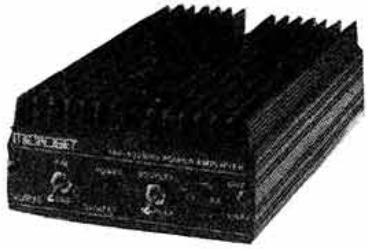
Alinco

DJ-160EA
£229!

The DJ-160EA is the natural progression from the DJ-160E. Exactly the same package but with a much wider receiver coverage and the addition of AM airband, a first in handhelds. The wide frequency range coupled with all the standard features of the DJ-160E give the new DJ-160EA an unrivalled specification. Standard features include 3 or 0.5 watts output, LCD display, keypad selection, rotary frequency control, 21 memories, scan and priority, reverse repeater, 5-25kHz steps, DTMF decoder, auto power off, DC-DC 12V converter, 700mAH pack, rapid AC charger. Add to this AM airband, receiver coverage from 108-174MHz plus 850-910MHz and you will see why this has to be the handheld for 1991!

Also available:
DJ-460E — 70cms £229
RX 415 — 469MHz option.

MICROSET AMPLIFIERS
SUPERB VALUE



R25
R25 2m (GaAs FET Rx Amp) is ideal for most popular handhelds. It requires a drive of between 1-4 watts and provides a 9dB power gain with maximum output of 30 watts. Being linear it can be used for SSB/CW/FM. **£79**

RV45
RV45 2m (GaAs FET Rx Amp) is ideal for higher powered rigs of between 3-15 watts. A power gain of 6.5dB offers a maximum power output of 45 watts. SSB/CW/FM **£99**

R50
R50 2m (GaAs FET Rx Amp) is a high gain power amplifier having a maximum output of 50 watts and will accept inputs of 1-7 watts. SSB/CW/FM. **£99**

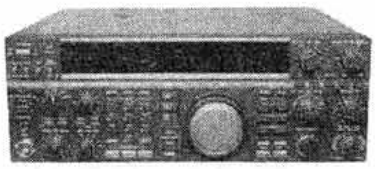
SR100
SR100 2m (GaAs FET Rx Amp) provides 100 watts output and is ideal for 25 watt mobiles. Being linear it will operate SSB/CW/FM. **£159**

RU 20
RU20 70cm (GaAs FET Rx Amp). A lovely little 70cms power amplifier giving a maximum output of 20 watts for drive levels of 1-3 watts. SSB/CW/FM. **£129**

NEW! VVR-30
Dual band 30 watt **£229**

HF STATION SPECIAL DEALS!

Kenwood TS850S



TS850S
£1,295 inc PSU

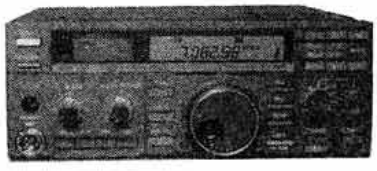
The Kenwood TS850S has taken the market by storm. A superb HF transceiver whose design and performance are unequalled in this price bracket. There's also a host of interesting accessories to upgrade it.

Kenwood TS140S

TS140S
£862 inc PSU

The Kenwood TS140S is a superb budget hf rig from the top manufacturer of hf equipment. Its size makes it ideal for mobile or base operation and it can be thoroughly recommended for those on a budget.

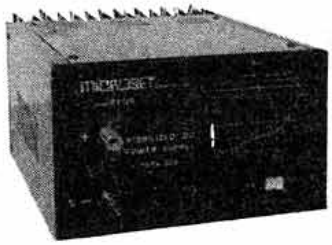
ICOM IC725



IC725
£759 inc PSU

The ICOM IC725 is proving extremely popular because of its size, price and reputation. This transceiver coupled with our free AC PSU offer represents an absolute bargain!

FREE!
MICROSET PT110 PSU WORTH £119
when you buy one of these hf transceivers



PT120 — £119
The PT120 AC PSU is superbly built to last. Ultra reliable, it has over voltage and over current protection and makes the ideal companion for 100 watt hf transceivers. There really is little point in paying high prices for something that spends all its life underneath the bench. The PT120 provides 20 amps continuously and 25 amps peak and weighs 7.8kg, size is 200 x 300 x 130mm. Since its introduction in July we have sold several hundred and it has been extensively tested by us for suitability and reliability. All this absolutely free when you purchase one of the listed transceivers.

SAGANT HF DX ZEPPS
A range of classic end fed Zepps that need no atu, just 50 ohm direct connection. Better than a dipole!
ZA-3.5F 100 watts 132ft long. Absolutely complete £55
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ZA-7 100 watts 66ft long. Ready to go! £49
ZA-7R 100 watts 33ft half size. Super performer! £69
ZA-14 400 watts 33ft end fed. Super for DX £55

12 MONTHS FULL WARRANTY — **INSTANT CREDIT**

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ALINCO The Serious Alternative!

DJ-560E Dual-Bander
2m-70cm *(Rx: 137-180/400-520MHz Option)*

This latest dual band handheld from ALINCO represents truly amazing value. In one package it forms a complete dual band station with a multitude of facilities that makes it totally user-programmable. You can personalise it to precisely meet your requirements.

Beautifully engineered, both technically and mechanically, this transceiver takes you into the realms of "high tech" communications whilst retaining simplicity of operation. Indeed, no other transceiver available offers all these facilities as standard!

At the heart of the DJ-560E are two quite separate transceiver sections that share the same logic control, yet provide quite separate volume and squelch controls for each band. The benefit of twin display, twin audio outputs and duplex operation provides almost limitless possibilities. Just as interesting is the optional receiver extension range to cover 130-174/400-520MHz. Add to this full DTMF and full tone squelch (CTSS), and you will see why all the waiting for the DJ-560E has been so worthwhile.

Of course we could go on by mentioning the 40 memories, multi-scan modes, programmable functions, auto dial, power saver, 700mAh pack, DC:DC converter etc. etc. But why not come and see for yourself this miracle of engineering or send for the colour leaflet. Each unit has a full 12 months parts and labour warranty backed up by the service skills of one of the oldest companies in the business.

Get "A HEAD!"

ALINCO DR-590E

£499

Remote Cable £25.95

2m/70cms

Will your dual band rig fit into a space as small as 6" x 2" x 1"? That's just how much room you need to mount the new DR-590 with the optional remote cable kit. The wafer thin head quickly detaches from the main body and using a unique side entry cable can be flat mounted taking up a depth of only 1". Of course the transceiver can still be used in the conventional manner without the optional cable assembly, but whichever way you use it you'll have at your finger tips one of the most advanced dual band mobile transceivers available.

Typical of ALINCO "value for money" concept, it's feature packed with every facility you are ever likely to need. As well as the optional receive coverage of 137-174/410-470MHz, facilities include, Dual Watch, Dual Control, Full Duplex, Programmable Scanning, 38 memories, Auto Repeater Memory, Auto Band Exchange, 3 Transmit Powers (Max 45W), Bell Function, Light Function, Reverse Function, Priority Mute, 6 Channel Steps, etc.

Retail and Mail Order: 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835/204965
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£899
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£549
LIMITED QUANTITY!

JST135
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RECEIVERS AND SCANNERS

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NRD535
£1,095
LIMITED AVAILABILITY

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+ 9 x £18.44

NEW!
MVT7000
£POA

IC-R72 ICOM

£599
CASH PRICE

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NEW!
FT5200 YAESU
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IC3220E ICOM

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'The *effective* aerial'

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B10 — Black mini dual bander, non radial **£16.65**
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2x4FX Compact 144/432 Mhz 4.5/7.2dB 200W 1.79 metres **£55.80**

DUPLEX & TRIPLEX Zinc alloy diecast
CFX514O 50/144/432 Mhz 800/800/500 Watt PEP 55dB isolation **£38.10**
CF413N 432/1296 Mhz 500/200W PEP 55dB isolation "N" ... **£36.65**
CF416 144/432 Mhz 800/500W PEP 60dB isolation **£26.80**

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CA285 5/8 wave 3.5dB 300Watt 1.32 Metres Base loaded ... **£15.00**
CA287C 7/8 wave 52.dB 200W 1.89 metres double co-phase **£22.50**
CA430TM 3 x 5/8 wave 432 Mhz 6.8dB 150W 1.47 metres ... **£29.95**

MONOBAND BASE ANTENNAS
ABC21 5/8wave Ground Plane 144 Mhz 3.4dB 200W 1.4 metres **£24.50**
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ABC23 3 x 5/8 wave 144 Mhz 7.8dB 200 W 4.5 metres **£59.50**
ABC71 5/8 wave ground plane 432 Mhz 3.4dB .54 metres **£21.56**
ABC72 2 x 5/8 wave GP.432 Mhz 200W 5.8dB 1.07 metres **£34.85**
CA712EF 432 Mhz Twelve x Half wave! 9.5dB 3.10 metres ... **£55.00**

HF & 50 MHZ
CHA-5 Vertical with Loaded Radials for 80/40/20/15/10 M 200W SSB 5.29 Metres. Features trifilier wound toroidal core ..... **SPECIAL OFFER £199.00**
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CRZ12DB A Unique wide band Active antenna 500Hz to 1500 Mhz 1.24 Metres with controller **£96.30**
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See the superb range of Comet antennas at our shops or rallies inc NEC
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PROGRAMME OF EVENTS

OPENING TIMES

Saturday 27th
Doors open 1000
Doors close 1800

Sunday 28th
Doors open 1000
Doors close 1700

ADMISSION

£3, concessionary rate £1.50 *(includes free parking and shuttle service to hall 7).*

Children under 12 years of age (accompanied by adult) free of charge.

Concessionary rates for groups of 25 or more.

LECTURE PROGRAMME (Saturday only)

All lectures are held on the first floor above the exhibition hall (Hall 7), in Seminar Room 1.

1030 "The Saga of a Homebrew Rig", *by Peter Lindsley, G3PDL*

1145 "AROS and the Amateur Bands", *by Geoff Griffifths, G3STG, RSGB Radio Observation Service Co-ordinator.*

2000 "Polar Communications", *by Lawrence Howell, GM4DMA, Member of the North Pole 90 Expedition.*

1515 "Sporadic E", *by Geoff Grayer, G3NAQ, Chairman of the RSGB Propagation Studies Committee*

MORSE TESTS (Saturday only).

These must be booked in advance with RSGB.

All morse tests are held on the first floor above the exhibition hall (Hall 7) in Room 4.

10am - 11.30am

LOTTERY DRAW

Sunday, 28th April at 3.30pm

Drawn by the Project YEAR Video star Jim Bacon, G3YLA, of Anglia TV, and other notable radio amateurs.

Master of Ceremonies - Ron Broadbent, G3AAJ, AMSAT-UK

Talk-in on 2 metres, S22

The National Convention and Exhibition is organised by the Exhibition and Rally Committee of the Radio Society of Great Britain

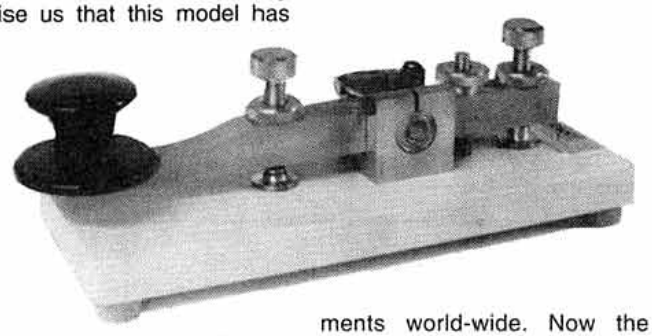
RSGB NEC91 PRODUCT NEWS

We asked exhibitors to tell us what products would be launched or featured at the NEC. Here are their replies . . . .

The information below is compiled from information sent in by the manufacturers and distributors concerned. Details are published in good faith but the RSGB cannot be held responsible for false or exaggerated claims made in the source material.

R.A. KENT (ENGINEERS) *(Stand K1)*

Kent are releasing the **'Professional' Model KT1 Morse Key** to the amateur radio enthusiast for the first time at the NEC. They advise us that this model has



proved so successful that some 25,000 have been supplied over the past four years exclusively to military and training establishments world-wide. Now the amateur radio enthusiast has the opportunity to acquire the 'Professional' key with professional performance!

SISKIN ELECTRONICS LTD *(Stand B2)*

Siskin Electronics are demonstrating yet another application of putting Packet Radio to good use; this time for finding out about weather conditions up to hundreds of miles away by remote control.

The **Kantronics KTU Node** simply connects directly into the RS-232 port of any TNC providing a **remote weather station** which may be polled from any conventional Packet Radio network in the same way one might access a BBS or Personal Mailbox. The KTU Node will support multiple users and will even store historical information about recent weather conditions at the site for future analysis. Up to seven sensors may be connected to the unit providing information such as temperature, wind speed and direction etc. Any type of TNC may be inter-linked into the KTU node or even a Hayes compatible telephone modem!

Other products on show will be the prototype **TINY 2 256k memory expansion board**, the much publicised **DSP from AEA**, the Kantronics Data Engine now with G3RUH compatible 9600 modems (designed by the man himself) and Siskin's new **ATARI ST packet driver program**. Siskin will of course be carrying its full range of Packet radio TNCs and accessories for those keen to put a dent in their Barclaycard!

SOUTH MIDLANDS COMMUNICATION LTD *(Stand C2, C6)*

SMC is showing three of their latest Yaesu products. The **FT-990 all mode HF Transceiver** combines the easy operation and features of the FT-1000 with a number of recent advances, such as a very quiet switching-mode AC power supply and digital switched-capacitance filters. Power output is adjustable up to 100W and receive frequency range is 100kHz-30MHz.

The new **FT-26 and FT-76 VHF and UHF transceivers** are 'sub compact' hand held models weighing only 360g and sized at a mere 55 x 117 x 33mm. Scanning is available on 53 freely tunable memory channels and the DTMF-based selective calling facilities are entirely front panel controlled.

Two new dual band mobile transceivers are on show. The **FT-5200 2m/70cm and FT-6200 70/23cm rigs** offer a variety of new innovations including a built-in antenna diplexer and a digital voice option providing recording and playback of both received signals and messages for transmission. The front panels of both models can be removed by a simple latch for mounting remotely.

NEVADA COMMUNICATION *(Stand B11)*

NEVADA were recently appointed UK distributor of the **Yupiteru** range of radios and are showing the new **MVT-7000 handheld scanner** for the first time at this year's NEC Exhibition.

The MVY-7000 will receive, with continuous coverage, from 100kHz - 1300MHz. The radio has 200 memories and will receive AM/FM/FM-Wide modes. The set has its own internal Ni-Cad batteries but may be run from an external 12V DC supply. Nevada say the sensitivity of the first sample was exceptional. Retailing at £289 they feel sure this radio will be very popular.

ARE COMMUNICATIONS LTD (Stand C7)

The exciting new **NRD-535 HF receiver** is central to the ARE display at this year's show. Covering 100kHz to 30MHz, this remarkable receiver is a triple superhet of advanced specification with facilities for SSB, CW, AM, FM, RTTY and FAX reception. A truly professional level radio for the most discerning of amateurs. ARE will also be featuring the new **Kenwood TS-8505 100W HF rig.**

CAP.CO ELECTRONICS LTD (Stand B4)

In addition to their established range of HF components, Aerial Tuning Units and Magnetic Loop Antennas for the higher frequencies, CAP.CO are displaying their new **Complete and Kit-form Loop Antennas for the lower frequencies.**

The Loop capacitors, with or without motor, have been designated CAP-L2 or CAP-L2M covering 3.5 - 11MHz and CAP-L3 or CAP-L3M covering 1.8 - 4.2MHz. These capacitors are built to the same quality specification but to a different design to the conventional capacitors, enabling the greatest tuning range to be achieved.

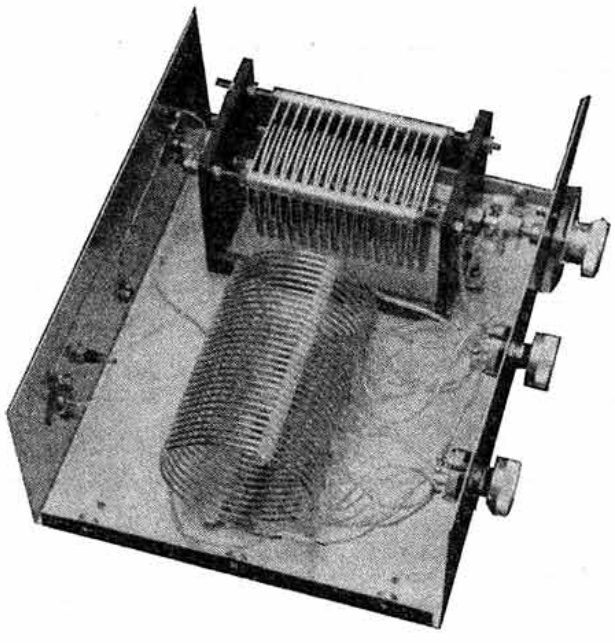
CAP.CO are also introducing the **AS-305R, a remote version of the popular Aerial Switching Unit** which enables the amateur to operate several aerials at once without the need to keep changing plugs. Rated at a power handling capacity of up to 3kW, they incorporate the unique CAP.CO relay switching system which ensures all aerials are earthed when not in use.

It comes complete with the remote mast-mounted unit and a small control box for in-shack control of up to four aerials. There is a considerable saving of the amount of feeder cable when using this device. Price £82.50.

Finally, they are demonstrating the **SPC-100 Antenna Tuning Unit**, a small-budget priced L & C Match covering impedance range of 6:1 max. The power rating is 300W PEP and price is £85.80.

LAKE ELECTRONICS (Stand P9, P10)

A new **Top Band QRP transceiver kit** priced at only £87.50 is Lake's star exhibit. Offering 2W CW output from 1.8 - 1.9MHz, the DTR1 is the companion rig to the 80 and 40m kits, both of which continue to be much in demand and are available at the stand together with a full range of QRP accessories.



W.H. WESTLAKE (Stand S5)

W.H. Westlake will be offering for sale **an extended range of connectors**. Of special interest will be the special N Plugs which Greenpar have designed to fit the WESTFLEX 103 low loss coaxial cable. These have been specially designed with a larger hole in the centre pin in order that the cable can be fitted without filing down the centre conductor - they are priced at £5 each inc VAT.

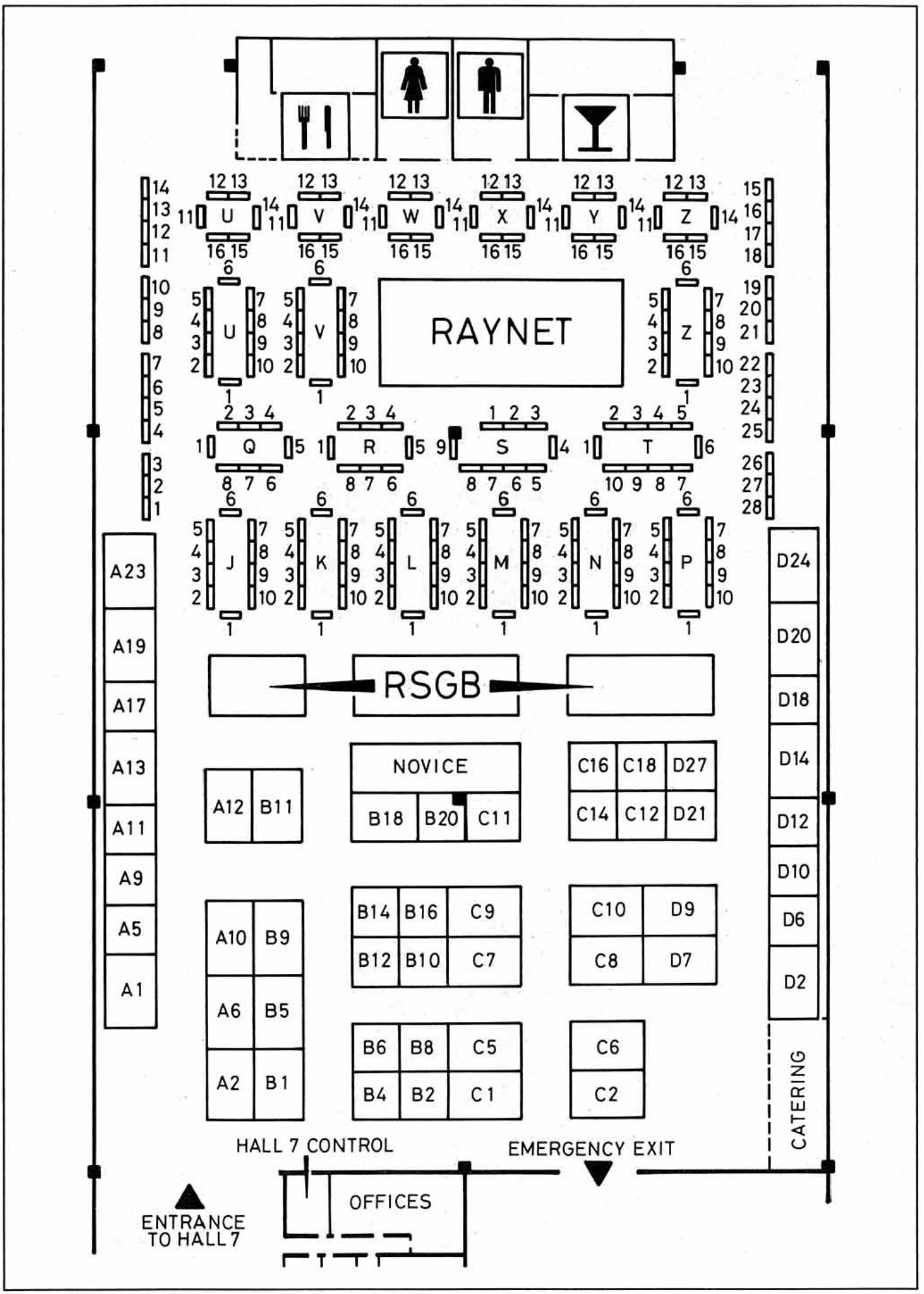
Incidentally, we hear that, during the past few months, orders for Westflex 103 and connectors have been obtained by the many authorities operating in the Gulf war, in order to assist with communications and broadcasting.

Also available at the show will be a very wide range of **Mil spec RF adaptors** - both between and inter series - having been bought in a large factory clearance lot; these will be sold at below manufacturers cost price.

There have been many requests for a **stranded copper aerial wire** in the past, and Westlake have had a large batch specially made. This will be also on sale at the show. It will be easier to use and cheaper than either 14 or 16SWG single copper wire.

RSGB NEC91 PRODUCT NEWS

continued on page xvi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RSGB NEC91 National Convention and Exhibition

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. . . . and many others	

HUGE DISCOUNTS FOR RSGB MEMBERS ONLY . . .

NEC COUNTER PRICES ONLY

NON-MEMBERS **MEMBERS**

Amateur Radio Awards Book — £9.54 — £6.00

Cris Henderson, G4FAM

3rd edition, 186 pages

A recently updated and much enlarged compilation of all the world's popular and obscure awards suitable for the avid parchment chaser or casual QSL card collector. Fully referenced and with many check lists.

Amateur Radio Operating Manual — £6.80 — £5.00

Ray Eckersley, G4FTJ

3rd edition, 204 pages

This well-known book not only makes an interesting read for the new or experienced amateur, but makes an excellent reference book for the shack. Topics covered include DX operating, contests, mobile, RTTY, satellites and includes a 38-page appendix containing detailed information on each country's licensing details and prefixes.

The Bright Sparks of Wireless — £9.98 — £8.00

by George Jessop, G6JP

90 pages hardback

This is the story of the real experimenters; the radio amateurs from Marconi to the 'secret listeners' of WWII, who laid down the foundatons of circuits and procedures all radio users now take for granted. *Bright Sparks* traces the development of circuits and aerials and places them in context with personalities and incidents, adding detail and human interest to the histroy of this fascinating period.

G-QRP Club Circuit Book — £6.76 — £5.00

George Dobbs, G3RJV

96 pages

If you like construction, and want to build some simple circuits that work, this is the book. It is a pot pourri of eight years of the best articles that have appeared in *Sprat* - the journal of the G-QRP Club.

HF Antennas For All Locations — £5.96 — £5.00

Les Moxon, G6XN

260 pages

This book explains the "why" as well as "how" of hf antennas, and takes a critical look at existing designs in the light of latest developments.

How to Pass the RAE — £6.66 — £5.00

Clive Smith, G4FZH and George Benbow, G3HB

2nd edition, 84 pages

Multiple choice questions may look easy, but they are not - especially if you have not sat an exam for years. As the RAE is held only twice a year, it makes good sense to optimise your chances of passing so that you do not have to wait another six months. This book contains some excellent practical advice on how to tackle the exam and has nine sets of typical papers (and their answers) on which to practice.

Microwave Handbook Vol 1 — £16.31 — £10.00

Mike Dixon, G3PFR

224 pages

A brand-new book giving practical advice for the microwave enthusiast. This volume deals with operating techniques, antennas, transmission lines and devices.

NEC COUNTER PRICES ONLY

NON-MEMBERS **MEMBERS**

Novice Licence Students' Notebook — £3.78 — £3.21

by John Case, GW4HWR

70 pages

This is the official text book for the RSGB Novice Licence Training Course. Spiral bound for ease of use, the book is essential reading for the prospective Novice Licensee.

Morse Code for the Radio Amateur — £3.62 — £3.08

Margaret Mills, G3ACC

6th edition, 20 pages

This favourite book for many years contains words of wisdom for the novice and graded and timed passages for the tutor to send to the students.

Practical Wire Antennas — £7.92 — £6.00

John Heys, G3BDQ

96 pages

Wire antennas offer one of the most cost-effective ways to put out a good signal on the HF bands, and this practical guide to their construction has something to interest every radio amateur on a budget. Theory has been kept to a minimum - instead, the author has shared his years of experience in the field.

RAE Manual — £6.66 — £5.00

George Benbow, G3HB

12th edition, 129 pages

This is *the* standard text book that almost every radio amateur has studied in order to pass the RAE. The author is an experienced course tutor and this knowledge is reflected in the style and presentation of the material. The book reflects just the RAE syllabus, so the student is not distracted by any extraneous facts.

Radio Auroras — £7.05 — £5.00

by Charlie Newton, G2FKZ

92 pages

During the late 1940s, Scottish and Scandinavian radio amateurs were among the first to notice the strange 'hissing steam' CW signals emanting from the north during the 'northern lights'. As powerful FM broadcasting was introduced in the '50s, long distance reception was found to be possible via the aurora. Soon radio amateurs were using auroras for two-way contacts, to the astonishment of the professionals. Later, they were to make a significant scientific contribution to our understanding of this fascinating phenomenon.

Radio Auroras tells that story, one of which radio amateurs can be proud, and gives an account of how auroras are caused, how they can be forecast, and how best to use them to work DX. Anyone interested in the experimental side of radio propagation will welcome this unique guide written by someone who has been researching this field for over 30 years.

Radio Communication Handbook — £11.42 — £9.00

5th edition, 779 pages

First published in 1938 and a favourite ever since, this large and comprehensive guide to the theory and practice of amateur radio takes the reader from first principles right through to such specialised fields as slow-scan television and amateur satellite communication. Excellent value for money.

SEE RADIO COMMUNICATION FOR MAIL ORDER PRICE LIST

. . . BRING YOUR MEMBERSHIP CARD TO NEC91

NEC COUNTER PRICES ONLY

NON-MEMBERS **MEMBERS**

R.F.Byrne's Unpublished Masterpieces — £3.55 — £2.00

by Paul Thompson, G6MEN

52 pages

Love him, or hate him, there is something for everyone in this collection of R.F.Byrne cartoons, never previously published. Full of instantly recognisable characters, this is an ideal book for the radio amateur who enjoys a laugh.

VHF/UHF Manual — £10.24 — £7.50

George Jessop, G6JP

4th edition, 511 pages

The standard textbook on theory, techniques and equipment for amateur radio transmission and reception at frequencies from 30MHz to 24GHz.

Amateur Radio Logbook — £2.38 — £2.02

A4, 96 pages, spiral wire bound

The standard fixed-station logbook. The wire binding gives easy fold-back to save space and the large A4 size ensures plenty of space for notes.

Mobile Logbook — £1.66 — £1.41

5.75" x 4.25", spiral wire bound, 32 pages

A small logbook to keep in the car so that you can keep track of your mobile operating.

Receiving Station Logbook — £3.15 — £2.68

50 pages

Especially designed for the listener to the amateur bands, this logbook includes three columns for RST reports: given, received and at the SWL station.

Great Circle DX Map — £2.35 — £2.00

Wall: 3 colour 24" x 31.75" and desk: A4 printed in black.

This popular station accessory shows the bearing in degrees from London of any DX station and is invaluable for the HF operator using a directional antenna. The wall map is plastic laminated for extra durability.

Locator Map of Europe — £1.29 — £1.10

Wall: printed in black, 22" x 24.5" and desk: A4 printed in black

Covers whole of Europe from Iceland and Finland to North Africa and the Black Sea. Shows the medium locator squares, eg KN80, as well as country prefixes.

Locator Map of Western Europe — £0.49 — £0.42

Wall: printed in blue and black 36.5" x 49"

Shows the full IARU locator squares, eg JN36BF, for the whole of the British Isles, Southern Norway, Denmark, France, Northern Spain and Italy.

NEC COUNTER PRICES ONLY

NON-MEMBERS **MEMBERS**

World Prefix Map — £2.45 — £2.08

This is a superb multi-coloured wall map measuring approximately 1200mm x 830mm. It shows amateur radio country prefixes worldwide, world time zones, IARU locator grid squares, and much more.

Software Register — £1.-08 — £0.92

A multi-page list with brief details of where to obtain programs relating to amateur radio for all the common home computers.

Discover the world of Amateur Radio with RSGB — £0.53 — £0.45

11.5" x 2.25"

Black on yellow

I Love Amateur Radio — £0.72 — £0.61

12.25" x 2"

Black and red on white

I'm on the air with amateur radio — £0.72 — £0.61

7.625" x 3.125"

Black, red and white on blue

I'm monitoring .5 are you? — £0.72 — £0.61

3.25" x 6.75"

Black on yellow

RSGB Emblem (members only) — £0.60

Ties (members only) — £4.12

A selection of good quality ties containing the RSGB logo. Available in navy, maroon, green and coffee colours.

Callsign lapel badges

A range of four different styles of badge are available - two with just the RSGB diamond and two with space to have your callsign engraved. Different colours are available according to the length of continuous RSGB membership.

Radio Communication Bound Volumes

Just the thing if you want to refer to articles before you joined RSGB or simply desire a tidy bookcase.

NEW BOOKS FROM RSGB - AVAILABLE FOR THE FIRST TIME AT THE NEC!

(see December *RadCom* page 55 for details)

- **Space Radio Handbook**
- **Amateur Radio for Beginners**
- **The 1991/92 Call Book and Information Directory**
- **Microwave Handbook Vol 2**

SEE RADIO COMMUNICATION FOR MAIL ORDER PRICE LIST

PROJECT YEAR

PROJECT Y.E.A.R
Youth into Electronics via Amateur Radio

Youth into Electronics via Amateur Radio

Project YEAR is a major initiative launched by the RSGB's patron HRH Prince Philip, the Duke of Edinburgh, at our 75th Anniversary National Convention at the NEC in 1988.

Actively supported by the UK Government and by the electronics industry, Project YEAR is about promoting and fostering an interest in electronics in young people through the self-training aspects of amateur radio. Experience has shown that this enjoyable hobby can frequently lead to a successful and rewarding career in electronics, an industry which is crying out for engineers and technicians.

Project YEAR involves :

- A video "Amateur Radio For Beginners" (sponsored by Yorkshire Television) explaining what amateur radio is about. The video is running on a number of screens in the Exhibition Hall.
- A range of books to explain the hobby and to provide technical help for those studying for the licence. Three books have been produced so far:

  Amateur Radio for Beginners by Victor Brand, G3JNB.

  The Novice Licence Examination - Sample Questions and Answers by Esde Tyler, G0AEC (available soon).

  Novice Students' Notebook by John Case, GW4HWR.
- A Novice Licence which has been proposed in detail by the RSGB and approved by the Government.
- Inexpensive radio kits to help the newcomer. The RSGB will provide some kits, will promote others, and is issuing technical guidelines to kit manufacturers.

THE NOVICE LICENCE

This is the biggest change to amateur radio since the Class B Licence was introduced some 25 years ago, and is intended to bring more young people into the hobby. Involving a short training course, a straightforward examination, and an optional five words per minute morse test, the Novice Licence will allow amateur radio to be sampled more easily than before.

The licence will permit low power operation on small parts of many of the amateur radio frequency bands, the morse test being necessary for longer range (HF) communication. It is expected that many Novice Licensees will go on to study for the full Amateur Radio Licence.

Full details of the Novice Licence, what it permits, how to obtain one, and so on, can be found on the Novice Stand opposite the main RSGB stand. (Look for the hanging banners).

RSGB 1991 LOTTERY

The proceeds of the 1991 Lottery will be used entirely for the benefit of Project YEAR. See the opposite page for details of Project YEAR and the Novice Licence.

Make sure you do not miss your opportunity of taking part in this major lottery. Tickets are available right up until 6pm on Saturday 27 April.

1st prize: Red Ford Fiesta (in co-operation with Perrys of Finchley)
See the car at the RSGB Book Stand during the duration of the show!

2nd prize: Holiday in Gambia (one week for two people) (Serenity Holidays/RSGB)

3rd Prize: Amstrad TV/Video or equivalent

Seller of the highest number of tickets will win a Kenwood TM-241 mobile transceiver
(Lowe Electronics)

Seller of the winning ticket will receive a Kenpro KT22E handheld transceiver.
(ARE Communications)

Runners up prizes: Chrome on marble base pump key (G4ZPY Paddle Keys)
Morse tutor (Datong Electronics Ltd)
QRP SWR meter (Lake Electronics Ltd)
Mobile operator's microphone (Heatherlite Communications Ltd)
Pocket size digital multimeter (Cirkit Distribution Ltd)
Soldering kit (Antex Electronics Ltd)
Barker & Williamson 2m band pass filter (RF Engineering Ltd)

SATURDAY THE 27TH APRIL 10AM-6PM

DON'T MISS YOUR CHANCE OF WINNING ONE OF THESE SUPER PRIZES!

TICKETS ON SALE ON THE RSGB BOOK STAND UP UNTIL

6PM ON SATURDAY THE 27TH OF APRIL.

SUNDAY 28TH APRIL 3.30PM

THE DRAW IS TO BE MADE ON SUNDAY THE 28TH OF APRIL AT 3.30PM BY JIM BACON, G3YLA, (STAR OF THE RSGB VIDEO AMATEUR RADIO FOR BEGINNERS AND KNOWN TO MANY AS ANGLIA TV'S 'WEATHERMAN')

MASTER OF CEREMONIES - Ron Broadbent, G3AAJ (AMSAT-UK)

RSGB NEC91 PRODUCT NEWS

continued from page viii

WATERS & STANTON (Stands C12/D21)

The **DR-590E is the latest dual-band mobile** from ALINCO covering 2m and 70cm. It features 45W output on 2m and 35W output on 70cm. Main attraction will be the removable head unit that can be installed on a flat surface and takes up only 1in depth. Full duplex and dual watch is provided.

The **ALINCO DJ-160EA** is a special version of this well-established **2m handheld** transceiver, incorporating a wide band receiver which covers 108-174MHz and including an AM detector for airband monitoring.

The new **50W mobile** from ALINCO is the DR-112E replacing the DR-110.

Note that almost all Alinco transceivers now have the capability of covering a wide receive frequency range. This is an option that can be carried out by ARE on request.

A new **handheld scanner** covering 8 - 1300MHz without gaps is the **Yupiteru MVT-7000**. It receives AM, NBFM and WBFM, has 200 memories, rotary dial and variable LCD contrast.

Recently introduced, ARE is showing the complete range of Microset VHF/UHF Amplifiers and Power Supplies for the first time. Both ranges carry very competitive price tags.

A number of additions have been made to the **Diamond** range, both aerials and VSWR meters. All are on display.

JANDEK (Stand Q1)

Following the success of the modular receiver, CW transmitter and transceiver kits, Jandek is pleased to announce three new additions to the range.

The **Crystal Marker Generator** is based around CMOS IC's and a 4MHz crystal oscillator. This kit provides reference marker signals throughout the HF spectrum and into VHF, of selectable spacings: 4, 2 and 1MHz, 500, 100, 50 and 10kHz. £10.35.

The **VOGAD** is a speech compressor utilising the popular Plessey SL6270C chip. Low and high impedance microphones can be accommodated. £7.45.

The **Audio Booster** is a circuit capable of delivering 10W of audio to a 2Ω speaker, built around a single TDA2003 IC. It can be used to increase the audio output from, for example, a hand-held rig under mobile conditions, or as a stand-alone amplifier for general purpose use. £5.95.

Each kit contains a tinned and drilled printed circuit board together with all board-mounted components and a set of instructions. The complete range, with even more additions, will be on show at the RSGB National Convention.

G4ZPY PADDLE KEYS INTERNATIONAL (Stand L1, L11)

Several new introductions to the G4ZPY Morse Key range make their debut at the NEC rally this year.

The company has finally miniaturised its Iambic Circuit and combined it with a Twin Paddle Key. Eventually all Paddle Keys will be obtainable combined with the Iambic.

This Keyer is so new that at the time of going to press ZPY was unable to quote a price.

For the amateur who loves the touch of gold, the **'Sovereign' Pump Key and 'Sovereign' Trophy Key** will be inlaid on the top of the knob with a British gold half sovereign.

These models have already been welcomed by overseas customers. The price for these beauties:- Sovereign Pump, £175. Sovereign Trophy, £215.

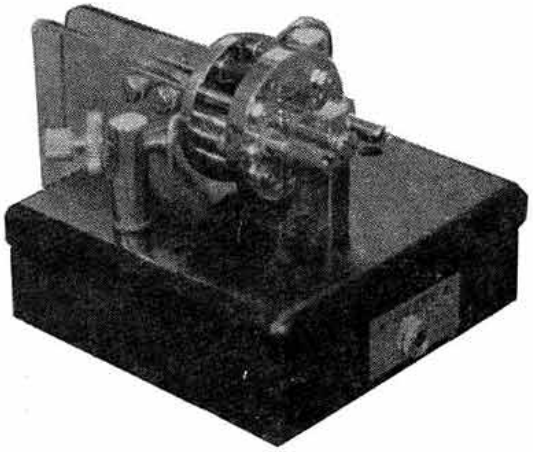
For customers who would like to upgrade their G4ZPY, they can purchase this knob on its own for £90.

J.A.B. ELECTRONIC COMPONENTS (Stands U15, U16)

For the first time, J.A.B. Electronic Components are exhibiting at RSGB NEC91. J.A.B. specialise in the supply of RF and electronic components, for hobby, education and industrial use. On show are **kits for *RadCom* projects** past and present and a vast range of components. J.A.B. are Midlands area stockist of Toko parts.

ICOM (UK) (Stand A1, A5)

On the ICOM stand is something truly unique - **the IC-W2E, a dual-band hand-held packed with features**. Coverage is 144-146MHz and 430-440MHz in a variety of tuning steps. Power output is up to 5W, depending on the power source used. Extra facilities include monitoring of two bands at once, full duplex operation, 60 memories, top panel tuning control and digit keys, selective calling and a built-in clock.



ICS

ICS Electronics Ltd.

DATA COMMUNICATIONS

DSP-2232: New Digital Signal Processing based terminal unit. As PK-232, but with all satellite modems.

PK-232MBX: 7 mode intelligent terminal unit. Over 45,000 shipped worldwide.

PK-88: Packet Radio terminal unit with mailbox and all the latest features.

AMT-3: RTTY and AMTOR. *The definitive implementation* of AMTOR by G3PLX.

RADIO FACSIMILE

FAX-1: Facsimile demodulator. Connects between receiver and printer to produce superb weather maps and pictures.

FAX-2: Specialised marine system with Navtex.

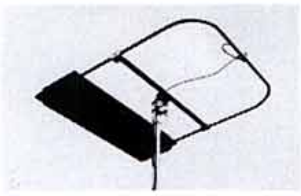
MET-2: Meteosat reception on an IBM-PC. NOAA reception optional.

ICS-FAX: Low cost HF facsimile reception on an IBM-PC.

ACCESSORIES

LA-30E: 3-500Z linear amplifier. Over 600 watts output. Simplified tuning.

MM-3: The ultimate in memory keyers. For contester or beginner. Live QSO training modes.



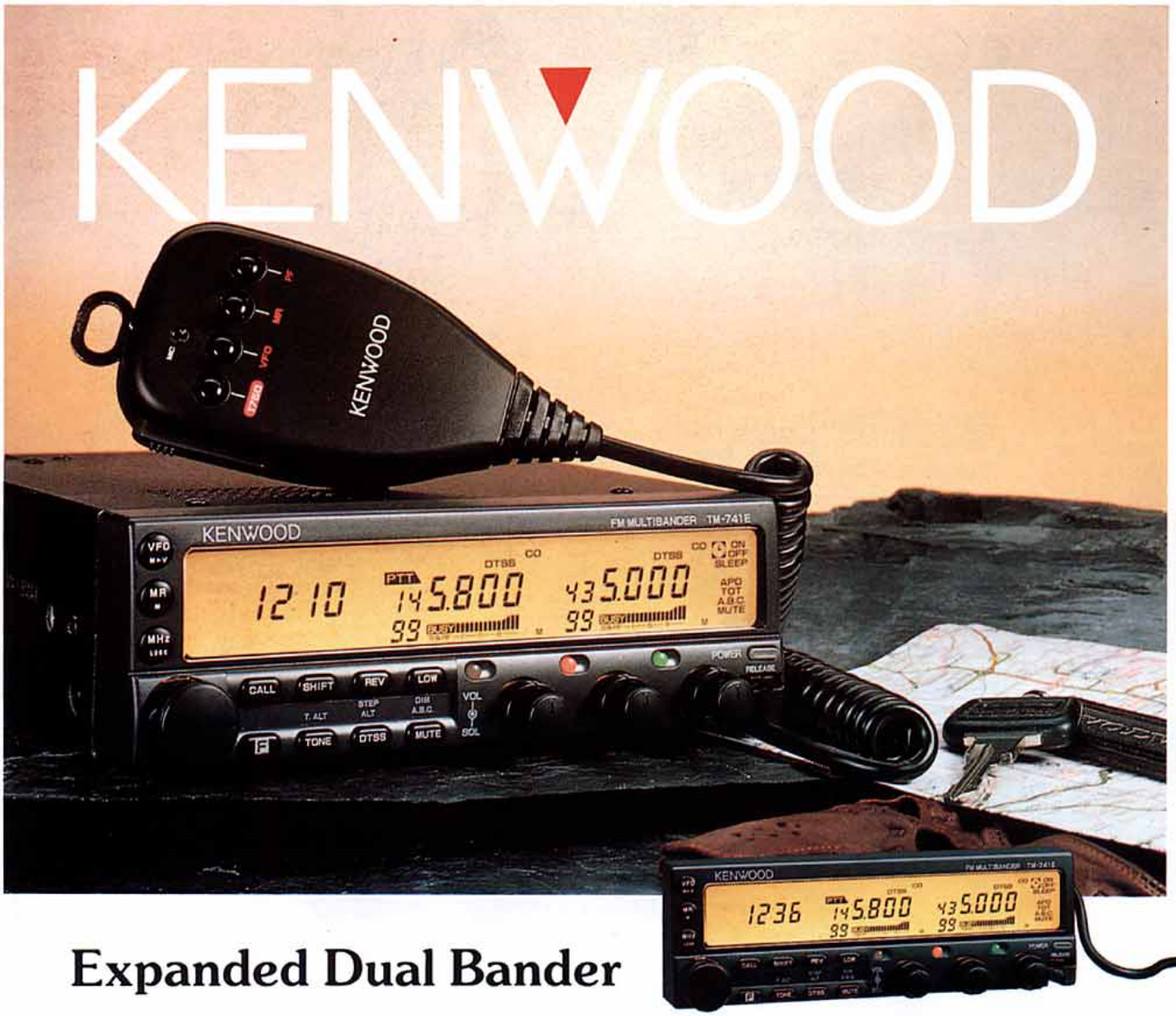
ISOLOOP: Dipole like performance from an antenna 32in. square. 14-30MHz. 150 watts.

ET-1: 300 watt antenna tuner with SWR meter. 1.8 to 30MHz.

Available from Dealers and Distributors throughout Europe. **Free catalogue on request.**
12 months warranty. Full range of professional and marine data-over-radio products.
Visitors by appointment 0900 to 1730 weekdays

VISA

ICS Electronics Ltd, Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD, England — Telephone: 0903 731101 — Facsimile: 0903 731105



Expanded Dual Bander

The new Kenwood TM-741E is a Multi-Band FM transceiver designed to meet the demands of the mobile radio amateur. The revolutionary design of the TM-741E provides dual band (144MHz/430MHz) operation, with the capacity of expanding to triple band operation by adding optional modules for 1200MHz, 28MHz, 50MHz.

■ **Full Features, Ultra-Compact Design** ■ **Optional Band Units (28MHz, 50MHz, 1200MHz) for Tri-Bander** ■ **Easy-To-Operate, Easy-To-Install Detachable Front Panel** ■ **High Power Output (144MHz: 50W, 430MHz: 35W), with a 3 Position Power Switch** ■ **Independent Receive Function** ■ **Multi-Function Scan** ■ **Tone Alert System with Elapsing Time Indicator** ■ **Dual Tone Squelch System (DTSS)** ■ **Pager Function** ■ **Clock Function** ■ **Automatic Band Change Function** ■ **Auto Power-Off Function** ■ **Multi-Function Microphone Supplied**

FM MULTIBANDER

TM-741E

LOWE ELECTRONICS LTD

Chesterfield Road, Matlock, Derbyshire DE4 5LE Tel: 0629 580800 Fax: 0629 580020

***BOURNEMOUTH:** 0202 577760 ***BRISTOL:** 0272 771770 **CAMBRIDGE:** 0223 311230 ***DARLINGTON:** 0325 486121
***GLASGOW:** 041-945 2626 **LONDON (EASTCOTE):** 081-429 3256 **LONDON (HEATHROW):** 0753 45255
S WALES (BARRY): 0446 721304 **Closed all day Monday*

Sole Appointed UK Distributor for KENWOOD Amateur Radio