Radio Communication

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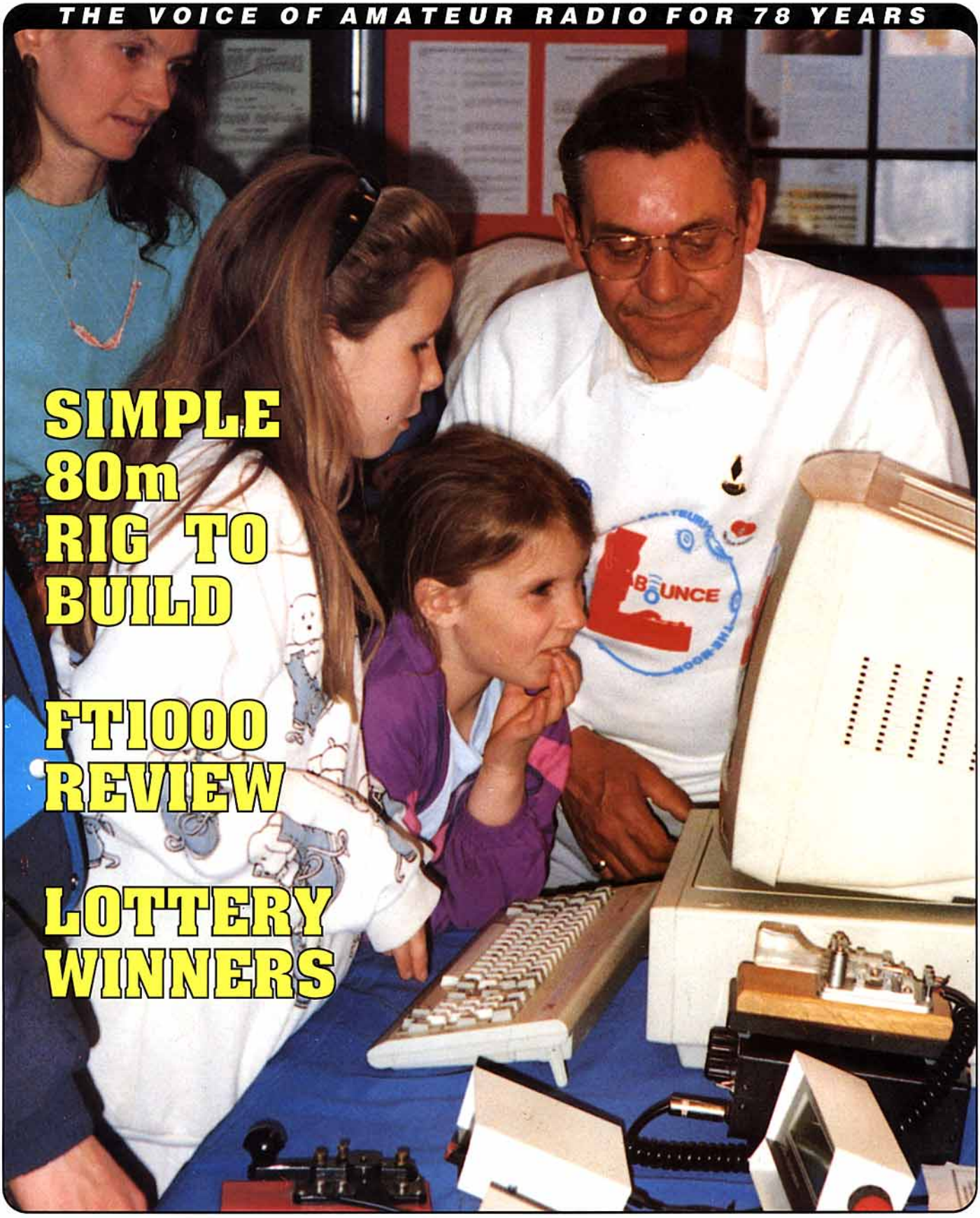
THE VOICE OF AMATEUR RADIO FOR 78 YEARS



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FT1000 REVIEW

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Radio Communication

Twenty pages of technical articles:

- **TECHNICAL TOPICS - Two extra pages this month.**
- **FIRST STEPS IN HOME CONSTRUCTION: Part two.**
- **BUILD A SIMPLE 80m TRANSCEIVER.**
- **AN AUTO-SWITCH-OFF NICAD CHARGER.**
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COVER PICTURE:

Visitors to the RSGB Novice Information Stand at the NEC try their hand at Morse Code, computer-style on the 200th Anniversary of the birth of Samuel Morse. Supervising is RSGB Council Member Clive Trotman, GW4YKL.

PHOTO: G4JKS

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RADIO SOCIETY OF GREAT BRITAIN

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

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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

Sporadic E Hotline

THE RSGB IS RUNNING ITS Sporadic E Hotline again this year. This is an experimental service to help operators make the most of potential Es openings. It is run by Jim Bacon, G8YLA, the IARU Region 1 Sporadic E coordinator, who will update the information when new data becomes available.

The hotline will include details of possible Es locations for that day (based on past years' studies), any known Es event and the Boulder K index when available. Please note these will not be forecasts, merely indications of where new logs are most needed to resolve some of the many remaining mysteries of Es formation.

RSGB SPORADIC E HOTLINE
0426 952211

This is a local rate call in the UK. If you do work anything let Jim have your logs. Remember to include all the usual details:

a) date
b) band
c) time
d) callsign
e) QTH loc
f) report
g) beam headings

} both stations

The best times to check for Es are typically late morning (1030-1230 UTC) and particularly late afternoon (1600-1800 UTC). The prime months for Es on 2m are May to August so now is the time to sample this exciting mode of VHF communication. You do not require high power or large antennas to work Es, but you do need to be brief with the overs because a QSO may only last a few minutes before the path fades. Further details can be found in *RadCom* May-Aug 1989 *[Reprints available only to members at £5 inc P&P from RadCom office - Ed].*

Please send all your Es logs to help propagation research. The address is: J D Bacon, G3YLA, Highways, East Tuddenham, Dereham, Norfolk, NR20 3AH, England.

It is also hoped to issue bulletins on the packet radio network and, of course, receive any data or messages. Contact G3YLA @ GB7TLH.

Finally, Jim is establishing a computerised database for Es logs which will enable any interested researcher to participate in this active area of propagation work. The aim is to be able to provide data for any given day on request, probably via floppy disk in a PC compatible format. Your logs will help to ensure that this database is as comprehensive as possible. An announcement will be made when the database is ready for use.

NEWS & REPORTS

HQ News

WE ARE NOW back from the NEC and in the process of assessing the result and listening to feedback from members and traders. Over the two days 5,806 people visited the show, bringing in an income of £13,494 after deducting VAT. The receipts from renting out stands just about covered the cost of hiring the centre and book sales income was almost £16,000. Financially the show was a success although this was not the only objective. The Novice Licence stand presented an opportunity to meet members and potential members in an informal activity- based forum which was very popular.

The Lottery bank account will stand at £19,295 when all the credit cards have cleared. Printing of tickets, application forms, etc totalled £3,218 and the cost of the prizes was £7,962. This leaves a surplus of £8,115 which will be used to pay for the information packs which are currently being printed. These cost approximately £1.45 each and several thousand will be required depending on the interest generated. The electronics-associated prizes were donated by generous suppliers, leaving only the car, video and holiday travel to be purchased. Although Perry's garage was most helpful, we were surprised at Fords' lack of generosity, given the increasing requirement for electronics experts in the car industry.

The Society has now received a net repayment of VAT from Customs & Excise amounting to £87.491. This claim was successfully negotiated in conjunction with our auditors who are still in discussion with Customs & Excise. These funds should enable the Society to continue its operations without recourse to bank support.

We have now achieved a small surplus for each month since the half year figures were released, so our overall deficit for the year is steadily being reduced. We are at a critical period in our fortunes until we have the bulk of our subscriptions in for July. These represent one-third of our subscription income for next year and our preliminary budget looks very promising. However, I feel we should take a conservative approach and have the subscriptions in before redirecting our efforts.

Many of our problems are associated with lack of HQ resources and manpower. However, the Society has a wonderful reservoir of talent and enthusiasm in its RLO system and affiliated clubs. Much of the hard work on the Novice Licence is being conducted at grass roots level through this organisation. I am talking to a group of RLO's in a few days time and hope to obtain feedback on problems and progress as experienced by amateurs across the country. I am listening to many good ideas and need to sort out the practical from the purely hypothetical.

Philip Smith
General Manager

"No-one Ever Wins Cars in Lotteries"

Bob's Biggest Ever Trophy

A STUNNED Bob Harrison, G4UJS, said, "no-one ever wins cars in lotteries." These were amongst the first coherent words to come from Bob after he discovered he had won first prize in the RSGB Project YEAR Lottery — a shiny new red Ford Fiesta.

Bob, who bought his ticket at the highly successful RSGB Convention and was present at the NEC when the draw was made, was rendered almost speechless by winning the car. It also took him half an hour to convince his wife it was true when he got home.

As a member of the Northern Lights Contest Group, Bob is no stranger to winning RSGB trophies, but this was the biggest yet. Amazingly, he also won the third prize - the TV/video - but gave it back to be raffled again when he learned he had won the car.

The draw was made by TV weatherman and RSGB video star Jim Bacon, G3YLA. Ron Broadbent, G3AAJ, of AMSAT-UK was Master of Ceremonies.

Other prize winners were:-

- A week's holiday for two in The Gambia: **Mr M Watts, G4JZO**, of Scarborough.
- The combined video recorder and television: **Mr R Smith**, of Surrey.
- Chrome and marble morse key: **Mr D Phillips**, GW7CYT of Rhondda.
- Morse tutor: **Mr P A Hadler, G4CZU**, of Herne Bay.
- SWR Meter: **Mr A Newton** of Arnold, Nottinghamshire.
- Mobile microphone: **Mr D Dumbleton, G3HCM**, of York.
- Digital Multimeter: **Mr W Andrews, GW2DHM**, of Cardiff.
- 2m Band Pass Filter: **Ms E McCart** of Ayrshire.
- Soldering iron: **Mr A Dyson, G0BXT**, of Teighnmouth.

The seller of winning ticket, **Mrs Audrey Hall**, won a 144MHz handheld. For selling the highest number of tickets - 450 of them, **Mr J T Barnes, GI3USS**, won 50W 2m mobile.

All of the proceeds of the lottery will go towards the RSGB's Novice Licence work and will help to recruit more people into amateur radio.

Lottery winner, Bob Harrison, G4UJS, being congratulated by RSGB President John Case, GW4HWR.

Master of Ceremonies, Ron Broadbent (right) being protected from the weather by Jim Bacon, G3YLA.

Raynet Independence Rethink

MEMBERS WILL have read in the May edition of *RadCom* that Raynet was to become an independent affiliated society of the RSGB from 1 May.

Following much correspondence from members about this, an ad hoc meeting of Council was called for 27 April at which Council considered members comments, as well as input from an informal meeting of interested parties held at the NEC during the previous evening.

It was decided by all concerned to make a fresh start by returning to the status quo existing between the Society and Raynet on 1 January 1991. Emphasis was placed on the removal of the time scale and the implementation of a Presidential Working Party to ensure much closer cooperation between Raynet and the Society.

The chairman of the RSGB Raynet Committee, Mr P Howarth, was reinstated and the caretaker chairman was asked to stand down. Credit must be given to the two members concerned, Mr P Howarth and Mr G Mills, for the efforts they both made to resolve an almost impossible situation and we thank them for the manner in which they accepted the reversal of Council's original actions.

The working party will comprise a balance of Council and Raynet representatives, together with the President.

Council wishes to apologise for any distress caused by its previous, somewhat precipitate, actions and hope that the very cordial relations which existed during the Convention will be continued throughout the joint effort of determining the future of Raynet.

Council Resignations

IN MARCH, Hilary Claytonsmith, G4JKS, resigned from most of her voluntary RSGB jobs for personal reasons. This included membership of the Council and of several committees, and authorship of *RadCom*'s *EMC* column. She continues to spend a considerable amount of her spare time on Novice and Project YEAR work.

Mr G R Smith, G4AJJ, has found it necessary to resign from Council and, therefore, from the Chairmanship of the Finance and Staff Committee.

RSGB VHF/UHF Awards News

THE RSGB Supreme Award number 77 was claimed by Eddie Ashburner, G0EHV, who qualified for the award by having 144MHz Senior Transmitting Award 236, the 432MHz Senior Award 130 and the 70MHz Senior Award 64.

Two ladies have been busy updating their awards, namely Ela Martyr, G6HKM, whose awards now include the 50MHz 175 squares and 50MHz 50 countries (2-way) and Ruth Davies, GW1EHI, with the 144MHz Standard Transmitting and the 144MHz 80 square/18 countries awards.

Some recent applications for 70MHz awards prove that there is life on the band and numbered among these are John Lemay, G4ZTR 25 square/6 countries, D Hilton-Jones, G4YTL 35 squares/8 countries and Geoff Grayer, G3NAQ also with 35 squares/8 countries.

At the higher levels of award Geoff Brown, GJ4ICD is now up to 375 squares confirmed on 50MHz, George Eddowes, G3NOH has 200 squares on 50MHz, G4YTL 250 squares/35 countries on 144MHz, Derek Dibley G4RGK 140 squares/18 countries on 432MHz and G3IMV 110 squares/15 countries on 432MHz.

Nowadays award applications from radio societies are unusual; however, the University of Surrey Electronics and Amateur Radio Society was recently issued with two 144MHz Standard Transmitting certificates; the first to G8AHK and the second to G3IGQ/P. Perhaps your own radio society or contest group has sufficient QSL cards to qualify for an award certificate to put on the clubroom wall - it is worthwhile checking!

Flying the Flag – NEPCON 91

by David Evans, G3OUF

IT HAS LONG been an ambition of the Society to attend some of the major electronics shows in the UK. The objective, of course, is to promote amateur radio in general and to help give amateur radio a higher profile and more status. In the past, resources and cost considerations have always prevented such plans reaching fruition.

The Society was therefore pleasantly surprised when David Topham, GM3WKB, of Cambridge Intercommunication Technology Limited, sponsored a stand for us at the recent NEPCON-Europe Show, held at the National Exhibition Centre, 19-21 March. This most relevant and delightful form of sponsorship was wholeheartedly accepted. It was offered as part of the RSGB's YEAR (Youth into Electronics via Amateur Radio) initiative and as such this set the scene for the construction and lay out of the stand.

"The theme Youth into Electronics worked well" said stand manager, Hilary Claytonsmith, G4JKS, who is the RSGB's Project YEAR Co-ordinator. Hilary worked very hard on all the stand publicity material and design which all came together to make a most attractive display for the Society.

In the three days of the show, nearly 300 radio amateurs signed the visitors book. The HF station, GB2NEI, on the stand attracted a lot of interest, especially when using Morse, though we did have a case of AF breakthrough on day one - a salesman on an adjacent stand could not hear one of his customers because of the morse!

There was a great deal of interest in the RSGB stand, and many leaflets on amateur radio and the Novice Licence were given away. Most people certainly picked up the link with UK industry in generating interest and enthusiasm from young people as a potential seedbed for future careers in electronics or science.

Very many people helped to make the Society's stand at NEPCON-Europe 91 a success. Above all, David Topham, GM3WKB, is thanked for his most generous sponsorship. Hilary Claytonsmith, G4JKS, the RSGB's Project YEAR Co-ordinator burnt the midnight oil to prepare the stand. Warwick Hall, G4WMH, was our man in Birmingham and proved as helpful and energetic as he had been at the RSGB's 75th Anniversary celebrations in 1988. Many others are to be thanked for giving up their time to be on the stand and helping in other ways. These include: G3OOQ, G3TZM. G3ZOM, G4AAL, G4IVJ, G4LQF, G4VMP and G8ACR.

VHF Round Table – Martlesham, Suffolk, 16 June

ANOTHER RSGB VHF Round-Table is to be held at BT Labs, Martlesham, Suffolk, on Sunday 16 June, starting at 10.00 am. It will be similar to last year's event, and will include two lectures, one before lunch, and one after it. Full details of the talks will be announced on the *GB2RS* News Service.

The usual test-equipment facilities will be available, including:- Pre-amp and converter noise figure measurement; insertion loss, isolation, return loss measurements on relays, amplifiers etc; small signal two-tone measurements for receiver, amplifier, transverter dynamic range etc; usual spectrum analyser type purity measurements; and power amplifier power/gain compression measurements to 1kW. Please ensure anything to be measured uses either N, BNC, SMA, SMC, or even 'UHF' connectors. 432MHz pre-amps with 4mm banana plugs for the antenna connection will not be measured!

There will be a refreshment facility serving hot drinks and filled rolls, and there is also a pub ten minutes walk away.

There will be a bring & buy stand, but it is important to point out that the event is not 'another rally'. It is really intended as a meeting point for those interested in serious VHF/UHF operation and construction. Admission to the Round Table will be £1.

In order to meet BT's security requirements, the numbers are going to be limited, and admission will be by ticket only. These can be obtained, on a first come, first served basis, by sending an SAE, to arrive before 7 June, to:- Malcolm Bell, 50 Avocet Lane, Martlesham Heath, Ipswich, Suffolk.

The first amateur radio expedition to Fastnet Rock

Fastnet force seven

STANDING AT the gateway to the western approaches to the British Isles, the Fastnet Lighthouse has been an important landmark since 1854. Built in 1905, the present lighthouse comprises 2074 interlocking hand-carved stones with a weight of 4300 tonnes. Although the tower is over 50m high, it is less than 3/16 inch off vertical!

The rock, four miles off the south-west coast of Ireland and measuring only 100m by 50m, is lashed by Atlantic gales. It is reckoned to be possible to make a step-off boat landing only on some 12 tides per year, and many will recall the Fastnet Yacht Race disaster in the summer of 79.

Undeterred by all that (or maybe because of it), six Irish operators - Fastnet Force Seven - intend to activate the rock this July. Two of the group, Frank, EI2GS and Tony, EI3GU, have been fascinated by Fastnet since before taking up amateur radio. In 1977, their scuba diving group located the wreck of the *Skibbereen Eagle*. It was the loss of that ship in 1847 which finally persuaded the authorities to build the lighthouse.

Whilst exploring around the wreck, they came across two five-foot long copper 'mushrooms' weighing over 600lb, together with remnants of copper wire, lying in 30m of water. It took two years of enquiries before their purpose was discovered. In 1895, they formed part of an experimental telegraphic link for Lloyds of London. Over seven miles of copper conductor was used and the 'mushrooms' acted as anchors and earth plates. The system was abandoned in 1905.

It has taken a year of planning to get to the stage where the expedition can take place. Finance has been provided by Telecom Eireann whose museum will finally house the mushrooms. The Irish Tourist Board and Switzer Catering have also helped.

Ham with mushrooms: (l to r) EI9FK, EI3GU, EI2GS, EI4GK, EI5CZB, EI2BB, with the finds which sparked off the expedition.

EJ7FRL

LOCATION: Fastnet Rock; 51° 23' 18" North, 9° 36' 25" West; IOTA EU-121

Dates: Landing by helicopter on 9 July, leaving 19 July, weather permitting.

Frequencies: SSB - 3.775, 7.075, 14.140, 14.240, 21.275, 28.450, 144.260MHz, plus 160m and WARC bands. CW - 3.510, 7.010, 14.010, 14030, 21.010, 21.030, 28.010, 28.030, 144.040.

QSL: via EI2BB, QTHR, or Bureau.

Geo-Physical and Solar Data Broadcast

GAM1

THE SELECTION OF operational frequencies for radio communication in the high frequency (HF) bands, as well as the study of the propagation of radio waves generally, requires a knowledge of the magnitude of various factors. These include the sunspot count, solar flux and magnetic index. For some purposes it is highly desirable to have the value of these progressively on a daily basis.

For many years broadcasts of such data in Morse code were made routinely from Ste Assise in France (c85kHz), the data for which emanated from the Meudon Observatory. The messages were known as Ursigrams, a name derived from the sponsoring body, the International Union of Radio Science. Whilst the transmissions were primarily intended for professional use, they were available to all including many radio amateurs.

With the development of communication techniques allowing the interconnection of establishments by landline and satellite, the need for radio Morse broadcasts declined resulting eventually in the closure of the service, though the ursigrams continue to be disseminated by wire services. This left many observers with little or no chance of obtaining the information daily, or even regularly, unless they subscribe to one of the professional outlets.

The problem was discussed within the IARU Region 1 HF Committee and the provision of a replacement system was highlighted as a pressing need. For

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GAM1

continued from page seven

some considerable time, the RSGB Propagation Studies Committee has been working on establishing such a service with the aim of covering the British Isles and much of NW Europe.

The scheme has the support of the propagation research staff of the Radiocommunications Agency and the Scientific and Education Research Council and it is part of the National Radio Propagation Programme.

An application was made for a 'fixed-service' frequency assignment close to the 3.5MHz amateur band to enable operators with 'amateur-bands only' receivers to use the broadcast. A frequency of 3812.3kHz has been approved, together with the callsign GAM1. The supply of the data directly from a professional source, the World Data Centre at the Rutherford Appleton Laboratory, has been arranged. The transmission will eventually be both A1A and F1B with an 'ursigram-type' message at regular intervals.

To launch the service, the equipment is being set up at the QTH of G3DME at Crowborough, Sussex. The investigation of locations for a long term permanent site will continue. It is expected that, by the time you read this, tests will have commenced and that data will be transmitted in the near future.

To assess the geographical coverage of the service, reception reports will be appreciated and should be addressed to G3DME (QTHR). Whilst the station is not a beacon in the normal sense of the term, it will obviously give an indication of propagation at 3.8MHz. Consolidated reports in respect of extended periods of observation would be most useful for analysis and study. They should be sent to RSGB HQ marked "For the attention of PSC".

The project has received valuable assistance from external organisations as follows: Marconi Communications Ltd (donation of a 1KW HF transmitter); Messrs ICS Electronics Ltd (donation of a multi-mode terminal node controller); Messrs Schneider Computers (help with the provision of a computer); Messrs McKnight Crystals (donation of high quality crystals). Those contributions are hereby gratefully acknowledged, as is the assistance given by a number of individuals, including G2FKZ, G3FET, G3HCT, G3HTF, and G0DLF.

RSGB member, Richard Horton, G3XWH, (right) meets UK astronaut Helen Sharman (GB1MIR), in Star City, Moscow, to finalise arrangements for the schools projects and amateur radio activity taking place during her time on the Mir space station. See next month's *RadCom* for the full story of this historic space journey.

Space Stamps Launched

THE POST OFFICE used amateur radio to launch their new Europe in Space stamps on 22 April. Using a 144MHz FM link between GB2SFS at RSGB HQ, and GB4SFS at the University of Surrey space centre, colour slow scan TV pictures of the stamps were exchanged. The Robot SSTV system was provided by G4TUK and the event was covered by the Post Office publicity team as well as by the *Potters Bar Times*.

RSGB Secretary David Evans, G3OUF, receiving slow scan pictures of one of the space stamps from Surrey University.

Trophy Nominations Required

Scottish Trophies

TWO TROPHIES are awarded annually in Scotland: the Jack Wylie Trophy to the Scottish club, society, or RSGB member thought to have done most for amateur radio in Scotland, in general terms, in the past year; and the Jock Kyle trophy to the Scottish club, society, group or RSGB member thought to have done most in Scotland in the field of VHF in the past year.

In the case of an award being made to an RSGB member, that person must have been resident in Scotland during the period that the award refers to.

In 1990 the Jock Kyle Trophy was awarded to Dave Cossar, GM3WIL, for his work on the 144MHz bands and above. The Jack Wylie Trophy was awarded to the Scottish Tourist Board Expedition Group for their continuing work in connection with the Scottish Tourist Board.

Nominations and citations for each of the trophies in respect of the 1991 awards are required from at least five RSGB members resident in Scotland who should send them to the Zonal Council Member, Ian Suart, GM4AUP, by 12 August 1991. In the event of more than one nomination being received for either trophy, the final decision on the award will be placed in the hands of the Scottish RLOs.

In the event of no nominations being received, the trophies will pass to the safe keeping of the Zone G Council Member until nominations are called for in 1992.

G5RP Trophy

NOMINATIONS ARE requested for this trophy which is presented to the RSGB member who has, in the opinion of the HF Committee and the Vale of the White Horse Radio Society, made the greatest progress in the field of HF DX in the period July 90 to June 91. The trophy is intended to encourage newcomers to DXing and particularly progress in the many HF award programmes. The trophy will be presented at this year's RSGB HF Convention in Daventry (28-29 September).

Nominees should request the 'Guide for Proposers' from Bob Whelan, G3PJT, 36 Green End, Comberton, Cambridge, CB3 7DY.

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M-285	2m 5/8 wave	15.95
EL-2E	2m 7/8 wave	32.95
K-10M	Fold gut mount + cbl	32.95
K-30M	Fold hatch/bt + cbl	32.95
K-11	Gut mnt. thumbscrew	19.95
K-33	Hatch mnt. thumbscrew	19.95
K-400	Slim universal mnt	46.00
K-600	Deluxe boot mnt	39.95
K-704M	Hvy dty magmount	38.00
AM-L	Gutter mount	12.95
EC-H	Cable =AM-L K-11 etc	9.95
SP-M	Deluxe mag mount	24.95
TR-A	Hvy dty boot mount	26.95
D-505	Active rx	69.00
MB-100A	Univ. Mnt. tnc	39.95
MA-1100	2m/70cms tnc	26.95
MA-200	2m 1/2 wave tnc	26.95

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X-300	6.5/9.0dB 3.1m	89.00
X-500	8.3/11.7dB 5.2m	119.00
X-700	9.3/13.0dB 7.2m	199.00
X-5000	2m/70cm/23cm 1.8m	99.95

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CP-5	10-80m vert + radials	189.00
D-130N	25-1300MHz discone	82.50
CP-22J	2m 2 x 5/8	49.95
D-707	Active 1.5-1300MHz	99.00

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SX-400	140-525MHz 5-200W	79.00
SX-600	1.8-528MHz 5-200W	119.00
SX-1000	1.8-1300MHz 5-200W	159.00
SX-2000	Auto 1.8-200MHz	89.00
SX-9000	Auto 1.8-1300MHz	179.00

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20818	9 el xd. 13.1dB	65.00
20813	13 el 14dB	55.00
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OSCAR

20899	2m/70cm 9/19 el	65.00

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20909	9 el 13dB	33.00
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20438	19 el xd 18.2dB	53.00
20912	21 el 18.2dB	53.00
20922	21 el (TV) 18.2dB	53.00

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20624	23 el (TV) 18.1dB	35.00
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20650	55 el (TV) 21.5dB	55.00
20696	4 x 23 el kit	199.00
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20725	25 el	41.00
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29423	4 x 1296MHz	53.00

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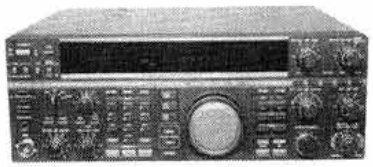
Carriage & Ins. Aerials £5.00 Splitters Free.

Free AC PSU Worth £119!

We are offering free AC power supplies on most HF transceivers. Below are illustrated just a few. This represents a major saving and we guarantee the PSU against over voltage and over current problems. We now have a superb demonstration "shack" with 3 element beam at 50ft and dipoles. Come and try the gear, work the DX and experience the kind of service and deals our competitors promise but never give. We'll put you in front of your favourite DX machine, give you a coffee or tea and let you sample the delights of our products actually on the air. You might even work a new country! Similar facilities are available for the VHF enthusiast.

Kenwood TS850S



TS850S

£1,323 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.

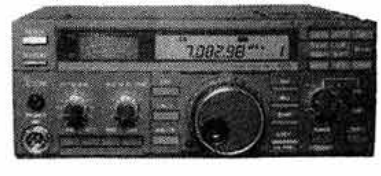
Kenwood TS140S

TS140S

£879 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

£775 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!

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It's now over six months since we introduced Microset to the UK and their performance and reliability has proved to be exemplary. We now have some lovely colour catalogues of their complete range which can be sent upon receipt of an SAE.

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R-25	2m 1-4W in 30W out. GaAsFET pre-amp	79.00
RV-45	2m 3-15W in 45W out GaAsFET pre-amp	99.00
R-50	2m 1-7W in 50W. GaAsFET pre-amp	159.00
SR-100	2m 4-25SW in 100W out. GaAsFET pre-amp	159.00
SR-200	2m 10-50W in 200W. GaAsFET pre-amp	289.00
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The complete range available direct or from all good dealers.

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LW10/2m	10 el 2m beam	39.00	32.00	PBM18	18 el 70cm beam	55.00	44.00
LW16/2m	16 el 2m beam	57.00	46.00	PBM24	24 el 70cm beam	72.00	57.00
PBM10	10 el 2m parabeam	77.00	61.00	MBM28	28 el 70cm beam	37.00	29.50
PBM14	14 el 2m parabeam	94.00	75.00	MBM48	48 el 70cm beam	59.00	47.00
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DJ-560E Dual-Bander
2m-70cm (Rx 137-180/400-520MHz Option)

DJ-560E
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 130-174/400-520 MHz. 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.

Accessories

EJ-6U	CTSS Tone squelch	39.95
EBP-10N	Spare ni-cad pack	29.95
EME-10	Headset/Vox	44.95
EMS-2Z	Speaker/microphone	24.95
ESC11	Soft case	9.95

DJ-160EA 2m Transceiver & Airband

£239

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!

Accessories

EJ-6U	CTSS Tone squelch	39.95
EBP-10N	Spare ni-cad pack	29.95
EME-4	Earphone/microphone	24.95
EMS-2Z	Speaker/microphone	24.95
ESC10	Soft case	9.95

LATEST DUAL-BAND MOBILE ALINCO DR-590E £499

OPTIONAL CABLE KIT

DR590E
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 fingertips one of the most advanced dual band mobile transceivers available.

ALL MAJOR BRANDS STOCKED **LARGEST IN SOUTH EAST**

LOWE ELECTRONICS LTD.

TS-790E £1,525

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.

TR-751E £610

Kenwood's all-mode 2 metre mobile/base station rig. SSB/CW/FM all provided with 25W on all modes. Hot receiver, ease of use, total satisfaction in the Kenwood way. Chatting on the repeater, chasing the SSB DX, satellite comms or AMTOR, all is yours with the best all mode rig on the market. Why not have it all in one box?

TM-241E £295

High power (50W) compact FM mobile for 2 metres, combinining top performance, ease of use and ease of fitting; thanks to diminutive size. Bright easy-to-read display coupled with a multi-function microphone make mobile operating a real pleasure. Indeed, owning a TM-241E is a pleasure in itself. There is a 70cm brother in the TM-441E (£325) and even for 23cm in the TM-531E (£415).

TS-850S £1,325

The HF rig which has taken the world by storm. We have a queue of eager folk waiting for delivery; and it's no surprise when you see and hear the TS-850S in action. All band operation from 160 to 10 with a general coverage receiver which beats everything except the TS-950S. Every possible operating convenience and total ease of use make the TS-850S the world beater in the HF field. Send for details today or call at any of our branches to see it.

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BNOS PRODUCTS
The Power Supplies

The "E" series, of rugged, "Black Brick" construction, are desigtned to be tucked away under the bench and forgotten about.

The first number in the model description is the nominal output voltage; the second is the rated current output at 50% duty cycle.

The peak current capability is 20% higher than the rated output. (e.g. The 12/30E delivers 30A rated and 36A peak.)

12/5E **£78.20**
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12/30E **£250.70**

The "E" series is also available in 5V and 24V output voltages at the same price as the 12V range.

I know, I know. You can get cheaper power supplies, but not with the in-built protection and RF immunity which come as standard features from BNOS.

The Linears

(First number is the frequency band, second number the input power, third number the output power.)

CLX Range. Linears without pre-amp.

CLX144-3-100 ..... **£225**
CLX144-10-100 ..... **£192**
CLX144-10-180 ..... **£356**
CLX144-25-180 ..... **£303**
CLX432-1-50 ..... **£225**
CLX432-10-50 ..... **£192**
CLX432-10-100 ..... **£356**
CLX432-25-100 ..... **£303**

CLP Range. Linears with high performance Rx pre-amp.

CLP50-10-100 ..... **£257**
CLP70-10-100 ..... **£257**
CLP432-1-50 ..... **£257**
CLP432-10-50 ..... **£225**
CLP432-10-100 ..... **£389**
CLP432-25-100 ..... **£334**
CLP144-3-50 ..... **£152**
CLP144-10-50 ..... **£152**
CLP144-3-100 ..... **£257**
CLP144-10-100 ..... **£225**
CLP144-10-180 ..... **£389**
CLP144-25-180 ..... **£334**

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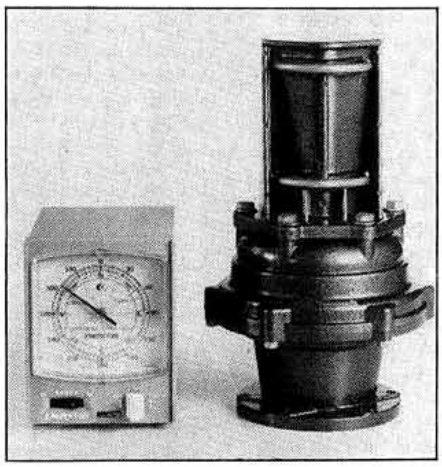
Rotators from this long established company are amongst the best engineered units we have ever seen. Designed by an engineer who knows his subject, the EMOTO rotators are a pleasure to own. All rotator controllers incorporate clear backlit compass scales for beam heading and the cabling is simple and straightforward. Models range from the 105TSX for VHF/light HF use, through the variable speed 747SRX to a mighty 1800SFX for turning large log-periodics. Buy the best you can; it's always folly to cut corners on your rotator. The best is EMOTO.



105TSX ..... VHF/light HF use **£159**
747SRX ..... 3 element HF and up **£354**
1105MSAX . 3 element 40 metre beams, etc..... **£459**
1200FXX ... even bigger and variable speed **£531**
1300MSAX .. I believe that this turns the 16 inch guns on the USS Missouri .. **£914**

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KPC2. Single port TNC for HF/VHF/UHF. 300 & 1200 baud **£165**
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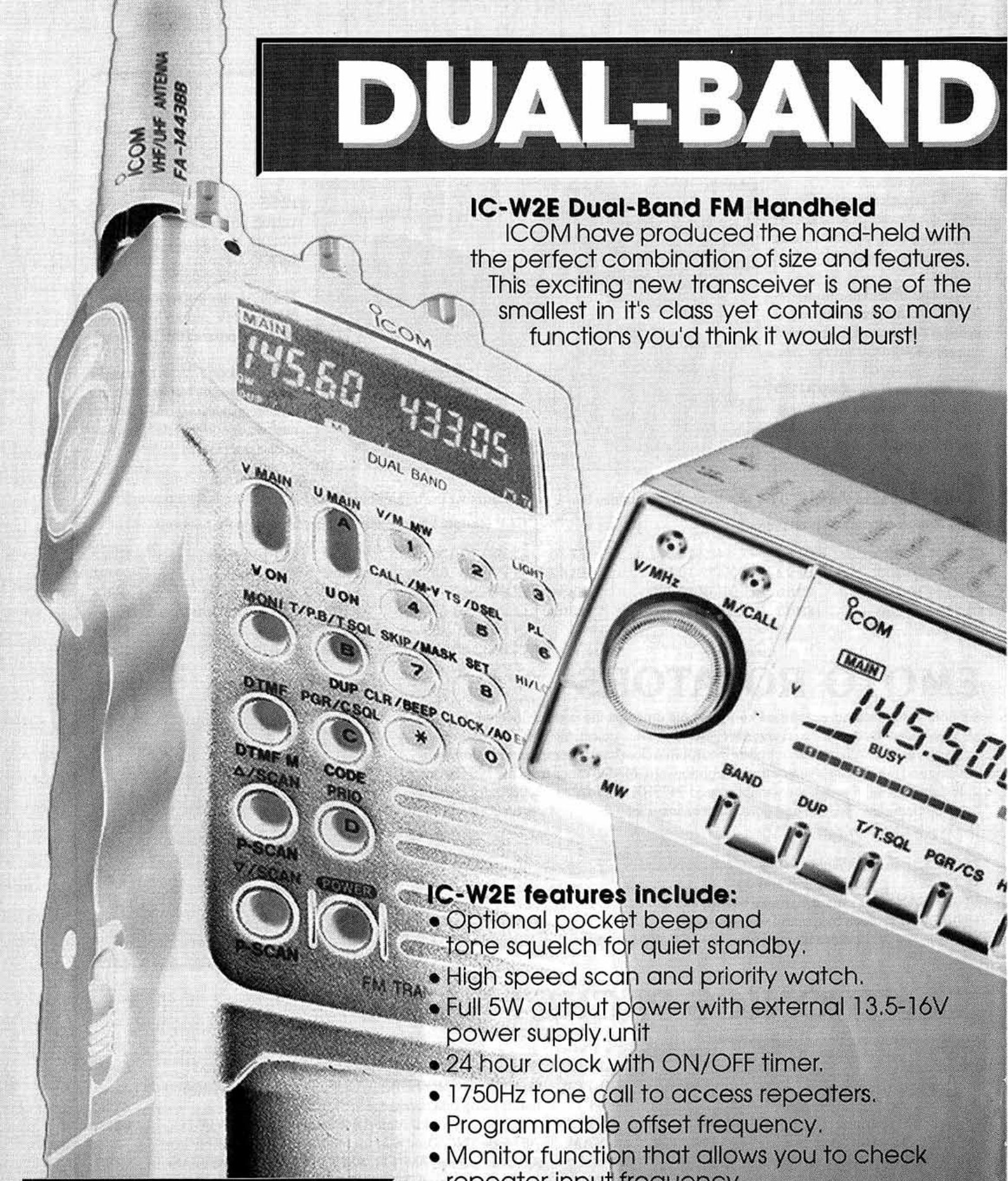
DUAL-BAND



IC-W2E Dual-Band FM Handheld

ICOM have produced the hand-held with the perfect combination of size and features. This exciting new transceiver is one of the smallest in it's class yet contains so many functions you'd think it would burst!

IC-W2E features include:

- Optional pocket beep and tone squelch for quiet standby.
- High speed scan and priority watch.
- Full 5W output power with external 13.5-16V power supply.unit
- 24 hour clock with ON/OFF timer.
- 1750Hz tone call to access repeaters.
- Programmable offset frequency.
- Monitor function that allows you to check repeater input frequency.
- External DC power jack.
- Memory mask to hide seldom-used channels.
- Memory transfer function.
- PTT lock function.
- Keypad and tuning control lock.
- Automatic power save.

ICOM

SUPERIORITY

IC-2410E Dual-Band FM Mobile

ICOM introduces simultaneous reception of two frequencies in the same band!, combine this with simultaneous dual-band receive and you have a breakthrough in features not found anywhere with any other radio. Compact design fully utilises the latest technology while using a minimum of knobs and switches. One-touch controls activate both primary and secondary functions, this ease of operation makes the IC-2410E especially safe when in mobile use.

Outstanding IC-2410E features include:

- Independent volume controls and squelch setting.
- 20db RF attenuator effective against strong signals.
- Built-in duplexer for easy dual-band antenna connection.
- Scan and priority watch functions.
- Illuminated switches and dials for night ops.
- Optional pager and pocket beep for selective calling.
- Optional speech unit.

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As the appointed **U.K. Distributor** for **SHINWA SCANNERS, MARTIN LYNCH** is proud to present the **SR001.**

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Take a look at these advanced features:

- ★ Full infrared remote control/programmer
- ★ Continuous tuning 25 to 999.95MHz
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- ★ 200 channels of programmable memory
- ★ Two remote switched antenna inputs
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- ★ AM/NBFM+FM wide receiving modes
- ★ Mega-fast scanning - 30ch/sec.
- ★ Multi function scanning modes
- ★ Multi mode squelch options
- ★ Channel lock-out facility
- ★ Internal lithium back-up
- ★ Unique strength meter
- ★ Switchable attenuator
- ★ RS232C port available
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- ★ Programmable delay
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- ★ Priority watch
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- ★ Din size - ideal for base or mobile installation
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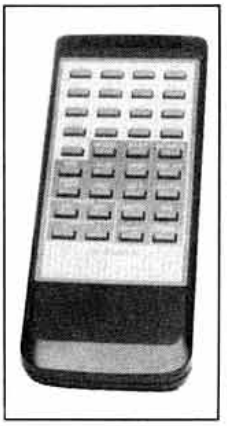
- ★ 12 Months parts and labour guarantee



Mr Chris Lorek, G4HCL recently reviewed the **SR001** in HRT and said, "The set is a unique departure from the "normal", it's very smart appearance combined with remote control features I'm sure will appeal to scanner enthusiasts".

Available from MARTIN LYNCH and other appointed dealers, the SR001 is now available from stock. Phone for details.

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GAREX ELECTRONICS

WIDEBAND SCANNERS

All major brands available, with the all important service back-up. AOR; BLACK JAGUAR; JIL; REVCO; ICOM; YUPITERU. Also good stock of secondhand sets: ask for list.
"SCANMASTER" Scanner Controller: versions for AOR2002, REGENCY MX8000, ICOM ICR7000, YAESU FRG9600. £153.25 Complete with full software for any computer.

WIDEBAND ANTENNAS

Premium quality British antennas & accessories from REVCO. "REVCONE" VHF/UHF Discone (guaranteed free from exaggerated advertising claims!) SO239 connector: £37.75 N-type for improved UHF performance: £39.80 Optional vertical whip feature for experimenters.
"RADAC" nest of dipoles: imitated but not equalled. Guaranteed Tx capability over customer-specified 6 bands in the range 27-470MHz, with excellent wideband Rx performance: SO239 Conn: £86.85; N-type: £88.89; Special VHF/UHF Airband RADAC: 108-380MHz: £80.72. Top quality cable and connectors also available.

WIDEBAND PREAMPS

PA3 series 20MHz-1GHz; min. 13dB gain fitted with HPF to reduce breakthrough problems.
PA3 Masthead with special mains psu, PL/SO connectors: £51.04
PA3/N, as above with N connectors: £54.61
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PA3I/S (SO239): £36.27. PA3I/N (N conns): £39.80
Mains adaptors for "back-of-set" models: £8.68

MOBILE ANTENNAS

REVCO super Mag-mount + 5/8 for 2m: £35.71
Mag-mount + 4.5dB 70cm: £35.71
Body-mount ½" or ⅜" hole (state which) + 5/8 for 2m £20.38
⅜" hole body mount + 70cm colinear (4.5dB) £20.38
Mag-mount with 3dB 900MHz whip: improve the performance of your cell-phone or 900MHz scanner; in the car or on the office filing cabinet: £35.71. All with 4m feeder. Plugs on request.
REVCO unbeatable glassmounts, with tuned matching units for peak efficiency: 2m or 70cm: standard model £40.82; deluxe model: £52.06.

METEOSAT WEATHER SYSTEM

The complete basic METEOSAT system, no computer, just a plug-in and go package that can be up and running in 10 minutes. Antenna, receiver, frame store, all cables through to 12" mono monitor: £813.25 (or less monitor: £612.00).

GAREX VHF PREAMPLIFIERS

Miniature (only 34x9x15mm), any frequency in the range 40-200MHz, up to 25dB gain.
Stock versions: 6m, 4m, 2m, 137MHz (W-Sat): £12.21
Airband 118-136MHz (reduced gain) £12.21.
Other frequencies in the range 40-200MHz to order £14.56

TONE BURST GENERATOR

Miniature (38x18x10mm) xtal controlled 1750Hz £18.34

GAREX DC/DC INVERTERS

A popular line for many years. Economy package: chassis section cut from commercial R/T gear, re-wired & tidied up to make free-standing unit, no expensive cabinet, just basic value for money.
12v DC input, 250v 150mA DC output £11.19
12v DC input, 400v 200mA DC output £12.21

4 METRE Rx CONVERTER

High quality PMR front end by famous manufacturer, modified to make a 4m converter: 10-11MHz output. Full data. Requires xtal, approx 15MHz. £17.32

4 METRE 0.5 WATT Tx FM

Tx Low Power driver unit matching above Rx, with modulator, fully aligned, with data: £16.30 (or + xtal for 70.45MHz £19.95)
Suitable PTT fist microphone: £4.04

PYE ANTENNA RELAYS

12v operation, handles 50 watts up to 200MHz: £1.99; 5 or more £1.53 each

WESTMINSTER FM BANDWIDTH CONVERSION KITS

Converts 50kHz or 12.5kHz FM Westminsters (UHF or VHF) to Amateur band 25kHz spec. Comprises 2 x IF filters + squelch board £15.28.
Lots more: Timestep world-beating weather satellite systems, Monitor Receivers, Pye R/T spares.
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VISA

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

HOW ABOUT this for a record? G3KPO and GW4BKG have brought to my notice a quite extraordinary feat performed by Hubert Whatley, G2BY, who - at 82 - is still to be heard most days on 14.060MHz keeping skeds with VK and ZL at 0800. Not too unusual perhaps but he has now recorded *566 first time contacts* with VK stations since he came on the air in 1928! Well done Hubert - only 444 more for your thousand . . . .

29MHZ FM INTERFERENCE PROBLEMS

I HAVE RECEIVED the following letter from Pat Gowen, G3IOR, of AMSAT. He says: "On behalf of AMSAT, may I make a direct appeal to 29MHz FM users to employ only that part of the 28MHz spectrum allocated by IARU (between 29.2 and 29.3MHz) and specifically to avoid terrestrial use of the amateur satellite service allocations between 29.300 and 29.560MHz, in particular not to use any frequency between 29.350 and 29.460MHz at this time.

"Satellite signals of 2 to 3mW at 3,000km distance on CW and SSB cannot compete with the wide-band FM signals from those who may not even be aware of the continual presence of satellite downlinks. Many FM users may not even have the capability of being able to hear those modes that the allocated space-section carries. Indeed, some of the invading stations that I have tackled (by having to use the self same FM in the space band myself!) were incapable even of knowing the frequency they were using !

"If you are using a conventionally converted ex-CB FM transceiver, then Channel 0 corresponds to 29.300MHz, Channel 1 to 29.310MHz, Channel 2 to 29.320MHz and so on up. The satellite allocated sub-band (see *Radio Communication*, March 1991, p.47) extends from Channel 0 (29.300MHz) to Channel 25 (29.550MHz), although at the time of writing (late March 1991) only two twin transponder satellites, RS 10/11 and RS 12/13 were in current use, these employing from 29.330 (Channel 5) to 29.460MHz (Channel 16). Thus **please avoid the use of this section** and if you hear others using or attempting to use it, please ask them to move to the conventionally FM allocated part of the band, which is plentiful in the number of channels available.

"In the recent surge of activity brought about by elevated 'E' ionisation, whilst the lower and higher channels outside the satellite band are little used, numerous users have concentrated themselves within the satellite section. If *really* essential, by all means temporarily use Channels 0 to 4 and 17 to 40 - ie up to 29.340 and/or above Channel 16 (29.460MHz) at least until such time as the RS-11 and RS-13 satellites now in orbit put their transponders, ROBOTs, and beacon telemetry on for general amateur use."

5Z4ERR NAIROBI

5Z4ERR IS THE callsign of the beacon on 28.2075MHz maintained and operated by the Radio Society of Kenya. The beacon is located at Kiambu some 15km NE of Nairobi City at the QTH of Hermann, 5Z4RT. The station consists of a Kenwood TS120 which feeds 15W into a vertical antenna. The callsign and relevant information are auto controlled. The beacon is operative most evenings and all day at weekends. Listeners reports are welcome and will be acknowledged by the Radio Society of Kenya, PO Box 45681, Nairobi.

Why is the callsign 5Z4ERR? The reason is that 5Z4ERR was the call of the late Robbie Robson (ex-VQ4ERR) a pioneer and leading figure in East African amateur radio. 5Z4ERR immortalises his memory.

ISLANDS ON THE AIR AWARD

THIS RSGB AWARD is becoming very popular and a new and fully revised Directory was due to become available at the end of April. It can be obtained from Roger Balister, G3KMA, La Quinta, Mimbridge, Chobham, Woking, GU24 8AR, price £5, US$10.00, or 15 IRCs (inland). To addresses outside the UK it costs £6, US$12.00, or 18 IRCs.

DX NEWS

PLEASE NOTE a special request received from Richard Barnes - S79D - advising that he no longer acts as QSL bureau in the **Seychelles**. Ken Cheetham, G4RWD, expects to be on the air from **Ascension Is** by now. His callsign should be ZD8WD.

ET2A closed down at the end of March but was expected to return to **Ethiopia** soon and may already be there. His operation has been accepted for DXCC credit. (WB2WOW - who was QSL manager for ET2A and ST0DX - became a silent key recently. However if you have already sent QSLs to him they will be attended to and there is no need to resubmit).

ST0DX in **Southern Sudan** has been very active and is believed to be training two local amateurs who will be operating from a club station which is being set up - they are interested in CW and a key is being provided. Dennis himself should be on RTTY soon.

PHOTOGRAPH: DF9UG

Seeing double at SEANET, '89 in Singapore. l to r: Don Nelson, 9V1SS; Sangat Singh, 9M2SS; and Ambran, V85SS.

TR8JWH (G4VMG), from **Gabon**, appears at about 2000 in the 21.475MHz area. If you hear a station with a ZS3 prefix in future it will be located in the northern part of Cape Province - Namibian stations now use the V5 prefix of course.

RSGB DX News Sheet repeats information from *QRZ DX* that VK0ML on **Macquarie Is** is not a DXer and only uses his radio to talk to friends at home. However, QSLs from those lucky enough to work him should go via the bureau to VK5AHI.

The Union DX Club in the USSR is planning to operate as RZ9W/RA9SB and U9W/UZ9SWO between 20 June and 3 July. These will be of interest to Oblast hunters and the group will be visiting more rare areas later.

VQ9JN on **Chagos** has recently received his licence. VQ9AY is often to be found near 14.190MHz from 1800 and also meets S79MST there on Wednesdays at that time. VQ9TB is to be found near 21.335MHz at about the same time.

FT4WC on **Crozet Is** is often on at 1530 near to 28.500MHz, and FR5AI could possibly be back on **Tromelin Is** at the present time and for a few more days as FR5AI/T. FT4YD in **Antarctica** appears on Wednesdays at 0700 on 14.148MHz.

Steve Lowe, G4JVG, is now in **Papua New Guinea** and his equipment was due to arrive early in May. He has been on from a temporary QTH as P29DX.

Another traveller is PB0AJS who was due to arrive in **Sarawak** at the end of April and who expects to be there for several years. He will be active on CW and SSB with mono-band beams and wire antennas - his 9M6 callsign was not known at the time of writing. According to the *Long Island DX Bulletin*, HS0AC is back on the air and station manager W2ZWW says that their schedule is as follows : 0100 - 0200 28.025 or 28.300MHz; 1000 - 1100 14.025 - 14.030MHz; 1200 - 1400 7.025 - 7.075MHz; 1400 - 1600 14.226MHz (Family Hour Net). That 28MHz time may *appear* to be impossible for us but the band has been open into VK at that time recently!

HS0E comes on 28.480MHz at 1600 and moves to 21.020 or 21.300MHz later. XW8KPL, in **Laos** continues to be available in the afternoon near 21.250MHz.

Joeke, PA0VDV, was due to be in **Curacao** again until 16 June signing PJ2/PA0VDV. He works CW only, usually in the area 25kHz up from lower band edges.

A group of US amateurs will be in **Bermuda** from 5 to 11 June and will be on all HF bands and 50MHz with the callsign WA4VCC/VP9, (50MHz enthusiasts please note - they hope to run a beacon on 50.085MHz).

According to *DX-NL*, there is a new station on **Juan Fernandez Is**, CE0ZVS, who has been worked on 14MHz CW.

A note from Jarmo, OH2BN, who has been dealing with the AH3C/KH5J cards, says that as of 15 April all direct requests had been processed and that bureau cards are still being dealt with. As Jarma is no longer involved in amateur radio or as QSL manager he asks that all correspondence in future goes to OH2BH (see *QTH Corner*).

AWARDS

MARYLAND AWARD

MARYLAND COUNTIES AWARD

DELMARVA AWARD

All issued by the Chesapeake DX Club of Maryland. The first is for QSOs with at least 10 stations in Maryland, and the second for verified QSOs with all Maryland counties. The Delmarva Award is in two Classes - Class 1 requires 10 QSOs with Maryland, 10 with Virginia, and one with each of Delaware and Washington DC. Class 2 is for five contacts with each of MD and VA and one with either DC or Delaware. Send certified list with five IRCs (eight for airmail delivery) to John Rouse, KA3DBN, 2703 Bartlett lane, Bowie, MD 20715, USA. There are no time, mode, or band restrictions for any of these awards.

VYTIS AWARD

For contacts after 1 October 1989. Issued by Vytis Radio Club (A Albrechtas, LY2BQQ, Box 1, Siauliai - 10, 235410 Lithuania from whom a members list can be obtained for an IRC and SAE). Work or hear five members of the club and send certified list and 10 IRCs or equivalent to J Lekesys, 4 Gleneagles Way, Fixby Park, Huddersfield, HD2 2NH. There is also a Vasario Award for contact with 16 LY stations.

CONTESTS

SPANISH RTTY CONTEST

1600 15 June to 1600 16 June

RTTY only - I have copies of rules (SASE please).

THE ALL ASIAN DX CONTEST

0000 15 June to 2400 16 June (CW)

0000 7 September to 2400 8 September (Phone)

1.8 to 30MHz (no WARC bands). Single-operator single or multi-band and multi-operator multi-band classes. Exchange RS/T plus two figures indicating your age (ladies are allowed to send "00"!) QSOs with Asian stations count three points on 1.8MHz, two on 3.5MHz, and one on other bands.

The multiplier is the number of different Asian prefixes worked on each band added together. Note that contacts with US military stations in the Far East or Japan do not count and that JD1 (Minami Torishima) is not in Asia.

JARL AA contest logs and summary sheets are advised. They can be obtained from JARL, PO Box 377, Tokyo Central, Japan, in exchange for a few IRCs. Logs have to reach JARL by 30 July (CW) or 30 September (Phone).

PORTUGAL DAY CONTEST 1991

0700 to 2400 9 June.

SSB only on all bands 3.5 to 28MHz observing IARU band plan segments. Single-operator multi-band only. Exchange RS plus serial QSO number (from 001). Portugese stations will give two letters indicating their county. QSOs between non-Portugese stations count one point, with CT1, CT4, or special CT prefixes two points.

Multiplier is number of counties (maximum 18), DXCC countries, and continents worked and each counts only once - not once per band. Mailing deadline is 30 July 1991. I have copies of the rules (SASE please).

In the **1990 UBA Contest** G5LP came second in the list of non-Belgian entrants with 5797 points. G3OXC was third with 5100 points, and G4OGB fourth with 4340.

Thanks to all who provided information this month. These included the *Long Island DX Bulletin* (W2IYX), the *RSGB DX News Sheet* (G4DYO), the *Lynx DX Group Bulletin* (EA2KL), *DX'press* (PA3CXC), the *Heard Island DX Association Bulletin* (VK9NS), *DX-NL* (DL3RK), and the *Ex-G Radio Club Bulletin* (WA8TGA).

Please get your news for the **August** issue to me by **26 June**.

QTH CORNER

AH3C/KH5J	now to Martti Laine, OH2BH, Nuottaniementie 10-D-20, 02230 Espoo, Finland.
ET2A	now via WA2HNA, 90 Nellis Drive, Wayne, NJ, 07470, USA.
FW0BX	Box 195, Killars 2071, Australia.
ST0DX	via WA2HNA (see ET2A).
ZD8WD	G4RWD, Ken Cheetham, Callingwood Hall, Tatenhill, Stoke on Trent, Staffs, DE13 9SH.
7O8AA	DL2BCH, Gabriele Graeter, Bachstr. 8, D-2907 Ahlhorn, FR Germany.

1991 28MHz COUNTRIES TABLE

G0JZA	158	(SSB)	G4YNG	57	
G0AEV	137		GM0GEI	55	
G4DXW	133		G0DUS/M	54	
G4MUW	114	(SSB)	G4NXG/M	52	
LA0GC	100		G4XAH	43	(RTTY)
G0KDS	92		G2AKK	31	(CW)
GM4CHX	81				

BAND REPORTS

ONCE AGAIN conditions have been extraordinarily good at times particularly on 28MHz where it has been possible to work into VK and ZL around midnight and even later. 24MHz has also been excellent. The following helped with information for this part of the column : G2s AKK, HKU, G3s GVV, KSH, G4DXW, GW4KGR, G4s MUW, NXG/M, XAH, ZQL, G0s AEV, KDS, and LRX. Calls in *italics* are those of stations on CW:-

14MHz

0000	4S7EF.
0700	CE0DFL. FK8FS. T30A, VP8CEX.
0800	KL7XD, P29SL.
1800	EP2AG (?), JW0GB, VQ9IO, OX3SG/Z2.
2000	A61AD, C21JM.
2100	FR5ZN, S01A, TJ1PT, UNSC8R1, ZL1AFY, 3V8PS.
2200	ST0DX, VP8CEL, VQ9JN.
2300	BV2AT.

18MHz

0900	FW/VK2BEX, ZL3GQ.
2000	J8/LA3FL.
2200	HL1IUA.

21MHz

0700	BY5s RY, SY, HL, JA, VK.
0800	KC6ZZ, V85EB, 9M8AJ.
0900	FO0IGS, KL7HQY.
1000	9N1MM.
1400	ST0DX.
1500	VK6BFZ/VK9Y, XE3AAF.
1600	BT80TUA, SV2ASP/A, XX9LF.
1700	A22MH, HF0POL, HV3SJ.
1800	A61AD, HS1BV, 3X1AU.
1900	A41KV, ET2A, S01A, 7Q7JA.
2000	PZ2AC, TR8JWH, YB8NA, 3DA0BW.
2100	HL1LIZ, HS0E, JA, 9M8PV.
2200	BZ4SAA, ZD7VC, ZL4BO.
2300	VK, VS6CT, 9M2CW.

28MHz

0700	TJ1MR, VK.
0900	9M8PV.
1000	BZ4WAB, D68FT, J28NU, 3C1EA.
1100	A35KB, JT1BG, ST0DX, T20AA, 5V7AK, 5W1KM (RTTY).
1200	P29s DK, NMD, P40V, VP8CEX, 8R1RDF, 9N1MM.
1300	D68FT, HI500A, KH2DW, ZF2NE/P/ZF8, 4K2FJL.
1400	FR5DX.
1500	FH4EH, FT4WC, 3C1EA.
1600	A61AD, A71AL, BV2AR, V51BG, V63AO, XQ0Q, 6Y0I.
1700	A22AA, Z21DC, 5R8JD.
1800	V31DF, V85GA, VK6BFV/VK9X, 8Q7ZL.
1900	CE0ZCD, D68FT.
2100	PY0PT (? QTH), ST2YD.
2200	CE2GS, FH5EJ, VK, ZL.

EIGHT BAND TABLE No 6

Call	1.8	3.5	7.0	14	18	21	24	28	Total
G3KMA	138	256	311	322	215	321	200	312	2075
G3XTT	161	221	270	308	172	303	154	282	1871
G3GIQ	70	210	273	321	142	319	128	304	1767
GM3PPE	68	164	180	245	169	235	135	212	1408
G3NOF	5	100	104	320	115	321	104	288	1357
G3TXF	71	166	215	290	17	287	12	251	1309
G4OBK	123	155	202	277	33	251	11	226	1278
G3JJG	51	102	186	226	131	253	114	199	1262
G3JXN	39	93	148	236	100	227	105	248	1196
G4NXG/M	2	33	73	213	64	229	112	229	955
Average 73	150	196	276	116	275	108	255	1448	

Next deadline - to reach G3GIQ by 8 July 1991

Propagation NEWS

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

MARCH *Propagation News* referred to the bulletin board operated by GEC-Marconi Research. Members using this facility regularly, and who can also make observations on actual HF conditions which can be co-related, are asked to send such information to RSGB Headquarters marked "For the attention of PSC".

If a reasonable number of reports are received, an analysis will be made of them and the outcome will not only help G-MRC to improve the forecasts, but will also demonstrate a co-operative spirit with the professional radio world. This aspect is ever more important with the approach of WARC-92.

HF BANDS

THE G8KG REPORT this time goes as follows: "Conditions on the HF bands have recovered from the effects of the major storms in the last week of March, though the first few days of April saw another mildly unsettled spell and the daily solar flux values had by then fallen below 200 sfu. For the rest of the month up to the time of writing (22 April) the geomagnetic field had been mostly quiet while the solar flux passed through a peak of 268 sfu. Conditions on the higher bands were generally good and on 15 and 16 April MUFs were exceptionally high for the time of year, with the 28MHz band open to all continents as early as 1000 and again between 1900 and 2100." He concluded by saying that most of us might assume that 28MHz would not have been worth looking at in April - but it most certainly was.

50MHZ

THERE SEEMS TO be continuing confusion about the relationship between daily sunspot counts, solar flux, geomagnetic indices and prevailing conditions. Many DX-ers on the HF bands and 50MHz use computers to 'forecast' conditions. The inputs required include date and time, home and target QTHs and the band; all quite finite. The other essential data include either the solar flux or the sunspot number and this is where some people go wrong.

The International Ursigram and World Days Service network collects a huge amount of solar and geophysical data. For example, a typical week's information downloaded from Telex messages from the Rutherford Appleton Laboratory takes up 8-9 pages. Some of these data are extracted by Charlie Newton, G2FKZ, who provides the propagation section of the GB2RS Sunday News Bulletins.

These IUWDS data give a picture of *daily* activity, warning of possible geomagnetic disturbances and other solar eruptions which could affect commercial and broadcast communications in the immediate future. To input a high sunspot number transmitted by Boulder or Meudon for the previous day will result in a totally false prediction of the MUFs in various directions. For example, take 16 March when a spot count of 343 was reported. The well-known MINIPROP program by W6EL predicts the midday MUFs to be well above 50MHz in almost all directions. Even using the solar flux value of 257 for that day, the predicted MUFs exceed 50MHz in a 180° arc from 60-240° azimuth. In reality, the G4UPS activity notes for that day reported only very weak TEP signals to southern Africa in the early evening.

The proper sunspot number to use is the 12-month moving average Zurich figure. In the very comprehensive documentation for MINIPROP, W6EL says he favours the monthly predicted SSNs; you can use the values that appear at the foot of this page.

HF F-LAYER PROPAGATION PREDICTIONS FOR JUNE 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	.....	.....11.	1.1232222442	323455445675	7666666556788	8653333333578	642111.11257	3.....24
MALTA	.....	...11.1.111.	1.1333333443	423655555776	877766667899	997543334689	875211112368	+42.....35
GIBRALTAR	.....	.....	...111111221	2.1343333553	7457766666788	9886544456689	886422112468	+53.....35
ICELAND	.....	.....	.....	....11..1121	422344334566	876554444567	665321112245	332.....2
** ASIA								
OSAKA	.....	.....1.	...121112231	1..121113463	....1...1573	.....25.	.....2.	.....
HONGKONG	.....	...111.1122.	1.1122123552	2.1122124675	2.....2686	354	32	.....
BANGKOK	...111..111.	..1222112331	2122232224664	411112224787	5.....2688	3.....367	34	.....
SINGAPORE	...111..111.	..1222112331	2122332346664	421122224787	51.....2688	3.....367	35	2
NEW DELHI	...111..111.	..1222212331	2222232346674	531111224787	73.....2689	5.....367	2.....35	2
TEHERAN	..1222112221	1133333223442	3353333335776	655211224788	863.....2689	84.....367	51.....35	2.....2
COLOMBO	..122211222.	1123333223442	3333334335775	642113224788	84.....2689	61.....367	3.....35	2
BAHRAIN	..1222222331	1134333334554	5454333346787	765211225799	973.....2689	85.....368	62.....35	3.....2
CYPRUS	..1222222331	1124444434553	5367666677887	767766667899	987533345789	87421..12478	752.....256	42.....23
ADEN	1.1323334443	3234344456665	6564334468886	877311224899	985.....2689	862.....368	63.....36	3.....3
** OCEANIA								
SUVA/S	.....	.....	....1...111.	..1211112331	..331...154.	..12.....22.	.....	.....
SUVA/L	2112.....43	4224.....74	33561.....85	23672.....73	..551....251	..22.....22.	.....	.....
WELLINGTON/S	.....	.....	..1111....21	112221....52	12541.....63	..31.....241	.....2.	.....
WELLINGTON/L	211.....2	4221.....14	6554.....37	66761.....57	34651....275	1142.....252	..1.....2.	.....
SYDNEY/S	.....	..11111.....	1124322....3	213532111..5	1.141....1326	...1.....353	31	.....
SYDNEY/L	2.....2	3112.....4	53341.....17	53462.....37	21352.....66	...2.....153	21	.....
PERTH	..12221.....	1123332.....	32345431....	54334221....	62.11...112.	4.....251	1.....34	2
HONOLULU	.....	.....	.....111.	..1111111211	..331...12..	..22.....	.....	.....
** AFRICA								
SEYCHELLES	1.1323334211	213434445433	646434446666	866312224788	985.....2689	862.....368	63.....36	3.....3
MAURITIUS	..1323434443	1.3434556766	5.6534446888	717313225899	955.....2689	872.....368	64.....36	3.....3
NAIROBI	211323445533	423534556756	766634446888	987512224899	9972.....1689	874.....368	651.....36	32.....3
HARARE	2..323455644	511534567876	844744446899	977722224899	9974.....1689	8851.....368	652.....36	32.....3
CAPETOWN	...22245663.	...444567851	...754446884	2..742224897	73.51....1589	8712.....368	662.....36	33.....3
LAGOS	2..122455753	421343567875	754653346898	986742114799	99751....1589	8852.....268	662.....36	33.....3
ASCENSION Is	....3234564.	11..53456762	552164446885	774342224798	99752....1589	8852.....268	663.....35	33.....2
DAKAR	21.132344542	422353455764	865664344888	987752112799	99852....489	8852.....157	663.....35	33.....2
LAS PALMAS	1..121121221	211243343553	633575566786	866776677898	998765445689	987432112478	77421....156	542.....24
** S. AMERICA								
Sth SHETLAND	......35452.	......46674.	.....134587.	1224782	1.....1586	623.....257	653.....35	33.....2
FALKLAND Is	243442	1....1455764	4....2345888	7....2224799	94411....1579	8752.....257	663.....25	33.....2
R DE JANEIRO	21...2243442	422..3354664	765114344787	987322222589	99852....279	8852.....47	663.....25	33.....2
BUENOS AIRES	21...1233332	4211.3354564	7644.4345687	9876.2223589	99751....1269	8852.....37	663.....15	33.....2
LIMA	1...1.111122	31.121232244	742342233357	975542221247	99752.....16	8853.....3	663.....1	33.....
BOGOTA	1....1.11111	31..12122233	642243232246	864542121137	99752.....5	7853.....3	553.....	22.....
** N. AMERICA								
BARBADOS	1...11111122	31.122222244	742343232257	875542111158	99752.....27	8853.....4	663.....1	33.....
JAMAICA	1.....11	2....1111123	5311222221135	863332121126	88752.....4	6852.....1	353.....	.2.....
BERMUDA	11	2....1111123	531112221145	853332111137	88752.....15	7752.....3	453.....	.2.....
NEW YORK	.....	1.....12	41...1111124	642111111125	78642.....4	5752.....1	252.....	.2.....
MEXICO	.....	1.....11	41....111123	6422111111113	57642.....1	3752.....	.42.....	.....
MONTREAL	.....	1.....11	31...1111124	642111111125	78632.....14	5752.....1	252.....	.2.....
DENVER	.....	.....	21.....1	4211.....2	4653.....	1552.....	.22.....	.....
LOS ANGELES	.....	.....	1.....1	2211....1..1	25531...1...	.352.....	.12.....	.....
VANCOUVER	.....	.....	1.....	1111.....	14531.....	..252.....	..2.....	.....
FAIRBANKS	.....	.....	.....	111111..11..	.1331...11..	..22.....	.....	.....

The provisional mean sunspot number for March 1991 issued by the Sunspot Data Centre, Brussels was 139.9. The maximum daily sunspot number was 227 on 12 April and the minimum was 33 on 24 April. The predicted smoothed sunspot numbers for June, July and August, were respectively: (classical method) 126, 123, 121; (SIDC adjusted values) 119, 117, 116.

VHF/UHF NEWS

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

STILL NO NEWS of any wonderful tropo openings, nor a repeat of the late-March auroras to report. However, June is the month when we expect to enjoy Sporadic-E propagation to Europe on 50MHz, to Gibraltar on 70MHz, and less often to anywhere within a 2,200km radius on 144MHz.

If you have a scanning receiver, program in some of the VOR aircraft beacons in the 108-118MHz part of the spectrum. The most authentic lists are the quarterly *En-Route Supplements* available from: 1-AIDU, RAF Northolt, West End Road, RUISLIP, Middx, HA4 6NG. Send them an SASE for details of areas covered and costs.

ACTIVITY

MANY LETTERS begin with the comment: "Not much to report this month." Another frequent query is: "Where has everybody gone?." There is no disputing that we have not experienced a decent tropo lift for months. Although solar activity remains quite high, with significant flares at times, there have been few good auroras in the past year, either.

Consequently activity has declined; people switch on, tune around the various calling frequencies, hear nothing, so switch off. Even if the band seems dead, it is worth putting out a brief CQ call, indicating where you are and where you are beaming, just to see if anyone is monitoring. Occasionally one gets a response from somebody a good distance away.

Unless someone calls "CQ", random QSOs will never occur. Under flat conditions, short calls are not much use, so call for about a minute to give the other operator a chance to tune onto your frequency, pausing to listen every so often. If using a beam, point it in different directions and call again before giving up.

For those new to the SSB mode, accurate tuning onto the received signal is essential and should be done with the VFO, *not* the RIT (clarifier) control. A short reply to a CQ call, somewhat off frequency, can be confusing especially if signals are weak. So give your call several times using standard phonetics and say where you are.

REPEATERS

THE WEST WALES Repeater Group, whose Secretary is John Gray, GW6ZUS, sent its Spring *Newsletter.* A major topic was 'The Saga of the BBC Site Rental' for the Group's repeater, GB3WW, located at the Carmel Tx site. The editor seems satisfied that the RSGB has negotiated a reasonable fee for this and the electricity bill which, with other expenses, have to be met by the 77 members. *[The group was billed 'half the commercial rate' by the BBC - the best part of £1000! Negotiation by the RSGB reduced this to £50 plus £50 electricity. - Ed]*

In the 'Technical/Engineering' section, mention was made of the Rx deafness and drop in Tx power noticed by users in recent months. It was suggested that these phenomena might be due to additional antennas which have been installed on the mast.

The South Dorset Repeater Group operates voice relay GB3SD and packet repeater GB7SD. Group membership is about 60, less than half the number of calls heard through GB3SD. Anyone interested in building new equipment or maintaining the repeaters is invited to contact G3VPF or G0EVW, both QTHR.

SOFTWARE

AS REGULAR READERS know, I use an Amstrad PCW8512 for business and hobby purposes, including the writing of this column and its transmission to the Editor via E-mail. I have a lot of Public Domain software and shareware to supplement my own programs and a small selection of immediate interest to VHF/UHF readers is shown in the PROGLIST. For a copy, send me an SASE.

One of the programs is CTYAZ, which prints out the azimuths to all the British Isles counties. Jon Acton, G0NFH (AVN), asks if there is a similar program for the Commodore 64? I do not know of one but there may be something in the Public Domain and Shareware Library's collection, which includes a 'Ham Radio' section. Their latest *Software Source Journal* has 112 pages listing 2,000 disks and has a cover price of £2.00. Their QTH is Winscombe House, Beacon Road, CROWBOROUGH, E Sussex, TN6 1UL; tel 0892 663298, fax 0892 667473 and BBS(8N1) 0892 661149.

METEOR SCATTER

SEVERAL USEFUL meteor streams occur in June. The following data are the predicted peak date, the Right Ascension and Declination of the radiant in degrees, UTC times the radiant is above a mid-UK horizon, the stream velocity at atmospheric encounter and the possible ZHR, all taken from the IMO's *1991 Meteor Shower Calendar.* Next come the best times for skeds in the usual four directions, as derived from my MSD1 program; the figures in parentheses are the times of lesser peaks.

First the Arietids. 7 June, 44/+24, 0100-1730, 37km/s, 60. NE/SW 0700 (1430); E/W 0930; NW/SE 1200 (0430); N/S 0600 and 1300. Second the Zeta Perseids, also 7 June. 62/+23, 0200-1930, 27km/s, 40. NE/SW 0830 (1600); E/W 1100; NW/SE 1330 (0600); N/S 0700 and 1500.

Next the June Lyrids. 16 June, 278/+35, all day, 31km/s, 5. NE/SW 0600 (2200); E/W 0800 and 1800; NW/SE 2000 (0400); N/S 0500 and 2100. Finally the Beta Taurids. 28 June, 86/+19, 0300-2000, 30km/s, 25. NE/SW 0900 (1630); E/W 1130; NW/SE 1400 (0630); N/S 0800 and 1500.

SPORADIC-E

NOW IS THE TIME to re-read Jim Bacon's, G3YLA, definitive articles 'Sporadic-E Studies' published in the May to August 1989 issues of *RadCom.* In Part 2 he pointed out that an input of metallic ions to the E-layer is essential to support the popular wind shear theory of Es. As June is the peak month for cumulative meteor activity, it follows that metallic ion input will also be a maximum.

These metallic ions can have a lifetime of 5-20 days and it has been observed that there is a 1-2 weeks delay between meteor input and Es formation. However, these ions can be 'used up' much quicker if a suitable 'trigger' occurs. The Arietids and Zeta Perseids have a combined ZHR of 100, so it seems feasible that we might expect some Es in the second and third weeks of June, in particular.

Once again the Society is operating an Es Hotline this year. This consists of a short recorded message by G3YLA suggesting possible trigger mechanisms, regions over which Es ionization might occur, the Boulder K index, if available, and any other relevant data. The number is 0426 952211 and calls are charged at the local rate wherever you are calling from in the UK.

Jim would appreciate your sending reports of Es signals heard/worked on 144MHz this summer. Letters are preferred but he can be reached on packet radio at GB7TLH. I will pass your reports to him for future analysis. He is establishing a database of information; more details later.

MOONBOUNCE

HIGH SOLAR ACTIVITY during the 23/24 March REF Contest weekend resulted in unusual conditions. Nevertheless, several EME devotees completed some good QSOs as reported in the April issue of Mark Turner's, G4PCS, newsletter *2M Direct.*

144MHZ

On 23 March there was very rapid and deep fading with signals coming up to good strengths for a couple of minutes then disappearing for an hour at a time. Andy Cook, G4PIQ (JO01MU), completed random QSOs from 0200 on the 24th with N5BLZ and W5UN. Tony Read, G0GMS (IO91UB), had an "easy" contact on the 23rd with SM5FRH and completed next day with SM2CEW and Y22ME; none of his W and VE skeds came off though.

John Regnault, G4SWX (JO02PB), completed random QSOs with DL8DAT, SM5FRH, W5UN and EA2LU on the 23rd. He called about 20 others but conditions were very poor. PA3DZL was worked at 2200 on the 30th and at 2104 on the 31st, John heard VK3AMZ.

Graham Daubney, G8MBI (JO02ID), worked UA4ALU, a new initial - ie a station worked for the first time - at 2200 on 22 March. From 0150 till moonset on the 23rd he tried with ZL1BVU, who was a good signal most of the time, but no report was received. At 1046, F1FHI was the 200th new initial worked. Other completions were with JA4BLC, DL5MAE, UL7TQ and VS6BI, the last two being new countries.

Keith Kerr, GM4YXI (IO87WI), completed with VE3BQN at last on the 23rd. Other successes were N5BLZ, W5UN, DL5MAE, DJ7UD who was 1kHz HF, and OH5IY. On 28 March Andy Steven, GM4IPK (IO99IW), completed in 10min with SM2CEW at 1735.

432MHZ

Dave Dibley, G4RGK (IO91ON), mentioned "rapidly changing conditions" in the evening of 22 March. He completed with K1FO, but lost K2UYH in the middle of the QSO after getting a 549 report. From 1430 on the 23rd signals were stable for an hour during which he worked F1FEN. At 2009 he completed with K1FO. No QSOs were completed on the 24th.

50MHZ

THE MARCH REPORT from Ted Collins, G4UPS (DVN), arrived after I had sent my May copy to the Editor and the April notes missed the boat, too. WA4VCC/VP9 will be QRV from FM72 in Bermuda, 5-11 June, preferred QRG 50.085MHz, and also listening on 28.885MHz. IK2GSO plans to operate from the small I di S Antioco (JM48/49), 15-29 June signing IK2GSO/IM0.

Darrell Moody, G0HVQ (GLR), reported a good opening to South Africa on 29 March, all stations being S9+ in much QRM. On 5 April he worked PY5CC (GG54), FM5WD, ZS6 and ZS4 and heard LU, 9L, TU and 3X in an opening 1130-1600. The RSGB Contest on the 7th attracted very few stations with nothing heard outside G and GW. Darrell mentions inter-G QSOs on 50.200MHz, particularly on Sunday mornings. G0NFH picked up 19 counties in the contest; countries worked were G, GD, GJ and GW.

Terry Chaplin, G1UGH (SFK), worked some ZS6s in the big opening on 29 March and on 22 April he contacted ZB0W (IM76) at 1359 via Es. Neil Underwood, G4LDR (WLT), has opened his 1991 account; he runs a 144MHz transceiver, Spectrum transverter, 20W amplifier and 5-ele Yagi at 15m AGL.

Jack Hum, G5UM (LEC), reports FM net operation by East Midlands stations on 51.41MHz. This has been going on for three years from 1930 local time every Friday. Several dozen Midlands operators have now equipped themselves for FM mobile operation on 51.51MHz using converted ex-PMR sets.

Ela Martyr, G6HKM (ESX), worked I0SSW (JN61) on 2 April via Es and later got 7Q7JA (KH74). PY5CC was contacted on the 5th but she didn't hear FMs 3AG and 5WD-some others were working; she did manage 3DA0BK (KG53) though. The RSGB Contest on the 7th brought no DX but several table points. On the 8th, G8CRN/M (BFD) was her first mobile contact.

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
GJ4ICD	446	269	119	59	893
G4DEZ	116	249	62	54	481
G4RGK	121	311	145	52	629
G8ATK	74	144	94	52	364
G3IMV	319	446	125	51	941
G6HKM	284	224	112	48	668
G1KDF	309	184	104	39	636
G4MUT	142	155	94	34	425
G1GEY	-	170	92	22	284
G6MXL	52	97	48	20	217
G8LHT	113	185	93	14	405
G1SWH	201	166	62	9	438
G0NFH	113	78	18	9	218
G4XEN	66	301	115	6	488
G6MEN	67	54	27	3	151
G4IJE	385	338	5	2	730
G6HCV	309	233	-	-	542
G4TIF	222	204	111	-	537
G0CUZ	-	350	73	-	423
G0OFE	264	152	-	-	416
G0EVT	142	213	57	-	412
G1LSB	73	176	144	-	393
GW6VZW	238	143	6	-	387
G0JHC	338	48	-	-	386
G4PIQ	-	278	105	-	383
G8PYP	208	120	35	-	363
G4SSO	-	261	98	-	359
G4SWX	-	347	-	-	347
GM4YXI	-	340	-	-	340
G4DHF	-	331	-	-	331
GJ6TMM	109	151	52	-	312
G0GMB	-	198	103	-	301
GM4CXP	50	201	32	-	283
G1SMD	171	112	-	-	283
G4YTL	-	269	-	-	269
GU7DHI	187	68	-	-	255
G0HVQ	183	71	-	-	254
G0EHV	-	173	79	-	252
G3FPK	-	244	-	-	244
GW4VEQ	-	241	-	-	241
GW4FRX	-	232	-	-	232
GM0GEI	224	-	-	-	224
G8XTJ	101	121	-	-	222
G4DOL	-	219	-	-	219
G1UGH	112	94	-	-	206
GW4VVX	81	120	-	-	201
G1TCH	99	95	6	-	200
G4XBF	-	172	-	-	172
G1WPF	20	114	37	-	171
GM1XOG	145	-	-	-	145
G4TGK	-	139	-	-	139
GM1BVT	92	23	-	-	115
GM0GDL	-	88	23	-	111
G1CEI	11	77	18	-	106
G7CLY	-	100	2	-	102
GM0CLN	-	88	-	-	88
GM1ZVJ	35	48	-	-	83
GM0CLN	-	81	-	-	81
G6ODT	-	29	47	-	76
GW7EVG	-	22	-	-	22

No satellite, repeater or packet radio QSOs.
'Band of the month' 1.3GHz.

Brian Williams, GW0GHF (GNS), suffers much QRM from TV time-bases with his indoor antennas. He queries QRM on discrete frequencies just below the band - 49.95, 49.92, 49.88 and 49.86MHz - which seem to come from overhead telephone lines in the Penarth and other areas. Strange modulation and garbled voices can be heard. Any ideas?

144MHZ

SCOTTISH STATIONS recorded auroras in March on 9, 11, 12, 19, 21, 22, 24-27 and 30, and from April 1-4. The major event was that around 24 March, some reports of which were published last month. G4PCS commented; ". . . not one of the all-time greats, but certainly very welcome." However, it was the second biggest aurora of Cycle 22.

The largest event was on 22 March when a ten flare of 36,000 flux units was recorded at 2242. At 0820 next morning a proton event began, reaching 43,000 particle flux units and producing a PCA (Pole Cap Absorption) of 38dB. A sudden magstorm started at 0148 on the 24th with a K index of 8 recorded at Chambon-la-Foret in France.

Daily proton outbursts continued until the 27th, disrupting HF radio communication. The A indices reached 84 on the 24th, 81 on the 25th and 64 on the 26th.

A summary of countries worked, with times, was published in last month's column and these have since been supplemented by detailed reports from several contributors in the April *2M Direct*. To pick out a few of the more interesting items from the 24th, GM4IPK's furthest east QSO was SP2MKO (JO83) at 2205 at QTE (azimuth) 65°.

G4PIQ discovered two areas to beam at, 45° and 15°, the former giving stronger signals with a Doppler shift 1kHz lower than the latter at around 2140. Andy made about 80 contacts including northern DLs at 45° and PAs and central DLs at 50-55°.

GM4YXI reported the event notable; ". . . . for the quite incredible visual display . . . ." with arcs, beams and coronas from 1930 to 0130. At 1900 on the 24th, the aurora had gone but at 2000 Keith copied G4SWX at QTE 60° with 0° of elevation; John was using 20° of elevation at 30° azimuth. No other auroral signals were heard until 2030 when the band suddenly became full of S9 Gs and near continentals. The furthest south worked was HB9DFG (JN37) at 2301.

G4RGK found all local stations completely auroral with quite large Doppler shifts. Dave tried different headings but 35° was optimum for his QTH. G4SWX's report showed QTEs 15-70° and elevations up to 40°. At 2103 John worked DL5MCO, then DL5MCG both at 70° azimuth, 20° elevation with no signals at all at 0° elevation. By 2250, 0° elevation proved optimum. At high elevation, 20°+, signals were almost like Es, S9+20dB, but only for very short periods with deep QSB.

From Shetland, GM4IPK reported a; ". . . . spectacular visual display over the whole sky . . . ." from sunset on the 25th to sunrise next morning. He commented: "A few people complained of bad headaches during high magnetic activity, including Ilan, DL5BCU, who was visiting me at the time. This seems to be a common problem for some people."

On the tropo scene, Bob Minton, GW0HOL (GNS), mentioned observing frequent short openings around 0600 local time in recent summers when the beacons were often quite strong. CQ calls usually went unanswered so he suggests early riser HF DXers might like to try VHF once in a while.

SIGN OFF

THANKS TO John Hill, G7CLY (HBS), Darrell Mawhinney, GI4KSO (DWN) and G6HKM for input on 144, 430 and 1296MHz respectively. Deadline for copy **August** is **27 June**, **September** is **1 August**.

SWL NEWS

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

AS WE HEAD into June, I hope that the Sporadic E propagation on 144MHz this year is many times better than in 1990. One five minute opening to CT was all your scribe caught then. The band to monitor, of course, will be 50MHz, where Sporadic E propagation will be much more prevalent. The main listeners on this band will be looking to improve their countries tallies - your scribe currently on 69 heard, David Whitaker on 52 and Mick Toms, who only got on the band last September, on 26. If any other listener would like to write with details of countries heard on this band, I shall gladly include the details.

While on the subject of Sporadic E and 50MHz, the UK 6 Metre Group are to hold their Summer Sporadic E contest over the weekend of 8 - 9 June. There is an SWL section. Full rules and your completed logs should be sent to G6HCV, who is QTHR.

NORDIC ACTIVITY CONTEST 1991

MICK TOMS, BRS31976 sent details of this Contest, which is open to any amateur or SWL outside Scandinavia. Send an SASE for rules. Scandinavian activity will be on Tuesday evenings between 1800 - 2200 UTC, with 144MHz on the first Tuesday every month, 432MHz on the second, Microwaves on the third, and 50MHz on the fourth.

WHITE ROSE CONTEST REPORT

ANTHONY, G4UZN, sent results details of this event. Again, space does not allow me to go into too much detail. There was excellent support, with logs from DL, G, OE, OH, ON, PA, Y2 and SH1. Conditions were poor at least as far as DX was

concerned. Very little was heard on 1.8MHz, but the other bands produced openings to VK/ZL and South America. The WARC bands were very busy, and 7MHz provided most of the activity and the best of the DX, in the shape of XQ0X and CE0Z. A copy of the results will be sent to all the entrants, and the Society will sponsor a repeat on the second weekend next January. The rules will be unchanged, a reminder nearer the time.

HELP!

CHARLES Newgas, BRS44705 wants to know if there are any SWL's living in Highgate, London, N6 who could get in touch to discuss SWLing. He uses a Lowe HF235 and has a perfect receive location on top of a hill. His telephone number is 081-348-8773.

50MHZ LOGGINGS

MOST OF THE real DX to appear on the band since mid-March seems to have managed to avoid yours truly, David Whitaker and Mick Toms - mainly because some good openings had occurred, but while all were at work! Mick did hear TU4DH (IJ77) on 17 March and the SL1 beacon for 10 minutes on 18 March, but otherwise had to content himself with an Aurora on 24 March. From 2230 to 2328 he heard GM3WYL, DJ9KG, GI4GPC, GM3WOJ, the GB3NGI beacon, OH2TI and GM4DGT. All these stations were on CW.

Mick would be grateful if G4FUF reads this to know who he worked at 1007 on 3 March on 50.118 ssb. Mick could hear the station quite well, but he did not hear a callsign. Then, of course, the station faded out. He thought the locator was "PK", so it was probably one of the DU's. Confirmation from G4FUF, please.

The 29th provided a good opening to South Africa, with V51KC, ZS6WB, ZS6XJ, ZS6XL and ZS6AXT all putting in good signals into London.

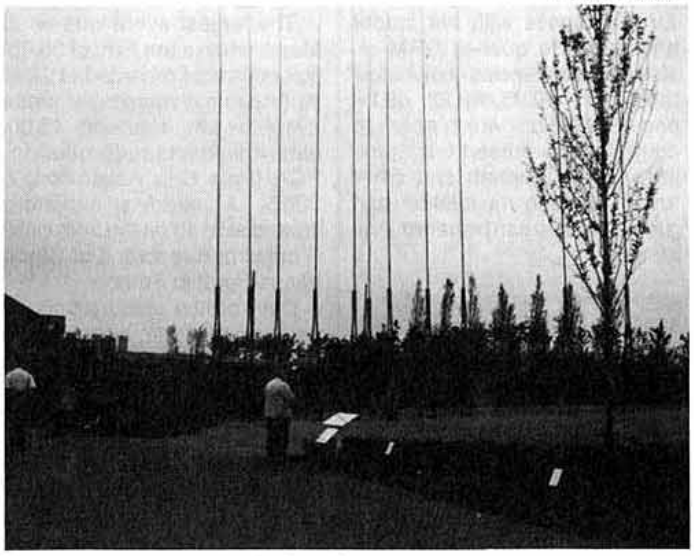
On the QSL front, David Whitaker received cards from 6W1QC and 7Q7JA during the month under review.

DX REPORT

NOT MANY reporters this month, but it was pleasant to receive a log from Peter Cain BRS36554, whose last report to 'SWL News' was in 1985! He now has 272 countries confirmed. The Aurora at the end of March which knocked the bands 'sideways' was a reminder of what the HF bands could be like in a few years at the trough of the cycle. At Robert Small's QTH in Stowmarket, it was actually visible. If he was active on 50MHz he would have heard the DX which I reported Mick Toms to have heard on 50MHz. Apart from the Aurora, conditions during the month were very good, which helped those participating in the March 14MHz Challenge - more of this another time. The fact the Challenge was taking place means that there is much more 14MHz DX reported this month. Because of the restriction on space, I cannot provide my usual anthology of QSL routes for the many special prefixes which were active in the CQWPX contest.

Using the now 'standard' procedure of taking the best from the logs received, I have arrived at this collection as the best HF DX: 28MHz - A22AA, ET2A, FH4EH, KH0AC, P29RB, TJ1MR, VS6CT, ZS9S and 9Q5US; 24MHz - A22GH, DU1DBK, H61T (YN), HF0POL, HL1IUA, TY2AB, V73BN, YB0WR, ZC4CZ and 7Q7MS; 21MHz - FP/KH2I, I2YDX/DU6 (Semirara Is), HS1BV, ST0DX, S01A, TL8JL, VK6BFU/VK9X, ZL9DX, 5W1JM, 9K2/HB9CVN, and 9X5SW; 18MHz - A92BE, P29DY, FO0IGS (French Polynesia) TU4DH, YS1YS, 4S7EA and 9J2HS; 14MHz - A35KB, AH0K, BV4AO, C21JM, CE2NVH/CE9 (South Shetland), D68JM, D73A (HM), I2YDX/DU1 (Lubeng Is), H44AP, HH6JH, AL7HS/KL7 (Shemya Is), KA3HMS/V73, SU1FM, TG9TSS, VP8CFM (South Orkneys), XQ0X, ZL9YL, 3V8NU, 3X1AU, 4K4/UA9CDV (Sredny Is), 4K4BEM (Dickson Is), 7Q7LA, 9M2QQ (logged from Pangkok, Kemat and Perhentian Islands) and 9M8ST. April 1 saw the customary 'jokers' and this year 1A0/IK4GNH was heard! (What no ZA!!!! - Ed); 7MHz - A92FN, XQ0X and 4S7RO; 3.5MHz - BV2QB, FP5DX and V21AK; 1.8MHz - SV5TS.

PHOTOGRAPH BRS87871



The Gateshead Garden Festival's radio garden.

RADIO GARDEN

ANN REED, BRS87871, VISITED THE Gateshead Garden Festival in 1990 and saw a section titled Radio Garden. The photographs show the site and a plaque which was on the site. It seems that there were 20 specially built 30ft towers each mounted with a shortwave receiver at the top and loudspeaker at the base. Each receiver is tuned to a different radio station, ranging from Bulgaria to a local station broadcasting in Hindu. The aim of the project was to explore local, national and international awareness in relation to borders, boundaries and cultural divisions.

HEARD ALL BRITAIN

G0MFV, EX-RS90450 considers that *RadCom* contains too many abbreviations such that many readers can be left bewildered. *[This was something mentioned by several of our Survey respondents - Ed].* No doubt I am as guilty as other contributors, but I will try to limit the amount of abbreviations for the future.Any listener interested in Heard All Britain (HAB) seeking a comprehensive logging and checking program should write to G4FCN for details.

Up-coming Heard All Britain contests are the Low Frequency phone from 0900-1800 on Sunday 19 May, and the 432MHz phone from 1400-1800 on Sunday 9 June.

FINALE

PLEASE KEEP writing, and remember to send in those photographs. The next deadline is Monday 10 June.

Novice NEWS

E P TYLER, G0AEC
43 Nest Est, Mytholmroyd, Hebden Bridge, W Yorks, HX7 5BH

FROM NOW ON, Novice News will have a different flavour. I have been invited into the hot-seat and, though this first venture is obviously difficult, I hope to do better as time goes on.

I would hope that *Novice News* becomes, in part at least, 'News from Novices', and would welcome any input giving the Novice point of view. What aroused your interest? Was the course what you expected? Will you go further and take the RAE? How did you fare on your first solo radio contact under your very own callsign?

Your comments could be of value to other Novices and would-be Novices. However, your views can't reach others unless you express them and *Novice News* is the ideal way to do this. Please put your thoughts on paper and send them to me at the address above.

Meanwhile, until there are some licensed Novices around, how about comments from other readers of *Radio Communication*, Instructors perhaps? There is a wealth of information, advice and matters of interest out there, please help me to bring it together.

FIRST NOVICE COURSE COMPLETION

IN MAY'S *Novice News*, there was a feature giving details of the first Novice course completions. Although only the first seven were specifically named, there are now many others also facing the Novice Radio Amateurs Examination (NRAE) which takes place in a matter of days.

On behalf of all amateurs, I would like to say "Good Luck! to all of you", and hope for success for you all. I'll bet you find waiting for the result harder than the exam! I wonder where 2?1AAA will be located?

NOVICE AWARD

THE G-QRP Club has announced its intention to sponsor a permanent award for Amateurs in their first year. The rules appear opposite.

The G-QRP Club has always actively encouraged the use of morse (CW) using low power, and their Class A award is tailor-made for the Novice.

Indeed, the whole concept of the G-QRP Club is ideal for those working on low power, such as Novices. You could get an enormous amount of help and advice, and their publication *Sprat* gives many low-cost projects.

AND THERE'S MORE

THE G-QRP Club has also announced that a special award, (on a once-only basis), will be given to the first full Class A licensee to work 100 Novices. Send a list of contacts plus QSLs to: Gus Taylor, G8PG, 37 Pickerill Road, Greasby, Merseyside L49 3ND.

AND EVEN MORE

A FREE year's membership to the G-QRP Club will be given to:

a) The first Class A Novice licensee, and
b) The first Class B Novice licensee.

For these, apply to: David Jackson, G4HYY, Castle Lodge West, Halifax Road, Todmorden, West Yorks OL14 5SQ.

A super picture of the 1990 Jamboree On The Air (JOTA) station, GB2IDS, has reached me. This is the Icknield District Scouts of Luton, Beds. HF and VHF stations were in operation and, judging by the expressions on the faces, a good time was had by all! Any potential Novices there, I wonder?

Another JOTA station, GB2GP, operating from Gilwell Park, near London, was using equipment supplied by Lowe Electronics. The young man at the mike was one of many youngsters to take advantage of these facilities. Gilwell Park offers a variety of events throughout the year. I am sure the Warden, Steve Beasley, G7BIM, will not mind if I give the address. (Gilwell Park, Chingford, London E4 7QH) in case you need further information.

NOT FORGETTING THE LADIES

THINKING DAY on the Air (TDOTA) is over for '91, but it was certainly popular! The weather could not have been worse - at least in this neck of the woods - but aerials were erected outside by a dedicated, but drowned, team of amateurs and others. Gear was moved in and set up, and the walls covered with posters and maps etc. A lot of work went into all this, as it did throughout the country, with about 150 TDOTA stations in operation.

Interest was extremely high and the microphone manner shown by these young ladies was staggering! Wish I'd had the same confidence when I was that age. If the GB2TOD station was representative - and I'm sure it was - there will be many YL voices on the air in the future! Brownies without the Communicator badge were rare!

Details of the next Thinking Day will be publicised well in advance but anyone wanting earlier information should contact - Jennifer Jackson, G8WWD, Castle Lodge West, Halifax Road, Todmorden, Lancs OL14 5SQ who is the Co-ordinator for Thinking Day On The Air.

NOVICE LICENCE INFORMATION SHEET

THE FINAL version of this document from the Radiocommunications Agency is before me. I have been comparing the information it contains, with *Novice News* in RadCom March 1991.

It is in question-and-answer form, and most of it is familiar to you. For instance the need, by law, for a licence *before* being permitted to send messages by radio; the types of Novice Licence available; and the frequencies available to them. These are set out in the Schedule (which, incidentally, will be provided for reference during the examination). The Schedule appeared on page 56 of the March *RadCom*. There are only two questions based on the schedule itself, so finding the answers won't take an age.

No licence is needed for simply listening to Amateur Radio trans-

missions of course, provided that the equipment is designed for *reception* only. Listening can be a useful introduction, and can help with learning procedures etc.

The required qualifications are listed, and a brief description of the training course and continuing assessment.

Guidance is given on the costs to expect, as this is an important factor. There is no fee for the training course but there will be a charge for materials such as components for projects, and worksheets. An estimate of £25 is given.

The City and Guilds fee for the Novice Radio Amateur Examination is £8.95, though there may be an administrative charge to candidates by individual examination centres.

The Radiocommunications Agency's fee for both classes of Novice Licence is £15 annually, but free to those under 21.

Renewal reminders will be sent to all licensees one month before the expiry date, and, in the case of no response, one month after the expiry date. It is of course illegal to transmit without a fully paid-up licence. If still under 21 at the renewal date, a Novice would only need to indicate that he or she wishes to continue to be registered as such. There is no refund if anyone stops using amateur radio, as the fee covers the cost of issue plus a contribution to the costs of the RA.

The RA's Information Sheet goes on to say that operating costs vary greatly. It is pointed out that Novices may use any type of equipment, provided they stay within their licence conditions. The best advice will probably come from your Instructor.

A brief description of how each callsign is made up is included (see March *Novice News*), pointing out that each is unique to an individual licensee.

And there it is in a nutshell! More information is available by telephoning the RA's Amateur Radio Licensing Section on 071 215 2217.

CONJURING UP NEW MEMBERS

HAS YOUR CLUB thought how to encourage new (and younger) recruits into the hobby? The Surrey Radio Contact Club has embarked on a novel but simple publicity scheme which others could well copy.

Attractively produced and framed copies of the notice shown here have been placed in twelve local public libraries, and it is backed up by an eight-page leaflet enlarging on the magic of radio and inviting visitors to the club. A map is included.

As imitation is the sincerest form of flattery, the SRCC would no doubt appreciate other clubs copying this idea.

If your club has a successful recruiting scheme, let us know about it.

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2. PERIOD OF AWARD: All contacts claimed for the purpose of the award must be made during the first year. Contacts may be made on any amateur band for which the applicant is licensed; they must all be on CW.

3. REQUIRED CONTACTS: For the purpose of the award, the applicant must have contacted fifty (50) other amateur stations.

4. CLASSES: The award will be issued in two classes. For the Class A award all contacts must have been made when the applicant was using a DC power input not exceeding 5W or 3W RF output. For the Class B award any power not exceeding that for which the station is licensed may be used.

5. AWARD APPLICATION: Application shall consist of a list of the stations contacted, including date and band used. The list must be signed by the applicant and countersigned by one other licensed amateur who has seen the log entries. For Class A the applicant must also include a signed statement that his DC input did not exceed 5W, or 3W output, when making the contacts claimed.

6. APPLICATION FEES: UK applicants must send 50p in UK stamps with their application. Overseas applicants must send 3 IRCs.

7. ADDRESS FOR APPLICATIONS: Applications must be addressed to Communications Manager, G QRP CLUB, 37 Pickerill Road, Greasby, Merseyside, L49 3ND, England.

NEC 1991

PHOTOGRAPHS: G4JKS

Tremendous interest was shown in the RSGB Novice Stand at the NEC in Birmingham over the weekend of 27/28 April

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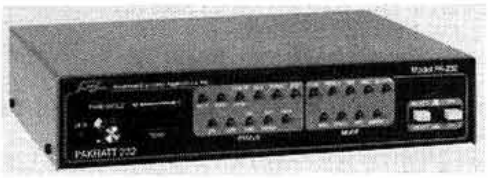
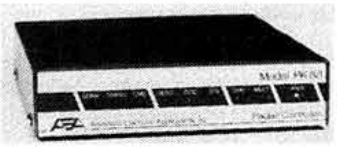


PK-232MBX

PK-88



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TOPICS

PAT HAWKER G3VA

VHF D/F LOOP WITH INTEGRAL SENSING

TT HAS RECENTLY carried (September 1990, March & April 1991) a series of items on 144MHz direction-finding and it may seem that this was enough for the time being. However, an article "Precision direction finding antennas" by Son and Tho Le-Ngoc (Memorial University, Newfoundland and Concordic University, Montreal) in *IEEE Trans on Consumer Electronics*, November 1990, pp918-921, captured the interest of both Peter Chadwick, G3RZP, and myself. This describes a novel VHF D/F antenna that combines a half-wave loop (**Fig 1**) with an integral quarter-wave monopole (sensing) antenna to provide a cardioid reception pattern with a single sharp null and so avoiding the usual sense ambiguity (**Fig 1(b)**) of a conventional loop.

Apparently, such antennas have been marketed in Canada for several years for such applications as wildlife and animal tracking, aircraft emergencies etc. It is pointed out that a complete VHF D/F antenna weighing less than half a pound can be constructed from materials costing less than $10.

In essence, the antenna shown in **Fig 2** comprises a half-wave loop antenna with a quarter-wave shield acting as the sensing antenna. The shield also acts as a quarter-wave stub to match the antenna. The authors write: "The antenna is simply made by using a piece of 50Ω coaxial cable. By trimming off the shield, the return loss of 18 to 20dB can be achieved. The forward pattern is very broad although the front-to-back ratio is excellent with deep nulls in the rear hemisphere. As the operating frequency is increased the patterns tend to become broader, but they retain their good front-to-back ratio and deep nulls in the rear hemisphere."

Construction and testing is described as follows:

(1) Cut coaxial cable to a desired length. Mark the loop length, ie a half wavelength, and lightly cut the shielding braid off, but not the insulation.
(2) Push the shielding braid out to one end until a quarter wavelength is exposed.
(3) The shielding braid is cut and soldered to the inner conductor as in Fig 2.
(4) Put a connector to the other end of the coaxial cable, and the antenna is now ready for the return loss test.
(5) The antenna can be easily tuned by trimming the shielding braid.
(6) After having achieved the return loss test, the loop support and the handle may be made by using plastic tubing as **Fig 3**.

Some points arise from the earlier items on VHF direction-finders. First an apology for not realising that the *Radio-ZS* diagram of the PCB for the hand-held Doppler switch had been wrongly reproduced and should have been the mirror-image of that shown with the ground-plane on the component-side. (No excuses since Derek Cole, who redrew the diagram, queried it but I advised him to keep it the same as in the South African journal!) I understand that corrected PCB's are now available from Badger Boards. Also the FETs are BF982 not BP982

Clive Mott-Gotobed, G4ODM, has constructed two of the DEF Sniffer receivers (*TT*, March 1991) using the additional information in the original *Radio-ZS* journal "with great success", plus some enhancements to improve sensitivity etc. On the other hand, he cannot achieve a sensible reception pattern from his attempt to construct the earlier MEF antenna. I am aware that at least one successful copy has been made in the UK but cannot recall the constructor's name/callsign. I feel certain that G4ODM ('Cherry Trees', 17 Reading Road, Chineham, Basingstoke, Hants RG24 0LN) would be glad to exchange notes with anyone who has made the antenna work as described, but has not yet tackled the sniffer receiver. G4ODM is Chairman of the Basingstoke ARC, a club that holds 144MHz foxhunts although they specifically exclude the use of Doppler equipment, primarily to stop the taking of bearings on the move. Personally I feel that this should not rule out the use of the hand-held type of Doppler equipment described by ZS6EF (*TT*, April) although G4ODM does point out some disadvantages in this approach.

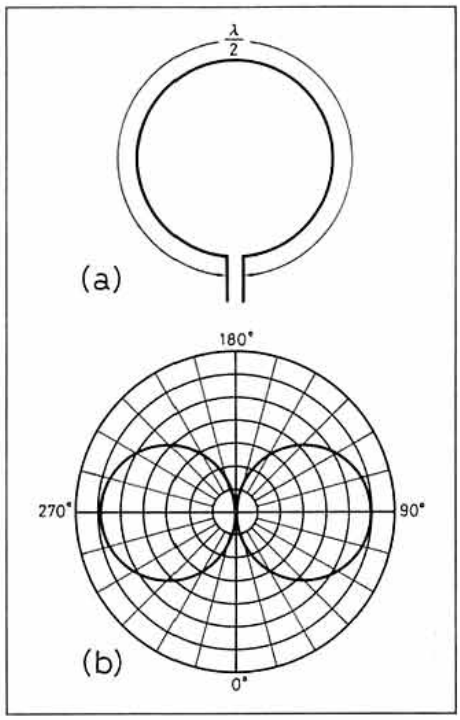


Fig 1: (a) Conventional half-wave loop antenna with (b) bidirectional radiation pattern.

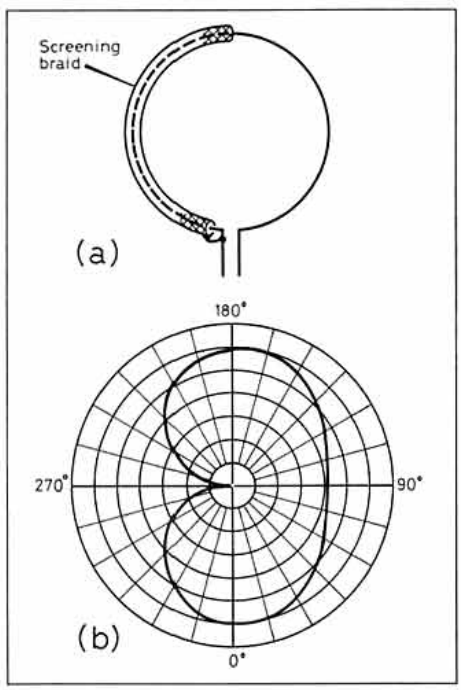


Fig 2: (a) The Canadian "precision D/F antenna" with (b) single deep null.

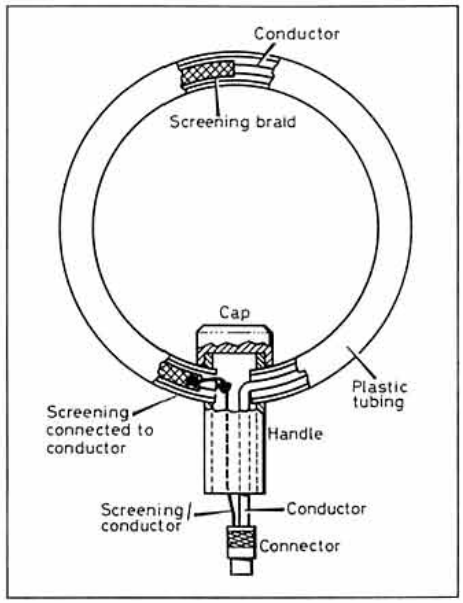


Fig 3: Construction of the precision D/F antenna assembled in protective plastic tubing.

SAFE SOLDERING

AS LONG AGO AS November 1979, a *TT* item 'Allergic to soldering?' drew attention to the advisability of carrying out soldering operations only in well-ventilated areas. This item came about when Dr Gerard Bulger, G3WIP, sent along a copy of an editorial in *The Lancet* (25 August 1979, pp397-8). The editorial reviewed the evidence that fumes given off by solder-fluxes could cause a form of troublesome asthma ('woodworker's asthma') among about 20-25% of those exposed to flux fumes in factories assembling electronic equipment. Many non-corrosive fluxes, including some cored solders, contain colophony which is the solid material remaining after turpentine has been distilled off pine resin (hence the connection with woodworking). I recall that, following publication of this item, one firm marketing cored solder pointed out that they had eliminated the problem of colophony, but I doubt whether this was done universally. I have no evidence that many amateurs now open their windows wider while soldering. Perhaps the full-length, detailed article 'Making soldering safer' by Bryan P Bergerone, MD, NU1N (*QST*, March 1991) will jolt more of us into taking sensible precautions. In his introductory note, he writes:

"Soldering is the centuries-old process of bonding metals through the use of a relatively low-melting-point metal, commonly a lead-tin amalgam, that *alloys* (binds) with the surfaces to be joined.

"The potential hazards associated with

soldering, aside from the obvious risk of thermal burns, arise from:-

(1) improper hygiene after contact with the lead and other metals in solder;
(2) inhalation of the smoke and fumes associated with soldering;
(3) inhalation of the thermal-breakdown products of wiring and component insulation; and
(4) direct contact with, as well as inhalation of fumes from, solvents used to remove the residue from soldered connections."

NU1N reviews two of the more common medical manifestations associated with soldering, namely asthma and, to a lesser extent, lead poisoning. Persistent asthma (ie not 'woodworker's asthma') induces attacks of shortness of breath, often accompanied by coughing and wheezing. It is due to an inherited, abnormally elevated sensitivity of the air passages to certain substances that results in a generally reversible partial obstruction. About 1% of the population has asthma.

Non-corrosive organic fluxes, as used for electronic soldering, commonly contain colophony, a pine resin with an active ingredient, abietic acid, NU1N points out, adding: "Reaction to solder-flux fumes can be immediate and pronounced. In a factory in England, 20% of workers exposed to solder flux fumes developed wheezing and breathlessness. (S Burge *et al* 'Occupational Asthma in an Electronics Factory' Thorax 34 (1979) pp13-18)".

NU1N also discusses the problem of lead poisoning as well as fumes from the heating of wire and component insulation: "Heating insulated wires during soldering releases toxic fumes. PVC begins to break down at 176°F (80°C) releasing hydrogen chloride, benzene, toluene and other irritants. Toluene di-isoryanate, an established asthmatic agent, has been shown to be generated from soldering polyurethane-coated wires. Fumes from soldering Teflon-insulated wires may also cause polymer fume fever." Remember that if you can smell soldering fumes, you're certainly breathing them. However, NU1N stresses that soldering safely is simple: "Any tool or product, if used improperly, is potentially dangerous. By observing simple precautions you can keep soldering a safe and enjoyable part of the amateur radio experience."

- Properly ventilate your work area - so that you or those around cannot smell fumes from your soldering. Preferably ensure a flow of air between two windows. Using a fan may expose others to an unreasonably high level of 'secondary soldering' fumes.
- Wash your hands after soldering and before handling food and smoking materials.
- Minimise direct contact with flux and flux solvents.

A few final points: For the amateur using a relatively low-temperature soldering iron, the main threat of lead poisoning lies not in inhaling lead vapours, but in handling solder. If the ventilation has to be poor, it may be advisable to use a cartridge-based respiratory system, which functions and looks much like a military gas mask (a simple dust mask is not suitable).

If you suffer from asthma, other than flux-induced symptoms, a respirator fitted with suitable cartridge that can absorb solder fumes, should be regarded as *mandatory*.

[see page 39 of last month's RadCom for more soldering safety points - Ed]

AGC - STILL A DIFFICULT TECHNIQUE

AS SOMEONE INTERESTED primarily in CW operation using headphones, I have never been convinced of any essential need for AGC in HF receivers, believing strongly that no AGC is better than poor AGC, and depending on audio-limiting by back-to-back diodes to protect my ears. It gives one a sense of being in control of the receiver when occasionally making manual adjustment to RF-gain controls! However, I recognise that most operators, even on CW, would regard this approach as a cop out - and would not today contemplate using a receiver that does not provide AGC for SSB and CW.

Unfortunately, there is far more to achieving really satisfactory AGC for these modes than many of those who produce 'black boxes' seem to appreciate even now, some 60 years after the original appearance of 'AVC' in broadcast receivers, and more than 50 years since the Germans showed how, by using switched time-constants and by reducing the leakage of the BFO signals into the IF stages, it is possible to provide quite effective AGC for CW and SSB.

In *TT* (April) LA8AK described a circuit for obtaining IF-derived rather than AF-derived AGC with the Plessey SL621 IC. This encouraged Peter Chadwick, G3RZP, to explain the background to this device, designed over 20 years ago. He writes:

"The original SL600 series was designed for use in a military radio in which an SL623 AM detector/RF-derived AGC/product detector operated in parallel with the SL621 AF-derived AGC. This meant that the RF-derived AGC was in action all the time, although the levels were arranged so that the AF-derived AGC 'took over' with rising output. When the level of the AF-derived AGC voltage fell, such as when the frequency of a single tone was low, the RF-derived AGC took over. The original multiple time-constant AF-derived AGC system (as opposed to W1DX's 'hang-AGC' circuit) first saw the light of day in the Marconi Marine 'Pennant' channelised HF marine SSB receiver.

"The Pennant was a valved design of the early 1960's using, if I remember correctly, three E88CC twin-triode valves in the AGC circuit. Although I doubt if the IC designers were aware of the Pennant design, the SL621 is extremely close to being a solid-state version of the Pennant system. The Pennant also used a ring-bridge mixer with germanium diodes and achieved what, for its day, was a very good IMD performance.

"AF-derived AGC systems on their own (**Fig 4**) tend to suffer from a lot of faults. This is partly caused by the fact that as the input audio frequency drops, the response time must fall, while at frequencies below 10Hz, the phase shift in the AGC loop can lead to instability. Again, the lower input frequencies tend not to get well filtered, so some rectified AF gets on the AGC line, modulates the gain of the IF, and so increases the in-channel IMD. This was not so much a problem with valves, since the dB change per volt was so much less.

"However, putting RF-derived AGC in parallel gets round most of the problems. Probably much of the 'flak' that the SL621 has attracted can be traced to the simplified low-cost approach (originally exemplified by Brian Comer, G3ZVC - now KF6C - in not using the SL623 in parallel) being copied into areas where it is not the best approach. Incidentally, some of the much older applications information from Plessey showed the SL623 fed from a tuned circuit, thus reducing the amount of wideband noise hitting the AM and AGC detectors, as well as the product detector.

"One of the difficulties in using narrow filters at the back end of the IF chain (as in the 'roofing filter' approach) is the result of hitting the filters with a large amount of noise: this showed up in the case of the SL6700 where using a ceramic two-pole AM filter produced a very faint (but annoying) whistle down in the noise at the output, whereas a tuned circuit did not, since it did not 'ring'.

"In a simple SSB receiver operating linearly through to AF, the use of an AF low-pass-

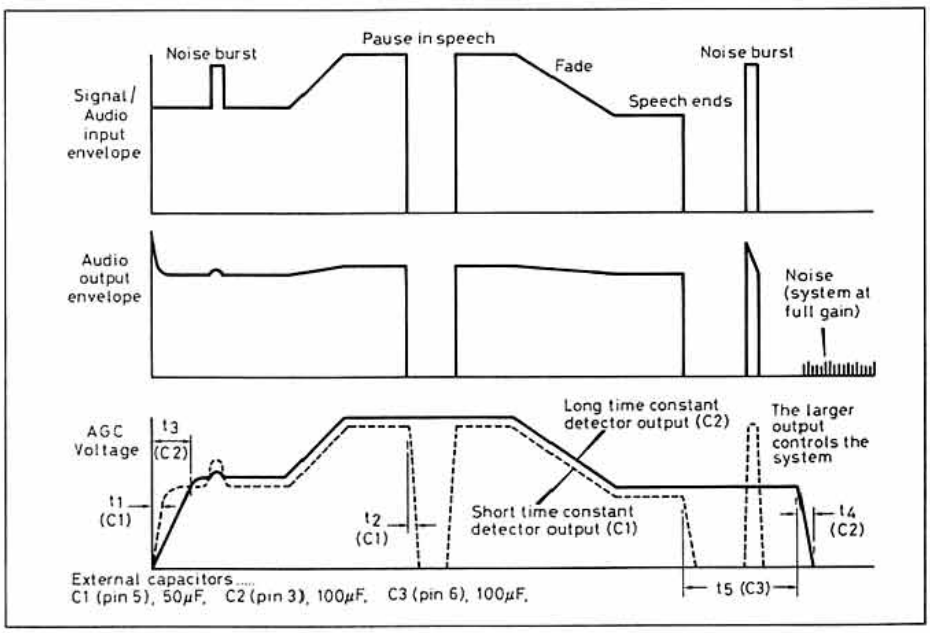


Fig 4: Dynamic response of an AF-derived AGC system controlled by an SL621C.

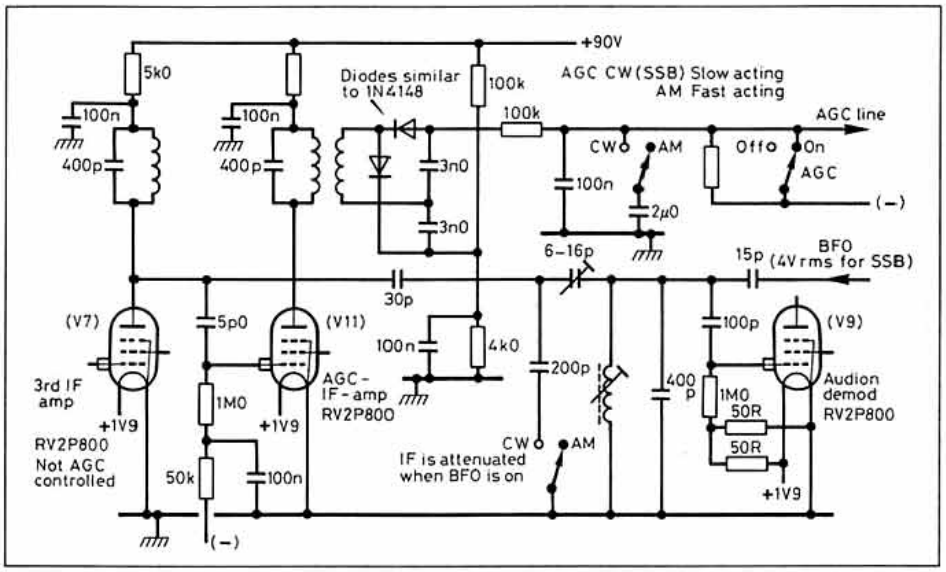


Fig 5: AGC/demodulator circuits of the German receiver type KW.E.a designed in 1939 with (a) two AGC time-constants; (b) IF signal to detector attenuated in CW position to achieve same audio level; and (c) 'modern' type use of diode AGC detector circuits. Unlike other communication receivers of this era the AGC function can be used for CW with the BFO switched on. German valve code RV2P800 indicates a 2V pentode amplifier valve with an amplification factor of 800. This receiver is considered by LA8AK as an excellent example of the designers really understanding the principles of receiver design - something he does not always find in modern receivers.

filter gets rid of the excess noise - a technique that was used very successfully with an LC filter in the KW2000CAT channelised HF transceiver.

"AGC systems often appear to be afterthoughts, whereas in reality they can be very difficult to design! Fast AGC systems with narrow IF filters can get really interesting because of the delay introduced in the filters, and some very fast AGC circuits used in certain Electronic Warfare applications end up using very complex and dedicated circuitry usable only in that specific equipment."

These notes from G3RZP should clear up some of the misconceptions about the SL620-21/SL1620/21 device, although I note that the useful notes on these devices in the Plessey *Radio Communications Handbook* (1977) make no mention of having an RF-derived AGC system in parallel with them. Nevertheless, as G3RZP points out:

"It's strange to realise in these days of new ICs every few minutes, that the SL600-series was designed in the mid-1960s. The SL521 logarithmic amplifier IC was designed about 1964 yet is still being designed into new equipments today, which must be some sort of record!"

Jan Martin Noeding, LA8AK is convinced that many of the currently available receivers exhibit strange faults that elude some of the reviews. He believes that some of the manufacturers, including Yaesu, tend to design new models adapted from earlier models without checking out fully the behaviour of the circuitry in the field rather than the test laboratory. He refers particularly to AGC circuitry which can continue to be used in successive models for many years without ascribing to the rules for good AGC as laid down, for example, by Professor U L Rohde, DJ2LR in various books and publications.

LA8AK writes: "My argument is that some firms have never understood the principal (and yet important) rules for how a good AGC system should operate and have not tried to understand that DC gain is not enough. Usually they apply too high brute DC-gain, such that the AGC detector switches between on-and-off instead of performing like a linear element. DJ2LR considers that it is good practice to have a limiter function in the IF to limit, at 6dB above maximum normal IF level, although tests by LA7MI on his R-4C did not yield any significant results."

LA8AK describes how he modified a Collins 51-S valve receiver removing AGC from the final IF amplifier and providing a relay-switched reduction of the time-constant when receiving AM signals. But he considers that the "finest receiver I have used" is the German military receiver type KW.E.a (Kurzwellen Emfaenger Anton) designed in 1939. This has a 250.9kHz IF with LC filters having the selectivity variable in seven steps (with 250kHz BFO) and a further eighth step (same filter selectivity as the seventh step but with the BFO at 251.8kHz). The image rejection at 10MHz is specified as about 78dB despite the low IF. This is achieved by having either four or five (selectable) tuned pre-mixer stages.

He was surprised to discover that this vintage receiver has two AGC time constants, 'slow' for CW and 'fast' for AM. For CW (and for SSB) an IF-attenuator equalizes the audio for AM and CW, an arrangement which also reduces the BFO feedback to the AGC stage facilitating the use of AGC on CW (**Fig 5**) - a feature seldom, if ever, found in other receivers designed much before about 1960. LA8AK also comments favourably on the 'audion' demodulator used in the KW.E.a and a number of other German receivers which, in effect, was not subject to the poor, low-signal-performance of the usual AM diode envelope detector. He writes:

"The audion demodulator seems to have a fine 'capture' effect on the signal so that one can still hear (AM) broadcast stations in poor conditions when a conventional envelope detector has too little signal. The effect can be compared with modern PLL-AM demodulators (as experienced by SM6HYG).

"About ten years ago I was told that the meteorological station at Tromsoe used these German receivers for many years but in 1960 replaced them with professional Collins receivers which worked extremely well as long as propagation conditions were reasonable but proved virtually useless during the severe magnetic storms experienced at this high latitude. The operators were forced to dig out and re-install the discarded German receivers. Some amateurs have criticised the KW.E.a for being so large and heavy (a criticism often levelled at the AR88 - G3VA) without appreciating that this receiver was never intended to be used in the field but only in fixed installations."

On the other hand, LA8AK still finds much to criticise in many relatively modern transceiver designs, including such models as the FT-7/FT-901/FT-902/FT-747 and other models of which he has had personal experience. He has been able to overcome, with relatively simple modifications, some of the problems such as keyclicks, RF-processor deficiencies etc and to make some improvement in the audio-quality of the FT-747 by removing from the circuit the 10nF 'chip' capacitor across the audio signal and similarly by changing C511 in the FT-7 from 1µF to 47nF (a similar modification applies also to the FT-901).

But he continues to wonder how so many operators can find pleasure in unmodified equipment with poor audio fidelity: "I do not like to operate a rig which causes a headache after using it for about half-an-hour. In contests, it is important to immediately understand the speech, often in a dialect or language to which one is not accustomed. Often I have problems talking to Danish amateurs (the TR-7010 and TS-700 have poor bass responses and it is desirable to insert a 47nF capacitor in series with the microphone) .... Why do so many reviewers (except G3SJX) so seldom report on annoying deficiencies? I can understand that amateurs, once they have bought equipment, being motivated by a desire to tell the world what good equipment they have chosen and glossing over the deficiencies, but this should not apply to reviewers".

COMBATING CORROSION

DICK BIDDULPH, G8DPS, in a short item in *TT* (April 1991, p34) drew attention to the need to avoid contact between copper and aluminium in antenna installations, in addition to other rust-prevention precautions such as the application of grease, lanolin or RTV silicone rubber.

This topic crops up also in a detailed article 'Combating corrosion in aerials' by Steve Henderson, ZL1AOC, (*Break-in*, November 1990, pp10-14) covering this important topic in depth. It is based in part on publications of the Building Research Association of New Zealand as well as drawing on examples of corrosion problems in both amateur-radio installations and in the more numerous VHF (Bands 1/III) TV-receiving aerials used in New Zealand, including wideband log-periodic arrays. Most populated areas in New Zealand have a marine atmosphere, with high concentrations of chloride-containing sea salt aerosol (which, like the sulphur dioxide of industrial atmospheres, promotes corrosion).

It should be appreciated that all corrosion involves electcrolytic processes, including that produced by coupling dissimilar metals or by the existence of different concentrations of dissolved salts or gases in the electrolyte at different parts of the metal surface.

In his opening paragraph, ZL1AOC stresses: "All unprotected metal surfaces (except the few 'noble' metals such as gold and platinum) corrode or oxidize to some degree. How long this takes before it becomes a problem very much depends on the working environment. All too often one hears of an antenna where the telescoping tubes of an expensive Yagi array can no longer be adjusted, or a trap in an element has disintegrated. Not only are amateur radio antennas involved; domestic television aerials can also give a great deal of trouble. Antennas are costly items which, with a little effort, can be given good protection that will extend their life."

He lists some typical examples of problems commonly encountered: tinned-copper braided pigtail connections from a balun to a wire dipole completely disintegrated; aluminium-alloy bolts terminating the wire connections to traps in a wire dipole corroded to the extent that some had fractured; telescoping tubes of a Yagi corroded and seized, offering high resistance between sections; element mounting bolts of TV aerials rusted with corrosion to the extent that an element may fall off after only a few months use; two-piece element clamps of diecast metal corroded so that the element sections no longer provide a continuous electrical path. He writes:

"Amateur-radio antenna arrays can have a large number of tubular sections, many of them being required to have telescoping adjustable sections. If these are not protected when they are assembled, it will be impossible to dismantle them at some later date. Hardware supplied with some arrays is electro-plated; with others, stainless steel is provided. The preference is always to use stainless steel hardware on this type of antenna. It is a point worth exploring if one is contemplating purchasing a new antenna."

He stresses that rust is always a problem with hardware, both in the antennas and in the supporting structure. Not only is it a progressive action in reducing the mechanical strength of bolted points but the corrosion also produces a rectifier, leading to the 'rusty bolt' effect and possible EMC problems.

In a section: 'Improving the durability of an antenna', ZL1AOC writes:

"In assembling an antenna for the first time, or after repairs, care should be taken to prepare all sections to prevent the entry of water. If a telescoping section is involved, all signs of corrosion should be cleaned off the metal. The sections should be liberally coated with grease or better still with one of the anti-corrosive compounds. When the position of the sliding joint is finally determined, the surplus compound should be cleaned off and the joint wrapped to seal it completely with a self-amalgamating tape. If you have access to a hot air gun then the joints could be covered with heat-shrink tubing. In assembling the antenna elements to traps or on to a boom, all the nuts, bolts, washers and clamps should be completely coated with a suitable compound. The presence of the compound in a joint does not introduce any electrical discontinuity between sections. There are always sufficient surface imperfections on the metal that maintain contact when a joint is secured with the clamping system. Grease is not entirely suitable in this application as it will weather and finally wash off.

"Always ensure that drain-holes in traps and other components are clear and face the ground, so that any water that may penetrate the trap will drain away. Element tubes with open ends should be plugged to prevent water gaining entry.

"An expensive TV aerial is worth treating before it is first installed (Most of this advice applies to any VHF/UHF antenna - G3VA). All the connecting joints, mounting clamps and hardware should be thoroughly coated with a compound before assembly. If it has been in use for some time and is being reconditioned, have a good look at the hardware. It could have been electro-galvanized and is almost certain to be rusted. Replacement hardware should be stainless steel. Providing the new hardware is given protection it should not give any trouble in future years. It is important to ensure the compound is worked into all crevices at the joint points.

"In one location with a marine atmosphere, an antenna was successfully protected by carefully wrapping all the joints with Denso plumbing tape (a messy process due to the compound on the tape but providing good long-term treatment). The action of covering the joints with an anti-corrosion compound or taping it prevents the moisture-laden solutions reaching the metal and provides a barrier to prevent corrosion taking place.

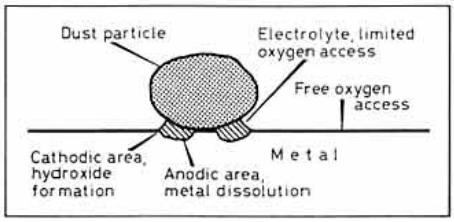


Fig 6: Differential aeriation cell illustrating the role of oxygen in the corrosion process.

"Corrosion is frequently found on die-cast components, including the clamps and die-cast casing of rotators. In one case, the unit was dismantled and the case sections and clamps sand blasted to remove the corrosion and then sent for powder coating. This has the same function as a wet paint application but is tougher and more durable. Outdoor use requires that coatings must be capable of withstanding weathering under all conditions. The coating best able to cope is based on polyester powder. It is necessary to dismantle items to enable the treatment to be carried out, as the coating needs to be oven cured, in some cases at up to 160°C. Powder coating is a specialist application which requires consultation with an expert associated with aluminium joinery components."

ZL1AOC lists a number of materials used for corrosion protection available in New Zealand. He is particularly keen on Lanacote MSG based on 'woolgrease' and presumably a local proprietary form of the lanolin recommended by G8DPS. Other products he lists include Naolox (anti-oxidant preparation for use as a joint compound, particularly with aluminium joints); Corium 89, an aluminium cleaner for removing microscopic corrosion film from stainless steel and aluminium; Corium 209, an aluminium sealer capable of protecting aluminium from chemical action; Denso or Protector Industrial Tape; Poly-isobutylene (PIB) self-amalgamating tape which is moisture and ozone resistant (if a rubber self-amalgamating tape is used, finally wrap the joint with good quality PVC tape). Liquid water on the metal surface is needed for corrosion to occur, while oxygen has a special role in atmospheric corrosion because it acts as acceptor of the electrons lost by the metal during corrosion. Atmospheric corrosion usually ceases in the absence of oxygen. However, different concentrations of oxygen at points on a surface, such as inside and outside a crevice, can provide the driving force needed for corrosion. This is termed a differential aeration cell: **Fig 6**.

SMALL MAY BE BEAUTIFUL BUT BIGGER CAN BE BETTER

THE REFERENCE BY LA8AK to the size and weight of the KW.E.a receiver of 1939 (or the AR88 of 1941) struck a chord to which I can respond. As someone whose height is almost exactly one-metre-plus-one-yard (there's a mixture of measurements) and with fingers (and feet) to match, I have never been much attracted to the Tiny Tim scale of current amateur-radio equipment, although fully recognising its attraction for mobile or portable operation. Indeed, the pressure on manufacturers to reduce size is partly a desire to have commonality between mobile and base equipment and partly to economise on enclosures etc. I like my equipment to be large and fairly heavy, with good-sized knobs and switches, with meters that follow my keying, and cabinets that emit the gentle hum of transformer laminations! And free from a massed phalanx of miniature switches.

The consumer-electronics industry is only gradually responding to the growing dislike ('technifear') of over-complex and often confusing (except to the very young) controls. Video recorders so easily set to record the wrong programme on the wrong channel at the wrong time. Teletext units that remain little used. Digital car radios . . . .

Consider the following extract from a letter from a Mike Rogers in *New Scientist* (6 April 1991): "Previously, it was simple, while driving, to cope with two big knobs and six decent-sized push buttons to get a useful selection of (broadcast) stations. Now one is faced with several, barely identifiable minuscule buttons packed side by side or on top of one another. You read the manual - which is nearly as thick as the one describing the car - and try to memorise which button is for what. Then you drive up a motorway at night-time and are left feeling nervously for the said badly illuminated buttons on a radio usually placed at the bottom of the centre console. The discipline of good ergonomics seems to have flown out of the window."

VARIABLE SELECTIVITY AND SIDEBANDS

DAVE LUNN, G3LSL, while browsing through a box of old radio magazines he had been

given, came across a fascinating article by the great Professor E V Appleton (discoverer of the 'F' (Appleton) layer of the ionosphere) 'The physical reality of sidebands' (*Wireless World*, March 19, 1930, pp299-300). This was subtitled 'A reply to the Heretics' and was a devastating reply to those who still, in 1930, refused to accept that sidebands really existed and were not just a mathematical concept. The heretics included not only Sir Ambrose Fleming, Baird and his supporters (who believed that television of entertainment value could be transmitted in the medium-wave band without creating chaos) but also Dr Robinson who believed that his 'stenode' receiver, incorporating a single-crystal filter with top-boost, would permit broadcasting stations to be packed together with minimal frequency separation.

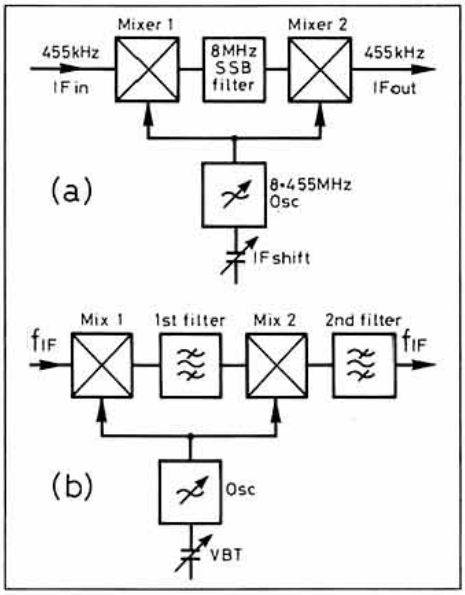


Fig 7: (a) IF shift positions the IF passband but does not change the overall selectivity. (b) The use of a second filter variably aligned with the first filter provides variable bandwidth tuning.

One of the speciously powerful arguments used by the heretics was that it is possible to listen to the harmonics of a broadcast station without the audio frequencies being doubled as they avowed they would be if they really existed at the fundamental. As the professor pointed out, they overlooked the fact that modulation is essentially a mixing process which, as every user of SSB appreciates, can be used to heterodyne a modulated signal to another frequency without affecting the audio-band frequencies. The harmonics are, in fact, themselves generated in the mixing process as unwanted products.

Today, we accept the physical reality of sidebands without question - after all they can be displayed clearly on a spectrum analyser. But this means that, if in an SSB receiver, you strictly limit the bandwidth to say 300 - 2500Hz in a 2.2kHz filter having a shape factor approaching unity, then the audio response of an accurately tuned receiver is inevitably limited to about 300-2500Hz which is bound to reduce intelligibility (as well as making it sound rather unpleasant) to some degree, even for male voices. A 2.7kHz filter sounds

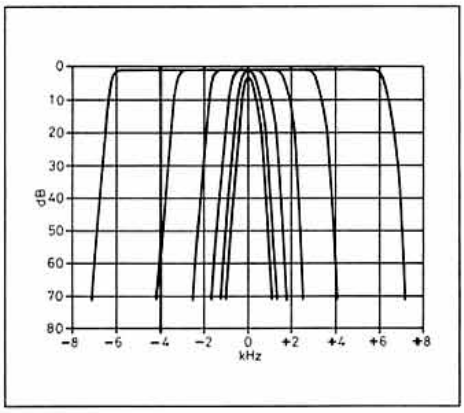


Fig 9: Selectivity curves of the EKO7-80 filter at bandwidths of +/-0.15, +/-0.30, +/-0.75, +/-1.5, +/-3.0 and +/-6.0kHz. Note the similar slope at all settings right down to -70dB.

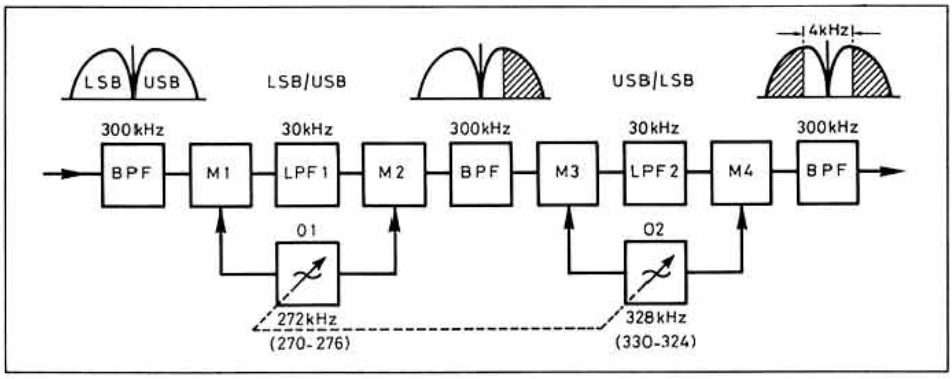


Fig 8: The basic principles of the 1969 Rohde & Schwartz EKO7-80 filter based on two low-pass-filters using inductors and not crystals to provide continuously variable bandwidth.

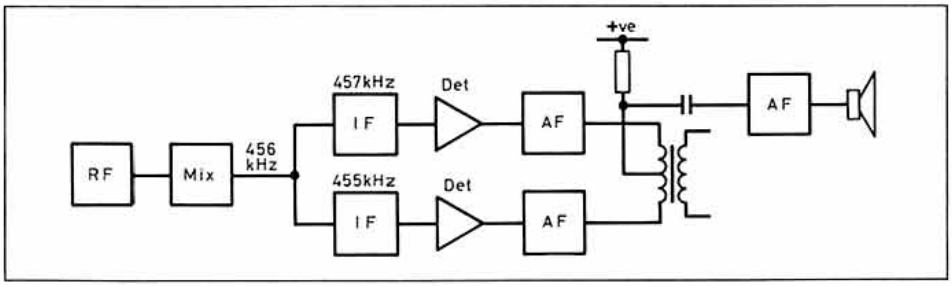


Fig 10: G3IJE's outline of the receiver described on HCJB claimed to eliminate adjacent channel sideband hash from closely spaced carriers.

a little better, but there is still much to be said for having some degree of variable selectivity or bandwidth options that enables an operator to take advantage of band conditions and extend the audio response up to say 4-5kHz when the band is less crowded. For AM broadcast reception of reasonable quality music, the bandwidth needs to be around 12kHz (+/- 6kHz) and even then not to roll off too sharply.

In *QST* (March 1991) David Newkirk, WJ1Z, reminds us of several "Transceiver features that help you beat interference" (more concerned with narrowing than widening the response) including passband tuning (IF shift) and variable bandwidth tuning (VBT), both of which are outlined in **Fig 7**. A de-luxe version of VBT (requiring four extra mixers instead of two) was described in *TT* way back in December, 1969, based on a Rohde & Schwartz professional receiver using their EKO7-80 filter in which two high-grade low-pass-filters at 30kHz, using inductors rather than crystals, were so arranged that they provided a *bandpass* filter, acting on both upper and lower sidebands (**Fig 8**).

As shown in **Fig 9** this filter had an excellent shape factor, giving a bandwidth continuously adjustable from +/-6kHz down to +/-150Hz with substantially similar slope right down to -70dB at all settings, presumably without introducing the non-linearities and limited dynamic range that are seemingly inherent in crystal filters.

This was indeed a deluxe, high-cost system but one suspects that today somewhat similar characteristics might be just about achievable using digital filtering techniques.

For those who believe that there are still new ideas to be explored with analogue technology, I pass along an intriguing though untested idea sent in by Mike Powell, G3IJE as the result of listening to an item on HCJB's amateur-radio/SWL programme of 13 March (HCJB's reduced carrier transmission on 21,455kHz). This described a form of receiver claimed to have been developed by a listener in the USA many years ago, although I am uncertain whether the receiver was ever successfully tested outside the laboratory.

Fig 10 shows what G3IJE believes was the essential idea behind the receiver which was claimed to be immune to adjacent-channel sideband splash permitting (shades of the stenode!) carrier separation of +/-1kHz while delivering audio out to some 7500Hz! As G3IJE puts it, it seems an ingenious way of using the common-mode rejection properties of a push-pull circuit to null out interference. He feels there may well be snags but hopes to give the idea a try. I suspect that it would be more suited to MF than HF - but who knows until they have tried it!

PHASING-TYPE SSB GENERATORS/ DEMODULATORS

SINCE THE INTRODUCTION of SSB into amateur radio some 40 years ago, there has been continued interest in, but often frustration with, 'phasing-type' techniques for the generation or demodulation of SSB signals. Transceiver manufacturers have for long universally adopted the alternative 'filter' method, following the development of high-

performance crystal filters at HF. Originally such filters tended to be limited to frequencies below about 500kHz.

The result has been that for many years, phasing systems have tended to be confined to the home constructor. This is despite their undoubted cost advantages in eliminating the need for an SSB filter, and the ability to select either the upper or lower sideband without the use of two offset oscillators. They also have the advantage that not having sharp-cut-off filters in the exciter, they can provide superior audio quality.

However, although cheaper, phasing systems require the use of stable, close-tolerance components often of critical, uncommon values with long-term stability against ageing, and good short-term stability against temperature variations, plus skill in setting up. The later development of 'third method' (Weaver) and 'polyphase' (Gingell) configurations largely overcame the component-value problem but required the use of four balanced modulators (mixers) and, for Third Method, reasonably good audio filters. Thus, even for home construction, the filter method has generally found favour, with the cost of SSB filters reduced by the use of low-cost colour-TV or 'clock' crystals.

In the early days, it was usual with phasing-type systems to generate SSB directly at the transmission frequency avoiding the (usually) double-conversion of filter-type SSB generated at, say, 455kHz. However, it is now often considered preferable to generate the signal at a fixed high frequency, as with filter-type SSB, and then convert it to the band in use. Phasing-type demodulators for direct-conversion receivers work at the incoming signal frequency although this in practice tends to limit slightly the degree of rejection of the unwanted sideband in multiband receivers.

Fig 11 shows the basic phasing-type system in which the carrier is suppressed by the balanced modulators (mixers), with the AF and RF 90° phase differences resulting in the outputs comprising two sets of each sidebands, with either the USB or the LSB sidebands in phase and the other set 180° out-of-phase. When the signals are combined (added together) the sideband which is 180° out-of-phase nulls and disappears, provided that both the RF and AF networks are almost precisely 90° over the range of frequencies involved. For RF this is not too difficult and can be done digitally by frequency division. For AF networks covering say 300 to 3500Hz or more, networks providing +45° and -45° as in **Fig 11(b)**, the problem of achieving an accurate stable phase-shift network is more difficult, although it has been made simpler by the technique of using all-pass lead and lag networks.

Moreover, even for the classic phase-shift networks it is possible to take advantage of the improved stability of modern components such as metalfilm resistors, multiturn cermet trimmers and polystyrene capacitors. John R Hey, G3TDZ, believes that it was the poorer components of yesteryear which gave the phasing method a bad name. He has adopted the system for the 'White Rose Radio' club constructional project which has been expressly designed to smash through the £1000 'brick wall' that deters many Class B licensees from struggling with the Morse test and getting on HF. His detailed description of an HF receiver that can be constructed for around £25 to £30 or so appeared in *Radio Communication*, February 1990, pp-35-39. *[Reprints £5 - Ed]*

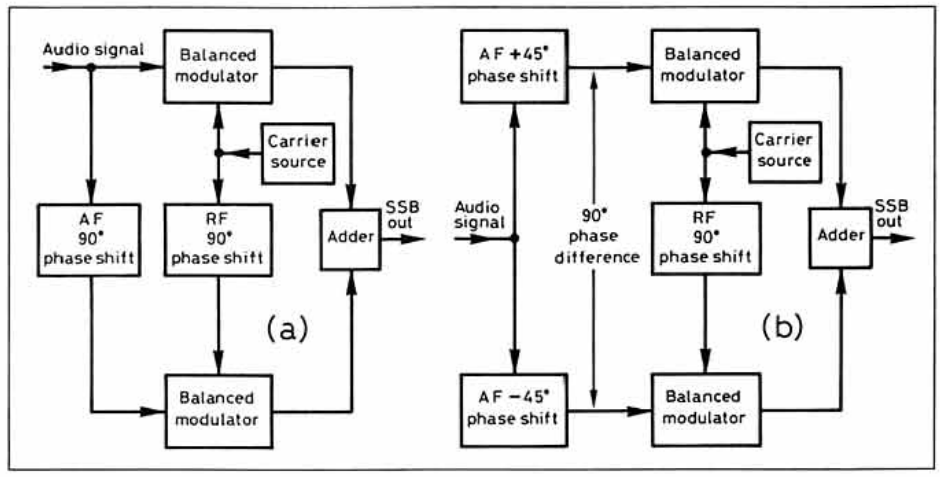


Fig 11: Phasing-type SSB generation. In reverse form the arrangements provide SSB demodulators.

G3TDZ writes: "Something not seen in *TT* or elsewhere for some time is the phasing method of SSB generation. Considering the advantage of there being no expensive filters or crystals needed, yet capable of superb SSB audio quality, with generation possible

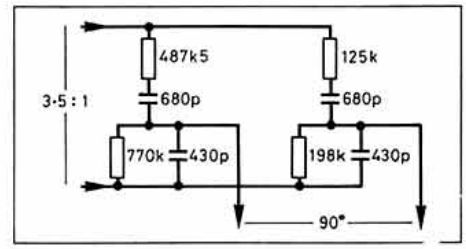
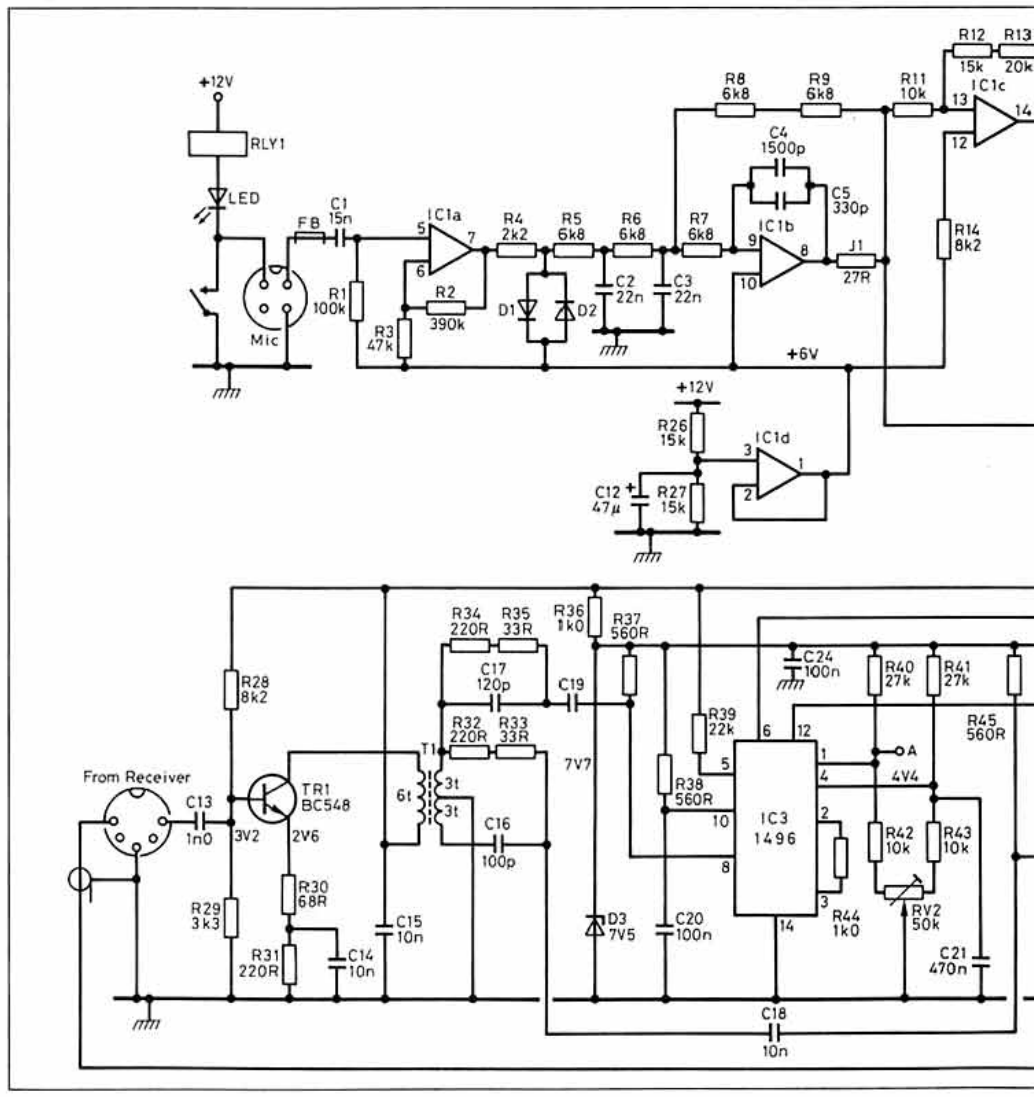


Fig 12: Audio-phase shift network providing outputs which differ by 90° in phase over the audio speech band.



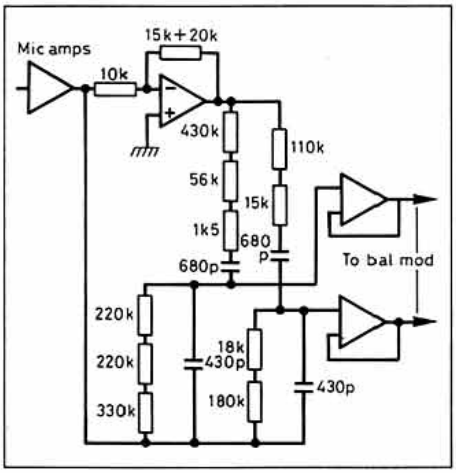


Fig 13: G3TDZ's practical realisation of the audio phase-shift network using standard value components (1%) found to give excellent results between about 150Hz and 4kHz.

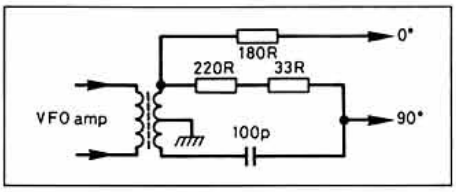


Fig 14: The RF phase-shift network used by G3TDZ for the White Rose constructional project.

directly in-band, perhaps a little regeneration of interest is needed. In designing a matching transmitter for our White Rose receiver project, the phasing method was chosen and has proved to work very well.

"It is a fair guess that it is the construction of the actual phase shift networks which frighten off the average amateur constructor. It is the way these requirements have been solved in our project that prompts this letter; readers may be interested to learn how easy these may be achieved.

"The audio network with its formidable and critical component values were perhaps responsible for the appearance of the Gingell Polyphase network where off-the-shelf component values go some way to simplifying the requirements. This network, however, does use a great number of individual components so it seemed a good idea to take a renewed look at the original network. It was soon found that series combinations of common off-the-shelf values could not only satisfy the values of **Fig 12** but also resulted in an accurate 90° phase differential across the output from about 150Hz to about 4kHz. The 3.5:1 drive requirement is also very easily met with a single op-amp and common resistor values.

"**Fig 13** shows the practical realisation of the audio phase-shift network of Fig 28 using 1% tolerance resistors of common values, and where the 3.5:1 drive is easily accommodated. As with all such networks they must be driven from a low-resistance source and terminated by a high-resistance load.

"The RF phase-shift network is even simpler. Basically it consists of one resistor and one capacitor, although in practice the values are achieved by using series values: **Fig 14**. At mid-VFO frequency, the reactance of the 100pF capacitor is 255Ω.

"While every electronics text book shows the well-known series connection of resistance and reactance formula:

$$Z = \sqrt{(R^2 + X^2)}$$

I had to think long and hard to come up with the formula for the parallel combination:

$$Z = \sqrt{\left(\frac{R^2 \times X^2}{R^2 + X^2}\right)}$$

Or, where R and X are equal, the answer is found using the series formula and dividing the answer by two. With L, C and R in circuit, it is the difference between X_L and X_c which is entered into the above formulae.

"The simplicity of the RF network has caused some constructors to ask the question: 'Surely these values can only provide the required 90° phase shift at one frequency; how can they work over a whole 0.5MHz band?' My answer is that a little calculation ($\text{Tan } \varnothing = X_c/R$) shows that the error angle is only +/- 1° On a band such as 3.5MHz, where only 200kHz are used by SSB operators, the phase error is as little as 0.4°, hardly enough to cause any loss of sideband suppression. In practice the two networks result in an SSB system which gives excellent voice quality with all components off-the-shelf industry standards.

Fig 15 shows the full circuit of the White Rose exciter but without full constructional details or setting-up procedure which one hopes may be the subject of a full-length article by G3TDZ (who can provide a PC board for the exciter for £3.50). Briefly, following the single stage microphone amplifier are diode clippers which are intended as amplitude limiters rather than speech clippers, thereby obviating the necessity of difficult ALC circuits later. Out-of-band audio products are removed by the low-pass filter IC1b. C1 is chosen for low-frequency roll off below 250Hz. The filter with its inverting amplifier IC1c provides drive for the audio phasing networks. These are terminated by followers IC2a, IC2b and R25 and VR1 permitting audio drive equalisation. TR1 amplifies the VFO input to about 1Vp-p and drives the RF phase shift networks. These feed twin 1496 double-balanced modulators with carrier balance about -50dB. Following the combining transformer, either a low-pass filter or a tuned circuit has been provided on the board before the high level mixer which frequency changes the generated SSB signal into the required HF band. A tuned circuit must be included after this and before the power amplifier. This is included on the plug-in power boards together with a low-pass output filter.

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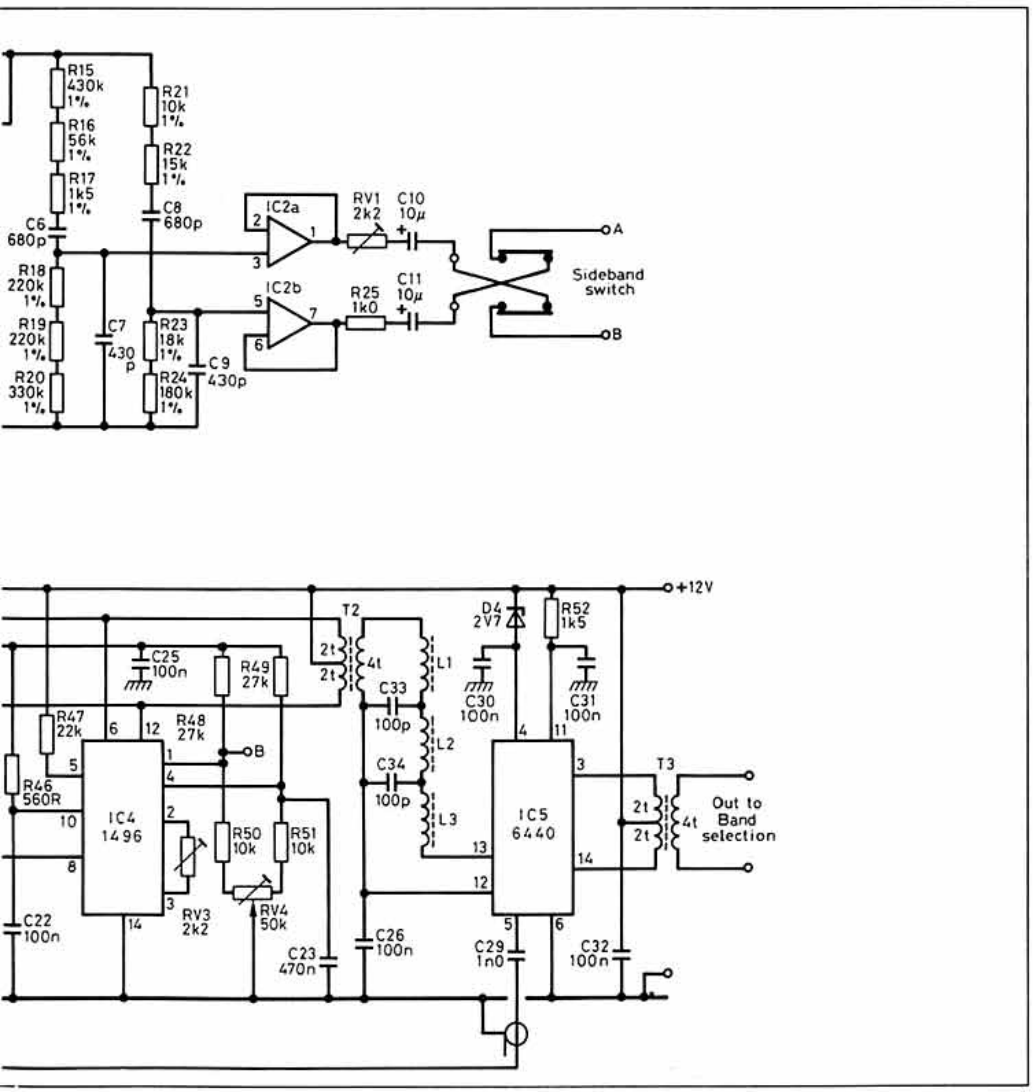

Fig 15: Circuit diagram of the White Rose SSB exciter.

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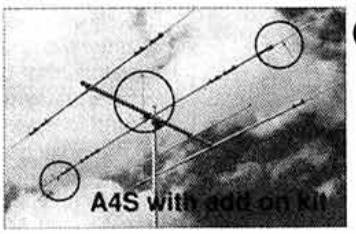

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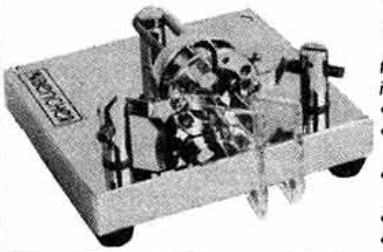

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by Chris Plummer BSc., C.Eng, FIChemE, MSaRS, G8APB

IT MAY SEEM STRANGE that a Class B licensee is writing about HF. However you do not even have to be licensed to take a full part in this technical sport. HF or more precisely Top-Band (160m) direction finding (DFing) is now approaching its 70th anniversary in the UK, and is still regarded by many as either too tough (a *man's* sport) or a 'black art'.

In reality it is only a combination of skill and accuracy in taking bearings with a radio set, map reading and a heck of a lot of luck. In fact I have described it as the ultimate game of adult hide and seek. At club level it is just the thing to raise a thirst or an excuse to go to the pub after the event. This pastime (for time does pass extremely quickly especially when you cannot find the transmitter) is for young and old alike; my son started when he was seven and there are still pensioners at it, even at national level.

The equipment is still regarded by many as very highly specialised, but the main requirements are only a directional antenna (ie a ferrite rod or frame) and a screened case for the works of the set. In the past some competitors have modified ordinary medium wave receivers to cover 160m by retuning the front end. However, most 'serious' competitors now have purpose-built sets suitably 'ruggedised' to take the inevitable knocks, and of course the competitor also takes the knocks, so be warned.

In the early years of DF, all the receivers were battery valve sets. These progressed to discrete component transistor sets, but with the advance in technology most of the best receivers in use today use the basic integrated circuit design that will be described later in this article. The overall cost of what is a rather useful 160m receiver is no more than £20-30 with judicious purchasing at local rallies.

A SPORT FOR ALL AGES

I WOULD DEFINE THE sport of DFing as 'finding a deliberately well hidden transmitter (and its crew) by taking cross bearings with a suitable radio receiver and physical searching in the immediate locale of the transmitter site'.

As I intimated above, it is a 'sport' for all ages and all professions, as indeed is amateur radio in general. Anyone can take part, and all are very welcome to do so. It is advisable, however, firstly to team up with an existing competitor, to gain experience in the wiles of the sadistic TX crews and get a feel for the behaviour of LF signals and receiver performance. It is no good leaving the car five miles from the Tx because the signal was so strong.

Many of the competitors will present a lecture to a club and organise a local club event as a demonstration, or for the less fit, put on an indoor computer based competition which can be just as cut throat as the real thing. First contact should be through the National RSGB Direction Finding committee who will then organise a local lecturer.

The author takes a bearing with the DF set described in this article.

There are eight RSGB qualifying rounds held throughout the summer, organised by local clubs throughout the country, and a National Final for all the qualifiers, held in September each year.

In a qualifying round, the competitors have two transmitters to locate and are provided with a form to be signed and timed by the transmitter operator(s). The winner being the first to find his second transmitter. On the National Final this is the first to find three transmitters. All competitors assemble at a pre-arranged start point on a particular Sunday (see the RSGB contest calendar) to sign in and prepare to take bearings on the first fixed-time signals from the transmitters at 1320-1324BST. If signals are successfully heard, the teams are then allowed to disperse after plotting their bearings.

The transmitters must be located on the same 1:50,000 Ordnance Survey (OS) map as the start point, with a practical route to each without the need to trespass. At 1400-1404BST there is a second fixed-time transmission from all transmitters. The aim of all team members is to place themselves in such a position as to obtain a good cross bearing to reduce the possible area of search.

Bearings may be taken at as many points as necessary to finally locate each transmitter. However, after 1404BST the Tx schedule is random, but there must not be a gap greater than 15 minutes between transmissions, or a period of transmission less than 2 minutes. Thus, it is up to the skill of the competitors to find the transmitters, and the guile of the Tx crews in timing and hiding to keep them out for a reasonable time to ensure a competitive result. No-one likes a competition that is over in an hour or takes all afternoon to find one station, especially if you have come from the other end of the country.

The bearings taken at the start are plotted on the OS map. Further bearings are then taken at other locations, the theory being that they should all cross at the transmitter. This in fact is rare, and even if it does happen you tend not to believe it. Inaccuracies can occur for one or all of these reasons:-

- Bent signals eg re-radiation from power lines,
- Inaccurate compass or reading the map wrong,
- Human error - a major cause,
- Reversed sense or no sense at all *[this is a technical DF term and does not refer to the operator - Ed]*,

Experience and luck (mostly the latter), as is usual, play important roles.

Having got as close as possible to the apparent transmitter location (my son is always briefed to say "Don't get out of the car too soon Dad"), the competitor and helpers then leave the vehicle and walk, run or crawl, dependent on the site, towards the Tx.

Close to the site, (under the aerial) the gain of the front-end of the set cannot be turned back any more and the set blocks and nulls or sense cannot be obtained. This is generally an indication that you are within a few yards (or tens of yards) of the hide which will in most cases be almost impenetrable thorn or other nasties that provide good camouflage. It is then up to you how determined you are to get

in the easy/slow way, or beat your own path as quickly as possible.

The general rule is that no more than four people are allowed per team, thus allocation of 'duties' are roughly:- set-operator/team-leader; driver; navigator and bush-beater/operator-carrier (especially when he's tired). Most teams comprise fewer members than this, even down to single operators. However, you need to have made a pact with some evil being to do well at all the jobs on your own.

RECEIVER SPECIFICATIONS

1. Cover the whole of 160m, 1.81-2.0MHz.

Transmitters may be anywhere on the band and are generally crystal controlled as Vfos drift and can be knocked off frequency.

2. Reasonable selectivity.

You must be able to sort out the real transmissions from the other occupiers of 160m ie 'fishphones', beacons etc, and receive AM transmissions, thus a 5-6kHz wide, reasonably sharp filter will suffice.

3. Easily tuned and accurately calibrated.

On many occasions I have heard complaints that the set won't tune to the Tx frequency. Also, any knocks to the dial must be easily noticed and rectified, as you could easily waste 15 minutes waiting tuned to the wrong frequency.

4. Portability.

A large frame aerial or ferrite rod mount may give more accurate bearings, but it is not the thing to go through the undergrowth dragging behind you. Also, weight is of the essence; the extra two pounds really saps the energy in the run in/out.

5. A sense system.

It is possible to locate the transmitter(s) without being able to select which null the Tx lies in, but it will take longer to do so. Thus an *untuned* whip aerial is phased in to the main aerial via a wideband amplifier. Of course reverse sense is still a problem but should be sorted out before the event.

6. A BFO.

It is much easier to hear a null of the carrier with an audio beat and is a must to identify the Tx from the CW transmissions (even take bearings on the CW). An advantage of leaving the BFO on is that it swamps the misleading audio that some Tx crew's give out etc. As a beginner, it is useful to be 'talked-in' occasionally, so switch it off sometimes.

7. Headphone output.

This is a must for weaker signals, and keeping your information on bearings and strength to yourself, but be prepared to listen for shouts in the undergrowth. S-meters and tuning indicators are not generally a good idea as they can cause confusion and are not robust. Meters also contain magnets (see below).

8. Provision for RF Attenuation.

Close in under the aerial, or even a mile or so away depending on TX power, the set will block so no null or sense can be obtained. Thus effective attenuation or RF gain control is essential. Even a short across the aerial, or a shorted turn, is crudely effective.

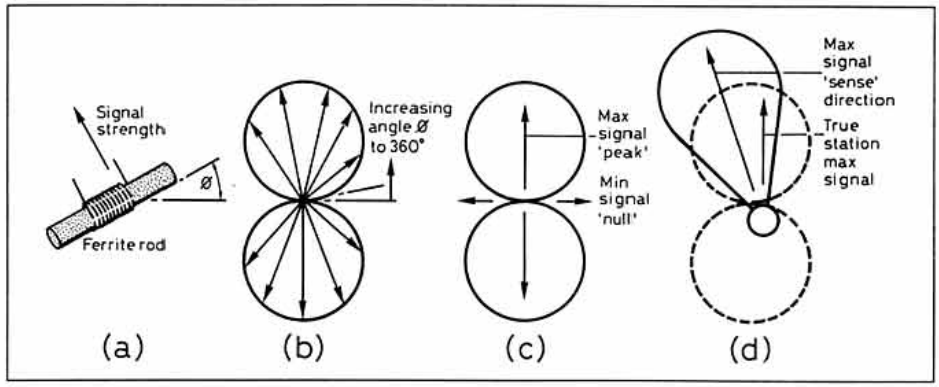


Fig 1: Showing the effect of rotating the aerial, and of adding a 'sense' whip

9. Audio/IF gain control.

Your ears can only stand so much beating.

10. Robustness.

The case and aerial must be capable of withstanding knocks, bangs, dropping from great heights and generally being dragged through unforgiving undergrowth. It is no good trying to repair a mangled set whilst sitting in the middle of a wood with no work bench.

11. Reasonably waterproof.

This goes hand in hand with the robustness of the set. It is a well-known British weather trait that it only rains when you are furthest from cover, even if you set out in sunshine. Rivers, canals and streams are also full of water!

12. As light as possible.

A small lightish set is a must, as running long distances with the weight of a 'ghetto blaster' soon saps the strength of even the superhuman, especially up hill and down dale. Consideration should also be given to the shape, and ease of forcing ways through the undergrowth.

13. Rapid access to the works.

Batteries can and do go flat at critical times (you should have checked the set before the start!). Thus the ease of opening a die-cast box is an advantage and it also seals well. Remember when considering power sources - where do you get charged NiCads on a Sunday afternoon or dead of night?

14. Reasonable stability.

It doesn't help if the receiver has drifted off frequency between transmissions.

15. Reasonable sensitivity.

The station may well be running lower power or be some distance away, but remember the RF attenuator for close work.

16. Screening.

Obviously, for good close in work you only want the signals to enter the set through the aerials, thus a tight fitting metal (aluminium) case is essential. An electrostatic screen around the aerial is not essential, but does help make it robust, and tends to aid the accuracy of bearings.

17. No magnetic materials.

As you will be using the set in combination with a compass, do not use ferrous materials or magnets eg meters, if at all possible, as they will affect the bearings. It is presently almost impossible to get batteries without steel casings (NiCads are worse), thus care must be observed in mounting the compass far enough away so as not to be unduly affected.

18. KISS.

Keep it simple, stupid. This is almost the most important pre-requisite, as running repairs do occasionally need to be carried out, in the car if not in the field. If you haven't got the frills they can't go wrong.

THE THEORY

SIMPLE TRIALS WITH an ordinary medium-wave portable receiver tuned to any station will show a marked broad maximum signal with the set broadside on to the transmitter, and deep nulls (or minima) off the ends of the set or aerial. On sets with a ferrite rod, the nulls will occur when the signal appears to come from a direction in-line with the rod, whereas with older sets with a frame aerial, the nulls will be apparent when the frame is broadside on to the transmitter. In fact, both nulls are in the line of the axis of the windings on the rod or frame. If the signal strength is plotted against angle theta as the set is turned, a Cos theta relationship is obtained as shown in **Figs 1 (a) and (b)**.

As can be seen from **Fig 1(c)**, there are two equal, relatively broad maximum signals, and two much narrower nulls. To obtain an accurate bearing on a station, one or other of the nulls is utilised. Thus you get two bearings opposite to each other. You could settle for this and move to another location to take another set of bearings and select the ones which cross, but to make things easier only one bearing is ideal.

This can be done by phasing the signal from an untuned 'sense' whip in with the main aerial signal, after amplification, to obtain roughly equal signal levels from the whip and frame or rod. This phase mixing distorts the double circle pattern such that a distinct difference can be judged from the two maxima of the main aerial Fig 2(d). It is then relatively easy to decide which is the correct direction. It is not advisable to take this new higher maximum signal from the 'front' of the set as a bearing as it is usually offset from the true maximum direction. It should be used only to decide which null to take as the bearing.

MAPS

ONCE A BEARING IS obtained, you then

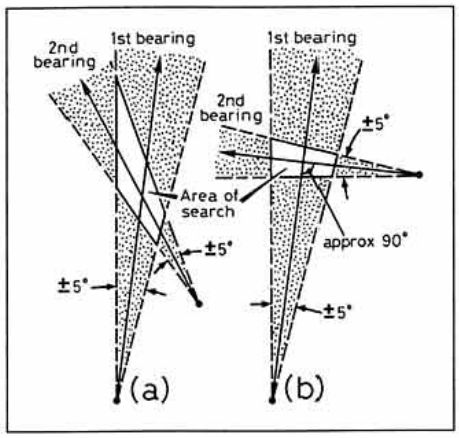
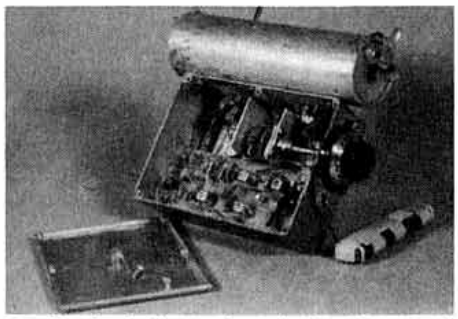


Fig 2: Making cross-bearings reduces the area of search very quickly.

have to transfer it to a map. The series usually used is the 1:50,000 Ordnance Survey. These are 40km square so the transmitters can be anywhere in 1,600 square kilometres - a needle in a haystack?. The compass will be calibrated 0 to 360° magnetic ie 0 or 360° is magnetic north, 90° is east magnetic, 180 is south magnetic etc. Care must be taken here to allow for the difference between these magnetic referenced bearings and grid north, ie the vertical lines on the map. There is quite a difference which varies over the years and where you are in the country.

Inspection of the edge of OS maps will give the variation of the various norths, grid and true north stay the same, but the magnetic pole slowly rotates about a fixed point thus giving about a half degree movement over an eight year period so an up to date map is essential. The latest revision will also hopefully show the new road networks, but this takes some time to get through the system, so some local knowledge is useful. However, magnetic north can generally be fixed at 6-8° west of grid north, thus an offset can be built in to the mount of the compass or the sighting device to make it easy to plot the compass bearings directly on the map against the grid lines.

Having obtained a bearing relative to grid north, then pinpoint your actual position on the map, align the centre of a full circular protractor at this position and set zero/360° to the top of the map, ie align the axis 0 - 180° with a vertical line on the map. Then plot the bearing with a sharp softish pencil, HB will do, and using a ruler carefully extend this to the edge of the map. It is possible, but rather messy, to use an overlay or plastic coated map, marked with a felt tip pen or china graph crayon. This has the advantage of keeping the map dry.



The direction finding receiver, showing the compact and rugged construction.

BEARINGS

YOU HAVE NOW PRODUCED the first or start bearing. Don't worry if you couldn't hear anything of the transmissions, approximate bearings are readily available for those that need them. The next thing to remember is that at best your bearing accuracy is +/-5°, and at worst due to various factors +/-30°. You should then choose a suitable location for second bearings so that, ideally, this second bearing crosses the first at as near 90° as possible. This will reduce the area of possible search required, and it is a good idea where possible to reduce your distance from the hidden station so that this area is reduced even further, see **Fig 2**.

As the number of transmissions and time goes on, further bearings can be taken, gradually closing in on the Tx, and eventually the car is abandoned. The run in should be judged to be as short as possible to give time for bush beating. On arriving closer to the transmitter site some RF attenuation is turned in to avoid overload of receiver and ears. At this time the advantages of good screening is evident as the null becomes gradually less evident.

After many possibly frustrating minutes, or even hours, you will probably find the sadistic so-and-so who has been operating the Tx. Hopefully you find it before anyone else, but that is where some of the luck comes in.

A SIMPLE RECEIVER DESIGN

BY REFERENCE TO THE circuit diagram, **Fig 3**, the general simplicity of the design can be seen. This set is a derivative of the author's published design which used a TAD100 IC at the heart of the set. Due to the general unavailability of the chip and the need to wind your own coils with 42SWG wire it was decided to re-design the set. Many of the features and sub-circuits are in fact the same, however the oscillator and mixer coils are now standard pre-wound coils.

BASIC BUILDING BLOCKS

TR1 AND ITS ASSOCIATED components form the untuned sense amplifier. Input gain is adjusted by the length of the telescopic whip, whereas the best sense on a distant station is set firstly by using a 10k linear preset in place of R1, then substituting a fixed resistor. This gives a more robust design. As the sense amplifier is not required all the time it is switched by S1. Output from the sense amp is passed by the low value capacitor Cx (nominally 2.2pF) to the input of the RF amplifier TR2.

The main signals enter the set via the frame or rod antenna which is peak tuned by C26, nominally 50pF. The joint main, or main and sense, signals are passed through the RF attenuator R17 (a 100k lin pot) to the gate of the RF amp TR2. Gain of this stage is set by preselection of R16. A value of 220R seems to work in the sixty or so sets used up to now.

Output of TR2 is passed to a tap on L1 which is tuned against ground by C21 with its padding and spreading capacitors, C23 and C24. These should be selected for best band-

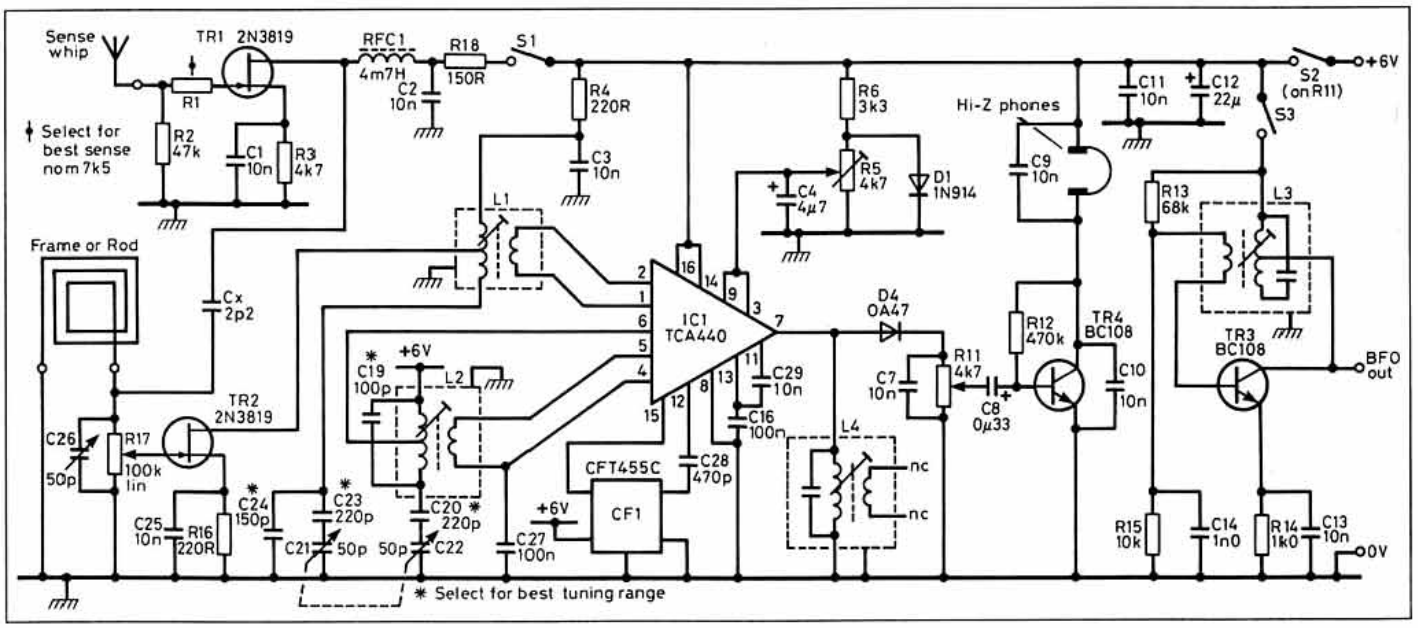


Fig 3: The simple but very effective purpose-built Top Band DF receiver.

COMPONENTS LIST

(DON'T WORRY IF some numbers are missing, it's due to developments. There should be 11 fixed resistors and 20 capacitors on board and 2 caps off board apart from the variables).

Resistors (all on board)

150R	R18	10k	R15
220R	R4, R16	47k	R2
1k	R14	68k	R13
3k3	R6	470k	R12
4k7	R3	7k5 SOT	R1

4k7 lin preset horiz R5

Capacitors (on board unless stated)

2.2pF ceramic Cx (not on board, could be twisted pair of wires)	
100pF ceramic	C19
150pF ceramic	C24
220pF ceramic	C20, C23
470pF ceramic	C28
1000pF ceramic	C14
10nF (0.01µF) poly	C1, C2, C3, C7, C9 (not on board), C10,C11, C13, C25, C29
100nF (0.1µF)poly	C16, C27
0.33µF tant	C8
4.7µF tant or elec	C4
22µF tant or elec	C12

Active components

IC1	TCA440
TR1, TR2	2N3819
TR3, TR4	BC108
D1	1N914 or 1N4148
D2	OA47

Wound components

CF1	Toko	CFT455C
L1, L2	Toko	154AN7A6440
L3, L4	Toko	YRCS12374
RFC1	Toko	4.7mH minimum RFC

Off board

4k7 log with switch	R11
100k linear	R17
50+50pF vari	C21+C22 or strip down a larger value
50pF or 100pF vari	C26
Small SPST switches to suit	S1, S3 (S2 is part of volume control)

Case approx 7in x 5in x 1.5in
2ft 6in whip to suit case

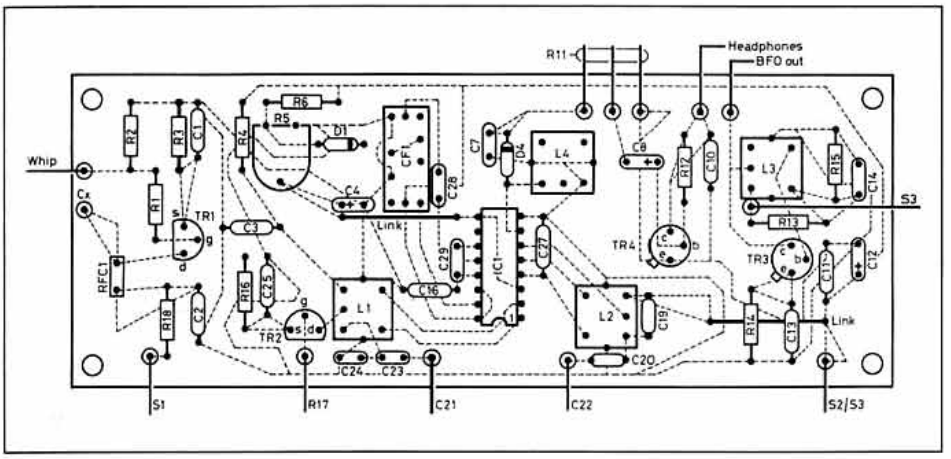


Fig 4: Component layout and connection details. (PCB artwork will be published next month).

spread and tracking with the oscillator. Values given work well.

Most of the rest of the receiver chain is contained within the IC TCA440. This includes the local oscillator, and RF/IF stages, apart from the frequency selection and tuning components. The oscillator is controlled by L2 and tuned by C22 with padding and spreading capacitors C19 and C20. The IF selectivity is given by a standard small Toko ceramic filter CF1 CFT455C, but any within the range would do. This filter has a bandwidth of 6kHz. DC isolation for the output of the filter is obtained with C28.

As it is imperative that the signal strength can be judged by how loud it appears, the AGC systems are disabled by a preset voltage on pins 3 and 9 of the IC by the preset R5 with a cheap zener across it - a reverse-biased silicon diode D1 1N4148/1N914. R5 is adjusted for best gain when setting up with fresh batteries. In fact, the later audio gain could be fixed and R5 used as the gain control, this has the advantage that the intermediate stages of the set are protected from overload. In practice, this makes little difference to the set's operation if good screening and layout is used around the RF attenuator.

The IF signal from pin 7 of the IC is peaked by the broad tuned L4, a standard IF transformer or suitable coil. Audio demodulation is obtained with the germanium diode D4 OA47. This is different from the TAD100 design as this contained the demodulator within the IC. With audio gain set by R11, which also contains the on/off switch S2, final amplification to high impedance phones (or a transformer to low Z) is with TR4 BC108. The final items on the circuit L3, TR3 and components surrounding them form the BFO. Output is taken as an insulated wire from the collector of TR3 pushed under the main IC. The position of this varies the coupling as required.

REFINEMENTS

THIS DESCRIBES THE standard diagram. However, one or two alternatives have been developed, notably an inductively coupled sense amp and varicap tuning for mixer and oscillator.

Inductive coupling of the output of the sense amp is obtained by substituting for RFC1 a one or two turn coil around the frame or rod, and leaving out Cx. Some competitors in fact switch the direction of this coil instead of turning the set, but this adds complication.

Varicap tuning is accommodated on the board layout and is achieved by substituting the circuit below for C21 and C22 with adjustment of the values of C19, 20, 23 and 24.

RECEIVER CONSTRUCTION

THE RECEIVER CAN BE built by any standard technique. However, it is essential to keep the front end RF stages and aerial input well screened or judiciously located. To this end, a printed circuit board has been designed such that no internal screens will be needed. This board, which is approximately 50mm x 150mm is designed to carry the majority of the components except S1, S3, R11/S2, C_x, C26, R17, C21/C22, C9. These are the major mechanical components and thus best mounted on the case.

When planning the set, it is best to start with an idea of the size and mounting of the antennas together with the case size. Remember that you will have to accommodate a battery pack as well as the PCB, and a slow motion drive for the tuning. General layout as per the photograph of the author's set is reasonable and well tried.

A frame antenna of approximately 10 or 12 turns on a frame to suit the case size also provides a convenient carrying handle. This can be made from wood or metal but remember not to form a shorted turn if metal is used. Also the wire should be in the centre of a metal channel to reduce capacitive effects. If a ferrite rod is used, approximately 20 or 25 turns at the centre of the rod mounted in a slotted metal tube or insulating mount also used as a handle.

The author uses a 1/2in x 8in rod supported at the ends in perspex discs, and the tube filled with urethane household foam after final alignment so that the rod is not broken in use.

The component plan for the PCB is shown in **Fig 4**. There is a generous allowance of space to accommodate almost any sized modern components (the author has even contemplated using a leadless component layout but keeps dropping the chip Rs and Cs). Start by mounting the coils and IC then the Rs, Cs and active components.

When the board is complete, run an insulated wire from TR3 just under the legs of IC1 and stick down with tape but not touching any track or pin, this gives plenty of BFO insertion. Double check the board for faults and connect to the box mounted items, it is best to use fairly stiff wire for the oscillator tuning capacitor C22 to avoid microphonics, as with any construction of a VFO.

Set R17 to max signal ie top of the track, connect a milliammeter between the battery and +ve set rail and switch on. The set should burst into life. Now set the tuning to the HF end of the band and set L2 core to tune 2.455MHz. Check that the oscillator tuning will go down to 2.265MHz with some overlap at both ends of the band ie above 2.0MHz to below 1.81MHz. Peak the tuning of L1 to around 1.9MHz and set R5 for best gain. Peak C26 for best gain and find a local top-band signal to listen to. The sense amplifier is set up by comparing the front to back response of the set with the sense whip fully up and the amp switched on. R1 is then adjusted for best front to back ratio. It is easier to substitute a small preset for R1 to get best response then measure the resulting resistance and put in the closest fixed value you have in the junk box. You could always leave the preset in, but reliability would suffer. ❑

FOR MORE INFORMATION about HFDF, write to RSGB DF Committee Chairman, Brian Bristow, G4CBB, Camelot, Princess Street, Piddington, High Wycombe, Bucks, AP14 3BN.

RADCOM CONSTRUCTION FEATURE

First Steps in Home Construction

A series of articles by John Case, GW4HWR

PART TWO: THE CIRCUIT AND LAYOUT

SO THAT YOU CAN SEE where all this is leading, let us look at the circuit diagram shown in **Fig 3**. All the components marked with the suffix B are mounted on the PCB, with the remaining ones on the chassis. It is a relatively simple and conventional circuit in which S1, T1, BR1 and C1 form a full-wave rectifier which will provide an 'off load' voltage across C1 of about 22V falling to around 17V at the full load current of 1A, The remaining components form the stabilizer circuit. Q1B is a voltage comparator which compares the voltage on its base with the stable reference of 3.3V on its emitter provided by the zener diode D1B.

Q2B and Q3B form a high gain DC amplifier which is fed with the output voltage from Q1B. The output of Q3B is used as the control voltage applied to the base of Q4 - the pass transistor. If the voltage across the output network (R1B, VR1 and R2B) tries to change for any reason, the amplified difference in voltage between base and emitter of Q1B is applied to the base of Q4 causing its resistance to increase or decrease in a very good attempt to keep the output voltage constant.

If the proportion of output voltage is changed by resetting VR1, the resistance of Q4 will change to bring the output voltage to a level that will once again give about 4V at the base of Q1B, ie 0.7V above the voltage of the emitter. If VR1 is altered so that the slider moves nearer to the lower end, the output voltage will need to increase to keep the base voltage of Q1B at 4V, but if the slider is moved towards the top end, the output voltage must fall to maintain the 4V level.

Q4 must pass the full output current and drop the voltage from between 17 and 22V to the required output level, so that with the output set to 5V, Q4 must drop about 20 - 5 = 15V. With the current at 1A, the transistor must dissipate 15 x 1 = 15W. For this reason, Q4 is not mounted directly on the PCB but on the heatsink which is also used to support the PCB. Q5B provides current limit via R7B/R8B. With S2 set as shown, the voltage drop across R7B will rise to 0.56V when the (output) current flowing is 100mA. Any increase in current above this level will cause Q5B to conduct and act as a parallel path to D1B, reducing the voltage across it and decreasing the output voltage.

Under short circuit conditions, D1B will be virtually shorted out by Q5B and the output voltage will be very low. When S2 is closed the effective resistance of R7B, R8B and the contact resistance of S1 falls to about 0.56Ω so that the above current limiting effect takes place when the output current rises above 1A.

Neither the positive nor the negative output terminal is connected to chassis but either may be linked to the green terminal, thus providing either negative or positive earth.

Note that if the PSU is being built for one fixed voltage VR1 may be replaced by a 4k7 mini preset which will fit directly on to the PCB. If you wish to start looking for some parts, the components list is given, together with the source. Other transformers may be used, provided that the output is 18V at 1A and it will fit entirely in the space 55 x 55 x 85 mm. Similarly with C1. I bought a 4700µF, 40V working, capacitor for 60p and a 35V transformer (which was rewound to 18V. See *RadCom* July/August 1986) for 50p. The retail price of these two items is about £6-30.

If you buy electrolytic capacitors from rallies it is important to introduce them to DC volts gradually, ie start by connecting 1.5V, making sure that the polarity is correct, then increase to 3V and to 6V and so on up to 20V, leaving the supply connected for a minute or so in each case. This process reforms the dielectric and avoids the explosion that might otherwise occur. Of course this process would be easy if you possessed a variable voltage PSU!!

Having examined the circuit diagram of the PSU, let us take a look at the practical layout. **Fig 4** shows that there is not much room to spare so it is important that the plan is followed rather carefully. See opposite page for layout, and materials and components lists.

. . . . to be continued

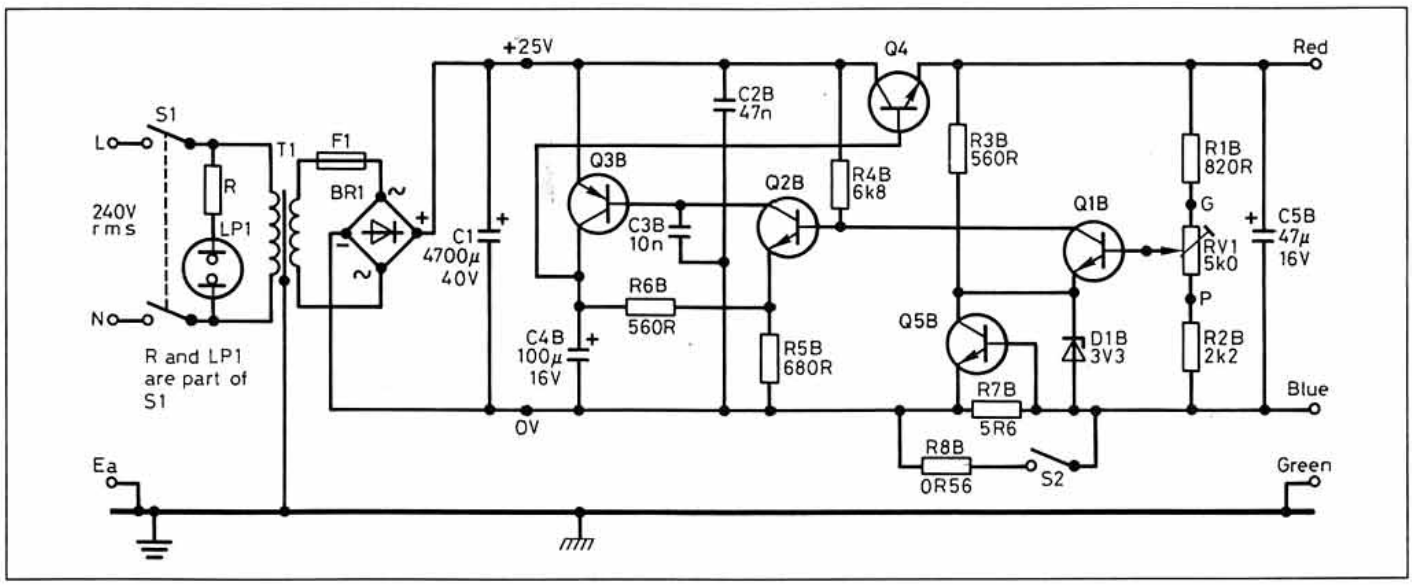


Fig 3: circuit diagram of the variable power-supply.

COMPONENTS REQUIRED

GENERAL

9	Bolts 6BA 6.4mm
3	Bolts 6BA 9.5mm
12	Half nuts 6BA
4	Bolts 4BA 9.5mm
2	Full nuts 6BA
4	Self-tapping screws No 4 6.4mm
12	Shake-proof washers
4	Small rubber feet
1	Cable strain relief bush
2 metres	3-core cable round 3A
1	Three-quarter inch control knob
1	35mm horizontal capacitor clip RS543-383
S1	Mains switch - (double pole, single throw) RS338-529
S2	Current limit switch - (single pole, double throw) RS330-963
T1	18V - 20VA transformer RS207-532
BR1	Bridge rectifier - 2A 200V RS261-592
C1	Reservoir capacitor - 4700µF 63V RS105-329
F1	Fuse - 2A surge type, 20mm Fuse carrier - 20mm
VR1	Voltage control - 5k linear RS161-773
	Terminals - one each, red, green, blue
PCB	See later in this series of articles
Q4	TIP31A including mounting kit, washer and bush
Q1, 2, 5	BC546 or BC238 or BC108 (metal can). NPN general purpose
Q3	BC556 or BC308 or BC178 (metal can). PNP general purpose
D1	BZY88 or BZX85 or BZX61 3.3V Zener diode
R1	820Ω 0.25W carbon film
R2	2.2k carbon film
R3	560Ω carbon film
R4 (all 0.25W)	0.8k carbon film
R5 (all 0.25W)	80Ω carbon film
R6 (all 0.25W)	60Ω carbon film
R7 (all 0.25W)	5.6Ω 0.5W thick film
R8	05.6Ω 0.5W metal film
C2	47nF polyester or ceramic
C3	10nF polyester or ceramic
C4	100µF 16V electrolytic
C5	47µF 16V electrolytic

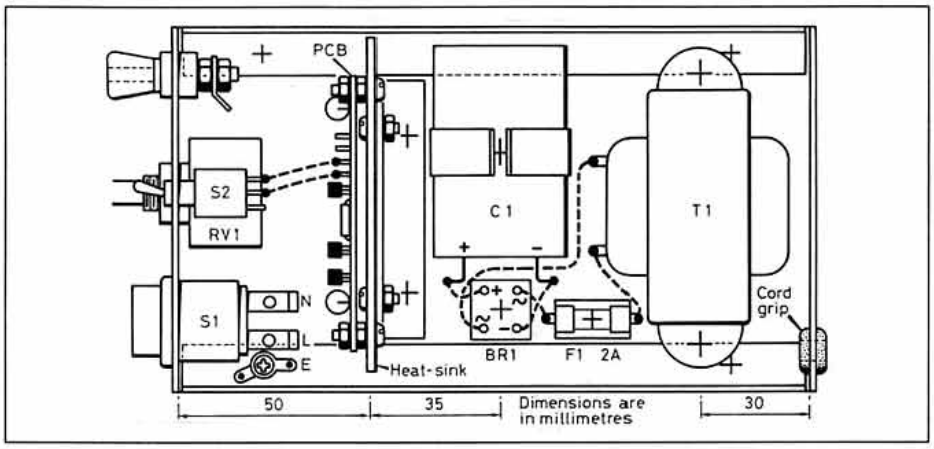


Fig 4: The layout showing how compact the unit is.

MATERIALS

BOX

(To Build)		
1	piece	312x97mm 1mm or 19SWG mild steel (base)
1	-	246.5x181mm 18SWG aluminium (cover)
1	-	285x210 book cloth (cover)
2	-	164x12mm half-inch aluminium angle (base)
(Or Buy)		
1	-	Small box RS 509-967

HEATSINK

1	piece	88x64mm 2mm or 14SWG aluminium
1	-	70x12mm half-inch aluminium angle

RADCOM CONSTRUCTION FEATURE

A Miniature 80 Metre SSB Transceiver

Part one of a two part article by Mike Grierson G3TSO

THE DEVELOPMENT OF sophisticated integrated circuits for the cellular radio market has produced a number of devices ideally suited to the development of very simple amateur radio equipment. The possibility of a three-chip receiver capable of very acceptable performance is attractive as a home construction project, especially to the relative newcomer to radio construction.

With a few additions, the three-chip receiver can become a transmitter as well, and with a suitable switching system can form the basis of a miniature transceiver. Unfortunately, 'solid state' cannot offer any real alternatives to the one-valve transmitter of yesteryear, but it can offer simpler ways of generating SSB signals than were ever possible during the great era of valve-based home construction.

A little over a year ago, I embarked on a project aimed to see how small and simple I could build an SSB transceiver. The description that follows shows the end product and outlines how it can be constructed.

Fire up this little rig whose performance is unmatched by it size.

THE PLESSEY SL6700

PLESSEY, FAMOUS FOR MANY YEARS for their communications series of ICs have produced almost a complete receiver in a single chip, the SL6700. This device was designed for low-power-consumption AM paging receivers, but it can also be used as an SSB receiver.

The SL6700 (**Fig 1**) comprises: two IF amplifiers each having 25dB gain up to 50MHz, a balanced mixer and a sophisticated third IF amp, an AM detector and carrier derived AGC system; the latter having an upper frequency limit of about 2MHz. The device was designed for use as a double conversion IF block using a 10.7MHz first IF with a 455kHz second IF, the balanced mixer performing the role of frequency changer. All stages are brought out to separate pins and can be interconnected to suit a wide range of applications, the simplest being a straight 455kHz IF and detector system.

THE SIGNETICS/PHILLIPS NE602

THE NE602 (**Fig 2**) IS A sophisticated double-balanced mixer IC, again manufactured for low power cellular radio applications. It has an upper frequency limit of 500MHz and contains its own onboard oscillator with an upper frequency limit of 200MHz. The mixer is similar to the MC1496, but requires fewer external components, making it much simpler to use. The NE602 has a gain of 15dB, an internal voltage stabilizer and a buffer amplifier between the oscillator and mixer.

It can be used with both single-ended and balanced inputs and outputs, the oscillator is internally biased and only requires the addition of a tuned circuit or crystal together with the necessary feedback components. It is important when designing circuits for the NE602 to ensure that no DC connections are made to the input, output or oscillator connections. All coupling must be either capacitative or inductive.

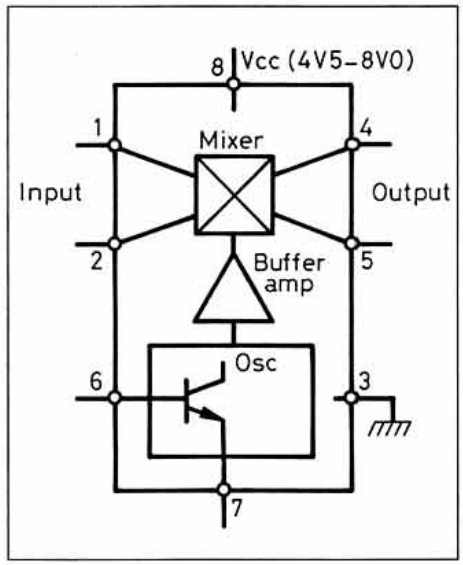


Fig 1: Block diagram of the Plessey SL6700.

THE 'SIMPLE' RECEIVER

A SIMPLE 80 METRE receiver (**Fig 3**), capable of giving good results, can be constructed using a NE602 followed by an SL6700. The antenna is coupled via a bandpass filter to the NE602 mixer. The oscillator section of the same device is used as a

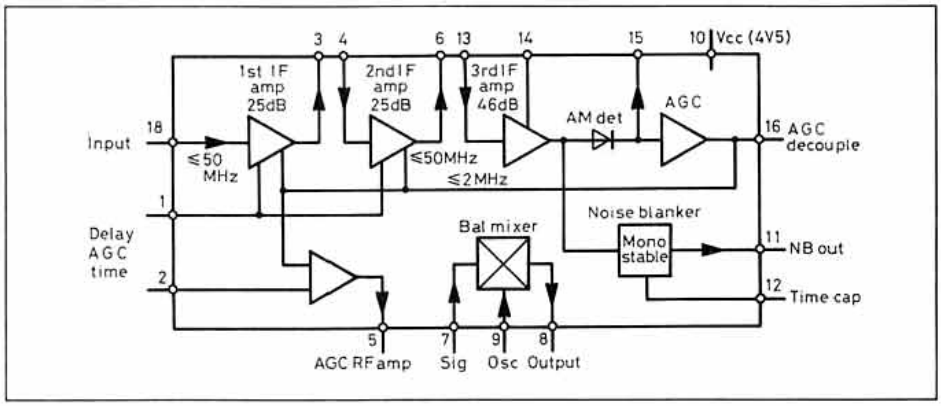


Fig 2: The NE602 double balanced mixer designed for low power cellular radio applications.

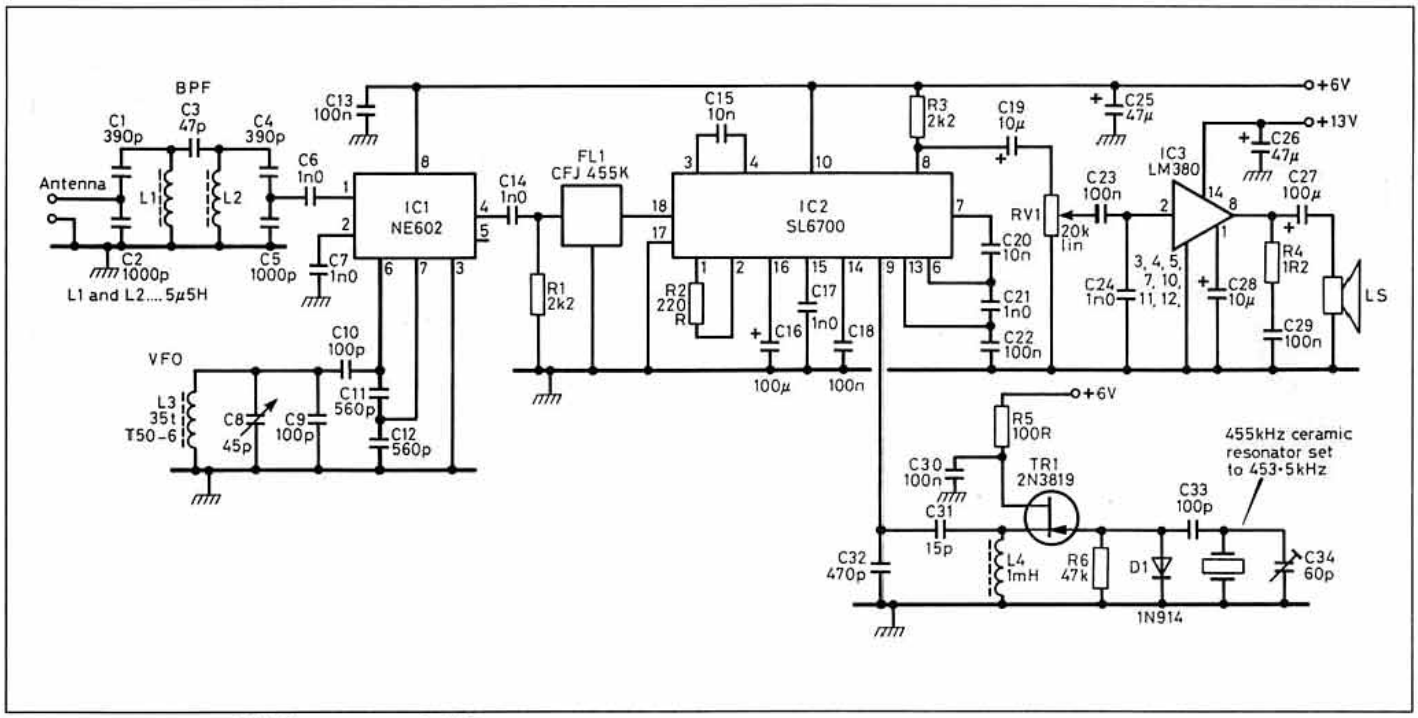
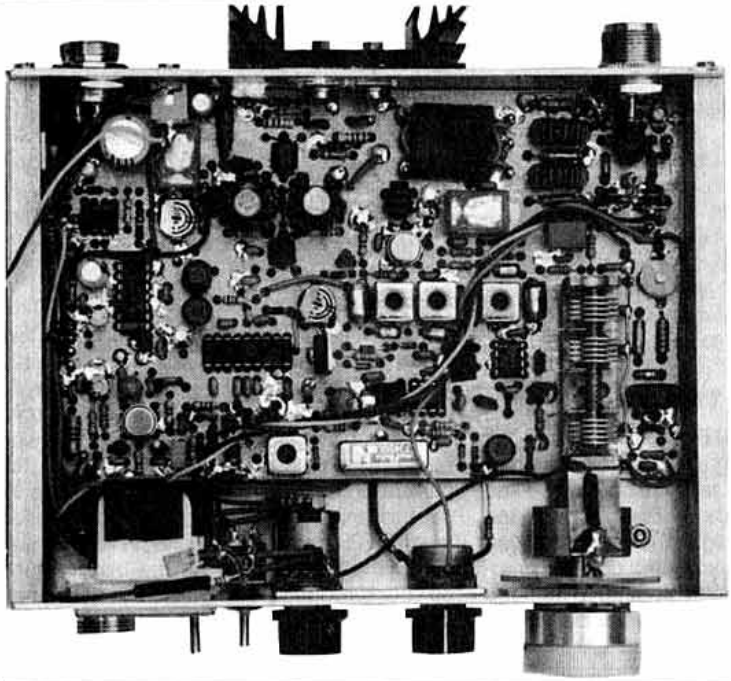
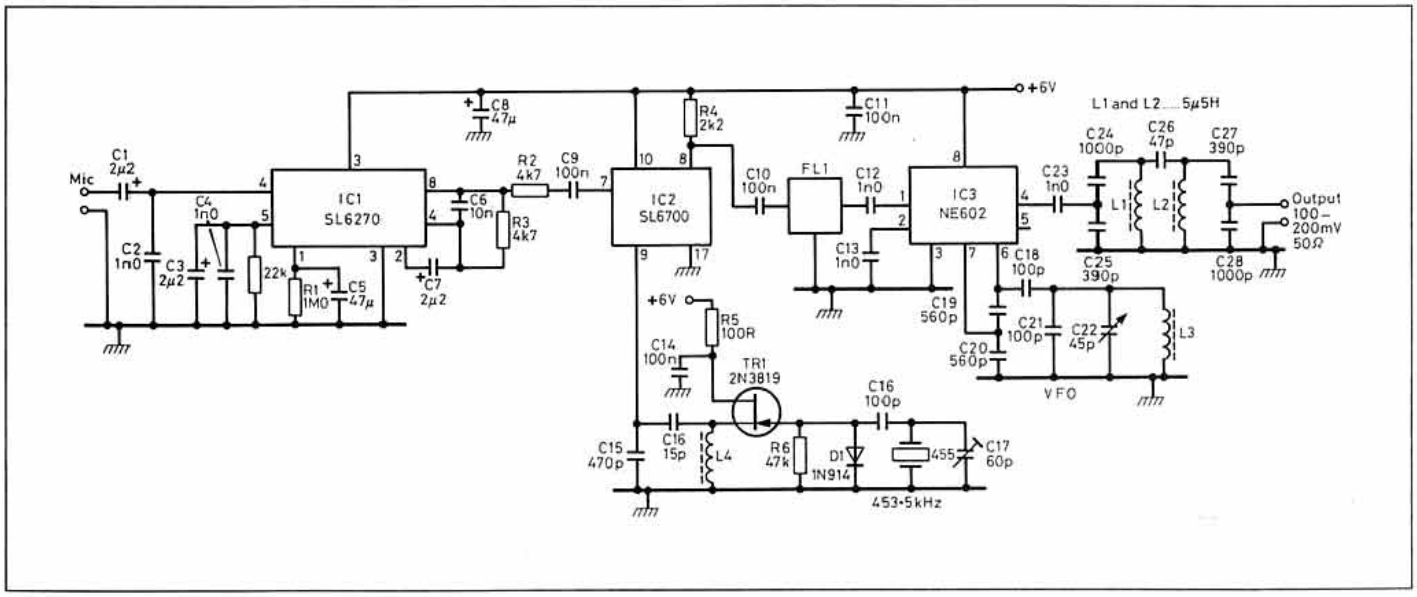


Fig 3: Showing how a receiver can be made from three chips and one transistor.



Photograph: Well over 150 components are packed into a very small space.

Fig 4: Showing how three more chips and one more transistor make a matching transmitter.



VFO tuning from 3.955 to 4.255MHz. Output from the mixer is filtered using a 455kHz ceramic filter having a bandwidth of 2.4kHz. The filter is coupled directly to the input of the SL6700 device where the first two IF amplifiers are cascaded to provide some 50dB gain.

The output of the second IF amp is connected to the internal balanced mixer and to the input of the AM detector and AGC system, thus producing a carrier derived AGC voltage to control the gain of the first two IF stages. The AGC range is in the order of 80dB.

A 453.5kHz carrier is generated by TR1 using an inexpensive ceramic resonator as the oscillating element.Its frequency can be easily adjusted by changing the series or parallel capacitance in the circuit. TR1 functions as the Beat Frequency Oscillator (BFO) or Carrier Insertion Oscillator (CIO) for CW and SSB reception.

AF output from the product detector can be amplified to loudspeaker levels in almost any high gain audio IC. The LM380 has proved both cheap and adequate, but devices such as the SL1631 or TBA820M may represent a better alternative to preserve the low power consumption of the receiver.

The receiver may be used on AM simply by switching off the CIO and taking the AF output from the AM detector. The SL6700 contains a full-wave AM detector and, if it is to be used as a broadcast receiver, it should have a filter capable of passing both sidebands, ie at least 6kHz wide and up to 12kHz for better audio quality. For specific use as an AM receiver, attention is drawn to the Plessey applications notes now included in the latest *Plessey Linear IC Handbook.*

The use of a 455kHz IF makes operation on amateur bands above 4MHz inadvisable due to the problems of image response or (second channel) reception. This occurs when signals 455kHz on the high side of the local oscillator also appear in the IF passband due to the inability of the bandpass filter to attenuate them sufficiently. The receiver is nevertheless capable of operation on the 160 and 80 metre bands (1.81 and 3.5MHz bands), and broadcast bands somewhat higher in frequency. The use of a selective preselector could greatly enhance the higher frequency performance, but at the expense of extra space required to accommodate the variable capacitor necessary to tune the preselector.

THE 'SIMPLE' TRANSMITTER

A SIMPLE SSB TRANSMITTER (**Fig 4**) can be constructed along similar lines using the same ICs. Whilst it is possible to use the SL6700 as a complete double sideband generator in its own right, the use of a vogad (voice-operated gain-adjusting device) is recommended. The Plessey SL6270 IC is cheap and makes an excellent transmitter audio amplifier, providing automatic gain control and protection against overmodulation.

The device gain is set by the value of the feedback resistor R40, giving optimum gain when set at 4k7. A low impedance microphone (less than 1k) is fed to one of the two balanced inputs, the second being grounded via a 2µ2 capacitor; a balanced input could be used if desired. The vogad output is coupled to the input of the balanced mixer in the SL6700, together with a 455kHz signal from the carrier oscillator.

The resulting double-sideband signal is fed directly to a suitable ceramic filter such as the CFJ455K for removal of the unwanted sideband. The VFO requirement is the same as in the simple receiver. For transceive operation, the VFO in the receive NE602 is buffered by TR1 and fed to the NE602 transmit mixer, producing an 80 metre SSB signal.

A bandpass filter is required in the transmit path to remove the unwanted image signal. Output from the filter will be in the order of 100 - 200mV.

The ability to construct such a simple SSB transmitter makes the construction of DSB equipment seem somewhat pointless as well as anti-social, as the bandwidth of many DSB transmitters approaches 10 - 12kHz due to the complete lack of audio filtering.

DIODE SWITCHING

TO THE UNINITIATED home constructor the diode switch may be difficult to understand, so I will try to explain it as simply as I can. A diode exhibits a very high resistance in one direction (reverse) and a much lower resistance in the opposite (forward) direction. If a current is made to flow through the diode in the forward direction then the forward resistance will become much lower, in which case a signal superimposed on the bias current can pass through the diode in either direction, provided that the signal current is lower than the bias current.

If a signal is applied to a diode that is reverse biased, ie no current can flow because of the very high reverse resistance, then the signal cannot pass either, except for a small amount of leakage due to the capacitance of the diode. It is important that the peak to peak amplitude of the applied signal does not exceed the reverse bias across the diode or rectification will occur.

To summarise, a diode can be turned ON to a signal by passing a forward current through the diode, or OFF by reverse biasing the diode.

When biased ON, the signal can be passed through the diode in either direction, regardless of the arrow on the diode. RF switching diodes such as the BA244 and BA482 have very low values of capacitance across the diode to minimise signal leakage when biassed OFF.

. . . to be continued

IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

A charger for hand-helds with automatic disconnect

from an original article by Klaus-Hartwig Rieder, DF5SG in *cq-DL* July 1989.

THE LIFE OF SEALED nicad batteries as used in hand-held transceivers, ie the number of full charge-discharge cycles, is reduced by frequent overcharging which must be avoided (*Technical Topics* May 88 and Jan 90).

Absolute battery voltage alone is no indicator of state-of-charge but the battery temperature rises and the charging voltage actually drops when full charge is achieved and these peculiarities can be used to indicate completion of the charging cycle.

THEORY OF OPERATION

A PARTLY DISCHARGED battery is charged at the recommended 0.1C constant current. During the first several hours of the charge cycle almost all of that current is converted into stored energy. As full charge approaches, progressively less current is usefully converted, the remainder turning into heat, causing the battery temperature to rise. Once fully charged, no more storage of energy can take place and 100% of the charging current goes to heat the battery, hence its temperature rises more steeply and the voltage across it drops. This voltage is sampled every 8 minutes and held on a capacitor. If a new sample is lower than the previous one, full charge has occurred and the charger is disconnected.

In eight minutes even a very good capacitor loses several mV when charged to 8 or 9V. This is avoided by not sampling across the battery but between +B and a Zener-derived reference voltage approximating the nominal voltage of the battery. That way the capacitor voltage is always very small and the leakage is negligible.

THE CIRCUIT

Fig 1 SHOWS THE circuit. The mains power supply includes transformer, rectifier bridge, smoothing capacitor C5 and a 24V regulator IC1. The battery is charged via the series resistors R7 & R8, LED D3 and the reverse voltage protection diode D4 included in most battery packs for hand-helds. The charging current is 60mA for my 0.6Ah battery.

An analogue quartz watch, which indicates elapsed charging time, is connected across LED D3, which is lit only during charging. It was salvaged from a cheap wrist watch and can be zeroed with a push button.

The clock circuit IC2B makes relay RLA once every eight minutes and then holds it in for approx 27s. When the relay contact is closed, C8 is charged to the voltage between the battery pack (inc D4) and the reference voltage across the series-connected Zener diodes D6 and D7. As the temperature coefficient of the reference voltage must not be positive, only Zener diodes of <6V should be used, hence two or more in series.

If, when the contact of RLA closes, the battery voltage is lower than that at the top of C8, the output of op-amp IC2A goes down and relay RLB drops out. The ratio R12/R13 determines by how much the battery voltage must be down for RLB to drop out and so terminate the charging cycle, stop the watch and extinguish the LED D3. LED D10 then starts flashing to indicate full charge.

R14-16, TR1-2 and D9-10 keep the voltage to the 24V regulator from exceeding 40V when not charging.

To start charging, pushbutton S1 must be held in until RLB operates. The watch should then be set to zero to indicate charging time. RLB has a 900Ω coil and must make at 6V. RLA makes at 20V and has a 5400Ω coil. If a lower resistance relay is used, make sure its op-amp is not overloaded or else use an emitter-follower driver. RLA and C8 must have very good insulation; a reed relay and a metallized polycarbonate film capacitor are suitable. D1 must have very low leakage current. A utility diode will not do. I have used the gate-source diode of an E300 FET.

OPERATION

I DESIGNED THIS CHARGER for a 7.2V battery pack. Changes to R8, D6, D7 and possibly RLB will adapt it to nicad packs of any voltage and capacity. K2 must pull in on the voltage available from a discharged battery, typically 1V per cell.

Fig 2 is a computer plot of battery temperature vs time. The temperature input came from a sensor on the battery case. The watch indicated how long it took to reach full charge.

Fig 3 is a computer plot of battery voltage vs time (resolution 10mV vert, 1 min horiz) of one charge cycle @ 60mA from complete discharge to full charge of another pack. The short duration, 9' 24", shows that this battery had a capacity of less than 0.6Ah.

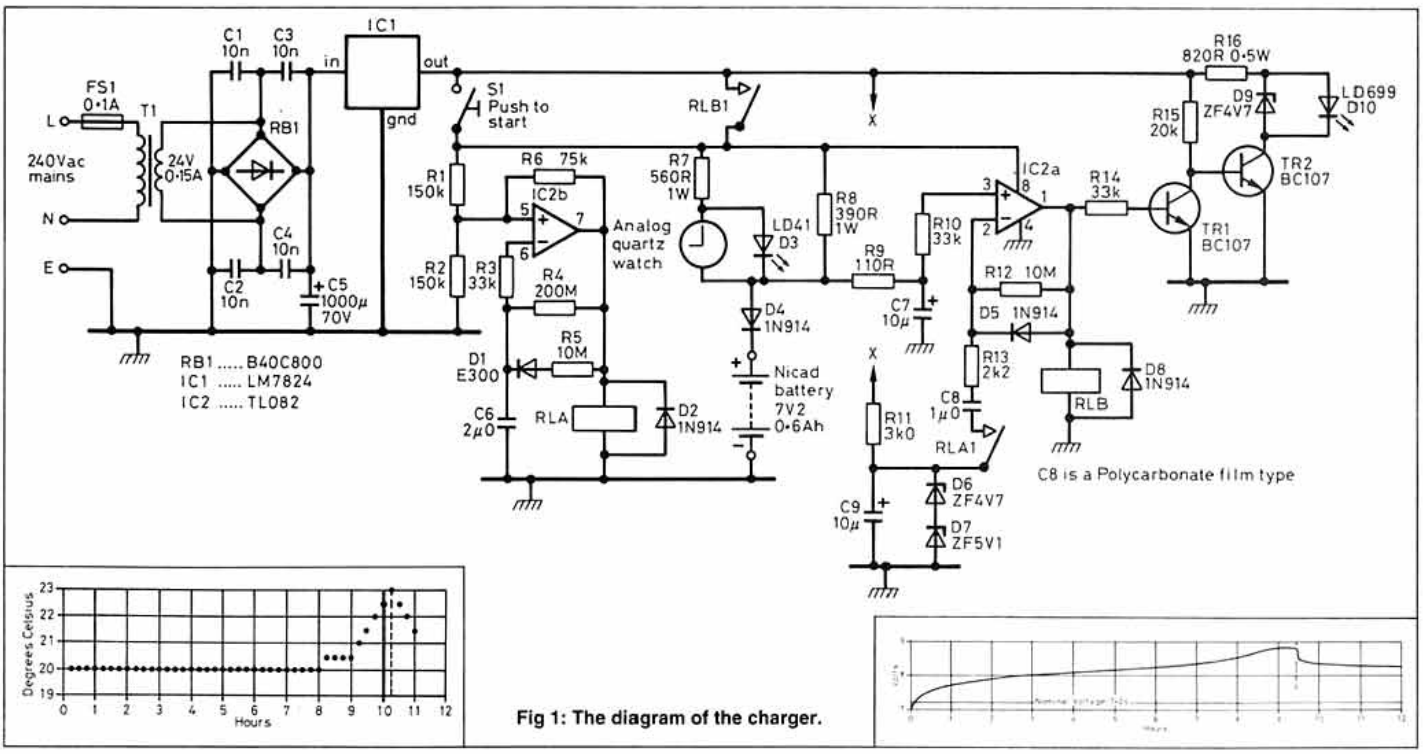


Fig 1: The diagram of the charger.

Fig 2: The temperature of a battery during charging.

Fig 3: Battery voltage vs time in one complete charging cycle.

MARTIN LYNCH

G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

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The Peter Hart Review

FT-1000

YAESU HF Transceiver

THE FT-1000 HAS ATTRACTED a tremendous amount of interest within the HF DX fraternity. More than any other radio, I have been asked so many times during the last year, when am I going to review the FT-1000. Having reviewed the Kenwood and Icom top of the range models in *RadCom*, the TS-950 and IC-781 (April and July 1990), I welcomed the opportunity at the end of last year to review Yaesu's flagship. Although prototypes were around early in 1989 - the 4J1FS Malyj Vysotskij Island expedition in May 89 was using one - it was not until early 1990 that the radio was readily available.

PRINCIPAL FEATURES

THE FT-1000 IS A MAINS powered HF base station covering LSB, USB, CW, AM, FM, RTTY and packet operation. Twin receivers each tune 100kHz to 30MHz and the transmitter covers the usual segments around the amateur bands.

Twin rotary tuning controls are provided, both stepping in 1000 increments per revolution. The larger rotary knob controls the main receiver and transmitter frequency and the smaller knob controls the sub receiver and transmit frequency in split operations. Tuning of both is in 10Hz steps at 10kHz per revolution on CW, SSB, RTTY and SSB packet. On AM, FM and FM packet the tuning is in 100Hz steps at 100kHz per revolution. A fast button increases all these rates by a factor of 10. The amateur bands are selected by individual push buttons (separate keys for 28 and 29MHz) and up/down keys step in increments of 100kHz or 1MHz.

Each band key selects the last used setting on that band in terms of frequency, mode, filter selection, clarifier etc. A second press of the band key selects an alternative frequency, mode, filter and clarifier setting. Further key presses toggle between these two settings. This is a very useful feature. The band keys also double as a numeric keypad to enter the wanted frequency directly.

Ninety-nine memories are incorporated, each storing frequency, mode, filter selection and clarifier settings. The memories are selected by a click-step rotary control, and the contents are previewed on the sub receiver display. Switching between VFO and memory and transfering the contents from VFO to memory, or memory to VFO, is simply accomplished by push buttons. Memory scanning is provided with a facility to skip any unwanted memory locations during the scan.

The clarifier allows for transmitter and/or receiver offsets up to +/-9.99kHz and on FM a +/-100kHz repeater offset is selectable. The repeater mode also transmits a continuous 88.5Hz sub-audible access tone.

IF filter bandwidths of 2.4kHz, 2.0kHz, 500Hz and 250Hz are fitted as standard in the 2nd IF path. Optional filters are available for the 3rd IF with matching bandwidths to enhance the skirt selectivity performance (XF-C, XF-D, XF-E, XF-F). IF width and shift controls are provided as well as an IF notch. A variable audio peak filter for CW is also fitted.

Main receiver functions not already covered include a switchable RF preamplifier and input attenuator, dual noise blankers for wide and narrow pulses, three-speed AGC and squelch.

The second or sub receiver uses a totally separate signal path from the RF amplifier to the audio output. In this way, the main and sub receivers can operate with different IF bandwidths and on different modes if needed. The audio outputs may be fed to the common internal speaker, kept separate and fed to external stereo amplifiers and speakers or routed to stereo headphones in stereo, mono or mixed modes. In the mixed mode, a degree of cross-talk is introduced between the two audio paths which can be effective in some situations. A balance control sets the relative balance between the two paths.

The band, frequency and mode keys used to set the main receiver may also be used to set the sub receiver by simply first pressing the 'SUB' key. A single key press sets the sub receiver to the same conditions as the main receiver and another key swaps the settings between the main and sub receivers. As for the main receiver, the band keys access two frequency/mode/filter settings per band for the sub receiver, giving a total of four available settings per band. The standard model has a single filter for SSB bandwidths in the sub receiver IF path. An optional 600Hz CW filter is available.

> **An excellent top flight transceiver in all respects**

A front panel control allows the receiver (both main and sub) to be switched to a separate receive-only antenna. In the standard model, the sub receiver shares the same front-end filter block with the main receiver and hence will only operate to full sensitivity when both receivers are on the same band. The BPF-1 bandpass filter option is available which allows the sub receiver to be used on any frequency, independent of the main receiver. However, it has its limitations. A separate antenna is needed for the sub receiver in this case and the receive-only antenna facility for both the main and sub receivers is disabled. An internal switch allows for the selection of receive-only antenna *or* full receive coverage for the sub receiver but not both. It is a pity that the switching was not arranged to provide full flexibility including full receiver coverage for the sub receiver on the main antenna, albeit this may not be the optimum antenna on some bands.

The transmitter includes a high power PA giving 200W output but is adjustable down to 20W. A large thermostatic blower is incorporated to keep the heatsink cool. Split frequency operation is via the second VFO, which also allows the transmit frequency to be monitored or searched out prior to trans-

mission. For SSB operation, an RF speech processor and VOX are provided plus a monitor function. For CW, the pitch is adjustable between 400Hz and 700Hz and a 'SPOT' key allows for accurate netting.

Full and semi break-in is provided and a built-in iambic keyer which just requires a keying paddle. The keyer weighting is adjustable to give 16 dot:dash ratios between 1:3 and 1:4.5 and a 'bug' mode is selectable which gives automatic dots with manual dashes. A nice touch is the provision of two keying jacks, one on the front panel and the other on the rear.

Several useful features are included for digital modes. On RTTY and AMTOR, the mode key toggles between LSB and USB. DIP switches select normal/inverted tones, 170/425/850Hz shift and high tones (2125Hz mark) or low tones (1275Hz mark). For packet operation, the mode switch toggles between 300 baud FSK and 1200 baud AFSK. DIP switches select from four different tone pairs to suit different TNCs.

An automatic antenna tuner is built-in with 39 memories storing matching settings for later rapid recall. An analogue meter indicates main receiver signal strength on receive and one of six parameters on transmit (ALC, compression, power output, SWR, PA current or voltage).

An orange fluorescent display panel with adjustable brightness indicates the main and sub frequencies simultaneously to a resolution of 10Hz, and the clarifier offset and selected memory number. The usual status messages indicate VFO and memory status, scan and sub receiver mode. The memory frequency and mode is indicated in place of the sub frequency and mode during memory preview.

The rear panel sports the usual comprehensive range of interface connections including antennas, audio in/out, 73MHz IF output for monitorscope, multiway DIN connectors for computer interface, digital voice recorder, RTTY interface, packet interface and band data for remote switching linear and ATU.

The computer interface is particularly comprehensive. Using the standard asynchronous CAT serial interface at 4800 bit/sec, virtually all functions associated with frequency, memories, modes, IF bandwidth, S meter, tuner etc can be controlled from a computer.

The 44 page instruction manual is excellent, very well written and somewhat different in style to the usual instruction manual. It is written more as a tutorial, and covers in detail all aspects of using the transceiver. In particular, the computer interface and digital modes are well covered and the possibilities for diversity reception. Fitting of the options is described but no technical or service information other than fold-out circuit diagrams.

Options available for the standard model include a high accuracy TCXO (0.5ppm as against 2ppm fitted as standard), additional IF filters and the bandpass filter module. An interesting accessory is the DVS-2 digital voice system. This is a small hand controller which provides a continuous recording of the last 18 seconds of audio from the main receiver and 16 seconds of recorded messages for playback on transmit. The transmit messages may be recorded as either two 8 second messages or four 4S messages. The audio is stored electronically using a CODEC and 1Mbit of battery-backed RAM.

DESCRIPTION

THE FT-1000 MEASURES 42 (w) by 15 (h) by 37.5cm (d) and at 25.5kg it is a heavy radio. This shows particularly when carrying it around as there is no handle on the case. It is very solidly built using the usual steel frame and back panel and with a substantial diecast front panel.

Removing the top cover reveals the hefty mains transformer in the power supply and the 9cm diameter upward facing speaker. A hatch in the top cover lifts to gain access to the VOX controls and DIP switches which set various parameters on CW, RTTY and packet. The memory back-up battery is easy to locate and replace, just under the top cover adjacent to the hatch.

The main receiver is quadruple conversion with IFs of 73.62MHz, 8.215MHz, 455kHz and 100kHz. The RF amplifier uses four FETs in a parallel push-pull arrangement and the mixer uses a further four FETs in a double balanced configuration. The sub receiver is a triple superhet with IFs of 48.64MHz, 7.68MHz and 455kHz. Dual FET mixers are used. On transmit, SSB is generated at 455kHz and mixed through the 8.215 and 73.62MHz IFs to final frequency. The 200W PA operates from a 30V supply.

A total of five direct digital synthesisers (DDS) are used to generate the various oscillator sources. Two ten bit DDSs are used to generate the main and sub VFOs in conjunction with phase locked loops to provide the local oscillator source for the first mixers. Three eight bit DDSs are used to generate the mode, width and shift sources. No less than six microprocessors are used for the various control tasks within the radio.

MEASUREMENTS

THE RADIO OBTAINED for review was an early sample. A number of modifications have been introduced to improve the performance since the radio first appeared, particularly the areas of receiver dynamic range, AGC, distortion etc. It is reasonable to expect that current production radios would have significant performance improvements in these areas compared with the measurements shown in the table. Additional comments are as follows.

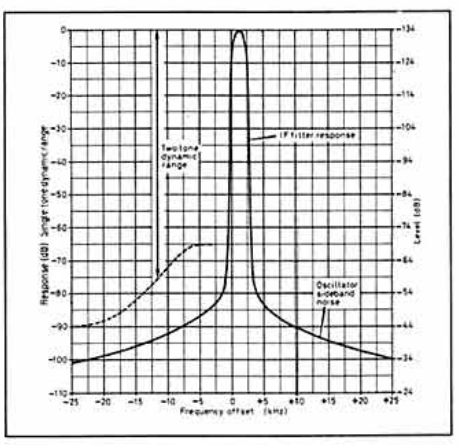

Fig 1: Effective selectivity on USB.

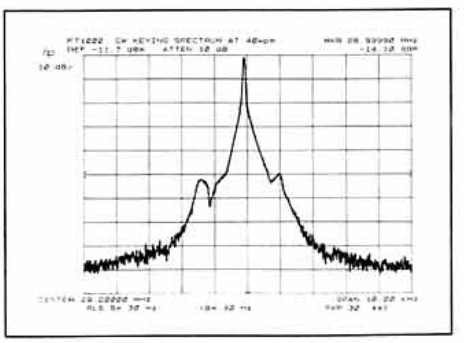

Fig 2: CW keying spectrum at 40WPM. Horiz scale 1kHz/div; vert scale 10dB/div.

RECEIVER MEASUREMENTS.

NOTE THAT ALL measurements refer to the main receiver only.

S-Meter Calibration

The range and linearity were reasonable and the calibration was the same on all modes.

Spurious Rejection

The rejection of all IF and image responses was in excess of 84dB which is an excellent figure. A few in-band spurious responses were found at levels around 80dB. This should not present any problems.

AGC

In the fast AGC position only, the attack time suffered considerable overshoot.

Strong Signal Performance

The front-end intermodulation performance varied quite markedly from band to band. Although the measured figures are good, better performance has been measured on other top class receivers. Note that this is one area where improvements have been made to current production radios. The intermodulation performance degrades close-in as usual and this is an area where the top class models are not necessarily better than the cheaper models. The FT-747, for example, has a very good close-in intermodulation performance, somewhat better than the FT-1000. The reciprocal mixing performance is a big improvement on previous synthesised Yaesu equipment and, although I have measured better figures on some radios, it should be entirely satisfactory.

The inband intermodulation performance is best with slow/medium AGC and a few dB worse with fast AGC. The performance improves significantly if the RF gain control is turned down. This is well worth doing on a crowded channel.

Selectivity

The optional extra filters provide improved skirt selectivity, particularly on CW. The effective selectivity on USB is shown in **Fig 1**.

TRANSMITTER MEASUREMENTS.

Power Output

The output power was variable down to 2W. The power meter accuracy was very good, generally within 5% at the higher levels or

10% at the lower levels. Into a 2:1 VSWR and with the auto-ATU switched out, the power output was reduced to 130-190W. At 3:1 VSWR, this reduced to 60-90W. With the auto-ATU switched in, the power was restored to about 180W.

SSB Performance

The level of intermodulation products is reasonable but could be improved substantially by reducing power to 150W. The speech processor degraded the 3rd order products but not the wideband products.

CW Keying Performance

Fig 2 shows the equivalent keying spectrum at 40WPM. **Fig 3** shows the keying waveform on semi break-in and **Fig 4** on full break-in. There is a noticeable shortening of the character on full break-in at this speed.

On-The-Air Performance

I was most impressed with the overall results obtained with this radio. Of all the top of the range models with dual receivers, the FT-1000 is the friendliest to use. The ergonomics have been very well thought out with simple and obvious control of all functions.

High on the list of ergonomic plus points are the following:- simple selection of all main and sub receiver functions, dual position band buttons for instant changes between SSB and CW sections of a band, twin weighted VFO knobs for both receivers, stereo headphone drive in dual receiver mode, simple use of memories with direct VFO from memory under all conditions.

Electrically, the FT-1000 also performed impeccably. The receiver sounded clean and the filters were excellent. Evening operation on the LF bands required switching out the preamp (IPO) but input attenuation was never needed. There were no synthesiser clicks audible at all during tuning.

On transmit, the extra power was useful but be careful not to overdrive any linear. Note that as supplied, linear switching via the TX GND line is disabled. To activate it, the bottom cover needs removing and an internal switch set. Good quality reports were obtained on both SSB and CW, and the QSK was effective. The internal keyer has a speed range from about 12WPM to in excess of 50WPM.

I also used the FT-1000 with the DVS-2 voice recorder. This was very effective although the audio levels were a little on the high side and there was a just noticeable digital sound to the speech. The transmit period is fixed at 4S or 8S and hence the message must be carefully tailored to fit this window.

My criticisms are very minor. The fan is rather noisy and so is the T/R relay on QSK. It is a very heavy radio to move around. Without the narrow filter fitted to the sub receiver and with the main receiver set to CW on 500 or 250Hz bandwidth, then setting the sub receiver equal to the main (a common operation) open circuited the sub receiver IF. This confused me at first, I thought there was an intermittent fault and is a good reason for fitting the optional filter. The BPF-1 option is inflexible as previously stated. Considering all the features which are provided, there is one omission - there is no transverter drive facility. This would be useful to incorporate in future updates.

YAESU FT1000 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

FREQUENCY	SENSITIVITY SSB 10dB s+n:n NOR	IPO	INPUT FOR S9 NOR	IPO
1.8 MHz	0.18µV (-122dBm)	0.35µV (-116dBm)	40µV	112µV
3.5 MHz	0.16µV (-123dBm)	0.32µV (-117dBm)	32µV	100µV
7 MHz	0.14µV (-124dBm)	0.32µV (-117dBm)	32µV	100µV
10 MHz	0.14µV (-124dBm)	0.32µV (-117dBm)	28µV	100µV
14 MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	32µV	100µV
18 MHz	0.16µV (-123dBm)	0.35µV (-116dBm)	32µV	112µV
21 MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	28µV	100µV
24 MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	28µV	100µV
28 MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	25µV	100µV

AM sensitivity (28MHz): 0.7µV for 10dB s+n:n at 30% mod depth
FM sensitivity (28MHz): 0.22µV for 12dB SINAD 3kHz pk deviation
AGC threshold: 1.6µV
100dB above AGC threshold for +1dB audio output
AGC attack time: 5mS (fast), 3mS (medium), 2mS (slow) (see text)
AGC decay time: 0.1-0.6S (fast), 0.6-1.5S (medium), 1-3S (fast)
Max audio before clipping: 8Ω-1.4W, 4Ω-2.3W at 1% distortion
Inband intermodulation products: -27 to -40dB (see text)

S-READING (14MHz)	INPUT LEVEL NOR	IPO
S1	1.1µV	3.6µV
S3	1.7µV	5.2µV
S5	3µV	9µV
S7	8µV	25µV
S9	32µV	100µV
S9+20	430µV	1.3mV
S9+40	5.2mV	16mV
S9+60	57mV	180mV

FILTER	BANDWIDTH -6dB	-60dB
2.4 kHz standard	2330Hz	3430Hz
2.4 kHz + XF-C *	2530Hz	3420Hz
2.0 kHz standard	1940Hz	3140Hz
2.0 kHz + XF-D *	1970Hz	2730Hz
500 Hz standard	600Hz	1240Hz
500 Hz + XF-E *	500Hz	870Hz
250 Hz standard	300Hz	1000Hz
250 Hz + XF-F *	260Hz	600Hz
AM-W, FM	5630Hz	10280Hz

* with optional filters fitted

Frequency	INTERMODULATION (50kHz Tone Spacing) NOR 3rd order intercept	NOR 2 tone dynamic range	IPO 3rd order intercept	IPO 2 tone dynamic range
1.8 MHz	-3dBm	86dB	+24dBm	100dB
3.5 MHz	+4dBm	91dB	+17dBm	96dB
7 MHz	+10dBm	96dB	+17dBm	96dB
14 MHz	+10dBm	96dB	+17dBm	96dB
21 MHz	+9dBm	96dB	+13dBm	94dB
28 MHz	0dBm	90dB	+6dBm	89dB

TONE SPACING (7MHz BAND)	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
3 kHz	-37dBm	65dB
5 kHz	-37dBm	65dB
10 kHz	-26dBm	72dB
15 kHz	-11dBm	82dB
20 kHz	-2dBm	88dB
30 kHz	+5dBm	93dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING NOR	IPO	TX NOISE IN 2.5kHz BANDWIDTH
3 kHz	81dB	-20dBm	-11dBm	
5 kHz	85dB	-15dBm	-7dBm	-76dBC
10 kHz	91dB	-4dBm	+4dBm	-81dBC
15 kHz	95dB	+5dBm	>+10dBm	
20 kHz	98dB	+7dBm	>+10dBm	-84dBC
30 kHz	102dB	+7dBm	>+10dBm	
50 kHz	107dB	+7dBm	>+10dBm	-89dBC
100 kHz	115dB	+7dBm	>+10dBm	
200 kHz	120dB	+7dBm	>+10dBm	

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	SSB(PEP) POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	5th order
1.8 MHz	215W	220W	-58dB	-24dB	-30dB
3.5 MHz	212W	220W	-60dB	-28dB	-35dB
7 MHz	210W	220W	-60dB	-28dB	-35dB
10 MHz	210W	220W	-62dB	-30dB	-36dB
14 MHz	210W	220W	-60dB	-28dB	-34dB
18 MHz	212W	220W	-58dB	-28dB	-31dB
21 MHz	212W	220W	-60dB	-25dB	-34dB
24 MHz	212W	220W	-60dB	-22dB	-36dB
28 MHz	212W	220W	-56dB	-22dB	-36dB

Carrier suppression: 50dB
Sideband suppression: >65dB
Transmitter noise: see table above
Transmitter AF response at -6dB: 325-2430Hz
Transmitter AF distortion: <1% at <30mV mic input
Microphone input sensitivity: 1mV for full output
T/R switching speed (SSB): mute-TX 12mS, TX-mute 3mS, mute-RX 20mS, RX-mute <1mS

NOTE:
In the above table, the receiver NOR setting corresponds to RF amplifier switched in and IPO to RF amplifier switched out.
All signal input voltages given as PD across antenna terminal.
Unless stated otherwise, all measurements made on SSB with the receiver front-end set to NOR.
All two-tone transmitter intermodulation products quoted with respect to either originating tone.
All measurements refer to the main receiver.

CONCLUSIONS

THE FT-1000 IS AN excellent top flight transceiver in all respects. It has all the features one would expect in a radio of this class and the ergonomics are really well implemented. The electrical performance is good and there are no major shortcomings. The current list price of the FT-1000 is £2995. The BPF-1 filter unit costs an extra £70.50 and the DVS-2 digital voice recorder £152.25. Additional IF filters are about £60.

ACKNOWLEDGEMENTS

I WOULD LIKE TO thank South Midlands Communications Ltd of Eastleigh, Hants for the loan of the equipment.

Peter Hart, G3SJX

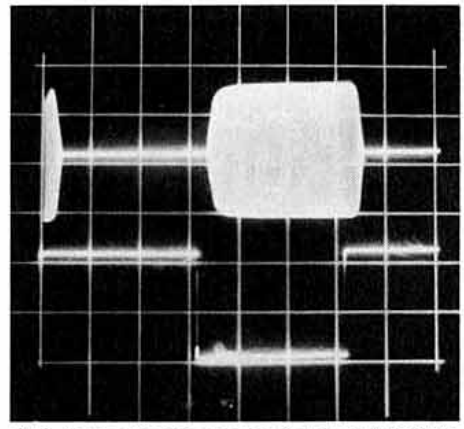

Fig 3: Keying waveform on semi break-in at 40WPM.

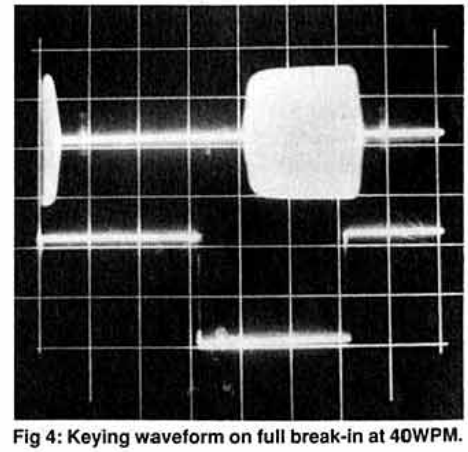

Fig 4: Keying waveform on full break-in at 40WPM.

Book Review

THE SETMAKERS - *A history of the Radio and Television Industry*

by Keith Geddes (in collaboration with Gordon Bussey)

First edition 1991, published by The British Radio & Electronic Equipment Manufacturers Association (BREMA), Landseer House, 19 Charing Cross Road, London WC2H 0ES, 464 pages (170 by 242mm), hard covers with some 500 illustrations (some in colour). Price £12.45 plus £2.50 (post and packing). Available only from the publishers.

RECENT YEARS have seen a number of books and periodicals devoted to aspects of the chequered history of the British radio and television industry but this highly-professional and extremely well illustrated book, at what must virtually be cost price, is outstanding. It deserves at least 95 marks out of 100 on the score of authenticity, research and detailed coverage of commercial, technical and personality aspects of the industry from the earliest days right through to the present era when, in effect, control has passed almost entirely to foreign companies who have, however, successfully revived production in the UK but with decisions, design and development largely carried out elsewhere.

Some may feel that a book commissioned and published by a trade association which exists to protect the interests of a highly-competitive bunch of rival setmakers (who often find it extremely difficult to agree among themselves) must inevitably gloss over past mistakes and shortcomings. They need not fear. Keith Geddes, OBE, a former staff member of The Science Museum and one-time BBC Engineering Research, has tackled the book with the eye and impartiality of a professional historian, drawing upon a mass of previously unpublished archival material and items drawn from the technical press, with the assistance of Gordon Bussey who also has much experience in this field.

Names such as C O Stanley (Pye), Stanley Mullard (and his love-hate relationship with Philips of Eindhoven), Edward Rosen (Ultra), John Logie Baird (whose real but limited contribution to television is dealt with fairly without adding to the myths that have been woven around in recent years), Frank Murphy and his engineering associate Ted Power who did much to raise the standard of domestic radios in the 1930s, all appear in these pages, along with hundreds of others.

The book does not, of course, relate directly to amateur radio, although its role, and that of the RSGB, in the early days of British broadcasting is mentioned briefly. There is a photograph of founder member Leslie McMichael in the RSGB '6ZZ' radio coach used in 1926 to demonstrate the feasibility of communicating from moving railway trains. Firms such as Lissen specialised in providing components for home constructors using a variety of ploys to promote relatively high-cost parts and valves. It would have been nice to have seen some reference to the contribution of HF broadcasting, as well as to amateur radio, by Stratton & Co Ltd (Eddystone) but presumably they were never BREMA/RMA members.

Much is said of the tactics of BVA (British Valve Association) and RMA (predecessors to BREMA) in their attempt to exclude non-British valves and equipment from Radiolympia and elsewhere until the coming of Philco with their American valves. Philips were able to represent Mullard valves as British although, during the 1930s, to quote S S Eriks "the only British part of a Mullard valve was the vacuum inside it". Eventually Philips set up large valve factories in Mitcham and Blackburn.

It is worth recalling that in 1926, Dr Ir B D H Tellegen of Philips, Eindhoven, found the solution to secondary emission in screen-grid (tetrode) valves and eliminated the 'kink' by introducing the suppressor grid, so forming the pentode which later became the most widely used of all valve electrode structures. Keith Geddes relates how, when in 1933 C S Bull and S Rodder of EMI were given the task of circumventing Philips' patent on the pentode, they quickly conceived the notion of the beam tetrode, in which the electron stream was brought to a focus between the screen-grid and anode: "The idea was patented, and around 100 experimental valves were made in the Research Department, but when manufacture was proposed to M-O V (in which EMI had an interest), they declared it could not be mass produced. The patent was subsequently shown to RCA, who used it to produce the highly successful 6L6 valve (and then the 807 - G3VA), whereupon M-O V relented and belatedly developed its famous British counterpart, the KT66". A story that underlines both the strengths and the weaknesses of an industry born out of hectic competition between intrinsically small entrepreneurs who fought their way up without collectively developing the necessary technical and production expertise.

The way in which British setmakers responded to the need for military radio and radar equipment during the war years is well told, with, for example E K Cole producing many hundreds of the Marconi-designed T1154 aircraft transmitters and Pye drawing upon their TV-designed IF strip for radar receivers. Well told also is the early struggle to make TV viable in an era when sales were few and makers often on the verge of pulling out. In the post-war period it was often the broadcasting organisations - BBC and IBA - who provided the technological incentives but found the industry initially reluctant to back innovation until too late to counter the growing reputation of Japanese firms for technical expertise combined with high reliability.

One of the very few questionable interpretations in this excellent book concerns the bitter struggle which lasted from late 1962 until 1967 to choose a TV colour-encoding system for Europe from the three rival systems NTSC (USA), SECAM (France) and PAL (Germany).

The author rightly points out that the BBC initially favoured NTSC rather than PAL but adds: "However, BREMA *soon* (my italics) developed a strong preference for PAL . . .". "Soon" is an uncertain term. I recall well that early in 1965, more than two years into the debate, BREMA issued a summary of a report prepared for them by Bernard Rogers (G3ILI), then of Bush Radio, which strongly supported NTSC (dubbed Never Twice the Same Colour) and were most indignant when I pointed out in *Electronics Weekly* that, on the contrary, the summary showed that NTSC required quite frequent adjustment of the viewer's tint control (no such control was needed for SECAM or PAL). One result was that G3ILI and the Bush Radio press officer invited me to a slap-up lunch at the Savoy Grill to bend my ear in favour of NTSC. I stuck to my guns - and soon afterwards Bernard became a firm supporter of PAL, and indeed helped to develop the final PAL standard!

The book is excellent nostalgia for those of us who lived through the early days of broadcasting - as listeners, in the industry as retailers or service engineers, or concerned with broadcasting - but it is much more than that. It is a serious study of an industry that could not be persuaded to stop for a moment to correct inherent faults which eventually delivered it into the hands of those who combine marketing skills with sound production engineering and good innovative technology.

G3VA

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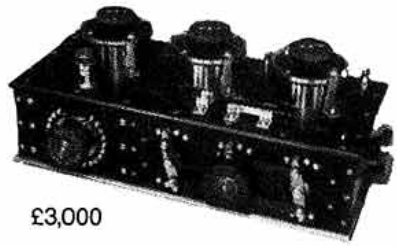
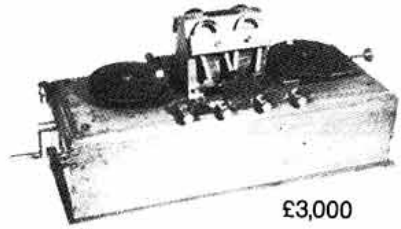


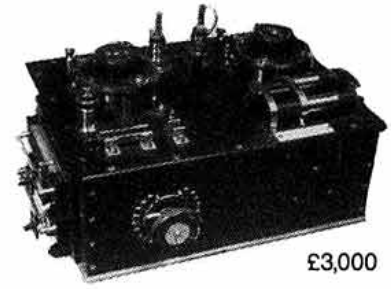
£3,000

MARCONI MAGNETIC DETECTOR



£3,000

MARCONI VALVE RECEIVER

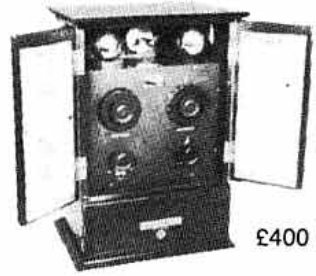


£3,000

W.W.I. TRENCH RECEIVER

£800

GEC° PHONE 2 VALVE

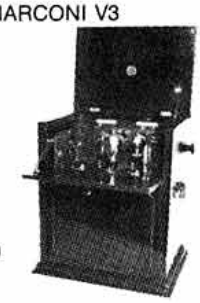


£400

ERICSSON 4 VALVE

£800

MARCONI V3



£600

PYE 3 VALVE

£600

GEC° PHONE CRYSTAL SET

£100

EKCO

£150

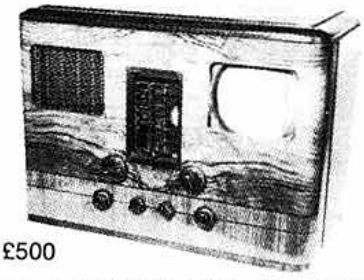
PHILIPS

£200

EKCO

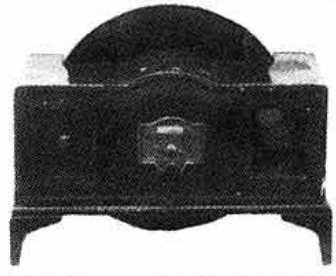
£250

HMV MARCONI TELEVISION



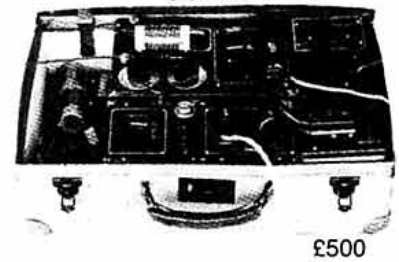
£500

BAIRD TELEVISOR



£2,500

S.O.E. SPY SET



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EMC

MEGAN SMITH, G0MEG
EMC Committee Secretary

YOU MAY NOTICE a difference in the column this month - it will be difficult to keep up the high standard set by Hilary Claytonsmith, G4JKS, who put in an enormous amount of work, not only on behalf of the EMC Committee but also on many other aspects of the Society. She announced her resignation from Council in March for a well-earned break, but is keeping in touch for long enough to see through to completion some of the projects on which she was working.

The EMC Committee would like to take this formal opportunity to thank Hilary for all the work which she has done. Not all RSGB members realise that the committees are all voluntary and the amount of time which the members spend on this work soon builds up. We hope that it is *au revoir* and not goodbye to Hilary.

DO YOU GET A BUZZ FROM YOUR MICRO?

ONE OF THE EMC Committee members has been investigating ways of reducing the HF breakthrough which can be produced by Amstrad PC1512 and PC1640 computers. Many of these computers were made and they are becoming quite common on the second-hand market. They do not appear to have been designed to minimise RF breakthrough in the amateur bands, but at HF, and particularly on 28MHz, the levels of breakthrough can be greatly reduced without any internal modification. The measures described may also be effective with other types of computer.

Breakthrough characteristics

Most HF RF breakthrough from these computers disappears when the video cable to the monitor is unplugged, indicating that the source is the cable or the monitor itself. The level of breakthrough also varies considerably depending on what is displayed on the screen. A GEM (trademark Digital Research) Desktop screen was used for testing as it produces a video waveform particularly rich in harmonics. A PC's video waveform has a large number of harmonics spaced at 15.75kHz intervals (CGA mode) or 22.1kHz intervals (EGA mode). Each harmonic is amplitude modulated with a 60Hz buzz. The PC1512 can only operate in CGA mode and the model tested had a monochrome monitor. The PC1640 can operate in CGA or EGA mode but is normally operated in EGA mode. The model tested had a colour monitor.

Both computers produced RF emissions on many HF frequencies, particularly in the 28MHz band. The most significant frequencies found in or near amateur bands were as follows:

PC1512: 14.318, 21.438, 21.470, 21.486MHz and numerous frequencies in the 28MHz band, particularly 28.636MHz.

PC1640: 14.007, 14.029, 21.545MHz and numerous frequencies in the 28MHz band, particularly 28.450MHz.

There was also some broad-band 'white noise' generated, probably fron the switch mode power supply. This was more significant on the PC1512.

Emission sources and methods of reduction

The two computers have different video interfaces to the monitor but both video cables carry a number of TTL level signals including Red, Green and Blue video and synchronising pulses. The cables have no screen and only one relatively thin ground wire. There is an RF voltage drop across this ground wire which causes a voltage to appear between the chassis of the monitor and the chassis of the system unit. A combination of two measures greatly reduces radiated emissions from the video cable

First, the chassis of the two units should be connected together with a 30cm length of copper braid about 10mm wide (from 12mm diameter co-ax). Secondly, the video cable should be screened between where it leaves the system unit to where it enters the monitor. The screen should be grounded to chassis at both ends. The section of video input cable inside the monitor should not be screened as this was found to increase RFI. The video cable cannot be threaded through a length of braid without cutting off the moulded-on DIN plug or D-type connector, but an aluminium foil screen is effective provided it has a bare copper 'drain wire' inside.

The foil should be covered in a layer of PVC tape (white looks best) to protect it and to hold it in contact with the drain wire. The drain wire can be a 70cm length of braid from 6mm diameter coax and should run the entire length of the foil screen so that it maintains continuity even if the foil splits due to flexing of the cable.

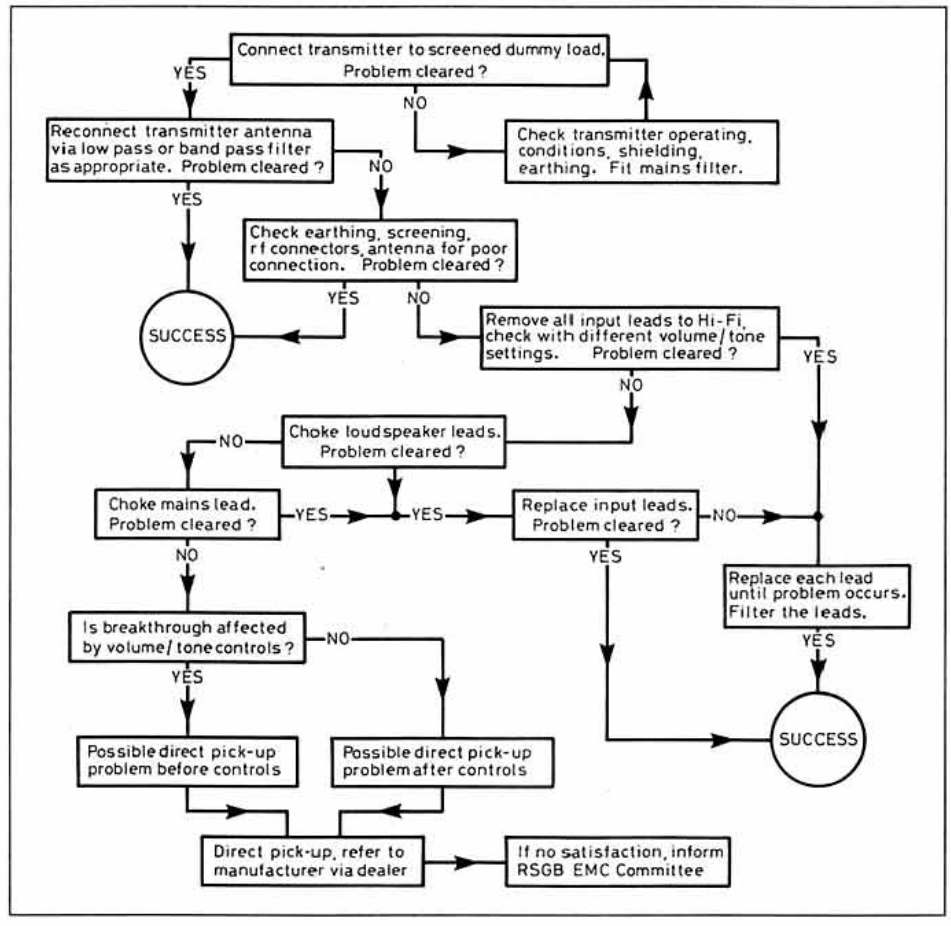
A connection to the monitor chassis can be made via a solder tag on the M4 x 0.7mm screw in the back of the monitor case. If this screw is replaced by a longer screw it is important to check that it cannot make contact with any components inside the monitor, although this was not a problem with the models tested.

A connection to the system unit 'chassis' can be made via one of the threaded bushes on the nearest D-type connector. If none of the D connectors used has retaining screws, (4-40 UNC thread), one of the threaded bushes can be unscrewed and a solder tag can be put behind it. **Fig 1** shows the screening and grounding arrangements together with further measures.

Screening the video cable and adding the earthing braid between the two units gave a very worthwhile reduction in interference of about 15dB in the 28MHz band. The broad-band power supply noise of the PC1640 was also reduced, but the PC1512 power supply noise was not affected. If a greater reduction in interference is required, further measures may be adopted.

Further measures

The remaining video RF emission is believed



Complete approach to an Audio or Hi-Fi EMC problem

to come from inside the monitor itself. Screening the whole monitor case was not attempted. At HF, the monitor appears to be radiating against several 'ground radials' such as the mains cable, and serial and parallel interface cables if any. Common mode chokes on these cables produce a further worthwhile reduction. These common mode chokes should be about 30cm from the computer to reduce the stray capacitance bypassing the choke.

The two-core mains cable of the PC1512 can be wound 10 turns through a pair of Mullard FX1588 toroids (if available) or a pair of Neosid ferrite toroids of the type supplied by RSGB (see this month's *Bookcase* pages). For the thicker PC1640 mains cable, seven turns on four toroids may be used.

Alternatively, for either model, wind the mains cable ten times round a 150mm long medium-wave ferrite aerial rod. The ferrite rod is as effective as the Neosid toroids at 28MHz but less effective at 14MHz.

For a parallel printer cable, ten turns on a ferrite rod is the only practicable solution. This is easier to wind with a ribbon type printer cable. If a serial cable is connected to the computer, this should also be fitted with a common mode choke.

Unplugging the mouse and keyboard may result in a further small reduction in breakthrough. If this is a worthwhile reduction, short extension leads should be wound through toroids and fitted with the appropriate DIN or D-type connectors to be plugged in series with the keyboard and mouse.

Mains filtering

Both computers have a basic mains filter with a line and neutral choke and a class 'X' capacitor between L and N. The PC1640 has provision for an additional class 'X' capacitor and for class 'Y' capacitors between neutral and earth, although these additional capacitors were not fitted in the **PC1640** tested. The **PC1512** has no earth wire and no provision for additional capacitors.

Additional mains filtering was found to be unnecessary on the **PC1640** above 14MHz, while on the **PC1512**, an external mains filter slightly reduced the broad band noise on 14MHz. Any such external filter must have its earth terminal connected to mains earth for safety, and to be effective the earth terminal of the filter should also be connected to the chassis of the **PC1512** monitor. The filter would need to be fitted between the common mode choke and the computer.

VHF

At 144MHz, none of the measures described above reduced RF emissions significantly. The majority of RF emission appears to come from the system unit at this frequency. There is a fairly uniform level of broad band emissions between 144 and 146MHz with peaks at certain frequencies.

For the **PC1512**, these include 144.372, 144.795, 145.487 and 145.500MHz. The **PC1640** produces a higher level of emissions at 144.003, 144.280, 144.376 and 145.034MHz. Further investigations will need to be carried out to see if there is a straightforward way of taming these VHF RF emissions.

SIBELIUS WITH SIDEBAND - MADONNA WITH MORSE?

FOLLOWING THE FLOW diagram for diagnosis and cure of television breakthrough problems in April's *EMC*, opposite is one for audio equipment. If the equipment includes an FM radio tuner, then it is more appropriate to follow the April chart for TV. It is possible that harmonics of the 160m or 80m band (generated by the transmitter, receiver or external device) could affect the 10.7MHz IF. A chart for MW/LW AM radio will appear in a future column.

The charts speak for themselves. However, it is probably worth remembering that most equipment operating purely at audio frequencies, such as tape decks, CD players, record players, electronic organs and so on, is not designed (or licensed) to operate as a radio receiver, and breakthrough may occur because EMC may not have been a prime consideration in the initial design of the equipment. The Radiocommunications Agency (of the DTI) is not obliged to do anything about it but a 'good neighbour' amateur should take reasonable steps to minimise the possibility of his/her installation producing high field strengths in the vicinity of this type of equipment.

If possible, locate the transmitting aerial as far away from the audio equipment as practicable, and mount beam aerials well above roof level. However, there is no reason why the transmitter should not be close to audio equipment, provided that the transmitter is well screened and decoupled and there is no radiation from the aerial feeder itself.

Although valve hi-fi equipment is now enjoying a return to favour, especially for the more expensive set-ups, the majority of audio equipment is solid-state, which appears to be more susceptible to breakthrough. In the majority of cases, the interconnecting leads carry the unwanted signal into the amplifier. The most likely culprits are the long loudspeaker leads which can behave very effectively as a dipole! Once the RF energy has been picked up, it is fed back to the earlier stages of the main amplifier by the internal negative feedback line, rectified by non-linearities and then amplified. When the unwanted signal enters the main amplifier, the volume control will have little effect on the level of the breakthrough signal. Alternatively, if RF currents flow through the circuit board and are detected by earlier, more sensitive stages, the volume control will affect the level of breakthrough heard.

Another common problem is unwanted RF signals entering the amplifier via the mains lead. Even the shorter interconnecting leads may cause trouble, although they are often screened. This is often a problem at VHF frequencies.

Fortunately, the trouble can usually be cured by the use of RF chokes in the leads. Several turns of the lead round one or more ferrite rings normally suffices. Use seven turns for VHF and 14 or more for HF. In the case of loudspeaker leads, screened or coax cable can sometimes reduce breakthrough. If the leads are acting as a resonant antenna then changing the length or repositioning them may also help.

If the RF chokes, treatment of speaker leads etc has been ineffective, and you have also taken the appropriate steps to minimise field strength near the equipment, then it is likely that the unwanted signal is being picked-up directly internally. An approach will have to be made to the manufacturer, initially via the dealer. Some manufacturers are helpful, but don't expect the oriental manufacturer of that 10-year-old music centre to be very sympathetic! In the end, for cases like that, it becomes a 'social' problem more than a technical one and the answer is likely to involve a negotiated compromise on both the amateur's and neighbour's side. All the more reason, then, to set out to be a good neighbour in the first place.

One word of caution though. Remember, touching your neighbour's audio equipment with or without permission may cause a tricky social situation if a fault develops afterwards, even if it is nothing to do with your investigation. It is far better to ask neighbours to fit filters etc themselves, under your guidance.

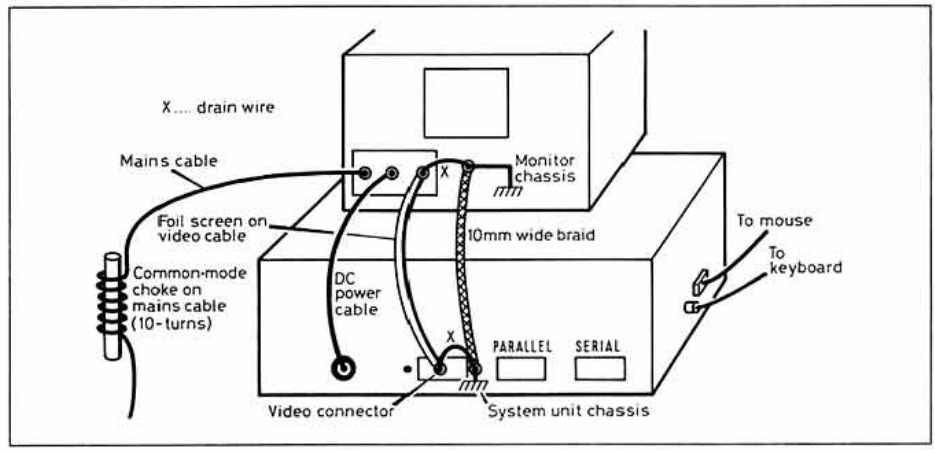


Fig.1: PC1512/1640 RF emissions reduction (HF)

THIS MONTH'S EMC was written by EMC Committee Secretary Megan Smith, G0MEG. Please send any correspondence to the Chairman, Bob Peace, G8SOZ, c/o Radio Communication, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE.

Q R P

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

THE GERMAN CW Activity group AGCW-DL has recently published the results of its survey on QRP operation. A questionnaire was answered by 132 QRP operators, most of whom were German, and the list of enumerated results has been translated by G4AWT. Although the report cautions against the use of percentages from the numbers because of incomplete data, I have converted some of the results to percentages for this simplified summary. In spite of its simplicity, the survey shows some quite interesting results.

The use of home made equipment for QRP operation just outstripped the use of commercial low power equipment. Of all the homebuilt equipment used, Heathkit equipment accounted for 28%, the rest being built from published or own designed circuits. None of the UK kit manufacturers seem to have featured in the results.

The sources of the published circuits are interesting: *CQ-DL* (German National magazine) 26%, *SPRAT* (G QRP Club journal) 23%, *QST* (ARRL journal) 16%, *Funkschau* 16%, *Funkamateur* 10% with the rest from a variety of sources. There was no mention of *RadCom*.

The antennas used explodes the myth that QRP demands large or expensive commercial antennas. Amongst the chief types used were: dipoles (single, multiplan and indoor) 30%, simple wires (end fed with a tuner) 21%, verticals (groundplanes, rod and telescopic) 16%, wimdom and FD4 combinations 8%, delta loops, inverted V and slopers 7%. Commercial multi-element directional beams accounted for only about 6%, interestingly equal with the use of magnetic loops.

The types of operation preferred may be typical of almost any amateur radio QRP group and worked out as: normal QSOs with QRP partners 40%, contests and awards 28% and dxing 20%, the rest being mainly interest in specialist modes. SSB operation is relegated to a special mode, accounting for only about 8% of the interest! The preferred band for general QRP working in Europe appears to be 40 metres, although all bands were named as commonly used.

The motivation for QRP operation produced the following preferences: portable operation, 'suitcase working' and outdoor or travelling operation accounted for 27%; the pleasure of home construction, design and testing of circuits 26%; arguments or worries about TVI and BCI 24%; the ability to operate independently of mains power supplies 11% and the rest spoke of the development of techniques opposed to 'power thinking' and the joy of operating with low power equipment.

I just wonder if the latter set of results would be duplicated in a survey in the UK? I suspect that QRP operators in the UK have more interest in home construction and power management. Perhaps we ought to try a similar survey here?

MORE HOT WATER

Heath HW Modifications

The survey above showed that, of all the homebuilt equipment used, that supplied by Heath in kit form was the most common. Heath have produced three popular QRP transceivers in kit form: the HW7, HW8 and HW9 *[see last month's RadCom 'Kits' feature - Ed]*. These are not only very popular pieces of equipment, but I reckon they are the most modified pieces of amateur radio equipment ever produced. It is practically impossible to buy an unmodified HW7, difficult to find an unmodified HW8 and even the latest model, the HW9, now has an impressive body of modification literature.

The situation may appear to question the design abilities of Heath, but all three were produced as relatively simple designs of a type and price that makes them ripe for amateur radio modification. Most people hesitate to poke a soldering iron into a commercial transceiver with a high resale worth, but a kit built transceiver, especially if bought secondhand is another matter. Over the years, many modifications have been published for the HW range of transceivers, from simple single component changes to complete rebuilds.

Several years ago, Fred Bonavita, W5QJM, collected some of the more popular modifications for the HW 7 and HW8 and produced *The Hotwater Handbook*. It ran to several prints including a revision by Michael Bryce, WB8VGE. That book has been out of print for quite some time and my own copy has been loaned out for copying several times.

A new book of HW modifications has now appeared, compiled and edited by Michael Bryce called *The HW8 Handbook*. It is not exclusively devoted to the HW8 but is a collection of articles on the modification of the HW7, HW8 and HW9 transceivers. The book contains 80 modification articles on the Heath HW series. The articles come from a variety of sources including *QST, CQ, 73, Ham Radio, Worldradio, SPRAT* and the *QRP Quarterly*.

The book is offered as a source of ideas rather than a complete manual for modifications of a particular transceiver. The editor clearly states that it is a resource book of circuits, not all of which have been tried by the editorial team. There is also duplication of ideas, several designs appear for the commonest modifications (adding RIT, improved keying, audio amplifiers etc) and the reader is invited to pick the circuits which best suit the individual need or level of skill. In some cases the installation of one modification may preclude the use of another circuit.

I have received an advance copy of *The HW8 Handbook*, which is, as yet, unavailable in the UK. It is certainly a good collection of the published material on these transceivers and HW series transceiver owners who would like to improve the performance of their Heath equipment ought to have a copy. Some of it is duplicated material from the *Hotwater Handbook* but there is quite a lot of new material.

The G QRP Club has ordered a limited number of these books and we expect to have them in stock by the time this column is published. The price will be £5 to members and £6 to non-members, including postage. They will be available from me, at the above address, with cheques payable to 'G QRP CLUB'. Please send an address label with every request as my mail order facilities are primitive.

In a recent letter from Doug DeMaw, W1FB, I have heard that he has just completed a revised edition of the *W1FB QRP Notebook*. This is not a mere revision; the book will be 100% new material, text and circuits. It will be twice the size of the original *Notebook* and should be published around July of this year.

A QRP Station: The operating and construction positions at G3RJV (operating to the left and construction to the right), after a tidy-up some two months ago.

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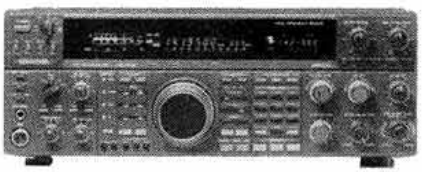

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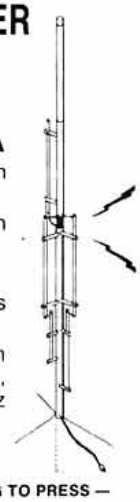

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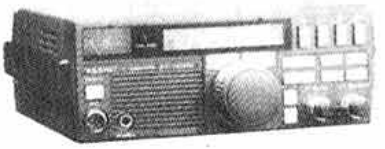

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HF RULES

RSGB SSB FIELD DAY 1991 RULES

1 The General Rules for RSGB HF Contests, published in the January 1991 issue of *Radio Communication* will apply. This event is open only to 'Portable' stations operated by members or groups of members; intending entrants are urged to read the General Rules carefully.

2 When: 1500GMT 7 September to 1500GMT 8 September 1991.

3 Sections: Both sections are multi-operator. Single-operator entries are welcomed, but will compete on equal terms with the Multis.

(1) Open: Maximum licensed power. Equipment: one transmitter and one receiver or one transceiver, PLUS an additional receiver if desired. No antenna restrictions.

(2) Restricted: Maximum of 200W pep **input power**. Equipment: one transmitter and one receiver, or one transceiver . . . . no additional receiver. Antenna: Only one antenna may be used, which must be a single element (eg dipole, longwire, W3DZZ, trapped vertical) having not more than two elevated support points. No part of the antenna may be more than 15m above ground level.

Entrants in both sections may keep standby equipment on site, but it may not be connected to a power source or antenna at the same time as the main equipment.

4 Contacts: Telephony only in the 3.5, 7, 14, 21 and 28MHz bands. **NB - QSY Rule:** A station making a scoring contact on a new band may not return to the previous band until ten minutes have elapsed since the previous scoring contact on that band, eg: G9ZZZ works W1AAA at 1555 on 14MHz, then QSYs to 28MHz and works PY2BBB for points. G9ZZZ may not make another scoring QSO on 14MHz until 1605.

5 Contest exchange: RS plus serial number starting from 001.

6 Scoring: For each complete QSO with

(a) a fixed station in IARU Region 1: 2 points

(b) any station outside IARU Region 1: 3 points

(c) a portable/mobile station in IARU Region 1: 5 points.

IARU Region 1 countries include those in Europe, Africa, USSR, ITU Zone 39 and Mongolia. For a more precise definition refer to the RSGB *Amateur Radio Operating Manual*.

7 Multiplier: ONE for each DXCC Country worked on each band.

8 Final Score: The final score is given by the total number of QSO points earned on all bands added together, multiplied by the total number of multipliers worked on all bands added together.

9 Logs must be addressed as per General Rules, and postmarked not later than the Monday **22 days** after the end of the contest. Please don't forget (i) Separate logs for each band, (ii) the list of Multipliers worked for each band and (iii) a Dupe Sheet or checklist for each band if you possibly can.

10 Awards: The leading station in the open section will receive the Northumbria Trophy. The leading station in the restricted section and the second- and third-placed entrants in both sections will receive certificates of merit. A certificate will also the awarded to the station in each continent submitting the highest-scoring checklog.

21MHZ CW CONTEST 1991 - AMENDMENT TO RULES

The HF Contests Committee has decided to open the above contest Transmitting Sections to Multi-operator entries, thus bringing the event into line with the 21/28MHz Phone contest. The following amendments are therefore made to the rules, which were published in *Radio Communication*, April 1991:

Rules 2 & 11 now to read as follows:

2 Eligible entrants: Overseas (which includes EI) - all licensed amateurs. British Isles - as per General Rules. Single-operator or Multi-operator entries will be accepted in the transmitting sections.

11 Awards: The leading British Isles single-operator station will be awarded the T.E.Wilson G6VQ Trophy. Certificates of merit will be awarded to the leaders and runners-up in each section, and to the highest-placed multi-operator entries from UK and Overseas. Additional certificates may be awarded (at the discretion of the HF Contests Committee) to the leading stations from each Overseas continent/country.

Preamble to the Receiving Section Rules now to read:

RECEIVING SECTION

Single-operator entries only will be accepted. Rules as for the transmitting section except where specified below. Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

The HFCC hopes that the introduction of the Multi-operator category may encourage some of those who often, through pressure of work or family responsibilities, are unable to devote the necessary time for a competitive individual entry to get together with some friends and take part in an atmosphere of camaraderie, as well as with a real chance of collecting an award.

HF RESULTS

FIRST 1.8MHZ CONTEST 1991

UK entries rose by nine, and overseas by fourteen, over last year's event. There was also a 100% increase in overseas SWL logs, from one to two. BRS1066 remains the only entrant in the UK receiving section; come on all you listeners, give Brad some competition! Conditions during the contest were good and whilst there was some QRM from the PACC contest, some Gs turned it to their advantage to help pile on the QSOs.

A few changes to the county codes were published in January *Radcom*. IOS has been removed (when did someone last enter a topband contest from the Isles of Scilly?) and at the request of some residents of Buckinghamshire, their county code has been changed to BUX to avoid confusion on CW. We haven't got it quite right yet: HBS and HBN are in fact a single county (apologies to Yorkshiremen) and GW3JI has pointed out that CWD means something rather rude in Welsh. It will be changed. Roughly half the UK entrants claimed DL and Y as separate countries, but since October 1990 they have counted as just one country on the DXCC list, and logs in this contest have been rescored accordingly.

The Republic of Ireland figures well in the overseas section, although EI4VIJ may be better known as Don, G3HZL who has taken up residence in County Galway. He promises to extend his mast to 60ft for next year's event, but managed to dig out eight more Gs than his nearest rival using his present antenna. G4PIQ deserves mention for a rig failure which put him off the air for the first 70 minutes of the contest, but he piled on 130 QSOs in the time remaining after he had made repairs.

Thanks to all those who included their duplicate check sheet with the entry. They speed up the checking process, and the variety of layouts used makes interesting reading.

G4BUO

UK TRANSMITTING

Posn	Callsign	Points
1	G4BWP	878
2	G3FXB	849
3	G3TBK	797
4	G4BUO	782
5	G0NAA	750
6	GM3YOR	713
7	G3OLB	709
8	G3WGV	694
9	G3ZGC/P	630
10	G0JFX	617
11=	G3JJG	614
11=	GM3YEH	614
13	G3RXP	599
14	G4PIQ	597
15	G3ULN	590
16	G3VYI	579
17	G3YAJ	548
18	G4OGB	538
19=	G3XTT	537
19=	G4ODV	537
21	G3OXC	533
22	G3RSD	520
23	G3BPM	518
24	G0IVZ	514
25	G3TXF	499
26	G0JNZ	498
27	G4CZB	469
28	G2MJ	464
29	G0IDE	462
30	G5MY	459
31	GM3CFS	450
32	G3GLL	442
33	GM3UM	431
34	G3HKO	411
35	G3AWR	399
36	G4HUP	394
37	G3HFG	393
38	GW3JI	389
39	G3GMS	368
40	G3KDB	360
41	G2AFV	348
42	G3FVW	329
43	G3GMM	327
44	GM3ZRT	307
45	G3NKS	250
46	G3JSR	245
47	G3ZRZ	239
48	G0LZL	228
49	G3IQF	223
50	G3ILO	75

OVERSEAS TRANSMITTING

1	EI4VIJ	376
2	EI9FK	340
3	DL0OV	325
4	OK1PRR	321
5	OK3KAP	313
6	LA1IE	306
7	OK2PMA	297
8	OK1KYY	294
9	LA2UA	268
10	SP5GH	256
11	Y25ZN	222
12	UA3PTW	216
13	OH1KF/2	208
14	UZ1CXF	165
15	YL2TW	175
16	PA3AAV	174
17=	OK1OPT	149
17=	ON4HX	149
19	OL8CWM	147
20	OK1DXU/P	134
21	OK2BXR	130
22=	OK1JST	129
22=	Y44PF	129
24	OK1DXW	120
25	OH7SQ	77
26	Y51TO	75
27	Y25BF	70
28	UA4ANZ	59
29	OH7NW	56
30	UL7CU	34

UK RECEIVING

1	BRS1066	452

OVERSEAS RECEIVING

1	DE4CWL	208
2	SP4028	32

Checklogs **received with thanks: G3LIK G3MCX G3SQX G3YLC GW3SB PA3BTH UV3DTN UA9TX**

YOUR COMMENTS AND SUGGESTIONS INVITED

Those of you who were fortunate enough to have been able to attend NEC at the end of April and who found the time to visit the HFCC stand will probably have seen already the excellent pamphlet prepared by Ed Taylor, and will hopefully have made your feelings plain to one of the Committee. For those of you who have not yet done so, now is your opportunity . . . . read on!

A large percentage of contesters nowadays rely heavily on computerised systems to improve the efficiency and competitiveness of their stations . . . . equipment such as memory keyers and digital voice recorders, which were almost unknown fifteen years ago; contest-logging programs have been sending code-group responses automatically for some years and recent licence variations permit, for the first time, the truly 'paper-free' station. The HFCC has always supported wholeheartedly the use of these technological advances . . . . they keep our section of the hobby vibrant and demand the development of new skills from the operator. There has been raised, from time to time, the question of inequality due to financial circumstances but this has always been accepted as (however undesirable) a fact of life. Now, new stars have risen in the firmament . . . . Packet Radio, and the 'Cluster'.

Reduced to the simplest terms 'Clusters' work like this:

(a) Someone monitoring the bands hears a rare station and sends details of callsign and frequencies to his local 'node' station, via packet radio.

(b) This information is automatically passed on to other stations who are 'Logged-on' to the system, and appears on their computer screens.

(c) The information is also sent to one (or more) further 'node' stations, thus spreading the information rapidly through the system.

Anyone monitoring the Cluster therefore has rapid access to information concerning band activity, which may be of great assistance in working new multipliers, etc.

Whereas the use of computers for logging applications etc. obviously requires the operator to be in charge of the system, there is already currently available in the UK certain software which is capable of simultaneously running a logging program, monitoring a packet cluster, and passing suitable packet messages to the screen for the attention of the station operator. The HFCC is of the opinion that since the information has been input into the packet system by a person other than the operator or a station with whom he is in QSO, this constitutes assistance *from a third party*, and therefore any station using this facility should be classed as a Multi-operator station.

A major problem with the acceptance of packet is that, at present, less that half the country is served and it is highly likely that there are large areas, particularly in Scotland and Wales, which probably will never have an efficient service. Operators in these areas would, *de facto*, be disadvantaged.

The HFCC is presently engaged in reviewing the current Multi- and Single-operator station designations for RSGB Contests. ARRL is similarly occupied, and is putting forward the idea of 'assisted' and 'unassisted' categories. It has been suggested that the Committee adopt the stance that the system imposed by the present General Rules be continued . . . . ie: that the use of any form of alerting or operator assistance, including monitoring of packet Clusters, be prohibited to Single-operator stations. Multi-operator entries would be permitted the use of such alerting facilities. Obviously, those contests presently restricted to single-operator entries would be considered for the inclusion of a Multi-operator class, and new awards would be made available where appropriate.

Now is the time for you to make your feelings known! If you have any suggestions, criticisms, observations then please don't be shy. Drop a line to the HF Contests Committee, preferably via the address published in the General Rules, but alternatively to any Committee Member. Help the HFCC to give you what you want!

G3UFY

HF CONTESTS CALENDAR - 1991.

Jun 1/2	NATIONAL FIELD DAY (Feb 91)
Jun 15/16	*All Asia DX SSB*
Jun 22/23	Summer 1.8MHz (May 91)
Jul 1	*Canada Day (CW/SSB)*
Jul 6/7	*YV DX SSB*
Jul 13/14	IARU HF Championship (CW/SSB)
Jul 13/14	RSGB SWL Contest
Jul 13/14	*SEANET CW*
Jul 21	Low Power Field Day
Jul 27/28	*YV DX CW*
Aug 3/4	*YO DX (CW/SSB)*
Aug 10/11	*WAE CW*
Aug 17/18	*SEANET (SSB)*
Aug 25	ROPOCO-2
Aug 26/26	*JARL All Asia (CW)*
SEP 7/8	SSB FIELD DAY (incl.IARU Region 1) (June 91)

DIRECTION FINDING

TORBAY AND DISTRICT QUALIFYING EVENT

Date: 23 June

Map: 202 (Torbay)

Assembly: 13.00 for start at 13.20 BST

Location: Windy Corner, on Brixham Road (A3022), NGR 890569.

Competitors requiring **tea** should notify Paul Clark, 180 Roselands Drive, Paignton, Devon; tel: 0803 523599, no later than 16 June.

George Whenham G3TFA

VHF RULES

VHF NATIONAL FIELD DAY 1991 RULES

1. Duration. 1400GMT 6 July to 1400GMT 7 July 1990

2. Site Notification. Each Group intending to compete must send details of the site to be used to: VHF Contests Committee, c/o B Llewellyn G4DEZ, 110 South Avenue, Southend-on-Sea. Essex SS2 4HU, **to arrive no later than 10 June 1991.**

The appropriate **site registration form** can be obtained from G4DEZ and should contain the following information. The name and address of the person responsible for the entry, the name of the group, the callsigns to be used on each band, the section (Open, Restricted or Low power), the locator and national grid reference of the site, and sufficient access information for an inspector to locate the site (preferably a sketch map). Each group may only register one site. A stamped addressed envelope MUST be enclosed for return of your band code. TWO copies of registration forms and maps/directions MUST be included in your registration. A separate **5 character code** will be issued for 432MHz, 1.3GHz and 2.3GHz. These codes must be sent in the contest exchange on those bands. Any station passing a code on a band other than the appropriate one will be disqualified from the band concerned. This is to put back a little more skill in operating and it will be

something that no group can have in their database, any mention of the codes on other bands will result in disqualification of the the offending group or groups.

3. Bands. Up to four separate stations may operate simultaneously on the 70, 144, 432, 1296 and 2320MHz bands. Single band entries for 144MHz will not be accepted. The 70MHz CW section will take place in the period 1400-2200GMT, and the 70MHz SSB section will take place in the period 0600-1400GMT, with close down between 2200GMT and 0600GMT. The same callsign must be used on 1.3GHz and 2.3GHz, with no simultaneous operation on these two bands. The 1.3GHz and 2.3GHz stations will close down for the period 2200-0600GMT.

4. Operators. Any RSGB member or group of members operating from the British isles (excluding Eire) may enter. Visiting foreign amateurs may also operate field day stations as long as they are members of IARU member Societies. Groups operating from the same site may combine their scores subject to rules 3 and 5.

5. Stations. All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. All equipment including antennas, must be installed on site not more than 24hrs before the contest, and the site must not be used by the entrant for transmitting activities during the five days prior to the contest. Only portable accommodation can be used to house the stations. Power for all equipment must be derived from an on site generator or battery. The public mains supply must not be used.

6. Scoring. Contacts will be scored by the radial ring system. Scores on 1.3GHz and 2.3GHz will be added together to give a final microwave score. The overall score will be determined as per general rule 10 using the final 70MHz, 144MHz, 432MHz and microwave scores.

7. Contest exchanges. (a) On 70MHz QTH information must be exchanged. It must be given in a different form on each mode. (b) On 144, 432, 1296 and 2320MHz QTH information need not be exchanged. A 5 character random code will be issued on 432MHz, 1.3GHz and 2.3GHz, this will need to exchanged in addition to normal contest exchange, the code should only be exchanged with UK portable stations. (c) Contacts with stations whose callsigns appear on any of the group's cover sheets will not count for points.

8. Sections. There will be four sections: Restricted section (R):

(i) The height of any antenna must not exceed 10 metres above ground level.

(ii) Only one antenna per band may be used (eg. no stacked, bayed or collinear arrays or switching between two or more antennas). A slot fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

(iii) 2.3GHz contacts will not count for points in this section.

Low Power section (L):

(i) The power output of any band must not exceed 25W PEP at the transmitter.

(ii) The height of any antenna must not exceed 10 metres above ground level.

(iii) Only one antenna per band may be used (eg. no stacked, bayed or collinear arrays or switching between two or more antennas). A slot fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

(iv) 2.3GHz contacts will not count for points in this section.

Open section (O): as per general rules.

SWL section (S): as per general rules.

9. Inspections. All stations are subject to inspection by members of the VHF Contests Committee or nominated representatives. Should the inspector be unable to locate the site due to inadequate or incorrect information, the entry will be disallowed. In the event of a last minute change it is the responsibility of the group to make suitable arrangements for the inspector to find the site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest.

10. Entries.

(a) All entries must be postmarked no later than 31 July 1990.

(b) Entries must be addressed to: VHF Contests Committee, c/o B Llewellyn G4DEZ, 110 South Avenue, Southend-on-Sea, Essex SS2 4HU. [PLEASE NO RECORDED DELIVERY or REGISTERED POST, any such entry will be disallowed].

11. Awards. The Surrey Trophy will be awarded to the overall winner of the Open section, the Arthur Watts Trophy to the overall winner of the Low power section, the Tartan Trophy to the leading Scottish entry in the Open section, the Scottish Trophy to the leading Scottish entry in the Low power section, and certificates will be awarded to the winners and runners-up on all bands in each section, and to the leading stations in each county. A new trophy has been donated by the Martlesham Club, this will be awarded to the leading station in the new Restricted section.

144 MHZ & 432 MHZ LOW POWER CONTESTS, JULY 27/28TH.

Rule 14 (country and county multipliers) applies to these contests.

AMENDMENTS TO GENERAL RULES FOR RSGB VHF/ UHF CONTESTS 1991

Inadvertently, the incorrect general rules for 1991 were published on pages 63/64 of the December 1990 edition of Radio Communication. The following changes should be read in conjunction with those pages :-

5. Single Operator, Fixed Stations.These are defined as those operated by the licensee, in person, from his/her normal place of residence, or past residence, with no assistance with operating or logging during the contest.

7. Locations. Add: Testing of equipment in the 24 hour set-up time is allowed, but advertising or making schedules for later operation is not allowed. (Monitoring of the band or bands in question will be undertaken, and any infringement will be dealt with!)

17. Antennas. The same antenna system must be used on transmit and receive at all times.

26. Special Calls. Entries from stations using special event calls such as GB, GX, GS or any other special club prefix is not allowed. Normal club calls eg G4ZDA are OK, GX4ZDA is not.

RSGB VHF CONTESTS CALENDAR - 1991

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 (Jun 91)
27 Jul	144MHz Low Power/SWL (Mar 91 + Jun 91))
28 Jul	432MHz Low Power/SWL (Mar 91 + Jun 91))
25 Aug	432MHz Fixed/SWL (Mar 91)
4 Sep	144MHz CW Cumulatives (Mar 91)
7 Sep	144MHz CW Cumulatives
7/8 Sep	144MHz Trophy/SWL (Mar 91)
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

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.

The demise of the Hornsea Amateur Radio Club's 23cm contest station as a result of freak winds. Operators were Clive, G8EQZ, and Dave, G3ZTR.

VHF RESULTS

432MHZ FIXED, AFS, AND SWL CONTEST FEBRUARY 1991

Entries in the listener and overseas sections were up on last year and stations in DL, F, G, GM, GW, ON and PA were active. Generally conditions were observed to be either flat or slightly above average. The most commented on aspect of the contest was the timing, with views varying from "a much better time for the contest" to "strange time, TVI problems during evening, contest too long". The majority of entrants who expressed a view preferred the contest to be earlier in the day and not so long; these comments will be considered when deciding the times for next year's contest. Congratulations to G8KQW, G4RFR, Martlesham DX & CG, Sutton and Cheam RS, PE1EWR and BRS 52543 for winning their sections and also congratulations to G4PIQ, G1DSP, Farnborough & District RS, Flight Refuelling ARS, PA0GHB and BRS 31976 for being runners up in their respective sections. Many thanks to G0CLP for the checklog. In the results tablets stations marked * are certificate winners.

SINGLE OPERATOR FIXED STATION SECTION

Pos	Call	Zone	Score	QSO	LOC	Ant	dBW	Best DX	Km
1	G8KQW	D *	1255	174	IO91	16x19	26	DJ9DL	592
2	G4PIQ	C *	1181	147	JO01	4x17	25	DL3YEL	503
3	G8TFI	D	1158	150	IO81	4x19	25	DJ5BV	658
4	G8HHI	D	787	115	IO91	2x21	26	DJ5BV	552
5	G4WKN	B *	662	116	IO92	2x19	20	DL2KBB	504
6	G6ZTU	A *	656	100	IO93	21	23	ON4FI	449
7	G4ERG	A	602	70	IO93	21	25	DJ5BV	609
8	G3WHK	C	465	94	IO91	24	20	DL2KBB	447
+	PE1EWR	+	390	36	JO11	21	10	G8XVJ	464
9	G8MNY	C	348	73	IO91	19	26	DL2KBB	434
+	PA0GHB	+	343	37	JO11	4X17	10	G8XVJ	493
10	G8NTD	B	331	85	IO92	18	19	G7DHW	290
11	G1OGY	C	325	57	JO01	18	16	GW8ELR	350
12	G4DDK	C	285	38	JO02	17	20	DF8XR	393
13	G6PHJ	B	257	67	IO92	9	19	GM6BIG	382
14	G4JSX	B	233	58	IO82	2x18	23	PA0FRE	480
15	G0EHV	A	232	23	IO94	21	17	G4RFR	464
16	G8ZQB	B	220	56	IO92	17	13	GM6BIG	381
17	G4JLG	A	218	45	IO83	88	22	G4RFR	307
18	G6XRS	B	205	53	IO92	88	20	PA0GHB	373
19	G4LDR	D	201	37	IO91	17	17	G4ERG	302
20	G3ZDM	A	200	51	IO83	21	20	GM4LBV	308
21	G8JXV	C	184	35	IO91	48	17	DL9LBH	436
22	G1HSK	A	168	32	IO93	88	11	G4RFR	331
23	G7FWE	A	152	35	IO83	48	10	G4RFR	293
24	G3YSX	C	142	30	IO91	8ov8	10	PA0FRE	326
25	G1XJO	B	126	43	IO92	24	10	PA0GHB	365
26	G4DEZ	C	117	43	JO01	18	17	G8DOK	303
27	G3TQF	B	113	33	IO92	18	22	PA0GHB	378
28	G3UBX	B	112	34	IO82	88	17	G0EHV	267
29	G6NUZ	B	99	17	IO92	21	13	G4RFR	275
30	G8JAM	B	95	25	IO92	48	15	G4RFR	216
31	G1WIS	C	93	24	IO91	18	17	G8XVJ	287
32	G4EPA	B	80	28	IO92	19	16	GW7GXV	204
33	G8FCQ	B	77	29	IO92	48	13	G4RFR	211
34	GM8MJV	G *	73	7	IO86	21	20	G4CVI	574
35	G6MXL	D	69	18	IO80	48	20	G6ZTU	318
36	G0GCI	C	60	16	IO91	19	21	PA3AEF	385
37	G6GAU	C	53	10	JO02	HB9CV	10	G4RFR	252
38	G7DWC	B	25	14	IO92	5	<1	G3OLX	146
39	G5UM	B	9	12	IO92	21	5	G8HHI	148

MULTI-OPERATOR SECTION

Pos	Call	Zone	Score	QSO	LOC	Ant	dBW	Best DX	Km
1	G4RFR	D *	995	136	IO90	2x24	26	DJ9DL	637
2	G1DSP	B *	783	112	IO92	88	26	DJ5BV	542
3	G3OLX	C *	766	123	IO91	2x21	26	GM6BIG	536
4	G4OWM	C	362	84	IO91	88	20	G0EHV	404
5	G8KGC	B	270	72	IO92	48	20	PA0GHB	404
6	G7APD	B	71	30	IO92	21	10	G4RFR	183

AFFILIATED SOCIETIES SINGLE OPERATORS SECTION

Pos	AFS			Operators				Total	Zone
1	Martlesham Dx & CG*	G4PIQ	1181	G4DDK	285	G6GAU	53	1519	C
2	Farnborough & Dist*	G8HHI	787	G0GCI	60			847	D
3	Rugby Amateur TS*	G8NTD	331	G6PHJ	257	G8ZQB	220	808	B
4	S. Manchester RC*	G4JLG	218	G3ZDM	200	G7FWE	152	570	A
5	Reigate Amateur TS	G8JXV	184	G3YSX	142	G1WIS	93	419	C
6	Leicester RS 'A'	G6XRS	205	G3TQF	113	G8JAM	95	413	B
7	Leicester RS 'B'	G8FCQ	77	G7DWC	25	G5UM	9	111	B

AFFILIATED SOCIETIES 'ALL OTHER' SECTION

Pos	AFS			Operators				Total	Zone
1	Sutton & Cheam RS *	G3OLX	766	G3WHK	465	G4OWM	362	1593	C
2	Flight Refuelling ARS *	G4RFR	995	G6MXL	69			1064	D
3	Spalding & DARS *	G1DSP	783	G6NUZ	99			882	B
4	Rugby ATS	G1XJO	126	G4EPA	80	G7APD	71	277	B

LISTENERS SECTION

Pos	Call	Name	Score	QSO	LOC	Ant	Best DX	Km
1	BRS52543	M Parry	106	23	IO83	19	G4RFR	346
2	BRS31976	M G Thoms	55	15	JO01	19	G8XVJ	293
3	BRS28198	N Henbrey	14	3	JO00	48	G8TFI	210

VHF LISTENER CHAMPIONSHIP 1990

This year's event was a close run thing, but congratulations go to Martin Parry for triumphing in the end, by dint of entering more of the contests. Therefore, he is awarded the Hansen Trophy.

Remember that this year's season runs from 4 March to 3 September, and the more events you enter - the better your chances! *G4PIQ.*

Pos	Station	50MHz Trophy	432MHz Trophy	432MHz UHF/SHF	May 144MHz	VHF NFD	144MHz QRP	432MHz QRP	144MHz Trophy	Total Score
1	BRS 52543		1000	1000	329	1000			458	3787
2	BRS 31796		795		1000	952			1000	3747
3	BRS 25249	1000				508	1000		500	3008
4	BRS 28198				211	331	125	1000	126	1793
5	BRS 32525								633	633

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INTELLIGENT RS232 DISPLAY

NEW

£185.00

Don't tie up your computer while monitoring. This new unit will display, store and print messages sent via the RS232 output from the MICROREADER or PACKET TNC. Text is stored in memory and at the same time displayed on the large 160 character backlit screen. A unique scrolling facility allows you at any time to scroll back and forth through over fifty screens of text messages while still receiving data. The display incorporates a PARALLEL PORT that allows printing of all or selected sections of text at the touch of a button

MK II MICROREADER

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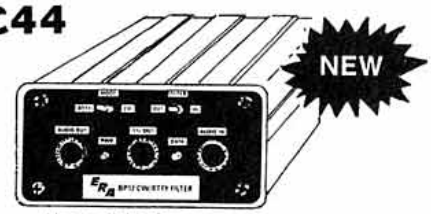

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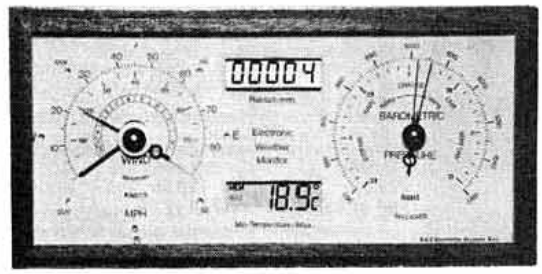

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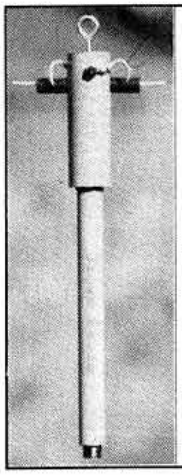

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6 METRE module for FT726R: £195, 6m preamp: £15. 2m to 10m m/m tsvtr: £85. VTX5000 modem for ZX Spectrum: £10. (Corsham) 0249 712009.

650FT ASL. Two bedroomed bungalow, large garden, five existing masts 20/30ft. Full written details from Joe RS85042. (Macclesfield) 0625 420835.

813 Tx valves: £30 pair. 64 mixed valves, all new, bxd B7 or B9 bases: £30ono the lot. (Pocklington, Yorks) 0759 305355.

AERIALS Cushcraft vertical AV3 10 15 20m: £50. Hately dipoles 10m 2kW: £13. 15m 200W: £10, 2m s/steel 5/8 whip mag mounted: £15. 2m HB9CV: £8. 2m mobile halo: £5. All in good cond. Carr at cost. G3UFQ QTHR (Solihull) 0564 777802.

ALTAI ALT 100W/channel sound to light unit 3CH 4-way 13A ganged sockets: £40. Crown 5in 625 line B&W TV/radio model 525R mains lead 8xHPZ bttry power ideal 70cm or DXTV: £25. Nicads for above: 50p each. ITT star 70.260 AM 8W 4m tcvr with nicads: £30. Pye Bantam 70.260 AM .5W portable 3 nicads charger case: £25. (Ashtead Surrey) 0372 277945.

ALTRON AQ6-20 minibeam 3ele: £120. 2m 8ele Jaybeam: £15. Channel Master rotator HD9508: £50. Linear valves, two 813's as new: £50. All items boxed. Buyer collects or pays postage. All ovno. GM0MDB QTHR 0436 76486 after 5pm.

AMSTRAD 12in Paperwhite mono VGA monitor, suit 2086 Amstrad PC, new, bxd: £45. Foster X-15/II 4-track recorder, good: £130. (Bracknell) 0344 428995.

AMSTRAD PC1640. Re-housed into metal case, V30 chip fitted, 5.75in 360K + 3.5 720K drives, micropolis 69Mb MFM (28ms) hard disk + controller + PSU, keyboard, mouse, ECD (EGA) monitor. Faulty RS232C (serial) port, but everything else in gwo, hence silly price of:£400. Must be collected. Lots of other bits-n-pieces on offer also. Peter G0GSZ QTHR. (Norwich) 0603 748338 or send sase for full list.

ANT MAST solid brass telescopic 4 section wind up and down approx 30ft to fit on bracket on front of long trailer WID STD braking ball hitch etc 2 spare wheels: £125. 10m Stn Belcom LS102L multi MD 100W microwave mod linear preamp fist and protel desk mic 40amp PWR supply vert ant MBL brkt etc: £325. Ant 14AVQ hygain vert 10/40 new never used: £50. Daiwa CNW 418 ATU 10/80 PWR SWR cross needle meter: £95. Taxi high band main stn 170MHz vert colinear: £20. R. Thorley G0GDN 326 Lapwing Lane Manchester M20 0UX. 061-445 6628.

ANTENNA 13ele Elite 2m beam, ex cond: £30. Consider swop for vertical. Arrow silver 70 70cm beam: £5. John G0MJX QTHR (Kidderminster) 0562 743481.

AOR 1000 scanner plus accessories, 9 months old: £199. Sinclair Z88 128K Ram 32K Rom PC link for IBM XT parallel cable mains supply: £199incl. Casio FX730P 8K basic h/held computer with tape interface: £45. Windows 286 for PC registered copy: £20. G4IYK not QTHR (Gravesend) 332822.

AR22R rotator: £25. CRT's 09/J split beam (Cossor 339 scope): £8 ea. QQE06-40 (QQV06-40A) unused: £8 ea. Electroniques coils for G2DAF Rx MkII front end and tuneable IF: £15 set. CR100 parts. Denco DCR19 Rx parts incl 1.6MHz IFT's: £2 ea. XTL filter: £5. Electroniques IFT's DIF/11/85 85kHz: £5 pr. DIF47 470kHz: £4 pr. Collectors items: Pamphone 1004 amplifier: £10. Philips Disc Jockey Major: £10. G3OWY (Chester) 0244 381051.

ATLAS 210X with built-in PSU mobile bracket and attenuator: £265ono. G0GZS (Upminster) 04022 28896 (evenings).

BBC MASTER 512/6502 processors. Teletext adaptor cassette twin drives colour monitor masses programs ROMS Wordwise viewstore. Also books. Buyer collects: £550 G3WYU (Ramsgate) 0843 587548.

BBC-B Issue 7 board, 40T disc drive, mono monitor, ATPL sideways RAM, wordwise plus, disc doctor: £235ovno. Peter G4BVH (Brighton) 0273 540793.

BNOS 432MHz 100W linear 10W input, also preamp: £185. Also microwave modules 144MHz 200W linear with preamp 3 - 10 or 25 Watts input: £225. G4NTY QTHR (Manchester) 061-790 7673 (after 6pm).

BURROUGHS ET1100 green screen 12in dumb terminal units with keyboards RS232: £12 each. Elkart tenor sax lacquered brass case reeds two mouthpieces immac: £275 or exchange for Revox A77/4 7.5/15 tape recorder with D/P amp cards. (Ashtead, Surrey 0372 277945.

CLARKS 40ft pump-up Scam Mast. Bought from Anchor, never installed: £150. Buyer collects or transport at cost. Alan G1EBH QTHR (Basildon) 0268 545573.

COLLINS 30L1 W/E, with CC2 carrycase, new RCA tubes fitted, with H/B photocopy, vgc: £600. Four new bxd RCA 811A tubes: £100. KWMZA W/E, with plug-in relays, CC2 carrycase and H/B photocopy, new tubes throughout, with PM2 PSU, and period vitavox mic, vgc: £600. Spare tube set: £80. SM3 mic, new: £50. NEMS-Clarke R1302B Rx, 53-262MHz m/mode, final generation thermionic, ex-USAF, 19in rackmount, sold with R300C adaptor for 250-900MHz, both with authentic H/B's, rare, collectable, vgc: £320. Snailblower 6in, 230V/30V: £15. Generator ex-WD, MFG Tooley, comprises Hatz ES780 single-cylinder aircooled diesel mated to Markon SCN21 regulated 240V 50Hz single-phase alternator, rated 5KVA continuous, well suited to SSB loads, sled-mounted, four-man lift, starts first time every time, runs without black or blue smoke: £500. FT290R with carrycase, carrystrap, YM47 mic, nicads, charger, Mutek preamp, mobile mount, all bxd and excellent, little used: £300. MML144/30LS 2m linear, switchable preamp, suits FT290R, as new: £80. Eagle SR165 HF Rx, vgc: £40. 8µF/2500V: £5; 110µF/2000V: £15. 4CX10000D (ten thousand), 6BL6, 6F33, 11E1, 12E1, 5B/255M, 2E24, 2E26, E180F, E810F, 6FV6, 6080, PX4, PX25, QY4-400, KT66, VX3558, U18/20: Please phone. AVO8 Mk3 with leads, accurate all ranges: £50. Katsumi EK9X keyer: £5. 5VDC SMPU, .25 CUFT: £10. Hansen SWR3, vgc: £5.Chris, G8JFJ (Portsmouth) 0705 596836.

COLLINS KWM-2A HF tcvr with 516F-Z PSU, professional quality classic rig: £475. No offers. Kemp G4TMO (Kingston) 071-218 0834 (day) 081-549 1427 (after 8pm).

COMPAQ plus luggable computer, 5.25in floppy and 10MHz hard disk. MS-DOS 2.11, Wordstar 3.3. Also Epson LX-80 printer. Offers. Richard Larkin, 42 Mansfield Road, London NW3 2HT. Phone or fax 071-267 7573.

COMPLETE "Howes" QRP 7MHz CW station. Receives SSB boards DC/RX40 ASL5 CVF40 CTX40 PSU headphones: £80. G4KFW QTHR (Birmingham) 021 357 2009.

COMPLETE Collins station KWM2A 3.4-30MHz continuous 30S1 linear 516F-2 PSU 302C-3 Wattmeter 2.5kW isolating trnsfrmr, all gwo, daily use, spare valves: £750. G3AJT (Romsey) 0794 512557.

COMPLETE HF station, Icom 751A with internal mains psu, hand & desk mic, SEM Tranzmatch with Dummy load fitted, Hi-Mound key with marble base, G4MH mini-beam, Cde 45 Rotator. Pole, wall brackets & pulleys etc: £1100. G4RLE (Portsmouth) 0705 257019 (after 7.30pm).

COMPLETE working HF station, one owner, less then 100 hours usage. FT902DM tcvr SSB/CW/FM filters. Matching FC902 ATU, all mint cond, orig bxs, instruction booklets, service manual. Unused new 6146B PA valves - best offer over £575 secures. G4TMG QTHR (West Sussex) 0903 772052 (after 6pm wkdays, anytime wkends).

COMPUTER Tandy portable 1400FD 3.5 twin drive nicad pack PSU chrgr mouse padded carrying case 768K RAM: £650. (Tonbridge) 0732 366704.

DRESSLER D200 2m linear with masthead preamp: £450ono. CBM8032-SK computer, twin disks: £40ono. Telequipment D63 dual beam scope: £50ono. G3UPA QTHR (Meriden) 0676 22767.

EDDYSTONE 358X HF Rx with 9 coils, collectors item: £55. Barograph, as new: £250. G3VXZ QTHR (Maidenhead) 0628 27350 or 045383 5510.

EQUIPMENT sale 2x17ele 144MHz Tonna Yagis, spare elements: £80. 5ele 50MHz Tonna Yagi: £30. G3WPO 50MHz tvtr 28MHz IF, H/B QQV0640 PA and PSU's: £100. Incomplete 144MHz linear project most components, 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. G4BLX QTHR 0273 844711.

FDK multi 800D 2m external freq display unit, mint, bxd: £200. (Leeds) 0943 874794.

FT101 in good cond, with mic and h/book, ideal beginner: £200. G4LUF QTHR (Devon) 054 882 442 (evenings).

FT101E HF tcvr, gd cond: £250ono. 23cm 2C39 valve PA: £50. 23cm 6W PA: £50. Or WHY. (Merseyside) 0925 225829.

FT101Z mint cond, mic, manual, spare PA valves: £375. Matching 1KW PEP linear amplifier H/B to professional standards same dimensions as FT101Z: £195. Matched pairs new valves 811, 804, 310, T50-2, good used pairs 6146, TZ40 glass and metal 6V and 12V popular octals - offers. 1939 Ferguson 10 valve AC503 all-wave radio in superb cond - offers. G3WIF (Bristol) 0272 293738.

FT101Z mint cond, new valves and set of new spares: £350. CBM64: £75. MML 144/30-LS: £60. Mint cond 1 or 3W in, 30W out. (Huddersfield) 0484 540867.

FT101ZD Mk3 all bands, FV101DM external digital VFO, memories: £475ono. Buyer collects PT790R, Alinco 10W linear: £225ono. GM0HBT QTHR (Glasgow) 041 334 6823.

FT101ZD, gd cond with manual and mic:£350, FT225RD 2m m/mode gd cond with manual and mic: £350. G3WIW QTHR (Calne. Wilts) 0249 812966.

FT101ZD, immac cond, fan, CW filter, all bands, Shure 444 desk mic: £410. G3PFE QTHR (Nantwich) 0270 628990.

FT102 good cond, all options fitted, spare PA's: £475. FT290 + soft case + chrgr + Yaesu linear: £250. John GW0BNN QTHR (Pontypridd) 0443 485283.

FT290 Mutek nicads chrgr: £250. Mobile mount new boxed unused: £10. BNOS amplifier LP144-3-50: £50. Armstrong FM tuner and stereo amplifier with a few spare valves - offers? G4NAO QTHR (Fareham) 0705 733314 extn 29 (work) 0329 661078 (home).

FT290R m/mode tcvr, Mutek F/E nicads case strap rubber duck chrgr manual bxd vgc: £260. Oscar 2m 7/8 mobile whip: £15. Heatherlite mobile mic: £15. FTV 107R tnsvtr 2m & 70cm leads manual bxd: £150. ICR71 HF Rx: £550. Realistic 2006 scanner: £225. (Dunstable) 0582 668648.

FT707 300Hz filter, m/mount, speech proc: £350. TR2500, 15W PA, spkr mic: £160. Lowe SRX30 gen cov Rx: £85. 2m/10m MM conv: £12. HF trsvtr (10 15 20m), 2m IF: £80. 10FM rig, 25W O/P, repeater shift: £35. 88ele 70cm Jaybeam: £35. John G4TLS QTHR (Horsham) 0403 53051.

FT726, 2m, 70cm, 6m and satellite. Buyer collects: £850. Fax-1: £175. Bob Fuller (Wimborne) 0202 882269.

FT736R box, as new: £950ono. (Wolverhampton) 0902 783299 (after 6.30pm).

FT77 FM board fitted narrow CW filter: £375. CR100, working but could do with overhaul: £15. Richard G4XHE QTHR (Crawley) 0293 560590.

FT790R, nicads, chrgr, ERC, bxd: £210. YM49 spkr mic: £15. Slide mount - missing screws: £5. Mutek TVHF 230C tvtr 2m to HF, nine bands, 10W output, fab performance, "QRP" mode for FT290 or similar: £200. G4UDT (Wembley) 081-902 5995.

FT901DM all filters fitted with YD148 desk mic mobile cables: £425. Brian, G1HMH QTHR (Belper) 0773 823638.

FT902DM Sommerkamp/Yaesu all band HF tcvr CW and AM filters, keyer, FM, as new, very little used, C/W, mic, manuals etc: £550. Mario GM3MZX QTHR (Newton Stewart) 0671 2190 (day) 0671 2268 (evening).

FT980HF tcvr + CW board, mint condx, little

used, with box & manual: £850. Buyer inspects and collects. David G4XWZ (Stroud) 0453 752057.

HANDIES Yaesu 208 and 708, both with NC8 chargers and spare batts, cases: £125 each. PYE PF2UB's 2m on R3 70cm RB10 spare batts BC10A charger: £40 each. PYE PFX 2m case spare batts: £165 possibility charger. G0HZE QTHR (Peterborough) 0733 342439.

HOKUSHIN HS-HF-S S-band HF trap vertical antenna: £20. Two element HB9CV 70MHz: £10. Atari 800 computer complete with Atari 1027 printer Atari 810 5.25in disk drive: £50. Buyer inspects and collects or carr extra at cost. Phil G3SWH (Weston Super Mare) 0934 832736.

HQ1 Quad mini-beam: £50. Will deliver a reasonable distance but prefer buyer collects. G0FQX QTHR (Milton Keynes) 0908 667250.

HRO Type M. two complete sets sold as used spares - boxes of coils, valves, manual, resprayed chassis. All ready for rebuild! Restoration project ran out of steam. Now need space: £50 or sensible offer. Brook G7HJA QTHR (North London) 081-882 4110 (ansaphone).

HY-GAIN 203BAS 3el 20m beam, new in orig carton: £150. G3PVA QTHR (Morden) 081-646 3738 after 6pm.

IBM 100% compatible computer 386/33MHz processor with 128K cache 124MB hard disk 1.2MB and 1.44MB floppies 4MB RAM 1MB VGA card 1024x768 resolution 14in colour multisync panasonic monitor, brand new, unused, with 1 year on-site warranty, cost new £3,290, wanted £2,300ovno. Terry (Reading) 0734 311852.

IC551 50MHz Tx/Rx, vgc, DFC230 ext VFO for TS530S with slight fault, Akai HX3 HiFi recorddedr, any offers. Dave G4GLT (Coalville) 0530 35835.

ICOM 726 HF tcvr with 6m, three months old, with SM8 scanning desk mic complete with Daiwa 30amp PSU, MFJ m/mode data terminal unit and diamond SWR and power unit, all ex condx: £900. No offers. (Milton Keynes) 0908 367495.

ICOM IC0ZE with case and chrgr: £150. Drake R4: £200. PK232: £200. Zetagi all-band linear 4W input 200W output, built-in mains PSU: £100. All in excell condx, may swop for computer WHY? Graham G4VUX (Watford) 0923 248331 evenings & wkends.

ICOM IC211E all mode base, 2m tcvr, manual, mic, orig packing: £295. Yaesu FT902DM, all mode all band HF tcvr, manual, YD844A base mic, mint condx: £550. Sinclair/Amstrad PC200, IBM compatible, 640K RAM 2x3.5 drives, mouse, 13 disks, use with TV video outputs, CGA mono/colour, cost £450, as new: only £199. G4JXK QTHR (Fareham) 0329 230737.

ICOM IC271E competition base m/mode 2m SP3 external spkr plus 10amp supply, pristine condx, absolute bargain: £525. Realistic PRO2006 top range Tandy scanner cost £349: £200; no offers. (Walsall) 0922 414796.

ICOM IC2KL 500W auto linear, built-in power supply: £1350. (Herne Bay) 0227 742061.

ICOM ICR7000 scanning Rx covers 25-2000MHz in all modes, gd cond, bxd with manual. Also 2m quad driven aerial, portable military discone aerial, also spare N-type plugs: £675. AOR 900 h/held scanner, bxd as new, 2 aerials and power supply, bttry chrgr: £165. (Tonypandy) 0443 435518.

ICOM linear IC-2KL with IC-2KLPS: £975. BNOS LPM144 160W linear: £225. Alan G4YYD QTHR (Bury) 061 797 7893.

ICOM SSI m/mode 10W 50MHz internal PSU fitted FM & passband tuning units: £400. Lunar electronics (USA) 120W solid state 6 metre amplifier 12V: £120. Together or separately. (Saffron Walden) 0763 838352.

ILLNESS forces sale 2 double-bed detached bungalow, plot 120 by 65, space for extension, superb radio QTH, 275 asl, large garage, views sea, wooded Downs, productive organic garden, gfch, sudg fitted carpets, exchange similar property easy reach Headingley. G3CPS (Eastbourne) 0323 643172.

JAYBEAM TB2 10-15-20: £70. AR-40 rotator hygain: £40, both 2 yrs, gd cond £100 both or exchange for vertical Butternut HF6V Cushcraft AP5 or similar. Peter G0BDF (Lutterworth) 0455 557263.

KENWOOD 140S, little used: £650ono. Also PK-88 packet controller: £70. Datong Morse tutor: £30. G0DZU QTHR (Romsey) 0794 884286.

KENWOOD AT250 auto ATU as new: £300. Kenwood SW-100B SWR/power meter, new: £40. Kenwood SWT1 ATU new: £40. (Monmouth) 0600 713549.

KENWOOD R-1000 Rx. 100kHz to 30MHz coverage. Spectrum FM board fitted plus 4-pole audio filter for CW, ex cond: £230ono. Kenwood TS830S Tx/Rx narrow CW filter. Ex cond with manual and fist mic: £600. Alan G1EBH QTHR (Basildon) 0268 545573 (after 6pm).

KENWOOD TL911 linear 1kW O/P spare valves, ex condx: £350. Wanted pair 17ele Tonnas with splitter N Type. (Plymouth) 0752 340946.

KENWOOD TR2300 2m FM Tx/Rx, DRAE 4A PSU, DRAE VHF wavemeter: £100ono. Yaesu FL50, FR50, HF Tx, Rx, working but need love! Suit DiY addict: £45ono. Box of valves (807's etc), xtals etc...free to callers. Prefer buyers inspect and collect. Mark G4EZR (Orpington) 0689 837953.

KENWOOD TR715-E with accessories: £475. Daiwa CN-410M SWR meter: £42. Kent twin paddle key: £38. all immac, carr extra. (Altrincham) 061 941 6443.

KENWOOD TS440 HF, ex cond: £700. Kenwood TW4100A 70cm/2m: £325. Standard C528 h/held 70cm/2m: £295. CAPCO loop 30/40/80m, ex cond: £275. Kamtronics m/mope tnc, never used, still in box: £195. Scanner AR1000, mint: £185. Tenna mast 25ft wind-up down position 13.5ft: £100. Marconi mobile radio test TF2950: £650. Starmarster memory keyer: £55. Reason for sale moving to EAS. (Washington) 091-4161709.

KENWOOD TS440S C/W auto ATU, CW filter, SSB filter, bxd, as new: £900. Kenwood TH77E dual band handie CTCSS board fitted, bxd, as new: £340. Icom IC-726 HF + 50MHz, bxd as new: £830. Belcom LS102 10m all-mode, vgc: £135. MFJ 10-160m ATU model 941D: £70. Yaesu NC-29 desk chrgr: £40. Koyu SWR/PWR meter 1-8-200MHz 200W: £40. (Kilsyth) 0236 824167.

KENWOOD TS440S, C/W auto ATU matching PS50 PSU: £895. Trio TM201A 2m mobile: £170. All in ex condx. Peter G0OJX (Exeter) 0392 432675.

KENWOOD TS830S nine bands no mods also VFO240 and MC50 mic all items pristine condx original packing and bxs manual: £750, no offers. May consider PX 2m base station or dual band base station. Brian G0BLO (London) 071 515 5517.

KENWOOD TS940S fitted 250Hz CW filter , immac cond, orig packing, little used: £1500. Kenwood TR751E fitted voice synthesiser, perfect cond, never used mobile, orig packing: £500. Icom IC720A 250Hz CW filter IC PSZO PSU ex cond: £500. 18AVQ: £50. (Slough) 0753 883934.

KENWOOD/Trio TS-940S with internal automatic ATU, immac cond: £1350. G2KF QTHR (Newquay) 0637 878741.

KW1000 linear amplifier, gd condx, uprated HT trnsfrmr: £390 plus carr. Geoff G3YLC (Buckingham) 0280 817496.

KW530SP projected upgrading demands reluctant sale of this excellent rig. Purchased new in Oct 87 complete with Fist Mic MC35 and manual of course: £535. Also Eddystone 730/1 in gd cond: £50. OscarII 10 FM with mic 25W PA and Bremi stabilised PSU 7amp surge: £40. G3BGY (London SW) 081-764 2194.

LINEAR amplifier components, with 2kV + trsnfmr, fil'trnsfmr, 2 x 813 valves, Pi-tank components, anode choke, HV caps, switches, plus HV variable caps: £100. CBM64C computer with technical s/ware interface and Tx-3 Rx-1 RTTY CW ASCII programs plus d/drive: £125. Norman G0IRK QTHR (Surbiton) 081-390 2650.

LOWE HF125 communication Rx 30k/cs- 30m/cs with FM option fitted, excell cond: £250. G1IDY QTHR (Kettering) 0536 760643.

MAGNETIC LOOP CAPCO AMA6, 15/20/40m, vgc: £210. Reg G4ZJB QTH (Sheffield) 0742 746464 (day) 0742 724671(evening).

MAKE AN OFFER Trio 120S 130S tcvrs ATU's SEM Z match easytune Tokyo HC200 Yaesu FL2100B little use FDK 700EX 2m PLL tcvr VFO120 PK232 ICS s/ware Comm 64 1KW transmatch TM1000 with balun Butternut vert HF6V all band. G4EVP QTHR (Stafford) 0785 840872.

MICROWAVE modules 70cm linear amplifier with preamp 10-50W, little used, orig packaging: £100. G1RST (Morpeth) 0670 790296.

MOVING sale. R/C trainer aircraft with fututa control, supertiger engine, never crashed!: £250. Fast S100 computers, 8in/5.25in drives, RS console case, hard disk controllers, memory PCB, CCTV camera, ATV tcvr, much more. Simon G8POO QTHR (Stocksfield) 0661 842389.

MUST sell!! Have 300 unused 5.25in low density blank disks, vgc and on IBM format but will format to any other system using 5.25in drives, RRP 65p each, sell 20 for £5. P+P free. William (Tetbury) 0666 504884.

NEW unused Create V-dipole, all metal construction, ideal small gardens, covers 40/20/15/10m, traps rated 1-2KW, cost £149: offers? G3JFC 0474 872743.

ONE 40ft tower mast crank up tilt over type with heavy metal base: £200. Also Yaesu FRG9600: £290. (Stepney) 071-790 1478.

OSCILLOSCOPE Philips PM3233 10MHz dual beam, small, in spec with probe and manual: £185. G4FPU QTHR (Welwyn Garden City) 0707 320741.

PRISTINE specimen Collins 'S Line' comprising 75S3B 32S3 516F2 new PA valves spares all manuals insured courier delivery: £800ono. G0GGI QTHR (Kirkby-in-Furness) 0229 89635.

QRT sale Yaesu FT290R Mkl nicads chgr flex ant leather case: £240. Kenwood TH215E h/held spkr mic AA batt case soft case: £220. Both radios as new cond. HF trap dipole + Marconi T 10 to 160m capability. Bargain: £40. RTTY Radprint terminal unit + Creed 444 printer. gd cond: £30. G4YIJ QTHR 021 747 3303.

RACAL 1218 Rx, gd cond, manuals, cabinet: £425. RA117E Rx, gd cond: £250. Solatron CD1400 oscilloscope, manuals: £85. Scopex 4D10A, faulty: £25. (West Wickham) 081-462 4461.

RACAL RA117E Rx. The actual specimen reviewed in 'Amateur Radio;, gd condx: £150. Brian G3ZOH (Orpington) 0689 862475.

RECEIVER Icom ICR-70 with SEM transmatch aerial tuner incl Ezitune and a G2DYM "Rolls-Royce" 8-trap aerial, all ex cond: £430ovno. (Doncaster) 0302-841011.

ROBOT model 400 slow scan tv cnvrtr: £350. Robot model 800 terminal used for Tx/Rx slow scan graphics RTTY/CW: £325. Both units as new, manuals, bxd. AVO signal generator plus homebrew digital frequency meter: £50. G4YME QTHR (Benson, Oxon) 0491 35669.

SCANNER FRG965 60-905MHz, identical to FRG-9600, discone antenna and AKD HF cnvtr included, as new, in box: £325. Pye MF5FM crystals fitted for 70-260 and 70-450, with mic: £60ono. G6JKK (Bournemouth) 0202 580114.

SCANNER Uniden Bearcat BC760 XLT 29MHz to 956MHz 100 memories: £170ono. G0CDD (Edgware) 081-958 1164.

SHACK clearance, tea chest of goodies incl 2 CRT's, 4 meters, 10 trnsfrmrs, 4 crystals, boxes of resistors, capacitors, semi-conductors, relays, fixtures etc. Highest donation to charity secures. Buyer to collect. Phone for details. G8LHQ QTHR (London) 071 735 0762.

SILENT KEY G4PTM IC471E: £495. Dressler 70clinear 400W: £395. HF linear FL2277Z K.Watt: £395. Dressler wideband preamp, new: £50. Datong Woodpecker blanker: £30. Mini meter: £18. Instrumech tower 100ft with head bearing and electric motor and brake winch: £475. (Workington) 0900 67607.

SILENT Key sale (5Z4IR/G2BPC) Hallicrafter SR150 Tx/Rx, SX117 Rx, liner 2 + PSU, m/m cnvtrs & trnsvtrs 2m & 73cm, Taylor 105A multimeter, modular electronics 40-2 linear, 14AVQ, winch (h/d), BC221AF, large qty valves & crystals (VHF/UHF), 7MHz traps, exWD meters, Revex SWR meter (UHF). Sensible offers. Postage at cost. Andre GM3VLB (Kelso) 0573 24664.

SILENT Key sale. DRAE VHF Wavemeter: £15; JRC spkr - JRC NDH518 memory unit - JRC NRD515 - rx: £375; JRC NRD525 rx: £675; Trio R1000 rx: £180; Trio SG402 RF signal generator: £50; Trio V/UHF TS-780 tcvr - Trio SP100 spkr: £550; Daiwa CN620A 1.8-150MHz SWR & PWR meter: £35; Daiwa CN630 140-450MHz SWR & PWR meter: £35; Mizuho KX2 ATU sky coupler: £25; Kent Morse key: £30; Turner +3B: £5; CB Master 75 SWR/Field strength meter + matcher: £2; Aerial 8 ele 2 meter beam: £30.

SPECTRUM X3 with lots of software incl RMS3 RTTY Morse SSTV, Morse tutor, log and lots of games: £100ono. (Stockport) 061 474 7057.

STANDARD C58 2m tcvr nicads charger CMB8 mobile mount carry case and hi-gain helical: £225. (Liverpool) 051-263 3660.

STARPHONE UHF h/helds, three working, one partly working, one spares, xtalled 438.5MHz with nicads & chrgr. 5 total: £99, incl postage! Pair PFI's on 437.00MHz with Pye nightcall BASG: £30. Buyer collects. ATVer's Ferguson 3COZ colour video camera and Ferguson video power mains adaptor, superb, cost £499, will accept £180 Auto F telephoto. G1EZJ QTHR (Stoke-on-Trent) 0782 46570.

TELEREADER CWR-68SE CW/RTTY ASCLL/TOR Rx/Tx keyboard built-in screen AMTOR R/T converter: £395. B/W ATU built-in meter 300W, as new, in box: £80. (Stourbridge) 0384 378119.

TELESCOPIC mast 35ft up to 55ft wall supported with winch + Daiwa DC7011 rotator: £225. Jaybeam 8 XY 2m: £30. Delivery possible. Nigel G4PJJ (Gloucester) 0452 75542.

TENTEC Century 22 with calibrator and matching PSU, as new: £325. Welz SP220 power/SWR 1.6-200MHz, mint, bxd: £40. 1/2G5RV: £10. (Deal) 0304 375136.

TEST EQUIPMENT Lab closing. Oscilloscope telequipment two-beam, two-channel D53: £50. Spectrum module Starwet 1-850MHz (use with 'scope): £40. Marconi TF455E audiowave analyser Marconi TF9958/2 AM/FM sig-gen 0.2-220MHz (needs attention): £100. Radford low-dist audio osc: £150. Radford distortion test set: £150. Tech instruments decade attenuator: £35. Hewlett Packard spectrum analyser 3580A 0-50kHz with narrow filters (down to 1Hz), cost more than £3000 (needs attention): £500 or offer. G4VFV QTHR (Brixham) 0803 882304.

TONI-TUNA: £35. MM144/28 receive converter: £15. QQVO6-40A: £15. Tradiper TE15: £10. Pace Nightingale modem: £30. 2m trnsvtr wired for TS430S: £20. 12V PSU's Farnell 5A: £10. Langham Thompson 3A: £7. El-bug: £10. SSB/CW audio filter: £5. (Manchester) 061-439 4952.

TONO 9000E multi-applic communication terminal. Morse, baudot RTTY, ASCII RTTY, word processor, centronic parallel interface. RS232C: £250. GM3HVN QTHR (Ellon) 0358 21324.

TOWER 30ft t/over base, head unit, mast bearing, spare winch, HQ1 four band mini beam: £250ono. Joe G4VLY QTHR (Leigh) 0942 603136.

TOWER/Mast, Altron SM30, wall mounted, complete with base, new winch, new cable, and rotator cage: £250. Chas (London) 081-764 6767 (evenings).

TRIO 2m FM tcvr 25/5W TR-7800 m/mount, gd cond: £150. G3HVX QTHR (Herefordshire) 0544 318412.

TRIO 530SP immac, all filters: £550. Part Ex possible Icom 251 Mutek: £450 Part Ex 271H WHY. G0IMK QTHR (Clows Top) 029922 279/298.

TRIO 9R-59D HF Rx plus matching spkr, ex cond: £75. Pye Westminster boot mount, crystalled/tuned 2m FM: £20. Buyer collects. B. Allen (Minehead) 0984 40576.

TRIO TS130S, VFO-120. SP-120. MC-30S mic and CW key, all bxd, ex cond: £450ono. Pye boot mount Wessie 2m with eight xtaled channels: £55. MBM 48/70 with 10m Westflex: £35. DXTV Band I/III Yagi, televerter and cable: £40. (Poole) 0202 678014 (evenings).

TRIO TS830S mint cond, with manual and mic, bxd: £625ovno. Kenwood TS711E, little used, gd cond, bxd: £600ovno. Jaybeam C52M collinear: £50. Standard C828M 12 channel xtal controlled 2m mobile S20 to 23 R0 to R9: £85. Buyers inspect and collect. Alan, G4XTZ (Slough) 0753 74463 (after 6.30pm weekdays, after 1.30pm wkends).

TRIO TS9 30S, as new: £1100, FP700: £100. TBS: £200. KW1000 linear: £250. Motorola 8500X: £220. All as new, bxd, ono. GW3XCR (Swansea) 0792 816088.

TRIO TS930S ex condx boxes books no mods: £950. MFJ 3kW MFJ989B: £250. FL2100Z WARC: £475. G4YIT QTHR (Peterborough) 073120 268.

TRIO TS930S mint cond + AT930 + CW filter 250Hz: £1000. 0203 313109.

TRIO Tx599 HF bands (ex-WARC) Tx, AM, SSB, CW, 100W out. Trio Rx599 HF bands Rx, with all AM, SSB, CW filters. Complete with S-599 spkr. With all transceive cables, hand mic, user and service manuals. Vgc, working: £285ono. Matching units so rather not split. Trio MC50 desk mic: £250. Palm 4 xtalled, 70cm h/held: £60ono. Richard Perzyna G8ITB (Bromley) 0689 852177.

TS440S fitted 270Hz filter voice synthesiser matching PS50 power supply, ex cond: £950. Non-smoker internal shack. G0HOA QTHR (Wimboorne) 0202 889352.

TS530S with CW filter: £480. IC551 50MHz tcvr: £280. 50MHz Halo: £5. A50-5 5ele 50MHz Yagi (as new): £20. MFJ 401B keyer: £20. AR40 rotator needs minor repair: £15. 4CX250B (pair) as new in bxs: £15 each. QQVO6-40 (new) with base: £17.50. Pair of QRO CX520D coax relays (new): £40. 3ele 28MHz Yagi and other priceless junk: free to callers. Dave G4GLT (Coalville) 0530 35835

TS700S VFO700S, Belcom 100W valve linear, mic, w/shop manual, immac: £425. Datong FLZ, brand new: £60. Wanted: ICAT100, MMC144/28HP. G4JBH (Yeovil) 093523873.

TS830 plus SPC transmatch (homebrew good). Sadelta d/mic: £475. Nato 2000 10m spectrum converted, linear, accept dual/band 2/70 P/X. Syd G0EZM (Southampton) 042121 4333.

TS830S + VFO230: £800. Corsair 2, CW filter, PSU: £1000. Hammarlund linear tatty: £200. Old TA32 beam: £50. Vertical V3: £50. Taylor signal generator: £15. Trio PS6 PSU/spkr: £25. Rana 50MHz counter: £40. BC221, charts: £15. Datong keyboard MK: £75, Heathkit CCIU: £30. Newtown (Powys) 0686 628958.

TS940S with auto ATU Lowe mod, voice synthesiser, recent dealer check: £1450. SP940: £60. (Plymouth) 0752 337980.

TS940S, used very little (CW only), functionally and externally as new, bxd: £1500ono. (Nth Derbys) 0909 722133.

YAESU ATU FC10Z: £140. FT10Z CWN/FM

MEMBERS' ADS

fitted: £525. Navico AMR1000S: £215. G3FIT QTHR (Somerset) 0278 760552. (Somerset) 0278 760552.

YAESU FRG8800 communications Rx: £325. (Gloucester) 0452 812216.

YAESU FT dx 401 tcvr with external VFO FV401 mic, manual, most spare valves, odd spkr. Usual 401 features built-in PSU xtal calibrator, noise blanker, CW filter. Could deliver Suffolk, better buyer inspects tests collects: £200. Sorry no split. G0BYY QTHR (Bury St Edmunds) 0284 702281.

YAESU FT101ZD Mk3 fitted fan FM C/W FC902 ATU spare 6146's mint and bxd: £565. GO QRO with twin 813 grounded grid HF linear high quality components and spare 813's: £210. Icom 202S 2 metre SSB/CW fully xtalled: £120. Mutek 6m tnsvtr C/W RN-Electronics 25W linear: £175. Shure 414A mic: £10. Trio MC-50 mic: £20. All inspect/collect. Dave G0MJK QTHR (Northampton) 0604 711647.

YAESU FT290 Mk1, gd cond: £200. FT101 new output valves: £200. PC XT almost new twin 5.25 drives monitor keyboard: £280 or swap for HF gen cov rcvr Commodore or BBC computer plus Ham software QRP tcvr or legal 10m gear. G0KWG QTHR (Halifax) 0422 344284 evenings/wkends.

YAESU FT290R 2m m/mode with nicads, case and chrgr, manual, bxd: £210. GM0MWJ not QTHR (West Lothian) 0506 842529.

YAESU FT790R with accessories: £265. MM432/30L linear amplifier: £70 - with commercial switch mode PSU: £90. HQ1 minibeam: £80. Three section heavy duty lattice tower ready for collection: £60. Oil filled radiator for shack!!: £20. G4DIC not QTHR. Enquiries to G8JFF (Abingdon) 0235 522458.

YAESU FT902DM CW filter mics h/phones: £560. CT1600 linear charger: £160. Daiwa NS660P: £80. Realistic PRO2005 400 channel scanner D707 active antenna: £225. Trio LF30 low pass: £20. Hansen SWR meter SWR-50B: £20. John G4YDM QTHR (Washington) 091 4162606.

YAESU FTV707 trnsvtr matches FT707, FT757 etc, ex cond: £160ono. RN Electronics 6m trnsvtr with 2m IF: £115ono. 3ele 6m beam: £15. Yaesu FT790R 70cm m/mode bxd C/W mic ant manual etc: £230ono. Dave G0OFC (Northampton) 0604 37769 (days) 0327 842141 (evenings).

YAESU FV-901DM external VFO, mint,, bxd, with manual. Buyer collects: £110. Gwyn G4FKH QTHR (Chelmsford) 0245 260831.

ZX Spectrum++: £40. Grundig stereo tape recorder: £40. Complete Packet radio system Paccom TNC320 dual port VHF/HF with all leads Kenwood fitting ZX Spectrum + 2 computer with many blank tapes and games: £250. LR2 vertical antenna Jaybeam: £40. Morse tutor tapes from Technical Software: £5. Collection only and cash if possible. Brian G0OIM 0249 816334

WANTED

AM/FM unit for Yaesu FT102, also ATU FC102 ex-speaker SP102 VFO FV102DM plus anything for the FT102. (Milton Keynes) 0908 320924.

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, Ferranti Varian RCA valves required Gee R/x type R1355 unmodified. M. Gee, 17 Foxley Close, Mountford Estate, Hackney, London E8 2JN, 071 254 9083 or 071 790 2846.

BIRD elements 5B, 50D. RF/IF Gain Knobs for Eddystone 990R. Eddystone 990U in gwo, ccts for 990R. G4AJE (March, Cambs) 0354 741168 after 5pm.

BOOKS wanted on antennas or propagation by Davies, Budden, Bennington, Agard etc. Age immaterial. Please write G3REP QTHR.

BUY/borrow service info Plessey T/Graph Test Set TDM5/5 & Trend T/Graph Gen 1A. (Gainsborough) 0427 616867.

COLLECTOR/Restorer looking for interesting valves up to end WWII. Magnetrons klystrons UHF triodes Tx types. Also top-PIP triodes for my WWI collection. Required to complete projects:- whip aerial for TBY8 Tx/Rx, phones/mic for Canadian 58 Tx/Rx. Need following:- indicator unit 6A 162. 10cm H2S Tx/Rx TR3159 or TR3191 radar jammers APQ2 APT4 TDY1. Rod Burman G4RSN QTHR (Sunningdale) 0344 22696.

COLLINS, Drake, Sherwood filters, WHY? Collins, Drake accessories/options, WHY? Waters rejection notch unit for KWM2. Handbooks: Marconi HR22 Rx, Philips CD304 CD player, TF2603 RF voltmeter, HP5308A counter, National NC190 Rx. Tubes: 7360, 12CU5, 5U8, 3BE6, 3CB6, 6DC6, 3BZ6, 3AL5, 7AU7. thermistors Type CZ2. Sundry parts for: 75A3, 75A4, AR88D, Atalanta, RA117, AR8516L, RA218, S940C, 358X/B34, R4C, R390A, R7A/TR5, B40D, SP600 JX6, WHY? Wanted dead or alive: BRT400 or 402, PS7, RV7 or RV75. Chris G8JFJ (Portsmouth) 0705 596836.

CRYSTAL filters type XF90B and XF90C for Yaesu FT201. Also ARRL h/books 1955 - 1969. G4BZI QTHR (Chester) 0244 351357.

CUSHCRAFT D120 20ele collinear antennas any condx or parts. Also Kenwood mic MC60A, Icom IC-3PS + BC-20. David 0778 425367 (6pm - 7pm).w**DRAKE** L4B linear amplifier, must be in mint cond. Ken G0HJA (Horsham, W.Sussex) 0403 52023.

DRAKE R4C with CW filters, top price for mint example. G3VWH 0743 365061.

DRAKE TR4C or CW, and AC4 PSU. One needing repair considered. G3GGK QTHR (Cambs) 0954 210374.

DRAKE TR7A or TR7 plus PSU, R7A, MN2700, L7, or combination. Pay highest cash. View/collect distance no object. (Leamington Spa) 0926 313534.

FRG7700. Must be in good condition, unmodified, with manual. Collect from any location within 50 mile radius. John G6AZV QTHR (Southampton) 0703 732781.

FT225RD Mutek FE mint cond.G7DRG QTHR (Stevenage) 0438 312749.

FT726R 70cm module, also Shape motors for Daiwa MR750 rotator, also any 21ele Tonna beams or longer, for 432MHz. (Isle of Skye) 047 032337.

FV707DM, must be as new with leads. (Nr Norwich) 0692 670600 (after 6.30pm).

ICOM filters FL44A FL53A FL54-Commodore C128D computer-action replay cartridge Mk V-pump handle type "D" brown enclosed. (Barrow-in-Furness) 0229 821227.

KENWOOD FC-10 frequency controller to suit TM-201A tcvr. Alan (Wrexham) 0978 759732 after 6pm.

KENWOOD trsvtr TV502, must be in good working cond. G0NDU (Cheltenham) 0242 224384.

MC50 desk top mic VFO230 digital remote VFO SP230 external spkr 70cm module for FT726R SP-102 external spkr. (North Sheilds) 091 2576021.

OT starting up again needs most of station for HF bands, particularly KW2000 or similar. Not too affluent, but cash paid and collection possible over 100 miles or so. G3UWA not QTHR (Sheffield) 0742 301214.

QRP Rx/Tx's, incl homebrew. Also Trio 120S (10W) and TS680. Bug key. ATU, balanced output. Aerial mast, telescopic, floor mount preferred. G2CYN QTHR (London) or 071-935 7119 (days).

R216 Rx preferably with mains PSU, unmodified and in working order. WHY? E F C Owen, 28 Chartfield Road, Reigate, Surrey RH2 7JZ. 0293 520172.

R216 Rx, any condition worker/non wrkr, and circuitry handbook. GM8MLH QTHR (Argyll) 08382304.

SO FAR missed every one offered so would the next prospective advertiser with a Datong FL3 around £75 give me a call. John G4WLD (London) 081-857 8096.

STANDARD C500. I desperately need an English translation of the owner's manual, the one I have is driving me mad! If anyone has worked out how to use it please contact me. Geoff (Wallington) 081 669 5926.

WEATHER satellite software and/or interface BBC. PA3FDK (ex G0KPR) Hugo De Grootstraat 20, 2311XL Leiden, Netherlands 010-3171 120706.

YAESU FT-75 FT-75 30W tcvr 5 band 80-10m, must be in good cond and gwo please. No time wasters. Maurice GM0NBO (Mid Calder) 0506 880345.

YAESU FT-7B 1.8-30MHz plus WARC bands Welz SP-15M power meter. Will collect reasonable distance power supply for FT-7B. (Dunstable) 0582 607949.

YAESU SP980 spkr. G3NXD QTHR 0562 850570.

EXCHANGE

H/F FT-757 FL-7000 automatic linear. CWR685 CW/RTTY/ASCII with added Amtor and baragraph display. Inbuilt VDU. I also have 2m and 70cm gear including TS-770 2/70cm all mode Tx/Rx plus antennas. "Swap" for 750 cc or larger m/cycle with fairing of recent manufacture. John (Chichester) 0243 771691 between 4.30 and 5.30 weekdays, anytime wkends.

TEN TEC Century 22 fitted the two options £275 Exchange for Shimizu 105, must be good condx. GM0KMG (Glasgow) 041-649 4345.

HELP LINES

CIRCUIT DIAGRAMS REQUESTED

Peter Richardson, G3AJT, is trying to locate a circuit diagram for VHF R/T (a) Dymar 'Worcester' type RC620 and, (b) REE Telecoms, Crewkerne, type TRT/2. Any expenses incurred will be reimbursed. Please ring Peter on Romsey (0794) 512557.

AVO REQUEST

Roger Livsey, GW3SMY, is looking for an instruction manual for an old AVO all Wave Oscillator (signal generator) 300kHz-80MHz, which he has acquired. You can contact Roger at tel: 0492 545325.

FOREIGN EXCHANGE

If you would like to stay in Hungary at the home of a radio amateur or, if you would like to welcome him into your home, then contact Mr Zentai, Keirsemiel, Bribor U23, 6000 Hungary (tel: 76 20-717). He mentions in his letter to the *RadCom* editorial office that he will arrange licencing arrangements with the Hungarian officials.

PCB HELP

Geoff Bagley, G3FHL, has been trying to develop his own method of making PCBs from a photocopy of his circuit produced on opaque mylar film (RS 561-375) he then copies this onto Reprefine film, enabling him to have a master film for making as many copies as he wants. However the problem arises when using his Epson printer as, to obtain a really black print, the ribbon is wearing out very quickly. Can anyone suggest the best negative (reversing) film to invert an image and save the ribbon? Advice please to Geoff on tel: 0684 573457.

R1155N RECEIVER

Mr Moore, G3AJD, acquired a R1155N in 1948 and it is still working well, but he is mystified by the letters 'LA947' in .75" high white letters on the top of case. Does anyone know what this signifies. Phone him on 081 449 0877.

ATARI PROGRAM REQUIRED

Harry Falconbridge, G0GWN, is trying to find a program for the Atari 130XE computer to interface with the G0BSX packet TNC terminal unit. Replies to G0GWN at tel: 0787 473136.

BURNDEPT BE448 TCVR

Kris Partridge, G8AUU, has a sample Burndept BE448 UHF transceiver, manufactured by Burndept Electronics (ER) Limited of Erith, Kent, in the late 1970s. The type number is BE448/5/10/25/U, and he wants to align it for the 433MHz band. Any information, service handbook, alignment details, circuit diagrams etc to get this tcvr working on 433MHz would be appreciated. All information received will be returned and postage etc refunded. Please contact him QTHR.

TX599 AND JR599 HF TCVR/RCVR

John Vernon, G1KMB, has a TX599 and JR599 transceiver/receiver, with a transverter output socket. The IF is 3.5-4.6MHz. He is looking for a circuit or modual of the transverter to build or buy for 50 or 70MHz. If anyone can help please phone him on 202 2715.

SILENT KEYS

WE REGRET to announce the deaths of the following members:

G0EFK	Mr C Stevens	05.03.91
G1DTI	Mr C H Middling	27.03.91
G1RKU	Mr G W Potts	
G1SCM	Mr H C Morton	07.03.91
G1SEK	Mr D L Putt	29.03.91
G2BPC	Major R Jarvis, ERD	
G3AFI	Mr T M Trotter	31.12.90
G3CXM	Mr E F Dilnot	09.11.90
G3GTX	Mr C A Greaves	24.01.91
G3GVN	Mr J H Butt	Feb 91
G3IGY	Capt W A P Dellar	
G3TML	Mr T H Lloyd	20.04.91
G3XTE	Mr J G Nicholas	
G3YOD	Mr P H Bayliss	07.04.91
G4NCR	Dr A Bryce	01.04.91
G6IFG	Mr R A Hook	09.03.91
G7GTM	Mr R B Harward	21.02.91
G8INQ	Mr D J Spridgeon	
G8RGZ	Mr D J Osler	05.03.91
G8XLN	Mr C Stones	19.02.91
GM3UVL	Mr W Bourke	March 91
GM6NPT	Mr B J Urquart	
GW0KFK	Mr A Allsop	19.12.90
GW6UIY	Mr O B Denny	03.04.91
RS32976	Mr F N Brocklesby	
RS85800	Mr E G Condon	23.03.91

YAESU FT 767 CAT

Mr Campden, G4CCR, has recently purchased a secondhand Yaesu FT767 and would like to use the CAT system. He has the use of an IBM PC but is unable to program the computer for this application. Perhaps someone has a computer listing or knowledge of commercial software - if so ring him on 0604 645090.

MANUAL NEEDED

Mr Edghill, RS42741, is looking for a manual for the Plessey PR1553. He would be pleased to borrow or buy this, and can be contacted on tel: 0622 761327.

TR9000 MODS?

Harold Lunson purchased a TR9000 all mode 144MHz tcvr. Reading section 2 of the handbook item 18 HILO switch it reads that the switch "is now a scan memory switch giving scanning on all memory locations". Upon examination the HILO switch has been disconnected, the 1750 tone burst did not work and had one lead cut and pair of wires had been inserted and was routed to one of the four M to RIT switch bank, it did not scan memory.

He reconnected the tone burst circuit so that he could use repeaters but scanning is in-operative. He would like to revert to standard and have the facility of low power and scanning. The seller is unable to help. This unit may have been a 'mod' described in some magazine or other, and any help would be appreciated and expenses would be reimbursed. Contact Harold, G3WR, tel: 0273 501100.

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.

CLUB NEWS

DEADLINE - Items for inclusion in the August 1991 issue must be sent to HQ marked "Club News - DIARY", to be received by 14 June 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

GORDANO ARG - 26, talk "Life After the DTI" by G3OUK. Details 0272 853849 (home) or 0272 857102 (work).
NORTH BRISTOL ARC - 1, CW National Field Day; 14, Bullseye contest versus South Bristol ARC at NBARC. Details 0454 616267.
SOUTH BRISTOL ARC - 5, QRP Workshops; 12, Exhibition of Calligraphy; 14, 'Bullseye' contest at NBARC; 26, Briefing for Longleat Rally; 30, Longleat Rally. Details Whitchurch 832222 on Wednesday evenings.
THORNBURY & DARC - 5, Fox Hunt John G6RAZ, 19, HF activity night; July 3, Test equipment - Shaun, G8VPG/Ken, G4BVK.

BEDFORDSHIRE

BEDFORD & DARC - 4, talk by John Allen, G4PDP; 11, social & committee meeting; 18,25, social; July 9 social & committee meeting. Details 0234 266443.
SHEFFORD & DARS - 13, VHF NFD Taster; 20, Pedestrian DF Hunt (2 Foxes); 27, VHF NFD Planning; 29, Bar-B-Q at Toplers Hill; July 6&7, Contest: VHF NFD. Details 0763 71149.

BERKSHIRE

MAIDENHEAD & DARC - 18, Preparations for VHF NFD. Details 0628 25952
NEWBURY & DARS - 26, talk "Relectometers and That" by Bill Mansell, G2CPM. Details 0635 63310
READING & DARC - 13, VHF NFD planning; 27, talk "EME" by Ian White, G3SEK; July 11, talk by Peter Chadwick, G3RZP. Details 0734 476873.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 5, talk "Repeaters in Aylesbury Vale" by Roger, G3MBH; July 3, talk and demonstration on "JANDEK Kits products" by Derek Pearson, G3ZOM. Details 0296 437720 or 0908 560026.
CHESHAM & DARS - 5, General meeting; 12, Technical topic/construction, 19, CW practice; 26, Pedestrian DF Hunt (Meet at Club for 8.15pm start; frequency 145MHz; c/s G1MDG/P). Details 0923 283911.
MILTON KEYNES & DARS - 10, MKDARS construction contest - viewing and judging. Details 0908 316435.

CHESHIRE

CHESTER & DARS - 11, talk "Computers, Modems & Packet for the Amateur" by Simon Taylor, G1NXT; 18, Surplus Equipment Sale; 25, Film/Video "The Secret War". Details 051-608 3229.

CLWYD

DELYN RC - 5, Talk about the work of the Animal Rescue Service; 19, Chairman's night; July 3, visit to Chester Police Station. Details 0244 819618.
RHYL & DARC - 3, Film night; July 17, Talk on Vehicle Suppression. Details 0745 336939.
WREXHAM ARS - 4, Field evening & B-B-Que; 18, Annual Constructors Contest; July 2, Field evening. Details 0978 261482.

CORNWALL

CORNISH RAC - 6, talk "Papua New Guinea" by G4ZUI; 10, Computer section; 11, Activities night; July 8, Computer section. Details 0209 820836.
NEWQUAY & DARS - *NEW SECRETARY* Mrs. Margaret Reed, G0KEM, Larks Rise, Great Hewas, Grampound Road, Truro TR2 4EP.

DERBYSHIRE

DERBY & DARS - 5, Junk sale. Details 0773 852475.

DEVON

AXE VALE ARC - 7, visit to Portishead Radio Station; July 5, Foxhunt. Details 0297 33756.
EXETER ARS - 10, Surplus sale; July 8, Construction contest. Details 0392 78710.
TORBAY ARS - 1&2, NFD contest; 7&14, club night; 21, Monthly meeting and junk sale; 28, club night. Details 0803 526762.

DORSET

PLESSEY CHRISTCHURCH ARS - 13, Foxhunt (2m Direction Finding Contest). Details 0425 621982.

ESSEX

BRAINTREE & DARS - 17, Six club speakers; July 1, Quiz evening. Details 0376 27431.
LOUGHTON & DARS - 7,8,9, Aylmers Farm Field Weekend (provisional); 14, Quiz night; 28, Calibration and alignment evening; July 12, talk "Computers in Banking" by Mike Pilsbury, G4KCK. Details 01 508 3434.
VANGE ARS - 6, Junk sale; 13, talk "QRP Working" by G3IOI; 20, talk "QSL Cards" by G4NVT; 27, talk "First Principle" by G3JWI.

GLOUCESTERSHIRE

GLOUCESTER ARS - 1&2, National Field Day contest; 5, NFD Log checking & Morse sending practice; 12, NFD debriefing; 19, construction group; 26, Trip to Three Choirs Vineyard. Details 0452 28533, ext 2741 (work)

GRAMPIAN

ABERDEEN ARS - 1&2, NFD; 7, Junk sale; 14, Mini lectures. Details 0224 780519.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK ARC - 18, Training and preparation for the next RSGB QRP Field Day.
COULSDON ATS - 10, talk "500kHz and Below" by Tom Mansfield, G3ESH; July 8, DF Hunt. Details 081-684 0610.
CRAY VALLEY RS - 6, talk "EMC" by G4JKS; 20, Annual DF Hunt; July 4, talk "Successful Contesting" by G4DEZ.
DORKING & DRS - 11, Informal The St Ashtead at Leg of Mutton & Cauliflower; 15, (afternoon 2.30 - 4.30) RSGB video - open meeting for Youth Organisations and all interested in the Novice Licence (Friends Meeting House); 25, VHF NFD Planning Meeting (Friends Meeting House). Details 0306 77 236.
EDGWARE & DARS - 1&2, NFD; 27, VHF FD briefing, July 6&7, VHF Field Day. Details 081 205 1023.
HAVERING & DARC - 5, informal; 12, Kite Flying with Peter Clegg, G3TTB, on Tylers (Upminster) Common; 19, informal; 26, talk "Reminiscences" Part 2 by Roy Harris, G4KTN; July 3, informal; 10, Quarterly business meeting.
SOUTHGATE ARC - 17, talk "The Antenna Noise Bridge"; 28, Construction Evening - Antenna Noise Bridge; July 12, talk "Radio Data Service" by Alan Guard, G3LWA. Details 081 360 2847.
SUTTON & CHEAM RS - 1&2, HFNFD; 20, inter club quiz, S&C v CATS; 30, Coach trip to Longleat Rally; July 6&7, VHF NFD at Leek, Staffs. Details 081 644 9945 (general), 0737 355271 (membership).
WIMBLEDON & DARS - 14, talk "Linear Amplifiers" by John Stockley, G8MNY; 28, General activity evening; July 12, talk "Weather Satellite Update" by Dave Young, G8VXB. Details 081 397 0427.

GREATER MANCHESTER

ECCLES & DARS - 4, Demonstration "Measuring Sproggies" by G8ZZF; July 2, talk "DTMF Dialling" by G7ELA. Details 061-773 7899.
SOUTH MANCHESTER RC - 7, talk "Awards" by C. Ward; 14, visit to Repeater Station; 21, Mid-Summer DF; 28, Coherent CW. Details 061 969 1964.
STOCKPORT RS - 12, talk "War Surplus Equipment" by Peter Kirsop, G4WCE; 26, talk "Computer Aided Design of Electronic Circuits". Details 061-439 3831.

GWYNEDD

DRAGON ARC - 3, Grand Debate "It is proposed that in future on all bands below 430MHz that relative to 1W the Maximum Power level be reduced to 9dBW (Carrier) and 15dBW (PEP)". Details 0248 600963.

HAMPSHIRE

HORNDEAN & DARC - 6, talk "Space Exploration Hubble Telescope"; July 4, talk "Coast Guard System". Details 0705 472846.
ITCHEN VALLEY RC - 14, Open meeting; 28, talk "Electronic Warfare". Details 0703 736784.
THREE COUNTIES ARC - 5, talk "The Changing Pattern of Pubs and Breweries in the Three Counties" by D.M. Sturley; 19, talk "Telecoms Through the Channel Tunnel" by a B.R. Representative; July 3, talk "UoSAT and OSCAR Satellites" by Craig Underwood. Details 0420 489847.
WINCHESTER ARC - 21, talk "Repeaters" by John Lewis, G3MYI

HEREFORD & WORCESTER

HEREFORD ARS - 7, Rig Testing - 2M & 70cm FM; 21, Amateur Radio Brains Trust. Details Hereford 354064.
KIDDERMINSTER & DARS - 11, Video Evening; 25, VHF NFD Preparation; July 9, Surplus Sale. Details 02993 79229.

HERTFORDSHIRE

CHESHUNT & DARC - 1&2, NFD, Herts Young Mariners Base, Cheshunt & BBQ; 12, visit to RSGB HQ Potters Bar; 26, DF Hunt, Baas Hill Common, Broxbourne; July 10, talk "After the RAE" by Derek, G0BTX.

HIGHLAND

INVERNESS ARC - 12, Key Night; 19, talk "Worked All Britain" by Les Davidson, GM4XKG. Details 0349 61783.

HUMBERSIDE

GOOLE R&ES - 1&2, NFD; 7, Logfill; 14, Junk sale; 21, VHF NFD planning; 28, Contest site inspection; July 5,6,7, VHF NFD; 12, NFD logfill. Details 0472 825899.
NORTH FERRIBY UNITED ARS - 7, "Topic of the Day" by Ken, G4VKK; 14, talk "HF Happenings" by Ken, G4JIO; 21, Night on the Air; 28, talk "Vintage Radio" by G4IGY; July 5, talk "HF Linears" by Peter, G3ZRS.

KENT

BROMLEY & DARS - 18, 7pm Top Band DF Hunt. July 16, Short talks". Details 081-462 2689.
DARENTH VALLEY RS - 12, 5th Construction night; 26, Annual General Meeting. Details 0689 876733.
EAST KENT RS - *NEW VENUE* Parkside Youth Centre, King's Road, Herne Bay. 7.30pm on the first and third Thursday of each month. Details 0227 452678.
WEST KENT ARS - 1&2, HF Field Day at Kipling Cross on the A21 near Tunbridge Wells; 21, Video Evening - RSGB Tape. Details 0892 664960.

LANCASHIRE

BURY RS - 11, Fox Hunt. Details 0204 883212.
FYLDE ARS - 27, Informal meeting with programme review. Details 0772 635464.
THORNTON CLEVELEYS ARS - 10, Planning VHF NFD; 17, Preparation for Special Event Stations on June 22 & 29th.
WIGAN & DARC - 2, Antenna feeders - general discussion; 16, Packet Radio - general discussion; July 4, talk "DX on 6 Metres" by Wilf, G6GVS. Details from G0DTY.

LEICESTERSHIRE

LEICESTER RS - 3, Quarterly progress, open meeting & HF NFD final arrangements; 10, HF/VHF activity night; 17, HF NFD post mortem; 24, HF/VHF night on the air. Details Leicester 762241.
LOUGHBOROUGH & DARC - 4, talk "The Other Man's Shack"; 11, open forum; 18, DF 2M; 25, Visit to Police Headquarters. Details from G0FTT.

LOTHIAN

DUNFERMLINE RS - 6, VHF Operating Evening; 13, talk "Aircraft Archaeology" by Wallace, GM0GNT; 20, Operating Evening/Work Party; 27, Barbeque Evening - open night for friends/XYL's; July 4, Operating Evening/Work Party. Details 031 331 4340.
LOTHIANS RS - 12, Annual General Meeting.

MERSEYSIDE

WARRINGTON ARS - *CHANGE OF SECRETARY* Keith Pocock, G8MKO, 3 Brewery Cottages, Netherley Road, Tarbock Green, Prescot L35 1QG, tel: 051 487 8076.
WIRRAL DARC - 12, Talk from British Nuclear Fuels; 26, Eileen Medley DF Hunt; July 10, Visit to BNFL Capenhurst.

NORFOLK

ARC OF FAKENHAM - 4, Video of G5RV talk; 18, General meeting and video about The Bircham Newton Training Centre; July 2, talk by John, G4RBJ, on his experiences as an Air Traffic Controller. Details East Rudham 633.
NORFOLK ARC - 1&2, HF CW NFD at East Tuddenham site; 5, 'Real Radio' evening; 19, talk "Experiments with Op-Amps" by Mike Harris, G3YIA; 26, Debate "Does Packet Radio have a future?"; July 3, Evening at Happisburgh (Eastern Communications and seaside!); 10, Mobile DF Hunt. Details 0603 747992.
YARMOUTH RC - 1&2, National Field Day. Details Yh 721173.

NOTTINGHAMSHIRE

MANSFIELD ARS - 6, VHF Activity/Construction night. Details 0623 755288.

SHROPSHIRE

SALOP ARS - 6, talk "Tropo Scatter Station for Oil Fields" by G3CSS; July 4, Pre-Field Day Get Together. Details 0743 790457.
TELFORD & DARS - 5, HF on air; 12, Rugby Station visit (provisional); 19, VHF NFD Planning; 26, Foxhunt 2 - details G8PAW; July 3, Tie VHF NFD loose ends. Details Bridgnorth 761203.

SOMERSET

TAUNTON & DARC - 11, Almondsbury Motorway Police Control Station - 7.30pm; 21, visit TBA; July 5, Bar-B-Q at G3WNI QTH. Details 0823 680778.
YEOVIL ARC - 13, talk "A Novice's Top Band Rig" by G3PCJ; 20, talk "Help with your RF problems" by G3AIK; July 4, talk "A Peak Reading RF Voltmeter" by G3MYM. Details 0935 28341.

SOUTH GLAMORGAN

CARDIFF RSGB GROUP - 10, talk "Welcome to the Novice Licence" by John Case, GW4HWR; July 8, talk "Amateur TV" by Bob Robson, GW8AGI. Details 0446 773212.

SOUTH YORKSHIRE

BRADFORD ARS - 27, G3NN Portable Operation; July 11, Fox Hunt. Details 0274 494694.

STAFFORDSHIRE

STAFFORD & DARS - 4, Monthly business meeting; 11, Night on the air; 18, Introduction to Contest Working - G4OUT; 25, Construction evening; July 2, Monthly business meeting; 9, Night on the air. Details from Bernard, tel: 0785 662350.

SUFFOLK

FELIXSTOWE & DARS - 23, DF Hunt; July 8, 10-Pin Bowling (King Pin Bowl), names to Secretary by 1/7/91. Details 0473 642595 (daytime).
ISPWICH RC - 12, Open Evening - showing of RSGB Novice Licence video; 13, Morse Test at Ipswich - details from RSGB; 26, 2M Open DF Hunt; July 10, ESWR post-mortem. Details Mrs. S.M. Elden, G8HYE QTHR, tel: 0473 742072.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 11, 2m DF Foxhunt. 7pm TX. 145.350 horiz FM; 25, Satellite TV with Alan, G0CRB and Steve, G1FIP, July 9, 2m DF Foxhunt. 7pm TX. 134.350 horiz FM. Details 0926 513073.
STRATFORD-UPON-AVON RS - 10, Visit to Mercury Satellite Communications, Whitehill Earth Station; 24, talk "Better CW Operating" by Neil Graham, G3OAY; July 8, Fox Hunt. Details 060 882 495.

WEST MIDLANDS

BARR BEACON RC - 3&19, Morse tuition. Details Walsall 36162.
COVENTRY ARS - 7, talk "Radio Communications in Sierra Leone" by Simon, G0GWA; 14, Canal trip - see George G3TFA, for details; 21, Outdoor Operation Evening - Burton Dassett Country Park; 28, Night In The Air - Gliding Trip.
MIDLAND ARS - 18, Treasure Hunt.
STOURBRIDGE & DARS - 3, On Air evening; 20, Treasure Hunt; July 1, On Air evening. Details from D. Body, G0HTJ
SOLIHULL ARS - 20, talk "Morse Operating" by Stan Butlin, G3MRP. Details 021-783 2996.
WORDSLEY RC - 6, HF On the Air - Harry, G4VJU; 20, BBQ Country - Bill, G6YAC. Details 0384 873666.

WEST YORKSHIRE.

HALIFAX & DARS - 18, talk "WAB" by Brian, G0BFJ; July 16, Visit to Elland Power Station. Details Halifax 202306.
KEIGHLEY ARS - 13, Foxhunt; 27, Questions and Answers. Details from Kathy, tel: 0274 496222.
NORTHERN HEIGHTS AR&ES - 5, Planning VHF Field Day. Details 0274 673116.
SPEN VALLEY ARS - 6, Evening Barge trip; 20, The Swindon Cup Construction Competition. Details 0274 875038.

WILTSHIRE

BLACKMORE VALE ARS - 11, talk "House Security" by Mr Dave Roberts; 25, 2nd DF Hunt 2M. Details 0935 442319. (9am to 5pm).
DEVIZES & DARC - 7, Committee meeting and On the Air, 14, On the Air; 21-23; Boto-X'91; 28, On the Air.
RIDGEWAY RG - 5, Annual General Meeting. Details G4XUT, QTHR.
TROWBRIDGE & DARC - 5, 2M DF Foxhunt - Map 183, 1.50 000. 6.30GMT meet opposite County Hall Trowbridge; 19, Open Evening; July 3, Picnic - White Horse Hill. Details 0380 830383 (evenings).

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact call-sign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

2 JUNE

NORTHAMPTON RC Car Boot Sale - (changed from 26 May) 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).

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. Easy access from M62 - junctn 23 eastbound, junctn 24 westbound. Doors open 11am. Usual traders, Craft stalls etc, bar catering. Talk-in on S22. Details from Eric Stewart, tel: 0484 532371.

NEWBURY & DARS Car Boot Sale - Cold Ash Playing Field. Less than 10 minutes from A34/Junction 13 M4. 10am - 3pm. Free parking and entrance for buyers. £6 per pitch for sellers, no pre-booking. Refreshments and children's play area. Talk-in S22. No entrance to field before 8am. Details from N. Jaques, G0HFU, QTHR tel: 0635 63310 or R. Jolliffe, G3ZGC, QTHR, tel: 0635 46241.

22 JUNE

Second Belfast Radio Convention, Avoniel Leisure Centre, Albertbridge Road, Belfast. Doors open at noon; trade stands; bring & buy; raffle; refreshments. Leisure Centre facilities available and unlimited parking. Proceeds in aid of the RAIBC (NI) equipment fund. Talk-in on S22. Further details from E. Barr, GI7FFF, tel: 0247 462295.

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. Opens 10am, entrance fee £1. Details from G4PYB, tel; 0553 761995 or 0553 306.

NEWPORT ARS Junk Sale - Brynglas Community Centre, Newport. Opens 10.30am (10 for disabled visitors). Talk-in on S22 from 0900. Light refreshments will be available. Details from Kevin, GW7BSC, QTHR, tel: 0633-270727 (W) or 0633 262488 (H).

YORK Radio Rally - Tattersall Building at York Racecourse. Doors open 11am (10.30 for disabled visitors). All the usual favourites; bring & buy; licensed bar and cafe; Morse Tests; Amateur Radio; Electronics and Computers; Arts & Crafts. Ample free parking. Talk-in on S22. Entrance fee 50p. Details from Dave Moreland, G7FGA, tel: 0904 790079.

13 JULY

CORNISH RAC. Rally - Penair School, St Clement, Truro. Usual attractions; refreshments; free parking; doors open 10am (9.30 for disabled visitors). Talk-in on S22. Details from Rolf Little, G0NDC, St. George's Hotel, St. George's Road, Truro, Cornwall, TR1 3JE, tel: 0872 72554.

14 JULY

SUSSEX AR&C Fair (formerly the Sussex Mobile Rally) - Brighton Racecourse. All usual facilities. This rally brings together the best in Amateur Radio, Components and Computer specialists. Information and booking details from Ron Bray, G8VEH (QTHR) tel: 0903 763978 or 0273 415654 (office hours).

21JULY

COLCHESTER RA Mobile Rally - Highwoods Sports & Leisure Centre, Brinkley Lane, Colchester. 10am - 4pm. Talk-in. Ample free car parking. Bring & Buy. Details from Frank Howe, G3FIJ, QTHR, tel: 0206 851189.

McMICHAEL Rally and Car Boot Sale - Haymill Youth and Community Centre, Burnham Lane, Slough (near Burnham railway station). Opens 10.30am, admzxc ission £1. The car boot sale is £6 per pitch on the day. Free parking on site and Talk-in on S22 (145.550MHz). Details from Neil, G8XYN, tel: 0628 25952.

RAIBC Romsey Picnic - Broadlands, Romsey. Super junk sale and bring & buy. Refreshments; grand draw; all RAIBC members, families and friends welcome. Talk-in on S22.Details from John Compton, G4COM, tel: 0703 693017

25 - 28 JULY

1991 AMSAT-UK COLLOQUIUM - University of Surrey. Details from G3AAJ.

28 JULY

RUGBY AR Car Boot Sale - venue to be advised. Opens 10am. Talk-in on S22 by GB8CBS. 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. Many trade stands; large bring & buy; tombola; licensed bar and refreshments. Morse tests followed by a demonstration by the North Yorkshire Morse Test team. Entrance 50p incl a prize draw. 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, Ryknield Road, Littleover, Derby. Situated on the A5250 road, just north of its junction with the A38 on the south side of Derby. Talk-in on 2m. All usual attractions including the famous monster junk sale. The Society is 80 years old this year, so we are hoping to make this a bumper event. Details from Martin Shardlow, G3SZJ, QTHR, tel: 0332 556875.

FLIGHT REFUELLING ARS Hamfest 91 - Flight Refuelling Sports and Social Club Grounds, Merley, Wimborne, Dorset. Opens 10am. Trade stands; bring & buy sale; radio and electronics car boot sale, craft fair, field displays. Special disabled parking is available in the grounds and overnight camping on Saturday 10th can be arranged. Details and booking forms from John, G0API, tel: 0202 691649 or Rob, G6DUN, tel: 0202 479038.

18 AUGUST

WEST MANCHESTER RC Red Rose Rally - Bolton Sports & Exhibition Centre, Silverwell St, Bolton. Doors open 11am (10.00 for disabled visitors). Admission £1, children free. Usual trade stands, societies, bring & buy etc. All at pavement level with facilities for the disabled. Details from G1IOO, tel: 0204 24104.

23-26 AUGUST

OSCAR VICTOR ACTIVITY GROUP (WAB) Family Fun Weekend - Bent Rigg Farm, Ravenscar, North Yorkshire. (Midway between Scarborough and Whitby. Campers and caravanners welcome with the availability of a Bunk Barn for those wishing to have a roof over your heads. (Prices on application from the Farm). Chance of working either HF or VHF pile-ups from the Control Station on site. Car boot sale, sporting activities arranged for the Kids (no age limit to qualify as a Kid!), child minding facilities, live entertainment from SGB & The Old Crones on the Bench (New Kids on the Block eat your hearts out). Competitions for all the family. Cost for use of site irrespective of caravan/tent size including Bar B Q's: Adults & over 14's - £2.50 per day; OAP's & under 14's - free. Details from Peter Austin, G7BXA, QTHR, tel: 0532 563462 or Steve G. Bryan, G1SGB, QTHR, tel: 0709 543747.

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, G3DWO, 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

LINCOLN SWC 10th Lincoln Hamfest which celebrates the 70th anniversary of G5FZ - Lincolnshire Showground. Entry £1; all the usual attractions; Caravans welcome. Details from Sue Middleton (XYL G8VGF QTHR), tel: 0522 525760.

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 or Mike Musgrave, G4NVT, tel: 0268 543025 (24 hour answering service).

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.

BRISTOL Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Details from David Farr, G4WUB, tel: 0272 839855.

EAST OF ENGLAND RADIO RALLY (Peterborough R&ES) - ICI Building, The East of England Showground, Oundle Road, Peterborough. Details from Nigel, G1ARV, tel: 0733 78685 or Mike, G0CVZ, tel: 0733 222588.

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 Radio & Electronics Rally will be held at the British Motorcycle Museum, Bickenhill nr The NEC, Jct 6 M42. Details from Frank Martin, G4UMF, tel: 0952 598173.

28/29 SEPTEMBER

RSGB HF CONVENTION - Penguin Hotel, Daventry, Northants. Details from Bob Whelan, G3PJT, 36 Greenend, Comberton, Cambridge CB3 7DY.

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

BLACKWOOD AR Rally - Oakdale Community College. Details from B. Matthews, GW0JWF, 25 Manor Park, Newbridge, Gwent.

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.

SOUTH DEVON RC Computer and Radio Rally - Hillhead Campsite, Dartmouth Road, Brixham, South Devon. Details from W.T. Trezise, G6ZRM, tel: 0803 522216.

19 OCTOBER

G-QRP CLUB Mini-Convention. Details from G3RJV.

25/26 OCTOBER

LEICESTER ARS Show - Granby Halls, Leicester. All usual facilities. Details from Frank Elliott, G4PDZ, tel: 0533 871086.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 8 August. It was taken from the HQ computer on 6 June. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

22 MAY
GB50ATC Air Training Corps

24 MAY
GB0QRP 'QRP 'Low Power'

25 MAY
GB0DX Long Distance Radio Comm

26 MAY
GB2CAT Cheshire Cat

29 MAY
GB0MC Madras College

31 MAY
GB4HBF Hall Barn Fete

1 JUNE
GB2RRM Rolls-Royce Motors
GB2WCF Wick Country Fair
GB8RRA Red Rose Award

4 JUNE
GB8BN Ben Nevis

5 JUNE
GB4LCF Le Court Fete
GB50ATC Air Training Corps

6 JUNE
GB4QRS Quainton Road Railway Station

8 JUNE
GB0BKA British Kidney Patient Assoc
GB0SF Scarborough Fair
GB0SRH Stamford & Ruxland Hospital

9 JUNE
GB0GAL Garrett Automotive Ltd
GB2MMR Mercury Mobile Rally
GB50ATC Air Training Corps

10 JUNE
GB0HLS Halton Lodge School
GB2HFD Hatfield

12 JUNE
GB50ATC Air Training Corps

14 JUNE
GB2DS Droitwich Scouts
GB2FD Fire Day
GB4SCG Shildon Community Gala

15 JUNE
GB4GPT GEC-Plessey Telecommunications
GB4MDP Ministry of Defence Police
GB4SVR Sandwell Valley Reserve
GB5PT Past Times

16 JUNE
GB4NBS Newbury Boot Sale
GB50ATC Air Training Corps

20 JUNE
GB4LMR Longleat Mobile Rally

21 JUNE
GB2HFD Hatfield
GB2SSD Scotlands Smallest Distillery
GB4WCF Wolverley Church Fete

22 JUNE
GB0EAS East Anglia South
GB0TSF Training Ship Forest
GB1LHM Living History Museum
GB2BRC Belfast Radio Convention
GB2HAS Halton Air Show
GB2LHM Living History Museum
GB2SLC St Loyes College
GB50ATC Air Training Corps
GB50RAF Royal Air Force

23 JUNE
GB0DFS Derbyshire Fire Service
GB0MS Multiple Sclerosis
GB50ATC Air Training Corps

25 JUNE
GB4RAF RAF Station

27 JUNE
GB0BC Bromsgrove Carnival

28 JUNE
GB0CDW Coastal Defence 'W'
GB4SSF Stalmine School Festival

29JUNE
GB0DFC Duddon & High Furness Camp
GB0NPP Normandy Pond Project
GB0RWC Rugby World Cup
GB4BPM Bromley Pageant of Motoring

The Last Word

ENDORSE SSB ON 30M?

I do not operate on the 30m band and therefore have no axe to grind, but I feel it necessary to draw attention to the prevailing state of affairs on this band. Listening several times recently I was surprised at the amount of SSB operation both Continental and British.

When the band was first released the RSGB decided to recommend the use of narrow-band transmissions only, and no contest operating. This appears to have been a sensible decision at the time but I wonder if it is still valid. The SSB operators appear to be quite reasonable - if a little long-winded! Yet this afternoon a UK SSB net suffered deliberate (and illegal) interruptions by a SSB station making adverse comments without giving a callsign and a CW station called CQ, again without a callsign. Even AMTOR was parked on the frequency.

This in turn led to the SSB operators making retaliatory remarks and saying, quite truthfully, that their licence permits phone operation.

It seems that UK SSB operation on 10MHz will continue anyway and may increase. The situation, left as it is, will become even more unpleasant.

I suggest, therefore, that the recommended bandplan be reviewed and that SSB operation be permitted in part of this excellent band, say between 10.125 and 10.145MHz. The present situation is not good for the Society or the hobby.

J L Bowley G3FXP

QSL OK?

Since the QSL Bureau was transferred to RSGB Headquarters, I have been an infrequent voluntary card sorter, fighting what seemed to be an ever-increasing mountain of cards awaiting sorting and despatch.

Yesterday, I again visited HQ to do another spot of sorting. The mountain had gone and four very efficient ladies were dealing with the day's intake; sorting was right up to date. New plastic sorting boxes had replaced the old cardboard ones, and the whole atmosphere was one of quiet efficiency.

Whoever is responsible for this transformation is to be congratulated. Members can now benefit from what must be one of the most efficient QSL bureaux of any national society.

Well done RSGB. *J J D Kay G3AAE*

QSL CARDS

I am indebted to my good friend G2MI for the following definition of a QSL sub-bureau: 'A place where envelopes are kept for which there are no cards, and where cards are kept for which there are no envelopes'. This may be regarded as a cynical view, though I think my fellow sub-managers will agree that there is more than a grain of truth in that statement.

Deryck Buckley, G3VLX

TECHNICIAN'S LICENCE

One might have expected that the news of a codeless licence in the US would have been greeted in *RadCom* by large banner headlines, not a tiny seventeen-line note which still had to include five lines on Novice licences.

When I was first licensed, CW ruled and 'phone was just about endured by the old guard. It seemed then that the main aim of amateur radio was to provide operators in time of war.

Amateur radio extends to almost every aspect of radio communications and has even been responsible for pioneering some. Furthermore professional and military operators no longer use CW, so that any possible necessity for knowledge of the code, except for use when communicating with other like-minded amateurs totally escapes me.

I am a firm believer in reasonable entry standards but, as the Americans seem now to have realised, the number of entry routes into the hobby must be increased. At present, nothing has changed since 1946, with a simple technical test which young children can pass (no criticism), along with a Morse test which is of interest to few and is too difficult for many, or impossible to justify the months (in my case two years) of effort.

How many more would join and strengthen the Service, and the Society, by their activity and expertise if only we had a 'technician's licence' which could have an advanced, perhaps modular technical requirement, together with, like the Americans if we must, a nominal Morse requirement or, better still, why not a new totally-modular entry requirement.

Peter H Poole G3ENV

[Hasn't the RSGB just successfully negotiated 'a nominal Morse requirement' - the 5WPM test available to Novices and Class Bs? - Ed]

NEW LOOK RADCOM

I felt that I must write to the RSGB, as this month it has done itself proud with the new look *RadCom*. The print is of excellent size - I, as an 82 year old pensioner, can read it quite comfortably.

May the Good Old *RadCom* continue to come through my letterbox.

Bob Freeman G0JCW

I fear that the new *RadCom* will alienate far more members than it will attract.

My first impression was of the ghastly colours, cheap and nasty is the description that springs to mind. So I put it aside for four days; now that I have looked through it, whereas there are usually one or two articles of interest plus *Technical Topics* to enjoy, this month there is only 'Sad Story of an Electronic Hobbyist'.

M J Barnes, G0FVE

Congratulations on the new presentation and printing quality of the RadCom.

As a member of the Society for over 40 years I had become very sad concerning the print quality, particularly of the photos, in recent years.

As an advertiser, I would have been very disappointed had I used photographs in my advertisements when they were coming out with such poor contrast and detail.

I am sure that this will be welcomed in the Council as a major step forward to halt the decline.

Maurice C Hately,
Hately Antenna Technology

I repeat a comment from Sam, G4AKT: "I used to have to *study* RadCom, now I can read and enjoy it".

Victor Brand G3JNB

MORSE SPEED, LESS HASTE

I have just made a return to the key after a few years' break and was dismayed to find the old courtesy of replying to a CQ call at the speed at which it was sent seems to have gone.

I have made a point of contacting newly licensed stations sending at slow speeds and the most common complaint is that a CQ sent at 12-14WPM is answered by a station using high speed keyboard or similar Morse. Some have even said that there seems to be little point in CW. It used to be one of the joys of our hobby in helping newcomers; after all, their speed will increase if they can get the contacts to give them practice.

Come on you CW operators, QRS and give the newcomers a chance and some encouragement, otherwise I can see them, particularly the Novice licensees, missing out on the joys of CW.

Ron W P Wilson G3DSV

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.

TIME FOR A CHANGE?

Now that there are a number of changes being made in amateur radio regulations, is it not time that the Morse test was changed to something of more practical value?

As it stands, the necessary requirements of the test leave the successful candidate in no way ready to use Morse on the air. No wonder so many amateurs lose heart and give up the idea of using Morse altogether!

To use Morse efficiently. the following have to be learned as well as what the test requires:-

Punctuation: comma, full stop, dash, question mark, diagonal slash; the ability to deal with mixed letters and numbers; the ability to compose in one's head while sending; abbreviations: Q code, CUAGN, ES, HW?, 73, TKS, 5NN etc; and the ability to maintain concentration for a ten-minute QSO without the mind going blank.

The Morse test would be of much more practical help if it was designed with these extra requirements in mind. The test itself should be conducted as a complete QSO across a table, or better still in adjoining rooms where there is no visible contact.

The present test with its three-minute runs of numbers and letters separately is only of limited use.

G. MacNeill, GM0DLZ

[Agreed. This is why the RSGB's Novice course teaches punctuation, abbreviations, procedure and callsign structure, and our 5WPM Morse Test is conducted QSO style. If this proves successful, the 12WPM test style will be reviewed. -Ed]

MATCHING UNDERWEAR

Referring to 'Antenna to Ionospheric Matching' (April) I trust your learned contributor Vladimir Adenov will not deem it an impertinence when I compliment him on the excellent wit and satire contained in his thesis. Indeed, there was even the curiosity bonus of seeing *The Great Eccentric* and his youthful YL assistant who presumably denoted the capacitive loading shown in the photograph

Clearly, Comrade Adenov has scored a worthy 'first' with his Y-Front Matching System yet it is relevant, I think, to mention the allied work of three eminent Scottish engineers, namely J Strapp (Inverted Vee Dipoles), Ben Doon (Radial Earths), and Phil McCavity (Convoluted Waveguides and Resonators). A long-standing treatise *Electrical Conductivity and the Earth's Moisture Content* is attributed to the Irish geologist Seamus O'Booze.

Total fulfilment, alas, was not to be. April 1st was a public holiday and the appropriate postal delivery date was thus precluded.

May I request that Comrade Adenov's identity and callsign be now revealed.

Frank Rose G2FHV

[The spoof article, which delighted some and appalled others, was contributed by Peter Dodd, G3LDO - Ed]

RS232 YET AGAIN

Reluctant as I am to prolong a minor issue, I must say that Mr Caswell's letter in April's *RadCom* still does not give the whole answer. To state that RS232C and V24 are electrically identical is incorrect. The CCITT recommendation V24 is but a list of definitions and timings for the interchange circuits between data terminal equipment (for example a modem). Electrical characteristics of these circuits are defined in recommendations V10 (unbalanced), V11 (balanced) and V28 (unbalanced), among others. From memory the nearest CCITT match to RS232C is to take V24 together with V28. Simple really!

Peter Hoath G7JBW

The current revision of this EIA (Electronic Industries Association) standard is in fact EIA-232-D not RS232C as Mr Caswell stated in his letter. The 'D' revision was introduced in 1986 to bring it into line with CCITT V24, V28 and ISO IS2110. The latest revision also includes the mechanical specifications of the interface.

Laurence Fletcher G4SXH.

[This correspondence is now closed - Ed]

RENEWED OPTIMISM

I must say that we enjoyed the RSGB's exhibition, and having attended many rallies, etc, during the past year and in the present economic climate, we were pleasantly surprised at the renewed optimism we sensed at NEC - we hope it continues!

Helen M Johnston, CAP CO Electronics Ltd

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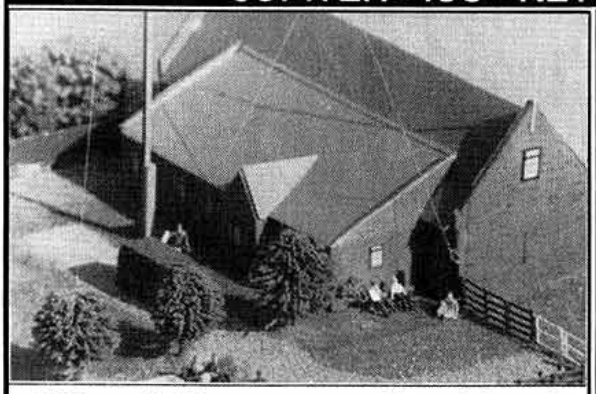

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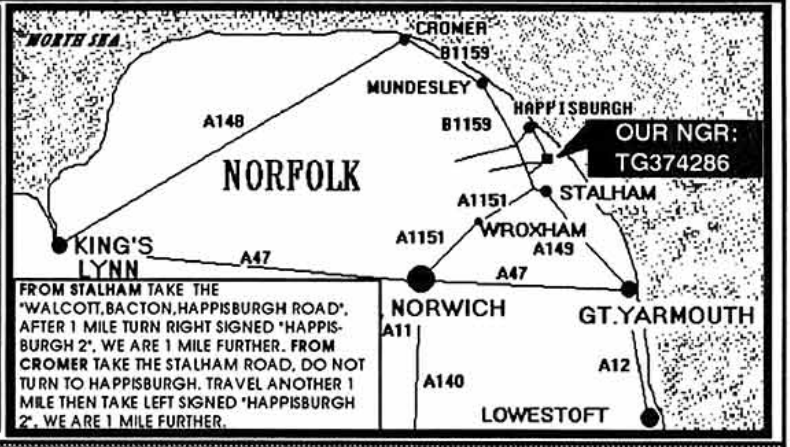

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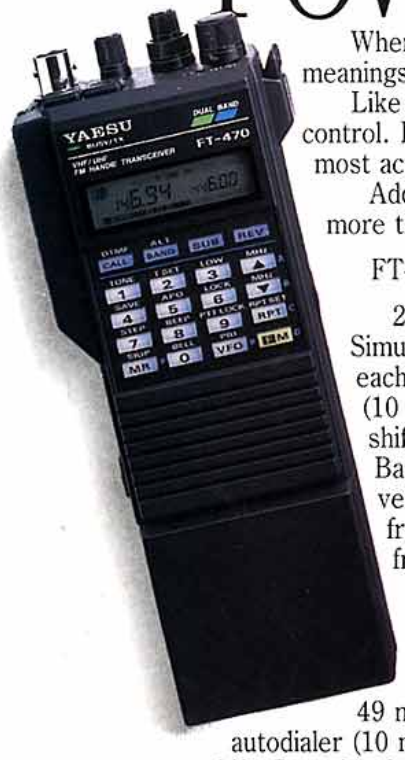

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