

Amateur

RADIO

For all two-way radio enthusiasts

**Pyramid Power:
Thomas E King Investigates
Amateur Radio in Egypt**

**A User Review:
The Yaesu FT-212RH
FM VHF Transceiver**

**The World of Data:
Introducing a New Monthly
Column on Datacomms**

- ★ 2m/70cm
- ★ 25 Watts output
- ★ Full duplex operation
- ★ 21 Memories
- ★ 2 Call channels
- ★ Priority channel
- ★ Dual VFO's
- ★ 12.5 & 25kHz steps
- ★ Memory Scan
- ★ Programme Scan
- ★ Memory Skip

£449 inc vat

ALD-24E

ALINCO DUAL BANDER



This transceiver could transform your operating habits! It contains completely separate 2m and 70cms transceivers, permitting full duplex operation. To the un-initiated, this means you can transmit on 2m whilst receiving on 70cms, or vice versa. The built-in duplexer means a single antenna socket with a full 25 watts output on both bands. Measuring only 5.5"x2"x6.5" it is the ideal mobile rig. Its comprehensive memory and scanning facilities provide rapid access to both

simplex and repeater channels on 2m & 70cms. Using the dual VFO's you can instantly switch between 2m & 70cm and the single knob tuning provides simple and quick frequency selection. The large LCD readout incorporates an S-meter and is back lighted. If you are looking for a completely self contained 2m & 70cm station, then look no further. At this price it has to be a bargain. For further details of this amazing transceiver, send today for the full colour brochure.

OUR FAMOUS FREQUENCY MANUALS!

UK LISTENERS CONFIDENTIAL FREQUENCY LIST 5th EDITION

This publication has now sold well over 3500 copies since it was advertised only a few months ago. Now the recent updated version is selling even better. No self respecting listener should be without a copy. If you enjoy exploring the short wave bands then this publication will add to your enjoyment. It covers the hf spectrum from 2 to 30 MHz and gives details of transmissions outside the amateur bands. Specially designed for the UK and European listener it sets out in a very easy way a comprehensive list of hundreds of interesting transmissions that will keep you occupied for days on end! Only a fraction of the cost of other similar publications it contains details of Marine, Air, Military, Embassy, Press and News agencies. Many listings have time schedules included together with comprehensive RTTY details. It tells you the frequencies used by civil and military aircraft whilst flying the Atlantic, when and where to pick up the press bulletins, long distance marine traffic etc and much more. Send today for your copy of this worthwhile publication.

NEW 1988 EDITION £6.95 p&p 90p

4th EDITION VHF-UHF AIRBAND FREQUENCY LIST

This frequency manual is without doubt the most comprehensive list of VHF/UHF aircraft listings available in the UK. Of vital importance to the airband enthusiast or indeed any keen VHF/UHF listener it sets out in a very easy to follow manner full details of a whole host of stations. Every known UK airfield frequencies, etc. Included are Civil, RAF, USAF, MOD, Naval fields on both VHF and UHF bands. There are also air to air frequencies, the Red Arrows frequency, and much more. Send today for your copy and find out just how much you have been missing!

£5.95 p&p 90p

THE COMPLETE UHF-VHF FREQUENCY GUIDE 26-2000 MHz

New 1988 Edition. Many listeners have asked for a guide to the wide VHF/UHF spectrum and to meet this request we have recently published this frequency manual. It covers the range 26 to 2000 MHz and has been specially prepared for the UK listener. Anybody who has used a scanning receiver will know that the wide frequency range involved means that it is difficult to know exactly where to listen. This guide takes all the guessing out of monitoring. It lists all the services throughout the spectrum together with both simplex and duplex frequency splits. If you've spent your hard earned money on a scanning receiver or are considering buying one you'll find that this publication contains a wealth of information that has previously remained un-published!

£5.95 p&p 75p

HF OCEANIC AIRBAND COMMUNICATIONS 1988 EDITION.

Prepared in response to many requests for more information about the air traffic on the hf bands this little guide sets out to explain to the beginner how the hf band works in relation to air traffic. It contains full details of the world aircraft frequency bands in the range 2 to 23 MHz together with control frequencies and those commonly used for Oceanic control. Also included are many VOLMET frequencies, the Search and Rescue frequencies used by RAF helicopters and Nimros, the Hf RT network, London Company frequencies, European control centres etc. An ideal companion for the hf airband listener. Send today for your copy.

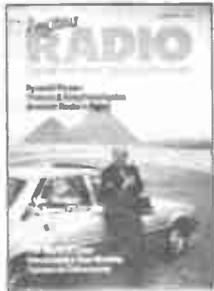
£3.50 p&p 70p

**WATERS
& STANTON
ELECTRONICS**

18-20 MAIN ROAD, HOCKLEY, ESSEX - 12 NORTH STREET, HORNCHURCH, ESSEX.
MAIL ORDER TO: 18-20 MAIN ROAD, HOCKLEY, ESSEX TEL: (0702) 206835



Amateur RADIO

**Editorial:**

Iain Mackenzie
Penny Phillips

**Advertisement
Manager:**

Marian Vidler

Advertisement Executive:

Maria Smith

Subscriptions:

01-684 9542

Publisher:

Peter Williams

On sale:

Last Thursday of the
month preceding cover
date

Next Issue:

Cover date April on sale
30 March 1989

Published by:

Amateur Radio
Magazines,
Sovereign House,
Brentwood, Essex.
CM14 4SE, England
(0277) 219876

Printed: In England

ISSN: 0264-2557

News Trade Sales by:

S M Distribution,
6 Leigham Court Road,
Streatham, London.
SW16 2PG
Tel: 01-677 8111

Cover: The first 2m mobile
operator in Egypt, Ezzat
SU1ER. (Pyramid Power, p21)

Whilst every care is taken when accepting
advertisements we cannot accept
responsibility for unsatisfactory
transactions. We will, however,
thoroughly investigate any complaints.
The views expressed by contributors are
not necessarily those of the publishers.
Every care is taken by Amateur Radio to
ensure that the information given to our
readers is reliable. We cannot however
guarantee it and we cannot assume legal
responsibility for it nor for any effects
howsoever caused.

© Copyright 1989
Amateur Radio Magazines

6 Straight & Level

The latest news,
comment and
developments on the
amateur radio scene

**11 The Yaesu FT-212RH
FM VHF Transceiver**

A user review of this
ultra-compact, high-
power rig by Steven and
John Goodier

17 The World of Data

The first in a new
monthly series by Don
Field G3XTT on data
communications

19 Second-hand

Hugh Allison G3XSE
with more down-to-
earth advice on second-
hand rigs

21 Pyramid Power

Thomas E King takes a
look at the development
of amateur radio in
Egypt

24 DX Diary

Don Field G3XTT with
this month's DX news

**28 The Racal RA 3701 HF
Receiver**

Brian Kendal G3GDU
visits the Racal factory
and tries out the latest
in a long line of
impressive receivers

31 Morse Report

Tony Smith G4FAI with
his bimonthly look at the
world of dots and
dashes

32 Short Wave Listener

Trevor Morgan GW4OXB
looks at marine
monitoring on the VHF
bands

36 On the Beam

Glen Ross G8MWR with
the latest news on VHF,
UHF and microwaves

39 Project Book

Martin Williams with
some advice on
increasing gain

40 50MHz

Ken Ellis G5KW with the
latest developments on
6m

**42 Using Your
Oscilloscope**

This month Joe
Pritchard looks at circuit
testing and examination

47 Coming Next Month

SERVICES**38 Subscription Order
Form****45 Free Classified Ads****50 Advertisers' Index****50 Advertising Rates and
Information**

**SONY ARE JUST 1 OUT OF
131 COMPANIES WHO CLAIM
TO HAVE THE WIDEST RANGE
OF SHORTWAVE RADIOS.**

Don't worry, Sony haven't stooped to making bogus claims.

The companies opposite are all those who stock our shortwave radios.

As you can see, the widest range of shortwaves is only available in a narrow range of shops.

This might give you the impression that they're fairly exclusive.

Far from it.

With prices between £69.95 and £299.95, Sony shortwaves cater for everyone, from the everyday business traveller to the most demanding enthusiast.

At one extreme you'll find the ICF 5100.

It may look like the standard tranny found in most people's kitchen.

It's as easy to use as your average tranny. But don't let that fool you.

A flick of a dial and Radio 1 is replaced by stations from every corner of the World (and the top, bottom and sides as well). To reduce interference it has a dual conversion circuit, a feature usually reserved for the most expensive models.

Speaking of which, at the other extreme is the ICF 2001D.

It does everything an enthusiast could want. And quite a few things he didn't know he wanted but will soon swear he couldn't do without. Like a synchronised detection system for instance, something you'd only expect in professional equipment.

You'll even find the World's smallest shortwave radio, the ICF SW1.

Slightly larger than a cassette box, it's just what you need when you wake up in a strange hotel room in Papua New Guinea, and feel a hankering for the news back home:

Whether it's a simple case of homesickness you want to cure, or an advanced case of 'enthusiast's fever', Sony shortwaves are the answer.

For a free trip around the World (well, its radio stations anyway), ask your nearest Sony Shortwave Centre for a free demonstration.

SONY.

London: SKB Limited, Video. & Audio, 100 Ballards Lane, Finchley, London N3 2DN.

Edgware Electronics Centre, 194 Edgware Road, London W2.

Harrods Ltd., Radio & TV Dept., Brompton Road, Knightsbridge, London SW1X 7XL.

Knightsbridge Electronics, 155 Knightsbridge, London SW1 7PA.

LeSet Ltd., 115 Fulham Road, London SW3.

PNR Audio Vision, 28 Tottenham Court Road, London W1P 9RB.

Welbeck Video Ltd., 26 Tottenham Court Road, London W1.

Selfridges Ltd., Radio & TV Dept., 400 Oxford Street, London W1A 1AB.

Wallace Heaton Ltd., New Bond Street, London W1.

Berrys of Holborn, 37-39 High Holborn, London WC1.

Westminster Audio, 169 Piccadilly, London W1.

Galaxy, 230 Tottenham Court Road, London W1.

Spatial Audio & Video, 29 Tottenham Court Road, London W1P 9RE.

Massey Radio Ltd., 117 Chiswick High Road, Chiswick, London W4.

David Ingram (Hi-Fi Centre), 42-43 Lower Marsh, Waterloo, London SE1.

Alvabond, 70 Ballards Lane, Finchley, London N3.

Goodwins, 7 The Broadway, High Road, Wood Green, London N22.

Southern England: Suttons Limited, Bournemouth Sony Centre, The Quadrant, Bournemouth BA1 2AB.

Milton's Audio Visual Ltd., Southampton Sony Centre, 29 London Road, Southampton, Hants. SO1 2AD.

Brasky Limited, Colchester Sony Centre, 14-16 Culver Street West, Colchester, Essex CO1 1JG.

J. O. R. Gilbert, 35a High Street, Baldock, Herts.

Nicholls Bros., 82 High Street, Braintree, Essex.

Videovision, Camberley Sony Centre, 42 High Street, Camberley, Surrey GU15 3RS.

Videovision, Kingston Sony Centre, 40 Fife Road, Kingston upon Thames, Surrey.

Whomes Centre Limited, 28 The Mall, Broadway Shopping Centre, Bexleyheath, Kent DA6 7JJ.

Whomes Centre Limited, 32 The Mall, High Street, Bromley, Kent BR1 1TR.

Whomes Centre Limited, 84 Eastgate International Shopping Centre, Basildon, Essex SS14 1EX.

Hamilton Electronics Ltd., 35 London Road, Southampton, Hants.

Dawson Radio Ltd., 23 Seamoor Road, Westbourne, Bournemouth, Dorset BH4 9AA.

Tony Reynolds Radio, 12 Lichfield Terrace, Richmond, Surrey.

R. Jones Ltd., 60 High Street, Whitton, Middlesex.

Whitstable Teleradio, 75 Biggin Street, Dover, Kent.

Gerald Giles Sony Centre, 37 St. Stephens Street, Norwich, Norfolk NR1 3QN.

R. N. French, 16 Queens Parade, Hastings, East Sussex.

Manns Radio, 52 St. James St. Brighton, East Sussex.

Malcolm Audio & TV Ltd., 12 South Street, Chichester, Sussex PO19 1EH.

South Midlands Communications, SM House, School Close, Chandlers Ford Ind. Estate, Eastleigh, Hants. SO5 3BY.

Barretts of Canterbury, 1 Rose Lane, Canterbury, Kent.

Paul Dogra & Sons, 6 High Street, Slough, Berks.

Allders Dept. Store, Radio & TV Dept., North End, Croydon, Surrey.

Tru-Fi Sound & Vision, 2 Central Parade, London Road, Redhill, Surrey.

Tru-Fi Sound & Vision, 10-12 Grosvenor Road, Aldershot, Hants.

Tru-Fi Sound & Vision, 10 Church Street, Leatherhead, Surrey.

Lyles (Worthing) Ltd., 224 Findon Road, Findon, Worthing, Sussex.

Weybridge Audio, 5/6 Waterloo Terrace, Baker Street, Weybridge, Surrey.



ICF SW1



ICF 5100



WA 8800



ICF

Loughton Photographic Limited, Southend Sony Centre, 11 South Church Road, Southend-on-Sea, Essex SS1 2NJ.

Loughton Photographic Limited, Chelmsford Sony Centre, 1-4 West Square, High Chelmer, Chelmsford, Essex CM1 1XS.

Waters & Stanton Electronics, 18/20 Main Road, Hockley, Essex.

Waters & Stanton Electronics, 12 North Street, Hornchurch, Essex.

Merrow Sound, 34 West Street, Horsham Sussex.

Merrow Sound, 45 Commercial Way, Woking, Surrey.

Merrow Sound, 22 Tunsgate, Guildford, Surrey.

Merrow Sound, 5 High Street, Epsom, Surrey.

South West England: Ron Millard, 31 Southgate Street, Bath, Avon BA1 1TP.

Tape Recorder & Hi-Fi Limited, Bristol Sony Centre, 8-10 Bond Street, Broadmead, Bristol BS1 3LU.

Tape Recorder & Hi-Fi Limited, Weston Sony Centre, 4 Waterloo Street, Weston-Super-Mare, Avon.

C. F. Loader, Plymouth Sony Centre, 20 Armada Centre, Armada Way, Plymouth, Devon PL1 1LE.

Hickmans Limited, Swindon Sony Centre, 39b Havelock Street, Swindon, Wiltshire SN1 1SD.

J. P. Williams Limited, Exeter Sony Centre, 15 Paris Street, Exeter EX1 2JB.

J. P. Williams Limited, Barnstaple Sony Centre, Holland Walk, Barnstaple, N. Devon EX31 1DW.

Battarbee's Limited, Taunton Sony Centre, County Walk, Taunton, Somerset TA1 3TZ.

Bee-Jay Television Ltd., 22 Clifton Down Shopping Centre, Whiteladies Road, Clifton, Bristol BS8 2NN.

Tom Molland Ltd., 110 Cornwall Street, Plymouth, Devon PL1 1NF.

Visibly Sounder, 100 Union Street, Torquay, Devon.

Moss of Bath, 45 St. James Parade, Bath BA1 1UQ.

Upton Electronics, 31 Torquay Road, Paignton, Devon TQ3 3DT.

Midlands: B.A.T.S. Sony Centre, 160-162 Corporation Street, Birmingham, W. Midlands B4 6TB.

C.T.S., 3 Regent Grove, Leamington spa, Warwickshire CV32 4NN.

C.T.S., 58 Evesham Walk, Kingfisher Centre, Redditch, Worcester B97 4HA.

R. Tilney Limited, Bamford Sony Centre, 77a Abington Street, Northampton NN1 2BH.

Stuart Westmoreland Limited, Derby Sony Centre, 2c Albert Street, Derby DE1 2DS.

Kings Radio (Hereford) Ltd., 35 Widemarsh Street, Hereford HR4 9EA.

Robbs of Gloucester, 15 Worcester Street, Gloucester, Glos. GL1 3AJ.

Witney Audio Centre, 29 High Street, Witney, Oxon.

David Buswell, 5 Talisman Square, Kenilworth, Warwickshire.

Russell Acott, 124 High Street, Oxford, Oxon.

S. May (Leicester) Ltd., 27 Churchgate, Leicester.

Seymour Chemist Limited, 5 High Street, High Wycombe, Bucks. HP11 2AZ.

Fenway TV, 8 Victoria Way, Newmarket, Suffolk.

University Audio, Peas Hill, Cambridge.

Ringjay Electronics Limited, Coventry Sony Centre, 73 Lower Precinct, Coventry, West Midlands CV1 1DS.

R. C. Snelling, Blofield, Nr. Norwich.

Horntons, 8-9 Lower Temple Street, Birmingham B2.

Johnsons Shortwave Centre, 43 Friar Street, Worcester, Worcs.

Ray Withers Communications, International House, 963 Wolverhampton Road, Oldbury, W. Midlands.

Millers Music Centre, Sussex Street, Cambridge, Cambs.

Northern England: E. W. Hewitt Limited, Stockport Sony Centre, 104 Princes Street, Stockport, Cheshire SK1 1RJ.

E. W. Hewitt Limited, Altrincham Sony Centre, 91a George Street, Altrincham, Cheshire, WA1H 1RW.

E. W. Hewitt Limited, Warrington Sony Centre, 48 The Mall, Golden Square, Warrington, Lancashire, WA1 1QE.

Peter Bamford Limited, Hull Sony Centre, 42 Paragon Street, Hull, North Humberside HU1 3ND.

Jones of Oakwood Limited, Leeds Sony Centre, 103 Vicar Lane, Leeds LS1 6PJ.

Jones of Oakwood Limited, Wakefield Sony Centre, 35 Cross Square, Wakefield, W. Yorks.

Cleartone Ltd., Manchester Sony Centre, 66/68 Bridge St., Manchester, M3 2RG.

W. M. Hewitt, 549 Ecclesall Road, Sheffield.

Lester and Nix Ltd., 11 King Street, Belper.

Williams Electrical Shops, Sheffield Sony Centre, 955 Ecclesall Road, Banner Cross, Sheffield S11 8TY.

CBS Audio Vision Ltd., St. John's Precinct, Liverpool.

Fairbothams, 58 Lower Hillgate, Stockport.

Williams Electrical Shops, Rotherham Sony Centre, 7 Riverside Precinct, Corporation Street, Rotherham S60 1ND

Whiteleys, Deansgate, Blackpool.

Ball Bros., Bacup Road, Rossendale, Lancs.

J. G. Windows, 1-7 Central Arcade, Newcastle-upon-Tyne.

Goodrights Limited, Preston Sony Centre, 98/100 Fishergate Walk, St. Georges Centre, Preston, Lancs. PR1 2NR.

Fenhams, 119 Grainger Street, Newcastle-upon-Tyne.

Lawsons, 7 St. Anns Staith, Whitby.

Erricks of Bradford Limited, Bradford Sony Centre, 18 Rawson Square, Bradford, W. Yorks, BD1 3JP.

Hadwins, 29-33 Finkle Street, Kendle, Cumbria.

Misons, 11 Warwick Road, Carlisle, Cumbria.

Searle Audio, 229 Rawlinton Street, Barron, Cumbria.

Scotland: Edinburgh Sony Centre, 386 Morningside Road, Edinburgh, Scotland EH10 5HX.

McMichael Bros., 9 Mill Street, Alloa, Clackmannanshire, Scotland SK10 1DT.

Graham Robertson, 5 Fountain Road, Bridge of Allan, Stirlingshire, Scotland SK9 4ET.

Video One, Glasgow Sony Centre, 31 Sauchiehall Street, Glasgow, Scotland G2 5HS.

Connolly Bros., Hi-Fi Limited, 31 Almondvale Centre, Livingston, Midlothian, Scotland EH54 6NB.

Connolly Bros., Hi-Fi Limited, 7 King Street, Kilmarnock, Scotland KA1 1PT.

David Steven, 1-3 Main Street, East Kilbride, Scotland.

Murray Mackie, 30 High Street, Fraserburgh, Scotland.

Martin E. Payne Limited, 38 South Methven Street, Perth, Scotland PH1 5NU.

Martin E. Payne Limited, 18 Union Street, Dundee, Scotland DD1 4BH.

C. Bruce Miller, 363 Union Street, Aberdeen, Scotland.

J. D. Brown, 28-36 Castle Street, Dundee, Scotland.

McMichael Bros. 23/27 Upper Craigs, Stirling, Scotland. FK8 2DG.

In Hi-Fi Ltd., 63 George Street, Edinburgh, Scotland.

Wales: Radiocraft Sonus Ltd., 251 Cowbridge Rd. Estate, Canton, Cardiff CF1 9TO.

Radiocraft Sonus Ltd., 231 High Street, Swansea SA1 1NY.

Tele-Electrical Services, 9 The Brackla Street Centre, Bridgend, Mid. Glamorgan CF31 1DD.

Northern Ireland: F. Rea & Co., 24-30 Chichester Street, Belfast, Northern Ireland.

Laser Electrical Ltd., Unit 3, Abbey Trading Estate, Newton Abbey, Northern Ireland.

Audio Times, 85 Royal Avenue, Belfast, Northern Ireland.

Channel Islands: Reg Mauger (Sales) Ltd., 20 Halkett Place, St. Helier, Jersey, C.I.

Soundtrack, 1 Church Square, St. Peter Port, Guernsey, C.I.

C. R. Regent, 49 Halkett Road, St. Helier, Jersey, C.I.



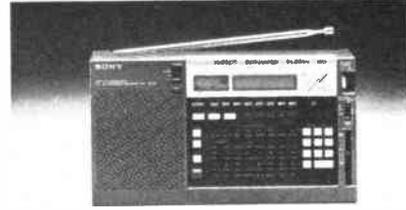
7600A



ICF 7601L



ICF 7600DS



ICF 2001D

STRAIGHT &

LEVEL

YAESU FT-102 USER GROUP

Publication of the FT-102 user group's newsletter has now been taken over by Jim Brown G4VBU, who has taken over the publishing side of the group's activities from Sean Quinn G14PCQ, who originally got the group off the ground over a year ago. Sean published four, sixteen-page newsletters last year and although he is no longer active in the editing of the letter, he still tries to co-ordinate the group's activities.

The group now boasts nearly 150 members worldwide, but the majority are based in the UK. The group deals with all aspects of the FT-102 series of HF transceiver including the FC-102 ATU, SP-102 external speaker and FV-102DM external VFO. They were fortunate in getting wholehearted support for the club from SMC and other UK dealers, and especially from Yaesu in Japan, who recently asked if they could photocopy parts of the newsletter to send out in response to direct user enquiries.

As a matter of interest, a number of common faults have come to light on the FT-102 series and these are mainly down to the changeover relays becoming pitted and thermal runaway in the PA stage caused, in part, by unbalanced biasing of the three valves. These problems have been dealt with by the members who came up with some novel solutions which were published along with some other ideas from the American-based Fox-Tango Club.

Apart from newsletters, the group has established two regular nets; the first on Tuesdays on 3.724MHz at 2100 local time, and the second on Sundays on 7.065MHz at around 1100 local time. Any owners of the FT-102 are welcome, and may call in on the above frequencies for information and 'on air' technical advice. G4BVE is also hoping to establish a telephone hot line in the near future, which will offer sound advice for members who are

having problems and wish to seek help.

It is interesting to note why Yaesu discontinued this fine piece of equipment after only a few years on the market. Apparently, its downfall was due to the special VFO chip being discontinued by its specialist manufacturer; this meant the end of hybrid transceivers from the Yaesu stable in favour of all solid-state models.

Membership, including newsletters for the next twelve months will cost you £3.50 and can be obtained from Jim Brown G4VBU, 10 Brinmead Walk, Witherwood, Bristol, Avon BS13 8SF. Back issues are also available for 1987/88, priced £4.00. These can be obtained from Peter Morrall G4TMK, 22 Chudleigh Road, Erdington, Birmingham BS23 6HB. Please include a large SAE with any enquiries.

HCJB DX PROGRAMS

HCJB The Voice of The Andes located in Quito, Equador, broadcast a couple of amateur radio and SWL based programmes. The first entitled 'Ham Radio Today' is presented by John Beck HC1QH, on Wednesdays from 0800 to 0830UTC. Ham Radio Today deals with current amateur radio topics which should be of interest to both radio amateurs and short wave listeners.

Their second programme is 'DX Party Line', and is aimed at the short wave listener. Also featured is 'Andex', HCJB's very own DX club, and details about its activities are given most weeks.

The programmes can be heard on the following frequencies: 6205kHz and 9655kHz at 0800UTC. They are also repeated in the evening at 2130UTC on 15270kHz and 17790kHz. Happy listening!

NEW BOOK ON PACKET

For anybody just entering the world of packet radio and finding it all a bit of a mystery then help is at hand in the form of a new and informative book which is designed to

offer help and guidance to the complete novice.

Your Gateway to a Basic Understanding of AX-25 has been produced by the South Hams Packet Group and contains thirty-four, A4 sized pages packed with information and advice. The book covers the early stages of selecting the equipment needed and then goes on to the more complex side of packet.

The book contains fifteen different sections including: Selecting a TNC, The Computer, The Software, First Steps on The Air and Bulletin Board Systems, to name but a few. Most aspects of packet radio operation are covered and the book also includes many useful addresses. The appendix is a useful reference guide for both the beginner and experienced user alike.

All proceeds from the book will go towards the running and establishment of the remote network node system, which is being gradually built up all around the United Kingdom. To obtain your copy send £3.50 plus 50p postage and packing to: Vince Bobin, 13 Homelands Place, Kingsbridge, South Devon TQ7 1QU. Tel: (0548) 2543. You can contact Vince at GB7PLY if you already have access to packet radio. Cheques and postal orders should be made payable to Vince Bobin. One last point, discounts can be arranged for ten or more copies, so get your local radio club interested.

BBC PUBLIC DOMAIN SOFTWARE

David Hutchinson G14FUM is appealing for radio amateurs to send him any public domain software that will run on a BBC micro. This is in aid of the Northern Ireland National Scout Jamboree, which is to take place in July 1989.

Ultimately, the list will benefit all BBC micro users as it will provide a source of good and useful software with very little cost involved. If you have any programs on 5¼in disc which you would be

All the latest news, views, comment and developments on the amateur radio scene

prepared to share (not commercial software), then please contact David Hutchinson G14FUM, 40 Oldstone Hill, Muckamore, Co Antrim, Northern Ireland BT41 4SB. If you have access to packet radio then David can be contacted at GB7TED.

YAESU'S NEW HAND-HELDS

Yaesu have recently introduced two new compact CPU controlled FM hand-held transceivers. The FT-411 will cover 144 to 146MHz and will deliver between 2 and 5W, depending upon the Ni-Cad pack used. The 70cm version is known as the FT-811 and has been designed to cover 430 to 440MHz, with an output power of between 1 and 5W.

Both transceivers feature a sixteen multi-function keypad, which provides control over their forty-nine freely tunable memories and two VFOs. All memories are capable of storing repeater shifts, separate transmit and receive frequencies, and tone squelch setting if the optional CTCSS board is fitted. Tuning steps can be user programmed in 5, 10, 12.5, 20 and 25kHz steps, and when switching in the battery save circuits, the current consumption is reduced to a remarkable 7mA (approximately).

A number of accessories has also been introduced including eight Ni-Cad packs, ranging from 7.2V, 200mAh, right up to 12V, 500mAh for those of you who wish to run 5W output. A long-life pack is also available rated at 7.2V, 1000mAh. If you wish to charge any of the Ni-Cads quickly then Yaesu have the NC-29 desk top quick charger, which is capable of charging all the packs quickly and efficiently.

Rumours suggest that Yaesu are shortly to introduce a new dual-band hand-held, which will have many advanced features including the ability to listen on both bands at the same time, with a fade control to adjust the volume between each band. However, there is

no news about the model number or price at the moment.

For more information regarding the above products or any Yaesu product, contact South Midlands Communications Ltd, SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY. Tel: (0703) 255111.

ARCHIMEDIES DATA TERMINAL

There is now a packet radio data terminal program available for the Acorn Archimedes range of computers. The program has been written by Des Mardle G6WCX. It is the first to use this computer's full abilities and includes many powerful commands not seen on other Acorn machines.

The software uses the RS423 port, and Des has tried to make it as compatible as possible with all makes of TNCs. It features split-screen operation with a status window, it is able to save incoming data to disc and transmit text files and basic listing. The user can also send incoming data straight to the printer for a hard copy if required.

The program also includes a personal mailbox facility, with a 255-character connect message. It is also possible to view the mailbox system at a touch of a key without leaving the main terminal. Des has also included a very clever option which enables the user to run other programs and then return to the data terminal by using the familiar * command. The software includes five new * commands: * Newterminal, * LTerminal, * Terminal, * Portopen, * Portclose.

The Archimedes data terminal can be obtained for £25.00 including post and packing from D P Mardle G6WCX, 138 Sibthorpe Road, Lee, London SE12 9DP. Tel: 01-851 9379. If you require more information about the Acorn Archimedes range then please send an SAE to the above address.

RALLIES

On Saturday 4 March the Blue Star Radio Rally takes place at High Gosforth Park (Newcastle Racecourse). The event, organised by the Tyne-side Amateur Radio Society, will have all the usual attractions plus a talk-in.

For further information contact Terry G6VEG, tel: 091-264 8196.

Pontefract and District Amateur Radio Society is holding its Ninth Annual Components Fair on Sunday 12 March. The event takes place at the Carlton Community Centre, Carlton, Pontefract from 11am to 4.30pm.

There will be a bring-and-buy stall, QRP and bookstalls. Admission is free.

Further details can be obtained from Colin G0AAO, tel: (0977) 43101.

The 1989 Cambridgeshire Repeater Group Junk Sale Rally takes place on Sunday 19 March at the Philips RCS (Pye Telecom) Canteen, St Andrews Road, Chesterton, Cambridge.

Starting at 10.30am it is an all-day event featuring trade stands as well as the popular 'monster' junk sale auction. There will also be a 'nearly new' bring-and-buy stall. Talk-in on S22 and RB14 (GB3PY) by G5PI.

Refreshments will be available and there is ample free parking.

For further details contact G0DAH QTHR, tel: (09547) 405 after 6pm.

The Tiverton South West Radio Club's 1989 Mid-Devon Rally takes place on Sunday 19 March at the Pannier Market, Tiverton, just off junction 27 on the M5. Doors open at 10.00am.

There will be two halls of trade stands, a bring-and-buy stall, displays and a talk-in on S22.

There will be refreshments and free parking is available.

For further information contact G4TSW Mid-Devon Rally, PO Box 3, Tiverton, Devon.

Wythall Radio Club is holding its Fourth Annual Radio Rally at Wythall Park, Silver Street, Wythall, Worcestershire on Sunday 19 March.

The doors open at 11.30am and there will be trade stands, a flea market, a large bring-and-buy, plenty of junk, talk-in on S22 and RSGB Morse tests (subject to confirmation).

A bar and snacks will be available and plenty of free parking. Admission still only costs 50p.

For further details contact Chris G0EYO, tel: 021-430 7267.

HAMFEAST

Bury Radio Society is holding its annual hamfeast on Sunday 5 March at the Castle Leisure Centre, Bolton Street, Bury (three minutes from the M66). Talk-in on S22. Doors open at 11.00am and entrance is by programme which costs 50p. Food and drink will be available.

For more details contact Mr C D W Marcroft G4JAG, Mosses Centre, Cecil Street, Bury, Lancs.

POLICE RADAR

On Tuesday 28 February Mr Ian Dowse G0DYW is giving a talk entitled 'Police Radar' to Venulam Amateur Radio Club. The venue is the RAF Association Headquarters, New Kent Road, off Marlborough Road, St Albans. Doors open at 7.30pm for 8.00pm. All visitors are welcome.

For further information contact Hilary G4JKS, tel: St Albans 59318.

STB EVENTS

The first special event this year of the Scottish Tourist Board (Amateur Radio) Expedition Group takes place over Easter weekend, 24-27 March, at the World Heritage Site at New Lanark, Lanarkshire.

The station will be opened by Mr Alan Devereux CBE DL (GM8VJV), chairman of the Scottish Tourist Board, after

11.00am on Good Friday, 24 March. He will have a short period of operating both the HF and LF bands. Calls are requested. A special QSL card will be sent out for every contact over the weekend.

The callsign will be GB2STB (Scottish Tourist Board). The frequencies for all STB events will be (as far as possible) 3.7, 7.065, 14.140 and 14.240, 21.250, 28400 to 28600. When used, CW will be plus 10kHz on all bands. RTTY, when used, will be 14.085 and 21.090. All frequencies are plus or minus QRM.

Dates of other events this year are as follows: 29-30 April, 27-28 May, 24-25 June, 29-30 July, 26-27 August and 23-25 September.

Two awards will be issued by the Group: the Thistle Award for working four separate events and the Supreme Tartan Banner Award for working a total of six separate events. Claims for the awards should be sent to Robbie GM4UQG, Design/Printing and Awards Manager, at PO Box 59, Hamilton, Scotland ML3 6QB. The Thistle Award costs £1.00 including postage.

The full events schedule is now available, on receipt of return postage, from Paddy GM3MTH QTHR or Robbie QTHR or at the above address.

FRIENDSHIP CLUB

To encourage the growing friendship between British and Soviet hams, a group of enthusiasts has formed the Club of Friendship. There are members from both the UK and USSR.

For further information write to Ken Norvall G3IFN, Honorary Secretary, Club of Friendship, 24 Ryedene, Vange, Basildon, Essex.

NEW SECRETARY

Mrs June Wrigley is the new honorary secretary of the Isle of Man Amateur Radio Society. If you are visiting the island and would like details about club meetings, contact Mrs Wrigley at 20 Fairy Hill Close, Ballafesson, Port Erin, Isle of Man. Tel: (0624) 834257.

144/146MHz CONTEST

The Derby & District Amateur Radio Society 1989 National 144/146MHz Contest takes place on Sunday 12

March from 13.00 to 17.00 GMT.

Any mode of operation is permitted but the bandplan must be observed. Fixed, alternative and portable entries are permitted.

Contestants will exchange: RS(T), serial number, starting at 001, and administrative county (Scottish contestants will send region). Metropolitan areas, eg Greater London, are still considered counties.

Contacts with G3ERD count ten points, all others score two points. The score is the total number of contact points, multiplied by the number of counties worked. Each country outside the UK is scored as a county.

Logs must be sent to Derby & District Amateur Radio Society, 119 Green Lane, Derby DE1 1RZ, to arrive by 29 March 1989. RSGB log and cover sheets are preferred, but any neat alternative is acceptable. Logs must show: time (GMT), station worked, RS(T), serial number sent, RS(T) and serial number received, and county received. Head each sheet with callsign of station entering and county. Check-lists of stations and counties worked would be appreciated. SWL entries must show time station heard, station being worked, RS(T) sent, county sent.

There will be three sections of awards: full legal power limit, low power - 30W max output, SWL. Specify whether single or multi-operator. The winner in each section will receive a certificate.

The ruling of the DADARS Contest Sub-Committee will be final and binding.

PEAKS AND PLAINS

The Cheshire based Macclesfield and District Radio Society have recently introduced a new award entitled 'Peaks and Plains'. To qualify you must have heard or worked ten stations located in Cheshire plus one of the special event callsigns used by the Macclesfield club. These are G4MWS (HF and VHF) or G1MWS (VHF only).

Any Cheshire station logged after the 1 January 1988 will qualify regardless of band or mode.

If you are interested and need more information then contact J R Thornley G1NUS,

270 Hurdsfield Road, Macclesfield, Cheshire SK10 2PN. Tel: (0625) 24534.

NIGHT ON THE AIR

On 25 February Loughton & District ARS are holding a six metre night on the air using the club callsign G4ONP. It takes place at Loughton Hall, Rectory Lane, Loughton, Essex IG10 3RU in Room 20, and starts at 7.45pm. For further details contact the club's secretary, John Ray G8DZH, tel: 01-508 3434 (after 7.00pm).

NEW SOCIETY

The recently formed Sevenoaks & District Amateur Radio Society is inviting new members.

Meetings will be held initially in the Emergency Control Centre, Sevenoaks District Council Offices, Sevenoaks, Kent. They will take place on the third Monday of each month and start at 8.00pm.

Subscription fees are £10.00 per year (£5.00 for Students) plus 50p per meeting. For an application form write to The Secretary, SADARS, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

PAC-COMM PERSONAL MAILBOX

A new personal message store system (PMS) is now available for the Pac-Comm range of TNCs. The PMS is a completely self-contained optional EPROM which may be factory installed or added to any existing Pac-Comm TNC which is fitted with 32K of RAM.

The PMS allows the packet controller to support all the standard packet functions while simultaneously allowing messages to be entered or read over the air. Approximately 15K of battery backed up RAM is allocated for message store. New commands include HELP, LIST, MINE, READ, KILL, SEND and BYE. SYSOP commands include MYP, PMS, 3RD, CWID and CWTEXT.

The EPROM is available from Andrews Computer Services Ltd, 6 Ash Hill Close, Bushey Heath, Hertfordshire WD2 1BW. Tel: 01-950 9381. The price is £12.50 or £7.50 if you are able to supply a 27256 EPROM.

CALLING THOSE WITH SMALL GARDENS

With the improvement in HF band conditions, many operators are trying their hand on the short wave bands for the first time. One of the problems with today's small gardens is that of fitting an aerial for 80 and 40m into the available space. One answer is to use a loaded dipole and if choke traps are used it is possible to construct a loaded two-band dipole.

Waters & Stanton Electronics are now marketing a pair of traps that will do just that. Using the instructions provided, a two-band dipole can be constructed that measures approximately 80ft long and covers 80 and 40m. If the ends of the aerial are dropped down vertically, it is possible to reduce the horizontal run to around 60ft. For those using a half-size G5RV, the same traps can also be used to add 80m to this popular antenna, whilst only increasing the length of the aerial a few feet.

The traps are sold as pairs complete with instructions and are rated to at least 500W. Those wishing to use them to add 80m to half-size G5RV should request the appropriate instructions when ordering. The price of the traps is £16.95 plus £1.50 P&P.

Further details are available from Waters & Stanton Electronics, 18-20 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835/204965.

MOBILE BASE SCANNING RECEIVER

The latest release from the Uniden Bearcat stable is a mobile/base scanning receiver - model 950XLT. It has 100 programmable memories in five 20 channel banks. The frequency coverage is 29-54MHz, 118-174MHz, 406-512MHz, 806-952MHz.

Features include: scan speed 15 channels per second; memory lock-out facility; programmable frequency search facility; programmable memory delay; backlit controls for night use; a dc cord and plug-in whip.

The size of the unit is 2in (h) x 7in (w) x 7in (d). It retails at £269.00.

For further information contact Nevada, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (0705) 660036.

SCANNER CORNER

CHALLENGER BJ200 Mk 2 HF/VHF scanning receiver. Our most popular scanner! 26-520 MHz (with some gaps) - 16 memory channels, search scan, priority and delay - covers civil and most military bands complete with free Raycom air band antenna.
£189.00 plus £10.00 post/packing

SONY AIR-7 AIR/PMR/VHF/AM scanner. 150 KHz - 2.2 MHz, 88-108 MHz, 108-136 MHz and 144-174 MHz. A quality sensitive hand scanner with good sound, 10 memories per band, priority and delay functions.
£249.00 plus £10.00 post/packing

SONY PRO-80 AIR/PMR/VHF/AM scanner. The executive version of the AIR-7. More features, functions and more coverage.
£349.00 plus £10.00 post/packing

BEARCAT BC55 XLT starter scanner. 29-54 MHz, 136-174 MHz and 406-512 MHz. 10 memories. An ideal first unit.
£99.99 plus £10.00 post/packing

BEARCAT BC100 XLT pro scanner, as the BC200 XLT (see above) but without 950 MHz. This is real value at
£179.99 plus £10.00 post/packing

MOBILE

ICOM 3210E DUAL BAND MOBILE, 144/430 MHz, simple to use but sounds good on the air and packed with too many features to list. We both use one so it has to be good.
£499.00 plus £10.00 post/packing

ICOM 3200E 144/430 MHz DUAL BAND MOBILE package. 25W on both bands, 10 memories and built in duplexer, this rig was selling at over £500 not long ago! A real bargain, and with a free dual band antenna.
£399.00 plus £10.00 post/packing
RAYCOM modded version for boom mics with tone on front panel at
£419.00 plus £10.00 post/packing

RAYCOM COMMUNICATIONS SYSTEMS LIMITED
INTERNATIONAL HOUSE, 963 WOLVERHAMPTON RD,
OLDBURY, WEST MIDLANDS B69 4RJ.
TEL 021-544-6767, Fax 021-544-7124, Telex 336483.

RAYCOM gives you MORE PURCHASING POWER

ALL MAJOR CREDIT CARDS ACCEPTED. BC, ACCESS, DINERS. INSTANT CREDIT UP TO £1000 (SUBJECT TO STATUS) WITH RAYCOM CREDIT CARD. FREE CREDIT ON CERTAIN ITEMS AT M.R.P. CALL NOW FOR APPLICATION FORMS AND MORE DETAILS.

TEL: 021-544-6767

FULL RANGE OF ICOM, YAESU, BEARCAT, MFJ, BUTTERNUT, CUSHCRAFT, AEA, NAVICO, TONNA, TEN-TEC, WELZ IN STOCK. MOST PRODUCTS YOU SEE IN THIS MAG ARE AVAILABLE AT RAYCOM, PLUS OUR SPECIAL PACKAGE DEALS. CALL US NOW FOR DETAILS OR SEND LARGE SAE!

NAVICO AMR1000/S 144 MHz mobile transceiver. A highly intelligent and well thought out rig, it mounts just about anywhere and features auto tone burst, proper repeater channelling. Excellent results on our Marconi tester. Well worth a look at. Prices from
£247.25 plus £10.00 post/packing

HF/VHF/UHF RX/TRX

ICOM ICR7000 V/UHF The ultimate in receivers, all mode 25-1300 MHz (2 GHz) with free Royal 1300 discone
£925.00 plus £10.00 post/packing

ICOM ICR71 SW Receiver covers all short wave bands. For the serious listener, with free short wave antenna
£825.00 plus £10.00 post/packing

YAESU FT747GX All band/mode transceiver with RAYCOM Mk. 2 mod for better RX performance. 120W TX, general coverage RX and free 20 amp regulated PSU. A great TRX package
£725.00 plus £10.00 post/packing

YAESU FRG9600 with the famous Raycom modifications. Supplied with free Royal 1300 discone and free mains psu. We really make them perform. Why not let us mod your 9600? *Mark 2, 60-950 MHz + tweaked RX*
£545.00 plus £10.00 post/packing
Mark 5, 100 KHz-950MHz plus 'N' connector plus active front end
£699.00 plus £10.00 post/packing
Your 9600 modded to Mark 2
£40.00 plus £10.00 post/packing
Your 9600 modded to Mark 5
£129.00 plus £10.00 post/packing
(2-3 week turnround subject to parts)

TEN-TEC PARAGON. A fine transceiver from one of the worlds best. A world-class rig you must come in and try out. 100w all mode, general coverage receiver. Computer i/f and voice module optional.
£1898.00 plus £10.00 post/packing

We stock much more than we can possibly list here. Please call us if you don't see what you want or if you would like a detailed price list of our products.

EASTER MADNESS!

FOR ONE MONTH ONLY!

Bearcat BC200xLT

THE BEST HANDHELD VHF/UHF SCANNER.

£199.99

Save £50 on current MRP!
Bearcat 100xLT as above
less 950 MHz only **£179.99**
PLUS £10.00 post/packing
This offer cannot be repeated!

COVERS 29 TO 956MHz (with some gaps). Covers all popular VHF/UHF PMR, Amateur, Air Band, Marine, Cellular and many other interesting frequencies. 200 Memory Channels. Complete with helical, detachable Ni-Cad pack and charger. Green keyboard/display nightlight. Super fast scan and search mode. Free where-to-listen guide and backed by Raycom scanner expertise and service.

RAYCOM NEWS BOX

Lots happening at Raycom! We are now stockists of the HRS range of Cushcraft and Butternut antennas, MFJ accessories and Packet terminals. See the TEN-TEC Paragon HF TRX and have a go. It's a beauty! - We are now stocking AEA PK-232 Packet terminals and software - RAYCOM goes digital! - We are now carrying NAVICO VHF mobiles. A nicely designed rig from the marine radio specialists, worth a look. - New Yaesu handhels in stock, little beauties and best designed HT we have seen for a while. Look for a RAYCOM special mod for this one. - ICOM 725's now in stock, this will be a winner with the same type of DDS synth system as the IC781. Don't buy an HF rig without looking at it. - We always look around for good scanners. Watch this space! 50-950 MHz plus Pan Display! - New ICOM mobiles and HT's on the horizon. - Re-organisation in our service and shipping departments to improve service turnaround. - If you need anything to do with radio please call us, if we haven't got it we can probably get it! - We have thousands of items too numerous to list here. - We are always looking for used kit and will give you a good part exchange on new equipment. - We are SONY dealers and carry a wide range of their quality receivers and scanners. - Don't forget we are now open again Thursdays, and late Friday until 7 pm. - ICOM 3200 with tone button mod now available for headset use at £419 plus carriage. Raynet modded 3210 available - call.

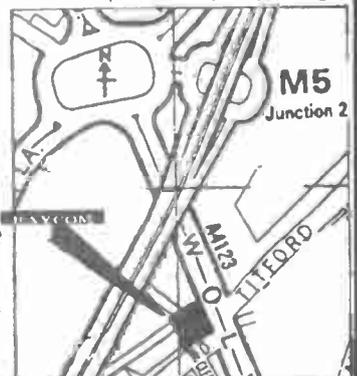
ANTENNA FARM

10-3CD	3-ele 10m	£115.04
R4 vert.	10/15/20	£219.00
AV4	4-band	£104.58
Ranger	VHF	£42.95
Ranger	UHF	£42.73
HF6V	5-band	£159.00
SC3000	Scanner	£63.99
70N2DX	Mobile dual	£37.00
G5RV	Full size	£16.95
G5RV	Half size	£14.95
R1300	Discone	£59.50

STOP PRESS! TCL Professional dipole kits. Complete with all fittings and guys. 1-30 MHz coverage.

TCLDSB	Single band	£69.95
TCLDDB	Dual band	£99.95

This is only part of our stock of HF, VHF, UHF and mobile antennas. We also carry a wide range of accessories for antennas. Call for info or drop in for free advice! And of course, there's always our famous ROYAL 1300 discone (improved spec. over ICOM AH7000/Diamond D109) still at £59.50 plus £5.00 post/packing.



ORDERING INFORMATION

ALL PRODUCTS SHOWN ARE NORMAL STOCK ITEMS. PHONE BEFORE 4 P.M. FOR NEXT DAY DELIVERY. MAIL ORDER PLEASE INCLUDE CARRIAGE AND PHONE NUMBER. ITEMS OVER £750 CARRIAGE FREE. PLEASE ALLOW TIME FOR PERSONAL CHEQUES TO CLEAR. MANY OTHER ITEMS IN STOCK. PLEASE CALL FOR MORE INFORMATION AND FOR EXTRA SPECIAL DEALS.

INFOLINE 0836-282228
5-9 pm (weekdays only)

STOP PRESS! DUE TO POPULAR DEMAND WE ARE OPEN THURSDAYS AGAIN. OPENING HOURS ARE NOW 9-5 MONDAY TO SATURDAY, LATE NIGHTS 'TIL 7 PM ON FRIDAY, 73 DE RAY G4KZH AND JIM G8ZMP.

RAYCOM

COMMUNICATIONS SYSTEMS LIMITED



FOR THE BEST IN AMATEUR RADIO

RAYCOM are authorised dealer/distributors for all of the products we sell.

NEVADA

THE UK'S SCANNER SPECIALISTS



BLACK JAGUAR MkIII

The new Mark III is probably our most popular handheld scanner with 16 channels of memory and a sensitive receiver. Selectable AM or FM reception and the facility to power the set from the mains or car using one of the many accessories now available.

Frequencies: 28-30 MHz, 50-88 MHz, 115-178 MHz, 200-280 MHz, 360-520 MHz

£199 NEW LOW PRICE

Black Jaguar Accessories

(suitable for all models BJ200 Challenger etc.)
 Mobile Mount **£6.95**
 Base Mount **£5.95**
 BJ1 Car Supply (Mk III version only) **£14.95**
 BCA6 Mains Slow/Fast Charger **£14.95**
 Airband Rubber Duck Antenna **£6.00**
 SA7 UHF Stub Antenna **£4.95**

We are the UK Distributors for Bearcat Scanners Handheld Scanners

Bearcat 55 XLT **£99.00**
 Bearcat 70 XLT **£149.99**
 Bearcat 100 XL **£189.99**
 Bearcat 100 XLT **£199.99**
 Bearcat 200 XLT (including 900 MHz) **£249.00**

Base/Mobile Scanners

Bearcat 175 XLT **£169.99**
 Bearcat 210 XLW **£179.99**
 Bearcat 580 XLT **£199.00**
 Bearcat 800 XLT (including 900 MHz) **£229.00**
 Bearcat 950 XLT (including 900 MHz) **£269.00**

NEW MODELS

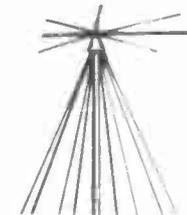
COBRA SR925 Base Receiver - Ideal for aircraft enthusiasts
 Covers 29.54 MHz, 118-174 MHz, 406-512 MHz **£149.00**
AOR 800 Handheld with 900 MHz **£199.00**
AOR 900 Handheld with 900 MHz **£235.00**
AOR 2002 Base with full coverage **£487.00**
AOR 3000 New Broadband Base Model **P. O. A.**
SAB9 MW and Airband Handheld **£19.95**
Sony Air 7 Handheld - Airband **£249.95**
Sony Pro 80 Handheld - Wide band **£349.95**

NEW LOW LOSS JAPANESE COAX

Essential for best performance with wideband UHF scanners. We have directly imported this cable which has exceptional low loss.

Frequency	5D	8D	10D
Loss/mtr @ 100 MHz (dB)	0.055	0.039	0.031
Loss/mtr @ 400 MHz (dB)	0.121	0.085	0.068
Loss/mtr @ 1 GHz (dB)	0.187	0.130	0.105
Price per meter	£0.56	£1.40	£1.99

DISCONE ANTENNAS - New British Made Antennas



Nevada PA15
 Base Antenna 100-960 MHz
 A new Colinear Ant with over
 9dB gain at 900 MHz **£49.95**
 (+£4.60 P&P)

Nevada WB1300 (25-1300 MHz)
 Wideband Top of the range
 stainless steel **£59.95**

Nevada Discone
 (50-700 MHz)
 High Quality
 8 Element
£24.00



USE YOUR CREDIT CARD FOR IMMEDIATE DISPATCH

HOTLINE (0705) 662145

NEVADA COMMUNICATIONS
 189 London Road, North End,
 Portsmouth PO2 9AE. Telex: 869107

Prices below normal trade. Some 1/10 quantity rate. Send 19p SAE or label for free catalogue. (OVERSEAS 2 REPLY COUPONS)

Millions of components: thousands of different lines

Rechargeable Nickel Cadmium batteries (ex unused equipment) AA(HP7) 1.25 volt 500 mA..... Set of four **£2**
 ITT Mercury Wetted relay 20-60 VDC Coil. SPCo, 2A..... **79p**. 10-£5
 LED illuminates Red, Green or Yellow depending upon
 polarity/current. 5 x 2 1/2mm Face

..... **25p** or 100 for **£23** or 1000 for **£200**
 10,000 Resistors. 1/2 to 2 watt. 1Ω to 22meg. 1/2% to 10% NOT a
 jumbled mass, but ready sorted into values

..... **£25** collected **£29** Mail Order
 5mm Red Flashing LED..... **25p** or 10 for **£2.25**
 Watch/Calculator/Lighter etc Mercury Batteries Made by
 Ray-O-VAC 10 mixed popular sizes..... **£1.50**, 50 for **£5.00**
 IN4004 or IN4006 Diodes..... **300** for **£6.50**

KBS005/01/02 3 amp 50 V/100 V/200 V/bridge rectifiers,
 35p/36p/40p. 10 off **£3.20/£3.40/£3.70**. 100 off **£30/£31/£34**

Plessey SL403 3 Watt amp, From Bankrupt source, hence sold
 as untested..... **4** for 60p or 10 for **£1.20p**

5mm LED, clear, lighting hyperbright (600mcd), red up to 200
 times brighter (gives beam of light)..... **25p**, 100/£20, 1000/£150
 Mullard 5mm LED, 40 red, 30 green, 30 yellow = 100 mixed..... **£7**
 'HARVI' Hardware packs (nuts-bolts-screws-self tappers, etc)
 marked 35p retail, 100 mixed packs for **£11**.

Modern silver/black/aluminium, etc knobs 50 mixed, **£6** (sent as
 10 sets of 4 + 5 sets of 2 - 15 different type/sizes).

SEND PAYMENT PLUS 19p SAE

Postal orders/cash - prompt dispatch.
 Cheques require 15 days from banking to clear.

Cheques drawn on Barclay's Bank not accepted.
Prices you would not believe before inflation!

BRIAN J REED

TRADE COMPONENTS, ESTABLISHED 31 YEARS

161 ST JOHNS HILL, CLAPHAM JUNCTION

LONDON SW11 1TQ.

Open 11am till 6.30pm Tues to Sat. Telephone 01-223 5016

NEW RX-8 MULTIMODE RECEIVE For the BBC computer

FAX screen and printer
PACKET HF and VHF
SSTV in colour
RTTY copies any signal
AMTOR/SITOR ARQ and FEC
MORSE best copy available
UoSAT 1 and 2
ASCCI all speeds

Full specification in every mode. Printer and
 tape/disc support. Text store etc, etc.

This is the ultimate receive system for the serious
 listener with a BBC computer.

We can't begin to list all the features here so send
 for full information about it and all our other
 products.

RX-8 system (EPROM, interface, leads and
 instructions) **£259.00** inc VAT and p&p.

FREE Klingenfuss 1989 Utility Guide to first 50
 purchasers of RX-8. **DISCOUNT** to existing RX-4
 users.

technical software (AR)
 Fron, Upper Llandwrog, Caernarfon LL54 7RF
 Tel: 0286 881886



The Yaesu FT-212RH 2m FM VHF TRANSCEIVER

A User Review by Steven Goodier G4KUB and John Goodier G4KUC

The Yaesu FT-212RH and FT-712RH are two examples of the new generation of ultra-compact, high-power mobile or base station transceivers, and Yaesu have been quick to incorporate many new and innovative ideas into their latest VHF and UHF equipment.

In this review we will concentrate on the FT-212RH 144/145MHz version. The FT-712RH, which is the 70cm equivalent, is identical in layout and general features, the only difference is in the transmit and receive specifications which we will outline at the end of this review.

General description

The rig is housed in a strong and attractive black metal case, which measures 140mm (w) x 40mm (h) x 160mm (d) including the back panel heatsink. It weighs only 1.25kg and feels a strong and sturdy product which should be capable of taking the knocks and blows usually encountered in mobile operation. The first thing that strikes you about this piece of equipment is its size, which can only be described as tiny. If the heatsinks were removed from the back panel then the whole unit would only measure 95mm deep, and this gives some idea of the huge advances that have been made in miniature electronics.

A large and substantial heatsink takes up most of the back panel; this is needed to dissipate the heat generated during transmit as the transceiver is capable of running some 45W output. Antenna connection is made to the rig via an 180mm piece of coaxial cable which is terminated in an SO-239 socket, this connector emerging from the FT-212's back panel on the far left of the transceiver.

The rig has been designed to operate from a supply voltage of 13.8V, and power is supplied via two short connecting cables, each terminated with a 'bullet type' plug and socket. An extra 2.8 metres of heavy duty cable is provided to connect to a suitable power source, such

as a car battery or fixed voltage PSU. Both the positive and negative leads are protected with a 15A fuse.

The MMB-37 mobile mount and hardware are supplied as standard, and the side panels contain the necessary mounting holes to take the supplied clips that have to be fitted before the transceiver can be used in its mobile mount. Yaesu have opted for a cradle-type fitting which locks the rig to the bracket on one side only. This makes fixing and removing the FT-212 from a car fairly simple and straightforward, as only one clip has to be unlocked before the transceiver drops free.

The receiver will cover 144-146MHz, and tuning steps may be easily programmed to operate in 5, 10, 12.5, 15, 20 and 25kHz, which is very useful if you intend to operate the equipment outside the United Kingdom. There are eighteen easy to program, general purpose memories plus three special ones which we will discuss later in the review.

A very useful and versatile feature is the option to select automatic repeater shift (ARS), which can be enabled to automatically select the repeater offset when the receiver is tuned to a standard repeater sub-band. In the case of the UK this would be 145.600-145.800MHz for 2m, and 433.000 to 433.400MHz if the FT-712RH 70cm version is being used. Whenever this part of the band is tuned, the transceiver can be programmed to select the repeater shift for you, which is very convenient if you are operating mobile.

The microphone jack is a standard Yaesu 8 pin socket which also includes input and output connections for the CAT interface system which is now included on many Yaesu products. The CAT system, or the 'computer aided transceiver' to give its full name, allows complete control via a computer of most of the features incorporated in the FT-212RH. So, in theory, it is possible to have external control of the operating frequency, transmit/receive switching,

HI/LO power settings and selection of the CTCSS tone encoder via a computer terminal. This, in fact, has been a little slow to take off, but there are now programs to make use of such facilities.

Finally, the FT-212RH and FT-712RH can be fitted with a unique digital voice memory unit (DVS), which has the capabilities to digitally record, and playback any transmission heard by the receiver. More on this later.

Facilities and features

The front panel has a large and easy-to-read backlit LCD display which is broken up into various shaded segments. It incorporates a bar graph meter that shows both received signal strength and relative power output on transmit, also detailed are other options such as memory channel, repeater shift, on air, busy, low power, and dial lock to name but a few. **Fig 1** shows the comprehensive layout and details the function of each part of the display.

The operating frequency is shown in full including any 12.5kHz increments. Ambient light is sensed automatically which controls the brightness of the display's back lighting, dimming the LCD display in dark environments thus stopping glare. All of the rotary controls such as volume, channel selector and many of the push buttons are also backlit, which can be useful if using the rig mobile at night.

To the right of the display are the volume and squelch controls; the rig can provide a maximum of 1.5W of audio into an 8 ohm loudspeaker which is located in the bottom half of the case. Alternatively, the SP-55 optional external speaker may be connected via the extension socket found on the back panel. The microphone socket is located on the far right, just above it are the ON/OFF switch and HI/LO power selector. Many keys have two functions which are clearly highlighted in blue lettering, the second option is selected by first pressing F/WRITE and then the second key within

YAESU FT-212RH FM VHF TRANSCEIVER

five seconds. The second function of the HI/LO power selector enables you to LOCK the rig to a specific frequency and freeze the action of the other controls. This option is also indicated on the front panel display, it can be released by using F/WRITE and LOCK a second time.

Each key has its own unique bleep, which is clearly audible and indicates that the transceiver has accepted the command issued. The different tones should be of benefit to a blind operator who should be able, after some practice, to tell what key has been pressed and what function is active by its sound. It must be noted that there is no speech synthesiser available, the VOICE button on the front panel is used to activate the DVS system if fitted.

Repeater operation

The repeater offset is simply selected by using the key labelled RPT. Once pressed, the rig cycles through its various shifts which can be -600kHz, +600kHz, or back to simplex again. All frequency shifts are displayed on the readout. Unfortunately, there is no automatic toneburst, therefore this has to be operated manually by using the yellow-coloured button located on the front of the microphone. When this is pressed, the FT-212RH is put on air, and a 1750Hz tone is superimposed on to the carrier and remains there until the key is released.

The reverse repeater switch is labelled REV and enables the user to listen on the input when the repeater shift is selected. The REV button has a toggle action, once pressed the rig will remain listening to the input for as long as the operator wishes. If you should forget to disable it before transmitting, then you will find yourself 600kHz up-band and transmitting on the output. Incidentally, it is virtually impossible to transmit out of band owing to misuse of the repeater

shift, and if this should occur then the letters 'Err' will be displayed and a double bleep heard.

Auto repeater selection

The FT-212RH has an ARS option fitted, which means that whenever the transceiver is tuned to a standard repeater sub-band, the correct split is automatically selected. The ARS function is disabled at the factory, and to enable it is a simple matter of pressing F/WRITE and RPT twice. When ARS is operational the letter 'A' is indicated. It can be confirmed by tuning to 145.600MHz. As soon as this part of the band is reached the repeater shift is selected and a "-" is shown in one of the shaded areas on the display just above the 10kHz digit. The shift is deselected automatically when the rig is tuned below 145.600 or above 145.800MHz.

The 600kHz repeater offset can be reprogrammed if desired by using F/WRITE followed by RPT. When this option is chosen the display clears and the currently selected shift is shown. By rotating the tuning knob the offset can be stepped up or down 50kHz at a time. To confirm the new shift, just press the RPT button again and the new offset is stored and programmed. Odd repeater shifts can be set up and then stored in any memory for future operation, therefore a number of offsets can be programmed and kept in memory without interfering, or losing the standard 600kHz repeater shift.

Memory options

The FT-212RH offers a total of twenty-one memories, eighteen of which can be classed as general purpose, whilst the remaining three labelled C, L and U offer special features. Memory mode is initialised by pressing D/MR; once this has been selected the memory number last used will be recalled and highlighted in

the top left-hand corner along with the currently stored frequency, and any other options programmed. To return to the VFO, simply press the D/MR button once more and the transceiver will return to the last used frequency.

To program any memory, first select the desired frequency plus any other options you require such as repeater shift, etc. Press and hold the F/WRITE key, the FUNC indicator will appear and shortly after that the memory channel number will flash in the top left-hand corner of the display. The desired memory channel can now be chosen by using the main tuning knob, once selected pressing F/WRITE again will put the information into your memory channel.

Memory tuning

One particularly useful function of the FT-212RH is the ability to tune away from any recalled memory frequency. If you press the MHz key whilst in memory mode, the selected memory can be used as a VFO in its own right and you can tune the entire band without losing the original contents of that particular memory. Pressing D/MR once will return you to the original recalled frequency. When this versatile option is in use, the letters M TUNE are indicated on the LCD display. In theory it is like having eighteen separate VFOs built into the rig.

Special memory functions

There are three special functions reserved for memory operation: C, L and U. Firstly, the C option allows you to store and recall your local calling channel or any other frequency of your choice. It is, in fact, labelled CALL on the front panel, and is programmed in the same way as a normal memory channel but instead of pressing F/WRITE to enter the information, you must press CALL. When in use a

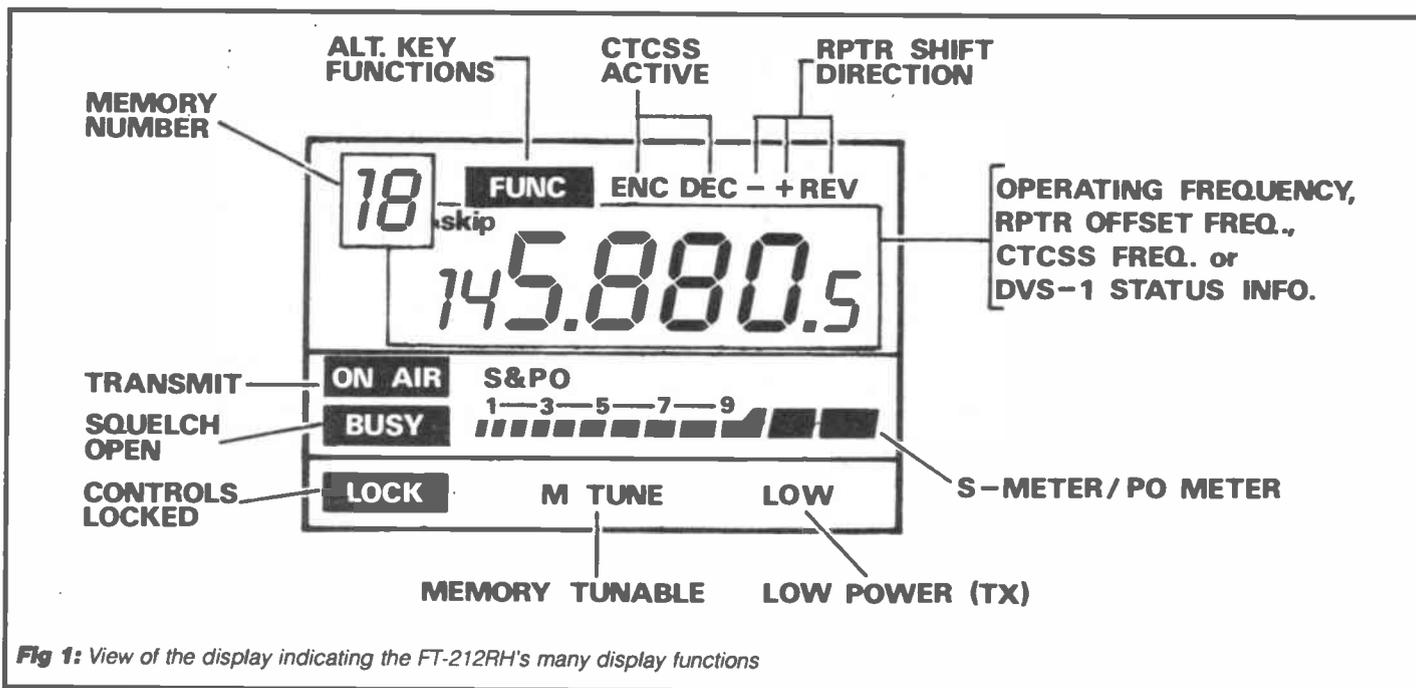


Fig 1: View of the display indicating the FT-212RH's many display functions

YAESU FT-212RH FM VHF TRANSCEIVER

'C' will appear in the memory channel window, indicating that the CALL option has been selected and is in use.

The frequency stored in this memory can be recalled at any time by pressing the CALL button. If you are in memory mode you can toggle between your selected memory and the calling channel at any time, the same is true if you are in dial mode, pressing CALL will simply act as a toggle between the two. This feature is extremely useful if you wish to return to a specific frequency quickly, and it saves you having to redial the calling frequency after your last QSO.

The memories labelled L and U are used to store the lower and upper limits in the programmable memory scanning mode (PMS). The lower edge of the scan is stored in L and the upper limit is stored in U. They are programmed in the same way as a normal memory, but you must make sure that L or U is shown in the memory window before programming.

If you select either of these memories, then select M TUNE, you will find that you are able to tune between the two limits previously programmed. As an example of how useful this can be, we programmed 145.600MHz into the lower limit and 145.800MHz into the upper limit; I was then able to tune between the repeater section of 2m. This type of tuning acts like a carousel and once the end is reached you are automatically returned to the beginning.

Once a memory has been programmed it would appear impossible to completely erase it, but unwanted memories can be hidden to the user by pressing F/WRITE until the unwanted channel flashes, then pressing REV/STEP. This causes the display to change to memory 1, and the previously selected memory can no longer be selected manually or by scanning. This, in effect, erases the memory but it may be recalled at any time along with its stored data by using F/WRITE, selecting the required memory number to be restored and then pressing REV/STEP.

The FT-212RH offers the choice of two types of scanning, which can be started by using the UP/DOWN keys located on the microphone; if either of these is held down for more than half a second then scanning will start. If the transceiver is in dial mode then the entire 2m band will be scanned for busy channels. Alternatively, the memory channels may be scanned by placing the rig in memory mode.

Scanning will stop when a signal is encountered that is strong enough to open the squelch; when this happens the decimal point on the display will begin to flash and a bleep will be heard from the speaker. You have a choice of two scan resume modes. The first is pause mode in which the scan pauses for as long as there is activity on the channel. The second option is a five second duration mode in which the transceiver pauses for five seconds and then resumes scanning regardless of whether the signal is still present or not. Scanning can be stopped

at any time by pressing the PTT, UP or DOWN buttons on the microphone, or the D/MR key on the front of the rig.

To select the scanning mode you want, press F/WRITE followed by REV/STEP. The display will indicate the tuning steps, but to the left-hand side will be a 'P' or a 'S', indicating which scan mode is in operation. To change from one to the other press F/WRITE, this will then toggle between either mode. Once you have made your choice, press REV/STEP to return to normal operation.

You can mark any channel in memory mode to be skipped during scan by using F/WRITE and SKIP. Once you have selected the required memory and operated the correct keys, the skipped channel will be marked by a small arrow and the word SKIP will appear by the side of it. Small sections of the band may be programmed into the programmable memory scan and then constantly scanned for activity. To do this, enter the upper and lower limits of the scan into memories L and U and select M TUNE.

Priority channel monitoring is also available on the FT-212RH; this allows you to monitor any memory channel for activity whilst listening to another frequency. The priority channel will be checked every five seconds; if it becomes busy the action taken will depend upon how the scan mode is set, ie, it will either monitor for five seconds or remain there until the carrier is removed.

To initiate priority checking, first choose the particular memory channel you wish to monitor, then return to dial mode, pressing F/WRITE and PRI will start the check. You may also priority check from within memory mode, the frequency stored in memory 1 automatically becoming the priority channel. This type of check can be very useful if you are awaiting a call on one frequency, and either wish to monitor the calling channel or have a QSO elsewhere on the band.

The FT-212RH is capable of 'memory cloning', which means that all memory data stored in one transceiver can be transferred to another by connecting the mic jacks. A full description of how to do this, plus the connecting leads required is given in the handbook.

Digital voice system (DVS)

One of the remarkable and unique features of the Yaesu FT-212RH is the optional voice recording system DVS-1, which can be fitted inside the rig and activated either by the user or a remote operator. The board contains a one megabit random access memory chip which can be used to digitally record speech from either the microphone or directly from off-air signals. Any recorded speech is stored in a battery backed-up RAM and can be played through the loudspeaker or transmitted over the air.

The memory can be used as a single block for recordings up to 128 seconds in length, or divided into four or eight

segments for selective recording or playback. The quality of recording is dependent upon the sample bit rate of the analog to digital converter and this is selected between 8, 11, 16 and 32 kilobits per second, allowing the operator to select the optimum trade-off between recording time and quality. The best recording is obtained with a sample rate of 32k bits per second; this produced an audio reproduction which was every bit as good as the off-air signal.

The DVS is toggled on and off by pressing the VOICE button, this causes the display to change and show relative information about the DVS parameters. First you must decide whether to record from the microphone or from off-air signals. This is toggled by using the TONE button and is shown by an 'S' or an 'M'.

The next thing that must be decided is the quality of the recording which is established by the bit rate; I chose the best quality of 32k bits per second which is shown as a '1' on the display. Unfortunately, the total recording time for this rate is only thirty-two seconds, but it must be said that reproduction was excellent. You may now make your first recording. The handbook advises you to record your own callsign into segment 1, this will be played back automatically in front of other segments when the system responds to remote incoming calls.

To make a recording of your own callsign into segment 1, first choose the microphone option, and ensure that you are on the correct segment; this is indicated by the third digit along on the digital display. Pressing the UP button on the microphone starts the system recording, the S meter serves as an elapsed time indicator, and when this reaches full scale the memory being recorded is full. To check the recording, press the DOWN button, this will playback the contents of segment 1.

Off-air recordings are made in precisely the same way, the only difference is that you must choose the speaker option and ensure that you have changed the memory segment. We set the segmentation code to '0', which combines the remaining memory into one long block. There are many other options to choose from and you will probably want to partition the memory for two different purposes; firstly to store your own replies to incoming calls, and secondly to record incoming calls and messages left for you from other people.

Segments may be locked to prevent them being recorded over and to prohibit remote playback, thus protecting any important information which you wish to remain in the DVS system.

Remote operation

If you have a second transceiver with a DTMF keypad (which allows access to the phone system in some countries), then you can operate the DVS system remotely, using a combination of three keys. To do this, the system must first be activated and then set to the remote

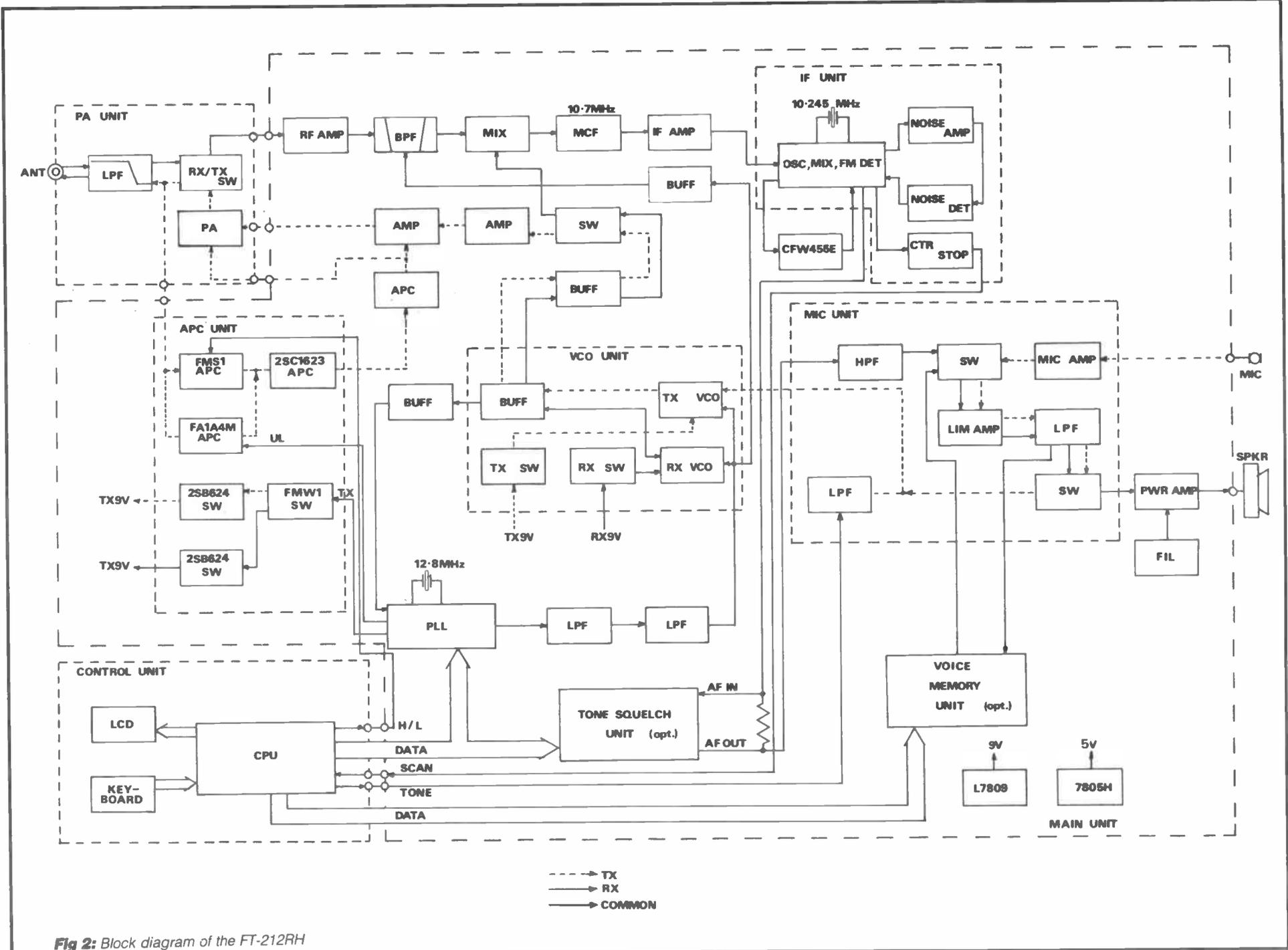


Fig 2: Block diagram of the FT-212RH

YAESU FT-212RH FM VHF TRANSCEIVER

control mode by pressing VOICE followed by RPT. When this command is issued the display clears and 'R' is shown along with the sample rate number.

Included in the handbook is a list of remote control access codes which can be sent by the remote operator, for example, sending #10 will playback all unlocked segments and sending *01 will record into any of them. In total there are eleven various codes to program and control the digital voice system. To send a command to the unit, hold the PTT switch on the remote transceiver and enter the required code. If you have set the system to record, then speak your message into the microphone, otherwise, release the PTT switch and listen for the response from the DVS. Note that segment 1, which should contain your callsign, is always read back before any other data is transmitted to comply with DTI regulations.

Private station ID code

To prevent unauthorised users from accessing the system a private station ID code may be entered, this takes the form of a four-digit number. Your personal code is entered by putting the system into DVS mode and then pressing F/WRITE followed by RPT. The display will now clear and the current ID code will be shown. If none is stored the display will show '0000', with the digit on the far right blinking. To enter a new code rotate the tuning knob, this will increase the flashing digit in steps of one, to move to the next digit use the UP/DOWN buttons located on the microphone.

Once your ID code has been programmed, any station calling in must precede his DTMF command with the ID code stored. Any remote commands received without the correct ID code will be ignored unless your code has been set to '0000'.

Construction and circuit description

To get into the FT-212RH, remove the screws on the top, bottom and side panels. The transceiver is built around a new style, compartmentalised, diecast chassis, which provides good RF isolation between the different sections of the transceiver. The printed circuit boards are sandwiched between the top and bottom sections, the design making extensive use of surface mounted components which, hopefully, will provide higher reliability and a better performance.

Space is provided inside the cabinet for both the digital voice memory unit and the FTS-12 tone squelch board. Fitting instructions for both boards are detailed in the handbook. The DVS unit, which sits just above the VCO and to one side of the loudspeaker, is rather large when compared to other boards within the transceiver. This is because of the two memory chips which have yet to be turned into surface mounted components, although I'm sure their time will come.

The handbook provides no circuit description, but both circuit and block diagrams are provided. The incoming signal is first passed to a low pass filter, and then through the Rx/Tx changeover network based around D02 and D03 which are located on the PA unit module. From there the receive signal is passed on to a dual gate MOSFET RF amplifier Q01, then into a two stage bandpass filter which is tuned by a voltage derived from the VCO unit. The resulting output is mixed by Q02 with another signal from the VCO to form the first IF frequency of 10.7MHz.

Selectivity is provided by filter XF01 and then the signal is amplified by Q03 before being passed to a dedicated 455kHz IF board based around the TK10485M oscillator, mixer and FM detector IC. The 10.7MHz first IF is mixed with a fixed frequency of 10.245MHz to produce the second IF of 455kHz. Main selectivity is provided by CF01, CFW455E ceramic filter. The resulting audio is used to drive a TDA2003 audio amplifier which is capable of providing 1.5W into 8 ohms. Information from the IF unit is also used for squelch control and fed back to the microprocessor to control scanning, etc.

On transmit, audio from the microphone is passed through a mic amplifier, then on to a limiter amplifier and low pass filter before directly driving the Tx section of the VCO. Audio can be switched to and from the optional voice memory unit, so stored messages can be

retransmitted over the air. From the VCO the signal passes through a switch then on to pre-drivers before reaching the main power amplifier slab, which is a M57726. The PA module is capable of delivering some 45W output and is bolted to a substantial heatsink.

Part of the transmitted output is fed back to an automatic protection circuit (APC), which constantly monitors the PA stage and reduces the output power if the SWR should become high. This will give a high degree of protection against misuse, but is not completely foolproof. The high and low-power selector is also controlled by this board.

The phase locked loop (PLL) is based around an M54959P and is locked to a 12.8MHz crystal. Its output is fed into a pair of low pass filters before directly driving the voltage controlled oscillator, which is located in its own screened compartment. There are separate VCO frequencies for both transmit and receive, these are selected by applying voltage to switches, which in turn select the correct output. Part of the output from the VCO unit is fed back via Q10 to the PLL chip to keep the circuit locked.

Finally, the whole transceiver is kept under control by a central processing unit (CPU). It is responsible for all the functions which the FT-212RH is capable of. Most of the push buttons and tuning controls connect to it directly via dedicated pins, which are constantly scanned to see if the operator has made any changes to the rig's operating

FT-212RH MANUFACTURER'S SPECIFICATIONS

General

Frequency coverage	144 - 146MHz (version B)
Channel steps	5/10/12.5/20/25kHz (user selectable)
Repeater shift	±600kHz
Mode of emission	G3E (FM)
Antenna impedance	50 ohms
Supply voltage	13.8V dc ±10%
Current drain	10A 45W Tx 500mA Rx, 300mA standby
Operating temp	-20 to +60 C
Freq accuracy	±10 PPM
Dimensions	140× 40× 160mm including heatsink
Weight	1.25kg

Receiver

Circuitry	Double conversion superheterodyne
IF frequency	1st IF 10.7MHz 2nd IF 455kHz
Sensitivity	Better than 0.25µV for 12dB SINAD
Selectivity	12kHz (-6dB) 30kHz (-60dB)
Image ratio	65dB or better
Audio output	More than 1.5W into 8 ohms

Transmitter

RF output	45W high 5W low
Modulation	Variable reactance
Freq deviation	±5kHz maximum
Spurious emissions	At least 60dB below carrier
Mic impedance	2k ohms

YAESU FT-212RH FM VHF TRANSCEIVER

functions. The CPU drives the LCD readout, which provides the operator with the necessary information to program and control the various options given.

Handbook

The rig arrives with a forty-page operating manual which contains all the information required to successfully operate the FT-212RH. The handbook is split into a number of sections and each is fully illustrated with either photographs or diagrams. It starts by describing the front and rear panel layout then moves on to mobile installation, power supply connections and packet radio interconnections.

A full description, accompanied by photographs, is given for installing the DVS-1 digital voice system and the FTS-12 tone squelch unit. After detailing the use of memories, scanning and general operation, the rest of the handbook is devoted to the DVS system, which requires a far greater amount of explaining and operating. Towards the back of the book is an explanation of the CAT interface with wiring details and tips on data format.

It was felt that Yaesu had produced a comprehensive set of operating instructions, which explained every aspect in a clear and precise manner. One nice touch is the inclusion of a pull-out quick-reference chart, which gives a run-down of the controls and functions the rig has to offer. A separate technical supplement 'The TST-212RH', which details the internal circuitry and operation of the rig, is available from SMC for £6.00.

On-air tests

We connected the FT-212RH to a GPV5 collinear, which is about 30ft above the ground. Tuning across the 2m band showed that the receiver was fairly sensitive, and a large number of fixed and mobile stations were received. The audio quality was reasonably good from the built-in speaker, but since it is located in the bottom half of the case, it was necessary to prop-up the transceiver for maximum volume; no bailey stand is provided. Once an external speaker was plugged in, there was more than enough volume and the quality was vastly improved.

Before going any further we decided to program a couple of the memories with our favourite operating frequencies. This proved to be a straightforward job once the keys had been mastered, but reference to the handbook is essential for the first-time operator. Once programmed, selection is simple and it is a great asset being able to tune each memory channel as a separate VFO.

The rig performed extremely well on transmit, but a few stations who knew our voices well reported a lack in bass response, and that the audio sounded a little under-deviated. However, other stations we worked made no comment about this at all, which perhaps goes to show that people can get used to a

particular sounding station, and transmitted audio is a matter of personal taste. For most of the time we ran the rig in the low-power setting, which provided more than enough output to work all regular contacts. Being able to switch the rig to 45W output will be of great benefit to the mobile operator, who often needs that extra bit of power to keep a simplex contact going.

The rig did get extremely hot when running high power for long periods, but this can only be expected when a 50W PA is bolted to the back of such a compact piece of equipment. The heat generated also warmed the entire case and eventually found its way to the front panel. Having said that, it did need extremely lengthy overs before reaching this condition. If you intend to operate the transceiver mobile then we would advise you to place it in a well ventilated area.

In conclusion

Yaesu have produced a compact and high-powered transceiver, which should meet the needs of most base station and mobile applications. They have included many new and exciting features, which

not only enhance performance, but make the equipment a delight to operate. Its compact size will be a plus if you plan to install the equipment into a vehicle with limited space under the dash. There is also the added advantage of not having to purchase or fit an external power amplifier.

The FT-712RH is the 70cm equivalent and has the same basic features as the reviewed sample. It covers 430-440MHz with a power output of 35W, it also has a standard 1.6MHz repeater shift fitted. All the standard accessories are interchangeable between the FT-712RH and the FT-212RH.

The FT-212RH retails for £349.00 and the FT-712RH sells for £375.00. Each rig is supplied with the MMB-37 mobile mounting bracket, power supply cable and a microphone.

For more information contact South Midlands Communications Ltd, SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire SO5 3BY. Tel: (0703) 255111. Please enclose a large SAE for a reply.

Finally, we would like to thank SMC for the loan of the reviewed sample.

GUIDE TO GENERAL FEATURES

Transmit:	5W low, 45W high
Display:	Backlit LCD with full frequency readout and fifteen different indicators
Tuning steps:	5,10,12.5,15,20,25kHz
Repeater:	±600kHz, with reverse repeater and automatic repeater shift option (ARS)
Memories:	Eighteen general purpose, three special
Scanning:	Bandscan, memory scan, programmable bandscan (PMS), priority monitoring and instant calling channel selections
CTCSS:	Optional tone squelch unit for silent monitoring
DVS:	Digital voice system for personal message store and remote recall
CAT:	Built-in computer interface for external microprocessor control

OPTIONAL ACCESSORIES

DVS-1	Digital voice memory unit
FTS-12	Tone squelch unit
SP-4	External base station speaker with built-in audio filters
SP-3	Mobile speaker with magnetic base
SP-55	External speaker
MH-14A8	Hand speaker microphone with tone burst button
MH-14B8	Hand speaker microphone
MH-14D8	Hand speaker microphone with DTMF keypad
MH-15D8	Hand microphone with DTMF autodialler memory
MF-1A3B	Boom microphone with flexible arm
YH-1	Headset with microphone
SB-10	PTT switch unit for MF-1A3B or YH-1
FP-700	External 13.8V power supply

All accessories can be obtained directly from South Midlands Communications and are interchangeable with the FT-712RH 70cm version

The World of D | A | T | A

Data communications is probably the fastest growing area of amateur radio right now. It brings together the more traditional aspects of the hobby with the world of personal computers to produce a mix which is absolutely fascinating. Where, just a few years ago, amateur datacomms was very much a specialist activity for those who knew their bits from their bytes, it is now accessible to anyone who is prepared to put in a modest amount of effort and to make a relatively small investment in equipment (assuming the shack already boasts a transceiver of some sort plus a home computer, which many do).

This magazine has carried some excellent reviews of terminal units (for example that of the PK-232 which appeared in the September 1987 issue) plus other articles such as those last year on the use of packet mailboxes. However, I still hear many amateurs asking for basic information on how to get started with packet radio and the other data modes, as well as wanting to keep abreast of new developments in this fast changing field. Concern yourselves no more! In this new monthly column I will do my best to cover the basics of getting started in the world of data communications, as well as to bring you news of up-to-the-minute changes, developments, product announcements and so on. Just what does get covered will depend on the feedback I get from readers (do write to me at my callbook address), but I imagine it will range from the technical, to operating tips, to book reviews, to the implications of the revised amateur licence and much more.

Packet radio

It is the ready availability of personal computers and TNCs (Terminal-Node Controllers) which has changed amateur datacomms from a specialist activity for the home constructor to an aspect of the hobby which everyone can enjoy, just as the ready availability of Japanese 'black box' transceivers did for SSB in the sixties and for 2m FM in the seventies. An amateur teleprinter handbook from the RSGB, printed as recently as 1983, devotes almost 200 pages to mechanical teleprinters and their various peripherals, and just two pages to operating procedures for RTTY (Radio Teletype)! Things have come a long way since then. It is estimated that over 3,000 UK amateurs now have the capability to operate packet radio. At the same time, many of them are using multi-mode TNCs which also include capability for CW, AMTOR, RTTY and, in some cases, facsimile.

I'll talk about RTTY and AMTOR in future columns, but first let's look at

packet radio which is the newest and, in many ways, the most exciting means of data communications available to radio amateurs. Its speed of growth has been enormous. In a report I have, dated February 1986, there is a list of all forty-five UK stations known at the time to be equipped for AX25 packet transmission. Just two years later, as I said before, there were rumoured to be about 3,000 TNCs in the hands of UK amateurs. The figure may well be much higher by now.

Like RTTY and, later, AMTOR, packet radio had its origins in the military and commercial worlds. In the late 1960s there was a growing demand from computer users to be able to pass data from one computer to another. The nature of computers is that large amounts of data have to be passed in a short time and then nothing happens for some time while the computer processes the data it has received.

The solution was to send data in 'packets'. Between packets the transmission medium (which might, for example, be a coaxial cable around a university site) could be used for carrying packets of data between other computers on the same network. This way the network could be used as efficiently as possible rather than standing idle at times.

In addition, shared devices such as printers could be left permanently connected to the network, but would only leap into life when packets were specifically addressed to them. Of course, this infers that, as well as containing the data itself, the packets would have to carry addressing information in order that they would only be received by the intended recipient.

Amateurs were quick to see the potential of packet transmission. Just as several computers could share a single network, so several amateurs could share a single frequency. Each one would only receive packets addressed to him and wouldn't be aware of other users on the same frequency. What is more, because each packet contains address information, packets could be forwarded around the country or even around the world, through any number of intermediate repeaters. This need not happen in real time. For most purposes it wouldn't matter if packets took hours, or even days, to arrive at their final destination. In fact, it was no accident that it was AMSAT (the Amateur Satellite Corporation) which played a major part in helping agree the protocols for packet radio back in 1982. Amateur satellites are obvious candidates for forwarding packet transmissions over long distances.

Funnily enough, it now looks as though packet radio may have gone full circle,

with the professionals adopting the particular techniques used by amateurs to provide relatively cheap (compared with cellular) data transmission to cars and lorries in the old VHF TV waveband which is now allocated to commercial mobile radio.

Amateur radio

The protocol most widely used for packet radio is AX25, meaning Amateur X25. X25 is the internationally agreed protocol for sending packet data over telecommunications networks. AX25 is an adaptation for amateur use which caters for amateur call signs in the addressing fields. Without going into too much detail about AX25 at this stage, suffice to say that, as well as defining how the data and the address information is held in packets, it also specifies some sophisticated procedures for the detection of errors which would lead to a request for re-transmission. As a result, packet radio is almost error-free, which means that it is well suited to sending data or computer programs. It also means that the data can be sent over a number of links without being corrupted en route.

The complexity of AX25 means that most home computers cannot cope with it. To get round this, a few years ago a simplified protocol was devised for implementation on the BBC micro and a number of UK amateurs used this for data transmission. However, AX25 is now the accepted standard world-wide, and the usual approach is to use a dedicated TNC, with the computer acting as a dumb terminal. At one time the cost of the chips would have been well out of the reach of amateurs, but nowadays it is possible to buy a TNC with built-in modem (to generate and demodulate the audio tones going to and from the rig) for less than £100.00.

I shall say more about the choice of TNC in a future column, as well as talk about the other factors to consider in choosing equipment for your datacomms station. Enough, though, of the theory for this month. What's new elsewhere?

BARTG

Firstly, a change of name. If you begin to take datacomms seriously, it is well worth joining BARTG, the British Amateur Radio Teledata Group. Until the beginning of this year they were the British Amateur Radio Teleprinter Group, but realised that having the word 'Teleprinter' in their title was misleading, especially as they have done much to help the development of packet radio in the UK.

BARTG publishes a quarterly newsletter covering technical and constructional

articles on RTTY, packet, AMTOR and fax as well as contests and awards (the BARTG-sponsored RTTY contests have long been the most popular events of their kind). BARTG also transmits news bulletins on the first and third Sunday of each month, carried on RTTY on 80, 20 and 2m, as well as on the 2m packet network. Their publications include a booklet 'Beginners Guide to Packet Radio' which costs just 95p plus p&p.

The new licence

So, what does the new licence contain that is relevant? Well, first of all it is important to realise that, despite some of the rumours flying around, the new licence does not impose any new restrictions on data operation. While there is a requirement for CW identification every thirty minutes, which many rightly regard as rather a pity, this is a relaxation on the previous requirement of identification every fifteen minutes. What is more, there is no upper limit on the speed at which this identification is sent. Of course, for the past few years many operators have ignored this requirement completely, hoping it would go away when the new licence came along, but I suppose you can't win them all. Many suppliers of TNCs are responding by making modifications available to permit CW identification.

On the plus side packet radio is now legal, which it wasn't before even though it was tolerated. In fact, the rules are

probably a lot less stringent than might have been expected. Automatic control of the station, where the computer is doing most of the work and the operator is sitting back eating his lunch, is now catered for in the licence, as is unattended operation in certain circumstances.

The DTI has also taken a liberal view of third-party traffic handling, more liberal in fact than in the USA which has always been held up as an example in the past. This all goes to make unattended digipeater operation legal, as well as opening the door for mailboxes/bulletin boards. There will be a separate licensing procedure for these, as well as for data repeaters which fall outside the terms specifically allowed by the licence (for example, for a high power repeater on 23cm as part of a high speed trunk network). However, this is no different from what has been the case for years now with speech repeaters.

What has been a large disappointment to many is the decision by the DTI to exclude most of 70cm from use for unattended digipeater operation or mailbox linking. The 70cm band would have been ideal for this purpose, with more channels available than on 2m which is getting extremely crowded, especially in the south-east. However, it appears that the MOD, which is the primary user of the band, raised objections. It should still be possible to get permits issued on a one-by-one basis once the applications have

been cleared through the relevant authorities, but this will be a much longer and more tedious process.

Another licence change is to allow data and RTTY on top band. The IARU bandplan recommends 1838-1842kHz for this purpose but, frankly, I would not have thought 160m was really very suitable for any sort of data operation.

Finally, the relaxation in logging requirements to allow the station log to be held on computer is also of particular interest to packet enthusiasts who, as a breed, are generally keen to use their computers for as many activities in the shack as possible.

And a contest

On the operating front, do remember that the popular BARTG Spring RTTY Contest is likely to take place over the weekend 18-20 March. I say likely to because, for some reason, the rules did not appear in the winter edition of **Datacom**, the BARTG journal. However, this contest has run for many years, starting at 0200hrs on the Saturday and running for forty-eight hours. The 80 to 10m bands are used, and operation is limited to a maximum of thirty hours in the forty-eight-hour period.

I hope this has whetted your appetite to give the data modes a try or, if you are already active on packet or RTTY, has given you some new insights. More news next month, as well as a look at what you will need to get started on data.

C.M.HOWES COMMUNICATIONS



**Eydon, Daventry,
Northants NN11 6PT
(mail order only)
Phone: 0327 60178**

It is several years since we attempted to list all our kits in one advert, so I am sure that many readers may not realise quite the range of amateur equipment that we offer. Using our kits you can build your own receiver, transmitter, transceiver, or station accessory. Most of the kits interlink, so that additional modules can be added for extra facilities as you build up your station. We believe this to be the best range of specialist kits available anywhere.

KIT		Kit Price	Assembled PCB Module
AA2	Active Antenna Amplifier	£7.50	£11.50
AP3	Automatic Speech Processor	£15.90	£22.80
AT160	80/160M AM/OSB/CW 10W TX	£34.90	£53.90
ASL5	External SSB & CW RX Filter	£14.90	£22.50
CM2	Quality Mic with VOGAD	£11.90	£15.90
CSL4	Internal SSB & CW RX Filter	£9.90	£15.90
CTU30	HF bands ATU for RX or 30W TX	£27.90	£33.90
CTX40	40M 3W QRP CW Transmitter	£13.80	£19.90
CTX80	80M SW QRP CW Transmitter	£13.80	£19.90
CV220	2M Converter for 20M RX	£17.50	£23.90
CV620	6M Converter for 20M RX	£17.50	£23.90
CVF20	20M VFO for TX or Transceiver	£10.40	£16.90
CVF40	40M VFO for TX or Transceiver	£10.40	£16.90
CVF80	80M VFO for TX or Transceiver	£10.40	£16.90
DSC2	Signal Indicator for OcRx/TRF	£6.60	£16.90

KIT		Kit Price	Assembled PCB Module
DcRx20	20M SSB/CW Receiver	£15.60	£21.50
DcRx40	40M SSB/CW Receiver	£15.60	£21.50
DcRx54	5.4MHz HF Air Band Receiver	£15.60	£21.50
DcRx80	80M SSB/CW Receiver	£15.60	£21.50
DcRx160	160M SSB/CW Receiver	£15.60	£21.50
HC220	20M Transverter for 2M Rig	£52.50	£83.50
HC280	80M Transverter for 2M Rig	£52.50	£83.50
MBRX	HF SSB/CW Marine Band RX	£29.90	£44.90
MA4	Microphone Amp for AT160 TX	£5.60	£9.90
MTX20	10W 20M CW Transmitter	£22.90	£29.90
ST2	Side-tone/Practice Osc.	£8.80	£13.50
SWB30	SWR/Power Indicator/Load 30W	£12.50	£17.30
TRF3	SW Broadcast TRF Receiver	£14.80	£20.20
XM1	Crystal Calibrator	£16.80	£21.90

P&P is £1.00 per order.

If you would like more information on any kit, simply send an SAE for a copy of our free catalogue and relevant information sheet. Our products are usually in stock ready for mail order despatch, and delivery is normally within 7 days. Credit card sales and technical advice are also available by phone (office hours). Additionally, our kits can be purchased from one of our many retail stockists, and at most radio rallies.



73 from Dave G4KQH, Technical Manager

SECOND-HAND

by HUGH ALLISON G3XSE

Do you need an RF stage?

Often called preselectors or preamps, outboard RF (radio frequency) amplifiers are often seen for sale at rallies in the £5.00 to £10.00 price bracket. I am talking here of your short wave preselector, ie, 1.5 to 30MHz, be it valve or transistor. Most preselectors are tuned, and often sport (apart from the tuning knob) a bandswitch, normally three position, and an RF gain.

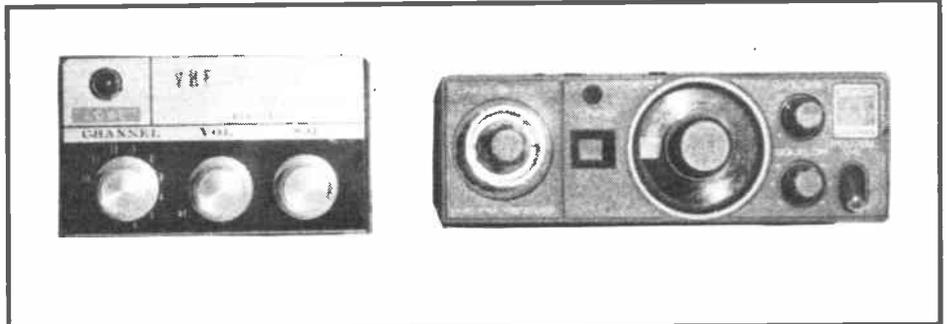
A decent receiver with a well designed gain, spread intelligently throughout each section of the receiver, will not benefit from any additional gain, in fact it will make things worse. Although there are several other factors to consider, one of the easiest for the beginner to understand is that any stage in the receiver path will contribute noise. So will your new 'bolt on' RF stage. If you think of every stage amplifying the noise that the preceding stage produces, you will soon realise that there must be an optimum somewhere.

OK, that was the boring theory part. In practice you've got this wonderbox in front of you and it seems a bit deaf compared with your mate's super-duper and he is hearing all sorts of things you ain't. If you have the handbook, a quick glance through the technical description will reveal if the set contains an RF stage already. If it doesn't, you need a preamp.

No handbook? Count the valves and ignore any with a 'Y' in the number – that's a rectifier. Three? Probably no RF stage. Another method is to count the switch wafers on the bandswitch. Four? Probably no RF stage.

There is one other way out. If you're flush, with a tenner in your pocket, buy a preamp and try it. You are unlikely to lose much if you are not happy and wish to resell.

A popular myth for beginners is that you mustn't use a valve preselector on a transistor receiver. BS, or to put it another way, not true. Well, almost. Buy yourself a transistor preselector and it will probably run on either its own internal battery (am I the only person who leaves them on when turning the set off?) or on a 12V external source. Buy a valve one and it may have its own built-in power supply unit (PSU), so just plug it into the mains. There is one other type left, valve but not internal power supply – the idea is that you borrow the preselector's modest requirements from the 'host' set. This may or may not be easy – some sets have a nice little terminal block (or a socket) with 6.3V and 250V available. In other cases it's soldering iron time, which might be a bit difficult, depending on your ability. The one problem you are not going to get over is the combination of a no power supply valve variant and a transistor set, 'cos the



Lowee receiver and Daiwa Search 9

high voltage required isn't available, hence the myth. You will have to build a separate PSU for the thing.

One cause of much misery is that the Codar valve preselector, PR30, comes in two varieties, one with the PSU included (internally) and the other without. From the front they look identical. Your hero sees one in a mate's shack, he sees another one at a rally that looks the same (but isn't) and when he's bought it, he can't use it. The Codar preselector is often seen at rallies, priced at about £5.00 to £7.00, and contains just the one valve. It's quite good and can certainly pep up quite a few receivers, but look for that mains lead coming out of it if you are a bit uncertain about delving into your set.

Daiwa Search 9

These are 2m fully tunable FM receivers. They tune 144 to 146MHz and can be either VFO (variable frequency oscillator) controlled, ie, tunable, or crystal controlled. It may, at first glance, seem stupid to have a crystal control option when you could tune to that frequency anyway. The problem is not stability, as you may think. The VFO is exceptionally stable, far better than a free running 50MHz oscillator has any right to be. The reason for the crystal control is what I call setability, others might call it dial accuracy.

The main tuning dial is only calibrated every 500kHz, ie, 144, 144.5, 145, 145.5 and 146. If you wished to dial, say, S21 (145.525MHz) for a club natter night and no one was transmitting, then you could not confidently set the receiver on that frequency and leave it monitoring whilst you worked in the shack. If you had the appropriate crystal then no problem; switch to the required position and up he will come. There is a built-in speaker.

Having now described the set's odd-ball tuning options, the rest can be summed up as quite good. Sensitivity is adequate, just over the microvolt for 20dB quieting seems typical. There is loads of audio and the set seems moderately reliable.

Faults. Well the first problem with any

repair on a Search 9 is removing the cover. The board with all the gubbins on remains in the lid and the 'bottom' comes away. Undo all the black-headed screws round the edge, then the one silver-headed screw in the middle of the front of the bottom. If you want to remove the board from the lid, first unsolder the wires to the aerial socket at the socket. If you don't, they will snap. I've broken dozens trying to be clever.

The series regulator can be a blower. It doesn't need anything downstream of it to cause it to pop. Very often it helpfully blows out the front of its case, thereby leaving you with no type number. It is a 2SC1959, which is a base-at-one-end 500mW device. Wop in a 2N3053, with its legs joggled, for increased reliability.

The audio output chip can go. It's the dreaded Texas SN76007N type. Best way to blow up one of these? Short the speaker wires together.

Prices. No rocks but with mobile mount, about £25.00. Lots of useful channels in good nick and with everything, £35.00 absolute top whack.

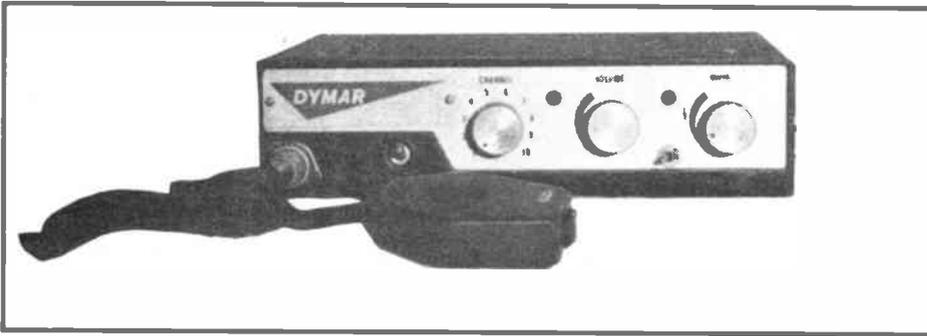
The Search 9 is an ideal first 2m receiver, spot-on for, say, a graduating CBER who wishes to see what is going on in the VHF amateur bands. A CB friend of mine is extremely interested in what he can hear with just his CB groundplane (obviously resonant on 27MHz) plugged into his Search 9 as its only aerial. Quite a few dedicated HF men have bought Search 9s for a listen around. You would be surprised what you can hear with just 19in of wire as an aerial out of the back of one of these.

Oh, nearly forgot. 12V powered only. The power lead is the standard black/red dual. You wouldn't believe the damage 240V ac mains up that lead can cause. Like a write-off.

Dymar

Take a good look at the photo. I've deliberately not given any model number since these sets come in all sorts of guises and with a couple of manufacturer's names on them. The GEC 'Worcester' is one example. There are PMR, Marine and Fuzz versions. Nearly every

SECOND-HAND



Dymar FM transceiver

one I've seen is high band FM. They are truly super and dirt-cheap to boot.

Super 'cos they are sensitive, like about half a microvolt for 20dB quieting. Super 'cos they are quite happy to chuck out 15W or more. Dirt-cheap 'cos they are freely available at about £5.00. £15.00 is the absolute tops. Watch it, some variants are bigger (deeper) than others.

Bad news? Well, two points. The receiver audio stages can do a flamer, ie, char the board if the speaker leads get shorted out. Very common but easy to repair with a couple of transistors and a length of BTC (bare tinned copper wire). Don't be put off one with a burnt bottom board. There is bags of audio out, by the way. One of these can give a 'ghetto blaster' a run for its money.

The second piece of bad news is the crystal. This is not your average 18 or 24MHz Tx, 50 odd for Rx. Everything, Tx and Rx, is $\div 12$. Thus to Tx on 144MHz requires $144 \div 12$, ie, 12MHz dead. Rx is also divided by twelve. You can go either (freqd +10.7) or (freqd -10.7) then $\div 12$. Thus for 144 receive $(144 + 10.7) \div 12 = 12.8916\text{MHz}$ or, alternatively, $(144 - 10.7) \div 12 = 11.1083\text{MHz}$. It is very, very important to note that you cannot mix +10.7 and -10.7 in the same set. The oscillator/multiplier chain doesn't have the required 21.4MHz bandwidth.

There is no internal speaker. The transmit strip can have its PA transistor 'linked out' with a capacitor if it blows and the driver will still chuck out a healthy 4W or so. Obviously there was never a factory-fitted toneburst, though second-hand sets may be fitted with one.

An excellent set, freely available and very cheap. Got to be a bargain, I just don't understand why they are not more popular.

Yaesu FT2 (plus F,FB)

We are talking here of a two crystal-per-channel rig. It is an old, early design that just about manages 20dB of quieting for a microvolt on receive. The transmitter is normally capable of a gnat's under 10W output. It is quite a reliable rig and many original (new) purchasers still have theirs in daily use after ten years plus.

One weird thing is the toneburst. On some rigs it is switchable either at the start of your over, or at the end of it, à la 'roger bleep'! The original toneburst isn't anything to write home about, by the way. A 7400 IC with feedback via none-too-stable ceramic capacitors can go walkies

50Hz or so from 1750Hz, between getting in your car on a cold morning and the heater coming on ten minutes later. Best to switch it out and stuff in something better. The original is just about all right for fixed station use on a tolerant repeater.

Faults. The channel select is via a wafer switch which is renowned for going intermittent. The back piece of the switch is the receiver bit and this is normally the worst. First signs of intermittency can normally be silenced with a blast from a switch cleaner, but six months to a year later it will be back, this time incurable. Well, incurable unless you open the switch up.

Major surgery on the switch is a delicate operation, roughly akin to the skill required in repairing a mechanical watch. There are quite a few fiddly little bits to contend with and this is definitely not a 'with hangover' job.

A 6BA box spanner is an advantage. Undo the two shaft nuts, remove the wafers, clean the rotating metal bits and do it all back up. Take care not to lose any of the tiny $\frac{1}{16}$ in thick spacers.

Second fault. PA transistor popping. This is common with any dodgy aerial. I blew one up when I had an FT2FB and water got in the coax at the aerial end. The good news is that there is quite a bit of room around the PA transistor and anything around 10W at 150MHz plus will go in.

I have patched up dead sets with BLY35s, 2N5142s, 2N5590s and 2N5591s, etc, quite cheaply. There is a fair amount of drive available, like a couple of watts, so we are not looking for much gain. Anything transplanted out of an ex-PMR high band set should do. Westminsterers are ideal donors!

Prices. Well, £50.00 is too much. I'd say £45.00 for a good one full of useful

Yaesu FT2



channels, complete with mike, bracket, handbook and aerial. £35.00 is about right for a well used example with some useless Japanese channels as well as a few good 'uns, and £15.00 is tops for a dead one.

One special variant was the FT2 Auto. About twice the size of the FT2 (the size of one atop another) this scans the channels. Lots of flashing red lights and buttons all over the place. Great fun if you have the room. These normally go for a fiver on top of FT2 prices, so £50.00 is just about reasonable for one in truly excellent condition. It isn't going in your Mini hatchback car without a struggle though!

'Lowe' 2m receivers

These things seem to have come in many flavours (including marine variants, take care!). They all have one common feature, crystal control. The early ones were six channel, the later ones twelve. The earlier ones seem just worse than a microvolt for 20dB quieting, the later ones just better than the microvolt. Note I'm basing these figures on examples to hand, not official figures.

At one time the receivers were offered as kits. The main board was complete, ie, all the component gubbins assembled and tested, but you had to string in the pots (volume and mute) plus switches, speakers, etc. Not too hard, an hour's pleasant playing really. Funnily enough, I bought two last year, at £2.00 and £2.50, that were still kits, ie, not built. Considering they haven't been sold for ten years or so, it's quite amazing that this stuff still exists in this state.

Uses? Ideal for cft used channels when you don't want to tie up the main rig, so spot-on for the local repeater, Raynet or natter channel use. Not a bad thing for an absolute beginner either, assuming a reasonably healthy selection of useful channels.

Power. Some were 12V, some mains and 12V. Personally I consider the mains plug into the back of the set a bit skippy and treat it with care - as you should with any mains plug of course. Be absolutely sure it is a genuine mains-powered one before stuffing 240V up it, and make sure you are using the mains lead. 12V and 240V both go in via the same socket, arrgh!

Prices. £10.00 to £15.00, depending on crystals and variant. £2.00 for a non-worker or the kit. Super little boxes.

PYRAMID POWER: AMATEUR RADIO IN EGYPT

by Thomas E King

In a dusty display case in an easily overlooked corner of Cairo's massive Egyptian Museum is a leather box containing a number of suspended and isolated copper strips. While this almost prehistoric relic cannot in any way be compared to the museum's magnificent gold and jewelled treasures of King Tut, just contemplating that the ancient Egyptians could have invented the first battery stimulated my imagination into creating a flurry of 'radio-active' visions.

In my mind's eye I could picture a 2m $\frac{5}{8}\lambda$ whip off the back of a horse-drawn chariot and a 20m monobander sprouting from the apex of the Great Pyramid. I couldn't visualise the earliest transmitter, however, but it must have been 'rock bound' with the chief operator 'pounding brass' during breaks from skirmishes with the Nubians or long evenings with Cleopatra!

While such situations are highly dubious, one thing is certain... King Tut was about 3,300 years too early to have joined the first Royal Egyptian Amateur Radio Club or make use of its SU1CR (Cairo Radio) station.

Although founded in 1934 there are still some 'G' callsign holders living in the United Kingdom who were active members of that radio club during their stay in Egypt. This was when the country, twice the size of Spain, was ruled by King Farouk. The hobby flourished for nearly two decades during his reign.

Decision 40

The first setback came in 1952 when the then President of the Egyptian Republic, Gamel Nasser, overthrew the monarchy and stopped all amateur radio activity claiming the action was 'in the interest of national security'. The order was overturned the following year, however, by the issuing (1953) of Decision 40 'for the purpose of installing radio equipment for technical and scientific tests'. Issued by the Transportation Minister, it set out twenty points to be followed by those applying for an amateur licence, taking the examination and operating an amateur radio station. Although this is an officially gazetted document, virtually all government bureaucrats and most of the country's population do not know that amateur radio is legal or realise that the Wireless Division of the Ministry of Communication issues four different grades of licence so that even school children can become members of the world community of amateur radio operators. The following is a brief summary of the amateur licence.

Grade 1. A code speed of 16wpm is required along with a pass in electronics theory, rules and regulations. Grade 1 licence holders can operate on all bands and all modes with 250W.

Grade 2. A code of 12wpm is required along with a pass in the same exam. Grade 2 licence holders can operate on all bands and use all modes with a maximum power of 50W.

Grade 3. Just a 5wpm code speed and a pass in a basic exam is required. Grade 3 licence holders can operate on all bands (30W SSB/CW on HF and 10W on the low VHF bands).

Grade 4. The same exam conditions apply here, but the Grade 4 licence holder is limited to 10W CW on all bands and 10W on the low VHF bands.

No firm date is set for the government examination which will be held in Cairo. A specific day is allocated for the student to sit the exam when the application is accepted. Since late 1987, however, there haven't been any applications or examinations. As of December 1988 there were six suitably qualified Egyptians prepared to take the exam but not prepared to pay the application fee.

High cost of Egyptian licence

In 1987 Saudi Arabia's Prince Talal HZ1UN, applied for an Egyptian licence. Since no provisions existed for such a service to foreign nationals, the officer on duty at the time felt that the yearly privilege should be worth E£200.00. Before, locals only had to submit E£20.00 with their application fee (the annual renewal is E£20.00 per item of equipment; a practice not seen in any other country). Obviously the individual on duty did not realise that no country in the world charges such a high amount for radio licences and that many countries encourage their amateur population by offering a free service. He charged Prince Talal an exorbitant amount for issuing the SU1UN callsign, and ever since, has been attempting to obtain the same fee from Egyptians making an application for an amateur radio licence in their own country!

EARS

The Egypt Amateur Radio Society (EARS) has made a highly justified complaint to the PTT stating that no application fee should be charged (or, at most, only a minimal amount to cover administrative costs of processing the paperwork), citing the non-commercial, non-business nature of amateur radio. It also pointed out the hobby's beneficial

aspects including the positive implications for Egypt – considered to be the most technically advanced country in the Arab world. When such a crippling and restrictive financial barrier is lifted, as must happen, those passing the relevant exam will join a very small group of only twenty-five Egyptian amateurs. They all live in Cairo except for the recently licensed, Tarek SU2TA, Alexandria – the first ever Egyptian station in this historic Mediterranean city.

Despite the small number of Egyptian amateurs, the situation in the Arab Republic is more prosperous than that of its near African neighbours. Libya does not have a regularly authorised amateur activity. Sudan has only three hams including Sid, the very AMTOR-active and TS-440S-equipped ST2SA of Khartoum. There are only a few foreigners on the air from Djibouti. The situation in Ethiopia changes but currently there is little activity.

Yes minister...

The Egyptian advantage is due mainly to the enthusiastic efforts of members of the Egypt Amateur Radio Society. It also helps immeasurably to have at least one senior government official interested and favourably disposed to amateur radio. In Egypt that important government official is Mahmoud MS El Nemr. He is responsible for the 'International Telecom Sector', the government department responsible for administering the amateur radio exam. During a short meeting with Mr Nemr we discussed the importance of encouraging the development of amateur radio which would in turn stimulate the growth of the electronics and communications industries in Egypt. The influential official also said he personally hoped that the numbers of amateurs would increase. 'Would you join the hobby?' I asked, 'No, the level of work-related commitments is too great,' he replied.

The amateur radio movement in Egypt will continue to grow, even if only in terms of a handful of new callsigns every year. This number would be quickly increased if a few relatively simple issues could be resolved.

Club station

The greatest need is to establish a suitably equipped club. For many years EARS meetings were held on a rotating basis at a member's home. An increase in membership and the need for more space to conduct electronics and code classes created problems which seem to

PYRAMID POWER: AMATEUR RADIO IN EGYPT

have been partly solved by the acquisition in February 1988 of a room on the thirteenth floor of the Wireless Officers Club in Ramses Square.

While regular radio meetings are held here on the first Saturday of each month, amateur operations are not yet authorised, even though an application for HF and VHF activities, along with a request for the callsign SU1ARS, was submitted to the PTT in February 1988. When permission is granted, EARS will have a major problem with equipping Egypt's first club station with radio gear and instructional supplies for training students. Apart from a code tape and an old tape player there isn't anything else. An amateur club looking for a worthwhile project might offer to donate some books and other useful items for the club station's first members.

Mrs Mubarak

There is a two-word solution to these problems – Susan Mubarak! She is married to the President of the Arab Republic of Egypt, Hosni Mubarak, who could easily become an amateur radio operator since he has a licence obtained when he was a pilot. Mrs Mubarak is deeply involved with youth and community activities and would be ideal for the role of Patron of the Egypt Amateur Radio Society.

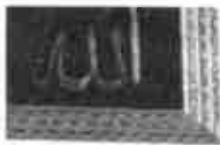
She could, together with EARS, introduce basic electronics, communication skills and the excitement of amateur radio to children in schools and libraries. These places could offer facilities for the establishment of radio clubs and provide equipment.

One individual who would be most grateful if Egypt's first lady did become involved in the hobby is Saad Sayed Adul Maguid, the Inspector of English, the New Valley Governate, El Kharga, UAE. Mr Maguid is trying to get boy scouts involved in amateur radio. The main problem is the shortage of training materials and equipment.

The shortage of equipment is another vital issue which must be tackled. Again, there is a fairly simple solution if legislation can be redrafted.

As amateur radio equipment is not sold in Egypt (it is available in neighbouring Israel, however) it is very difficult for any newcomer to establish a suitable station. While it's not yet economically viable for any Egyptian electronics entrepreneur to begin manufacturing amateur radio kits or modules, this could be a possibility in the future. A more likely solution involves making a few corrective pen marks on an official document.

Permission to personally import amateur radio equipment can be granted by ARENTO, the Arab Republic of Egypt National Telecommunications Organisation, but it is a time-consuming exercise requiring a number of forms and payment of a totally unrealistic 200% rate of duty! Yet if a computer enthusiast wants to import equipment, paperwork is much simpler and the duty level is just 5%. (Perhaps this abnormality will be recti-



Mr Mahmoud EL Nemr (left) and the author

fied when government officials understand that amateur radio is a training ground for those entering careers requiring computer skills).

Even when the duty on amateur radio equipment is reduced to the level of computer equipment or better still abolished altogether, most Egyptians could not afford a new HF transceiver. (The average annual income in Egypt is US\$580.00).

With a number of amateurs already licensed (but without equipment) and more to be licensed after the application fee fiasco is resolved, the situation is still critical. Even to accept gift equipment through EARS, Egyptian amateurs will have to undergo a hurdle of paperwork and pay the astronomical rate of duty.

Working to change such restrictive legislation, has been one task of the Egypt Amateur Radio Society.

Amateur Radio Union

Egypt's sole 'voice' for amateur radio operators became stronger on 16 November 1987 when EARS was notified of its acceptance as a full member of the International Amateur Radio Union. This influential organisation is noted for its dedication in assisting developing countries to cultivate amateur radio.

EARS committee

The committee of EARS is as follows: President–Loutfy SU12AL; Vice President–Ezzat SU1ER; IARU Liaison Officer–Mohamed SU1CR; Secretary–Fathy



The first 2m mobile operator in Egypt, Ezzat SU1ER

PYRAMID POWER: AMATEUR RADIO IN EGYPT

SU1FN; Treasurer – Ahmed SU1AH; 2m Officer – Hosni SU1HK; Awards Manager – Bass SU1BA.

Apart from these officers, EARS has established an educational wing with SU1AH as CW trainer, SU1s, HK and FN as instructors in electronics and SU1ER as course co-ordinator. SU1ER is also the government/society liaison officer responsible for dealing with licensing and other regulatory matters.

Despite a full-time engineering job and dual voluntary duties with EARS, Ezzat is one of the most active amateurs in Egypt. From his suburban home, he operates one of the country's most sophisticated amateur stations. He was the first to obtain permission for mobile VHF operations. Along with SU1s, HK, FN, CR and AL, he is active on AMTOR and packet.

Ezzat regularly checks into the European DX net (14.246MHz at 1600hrs, Saturdays) to provide stations with an Egyptian contact and to talk to OE6EEG, the Egyptian-born Dr Salim; the Arabian net (14.246MHz at 1600hrs, Fridays) and the daily DX net (14.197MHz at 0600-0700hrs). Newcomers to these nets often ask him a number of common questions which receive the following answers:

1. Egyptian amateurs do not have a QSL manager and there is no QSL bureau. Send cards direct.

2. There are no SU callsigns issued for visitors. Anyone using such a callsign is an illegal operator.

3. All correspondence including offers for financial assistance and/or equipment donations should be directed to: EARS, PO Box 78, Heliopolis, 11341, Cairo, United Arab Republic Egypt.

4. SU3 callsigns have never been issued for Sinai operations.



Hosni, Manal (right), and Magda

Hosni's QSLs are very much in demand because SU1HK is an extremely keen 2m FM operator. Encouraged by

his as yet unlicensed, wife, and daughters, Manal SU1NK, and Magda SU1MK, Hosni has a hilltop QTH in an otherwise flat Cairo. Sited 250m above sea level, this enthusiast has worked eight countries on VHF including Malta, Turkey, a mobile station in Greece (as well as the Athens repeater), Israel (500km to the 145.775 Tel Aviv repeater plus packet stations), Lebanon and the R4 repeater in Jordan. As no repeater exists in Cairo, Hosni hopes that King Hussein JY1, will be instrumental in setting up a high-sited repeater at Aqaba in the far south of Jordan which could be accessed from Cairo.

Because of the vast area needed to house Cairo's increasing population (Africa's largest city has some 13 million inhabitants) and the lengthy travelling time between suburbs, 2m FM is used regularly to co-ordinate amateur activities. A daily Cairo net is held on 145.250MHz at 1800hrs local time.

The head of PTT, Mr El Nemr, has stated that an application for a repeater in Egypt or southern Jordan would be viewed favourably. However, the amount of paperwork involved, etc, will probably be prohibitive.

Nevertheless, miracles do happen in Egypt. You have only to look at the Pyramids, one of the Seven Wonders of the World, to see that.

HIGH QUALITY		Electronic Components		LOW PRICES											
Order code	Quantity	Pack description - all kit packs are just £1 each - all parts brand new													
K1	400	Mixed resistors, mostly 1/2W	K34	1	39 000µF 20V computer electrolytic										
K2	50	Mixed power/wirewound resistors	K35	5	680µF 63V high ripple electrolytic										
K3	50	Mixed electrolytic capacitors	K36	5	6 800µF 10V high ripple elect cap										
K4	100	Mixed polyester capacitors	K37	50	Mystery components pack: all sorts										
K5	200	Mixed capacitors, all types/values	K39	7	Ceramic 2 way Chock-Block, high temp										
K6	200	Mixed mica & ceramic capacitors	K42	20	4 pin transistor sockets										
K7	100	Mixed diodes, silicon & germanium	K51	10	Mixed ICs 7 different types, worth £5										
K8	40	Mixed transistors, fantastic value	K54	10	Mixed connectors, plugs, sockets etc										
K9	25	Mixed pots & presets, very popular	K56	10	Clip-on transistor heatinks										
K10	100+	Hardware, eg knobs, grommets, clips	K57	6	Different kinds of switches										
K14	12	Wirewound potentiometers, good mix	K65	1	Pack insulating sleeving, dozens of bits										
K16	5	Fuseholders, at least 3 different	K66	6	Assorted valve holders, min 4 different										
K17	25	BHT capacitors, mostly 8kV wrtg	K67	6	Large carbon brushes for motors										
K18	1	RPY20 light dependent resistor	K69	100	Assorted grommets, useful sizes										
K24	25	Mixed zener diodes, type not marked	K76	20	Aluminium backshells 4-5 types/sizes										
K28	3	Red LED displays, 7 seg, dot	K80	20	Surface mounting ICs, various types										
K29	50	OC71 transistors, nice long leads			More packs available - ask for free list										
K30	3	Microswitches with long lever arm													
TRANSISTORS															
2N2223	£7.80	1N270	18p	DIODES											
BC393	80p	1N541	14p	CMOS 4000											
BD375	39p	1N3062	12p	709 (TO99) 29p											
BD376	39p	1N3605	9p	HCC4002 14p											
BD710	79p	AA116	12p	HCF4051 44p											
BDX38	60p	BA13	4p	741 (14 DIL) 12p											
BDY33P	£1.50	OA91	4p	747 (14 DIL) 49p											
BF393	80p	OA95	9p	MICRO CPU											
BF399	14p	SFD49	9p	EF800P £2.80											
BU911	90p			EF800P £4.90											
BU912	90p			EF803P £4.80											
OC71	29p			IC EPROMS											
TP31C	24p			28002AD2 £48											
TP110	10p			2716 £1.99											
TP111	44p			2764 £1.99											
TP112	39p			2728 £2.49											
TP115	44p			74LS LOGIC											
TP116	44p			74LS10 20p											
TP117	44p			74LS30 20p											
TP131	44p			74LS40 20p											
TP132	44p			74LS54 20p											
				74LS175 44p											
				74LS195 80p											
				74LS299 69p											
				MOSFETS											
				BF120 £1.39											
Values: Brand new, boxed quality values - just a selection from our vast stocks. Many rarities and 'antiques' available. Quotations given for any type not listed.															
6A16	80p	CV4006	£3.49	E901	48p	ECC91	£1.80	E80	40p	EF183	40p	E281	70p	141	£7
6AU6	80p	DAF91	£1	EF80	80p	ECC189	£1.90	EF83	£2.50	EF184	80p	G32	£2.75	UBC91	£1.25
6BE6W	£2	DF91	40p	ECC81	£1	ECF80	90p	EF85	90p	EL32	70p	G234	£4.80	UF42	£1
6F33	£9	DF92	70p	ECF82	80p	ECF82	£1.80	EF86	£1.40	EL34	£2.75	KT66	£14	UF80	£1.50
6XSGT	£1	DF96	60p	ECC83	£1	EF36	£2.95	EF89	£1.50	EL85	£4	KT88	£20	UL41	£7
6X302	30p	DF91	£1	ECC84	80p	EF37A	£1.75	EF91	£1.25	EL91	£5	N37	£5.30	UV41	£2.25
12BH7	£1.20	DL92	£1	ECC85	80p	EF39	£1.45	EF92	£1.75	EF86-7	80p	OA2	£1.25	X78	£8
6059	£3.80	DF902	£1	ECC86	£1.80	EF41	£2.80	EF94	70p	E241	£3.50	SP61	£1.70	X79	£7.50

All prices include VAT when applicable. Please add £1 post/packing. Cheques payable to: Kenzen, Unit 9, 16-20 George Street, Balsall Heath, Birmingham B12 9RG. Tel: 021-472 3688

QRP KITS AT QRP PRICES!

80m CW TRANSCEIVER DTR3
Compact and lightweight, an ideal QRP rig for 3.5MHz CW. Great for /P and holiday operation!
A COMPLETE KIT - includes ALL Hardware, VFO, Audio Filter, RIT, Sidetone etc and fully detailed building instructions.

£76.25 including postage or ready built and tested £126.50

Also included in our Kit Range

	FULL KIT	PART KIT
*CARLTON 3-band RX for 80/40/20m	£83.00	
TU1 Mk2 Antenna Tuning Unit	£36.80	£34.50
TU2 Mk2 ATU with SWR Bridge	£48.00	£32.70
TU4 1: SWR Bridge	£14.50	£8.20
AP2 AUDIO FILTER	£11.50	£8.50
AP3 BASIC AUDIO FILTER BOARD	£8.50	
CM1 CAPACITANCE METER	£22.00	£14.00

REMEMBER: The 'FULL' kits are COMPLETE in every detail and come with FULL instructions. The 'PART' kits consist of the PCBs and all board mounted components plus, of course, the detailed Instruction Manual. All prices include postage.

For full details of these and the rest of the range, send a SAE to:
LAKE ELECTRONICS, 7 MIDDLETON CLOSE, NUTHALL, NOTTINGHAM NG16 1BX
or ring Alan, GADVW on (0602) 382808

Start training now for the following courses. Send for our brochure - without obligation or Telephone us on

REF: AR3 **0626 779398**

NAME	<input type="checkbox"/>	Telecoms Tech 271 C & G
.....	<input type="checkbox"/>	Radio Amateur Licence C & G
.....	<input type="checkbox"/>	Micro-processor
.....	<input type="checkbox"/>	Introduction to Television

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

DX DIARY

News for HF operators compiled by Don Field G3XTT

January was an exciting month, mainly because of the DXpedition to Mellish Reef and Willis Island. I was chasing Mellish Reef (callsign VK9ZM) and couldn't believe the size of the pile-ups. The last operation of any note from there was in October 1984, which isn't really all that long ago. Anyway, by the time they left the reef, UK amateurs had been able to work them on 10, 15, 20 and 40m, so it seems to have been a pretty good effort. They were heard on 80m, but I don't think any QSOs with the UK took place.

The operation from Willis Island was much shorter, but this one is regularly active anyway by way of weather station personnel based on the island. Just as well, because Murphy played his part and there was an aurora just before the weekend which just about put paid to propagation over the North Pole. Before this happened, those UK amateurs who were around during the week managed QSOs on 10, 15, 20 and 40m. Mellish Reef, of course, is uninhabited and not the easiest place to make a landing (the start of the operation was delayed for this very reason).

If you missed these operations, a couple of Australian amateurs have already said they may operate from Mellish Reef later in the year. Whether they will feel it is still worth going when a major operation has already taken place is another matter. Watch this space.

DXCC news

We have yet another new country! As expected, the ARRL has decided that Rotuma Island should count separately from Fiji for the purpose of DXCC awards, and that QSOs dating back as far as 1945 will count. In other words, if you worked the German group who operated from there a few years back, then you have this one in the bag. However, don't submit QSLs to the ARRL until after 1 June.

This latest decision takes the number of DXCC countries to 321. W1GKK, who heads the annual DXCC listings in **QST**, now has the grand total of 370 countries credited, which includes all the countries which, over the years, have been deleted from the list: countries which bring back all sorts of nostalgic memories such as Goa, Palestine, French Indo-China, Manchuria and Zanzibar. There was talk, as I have mentioned here before, of reinstating Okino-Torishima to the 'current' list, however, the DX Advisory Committee has now voted against this.

QSLing

There have been several reports recently that the Indian QSL bureau is no longer in operation. Presumably this means that if you want a QSL from a VU station you will need to send it direct. More and more Russian stations are starting to demand direct cards, presumably in order to get their hands on IRCs and dollar bills for their own QSLing activities. I got a long-awaited RZ1OWA card this way and the card even included the words 'Direct QSL Only'.

Controversy is also raging over some QSL managers who seem to be in it purely for the money, swallowing IRCs and dollar bills and sending out just the occasional QSL, presumably as an encouragement to keep trying! One French QSL manager, who handles cards for over 100 DX stations, has come in for particular criticism. It is hard to see a way round such behaviour other than just refusing to send cards to the manager in question. I was also surprised to see in DX News Sheet that VE1AL, who handles cards for last year's CY9DXX operation, is saying that QSLs will be answered when he has time and that he expects to have cleared bureau cards by the end of 1991!

I realise that the kind of people with the get-up-and-go to take part in DXpeditions may not be very interested in the chore of QSLing, but there are always plenty of others willing to take this on as their contribution to the overall effort. Surely there can be no excuse? Of course, cost can be a factor in that having thousands of cards printed doesn't come cheap, but for major expeditions help can usually be obtained from organisations such as the Northern California DX Foundation, set up specifically for such purposes.

DX news

Probably the biggest news is that Marion Island will be back on for the first time since 1979. This had been rumoured, but it is now certain that ZS6PT will be there from mid-April as a member of a meteorological team. A DXpedition as such has not been allowed because Marion Island falls under a UN treaty which limits visits to the island for scientific purposes only.

Peter will spend fourteen months on the island as the team's radio technician and will take gear for HF, 6m and satellite. On HF he will use the rhombic antennas already on the island when they are not being used for commercial

traffic. Apparently Radio RSA's 'Amateur Spectrum' programme will carry regular updates on Peter's activities. Check Saturdays at 1445 on 21590kHz, and at 1845 on 15345 and 17795kHz. Peter will probably use the callsign ZS8MI from Marion Island.

After over a year of effort, WA9INK has finally been issued with the callsign SU1EE and has been very active from Egypt. In May he moves to the Sudan and once again will be trying to get himself a licence.

LA5NM and LA7FD were due to be active as JW5NM and JW7FD from Svalbard from 22 February until 1 March. JX1UG has been very active from Jan Mayen on all bands, appearing on top band during several weekends with a massive signal from a 100m vertical to which he has access (presumably a broadcast station antenna of some sort).

It is reported that HB9MX will operate as S79MX sometime this spring. Sorry I can't be more accurate with dates, but keep your ear to the bands.

4K1DV will be active from Progress Base in the Antarctic from March until December. QSLs go to UA1DV.

Hilde DL5UF, Ulmar DK1CE and Hans DF2UU were due to operate from a number of Pacific islands between 5 February and 15 March. The proposed itinerary included 5W, ZK1, ZK3, KH8, A3 and 3D2, operating 5kHz above the band edges on CW and on 7075, 14195, 21295 and 28495kHz on SSB. Two other Germans, DF5UG and DL2GAC, will also be island hopping in the Pacific around the same time. Their operation will be from various island groups in Papua New Guinea (P29), the Solomon Islands (H4) and the Philippines (DU) for the benefit of those chasing the Islands on the Air awards. Check 14260, 14275, 21260, 21275 and 28560kHz as the frequencies where they are most likely to show. As if all this wasn't enough, HB9CUY and DK7UY will operate from the Pacific as follows: Fiji until 28 February, South Cooks until 13 March and French Polynesia from 17 to 22 March. 5W1GP is reported to be visiting KH8, A35, ZK1 and ZK3 during April.

John W1BIH should be back in Curacao by now on one of his regular visits. He will sign PJ9JT on all bands until sometime in April.

According to DX News Sheet the Hungarian group who brought off such a magnificent operation from Vietnam towards the end of last year did, in fact, get permission to operate from neighbouring Laos just before they were

due to leave Vietnam. By then, however, they were exhausted, both physically and financially, and decided to return home. Nevertheless, they hope to take up the opportunity to operate from Laos as soon as possible, although one rumour suggests they may have to call off the attempt owing to rig problems and lack of finance. I would have thought, as I said earlier in the context of QSLs, that one of the big DX foundations would have been more than willing to help in getting such a rare one back on the air.

The final tally from Vietnam, during thirty-seven days of operation, was over 63,000 contacts of which over 21,000 were on 15m. About 100 contacts were made on ptop band, mainly with Japan.

VU2RBI reports that an Indian group will once again activate the Laccadive Islands. Look out for VU7APR and VU7NR from 28 February until 30 March. The QSLs go to VU2APR.

XE2BDG, XE2TCQ and XE2MRY are reported to be well advanced in planning an operation from Revilla Gigedo during the first two weeks of May. They will use the callsign XF4T and will look especially for Europe and Africa. XE2TCQ will handle the QSLs.

French amateurs and those in the French overseas territories are celebrating the bicentenary of the French Revolution with some special prefixes. French stations will sign F89/callsign, while those in overseas territories will substitute 89 for the usual number in their call, eg, TK5VN would become TK89VN. The dates when this is allowed are 5 May, 20 June, 1-31 July, and 4 and 26 August (check your history books for the significance of these dates).

For the island hunters, JI6KVR will activate another of the Japanese island groups on 11/12 March, and 3D2HO is planning to operate from Lao Island at the end of February. Also, a French group is planning to activate Glenans Island on 1/2 April.

Soviet callsigns

It is getting harder to keep track of the various callsigns in use in the USSR. Veterans of WWII are being assigned callsigns like U5FG (previously UB5FG) and U2PBA (previously UP2PBA) which, in some cases at least, means it will be impossible to determine from which country a station is operating from the callsign alone.

Some of the special event callsigns from the USSR are also confusing. The YL2 prefix has been used recently from both Latvia and Lithuania. Incidentally, a special pennant is on offer to those who managed to work YL2RG on five bands. Send seven IRCs to Box 265, Riga 50, Latvia, USSR. Stations in Byelorussia used the prefixes EU2 and EW2 during January to commemorate seventy years of the Byelorussian Republic.

Contests

Look out in March for the ARRL SSB Contest (see last month), the Bermuda Contest on 18/19 March, and the CQ WPX SSB Contest which, this year, falls on Easter weekend. And, of course, the RSGB's Commonwealth Contest on 11/12

March is a marvellous opportunity to work rare spots without hindrance from other European stations (though it always amazes me how many of them seem to think they have joined the Commonwealth for the weekend and persist in calling contest stations)! Looking towards April, pencil in 1st/2nd for the SP-DX Contest (a CW event this year) and 29/30th for the Helvetia H-26 Contest.

I am trying to assemble a complete set of paperwork (rules, official log and cover sheets, etc) for all the major international contests in order to help DX Diary readers. I have the paperwork for the CQ and ARRL contests, but should like to receive copies of such material for any other contests if you can assist. If you don't have photocopying facilities, I am happy to make a copy and return the masters.

If you are a contest enthusiast, you may be interested in the **National Contest Journal** (NCJ) which is now published by the ARRL. Although aimed primarily at the US market, many of the features are of more general interest. A recent issue reviewed the Icom IC-781 from a contestant's point of view, carried several articles on 'How to Win a Big Contest' and the like, and a feature on propagation. K1KI also has a regular column about the USSR, covering oblasts, prefix and licence changes and much more.

NCJ is published six times a year and the subscription from the UK is \$12.00, which can be paid by quoting your credit card number.

In the German EU-DX CW Contest of 1988, G3FXB was second and G3SXW sixth in Europe in the single-operator all-band category. The leading European was Y24UK.

While on the subject of contests, I have recently compiled a list of world, European and UK records for the CQWW Phone and CW Contests, and shall be doing the same for the CQ WPX Contests. They make interesting reading, and I am sure several of the UK records are just waiting to be broken over the next few years. Rather than take up valuable space in this column with them, I should be happy to provide a copy in return for an SAE.

Over the Christmas holiday period Chris ZS6BCR operated along with Bernie ZS4TX as ZS3Z from Namibia, and on his own as 3DA0/ZS6BCR from Swaziland. Since then Chris has sent me a fascinating letter about the operation. The worst part of the trip, he says, was the journey. As a student Chris has to make do with a 1969 car which gave endless trouble during the 6,000km of driving which was involved. The station consisted of an IC-751 and a Butternut HF2V vertical which had been donated to Chris for a previous expedition and which appears to have worked extremely well on all the low bands. In Namibia they operated from a property belonging to ZS3E, who also supplied the generator.

They had reasonable success on LF although conditions were very poor. 160m yielded contacts with PY, VE and W. The 10m band was successful, using a TH5DX on a trailer-mounted tower, but

6m didn't open at all. Typically, the day after they left ZS3E managed some contacts into the USA!

The Swaziland operation proved much more difficult for Chris. He was unable to take the big tower because he couldn't count on having help to erect it, and was unable to get more than two hours of uninterrupted sleep as a result of trying to catch all the major sunrise and sunset openings on the LF bands. This, says Chris, made him irritable, especially when the Europeans persisted in calling out of turn. His prize goes to an LA9 station who, seven times in a row, insisted on calling when Chris had specifically asked for 'HV9'.

Despite the problems, propagation was kind and he was amazed to work eighteen US stations on top band the first day at sunrise, despite running only very low power.

Chris has made previous operations from A2 and ZS3 and is finding that the introduction of the single-band DXCC awards for 10, 40 and 80m has obviously led people to look back through their logs and chase up QSLs for contacts on these bands, even going back several years. Future operations are planned, but will depend on finances and health. Both Chris and Bernie, who is twenty-two and a trainee technician, are still recovering from a helicopter crash back in September, while trying to put some rare multipliers on the air in the SARL VHF Contest.

Trinidad Island

Finally, Ron PY1BYV has written an interesting article about last year's operation from Trinidad Island under the callsigns ZY0TF, ZY0TK and ZY0TR. Trinidad Island, lying 1500km off the Brazilian coast, is mountainous and rich in marine life. It currently hosts an oceanographic station, manned by forty-two members of the Brazilian navy, who receive supplies by boat every two months. Their quality of life has recently been improved enormously by the installation of a satellite dish enabling them to watch live TV!

Because of the rocky terrain, transferring men and equipment to Trinidad is by no means easy. Furthermore, the DXpedition team was depleted at the last minute when two of the five operators had to drop out owing to family and work commitments. However, the remainder pressed on, taking with them some 350kg of gear, including four transceivers, plus equipment for RTTY.

Operation took place from the meteorological building on the island, where the operators were surrounded by thermometers, anemometers, etc. The RTTY operation was the first from the island and proved to be much in demand. Some 3,500 QSOs were made in total, and the group hope to return in the future and to include 17 and 12m which had to be given a miss this time round.

If you worked the group you should note that, this was another of those operations which are demanding direct QSLs only. Send them to: Natal DX Group, PO Box 385, 59001 Natal, RN Brazil.

ICOM

IC-725 Budget HF



- General Coverage Receiver
- 105dB Dynamic Range
- 100W Output
- DDS System
- 26 Memories
- Scanning
- CI-V Computer Control
- Semi Break-in

The new ICOM IC-725 budget H.F. has been produced due to the demand for a simple, high specification transceiver. Despite the limited features, compared to more expensive equipment this set retains a superior level of technical performance necessary to operate on the H.F. bands today.

Additional features include Noise Blanker, Pre-amp, Attenuator, AGC and RIT. The DDS System (Direct Digital Synthesizer) ensures fast Tx/Rx switching times, ideal for Data Communications. An A.T.U. controller is built

into the IC-725 for use with the AH-3 H.F. Automatic Antenna Tuner for mobile or base station operation.

Accessory options available are the PS-55 20A P.S.U., AH-3 Auto Antenna Tuner, UI-7 AM Tx. FM Tx/Rx Unit, FL-100 500Hz CW Filter, FL-101 250Hz CW Narrow Filter and SP-7 External Loudspeaker.

For more information on the IC-725 budget H.F. and other ICOM amateur equipment contact your nearest authorised ICOM dealer or phone us direct.

Icom (UK) Ltd.

Dept AR, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Count on us!



IC-575, 28/50MHz Dual band multimode.

The ICOM IC-575 base station has been developed to meet the demand for advanced communications for the recently acquired 6m band. Similar in appearance to the IC-275/475 2m and 70cm base stations, the beauty of this new transceiver from ICOM is that it gives you the best of both worlds, 6 & 10m in one compact unit. The IC-575 covers 28-30MHz and 50-54MHz.

Operating modes are SSB, CW, AM & FM. Power output is 10 watts (AM 4 watts) with a front panel control to reduce output for QRP operations. A pass band tuning circuit narrows the I.F. passband width, eliminating signal in the passband. A built-in notch filter eliminates beat signals with sharp attenuation characteristics.

Some PLL systems have difficulty meeting the lockup time demands placed on them by new data communications. This is why ICOM developed the DDS (Direct Digital Synthesizer) method. With a lockup time of just 5msec the DDS method allows the IC-575 to handle data communications such as packet or AMTOR. 99 programmable memories can store frequency, mode, offset frequency and direction. A total of four scanning functions for easy access to a wide range of frequencies, memory scan, programmed scan, selected mode memory scan and lock out scan. The IC-575 has an internal A.C. power supply, but can also be used on 13.8v DC for mobile or portable operation.

Optional accessories available are the UT36 voice synthesizer, the IC-FL83 CW narrow filter, SM7 external loudspeaker, HP2 communication headphones and SM8/SM10 desk microphones. Other transceivers available in this range are: IC-275E 2m multimode 25w, IC-275H 2m multimode 100w, IC-475E 70cm multimode 25w, IC-475H 70cm multimode 75w.

IC-505, 50MHz Transceiver

The IC-505 is a 6mtr BAND SSB, CW, FM (Optional) transceiver. It can be used as a portable or like other transceivers of this type as a base station unit. When used with an external 13.8v power supply the 505 gives 1Q watts RF output, 3 watts or 0.5 watts on low power is available when using internal batteries. Other features include 5 memories with memory scan, program band scan, dual VFO's with split operation.

The easy-to-read LCD readout includes frequency, memory scan and call modes. Full metering of battery condition signal strength and power output is provided. When fitted with the optional EX248 FM unit the IC-505 offers 50MHz operation at an affordable price.



Helpline: Telephone us free-of-charge on 0800 521 145. Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders. Thank you.

Datapost: Despatch on same day whenever possible.

Access & Barclaycard: Telephone orders taken by our mail order dept, instant credit & interest-free H.P.



THE RACAL RA 3701 HF RECEIVER

by Brian Kendal G3GDU

From what is published in the amateur radio press and what is often heard over the air, the average radio amateur can be excused for believing that modern HF communications equipment is no longer produced in this country.

Nothing could be further from the truth, for at the present time there are at least five British manufacturers producing communications equipment which is as good as, if not better than, any produced elsewhere in the world. The problem is that such quality does not come cheaply and for the cost of one such receiver, it is possible to purchase half a dozen average amateur transceivers.

What separates this equipment from that with which we are all more familiar? I recently had the opportunity to find out when I visited the Racal factory and tried their RA 3701 – the latest in a long line of superb receivers.

The RA 3700 series

The Racal RA 3700 series of receivers was designed to meet the requirements of many types of commercial service. These include such diverse functions as air traffic control, military and diplomatic communications, broadcasting, news services and many others.

Although these requirements have much in common, they also differ to some degree. To meet these variations, rather than developing a number of different types of equipment, Racal have developed a receiving system which might easily be reconfigured to meet the needs of various services.

This is achieved by providing a 'receiver control unit' (MA 3700) which comprises a power supply, processor module and front panel assembly mounted on an open frame arrangement, into which other modules may be plugged as necessary. These three basic modules provide the necessary control functions for all receivers in the RA 3700 series.

The RA 3701 – 4

The basic RA 3701 receiver is configured by adding four modules to the receiver control unit. These are the front end, first local oscillator, IF/AF and reference/BFO modules. Together they form a standard communications receiver covering 15kHz to 30MHz.

After inserting these modules, five spare positions can be used either for a range of optional extras for the basic receiver such as sub-octave filter, seven additional IF filters, FSK, ISB, frequency

standard, etc, or, alternatively, a second independent receiver controlled by a common processor on the same chassis. The latter option is known as the RA 3702.

Two further options remain. The RA 3703 and RA 3704 are single and dual remote controlled receivers.

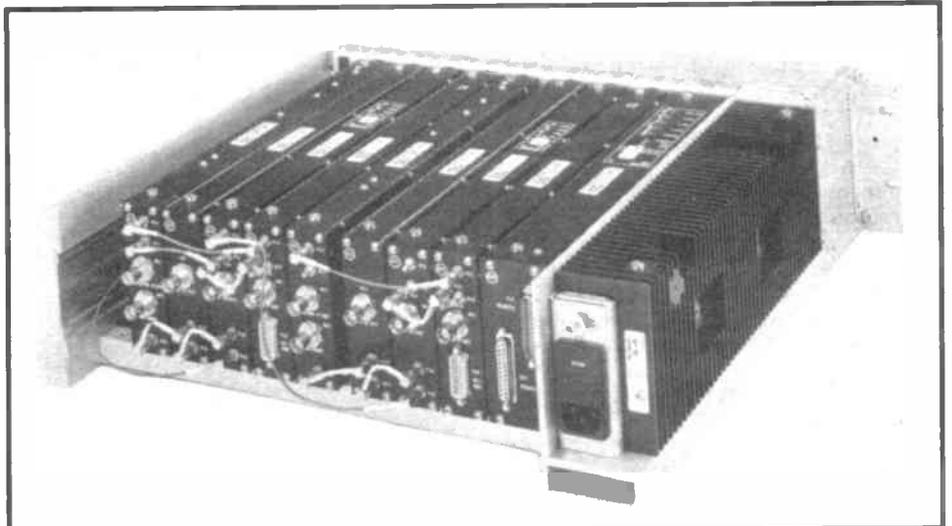
Development continues and it is understood that the intention is to extend coverage into the VHF/UHF spectrum. Each receiver includes, as standard, a serial ASCII remote control interface with a built-in multi-addressing capability for up to 100 receivers.

Slave receivers may be controlled by computer, an MA 3700 control unit, or by using the RA 3701 or RA 3702 receivers – both have built-in control facilities.

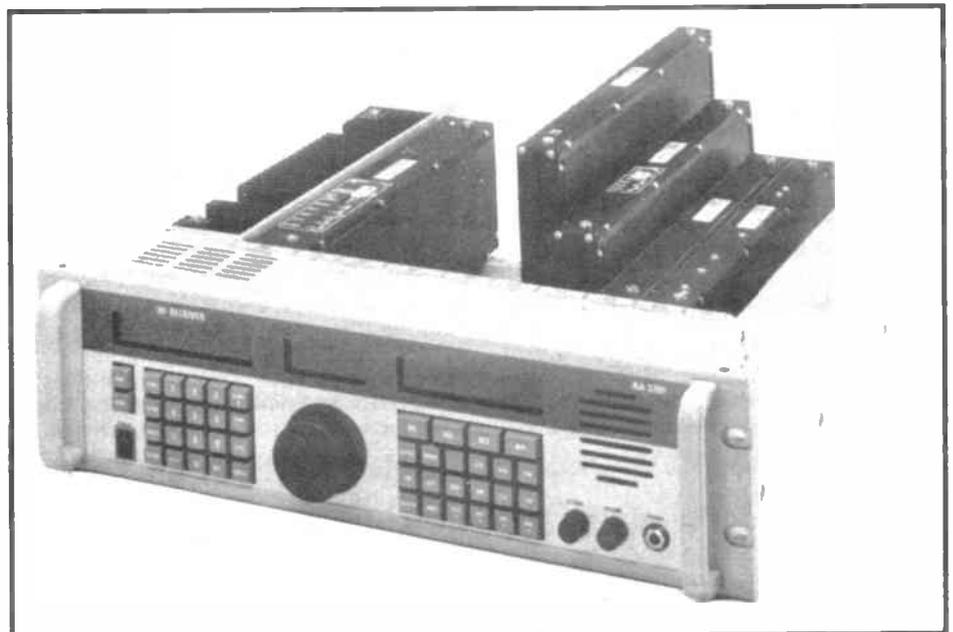
Operating the RA 3701

At first sight the panel, with its three separate displays and two keypads, might seem complex to operate. After only a few minutes' practice, however, the principles of operation become obvious and are very quickly mastered.

Frequency selection, for example, is quite logically initiated by pressing the

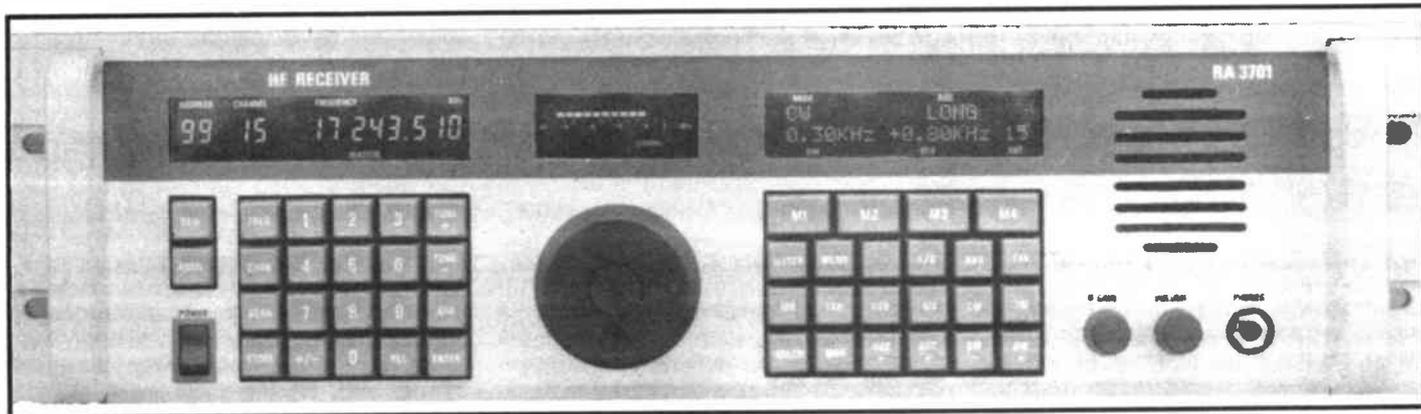


MA 3700 receiver control unit with a complete set of modules



RA 3701 with two modules ready for insertion

THE RA 3701 HF RECEIVER



The front panel of the RA 3701 HF receiver

keys marked 'freq' (followed by the required frequency) and 'enter'. Further adjustment can be achieved using a conventional tuning knob or by using the 'tune +' or 'tune -' keys. The frequency increases in 1Hz steps which, to all intents and purposes, is as smooth as an analogue control.

The memory circuits of the RA 3701 are capable of storing frequency, AGC characteristics, mode, bandwidth, gain and BFO settings for 100 channels in a non-volatile memory. The parameters of any stored channel can be displayed, but the receiver will continue operating on the previously selected channel until the enter key is pressed.

Up to the full 100 channels may be scanned with programmable start/stop channels and dwell time, with automatic stop on detection of a signal. Similarly, a bandsweep may be initiated between selected frequencies with selected step size and sweep rate.

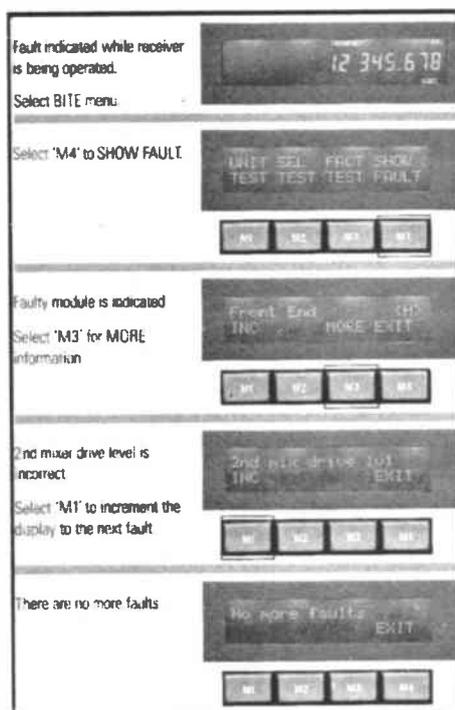
When BFO adjustment is required, the BFO key is pressed and the frequency may be varied by using the main tuning knob or the \pm and numeric keys. The selected frequency is indicated by the right-hand display.

Fault finding

All these functions are controlled from the left-hand keypad and the central tuning knob. Above this pad is a back-lit LCD display which indicates the frequency, channel number, receiver address and receiver status (master or remote). Additionally, should the 'BITE' (built-in test equipment) detect a problem, the word 'fault' will be displayed.

The second display is located above the tuning knob and indicates either the RF signal strength in dB above 1mV or the audio output level in dBm; or, if the FSK module is fitted, a tuning scale. Furthermore, the selected tuning knob function is shown.

The right-hand keypad comprises twenty-two keys, four of which operate a menu system which controls frequency sweep, channel scan parameters, aerial selection, passband tuning or, in conjunction with the BITE circuitry, fault location. Prompts for all the menu selections are shown on the display



Step by step sequence of locating a fault via the BITE circuitry

above the keypad.

The remaining keys in this pad control such functions as bandwidth mode (USB, LSB and five symmetrical bandwidths between 300Hz and 12kHz), AGC characteristics, squelch level and the on/off switch for the loudspeaker.

BITE

The RA 3701 has built-in test facilities which can be controlled locally or remotely. Thus, should a remote receiver at a distant receiving station become faulty, the technical staff can identify the fault before leaving the control station and ensure that they are carrying a replacement. The plug-in modules are designed in such a way that no alignment or other adjustment is required when replacing a faulty item before returning the receiver to service.

The test facilities operate at five levels:

1. At power-up, automatic basic processor module and memory tests.

2. Continuous monitoring for correct operation.

3. Operator-initiated confidence check provides a complete self-test of all modules (the receiver is out of service during this test).

4. Fault finding, which calls up any of the automatic tests on request and includes signature analysis. Tests requiring manual intervention, such as remote control loop-back tests, are included at this level.

5. Factory test, in which the receiver cycles through an automatic self-test.

Test results are displayed and faults can be investigated using the BITE menu facilities in conjunction with the four keys marked M1 to M4 on the right-hand keypad. Step-by-step instructions are shown on the right-hand display.

When a faulty module has been located, further investigation to component level can be achieved by using a receiver as a test bed. For this, only standard proprietary test equipment is required.

Performance

In considering the performance of a receiver such as the RA 3701, professional operators do not necessarily place the various parameters in the same order of importance as a radio amateur. An amateur, for example, might consider maximum sensitivity of prime importance; professional communications circuits are designed to provide adequate signal strength, thus the sensitivity of the receiver may not be quite so important. Nevertheless, a 1mV SSB signal applied to the RA 3701 will typically give a 19dB signal plus noise-to-noise in a 2.7kHz bandwidth.

It is, however, in the reciprocal mixing, blocking, inter and cross-modulation characteristics that the RA 3701 excels. As with many modern receivers, the RF amplifier can be switched out of circuit when not required, with consequent improvement in these characteristics.

For example, in the case of reciprocal mixing, with a wanted signal of 1mV EMF in a 2.7kHz bandwidth, an unwanted signal (20kHz removed) must be typically more than 102dB above the wanted signal to produce a noise level equal to

THE RA 3701 HF RECEIVER

the wanted signal with the amplifier in circuit. When switched out, this improves to 115dB above the wanted signal.

The cross modulation characteristics are equally impressive. With a wanted signal of 1mV EMF, an unwanted signal 30% modulated and more than 20kHz removed must be in excess of 1V to produce an output 20dB below the wanted signal.

Most impressive of all, however, even with the amplifier in circuit, the third order intercept point is typically +25dBm, which improves to a staggering minimum of +32dBm with the preamplifier switched out.

On the air test

After a few minutes familiarising myself with the receiver, I started searching across the bands at the high frequency end of the range. On that particular day 10m was devoid of signals so, not surprisingly, the first sounds I heard were on 27MHz FM. Even though the receiver is not intended for this mode I was able to resolve the louder signals by switching to the AM mode, although this was obviously not as satisfactory as purpose-designed equipment.

In common with other good quality receivers the RA 3701 seems very quiet—until you tune a signal. This became apparent as soon as I tuned my first SSB

signal. Despite only indicating a strength of a few microvolts, the signal-to-noise ratio was excellent. This, however, was not the real test, for it is when working on bands where extremely strong local signals are mixed with weak DX that the pedigree of a really good receiver shows itself.

As luck would have it, the 21 and 14MHz bands were not crowded and did not present the receiver with any difficulties, but on 7MHz the RA 3701 really began to show its mettle. With the selectivity tightened up, it was quite easy to read S11-2 CW next to signals which were registering strengths measured in tens of millivolts on the meter.

Duly impressed with this performance, I programmed a number of HF aviation frequencies into the memory circuits and set up a scan. As the scanning sequence 'caught' a transmission, I was able to determine the operational channel and revert to single frequency reception. Again, the performance was impressive giving excellent results, despite the rather indifferent aerial in use.

After tuning around for half an hour, I was invited to try the automatic test facilities. For this, an internal coaxial interconnection was disconnected. The fault indication was displayed on the left-hand display and within a few moments,

by using a series of menu selections in conjunction with the four upper keys on the right-hand keypad, the fault was localised to lack of drive to one of the mixer stages.

General Impressions

My time with the RA 3701 was necessarily limited, but I quickly concluded that this was the best receiver I have ever handled. Although on paper the sensitivity might not be quite as high as others, it is more than adequate. The other front end characteristics are outstanding and in these days of extremely crowded bands, both commercial and amateur, can make all the difference between communication being maintained or not.

Despite a relatively complicated appearance the RA 3701 is quite simple to operate, and the versatility of the BITE and remote control, together with ease of maintenance and its excellent performance in adverse conditions, will be a boon to the commercial operator.

Unfortunately, the necessarily high cost of this high-quality commercial equipment puts it outside the pocket of all but a very few amateurs but perhaps in a few years, say, just after the turn of the century, a few may find their way into amateurs' shacks.

It's just a matter of waiting for the treat in store!

SATELLITE TV RECEIVING EQUIPMENT

DRAKE ESR3240 RECEIVER 950-1750MHz. Less than 7db threshold. Rotary switch channel tuning..... £199.00

LNB's for KU band, 10.95-11.7GHz £58.00

Chaparral KU Polarotor £49.00

SPECIAL OFFER PRICE

All three above items @ £295.00

Dish Spinners

60cm RAW	£18.30	80cm RAW	£21.55
90cm RAW	£27.45	1.0M RAW	£40.05
1.2M RAW	£48.10	1.5M RAW	£70.25
1.8M RAW	£92.25	2.3M PTD	£172.96

LNB's

KU Band from	£58.00	Feed horns	
C Band from	£76.50	KU Band from	£23.25
		C Band from	£24.40

Actuator Arms

12in, Pot type	£90.35	Positioner	
18in, Pot type	£95.75	E/W Remote control	£82.80

Carriage and VAT to be added to all prices

World Satellite Almanac — contains over 650 pages with full details on satellites, footprints, charts, tables, etc. Price: £15.00 + carriage

The World of Satellite TV — over 200 pages on everything you need to know about selecting, installing, operating and maintaining your satellite earth station. Price: £9.95 + carriage

HARRISON ELECTRONICS

**Century Way, March, Cambs PE15 8QW
Tel: (0354) 51289**

BANDEDGE ANTENNAS

Vertical HF ANTENNAS for 10-15-20 designed and manufactured in the UK. We introduce a new concept in design giving exceptional performance with a very low VSWR across the band and no adjustments required. Superb mechanical construction, extruded aluminium brackets, stainless steel and galvanised fittings, high tensile tubing, waxoil coating to prevent corrosion. DX TRISTAR. Introduced at NEC 'SUPERB DX PERFORMANCE FROM THE SMALLEST OF GARDENS' Have you seen the review? A new approach to the TRI-BAND vertical ground plane using two trapped tubular self supporting radials. Very easy to assemble, no adjustments necessary. Price **£94.00**.

WBV-1 TRI-BAND vertical with wire radial kit. Price **£70.00**.

Prices include VAT, post, packing and insurance
Please send for details to:

MYANDERING LTD

**Barnwell House, Barnwell Drive Cambridge CB5 8UJ
Tel: 0223 410699**

NEWSAGENT ORDER FORM

Amateur
RADIO

To (name of newsagent)

Please order a copy of *Amateur Radio* for me every month

NAME

ADDRESS

Newtrade distributors: SM Distribution, 16-18 Trinity Gardens,
London SW9 8DX. (Tel: 01-274 8611)



Tony Smith G4FAI takes his bimonthly look at the world of dots and dashes

Bold's second Morse theorem

Last November I quoted the 'first Morse theorem' of Dr Gary Bold ZL1AN from The Morseman, in NZART's **Break-In**. His second theorem of 'perceived speed inflation' is as follows: 'As operating experience grows, CW operators progressively underestimate their sending speed.'

Gary comments: 'This is quite subconscious. An experienced operator once told me, "I called CQ at about 12wpm on 80 last night, hoping to talk to some new hams - but nobody answered". I had, in fact, heard him, but he was actually sending at nearly 20wpm as measured by my code reading software. He found this hard to believe and was astonished when I sent him some "true" 12wpm. So if you really want to give a newcomer some practice, please check your speed. 12wpm is five dots per second. Set your keyer with a stopwatch'.

New Q signal

Moe Lynn VE6BLY wrote to me recently. 'Have you heard the new Q signal - QKS?' This, he says, means 'how many knobs does your radio have?' Using his new IC-761 with its built-in ATU and electronic keyer, he replies '70/6'. This means it has seventy or more, but he only knows how to use six of them... In fairness to Icom, he goes on to say that it is not difficult to use them all and to understand them, but not all in one day perhaps.

Moe knows both International and American Morse, and was sending messages in the latter code for his father on the Canadian National Railway as a youngster. He is a keen QRPer so if you hear him coming through on the HF bands while conditions continue to improve, call him and mention that you have read about him in this month's 'Morse Report'.

The mother tongue

Many Morse operators are surprised to learn that they are not using the original Morse code. There were two earlier

versions before Samuel Morse and his partner Alfred Vail settled on what land-line operators in the US call 'Morse' code, to distinguish it from our own 'Continental' code.

Just to confuse things, outside the States our code was also called 'Morse' and the US land-line code became 'American' Morse. As I have mentioned before, this latter code is still used by Morse Telegraph Club members, including old-timers who worked with the code professionally and younger operators who use it to participate in MTC activities.

American Morse is fondly known as the 'mother tongue', although an important distinction is that it is received and read only on sounders. Amateurs using the code have converters enabling tone signals from their rigs to drive their sounders; while some enthusiasts, including non-amateurs, maintain their skills by tape exchanges or by exchanging signals over the public telephone system.

International Morse

Our code has had several names. When the Morse telegraph system was introduced in Germany in the late 1840s, it was found that American Morse was not entirely suitable for the German language, so a number of German States developed their own versions of the code.

In 1851, the code devised by a telegraph official named Gerke was adopted throughout Germany and became known as 'Austro-Germanic' Morse. This code included sixteen of Morse's original symbols, but in a number of cases meanings were changed.

As its use spread across Europe; it became known as Continental Morse; hence, the original American use of the term which persists to this day. When US ships stopped using American code at sea around 1912, Continental Morse was adopted for all international communications. It eventually became known as

International Morse, distinguishing it from a number of other codes including Arabic, Greek, Turkish, Japanese and Russian Morse.

Over the years various changes have been made to Gerke's original code, including numerals, some punctuation, spacing and the addition of further European letters. It is a fascinating subject, but I only have space here for the briefest outline. I am still gathering information and hope to eventually publish a detailed account of International Morse code (or should it be Gerke code?) in **Morsum Magnificat**.

EUCW looking back - and forward

The European CW Association had a good year in 1988. It welcomed the rapidly growing FISTS CW Club into its membership, repelled the AMTOR threat to CW frequencies in the 40m band (see 'Morse Report' September 1988), commenced a new EUCW net, held another successful 'fraternising CW party' in November, announced a new EUCW 'Straight Key Day' to be held on 24 June and decided to seek fraternal links with CW clubs outside Europe to further strengthen its purpose of supporting, encouraging and defending amateur radio CW activity.

The EUCW net is held every Tuesday at 1900hrs on 3555kHz (plus or minus QRM) with QSX to side frequencies as an available option. The net controller, SM7GWF, is assisted by OZ80 and DL2ZAV. Although intended as a forum for representatives of EUCW clubs to meet and get to know each other, it also runs as an ordinary 'rag-chew' net and all amateur stations are welcome to check-in.

The new Straight Key Day is open to all amateur CW operators and they are invited to send in three votes, one for each of the best three FISTS worked. Participants receiving at least two votes will receive a 'Straight Key Award' free of charge. Full details will be in the next issue of 'Morse Report' (or send me an SAE if you want it earlier). In the meantime, make a note in your diaries now for what promises to be a very nice straight key event with much activity across the United Kingdom and the rest of Europe.

Another nail?

The 'RNARS Newsletter' (Winter 1988) reports the remarks at its AGM of the RNARS's president, Captain A J C Morrow, on the future of Morse in the Royal Navy and elsewhere.

A decision has apparently been made for a gradual reduction of Morse skill throughout the NATO navies, therefore, Mercury has reduced its training effort accordingly. All new entrants will learn Morse in their early training, enabling them to use visual Morse in the fleet. At the radio 'leading rate' level they will be required to operate at 12wpm, although submariners will continue to train at higher speeds. Captain Morrow concluded with the significant words, '... we cannot afford to overtrain where navies have shown the requirement no longer exists'.

SHORT WAVE LISTENER

TREVOR MORGAN GW40XB

Although the winter months present us with fewer daylight hours and the closing down of the high frequencies much earlier in the day, there are still those who manage to find stations worth logging.

Sometimes I think that, judging from the mailbox, most short wave listeners (and, for that matter, licensed amateurs) are either unemployed, working peculiar shifts or retired. For many of us, getting on the air is a struggle in itself and, with early closedown of the DX bands, a session can be of only an hour or so. Nevertheless, when the time is available and the shack has warmed up, it's an even greater pleasure to make a contact with just about anywhere! If you happen upon a choice piece of DX when the receiver is getting its first airing for the week, isn't it a nice feeling? That's the beauty of this hobby; it doesn't have to be taken too seriously and can give immense satisfaction even if only taken in small doses.

Awards and contests

Terry Lincoln of Weymouth is one of the chaps who are taking advantage of the present high sunspot situation to get into the high frequencies. His trusty FRG-8800 has been well fired up on 15m where he found 3B9, 5B4, 5N28, 6W7, A92, BY2, BV3, BT0, FK2, HL0, J87, JT1, TU3, T31, YC6, YA3, ZF6, ZP8 and a whole batch of others for his Silver Award for 500 prefixes on the one band. Very nice logging, Terry.

David Davidson of Ayrshire used his FRG-7 to no less a degree on all the bands and came up with a superb list for his Gold Prefix Award for 1,000 prefixes logged over all bands. Some super stuff here, also, with A22, AL7, A71, BV6, FG6, FO8, HH5/KC4, HL0, HS0, H44, JW7, J6, KG4, KX6, POJ0/OH0, T5, VK0, VQ9, ZD7, ZD8, ZK1, Z2, 4S, 5W and many, many others. A very fine effort, David!

Our friend from East Germany, Peter Uhren of Waren,

also gets in the awards list yet again. This time, his claims were for the African and Oceanic Continental awards. No mean listener, is our Peter, with many creditable awards to his name including 'National Champion SWL' for best places in five contests including the CQM and IARU (2,300 + QSOs logged in twenty-four hours). His DXCC score currently stands at 317 heard with 310 confirmed!

The UBA SWL Championship is open to all listeners. You have to have received confirmed SWL reports from 100 DXCC countries, all continents, all Belgian provinces and twenty other 'ON' stations.

There is an entry fee of five IRCs, and all entries should be sent to: Cyriel Verbist ONL2500, Helhoekweg 6, 2310 Rijkvorsel, Belgium. There are no band, mode or time restrictions on this award.

Derby and District ARS announce their third annual 144/146MHz contest, to be held on Sunday 12 March 1989, from 1300 to 1700GMT.

Any mode is permitted (within the recognised bandplans) and fixed or portable entries are permitted. SWL entries should show the time the station was heard, the report sent and the county sent.

Scoring is ten points for G3ERD and two points for every other station. Multiply the total points by the number of counties for a final score. Each overseas country counts as a county.

Entries should be sent to Derby and District ARS, 119 Green Lane, Derby DE1 1RZ, to arrive not later than 29 March.

Marine monitoring

As you know, there are many facets to this hobby and there is something here for everyone. Some enthusiasts are interested in amateur bands while others find their interest lies in the broadcast bands, airbands or some other aspect of the hobby.

This month, we have a look at the VHF marine bands.

If you are interested in marine monitoring on the VHF bands, the ideal receiver is, as with airbands, a scanning receiver which will enable you to continuously monitor the necessary frequencies. In this case we are looking at 156.00 to 170.00MHz, which cover the simplex and duplex operation frequencies. In duplex operation, stations transmit on one frequency and receive on another, these channels being preset in the transceiver for duplex operation.

There are small, cheap receivers on the market which can be used for marine reception, such as the Icom 8342 (note the subtle name similarity!) which covers air, marine and public service bands for less than £30.00. If you are not sure of which area of listening you want to get into, a little receiver like this is probably a good buy.

However, if you are seriously interested in marine listening, then a scanning receiver is the pukka job but you are going to have to pay for it.

The FS10 hand-held scanner has ten crystal-controlled channels which are scanned in about 700ms and will lock on any occupied channel. It costs about £120.00.

The Bearcat 50XL requires no crystals and covers from the 10m amateur band to 512MHz in ten bands. It has ten programmable channels and a number of other features. It costs about £100.00.

The Black Jaguar 200 also covers a wide range of frequencies from 26MHz to 520MHz but in five bands. It has sixteen memory channels, scanning ten channels per second. It costs about £225.00.

The Sony Air 7 has an LW/MW/SW AM coverage from 150 to 2194kHz and VHF/FM coverage to 174MHz. This receiver has forty memory presets, priority channel and direct keyboard tuning. It costs about £250.00.

The AOR2002 is a real base station receiver covering from 25 to 550 and from 800 to 1300MHz. It has twenty memory channels with scan and search modes and can be linked to a computer, offering many additional features. It costs about £475.00.

Of course, the price and facilities increase proportionately from the Bearcat 100XL at £189.00 to the Yaesu FRG-9600 at £509.00 or the Icom IC R7000 at £957.00. You know your requirements and the size of your bank balance, so you make your choice. Once again, however, it pays to buy from a good dealer who has a reputation to protect!

What about aerials? Well, once again, the market is full of offers but, fortunately, the cost of antennas in these frequencies is nowhere as expensive as in the high frequency bands.

A good quality discone aerial covering 25 to 1300MHz will set you back about £82.00, or a cheaper version with less VHF coverage (70 to 500MHz) will cost as little as £33.00. (Incidentally, mine shows a 1.2:1 SWR on 2m and works fine on transmit).

So, with the simplest receiver and a small antenna, you can receive the VHF marine band, airband and the amateur 2m band (and a lot more besides) for less than £100.00!

SOS calls

As with airband or any other 'service' reception, no one really minds you listening in, providing you do not go around telling all and sundry about what you've heard. If, however, you should hear someone calling SOS, take down the details! Note the time, frequency, name of the vessel and any map reference given and call the coastguard immediately. There's an even chance that they heard the signal first, but you could be the one to help in an emergency.

Regular readers may remember Bob Watters of St Stephen in Cornwall who, last

Table 1

Boxing night, heard a call from a vessel in distress and informed the authorities. Their comment was '...we were grateful for his public-spirited action in making sure we had the information at the earliest possible moment...'. The lucky survivors were picked up by an East German freighter.

So, you never know what is going to happen. An innocent couple of hours on the receiver could develop into a drama! The important things to remember are to always log the signals you hear and keep local shipping charts to hand.

The distress and initial call frequency is 156.800 so this is the first frequency you should find on your receiver. If it is of the simple dial type, make a clear mark on the dial so that you can find it easily. For crystal-controlled receivers you have to have the correct 'rock' and these are available from a dealer or a crystal specialist. It is a good idea to program your memory-type receiver to channel 16 or the priority channel for this frequency.

During initial calls you will probably hear something like 'Coastguard to Sea Maid go to channel 67 over'. The operator on Sea Maid will acknowledge the channel number and go to that channel for further instructions or information. If you have full scanning facilities or a dial-type receiver, you can follow them up to that channel and listen to the rest of the contact.

The marine channels are set at 25kHz points from 156.000MHz to 163.000MHz. Many of these channels are for duplex operation (see **Table 1**), as I explained earlier, but the simplex channels are shown in **Table 2**.

Most marine receivers cover to 174.000MHz, but beyond 163.000MHz you will find mostly 'utilities' such as ambulances, public transport and so on.

There are some excellent books on the subject available from various sources, including full frequency guides. As with all radio monitoring, marine listening can become a very absorbing pastime and there are many enthusiasts who listen to nothing else. If you've never tuned into this section of the bands, why not give it a try?

Table 2

VHF MARINE FREQUENCIES. . . DUPLEX			
Frequency	Duplex	Channel	Station or service
156.025	160.625	60	Ship channel Start Point
156.050	160.650	01	
156.075	160.675	61	Ship channel Scillies, Anglesey
156.100	160.700	02	Ship channel Thames
156.125	160.725	62	Ship channel Pendennis, Forth, Orfordness, St Peter Point
156.150	160.750	03	Ship channel Cardigan Bay
156.175	160.775	63	Ship channel Bacton, Hastings
156.200	160.800	04	Ship channel Niton, Morcambe, Grimsby
156.225	160.825	64	Ship channel Lands End, Bacton
156.250	160.850	05	Ship channel Ilfracombe, Lewis, North Foreland, Weymouth Bay
156.275	160.875	65	Ship channel Start Point,
156.300		06	Coastguard and Intership
156.325	160.925	66	Ship channel North Foreland
156.350	160.950	07	Ship channel Bacton, Hastings, Ilfracombe
156.900	161.500	18	Ship channel
156.925	161.525	78	Ship channel St Peter Point
156.950	161.550	19	Ship channel Port operations
157.975	161.575	79	Ship channel Port operations
157.000	161.600	20	Ship channel Port operations
157.025	161.625	80	Ship channel Port operations
157.050	161.650	21	Ship channel Port operations
157.075	161.675	81	Ship channel Niton
157.100	171.700	22	Ship channel Port operations
157.125	171.725	82	Ship channel Jersey, Morcambe Bay, Orfordness
157.150	171.750	23	Ship channel Malin Head
157.175	171.775	83	Ship channel Thames
157.200	171.800	24	Ship channel Celtic, Collaforth, Forth, Humber, Skye
157.225	171.825	84	Ship channel Cromarty
157.250	171.850	25	Ship channel Buchan, Islay, Jersey, Severn, Whitby
157.275	171.875	85	Ship channel Humber, Lands End, Malin Head, Niton
			Ship channel Anglesey, Clyde, Cullercoats, Hebrides, Humber, North Foreland, Orkney, Start Point, Stonehaven
157.300	171.900	26	Ship channel
157.325	171.925	86	Ship channel Hebrides, Grimsby, Lands End, Port Patrick, Shetlands
157.350	171.950	27	Ship channel Buchan
157.375	171.975	87	Ship channel Anglesey, Cardigan Bay, Cromarty, Niton, Whitby
157.400	162.000	28	Ship channel
157.425	162.025	88	
157.450	162.050	to	
158.400	163.000		Private message handling service
157.850		M	Marina channel

VHF MARINE FREQUENCIES. . . SIMPLEX		
Frequency	Channel	Station or service
156.000	0	Coastguard only
156.375	67	Small craft safety, Malin head
156.400	08	Intership
156.425	68	Marine
156.450	09	Intership
156.475	69	Intership
156.500	10	Intership
156.525	70	Digital selective calling/distress
156.550	11	Marine
156.575	71	Port operations
156.600	12	Port operations
156.625	72	Intership
156.650	13	Intership
156.675	73	Intership
156.700	14	Port operations
156.725	74	Port operations
156.750	15	Intership
156.775	75	Guard band
156.800	16	DISTRESS/initial calls. St Peter Pt, Weymouth
156.825	76	Direct printing telegraphy/distress
156.850	17	Port operations
156.875	77	Intership

VISA
PHONE
0474 560521

P.M. COMPONENTS LTD
SELECTRON HOUSE,
SPRINGHEAD ENTERPRISE PARK, SPRINGHEAD ROAD,
GRAVESEND, KENT DA11 8HD

TELEX
966371
TOS PM

INTEGRATED CIRCUITS

AN103	2.50	LA4430	2.50	AL1327Q	1.10	TA7699P	2.95	TCA760	2.50	IDA4050	2.98	AA119	0.10
AN124	2.50	LA4481	3.95	SN7474	2.50	TA7611AP	2.50	TCA800	6.95	IDA4600	2.50	BA115	0.13
AN214	2.50	LC7120	3.25	SN7421	0.85	TA7629	2.50	TCA830S	1.95	TEA1000	1.15	BA145	0.16
AN214Q	2.50	LC7130	3.50	SN76110N	0.89	TAA310A	3.50	TCA900	2.50	TEA1009	1.35	BA148	0.17
AN236	1.95	LC7311	5.50	SN76115N	1.25	TAA320A	3.50	TCA940	1.65	UPC41C	3.60	BA156	0.18
AN239	2.50	LC7317	3.50	SN76111N	1.30	TAA350A	0.95	TDA440	2.20	UPC566H	2.95	BA157	0.30
AN240P	2.50	LM323K	4.55	SN76222DN	2.95	TAA550B	1.85	TD41001	2.95	UPC566H	2.95	BA244	0.75
AN247	2.50	LM324N	0.45			TAA570	1.95	TD41003A		UPC566H	2.95	BA245	0.75
AN260	2.95	LM380N	1.50	SN76227N	1.05	TAA621	3.95	TD41006A	1.50	UPC10001H	1.50	BA301	0.75
AN262	1.95	LM380NB	2.95	SN76228N	2.95	TAA6320S	2.95	TD41010A	1.95	UPC10020H	1.95	BA302	0.85
AN264	2.50	LM383T	2.95	SN76229N	1.95	TAA661B	1.95	TD41011	2.15	UPC1024H	2.95	BA303	0.75
AN271	3.50	LM390N	3.50	SN76533N	1.65	TAA700	1.70	TD41012	2.15	UPC1024H	2.95	BA304	0.75
AN301	2.95	LM1011	3.15	SN76560N	1.15	TAA930	3.95	TD41013	2.50	UPC1024H	2.95	BA305	0.75
AN303	3.50	M51510	2.95	SN76560N	0.90	TAA930S/B/C		TD41014	1.50	UPC1025H	1.50	BA306	0.75
AN313	2.95	M51513	2.30	STK011	7.95	TAA120AS/B/C	1.00	TD41015	1.95	UPC1025H	1.50	BA307	0.75
AN315	2.25	M51521L	1.50	STK014	7.95	S/VS/BT/UT		TD41016	1.95	UPC1025H	1.50	BA308	0.75
AN316	3.95	MB3705	1.80	STK015	5.95	TBA395	1.50	TD41170	1.95	UPC1028H	0.95	BA309	0.75
AN331	3.95	MB3712	2.00	STK018	7.95	TBA396	0.75	TD41180	2.15	UPC1028H	0.95	BA310	0.75
AN342	2.50	MC1307P	1.00	STK025	11.95	TBA440N	2.55	TD41270Q		UPC1032H	1.50	BA311	0.75
AN343	2.95	MC1307P	1.00	STK032	7.95	TBA480Q	1.95	TD41270Q		UPC1032H	1.50	BA312	0.75
AN344	2.95	MC1307P	1.00	STK078	11.95	TBA510	2.50	TD41270Q		UPC1032H	1.50	BA313	0.75
AN345	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA314	0.75
AN346	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA315	0.75
AN347	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA316	0.75
AN348	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA317	0.75
AN349	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA318	0.75
AN350	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA319	0.75
AN351	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA320	0.75
AN352	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA321	0.75
AN353	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA322	0.75
AN354	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA323	0.75
AN355	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA324	0.75
AN356	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA325	0.75
AN357	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA326	0.75
AN358	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA327	0.75
AN359	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA328	0.75
AN360	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA329	0.75
AN361	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA330	0.75
AN362	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA331	0.75
AN363	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA332	0.75
AN364	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA333	0.75
AN365	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA334	0.75
AN366	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA335	0.75
AN367	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA336	0.75
AN368	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA337	0.75
AN369	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA338	0.75
AN370	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA339	0.75
AN371	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA340	0.75
AN372	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA341	0.75
AN373	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA342	0.75
AN374	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA343	0.75
AN375	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA344	0.75
AN376	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA345	0.75
AN377	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA346	0.75
AN378	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA347	0.75
AN379	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA348	0.75
AN380	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA349	0.75
AN381	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA350	0.75
AN382	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA351	0.75
AN383	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA352	0.75
AN384	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA353	0.75
AN385	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA354	0.75
AN386	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA355	0.75
AN387	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA356	0.75
AN388	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA357	0.75
AN389	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA358	0.75
AN390	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA359	0.75
AN391	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA360	0.75
AN392	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA361	0.75
AN393	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA362	0.75
AN394	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA363	0.75
AN395	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA364	0.75
AN396	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA365	0.75
AN397	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA366	0.75
AN398	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA367	0.75
AN399	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA368	0.75
AN400	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA369	0.75
AN401	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA370	0.75
AN402	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA371	0.75
AN403	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA372	0.75
AN404	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA373	0.75
AN405	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA374	0.75
AN406	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA375	0.75
AN407	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA376	0.75
AN408	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA377	0.75
AN409	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA378	0.75
AN410	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA379	0.75
AN411	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1032H	1.50	BA380	0.75
AN412	2.95	MC1307P	1.00	STK085	8.95	TBA510Q	2.50	TD41270Q		UPC1			



P.M. COMPONENTS LTD

ELECTRON HOUSE SPRINGHEAD ENTERPRISE PARK, SPRINGHEAD ROAD GRAVESEND, KENT DA11 8HD

PHONE

0474 560521

FAX NO.0474 333 762

TELEX

966371

TOS PM

A SELECTION FROM OUR STOCK OF BRANDED VALVES (Contd)

A1714	24.80	ECF86	1.70	GD86W	6.00	N37	9.25	VR105/30	2.50	4-250A	85.00	6CA7	2.50	774	2.50	35A3	3.95	5704	3.50
A1834	7.50	ECF200	1.80	GD1720M	8.00	N78	1.50	VR150/30	2.50	4-400A	87.80	6CB5	3.95	888	2.50	35A5	4.90	5718	6.18
A1998	11.80	ECF202	1.85	GN1	0.00	OA2	1.50	VU29	4.50	1000A	428.00	6CB6	1.95	880	2.50	35LGT	2.00	5725	2.80
A2087	11.80	ECF801	0.85	GN10	19.00	OA3	2.80	WJ39	2.50	4B751B	67.00	6CD8GA	4.80	8805	1.95	35LGT	2.00	5726	2.80
A2134	14.95	ECF804	6.50	GR10G	4.00	OB2	1.80	W11	4.50	48V51B	67.00	6CF6	1.95	881	2.50	35S2GT	3.50	5748	2.80
A2293	6.50	ECF805	2.80	GS10C	16.50	OB3	2.50	W77	8.00	4807A	1.75	6CH6	0.95	882	1.95	38E7	0.95	5750	1.88
A2426	33.50	ECF806	10.25	GS10H	12.00	OB4	2.80	W81M	4.80	4826	2.95	6CL8	3.25	10D2	1.25	40KD8	8.80	5751	2.85
A2599	37.50	ECF807	4.50	GS12D	14.00	OB5	2.50	W729	1.00	4828	1.95	6CL8A	1.50	10D7E	2.50	42	6.85	5783	2.85
A2792	27.80	ECH4	4.25	GTIC	14.00	OM3	2.80	RPK2K5	62.80	4C35	145.00	6CM7	2.95	10DX8	2.80	47	6.85	5823	2.85
A2900	11.80	ECH35	3.50	GU20	35.00	OM4	2.80	X41	4.50	4CX125C	65.00	6CS6	0.78	10E8B	1.95	50A5	6.00	5823	2.85
AC3283	36.95	ECH42	1.50	GU50	17.50	OM5	3.00	X41	4.50	Eimac	180.00	6CS7	0.88	10E8E	2.05	50B5	1.95	5829WA	6.80
AC/SP2A	4.95	ECH81	1.75	GUX1	13.80	OM6	1.75	X66/X65	4.50	4CX250B	45.00	6CW4	8.00	10F1	0.75	50C5	0.95	5840	3.80
AC/SP2EN	4.95	ECH83	1.00	GUX3	34.00	OM7	2.50	X76M	1.95	4CX250B	65.00	6CX8	2.80	10GK6	1.95	50C6DG	1.95	5842	11.00
AC5 PEN	4.80	ECH84	1.00	GUX3SS	34.00	PC86	0.75	XC24	1.80	4CX250B	65.00	6D38	1.00	11E3	55.00	50EH5	1.80	5863	98.00
AC/TH1	4.95	ECL80	0.50	GY501	14.80	PC87	0.75	XFW47	1.50	4CX350A	118.00	6DQ5	8.50	10H14	2.50	50JY6	2.95	5864	13.95
AC/TH2	59.75	ECL82	1.00	GY802	1.50	PC97	1.10	XFW50	1.80	4CX350A	100.00	6DQ6	2.80	12A6	3.95	50K5	1.80	5893	4.50
AH221	39.00	ECL83	2.80	GZ32	2.50	PC98	0.75	XG1-2500	78.00	4CX350A	95.00	6DQ8	2.80	12A6	1.50	50L5	1.80	5894	1.78
AH238	39.00	ECL84	0.74	GZ233	4.80	PC99	1.25	S11E12	38.00	4CX350A	95.00	6DQ9	1.50	12A6E	5.90	80	4.50	5965	2.15
AL60	6.00	ECL85	1.95	GZ234	2.50	PC08	0.85	S104/K	10.00	4CX1000A	428.00	6E7	2.50	12A7E	1.00	83	8.80	6005	1.85
AN1	14.00	ECL86	0.95	GZ237	4.50	PC09	0.85	S130P	5.95	4CX1500B	428.00	6E8	2.50	12A7T	1.18	85A1	6.50	6021	3.95
DL35	2.80	ECL805	0.95	HBC90	1.95	PC08	0.85	SC1/800	5.00	4CX1500B	428.00	6E9	2.50	12A7T	1.18	85A2	6.50	6021	3.95
DL83	1.00	EF37A	2.50	HF93	2.50	PC09	0.70	SC1/1100	6.00	4CX5000A	67.00	6E8B	1.75	12A7U	1.50	90AV	17.50	6059	3.78
DL70	2.80	EF39	1.80	HL41	3.50	PC08	0.80	SC1/1200	6.00	4CX5000A	67.00	6E7J	0.85	12A7U	0.85	90AV	17.50	6060	2.28
DL73	2.80	EF40	1.80	HL90	3.50	PC09	0.80	SC1/1300	6.00	4CX5000A	67.00	6E7K	0.85	12A7V	1.95	90AV	17.50	6062	4.80
DL91	3.95	EF42	3.50	HL100D	3.50	PC09	0.85	SC1/1400	6.00	4CX5000A	67.00	6E7L	0.85	12A7W	2.80	90AV	17.50	6064	2.28
DL92	1.25	EF50	2.50	KT8C	7.00	PCF82	0.60	SP41	5.00	4D21A-125A	85.00	6E7M	1.75	12A7W	2.80	91AG	9.00	6067	7.00
DL93	1.10	EF54	4.80	KT33C	3.50	PCF84	0.65	SP61	3.80	4D32	125.00	6E7N	2.95	12A7X	1.95	92AV	19.50	6072	6.95
DL96	2.80	EF55	4.95	KT36	2.00	PCF86	1.20	ST11	5.00	4G57	2.25	6F1	2.00	12A7X	2.50	95A1	6.80	6080	9.80
DL810	13.50	EF70	1.20	KT44	4.00	PCF87	1.25	STV280/40	11.95	4JG6A	2.95	6F5	0.50	12A7X	7.95	100E1	1.00	6080WA	6.80
DL815	10.00	EF72	4.80	KT45	4.00	PCF200	1.80	SU42	4.95	4K176	1.50	6F5	0.50	12A7Y	3.95	108C1	2.80	6132	18.80
DM70	6.00	EF80	0.85	KT61	6.00	PCF200	1.80	TB2-5/300	95.00	4K180A	35.80	6F7	5.80	12B7A	4.50	150B2	6.50	6136	2.80
DM160	6.50	EF83	3.95	KT63	3.50	PCF801	1.35	TB2-5/300	95.00	4X500A	350.00	6F13	3.00	12B7B	2.50	150C1K	1.80	6146B	9.50
DDO-006	78.90	EF85	0.80	KT66 USA	6.95	PCF802	0.85	TB2-300	95.00	5A102D	9.50	6F14	1.00	12B8E	1.95	150C2	2.80	6146W	12.00
DY51	1.50	EF86	2.25	KT66 GEC	28.00	PCF805	1.25	TB2-300	95.00	5A152M	9.50	6F17	2.75	12B8H	3.50	150C4	2.50	6155	72.50
DY86/87	0.75	EF86 Mullard	0.85	KT66 GEC	28.00	PCF806	1.25	TB3-750	115.00	5A163K	10.00	6F23	0.60	12B8L	1.75	165BT	1.00	6156	72.00
DY802	0.85	EF86/AV4085	0.85	KT67	9.00	PCF808	1.25	TB3-2000	450.00	5A170K	6.25	6F24	1.25	12B8R	1.95	211	33.50	6157	6.80
E551	49.50	EF89	1.50	KT77 Gold ion	11.95	PCF809	1.25	TB3-2000	450.00	5A180M	6.50	6F25	1.25	12B7Y	3.95	230D	15.00	6158	3.25
E80CC	19.50	EF89	1.50	KT81	7.00	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F28	1.28	12CA5	1.95	250TH	18.00	6189	9.80
E80CF	12.50	EF91	1.95	KT81	7.00	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E80F	18.50	EF92	2.15	KT88 USA	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E81CC	8.50	EF93	1.80	KT88 USA	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E81L	12.00	EF94	1.80	KT88	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E82CC	4.50	EF95	1.95	KT88	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E83CC	4.50	EF96/AV4085	1.50	KT88	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E83F	5.50	EF97	0.90	KT88	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E86C	9.80	EF98	0.90	KT88	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E86C	9.80	EF98	0.90	KT88	10.95	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00	5A206K	10.00	6F32	1.28	12CA5	1.95	250TH	18.00	6201	6.48
E88CC	3.50	EF183	0.78	KTW61	2.50	PCF809	1.25	TB3-2000	450.00										



News and comment from Glen Ross G8MWR

First of all some news on the latest certificate issues. As reported in an earlier issue, G1TOS has received his Silver award for 144MHz. A recent letter from him shows that this was obtained using an FT-290 driving a 30W linear to a twelve element ZL special. The best contact was with HG9RC with 5/9 reports in both directions. Chris, GM1KHU, Aberdeenshire, claims his 144 Gold award to go with the Bronze and Silver already in his collection. At the other end of the realm Colin, G6XML, from Poole, wades in for a Silver award on 70cm; his best DX was to F1BUT at 862km. Robert, G7CCY, writing from Kettering, claims a 144 Bronze with a best contact to DG6CAL at 974km. Eric, G1PEY, Barnsley, claims a Gold award on 144MHz. This one is endorsed for SSB contacts only and the best DX was to 9H1GB in Malta at a distance of 2319km.

50MHz Award

GM1KHU asks if there are any plans to offer awards for the 50MHz band? This presents a real problem. Do you look at the band as being mainly tropospheric? If this is the case, a specification for the Bronze award might well be, say, ten squares, ten counties, three countries and a distance of 300 miles. The only problem is that the first time there is an HF-type opening on the band you could easily collect that lot in an afternoon. Probably the best way to handle the band is as a DX one and base the award more on the style appropriate to, for example, 20m. Your views on this would be appreciated.

Requirements

It has been a very long time since we gave a listing of what is required to claim the various awards. First of all let me say that you cannot get an award by simply square bashing, because it involves a balanced operating procedure. In **Fig 1** B = Bronze, S = Silver and G = Gold. The figures are in the order of countries, counties, squares and kilometres.

Special class

These are issued for any exceptional contacts. Perhaps you have worked 1000km on 2m whilst running only 10mW or have managed ten miles mobile-to-mobile on 10GHz, it has been done! Post your applications for a special award and they will be issued on merit. QSL cards are not required for claims. For details send an SAE to the address at the end of this article.

Openings

There was a superb tropospheric opening on Tuesday 24 January with some excellent contacts on both 144 and 432MHz. The opening seems to have favoured stations located in the Midlands and south-west of the country with reports of the opening extending into southern Ireland. The continental end covered an area bounded by the German/Danish border, extending down into Austria and Switzerland. Many Dutch, Belgian and German stations were worked on both bands with very strong signal reports being exchanged. Two Austrian stations, both in square JN67, OE2CAL and OE2KMM, transmitted excellent signals.

Got aways

HG0HO, Budapest, was reportedly heard by several stations on the east coast but there are no reports of a contact with the station. The Swiss station HB9HB came into the Midlands very strongly on 144.865MHz but, again,

144MHz	B-7-20-20-500
	S-14-35-40-800
	G-21-50-60-1200
432MHz	B-5-15-15-400
	S-10-25-30-600
	G-15-40-45-900
1296MHz	B-3-10-10-300
	S-6-15-20-500
	G-9-20-30-700

Fig 1

no reports of any contacts into Switzerland have been received. This shows the advisability of monitoring the beacon's sub-band to get an early warning of openings. Another early warning system appears in the guise of repeater activity on 145.800MHz from Belgium and Holland. There are no British repeaters on this frequency so the continental ones are obvious even when just above the noise level.

50 net

If you are interested in observing on 6m then monitor 28.885MHz in the 10m band. This is similar to the VHF net on 20m, but all the news is about 6m and to a lesser extent 4m. It is interesting to hear the American stations calling in as they hear European beacons and TV stations starting to break through. Listening on this frequency, gave the first indications of a very strong opening across the Atlantic on Monday 23 January. Stations from Canada and the States were coming in at a tremendous signal strength. There were also reports of signals from Ecuador on the same day with several stations making contact. A nice one if you can get it.

World record

The American magazine **QST** (December 1988 issue) reports some remarkable microwave contacts in the States. A new world record on the 47GHz band of 105km was set during the ARRL contest on 6 August 1988. The two stations involved were WA3RMX/P and K7AUO. The path was between Crater Lake (locator CN28VW) and Mount Ashland, (CN82PB), in Oregon. The fact that both stations are located approximately 7300ft above sea level obviously caused no problems! The contact was made using narrow-band gear (CW/SSB) and signals peaked to S3. WA3RMX used 3.5m to a 28in dish; equivalent to an 8ft dish on 10GHz, making alignment critical to say the least. At K7AUO the power was 4.3m to an 18in dish. They are both looking for larger dishes to extend the range.

Microwaves

From the same source comes news of some superb contacts on 10GHz. The participants in these contacts were N6XQ/XE2GFH, N6XQ and NN6W. All contacts were made on 10 September.

The day started with a contact of 498 miles between N6XQ at Guerro Negro, DL27VL, and N6CA in Palos Verdes. N6CA then travelled to Beverley Hills, resulting in a contact of 521 miles. Even better was to come when N6XQ worked NN6W over a 595 mile path. NN6W was located at Santa Ynez, CM94XM. After converting this into kilometres for measuring microwave distances in Europe, this is a path length of about 952km. Signal strengths were reported to be very high – frequently going as much as 40dB above noise level.

Modes

The surprising thing about these contacts is that they were all made, not by using fairly high power SSB as might be expected, but by wideband FM. The

power and equipment were similar to those commonly used for portable work in this country. N6QX ran 80m to a 4ft dish and NN6W ran only 15m to a 30in dish. Going even higher in frequency there is a report of a new 'light-wave' contact between WA7LYI and K7YB, both located in Arizona, over a distance of 95 miles.

Pave Paws

You may remember that we ran into some trouble with the RSGB a few months ago for suggesting that the new installation at Fylingdales was part of the Pave Paws anti-ballistic missile radar system which caused so much devastation to the 70cm band in the States. First of all they denied that it was Pave Paws, only to later admit that it probably was. They also stated that it would not cause any problems, and then accepted that it probably would. It certainly would – just ask any American who tries to operate on 432MHz.

Foreign aid

Is it possible that foreign aid is coming our way from no less a person than Mr Gorbachev? Mike GBAGO sent a press cutting stating that the Soviets are pressuring the Americans to dismantle all such installations.

Quote, 'The Soviet Union says that the US is violating the strict provisions of the Anti-Ballistic Missile Treaty by modernising radar installations at Fylingdales'.

They point out that the Americans have stated specifically that a similar Soviet installation at Krasnoyarsk must be dismantled.

Salvation

So perhaps we will be spared the problems of trying to work through many mega watts of broadband RF being pumped out from immense aerial systems. Just in case the RSGB accuse me of obtaining this information from the Beano or some similar publication, as they usually do, the quote appeared in the **Financial Times**.

To give the illustrious society something else to worry about the mole has been at work again. An interesting report may appear in next month's issue so watch this space, as they say.

Reciprocal

For a long time now we have been waiting for full implementation of the CEPT amateur radio licence. This would enable you to use your rig in many countries without the formality of having to obtain separate reciprocal licences. There have been limited facilities with some countries for some time, but now the list is beginning to look more interesting. Countries presently involved with the scheme include Austria, the Federal Republic of Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Switzerland and Turkey.

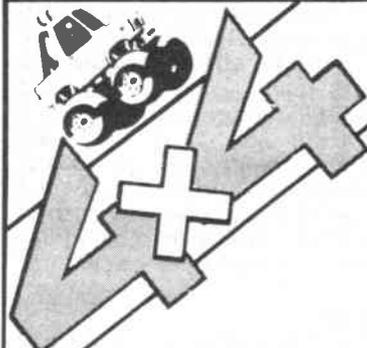
Information

It is not surprising that the smaller countries with, hopefully, less officialdom have been among the first in on the act. You will need some paperwork, so information on all these things is contained in Information Sheet 9 which is available from the Department of Trade and Industry. Tel 01-2152316. The idea is starting to gain interest from other countries, and it may not be too long before we get a standardised licence for all common market countries. This would allow you to operate anywhere in the European Economic Community with a minimum of formality. Keep your fingers crossed.

Close down

Thanks for all the get well cards received after the announcement of my recent illness, very kind of you, but where were all the blonde nurses I asked for?

I am still attempting to make sense of packet but at the moment it seems to be the slowest mode of communication known to man! A message left on a bulletin board was not read by the recipient for ten days. I could have phoned him but a first class letter would have been quicker. Keep your news coming to me at 81 Ringwood Highway, Coventry. You can also get in touch with me on Prestel using 203-616941 or, if you must, try packet via GB7NUN at Nuneaton.



Britain's leading four-wheel-drive action magazine

Each month 4x4 brings you:

- Four-wheel-drive news
- Green laning updates
- Off-road adventure
- The American scene
- Vehicle and equipment tests
- Technical articles
- The best writers on the off-road scene

*When you're in the muck, and really stuck
It's the only one you need in your truck!*

More fun than your average off-road magazine

On sale at newsagents 2nd Thursday in every month

GET DIRTY WITH 4x4

PROJECT

BOOK

by Martin Williams

Having spent the last couple of issues discussing various methods of reducing signal levels using attenuators, we now turn back to increasing gain for various purposes. Some time ago I described a broad band preamplifier with an integrated circuit used as the basic component. This resulted in several letters along the lines of 'that is fine if you have the IC, but what happens if you want to knock up something in a hurry using discrete components'?

The solution

Not too much of a problem really, it just depends on the frequency range you need and the transistors you can find in the junk box. The circuit shown in Fig 1 could hardly be simpler, yet it produces a gain of about 15dB over a frequency range of 20 to 200MHz with a noise figure of about 1.5dB. This means that it will provide excellent receiver performance on the amateur bands at 6, 4 and 2m. An alternative would be to 'hot-up' the performance of your airband receiver. The difference it makes to an average broadcast FM radio is astonishing.

Warning

Keep in mind that the design is wide-open in terms of frequency response, and if it is required for a specific purpose then a suitably tuned circuit should be included to limit the response. Probably the easiest method is to use a tuned circuit on the input as shown in Fig 2. The exact values will depend upon your own requirements, eg, if you use a 10pF trimmer then a suitable coil for 2m would require seven turns of 22swg wire wound on to a .25in former (a drill perhaps?) over a length of about .75in. The former is then removed to leave the coil airspaced. The exact gauge of wire is not too important since there will be an ample adjustment range on the variable capacitor for any moderate variations.

Building it

The best method is to use a small die-cast box fitted with the type of connector you require at each end. A piece of plain PCB material is bolted to the bottom of the box so that the components can be arranged as shown in Fig 3, assuming a tuned circuit is included. This means that you do not have to etch the PCB material. The transistor shown is a BFR91, but any small VHF-type would work equally well.

Alignment

There is no need for any alignment if you have built a wideband version. For a tuned version simply place the amplifier in the aerial line (it is designed to work well with either 50 or 75 ohm lines) then tune to a signal and peak the tuned

circuit to achieve the best results. There is effectively a series tuned circuit across the input comprising the top end of the coil and the trimmer. With care, it is possible to reduce the level of the signal, although make sure you get the right setting.

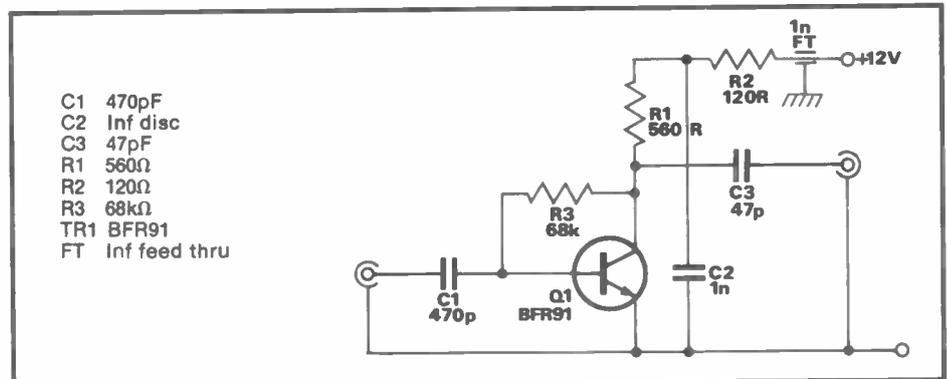


Fig 1: Circuit for wideband amplifier

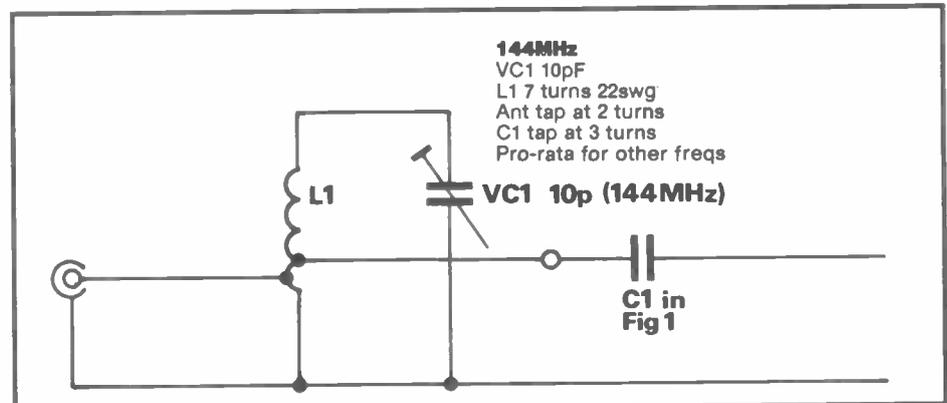
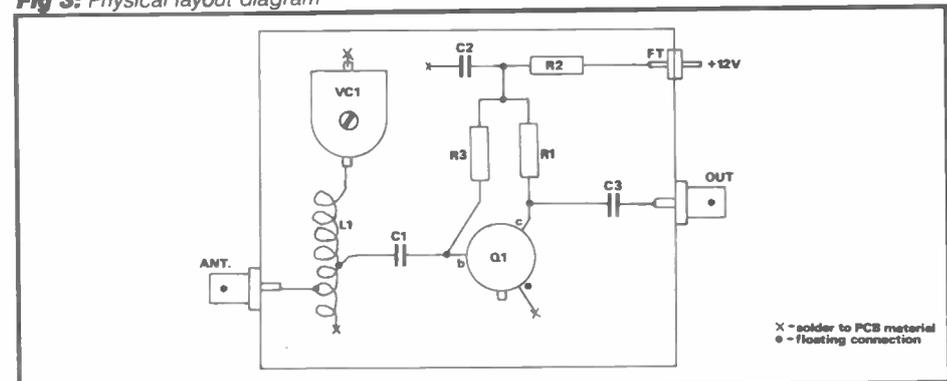


Fig 2: Circuit to limit response

Fig 3: Physical layout diagram



50MHz

by Ken Ellis G5KW

Longest 50MHz opening on record

Last month we briefly reported the start of the F2 season from the UK to the Americas. As expected, this developed into the most exciting period since permits were granted in the United Kingdom.

For a change the openings were not confined to the south coast but spread throughout the British Isles. Juan P43AS, Abuba, had QSOs with over fifty stations in G, GW, GM, GJ, GI and GD on 22 December.

From my own QTH at Folkestone I contacted seven new countries during the period: KP2A, KP4EOR, P43AS, HC1BI, J52US, PZ1AP and TI2HL.

From 20-30 December contacts were made from various parts of the UK with the Americas every day. During this time the solar flux remained at over 200, and peaked to 255 on the 22 December. Logs will do credit to successful operators on the HF bands during peak conditions!

Spring equinox and TEP

By the time this column appears in print, the spring TEP season to South Africa and possibly South America should be under way. ZS stations are already preparing for the openings and some DXpeditions are planned to rare locations. For up-to-date information listen to the two Six Metre Group frequencies on 3718 and 28885. Regular UK operators exchange information on 3718 each morning from about 0830hrs, and international DX operators exchange the latest news all day on 28885. Rick K1JRW gives out the latest WW solar data each evening at 1820hrs on 28885, and forecasts are given each Sunday morning on GB2RS.

Looking for DX

By now you should have a good idea where to find the best DX openings from reports sent in by some of the more successful operators, but a brief summary is perhaps not out of place.

Eastern Canada 1200hrs, VE1YX is normally the first to break through. FY7THF beacon, 50.039kHz, also from midday but sometimes earlier. Central Americas from 1300hrs onwards. W1, 2 and 3, 1300hrs, W4, 8 and 9 from 1400hrs onwards. Mid-west stations from 1600hrs. Far west stations come in later at 1900hrs. These are approximate times and are governed by prevailing conditions.

Review of the year

Charlie Newton G2FK2 writes: 'Cycle 22 is still full of surprises and there is much speculation about when the maximum will occur and what the final figures will be. Analysis of many aspects

of solar data has become more sophisticated, so what used to be guesswork has now been replaced by factual data. Cycle 21 was the first cycle to be measured in any detail, as satellites had been developed to help with the job. Also, observatories world-wide shared the more mundane tasks between them in order to provide better coverage. The result of all this is that a good comparison can be made between cycles 21 and 22.

'Let us look at the facts. We started 1988 with a smoothed sunspot count of 58. There has been a steep climb from the 12.3 minimum of September 1986 which has kept pace with or exceeded the steep climbs of previous cycles, thereby fuelling speculation that we are in for a big cycle. A small drop in this steep rate of climb occurred during 1988; the curves crossed the previous largest cycle (19). Even so, the monthly mean spot count has continued to leap forward and smoothed numbers of about 128 are projected by the end of the year. The September mean was 120.8, so it looks realistic.

'The story is very similar when we look at other data. The 2800MHz solar flux has also increased rapidly and the mean level was 152.4 by September. This event gave rise to a smoothed forecast of about 170 units at the end of 1988. Of course, spot and flux are not the whole story. In cycle 21 for the same period we had 4,000 recorded optical flares, and for this cycle we had 3933. When we look at active regions, cycle 21 had about 480 compared with 424 in this current cycle, so we have almost the same number. There were 52,000 flares and 3,903 active regions during cycle 21, so however we look at it there is a lot of activity to come yet.

'The geomagnetic activity, however, has departed from what we call "normal" quite significantly. Generally, the pre-spot minimum occurred about one year after the spot minimum, eg, during 1977 for cycle 21. Cycle 22 gave a magnetic minimum in December 1986, only three months after spot one and has so far not looked back, steadily climbing ever since. The comparable levels show the cycles to be almost identical. Projecting this into 1989 means that auroras should now become more common, since it is almost certain that we are now in the pre-spot magnetic phase.

'All this raises the question of when the expected maximum is due. Well, it may occur late this year if we are in for a short cycle, but early 1990 looks more promising. What level will it be? A sensible number appears to be around 170 to 180 (similar to cycle 21), so if this

turns out to be true, then this will be the second-highest cycle since reliable records began'.

News from Hal Lund ZS6WB

'1988 has been an exciting year for 6m operators in southern Africa as the rapid rise in cycle 22 has produced some excellent openings. Although propagation in our part of the world has not been as good compared to that experienced by stations closer to the equator, some good DX has been worked by ZSs as far south as 30°.

'From his choice location in northern Namibia, ZS3E contacted a number of European, Canadian and US stations. ZS6LN was involved in a crossband contact with Finland, this was the furthest north that propagation was reported in Europe.

'While the longest two-way contact completed from South Africa was ZS6 to GM3WOJ in northern Scotland, ZS1EK was reported briefly on the island of Jersey. ZS4TX/6 was heard for a few moments in Hawaii. North-eastern Africa (J52US, ZD8MB and DJ3OS/EA8) had several openings to Europe and North America. The South African Es season was virtually a total wash-out with only a few ZS3 to RSA openings, and none of the usual shorter skip propagation from ZS6 to ZS1/2'.

Outlook for 1989

Hal Lund continues: 'If cycle 22 continues to progress at its present pace, F2 propagation on 6m should be more frequent in 1989. TEP, TE and F2 should have clear access to the Mediterranean area; especially during March, April, September and October with many good European openings expected. The TEP zone will be wider and stations further south and north will participate in the openings. F2 will probably occur in April and November, although March and October should also be good.

'Many countries in Europe are now allowed access to the 6m band and several others, including Greece and Sweden, are allowed to operate on a limited trial basis. This system was a great success in the UK and can be expected to lead to permanent activity on the band. A recent count showed more than 120 countries are now active on 6m, so 1989 should be a bumper year'.

Rare squares to watch for

JG77 Chris, ZR1L, plans to activate this rare square during March/April 1989. KF26, ZS2HZ, most weekend mornings on 50.250MHz. KG11, ZS4AAB, weekend mornings on 50MHz SSB/CW.

Expedition to Ward Hunt Island

GM4DMA and GM1ILL will accompany Sir Ranulph Fiennes on his expedition to the north polar regions and will man the base station on Ward Hunt Island, located 450 nautical miles south of the North Pole and 450 nautical miles north-east of the magnetic North Pole.

At the time of writing it is expected that the expedition will leave Britain on 20 February and arrive on approximately 3 March, depending on meteorological conditions. They will take 50MHz equipment and operate on 50.110kHz with 25W to a four element yagi.

They will generally use the callsign GM4DMA/VE8 on 50MHz, although GM1ILL/VE may also be used. A wind generator charging 500 amp batteries will generate power to the station. It will operate until May at least, depending on the success of the expedition. Possible modes of propagation are F layer and especially auroral Es.

The monthly solar cycle for January has already exceeded the December 1988 figures. 12th, 269-25-6; 13th, 291-15-4; 15th, 274-6-2; 16th, 282-30-5 and 17th, 299-32-4. These are the highest figures so far during cycle 22, thus supporting the forecast of a very high peak.

From the mailbag

Mike G3SED, Portsmouth, sent in this report.

'December was quite a month on 6m. Stations worked two-way include VE1YX, VE1BNN, VE1RG, VE2BKL, VE2DFO and VE2EFL. 13th, J52US; 21st, HC1BI, HC5K and KP2A; 22nd, KP2A, WP4G, KP4EKG and P43AS; 23rd, HC1BI, K1TOL, WA1TRE and VE1YX; 24th, HC5K and J52US; 25th, PZ1AP, HC5K, TI2HL, KP4EIT, KP2A, WA1OUB and WB4OSN.

Calum GM0EWX, Portree, Isle of Skye, had a field day on 22 December 1988. At 1229hrs he worked P43AS and KP4EOR; at 1242 WP4G; at 1259, HC5K; at 1300, HC5T and KB4CRT; at 1305, HC2FG; at 1312, HC1BI and at 1332, KP2A; at 1455 hrs Calum heard VE1YX. On 11 December he worked forty-two North American stations between 1730 to 1813hrs, and on 21 December he worked thirty USA stations from 1532 to 1603hrs. An outstanding performance for a station so far north.

Arnold Mynett ZS6BMS/G3HBW (VHF Manager SARL), Pretoria, KG44DE writes: 'I first used 6m during the last sunspot maximum in 1980 but I was living in a hotel at the time and I could only manage to smuggle a vertical on to the roof, disguised as a "breather pipe". Despite passing traffic from the main road, I managed to make WAC on 6m. Apart from South America, the highlight was a contact in 1981 with Bert KH6IAA,

who gave me 439. Hawaii is our antipodes.

'Since 1983, I have been living on a hilltop in a secluded part of south-east Pretoria, with a steep drop of 220 metres or so to the north and west. My results have been transformed. Signals from the Mediterranean now come in at a colossal strength of 30-40dB over S9 - even by late evening via TEP. It has been very FB to make two-way contacts with the UK for the first time, thus linking up with many old friends and I hope to work many more in March and April during the TEP season.

'When the band is open to southern Africa from the UK, don't forget to look for ZS1, 2, 4 and 5. Their signals might be weak since they cannot fully share in the excellent north/south propagation enjoyed by ZS3s and ZS6s'.

Arnold Mynett was a very active member of the RSGB team of co-ordinators during the International Geophysical Year 1957.

'Smithy' G8KG recently sent this following report.

'You may like to have the following update on the progress of cycle 22 (strictly factual with no private theories!). December 1988 will certainly go down in the records as the month when cycle 22 really showed its hand. After a quiet start solar activity climbed steeply, passing the 250sfu level and remaining high for a week before settling down to around the 200 mark - much higher than at the end of November. The month's average just topped the 200sfu mark and mean levels have continued to rise in January (the twenty-seven day running average is now 222sfu with a daily value of 268 on 8 January).

'Cycle 21 ended in September 1986 so last December was the twenty-seventh month of the new cycle and its peak daily and monthly flux figures put it two months ahead of cycle 19, and much further ahead of 21 which only passed 250 in its forty-first month, near the cycle peak.

'The provisional monthly sunspot number from Brussels SIDC was 179.4, a value not reached by cycle 19 until its thirty-first month. This means that the three month mean value centred on November was 143, well above 19's 128 and 21's 88. This indicates that cycle 22 is making a bid to be the highest cycle'.

Geoff Roberts G3ENY writes: 'I enclose data on the monthly average 10.7cm flux for 1988 which should prove that we are into the steep part of the upward curve for cycle 22.

'I was lucky to see the sun today and I can report a great deal of new activity on the eastern side of the disc near the

equator. This substantiates the high flux rise of forty points from 208 on 6 January to 248 on the 7th. My hunch is that it will remain high for a few days yet'.

Geoff Brown GJ4ICD, Jersey, reports twelve openings to North America during December with over 100 two-way QSOs including sixty-three W/VE QSOs on 21 December. During the period, Geoff had 'all-time first' with GJ, J52, KP2, P43 and HC2.

John Baker GW3MHW, North Wales, writes: '20 December 1336hrs, QSOs with VE1YX, K11KN and heard WA1OUB. On the 21st from 1254hrs I worked: HC1BI, HC2FG, VE1YX, VE1ZZ, K11KN, KP2A and HC5K; followed by thirty-nine different USA stations in twelve different states. On the 22nd, heard P43AS and WP4G. On the 23rd I heard six US stations, and on the 25th, at 1229, PZ1AP was in for over one hour'.

Steve G4JCC, Hayling Island, had over fifty W/VE QSOs during the period under review, plus J52US, OH2KA, OH2TI, OH1YP and KP2OOF. Steve heard many of the other DX stations listed but failed to make contact. On 16 December he heard ZS3E from 1940 to 1948hrs (most unusual at this time and date).

Ted Collins G4UPS, Hemyock, Devon, sent in a long report about his QSOs to the Americas over a period of twenty-one days during December. Ted contacted all the DX stations worked by the remainder of us, except Roy G3GJQ operating from Lagos, Nigeria. Many of us in the past have been grateful to G4UPS for telephone call alerts when a DX station appeared, but on 15 January when G3GJQ/5NO appeared at S9+ for thirty minutes, Ted was not alerted; it was assumed he had a QSO during the previous opening!

50MHz countries worked two-way

I had hoped to include a table listing countries that worked two-way on 50MHz up until the end of December 1988, but despite letters, telephone calls and requests 'over the air' the response has been poor. Some of the highest totals received during December included G4IJE 39, GJ4ICD 35, G5KW 35, G4UPS 33, GW3MHW 29, G3UKV 27, G2ANT 29 and GM4DGT - twenty-three countries in all. An up-date will appear this spring, so let me have your score by then.

73 de Ken Ellis, 18 Joyes Road, Folkestone, Kent CT19 6NX.

AMATEUR RADIO
April issue
on sale 30 March

USING YOUR OSCILLOSCOPE

PART FOUR

Joe Pritchard looks at circuit testing and examination

Being able to see what a circuit is doing, rather than trying to work it out from voltage levels around the circuit is very useful. For example, we can detect instability, non-linearity, unexpected phase-shifts and many other potential problems with a 'scope, since it allows us to accomplish these tasks with only a minimum of influence on the circuit under test.

Analysing circuits

There are two basic methods of analysing circuits while viewing waveforms in the circuit. The first is to use the 'scope with a signal source, eg, to test a filter or amplifier. Alternatively, we might use signals that may be deliberately generated by the circuit, such as the output from an oscillator, or they might be spurious signals generated in the circuit unintentionally, such as RF or supersonic oscillations in audio frequency amplifiers.

Let's start by using the 'scope in conjunction with a source of signals. This is usually a signal generator capable of producing square and sine-wave signals in the frequency range. Clearly, the 'scope must have sufficient bandwidth to cope with the circuit. Testing VHF amplifiers with a 1MHz 'scope may give some indication of gain, but diagnostic information would not be given. Other considerations concern the signal quality from the signal generator, how the signal is introduced into the circuit and the way the 'scope is coupled to the circuit.

Signal quality

Clearly, there's no point in checking a circuit for distortion, etc, if the signal generator produces a flawed signal.

Signal input to circuit

The test signal should be no bigger than necessary to test the circuit. A few tens of millivolts peak-to-peak should be adequate for most amplifiers, although high-gain amplifiers may require a smaller signal and power amplifiers may need a larger one. If you are testing a commercial unit, apply a test signal no bigger than the maximum input signal recommended by the manufacturer's manual. This is because an excessive input signal will drive the circuit into clipping or produce excess harmonics. All amplifiers, no matter how good they are, will do this if you drive them hard enough.

Take care with the leads running the input signal to the circuit, and avoid any mains pickup which appears as hum on the 'scope. If there is a possibility of mains interference, check the signal with the 'scope to estimate the amount of hum present before testing the circuit.

Make sure that the signal being applied to the input is within the specified range of the circuit; there is no point, for instance, pushing RF through an AF amplifier and expecting sensible results! Also, when examining tuned amplifiers or frequency multiplier circuits, the input frequency should be that at which the circuit is expected to operate under normal conditions.

Output from the circuit

Due to the 'scope's high input impedance, the output usually has very little effect on the circuit. However, in some cases the application of the 'scope's probes cause problems with instability that are *not* present when the 'scope is disconnected! This indicates that the circuit is not unconditionally stable, although this can be rectified by using either inductive or capacitive coupling of the 'scope to the circuit (see Fig 1). Positioning the 'scope's probe close to the circuit will often give adequate signal pick up if the levels in the circuit are reasonable. Alternatively, the coil of wire shown in Fig 1b can be loosely coupled into the circuit by placing it near inductors in tuned amplifiers, etc. Be warned, however, that even relatively light coupling methods can upset some circuits!

Checking circuits with an input signal

You can either feed in a sine-wave or a square-wave together with amplifier circuits to test circuit performance. The square-wave test is applicable to relatively broad-band amplifiers, such as AF amplifiers or RF circuits with, if at all, very broad tuning. You should now have an idea of what the output of each test ought to look like for example, the diagrams in this article refer to a Class A linearly biased amplifier. In addition, a broad-band amplifier is assumed in all cases.

Fig 2 shows potential output waveforms for a sine-wave test of an amplifier.

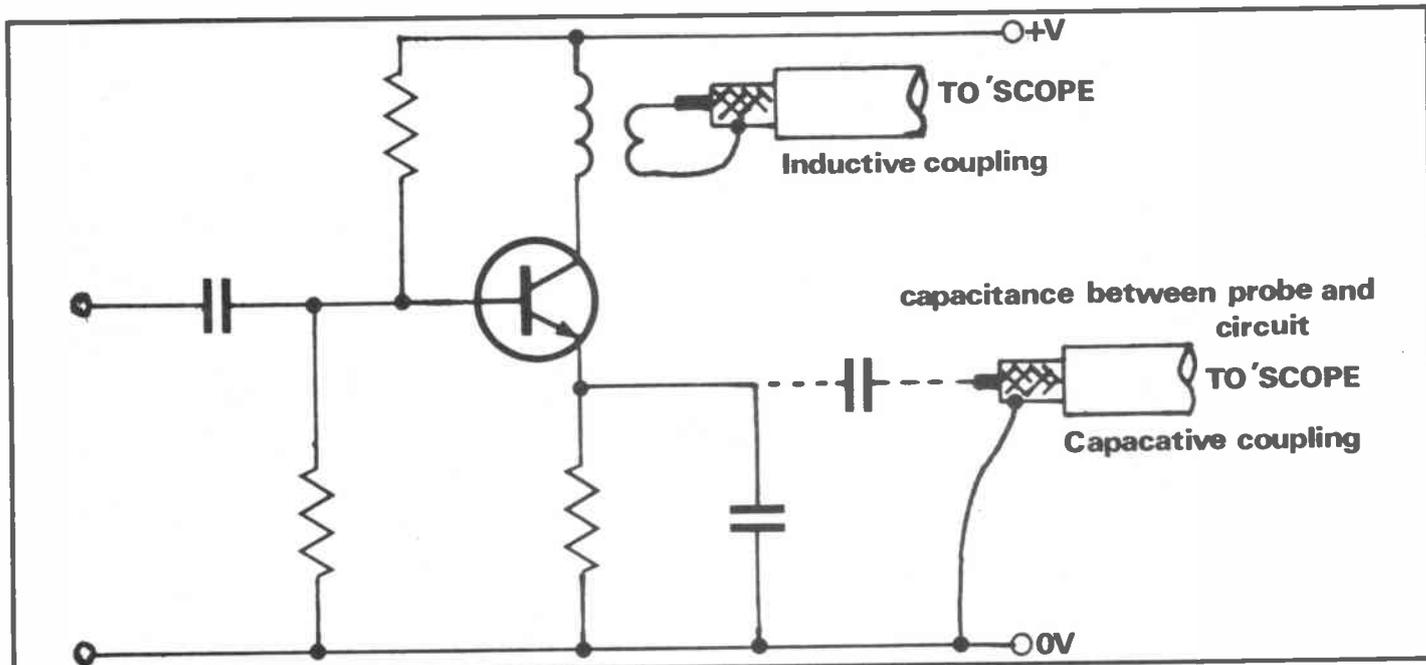


Fig 1 and Fig 1b

Crossover distortion can be a problem with Class B 'push-pull' amplifiers and the transition at 0V should be smooth; Marshall amplifiers base their 'sound' on crossover distortion, so don't feel that this is a totally bad thing! However, excessive distortion usually indicates a mismatch of transistors within the output circuit. One solution is to bias the circuit's output transistors (**Fig 3**) so that a small constant current flows through the transistors – even with no input signal.

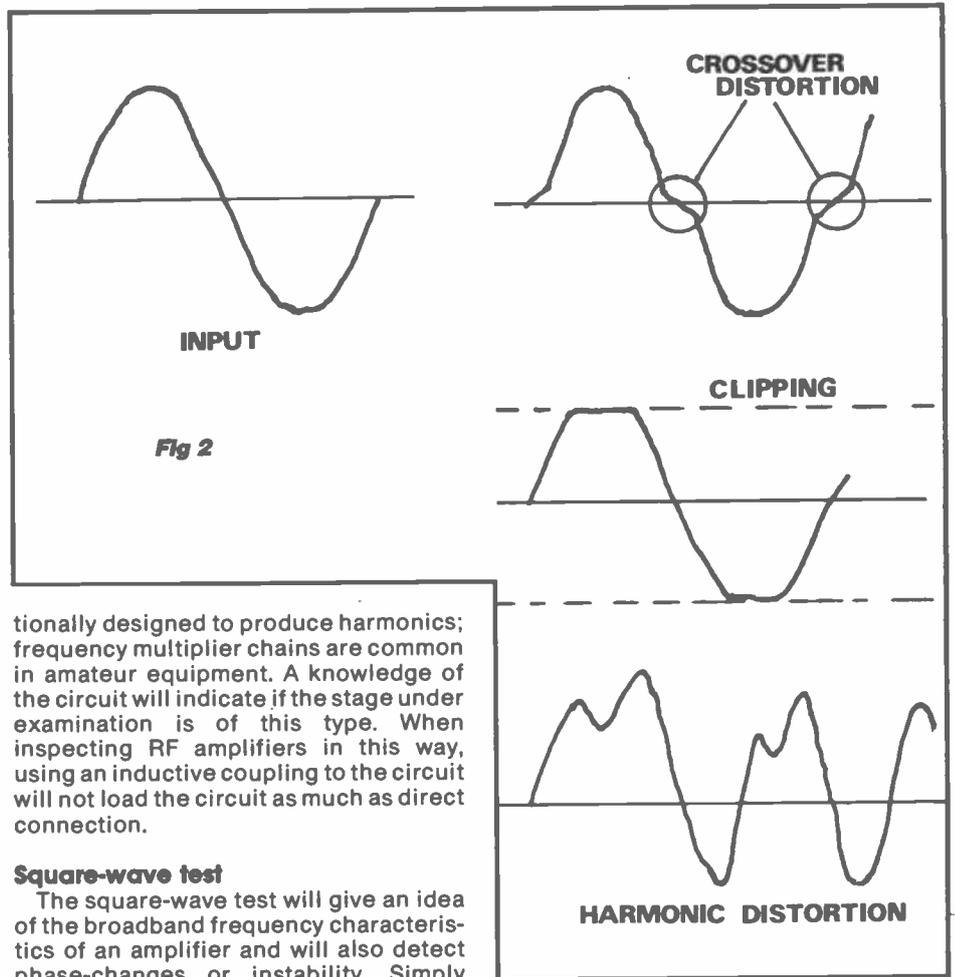
Clipping

Clipping is where the output's voltage swing is greater than the supply-voltage of the circuit under test, ie, it 'clips' at a level just below the supply-voltage. Apart from over-driving the amplifier by using the excessive input signal, the other major cause of clipping is faulty biasing one or several transistors in the circuit. Work your way through the stages of the circuit to determine where the clipping starts and then carefully examine that stage. When testing a Class C-type amplifier you might expect a lot of clipping, in fact, only half of the sine-wave is amplified in such circuits!

Harmonic distortion

Harmonic distortion is bad news for RF amplifiers when used in amateur transmitters, because it is indicative of signals which are two or three times greater than the input frequency reaching the aerial without adequate filtering. For this reason, it is better to examine output signals for harmonic distortion after the output filters, as this can determine what is being fed to the aerial. Distortion here indicates problems in the output filter or larger than expected levels of harmonic production in the circuit, as well as some degree of non-linearity in a circuit or instability due to inadequate neutralisation of amplifier stages.

Of course, some amplifiers are inten-

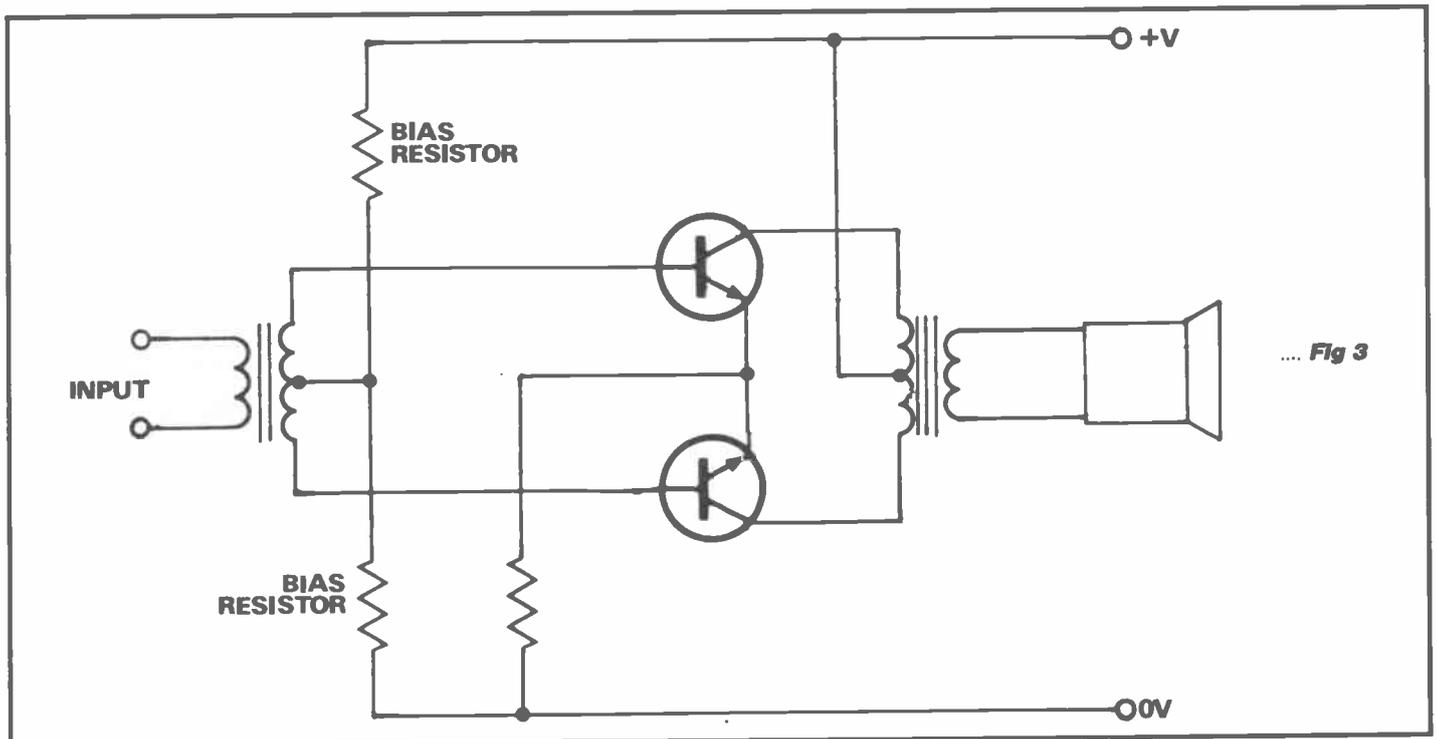


tionally designed to produce harmonics; frequency multiplier chains are common in amateur equipment. A knowledge of the circuit will indicate if the stage under examination is of this type. When inspecting RF amplifiers in this way, using an inductive coupling to the circuit will not load the circuit as much as direct connection.

Square-wave test

The square-wave test will give an idea of the broadband frequency characteristics of an amplifier and will also detect phase-changes or instability. Simply apply a square-wave signal of suitable magnitude to the amplifier's input and monitor the output (**Fig 4** shows some typical output signals). Ringing is a further indication of potential instability, because the square-wave 'shocks' part of the circuit into a burst of oscillation. A fuzzy top or bottom to a square-wave indicates hum or some degree of self-oscillation in the circuit.

Finally, examining the circuit for spurious oscillation is straightforward. Connect the 'scope to the output of the suspected circuit and apply power without an input signal. Use an ac coupling on the 'scope and set the 'Y' amplifier gain to observe signals down from tens to a few hundred mV. Use a fairly short timebase so that spurious



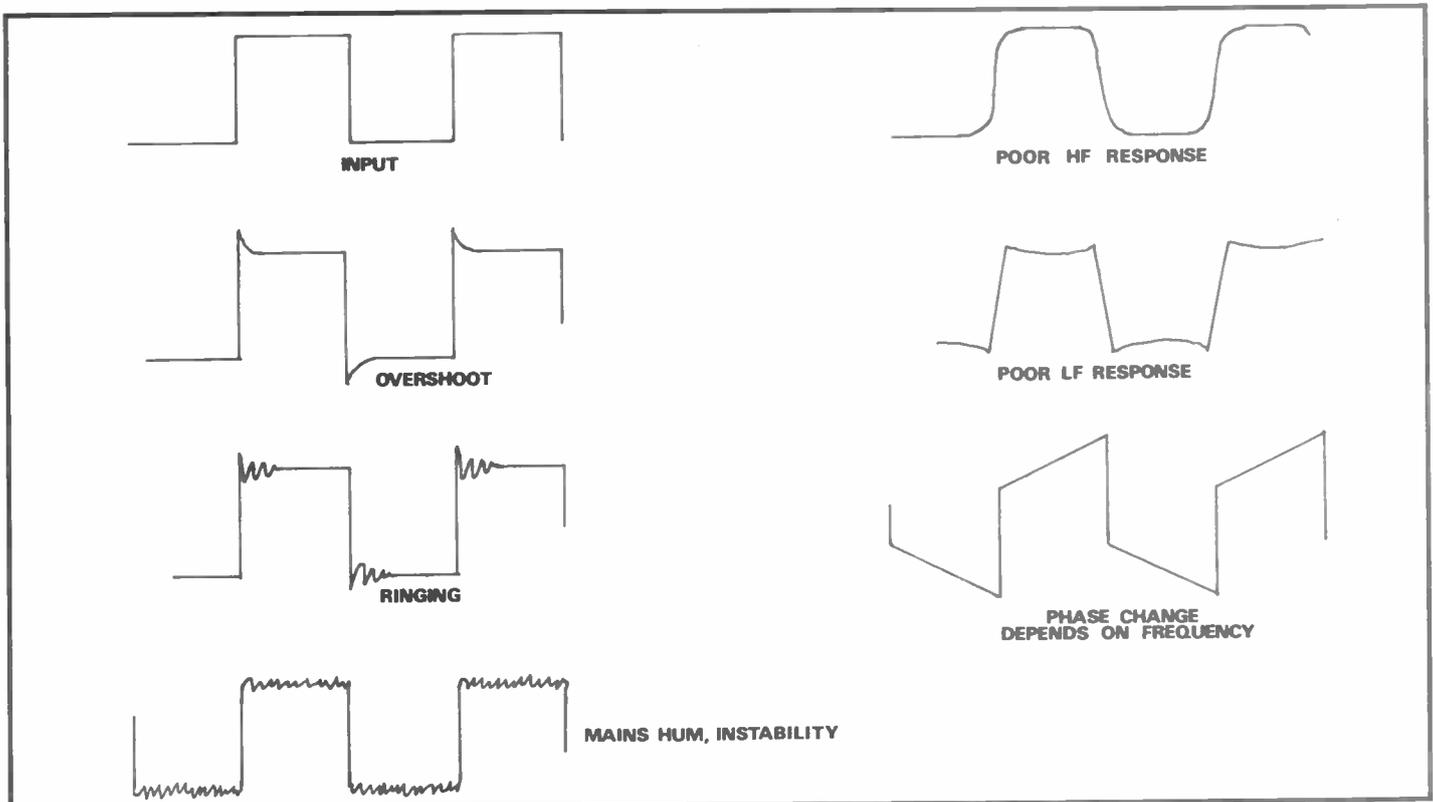


Fig 4

signals will appear as a waveform at the circuit's output. Some mains hum or small levels of pick up from other signal

sources will sometimes be evident, so only become concerned if the signals are a reasonable size.

Next month, I'll be examining the use of the 'scope to test components in circuits or from the junk box.

R. N. Electronics

PROFESSIONALLY DESIGNED EQUIPMENT FOR AMATEURS

TRANSVERTERS

- 144/50MHz 25w p.e.p. £179 + £4 p&p.
- Use with an FT290 or similar 2m transceiver, for the opportunity to work USA, Africa, Japan, Australia etc. In fact almost anywhere in the world
- 28/50MHz 25wp.e.p. £199 + £4 p&p
- 145/70MHz 25w p.e.p. £239 + £4 p&p
- 145/70MHz 10w p.e.p. £199 + £4 p&p
- 28/70MHz 10w p.e.p. £199 + £4 p&p
- 7dB Switched Attenuator £22 001 £2 p&p

POWER AMPLIFIERS

- RN690 P.A. 6m power amplifiers 25w p.e.p. £75 + £4 p&p
- RN490 P.A. 4m power amplifiers 25w p.e.p. £75 + £4 p&p

RECEIVE CONVERTERS

10M receive, 2M I.F. With thru switching on transmit use with 6m transverter and work 10m/6m Crossband £45 + £2 p&p

RECEIVE ONLY CONVERTERS

2m IF for 4m, 6m or 10m, receive £39 each + £2 p&p each
10m IF for 2m, 4m or 6m receive £39 each + £2 p&p each

PRE AMPLIFIERS

Low Noise (<1dB) GaAs Fet Pre-Amplifiers for 6m, 4m and 2 metres. RF or DC Through Switching (Max 100W pep)

- Indoor boxed unit £36 + £2 p&p
- Masthead (line powered) with indoor DC feed unit £59 + £4 p&p

MET. ANTENNAS

50MHz 3 el. £42.95, 5 el. £64.40 + £4.50 p&p

NAVICO 2m F.M. MOBILES

AMR 1000 5/25w 12.5/25MHz 2 Metre FM Mobile £247.25 + £4 p&p
AMR 1000S 10 memory + full scanning £299.00 + £4 p&p
Top mount bracket for above £6.85 + £1 p&p
12.6v 8A Switch mode regulator (15-32v input) £56.35 + £4 p&p



All prices include VAT



37 Long Ridings Ave, Hutton, Brentwood, Essex CM13 1EE.
Tel: 0277 214406

You'll learn all about how the Navy keeps in touch.

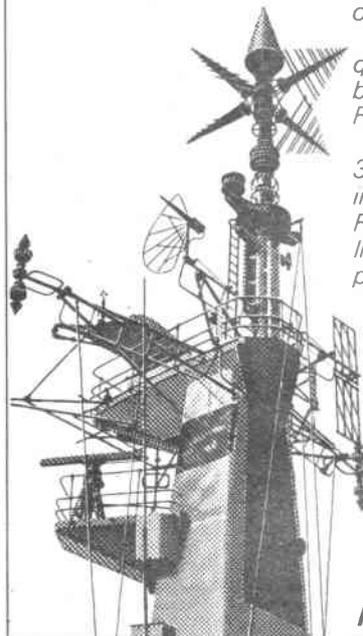
If you join the Royal Navy as a Radio Operator, you will be trained to use modern ship-borne computers and communications systems, including satellite links. After training you will serve at sea, in a surface ship or submarine, and later you could be based ashore, at home or abroad.

No formal educational qualifications are needed but you will need to pass the Royal Navy Entry Tests.

If you're between 16 and 32, get the facts now—call in at any Royal Navy and Royal Marines Careers Information Office (in the phone book under 'Naval Establishments').

Normally you should have been a UK resident for the past five years.

The Armed Forces are Equal Opportunity Employers under the terms of the Race Relations Act 1976.



RADIO OPERATOR
ROYAL NAVY

FREE CLASSIFIED ADS

FREE CLASSIFIED ADS CAN WORK FOR YOU

We are pleased to be able to offer you the opportunity to sell your unwanted equipment or advertise your 'wants'.

Simply complete the order form at the end of these ads. Feel free to use an extra sheet of paper if there is not enough space. We will accept ads not on our order form.

Send to: *Amateur Radio Classified Ads*, Sovereign House, Brentwood, Essex CM14 4SE.

DEADLINE AND CONDITIONS

Advertisements will be published in the first available issue on a first come first served basis. We reserve the right to edit or exclude any ad. Trade advertisements are not accepted.

FOR SALE

■ Dressler ARA30, 0.5MHz to 40MHz active antenna with interface cable and original packing. Squeaky clean, £90.00. VC10 VHF unit to fit Trio R2000, hardly used, £110.00. Archer active antenna, 60-600MHz interface, AWOL, hence any offer accepted. All letters answered. S P Martin, 24 Collingwood Close, Worle, Weston-super-Mare, Avon BS22 9PQ

■ AOR-AR 2002 VHF/UHF scanner receiver. Immaculate condition, in original packing, complete with handbook, £300.00. Tel: (0792) 464678.

■ General coverage Electroniques transistor Qoilpax MkII (GC166T), Electroniques IF amplifier, 1620MHz 1W 4 transistor audio amplifier, instructions and circuits, £30.00 plus carriage. Shure 201 microphone (new), £18.00. Howes 80m Rx wired PC board, plus tunig cap, £20.00. Howes CVF20 kit plus tuning cap, £10.00. W Beswick, Normanby, Swinington, Yorks YO6 6RH. Tel: Kirkbymoorside 31766

■ Comm Rx: National Panasonic DR48 1.8MHz to 28MHz plus MW, LW, UHF. Suit active listener, £40.00. Sig gen: Airmec 201 30kHz-30MHz, £50.00. Sig gen: Marconi TF995A, 1.5MHz-220MHz, £65.00. AVO valve tester, £35.00. Marconi bridge Q meter TF1245, TF1246, TF1101, £65.00. Ray Atthill. Tel: (0264) 51331 daytime

■ Icom R71E communication Rx, condition as new, excellent instruction manual, also FM unit fitted, £615.00 ono. J House, 4 Elizabeth Way, Kenilworth, Warwicks CV8 1QP. Tel: (0926) 54556 6-8pm

■ Yaesu FT-747GX, FM board fitted, also a 20A power supply. Rig boxed as new, hardly used. First £550.00 secures. No offers and cash only. Mick

■ Trio TS-120S HF transceiver with mobile mounting bracket, in excellent condition, 110W output, £350.00. Yaesu switch mode power supply to suit TS-120S, in perfect condition, £45.00. Icom IC-240 10W 2m FM mobile transceiver, in very good condition, with mounting bracket, £135.00. I H Crowther, 35 West Downs Close, Fareham, Hants PO16 7HW. Tel: (0329) 236906

■ Kenwood TS-940S, auto ATU, AM filter, Lowe mod, MC85, SP940, workshop manual, mint condition, very little use, £1,800. Yaesu SP900, £25.00. FRB707 linear relay FT-707, boxed, £20.00. GEM quad, £95.00. 18 AVT vertical, needs repair, £25.00. National HRO, excellent, £150.00. 1932 FBX, £125.00. Vintage wireless: 1925 Gecophone 8V superhet, 1924 Burndepth Ethophone 4V, 1926 AJS 3V, 1926 Pye 2V, Marconi 1929 4V mains, 1931 Majestic 8V mains, 1932 Philips 830A. Exchanges. Jim Taylor G4ERU, 5 Luther Road, Winton, Bournemouth. Tel: (0202) 510400

■ FRG-7, mint condition, £120.00 ono. Phelps G4FLK. Tel: (0202) 604806

■ Icom R70 receiver with FM board and dc unit, mint, boxed, £410.00 ono. Two HROs MX, one original GWO, one converted GWO, both with PSUs, seven coils, £115.00 ono or will split. Number of wireless sets, pre- and post-war, £30.00 to £45.00, all in GWO. Marconi wide range R-C oscillator, TF1370A with one for spares, £65.00 ono. Thermal noise generator, CT82, £15.00 ono. K Hindle, 9 Verdure Avenue, Brooklands, Sale, Cheshire. Tel: 061-962 7577

■ FT-73 70cm handie. Mint, 5W battery, fast charger, soft cases, £225.00 ono. Yaesu FT-690R, Mk1, 50MHz multimode and pre-amp/15W linear, 3 ele quad, £275.00 ono. Lab Scope Tektronix 545

base mike. No splitting, must sell complete, £460.00 ovno. D G Cousins, 25 Mayrick Street, Pembroke Dock SA72 6AL. Tel: (0646) 685082

■ 6m all mode portable transceiver, FT-690 Mk1, in good condition with soft case, £220.00. G0KNN. Tel: (0388) 817325 (Spennymoor)

■ Realistic DX200, immaculate condition, £97.00. Sony PRO80 scanner, three months old, £235.00. Fidelity CB 3000 FM, homebase, £35.00. Amstrad 901 mobile CB, £28.00. CVB colour monitor for BBC computer, £90.00. Modem 2000 for use on BBC or Master 128, complete with Micronet chip, £25.00. Tel: (0203) 332012 during working hours

■ Trio 440, ATU and voice chip fitted, as new, £950.00 ono. Yaesu FT-727R, 2m and 70cm, as new, with speaker/mic, £325.00 ono. Mr C J Lidstone. Tel: 01-366 4507

■ Transformer 110V to 240V at about 500W, £10.00. Rectifier assembly, 110V at 25A, four rectifiers with separate connections so can be used as bridge, series, parallel etc, £10.00. Both items new. Could post at cost. 100 salvaged valves, all sorts: TV, radio, industrial, £10.00. Must be collected (fragile). Two colour TVs for spares, £10.00, must be collected. Mr Bailey, 40 Seymour Close, Selly Park, Birmingham B29 7JD

■ CBM 272, Oscar 10m FM transceiver. Complete with Nevada 25W amplifier, microphone and handbook. E45 Rotator for 2m or 7cm aertals, never used outside, complete with original packing. As new with some rotator cable, £25.00. G4ANW. 34 Moggs Mead, Petersfield, Hants. Tel: (0730) 61859

■ Microwave Modules 70cm 100W linear, £225.00. Microwave Modules 2m 200W linear, £220.00. Microwave Modules 4m transverter, 10m IF, £90.00. Crofton 9in B/W monitor, £30.00. Jaybeam DB4.

Voucher Removed

FREE CLASSIFIED ADS

channels. Has ch 6, 8, 12, 14, 16, 25, 26 and 27 fitted high/low power output, 12V operated, £150.00 or exchange for 2m hand-held or mobile or gen cov Rx FRG-7, FRG-2700, WHY?. All letters answered. Details to: S Bishop G1XUU, 22 John Street, Brightlingsea, Essex CO7 0NA

■ Yaesu 7700, 0-30MHz comm receiver. Excellent condition. Includes Yaesu 7700 converter and Yaesu 7700 ATU, £325.00. Realistic PRO-30 hand-held scanner, four bands from 68 to 512MHz, inc Ni-Cads, as new, £180.00. Tel: (0772) 686259 (Lancs)

■ Yaesu 7700 communications receiver with 7700 ATU and 2m converter, £350.00. Also Yaesu FRG-7 general coverage receiver, £120.00. Both in very good condition. Tel: (0484) 661101

■ Complete set-up. President Grant transceiver. LO-MID-HI, UR40 plus some alphas, fair condition, GWO. Sadelta Bravo plus desk microphone. Bremi BRL210 250W mains linear amplifier, boxed, as new. 26-30MHz four-element beam antenna, boxed. Rotator with coax and 3-core cable, boxed, as new, £450.00. Buyer collects or pays postage. Will not separate. Paul PL95, PO Box 249, Poole, Dorset

■ Reftec 934MHz 40ch rig, complete with pre amp (has slight fault - drifts when warm) hence only £80.00, or will exchange with cash adjustment for VHF or UHF hand-held. Stornophone 800 (UHF), as used by police force, etc. Complete with mic and technical manual, ready for conversion to 70cm, £125.00. Yaesu FT-707, 100W HF solid-state, £325.00. FTV-707 2m transverter, £155.00. Tel: (0582) 33885 (Luton)

■ Yaesu FTC-740 4m FM, four channels fitted, 40W out base mobile, £80.00. NEC 2m 3W out portable base, twelve channels, £60.00. FT-73R, as new, FNB10 case, dc adapter, £180.00. 6m Tonna, 5-ele, new, £25.00. Tel: 01-801 8611 (North London)

■ TR7850 2m FM rig with PSU. All mobile mounts, manual, box mike, etc, as new, £185.00. Capco high-power 3000D ATU, £175.00. FT1012D, fan mike, manual, etc, mint, £395.00. Consider exchange for solid-state HF rig, cash adjustment any way. Need good antenna rotor, also quad spiders and

fibreglass rods. Consider HQ1 mini-quad. Jack GW3CBA QTHR. Tel: (0444) 741520

■ Siemens and Collins Radio/USA high performance general coverage receivers. Ragnar Otterstad OZ8RO, Vejdammen 5, DK-2840 Holte, Denmark. Tel: 010-452 801875

■ Panasonic RF9000 radio, in mint condition. Cost £2,500, sell for £900.00. Tel: (0462) 421427

■ Polyphase watt meter, model S79, 750W. Ammeter dc, model 82. Watt meter ac/dc, model 67, 30W. Watt meter, 450V, 1000W, 5A. And others. Mr D Janes, Station House, Baschurch, Shrewsbury, Shropshire SY4 2BQ. Tel: Baschurch 260492

■ Racal 17W receiver. Superb example, no dents or scratches. In original Racal steel case. Condition as new. Slight minor fault in circuit but when rectified, receiver will give fantastic results. Only reason for sale is that the owner is now partially blind. Rare bargain, £135.00, cash. Buyer collects, by appointment only. Write to: H F Howard, 31 Westbourne Gardens, Folkestone, Kent CT20 2HY. All letters answered

■ Sharp M2-80A, 48K home computer with built-in green screen, cassette deck, dust cover, some software, manuals etc. Still boxed, as new, £50.00 ono. Steve. Tel: (0706) 31489 after 6pm

■ Maxcom 30E, 27MHz FM radio, Cept, UK frequencies, Bremi 13.8V 3A PSU, Lemm mini 6P DX antenna, 27MHz SWR meter, R658U and R658 cable (rubber duck antenna and battery charger of H-H unit). All in, £40.00 ono. Steve. Tel: (0706) 31489 after 6pm

■ Trio-2000 Rx, fitted VC10, con, boxed, £450.00. Datong FL3 filter, boxed, £75.00. Regent scanner, 25-1300 MX7000, £200.00 ono. T131 plus 60ft cable, £60.00 ono. Daiwa four-way switch, £20.00. Tonna 9-ele beam rotor, £20.00. CB homebase and mobile, spare mikes, aerial, £80.00. RX4 for Com 64, £20.00. Tel: (0256) 882825

■ Commodore 64 portable computer. Built-in colour monitor and disk drive. Exchange for amateur radio equipment. Tel: (0277) 823434 (Brentwood, Essex)

■ Commodore VIC20 computer, 16R RAM expan-

der with Datasette, joystick, PSU, modulator, some games. An inexpensive computer to start your RTTY station, £60.00 or exchange, WHY? Zetagi mobile linear, B550 800W power output possible, £165.00 or exchange, WHY? Prefer an ATU, cash adjustment. John. Tel: (0734) 411501

■ Sony DR-S5 Dynamic stereo, adjustable headphones with tone volume controls for left and right ear. New, still in box. Can be used for amateur radio or stereo, £30.00. Zetagi BV131 amplifier, 200W AM, 250W SSB, £95.00 plus p&p. Sky coupler KX2 Mizuho, £30.00 plus p&p. Dipole, 108ft with traps and 100ft 75 ohm feeder with Marconi matching unit for radio receivers. Covers 160-80, 40-30, 20-17-15, 12 and 10m, £55.00 plus p&p. N Barlow, Glenside, Lon Street, Ffrid, Trearddur Bay, Holyhead, Gwynedd LL65 6YR. Tel: (0407) 860575

■ Yaesu FT-102 HF transceiver, with AM and FM board, wide AM filter, narrow SSS and CW filter, £475.00. Yaesu FT-726R VHF/UHF transceiver with 70cm, 2m, 6m and satellite unit, dc lead, VM48 mic, £900.00. Yaesu SP 102 speaker with audio filter, will suit either of above, £40.00. Daiwa CW630 cross pointer, 140-450MHz, 20-200W SWR meter, £60.00. Alinco aerial rotator, base mount, £60.00. Kenpro masthead beaming (new), £20.00. 18 ele 70cm Jaybeam parabeam, £20.00. 14 ele 2m Jaybeam parabeam, £30.00. 4 ele 6m Jaybeam (new) parabeam, £30.00. One 25m H100 (new), £15.00. One 50m H100 (new), £30.00. HK708 Morse key, £10.00. Yaesu 100W dummy-load, £20.00. One crystal calibrator 1-500MHz, £15.00. Tel: (0952) 255225

■ Yaesu FT-747GX, trans fitted FM. Yaesu MH-138 scan mic, still under guarantee, £590.00. Also Yaesu FP-757GX switchable PSU, £70.00 or exchange for Icom 735 trans. Tel: (0734) 411501

■ Sell or exchange for 880/2 (with cash adjust) AR88LF with speaker and handbook. Eddystone 730/4, very clean, works well. Tel: (0423) 67390

■ 1987 WRTH, £7.00. FT-250, 80-10m, HF, tcvr, manual. FP-250, 240W pep, matching PSU, gvo. Would exchange for Zenith 7000, Rx or Satellite 2500 onward multibander. Tel: 061-743 1570

FREE CLASSIFIED AD FORM

AD FORM USED

FREE CLASSIFIED ADS

■ FT-790 plus NiCads charger, carrying case and mobile mount, complete station, £325.00 ono. Tel: (0625) 611942
 ■ Kenwood R5000 as new, with manual and box, ac power cable, £600.00, cash, urgent, £120.00. Blaupunkt Toronto rad/cass auto reverse, FM, L, M, SW, 5.95MHz to 6.205MHz, offers. Electronic 2 way Search manual and box, offers. Tel: 049 481 2392 after 6pm
 ■ RCA AR88D general coverage receiver, 0.54-32MHz in 6 bands, mint condition, complete with original speaker cabinet, copies of manual and circuit diagrams, collector's item, £80.00. Tel: 051-336 4239 evenings
 ■ Technical software RAE maths program, for Spectrum computer, £10.00. Technical software Morse code tutor program for Spectrum computer, £4.00. JEP electronics Morse reader program with audio filter unit for Spectrum computer, £10.00. Tel: (0359) 70527 after 6pm
 ■ Dymar fish-fone model 883, portable, 3ch, x-tal control, Tx/Rx, complete with B1240 NiCad and Dymar charger, facilities for 4 batteries, discharge/charge cycle timer. Antenna, no x-tals but with instructions and x-tal formula. Tel: (0308) 27882

WANTED

■ FT-1012D or earlier model, good condition required. Tel: (0542) 41043
 ■ Coils for Bird watt meter: 50H or 100H for 50C or 100C. Tel: (0674) 76503
 ■ Information wanted on communications, NI-440DX FM (40ch) CB and circuit diagrams, etc, also mic for same standard and dc leads. Also information on AudioSonic's portable monochrome TV UHF/VHF. Tel: (0574) 78868
 ■ FRG 9600, 60-950MHz. All letters answered. S P Martin, 24 Collingwood Close, Worle, Weston-super-Mare, Avon BS22 9PQ
 ■ Circuit diagram and handbook for Telequipment model SS1B oscilloscope. Also interested in non-working or surplus valve oscilloscopes for disposal. J H Coles, 18 Bilford Avenue, Worcester

WR3 8PJ. Tel: (0905) 56818
 ■ 40m mono band transceiver for mobile use. Require at least 20W power output. Needed for PWork All Britain awards. Mrs Paula Young GM0GBH, 4 Primrose Avenue, Rosyth KY11 2SS, Scotland. Tel: (0383) 413440
 ■ Motorola walkie-talkies for cash, working or not. Also Baird mechanical television or autographs. Tel: 01-747 0069
 ■ 10/15m beam (not vertical). Will exchange for KW-202 amateur bands receiver, 10 to 80m IF, RF, AF gain filters, preselector calibrator, S-meter, etc, vgc. Matching speaker. Tel: (0450) 88206 after 5pm
 ■ High impedance crystal microphone. Speaker for 520 series transceiver or speaker for JR310 Rx.

■ Icom 271H or 271E. Must be in good condition. I also require a reasonably priced 2m transceiver for mobile use. WHY? Will collect from any area. Shirley G0BPP. Tel: (0742) 642842 (Sheffield)
 ■ Receivers, transmitters, parts and odd items. WHY? Military radio, pre-1960, must be valve equipment. Condition unimportant. Can collect up to 120 miles or postage paid. A Howard. Tel: (0908) 73114 (Milton Keynes)
 ■ One two-gang variable capacitor, 100P per gang. One three-gang variable capacitor, 140P per gang. Wide spacing. Wheeler, Kinglands, Bankfoot, Perth PH1 4DN. Tel: (0738) 87207
 ■ Old valve Tx KW, CW, AM, all old bands, or DX100U. WHY? Can exchange for AR88 or EA12 or buy. Can collect if reasonable distance. Tel: (0423) 67390
 ■ Cheap Datong D70 Morse Tutor in GWO. Will collect within ten miles of Cardiff. Tel: (0222) 707395 after 5pm. Ask for Mark
 ■ Yaesu 2m conversion unit to fit 7700 receiver. Also Yaesu ATU to fit same. Both must be in good condition. Will collect within 100 mile radius. Neill (Ormskirk) Connor, 9 Franchise House, Blakenhall Gardens, Wolverhampton, West Midlands WV2 3EZ
 ■ Collins R388 or 51J series receiver. Need not be working but must be complete with all parts and unmodified. Prefer reasonable appearance. Send details of condition and price to: K Barker, 29 St Andrew's Court, Benton, Newcastle-upon-Tyne NE7 7UT
 ■ 934MHz radios. Tel: (0226) 285450 daytime, or (0836) 672385 after 6pm
 ■ Sony ICF-2100D radio, or Philips D2999 radio. Cash paid. Tel: (0462) 421427
 ■ 1960s Practical Wireless, Radio Constructor. 1930s Aeromodellers, Model Aircraft, Practical Mechanics. J Savage, 7 Weyhill Close, Park North, Swindon, Wilts
 ■ German WW2 ex-service equipment, parts, etc, working or not. WHY? WS11, WS66, WS No1, AD67. Will collect. Ragnar Otterstad O28RO, Vejdammen 5, DK-2840 Høtte, Denmark. Tel: 010-452 801875

FREE CLASSIFIED ADS FREE CLASSIFIED ADS CAN WORK FOR YOU

We are pleased to be able to offer readers the opportunity to sell your unwanted equipment or advertise your 'wants'.

Simply complete the order form at the end of these ads - feel free to use an extra sheet of paper if there is not enough space. We will accept ads not on our order form. Send to **Amateur Radio, Classified Ads, Sovereign House, Brentwood, Essex CM14 4SE.**

Your price plus carriage paid. Tel: (0287) 34397 9-5pm, ask for Peter
 ■ AR88. Must be in good condition. Tel: 051-727 7423
 ■ Old-aged pensioner just beginning in amateur radio, requires instruction book for Tandy Realistic DX302 communications receiver. Prepared to pay. Urgent. Bates. Tel: 051-677 0536

NEXT MONTH

Amateur RADIO

Don't miss the April issue on sale 30 March

■ Ken Michae son reviews the Panasonic RF-B600L general coverage receiver



**All the
Regulars:
Second-hand
50 MHz
DX Diary
Project Book
Short Wave
Listener**

Amateur RADIO SMALL ADS

IAN FISHER COMMUNICATIONS OF STANHOPE

**CB Works, The Market Shop, Market
Place, Stanhope, County Durham**
☎ (0388) 528464

Main Distributors of 27MHz CB radios and the NEW CEPT models
including UNIDEN and DNT.

Including U.K. and CEPT walkie talkies.

Large stocks of coaxial cable, plugs, sockets and adaptors.

Stockists of the new UNIDEN 28/30 Multimode Transmitter
receiver

AIRBAND RADIO

Superb new SKIPTECH 9,000 airband and PMR band receivers
£18.50

Very latest sonic 4-8342 multiband radio receiver airband +PMR
from 54MHz to 178MHz two aeriels £21.00

Very latest SONIC 8342 Multi Band Radio receiver AIRBAND &
PMR from 54MHz to 178MHz with two aeriels £21.00

All available via mail order. Retail/Wholesale

OPEN: MON-SAT 10.30am-6.00pm SUN 2.30 - 4.30
RING FOR DETAILS (0388) 528464



Tel: 061-445-8918 061-434-5701 061-446-2347
Fax: 061-445-0978 Tlx: 666762 PAMACO G

WHOLESALE DISTRIBUTORS OF CB

WE DELIVER NATIONWIDE

Pama House, 433 Wilmslow Road, Manchester M20 9AF

Distributors of CB,
Scanner and some
amateur equipment.

Order Line:
0800 262963

MRZ MICROWAVE MOBILE ANTENNA

ICOM-BUSINESS/AMATEUR/ MARINE/AIR
UK AND EXPORT

MRZ COMMUNICATIONS LTD
NEWCASTLE UNDER LYME



TEL: (0782) 619658
7 DAY SERVICE

USED AMATEUR EQUIPMENT?

I buy, sell and exchange

For the deal you've been looking for, phone Dave, G4TNY,
anytime on Hornchurch (0708) 862841 or (0836) 201530

9am-7pm Mon-Sat or send SAE

Personal callers by appointment please

G4TNY Amateur Radio, Unit 14
Thurrock Commercial Centre, Jubel Way, South
Ockendon, Essex, RM15 4YD

ETESON ELECTRONICS



**15B Lower Green,
Poulton-le-Fylde, Blackpool**
Tel: (0253) 885107

Open: 9.30am - 12.30, 1.30 - 5.30. Closed Wed & Sun.
Electronic Component Specialists.

A wide range of electronic components, IC's, capacitors,
transistors, resistors, plugs and sockets etc.

Amateur RADIO

This method of advertising is available in
multiples of a single column centimetres —
(minimum 2cms). Copy can be changed
every month.

RATES

per single column centimetre:

1 insertion £7.00, 3 — £6.60, 6 — £6.30, 12 — £5.60.



ALAN HOOKER ELECTONICS



42 Netherhall Road
Doncaster

Tel: 0302 25690

Large stocks of electronic
components

★ **PSSS....** ★
**ALL THE SUPER
BARGAINS ARE
ON PAGE 9**



AMATEUR RADIO SMALL AD ORDER FORM

TO: Amateur Radio · Sovereign House
Brentwood · Essex CM14 4SE · England · (0277) 219876

PLEASE RESERVE.....centimetres by.....columns

FOR A PERIOD OF 1 issue..... 3 issues..... 6 issues..... 12 issues.....

COPY enclosed..... to follow.....

PAYMENT ENCLOSED: (Add 15% VAT)....

£ —

Cheques should be made payable to
Amateur Radio. Overseas payments
by International Money Order and
Credit Card

CHARGE TO MY ACCOUNT.....

CREDIT CARD EXPIRY DATE /

COMPANY

ADDRESS

SIGNATURE TELEPHONE.....

C P I

WHOLESALE

Scanners and some amateur accessories delivered to your shop. Contact for a price list

**Parma House, 433 Wilmslow Road,
Manchester M20 9AF
only 3 minutes from the M56**



NATIONWIDE DELIVERY

DEALERS contact us today for very fast, Friendly Service, Competitive Prices, Widest Range & Latest CB Products

Order Line: 0800 262963
Tel: 061-445-8918 061-434-5701
Fax: 061-445-0978 Tlx: 666762 PAMACO G

ACS SYSTEMS

AMATEUR RADIO: COMPUTERS: SOFTWARE

PC-PAKRATT	IBM-PC Software for the PK232	£19.95
PK-FAX	IBM-PC FAX Software for PK232	£18.95
COMM-PAKRATT	Commodore 64/128 Software for PK232	£39.95
COMM-FAX	Commodore 64/128 Software for PK232	£39.95
COMM-FAX/CT	As above but cartridge, manual only	£39
PK-232/BBC	BBC Software for the PK232	£26.95
PK-88/CBM	Commodore 64 Software for the PK-88	£39.95
PK-88/BBC	BBC Software for the PK-88	£26.95
PK232	7 Mode Intelligent TNC, inc manual cables	£279.95
PK88	Budget Packet Radio TNC (new ROM avail)	£109.95
FAX OPTION	Older PK232 Upgrades, manual cable ROM	£49.95
TNTERM	Advanced Software for the BBC	£49.95
*AMIGA-FAX	Tx/Rx Facsimile System (now cased unit)	£109.95
AMIGA-SSTV	Tx/Rx SSTV System for Commodore Amiga	£109.95
*AMIGA FAX/SSTV	Software on disc only (no interface)	£59.95
*MET-1	SHF Weather Satellite Receiver	£399.95
*TWR-3	Micro Weather Station with anemometer	£129.95
*PCW	IBM PC or compatible Weather Station	£269.95
*PCWGRAPH	Extended Software for PCW above	£59.95
*ROM1989	New Update ROM for PK232 (CW ident etc)	£17
*SC1200	120 CPS 80 Col Printer, no NLQ	£114.94
*SC1500	180 CPS 80 Col Printer with NLQ	£172.44
*STAR LC10	80 Col Multi-Font NLQ 144 CPS	£259
*STAR LC24-10	24 pin low cost Multi-Font	£399
AMIGA A500	1 meg drive free Modulator + SWR	£399
Atari ST Computers	(STM still available @ £299.00) 1 meg STFM	£299
*HF122	General Coverage HF Receiver (ask for spec sheet)	£375
*Spectrum +2 and +3	PK232 Software and cables	£14.95
*Use your Opus Discovery Drive with the Spectrum (ROM)		£12
*Spectrum +2, +3 6-way IDC to midi-cable		£9.95
*Spectrum +2, +3 6-way IDC to 25-way D plug RS232 cable		£9.95
*PK232/PK88 Software for Spectrum on 3.5 Opus disk		£4
*PK232/PK88 Software for Spectrum cassette		£2
*Astra Satellite Television Pack	has landed: 20 channels fully programmable; Remote control; Satellite finder; MAC Comp auto polarity; Pretuned for Astra: 60cm Dish; only £299	
	Printer cables £9.95 post free	
	Turbo Cordless Iron heats in 10sec Charger/Car Lead included, only £21.95 free del Postage Software £2.50; Printers £9; Terminals £4	
	* = new products	

All enquiries must include a large SAE or 2 IRCs or 75p in stamps

ACS Systems

19 Cheadle Terrace, Mountain Ash
Mid Glamorgan, South Wales CF45 3ND
Tel: (0443) 476040
Cheques payable to ACS Systems

Selectronic

Radio communications and scanning receiver specialist

203 High Street
Canvey Island, Essex,
Tel: 0268 691481
(Open Mon-Sat 9-5.30)

Amateur radio equipment also in stock



TAR

Aerials & Lashing Equipment

TAR Catalogue

FOR FREE COPY
JUST SEND SAE 9 1/2 x 6 1/2

TAR COMMUNICATIONS
King William Street, Stourbridge,
W. Midlands DY8 4EY

☎ 0384 390944

THE SCIENTIFIC WIRE COMPANY

811 Forest Road, London E17. Telephone 01-531 1568

ENAMELLED COPPER WIRE			
SWG	1lb	5oz	2oz
8 to 34	3.63	2.09	1.10
35 to 39	3.82	2.31	1.27
40 to 43	6.00	3.20	2.25
44 to 47	8.67	5.80	3.49
48	15.96	9.58	6.38
SILVER PLATED COPPER WIRE			
14 to 30	9.09	5.20	2.93
TINNED COPPER WIRE			
14 to 30	3.97	2.41	1.39
Fluxcore			

Please add 15% VAT. Orders under £3 add 50p.
SAE for list of copper and resistance wire.
Dealer enquiries welcome.

Maidstone YMCA Radio Rally, 28th May

Trade stand bookings

Tel: G1A0Q (0622) 890167 NOW

Other info: G6FZD 50709

JAYCEE ELECTRONICS LTD

JOHN GM30PW

20 Woodside Way,
Glenrothes,
Fife KY7 5DP

Tel: 0592 756962

Open: Tues-Sat 9-5

Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam - Microwave Modules - LAR.

JAPANESE Ic's (PART OF OUR RANGE)

AN7178 £2.95, BA5408 £2.20, HA1377 £2.20, HA1392 £2.50, HA1394 £2.95, HA1397 £2.75, HA1398 £2.75, HA13001 £2.95, LA4460 £1.80, LA4461 £1.80, LA4507 £4.25, LC7137 £4.50, M51517 £2.80, MB3705 £1.80, MB3712 £1.50, MB9722 £3.50, MB9730 £2.50, MB9731 £3.50, STK461 £7.50, STK463 £8.40, TA7205AF £1.00, TA7222AF £1.30, TA7240 £2.95, TA7241 £2.95, TA7270 £2.75, TA7271 £2.75, TA7274 £2.95, TA7280 £3.50, TA7281 £2.95, TA7282 £2.95, TA7283 £2.95, TA7288 £2.95, TA7611 £3.20, UPC575 £1.00, UPC1156 £2.95, UPC1181 £1.10, UPC1182 £1.10, UPC1185 £2.50, UPC1188 £2.75, UPC1230 £2.50, UPC1263 £2.50, UP1277 £2.75, UPC1278 £2.75, UPC1365 £3.60, UPC1394 £1.95

ADD 60p POST AND PACKING AND THEN ADD 15% VAT TO TOTAL
T POWELL 16 PADDINGTON GREEN LONDON W2 1LG
OPEN MON-FRI 10AM-5PM, SAT 9AM-12 NOON.
TELEPHONE: 01 723 9246
ACCESS VIA. TELEPHONE ORDERS ACCEPTED OVER £5.00

QUARTZ CRYSTALS and FILTERS

Large numbers of standard frequencies in stock for amateur, CB, professional and industrial applications. Stock crystals £8.00 each (inc VAT and UK post). Any frequency or type made-to-order from £8.80. Phone or SAE for lists.

GOLLEDD ELECTRONICS

Merriott, Somerset TA16 5NS
Tel: (0460) 73718

G4ZPY PADDLE KEYS

Britain's leading manufacturer of HAND-BUILT brass and nickel plated Morse keys. Keys of quality at competitive prices. Send a 4 1/4" x 6 1/4" SAE for our "NEW" COLOUR illustrated brochure to:

41 Mill Dam Lane, Burscough
Ormskirk, Lancs L40 7TG
Tel: 0704 894299

24v ni-cad battery contains twenty XD type cells, used condition, some cells may be faulty.....£12.00

Spring tension gauges, set of 3. 0-4 ounce, 0-16 ounce, 0-6lb.....£8.00

Ex Vulcan bomber hitch and roll assembly, contains gears, shafts, bearings etc.....£15.00

Range and bearing marker unit, contains bevel gears, servos, shafts etc.....£15.00

Ex Government Geiger counter with 3 probes x-ray, alpha, beta.....£45.00

MUIRHEAD Fax receiver type K401£45.00

Transmitter type K400.....£45.00

Other types in stock

Type R210 receiver 2-15 MHz, complete with plug and headphones.....£55.00

ITT UHF TX-RX base station.....£40.00

ITT 149 MHz VHF transmitter.....£40.00

Collins R390A receiver, poor condition

£150.00 Ring for details

Readyphone 100 watt, LIN, amplifier, complete with ATU.....£75.00

Prices include postage and packing

A C ELECTRONIC SERVICE

17 APPLETON GROVE, LEEDS LS9 9EN

TELEPHONE: 0532 496048

SOUTH WALES

ELECTRO DISPOSALS

BY THE TIME YOU READ THIS
WE WILL HAVE MOVED TO LARGER
PREMISES, COME AND SEE!

UNIT 31, LONLAS WORKSHOPS
SKEWEN, NEATH Tel: 0792 818451

MILITARY SURPLUS EQUIPMENT MANUAL

Giant collection Military Equipment Circuits/Data.

Only £10.00 including Post/Packing.

Just one of many unique Repair and Data Guides.

LSAE for your FREE catalogue.

WORKSHOP SERVICE MANUALS

Video Recorders £12.50. All others £6.00 inclusive.

State Make/Model/Type with order.

MAURITRON ELECTRONICS LIMITED (AR)

8 Cherry Tree Road, Chinnor

Oxfordshire OX9 4QY

Tel: (0844) 51694

AGRIMOTORS

MERTON CB AND RADIO CENTRE

MERTON GARAGE AND POST OFFICE, MERTON.

Nr OAKHAMPTON, DEVON EX20 3DZ

OPEN 6 DAYS 9-6 LUNCH 1-2pm

EARLY CLOSING THURSDAY 1.00pm

(SUNDAYS BY APPOINTMENT)

SPECIALIST IN 934 MHz

SUPPLIERS OF ALL 27MHz AND 934 MHz EQUIPMENT

AMATEUR ACCESSORIES CATERED FOR

08053 200

DISPLAY AD RATES		series rates for consecutive insertions			
depth mm x width mm	ad space	1 issue	3 issues	6 issues	12 issues
61 x 90	1/8 page	£66 00	£62 00	£59 00	£53 00
128 x 90 or 61 x 186	1/4 page	£115 00	£110 00	£105 00	£92 00
128 x 186 or 263 x 90	1/2 page	£225 00	£210 00	£200 00	£180 00
263 x 186	1 page	£430 00	£405 00	£385 00	£345 00
263 x 394	double page	£830 00	£780 00	£740 00	£660 00

COLOUR AD RATES		colour rates exclude cost of separations	series rates for consecutive insertions			
depth mm x width mm	ad space	1 issue	3 issues	6 issues	12 issues	
128 x 186 or 263 x 90	1/2 page	£305 00	£290 00	£275 00	£245 00	
263 x 186	1 page	£590 00	£550 00	£530 00	£470 00	
263 x 394	double page	£1,130 00	£1,070 00	£1,010 00	£900 00	

SPECIAL POSITIONS	Covers	Outside back cover 20% extra, inside covers 10% extra
	Bleed	10% extra (Bleed area = 307 x 220)
	Facing Matter	15% extra

DEADLINES		*Dates affected by public holidays				
issue	colour ad	mono proof ad	mono no proof & small ad	mono artwork	on sale thurs	
March 89	25 Jan 89	26 Jan 89	1 Feb 89	3 Feb 89	23 Feb 89	
April 89	1 Mar 89	2 Mar 89	8 Mar 89	10 Mar 89	30 Mar 89	
May 89	29 Mar 89	30 Mar 89	5 Apr 89	7 Apr 89	27 Apr 89	
June 89	26 Apr 89	27 Apr 89	3 May 89	5 May 89	25 May 89	

CONDITIONS & INFORMATION	
<p>SERIES RATES Series rates also apply when larger or additional space to that initially booked is taken. An ad of at least the minimum space must appear in consecutive issues to qualify for series rates. Previous copy will automatically be repeated if no further copy is received. A hold ad is acceptable for maintaining your series rate contract. This will automatically be inserted if no further copy is received. Display Ad and Small Ad series rate contracts are not interchangeable.</p>	<p>If series rate contract is cancelled, the advertiser will be liable to pay the unearned series discount already taken.</p> <p>COPY Except for County Guides copy may be changed monthly. No additional charges for typesetting or illustrations (except for colour separations). For illustrations just send photograph or artwork. Colour Ad rates do not include the cost of separations. Printed - web offset.</p>

PAYMENT
Above rates exclude VAT.
All single insertion ads are accepted on a pre-payment basis only unless an account is held.
Accounts will be opened for series rate advertisers subject to satisfactory credit references.
Accounts are strictly net and must be settled by the publication date.
Overseas payments by International Money Order or credit card.
FOR FURTHER INFORMATION CONTACT
Amateur Radio Sovereign House, Brentwood, Essex CM14 4SE.
(0277) 219876

Commission to approved advertising agencies is 10%.

CONDITIONS
10% discount if advertising in both Amateur Radio and Radio & Electronics World.
A voucher copy will be sent to Display and Colour advertisers only.
Ads accepted subject to our standard conditions, available on request.

ADVERTISERS INDEX

J Bull.....	53	Myandering Ltd.....	30
P M Components	34,35	Nevada.....	10
R N Electronics	44	Radio and Tele Corr School ..	23
Harrison Electronics.....	30	Brian J Reed	10
C M Howes	18	Royal Navy.....	44
ICOM.....	26,27	Sony Shortwave	4,5
Kenzen.....	23	Technical Software	10
Navico	54	Waters & Stanton	2
Lake Electronics.....	23	R Withers	9



No. 1 LIST BAKERS DOZEN PACKS

All packs are £1 each, if you order 12 then you are entitled to another free. Please state which one you want. Note the figure on the extreme left of the pack ref number and the next figure is the quantity of items in the pack, finally a short description.

- BD2 5 13A spurs provide a fused outlet to a ring main where devices such as a clock must not be switched off.
- BD7 4 In flex switches with neon on/off lights, saves leaving things switched on.
- BD9 2 6V 1A mains transformers upright mounting with fixed clamps.
- BD11 1 6 1/2in speaker cabinet ideal for extensions, takes our speaker. Ref BD137.
- BD13 12 30 watt reed switches, it's surprising what you can make with these—burglar alarms, secret switches, relay, etc., etc.
- BD22 2 25 watt loudspeaker two unit crossovers.
- BD29 1 B.D.A.C. stereo unit is wonderful value.
- BD30 2 Nicad constant current chargers adapt to charge almost any nicad battery.
- BD32 2 Humidity switches, as the air becomes damper the membrane stretches and operates a microswitch.
- BD34 48 2 meter length of connecting wire all colour coded.
- BD42 5 13A rocker switch three tags so on/off, or change over with centre off.
- BD45 1 24hr time switch, ex-Electricity Board, automatically adjust for lengthening and shortening day, original cost £40 each.
- BD49 10 Neon valves, with series resistor, these make good night lights.
- BD56 1 Mini uniselector, one use is for an electric jigsaw puzzle, we give circuit diagram for this. One pulse into motor, moves switch through one pole.
- BD59 2 Flat solenoids—you could make your multi-tester read AC amps with this.
- BD67 1 Suck or blow operated pressure switch, or it can be operated by any low pressure variation such as water level in water tanks.
- BD91 1 Mains operated motors with gearbox. Final speed 16 rpm, 2 watt rated.
- BD103A 1 6V 750mA power supply, nicely cased with mains input and 6V output leads.
- BD120 2 Stripper boards, each contains a 400V 2A bridge rectifier and 14 other diodes and resistors as well as dozens of condensers, etc.
- BD122 10m Twin screened flex with white pvc cover.
- BD128 10 Very fine drills for pcb boards etc. Normal cost about 80p each.
- BD132 2 Plastic boxes approx 3in cube with square hole through top so ideal for interrupted beam switch.
- BD134 10 Motors for model aeroplanes, spin to start so needs no switch.
- BD139 6 Microphone inserts—magnetic 400 ohm also act as speakers.
- BD148 4 Reed relay kits, you get 16 reed switches and 4 coil sets with notes on making c/o relays and other gadgets.
- BD149 6 Safety cover for 13A sockets—prevent those inquisitive little fingers getting nasty shocks.
- BD180 6 Neon indicators in panel mounting holders with lens.
- BD193 6 5 amp 3 pin flush mounting sockets make a low cost disco panel.
- BD196 1 in flex simmerstat—keeps your soldering iron etc. always at the ready.
- BD199 1 Mains solenoid, very powerful, has 1in pull or could push if modified.
- BD201 8 Keyboard switches—made for computers but have many other applications.
- BD210 4 Transistors type 2N3055, probably the most useful power transistor.
- BD211 1 Electric clock, mains operated, put this in a box and you need never be late.
- BD221 5 12V alarms, make a noise about as loud as a car horn. Slightly soiled but DK.
- BD242 2 6in x 4in speakers, 4 ohm made from Radiomobile so very good quality.
- BD252 1 Panostat, controls output of boiling ring from simmer up boil.
- BD259 50 Leads with push-on 1/4in tags—a must for hook-ups—mains connections etc.
- BD263 2 Oblong push switches for bell or chimes, these can mains up to 5 amps so could be foot switch if fitted into pattern.
- BD268 1 Mini 1 watt amp for record player. Will also change speed of record player motor.
- BD283 3 Mild steel boxes approx 3in x 3in x 1in deep—standard electrical.
- BD293 50 Mixed silicon diodes.
- BD305 1 Tubular dynamic mic with optional table rest.

VERY POWERFUL 12 VOLT MOTORS—YARD HORSEPOWER
Made to drive the Sinclair C5 electric car but adaptable to power a go-kart, a mower, a rail car, model railway, etc. Brand new. Price £15.00 plus £2.00 postage. Our ref. 158.

OVER 400 GIFTS YOU CAN CHOOSE FROM

There is a total of over 400 gifts in our Baker's Dozen range and you become entitled to a free gift with each dozen packs.

A classified list of these packs and our latest "News Letter" will be enclosed with your goods, and you will automatically receive our next news letter.



ATARI 65XE COMPUTER At 64K this is most powerful and suitable for home and business. Brand new, complete with PSU, TV lead, owner's manual and six games. Can be yours for only £45 plus £3 insured delivery.

DATA RECORDERS ACORN for Acorn Electron, etc., reference number ALF03, with TV lead, manual and PSU. Brand new. Price £10 plus £1.50 post. Order ref 10P44.

ATARI XC12 for all their home computers. With leads and handbook. Brand new. Price £10 plus £2 post. Order ref 10P53.

JOYSTICK FOR ATARI OR COMMODORE for all Atari and Commodore 64 and Vic20. New. Price £5. Order ref 5P126.

EXTRA SPECIAL OFFER We will supply the Atari 65XE, data recorder XC12, joystick and six games for £57.50 plus £4 insured delivery.

SUB-MIN TOGGLE SWITCH Body size 8mm x 4mm x 7mm SBDT with chrome dolly fixing nuts. 4 for £1. Order Ref. BD649.

VENNER TIME SWITCH. Mains operated with 20 amp switch, one on and off per 24 hrs repeats daily automatically correcting for the lengthening or shortening day. An expensive time switch but you can have it for only £2.95 without case, metal case—£2.95, adaptor kit to convert this into a normal 24hr. time switch but with the added advantage of up to 12 on/off per 24hrs. This makes an ideal controller for the immersion heater. Price of the adaptor kit is £2.30.

SOUND TO LIGHT UNIT. Complete kit of parts for a three channel sound to light unit controlling over 2000 watts of lighting. Use this at home if you wish but it is plenty rugged enough for disco work. The unit is housed in an attractive two-tone metal case and has controls for each channel, and a master on/off. The audio input and output are by 1/4in. sockets and three panel mounting fuse holders provide thyristor protection. A four pin plug and socket facilitate ease of connecting lamps. Special price is £14.95 in kit form.

RE-CHARGEABLE NICADS 'D' SIZE
These are tagged for easy joining together but tags, being spot welded, are easy to remove. Virtually unused, tested and guaranteed. £2.00 ref 2P141 or 6 wired together for £10.00 ref 10P47.

RECORD PLAYER DECK BRS. 12volt operated, belt driven with an 11in turntable, stereo cartridge. It will play 7in-10in or 12in individually at either 45rpm or 33rpm. Fitted speed selector and pick-up cueing lever. Price £12 plus £3 postage. Order ref 12P4.

2.5kw TANGENTIAL BLOW HEATER has an approximate width of 3in. (plus motor), elements made up of two 1.2kw sections so with switch available you can have 2.5kw, 1.2kw or cold blow. Over-heat cutout eliminates fire risk should fan stop or air flow be impeded. Fan blades are metal. Price £5 plus £2.50 post. Our ref 5P62. Switch 50p.

ALBA TWIN CASSETTE RECORDER AND PLAYER WITH STEREO RADIO This is a mains/battery portable made to sell, we understand, at about £50 but the ones we have are line rejecters. They are brand new still in the manufacturers' boxes but have a slight defect associated with the cassette section. The radio and amplifier section, both mono and stereo, is perfectly OK. If you are handy at mending things then this should be for you. Price £20 or two for £38 plus £3 insured post, either package. Our ref 20P7 or 2 x 20P7.

LASER TUBE

Made by Philips Electrical. New and unused. This is helium-neon and has a typical power rating of 1.6mW. It emits random polarised light and is completely safe provided you do not look directly into the beam when eye damage could result. DONT MISS THIS SPECIAL BARGAIN! Price £29.95 plus £3 insured delivery.

POWER SUPPLY FOR PHILIPS LASER is now available in kit form. Price £15 plus £2 postage, or made-up ready-to-use at £20 plus £2.50 postage. Our ref 13P1 for the kit and 18P1 for the made-up version.

PAPST AXIAL FAN—MANUFACTURERS REF NO. TYP4630N.

This is mains operated, 15 watt rating and in a metal frame with metal blades so OK in high temperatures. Body size approx. 4 3/4" square x 1 1/4" thick. £6.00 each, plus £1.00 postage. Our ref 6P8.

VERY POWERFUL MAGNETS Although only less than 1" long and not much thicker than a pencil these are very difficult to pull apart. Could be used to operate embedded reed switches, etc. Price 50p each, 2 for £1.00 Ref BD642.



ORGAN MASTER is a three octave musical keyboard. It is beautifully made, has gold plated contacts and is complete with ribbon cable and edge connector. Brand new, only £12 plus £3 postage. Order ref. 12P5.

MUSIC FROM YOUR SPECTRUM 128 We offer the Organ Master three octave keyboard, complete with leads and the interface which plugs into your 128. You can then compose, play, record, store, etc., your own music. Price £19 plus £3 special packing and postage. Order ref. 19P1.

20A DOUBLE POLE RELAY WITH 12V COIL complete with mounting brackets, made by the Japanese Omron company. Price £2 each. Our Ref. 2P173A.

TORRIDIAL MAINS TRANSFORMER with twin outputs. 6.3V 2A and 12V 600mA, so ideal for FDD power supply. Price £5. Our Ref. 5P122.

DOUBLE MICRO CASSETTE DECK made by the Japanese ABS company. This takes two micro cassettes and is complete with motors solenoids to select the deck to use and record and playback heads. Price £10. Our Ref. 10P49.

QUICK FIX MAINS CONNECTOR A must for your workshop. Saves putting on plugs as you just push the wires under the spring clips. Automatically off when lid is up. Price £7.50. Our Ref. 7P51.

BT NANASET with curly lead terminating with flat BT plug. Colour cream. Price £5. Our Ref. 5P123.

J & N BULL ELECTRICAL

Dept AR, 250 PORTLAND ROAD, HOVE BRIGHTON, SUSSEX BN3 5QT

MAIL ORDER TERMS: Cash, PD or cheque with order. Orders under £20 add £1.50 service charge. Monthly account orders accepted from schools and public companies. Access and B/card orders accepted. Brighton (0273) 734648 or 202580

POPULAR ITEMS

Some of the many items described in our current list which you will receive if you request it

3 1/2in FDD CHINOM 80 track 500k. Shugart compatible interface. Standard connections, interchangeable with most other 3 1/2in and 5 1/4in drives. Brand new. £26.50 plus £3 insured post.

CASE NOW AVAILABLE FOR THE CHINOM F353 This is the 80 track, single sided one which we have been selling at £28.50. The case is sheet metal, finished in hammer-beige with ample ventilation and rubber feet. Overall size 4 1/4in x 7in x 1 1/2in approx. Designed to take the ribbon cable and 3 core power lead. Price £8. Our ref 8P21.

3in FDD HITACHI HFD3653XA Shugart compatible interface. 500k on 3in disc. Recommended for many Amstrads but interchangeable with most drives. £29.50 plus £3 insured post.

FDD CASE AND POWER SUPPLY KIT for the 3in or 3 1/2in. £11.00. Ref 11P2 for the Chinom, 11P3 for the Hitachi.

3in MONITOR made for ICL, uses Philips black and white tube. Brand new and complete but uncased. £16.00 plus £5.00 post.

ACORN COMPUTER DATA RECORDER REF ALF03 Made for the Electron or BBC computers but suitable for most others. Complete with mains adaptor, leads and handbook. £10.00. Ref. 10P44.

POWERFUL IONISER Uses mains transformer. Generates approx. 10 times more ions than the normal diode/cap ladder circuits. Complete kit £11.50 plus £3.00 post.

FREE POWER! Can be yours if you use our solar cells—sturdily made modules with new system bubble magnifiers to concentrate the light and so eliminate the need for actual sunshine—they work just as well in bright light. Voltage input is .45—you join in series to get desired voltage—and in parallel for more amps. **Module A** gives 100mA. Price £1. Our ref. BD631. **Module C** gives 400mA. Price £2. Our ref. 2P199. **Module D** gives 700mA. Price £3. Our ref. 3P42.

SOLAR POWERED NI-CAD CHARGER 4 Ni-Cad batteries AA (HP7) charged in eight hours or two in only 4 hours. It is a complete, boxed ready to use unit. Price £6. Our ref. 6P3.

50V 20A TRANSFORMER 'C' Core construction so quite easy to adapt for other outputs—tapped mains input. Only £25 but very heavy so please add £5 if not collecting. Order Ref. 25P4.

SWITCH AC LOADS WITH YOUR COMPUTER This is easy and reliable if you use our solid state relay. This has no moving parts, has high input resistance and acts as a noise barrier and provides 4kV isolation between logic terminals. The turn-on voltage is not critical, anything between 3 and 30V, internal resistance is about 1K ohm. AC loads up to 10A can be switched. Price is £2 each. Ref. 2P183.

METAL PROJECT BOX ideal size for battery charger, power supply, etc., sprayed grey, size 8in x 4 1/4in x 4in high, ends are louvred for ventilation other sides are flat and undrilled. Price £2. Order ref. 2P191.

BIG SMOOTHING CAPACITOR. Sprague powerlytic 39,000uF at 50V. £3. Our ref. 3P41.

4-CORE FLEX CABLE. Cores separately insulated and grey PVC covered overall. Each copper core size 7/0.2mm. Ideal for long telephone runs or similar applications even at mains voltage. 20 metres £2. Our ref. 2P196 or 100 metres coil £8. Order ref. 8P19.

6-CORE FLEX CABLE. Description same as the 4-core above. Price 15 metres for £2. Our ref. 2P197 or 100 metres £3. Our ref. 9P1.

TWIN GANG TUNING CAPACITOR. Each section is .0005uF with trimmers and good length 1/4in spindle. Old but unused and in very good condition. £1 each. Our ref. BD630.

13A PLUGS Pins sleeved for extra safety, parcel of 5 for £2. Order ref. 2P185.

13A ADAPTERS Takes 2 13A plugs, packet of 3 for £2. Order ref. 2P187.

20V-0-20V Mains transformers 2 1/2 amp (100 watt) loading, tapped primary 200-245 upright mountings £4. Order ref. 4P24.

BURGLAR ALARM BELL—6" gong DK for outside use if protected from rain. 12V battery operated. Price £8. Ref. 8P2.

24 HOUR TIME SWITCH—16A changeover contacts, up to 6 on/off per day. Nicely cased, intended for wall mounting. Price £8. Ref. 8P6.

CAPACITOR BARGAIN axial ended, 4700uF at 25V. Jap made, normally 50p each, you get 4 for £1. Our ref. 613.

PIEZO ELECTRIC FAN—An unusual fan, more like the one used by Madame Butterfly than the conventional type, it does not rotate. The air movement is caused by two vibrating arms. It is American made, mains operated, very economical and causes no interference, so is ideal for computer and instrument cooling. Price is only £1 each. Ref. BD598.

SPRING LOADED TEST PRODS—Heavy duty, made by the famous Bulgin company, very good quality. Price 4 for £1. Ref. BD597.

ASTEC P.S.U.—Switch mode type. Input set for +230V. Output 3.5 amps at +5V, 1.5 amps at +12V, and 3 amps at +5V. Should be OK for floppy disc drives. Regular price £30. Our price only £10. Ref. 10T34. Brand new and unused.

APPLIANCE THERMOSTATS—Spindle adjust type suitable for convector heaters or similar. Price 2 for £1. Ref. BD582.

3-CORE FLEX BARGAIN No. 1—Core size 5mm so ideal for long extension leads carrying up to 5 amps or short leads up to 10 amps. 15m for £2. Ref. 2P189.

3-CORE FLEX BARGAIN No. 2—Core size 1.25mm so suitable for long extension leads carrying up to 13 amps, or short leads up to 25A. 10m for £2. Ref. 2P190.

ALPHA-NUMERIC KEYBOARD—This keyboard has 73 keys giving trouble free life and no contact bounce. The keys are arranged in two groups, the main area is a QWERTY array and on the right is a 15 key, number pad, board size is approx. 13" x 4" — brand new but offered at only a fraction of its cost, namely £3. plus £1 post. Ref. 3P27.

WIRE BARGAIN—500 metres 0.7mm solid copper tinned and p.v.c. covered. Only £3 plus £1 post. Ref. 3P31—that's well under 1p per metre, and this wire is ideal for push on connections.

INTERRUPTED BEAM KIT—This kit enables you to make a switch that will trigger when a steady beam of infra-red or ordinary light is broken. Main components—relay, photo transistor, resistors and caps, etc. Circuit diagram but no case. Price £2. Ref. 2P15.

1/8th HORSEPOWER 12 VOLT MOTOR Made by Smiths, the body length of this is approximately 3in, the diameter 3in and the spindle 5/16th of an inch diameter. It has a centre flange for fixing or can be fixed from the end by means of 2 nuts. A very powerful little motor which runs at 3,000rpm. We have a large quantity of them so if you have any projects in mind then you could rely on supplies for at least two years. Price £6. Our ref 6P1, discount for quantities of 10 or more.



The new AMR1000/S

It checks out from every angle



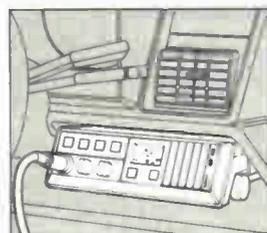
Whichever way you look at it, the Navico AMR1000/S sets new standards in 2m mobile transceivers.

The angled, reversible control panel, together with a range of inexpensive optional mounting brackets enables installation in any vehicle, whether under or on top of the dash, either side of a central console or even from the roof.

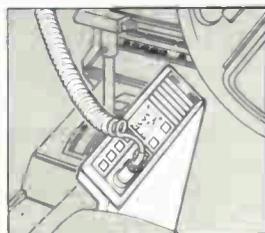
This means the display will always face you giving total access to the controls which are spaced to allow simple, safe, mobile operation. The front mounted loudspeaker will also face you, projecting the sound toward you and not at your feet or into the dashboard.

Combine this with the most sensitive and selective receiver, an audio response tailored for today's busy band and the unique, fully automatic repeater/simplex operating facilities and you have a truly remarkable mobile radio.

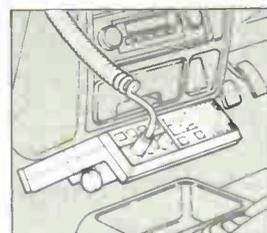
There is also a choice of models to suit your exact



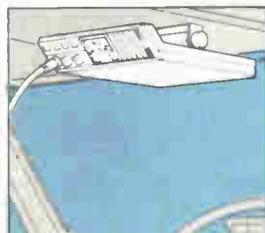
Under dash mounted (side)



Central console mounted



Under dash (central)



Roof mounted

needs. In the words of Chris Lorek of HRT about the Navico AMR1000/S "Not only does it out-perform its competition on technical grounds but it offers many very useful operating features not found on other rigs, and sells at what appears to be a very competitive price".

Check it out for yourself, prices start at just £247.25 (incl. VAT). For more details and to arrange a personal

demonstration clip the coupon today.

PRIORITY INFORMATION REQUEST

For full details send to:
Navico, Star Lane, Margate, Kent CT9 4NP,
United Kingdom. Telephone: 0843 290007.

Name

Address

Tel

AR3 89

The professionals in amateur radio

NAVICO