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VOLUME 7 NO 5 MAY 1989

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LETTERS

Letter of the Month

Since becoming a licensed amateur in July 1983 I have followed the debates on whether Morse code should remain the criterion for the HF licence and the Novice Licence.

Personally, I know from my own experience as a radio operator in the Army, that morse code is, for about 20-30% of the embryonic radio operators, completely impossible to pass. By that, I mean that some 10% cannot grasp the conversion of letter to symbol, and some 10 to 20%, while able to learn the code, cannot under any circumstances develop their ear to hand coordination to the requirements of the 12 wpm test. All fail on or between 6 to 8 wpm. This in my opinion does not in any way mark them as bad operators, far from it.

What we need is some means of ascertaining genuine lack of coordination and finding an alternative way on to the HF bands.

If we are to believe that standards of operating have dropped as low as some say, then it behoves us to support the implementation of the Novice Licence, if only to insure the reinstatement of higher standards.

It is better for amateur radio as a whole to insist that all future amateurs must first pass the Novice License

stage prior to taking the RAE, morse test et al, to ensure (a) that interest is sustained (b) procedures are learned (c) higher standards are maintained (d) those who are slower to learn get the chance to pass on to higher achievements (e) a powerful lobby of dedicated enthusiasts to resist the money grabbers from taking away amateur frequencies for commercial use.

We only have to look at CB to see how ready they are to appropriate bands used by minority groups.

934MHz went that way in 1988 — what next? Whether you agree or agree to disagree with me or the RSGB, we should be willing to stand together as licensed amateurs to resist the stealing of amateur bands to fill the coffers of any government.

 J. D. Bolton G4XPP, Timperley, Cheshire.

I am surprised at the figure of 20-30% unable to learn morse to 12wpm. I imagined myself one of them for the year or so it took me to increase from 5wpm to 12wpm. Let us know if you have spent a lot of time on morse practice with absolutely no result.

As regards the novice license, one justification for it might indeed be to permit the raising of the standard required in the RAE. Any comments?

something called an "AIR 7" to fall into the second category, and to perform accordingly. I regard sets like the AOR as a general coverage receiver, and to have airband limitations, in deference to compatibility with landmobile standards.

I am sending a copy of this letter to 'HRT" and look forward to a lively discussion.

 Peter Longhurst, Garex Electronics, Tring, Herts.

PS There was an error in the Warlingham frequency: surely not 127.725MHz? and Davidstone Moor, 128.600MHz ± 7.5kHz.

Is This Economy?

Your September issue carried a letter of 12 column inches on the need for second hand gear. Sadly, your Readers Ads column, which fulfills this need, did not appear that month.

An editorial footnote to this letter mentioned the 'economy model' transceiver, the 747. For £695 you can purchase the transceiver, but all you can do is look at it unless you also buy a power supply (£195) a microphone (£21) and, say a 5RY antenna (£20). The real cost to get on the air is £931. Is this economy?

To add FM, a £40 add on unit plus a larger power supply costing £280 is needed, bringing the total cost to well over £1000. A further £1600 will purchase a linear amplifier, which will quadruple the power output and add 1 "S" point but is this economy?

- G2BAM

One does instinctively expect a transceiver to come with a power supply (unless it is intended for mobile) and a microphone, but I would scarcely expect an antenna and a linear amplifier to be included in the price. The really keen constructor could build a power supply, and could perhaps

We regret that Ham Radio Today cannot reply to queries individually. Every month we publish a section of the most interesting. We will endeavour to answer straightforward queries about the back issues index if readers enclose an SAE and much patience. It helps if letters and back issue enquiries arrive on separate sheets of paper, although the same envelope can be used.

Subject Aired

I am very well aware of the problem of airband reception, particularly in relation to offset frequencies. In my previous industrial career, I had a strict upbringing in product and sales law ("Trades Description Act" etc.) and I try very hard to be responsible in my dealings with customers now that I run my own business.

Occasionally we have had customers report that they "can hear the aircraft but not the ground station"; I have never told anyone that "they must be out of range of the ground station" or any such remark and have been at great pains to explain the offset frequency system and to point out that the general coverage scanners which we sell are not totally compatible with airband standards. I normally suggest that the user can

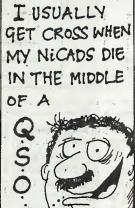
program the offsets. For example: use adjacent memories for the main and the offset.

One thing that should be made clear to users is that they should either buy a dedicated airband receiver like the Signal series, which have the correct IF bandwidth (~30kHz) or they accept this particular limitation on a general coverage set, which has a narrow bandwidth to suit normal landmobile standards.

We are probably the largest scanner dealer in the UK; and I do not recall ever parting bad company with a customer over this airband, issue. It would be interesting to know how many people really feel that they have been mis-led by a dealer.

I think there is a fine line between sets which "cover the airband" and those which are specifically promoted as being "Airband receivers". Presumably you would expect









make a microphone using an insert costing less than £21, and this is perhaps in the spirit of amateur radio, but it would be better if one were clearly warned if something normally required is not included. Add on extras are fair game though. After all, not everyone wants them. — G3YZW

Silent Spectrum

After reading your article on Packet Radio and obtaining a PK88 tnc, I have it up and running on my old 48K Spectrum with the Interface 1, but can't get the thing to talk to the RS232 port on my 128K Spectrum.

The reason I want to use the 128K is that I am using an Epson FX80 printer and a Plus D disk interface, so I cannot use the Interface 1 on this machine. My 48K Spectrum software will not run using the RS232 port built into the 128K Spectrum.

There must be a lot of other people who would like to use the 128K Spectrum on packet, but like myself are having difficulties.

Could you print my letter in your magazine to find out if any one has managed to get this up and running? I would welcome any advice.

Paul Sergent G40NF, Costessey,
 Norwich. Tel. 0603 747782.

Q And Take Your Turn

Ref. your query regarding G4ISB's point:

Why?:

Quite apart from the fact that not all of us have the benefit of the RN's code, the Q code already exists and — more importantly — is internationally known and understood.

Thus "QTH" is "location" in any language and, with the rudiments of a foreign language, and the knowledge of its phonetic pronounciation, it is surprising what can be worked.

- J. W. Barker G3WAL, Rugby.

Defeat Feet

It is utterly pathetique to read your article in February describing a program for calculating aerial dimensions. We are now in the 20th Century. Why on earth are you still printing feet and inches? The world is becoming increasingly smaller and standardisation is the key to make compatibility feasible. The world has decided to use the metre to describe dimensions — so in future let us see no other feet than the editor's — please. — Ragnar Otterstad OZ8RO, Holte, Copenhagen.

20th Century? 20th Century? The metre was invented by Napoleon

Bonaparte in the 19th Century to get his own back on the Duke of Wellington. The story goes that the Emperor ordered his astronomers to calculate 1/10,000,000 of the meridian through Paris and devise a scientific system of measurement based on this divinely ordained distance. Unfortunately, this turned out to be almost exactly the distance from the tip of King Alfred the Great's nose to that of his thumb, which is, of course, the English Yard, or passus, as the Ancient Romans liked to call their version. Napoleon added about three inches to the metre to make it different. This dubiously derived measurement has been defined with ever greater precision, but never corrected.

He always get things wrong who does them in a hurry or a temper or, like Napoleon, both. So put not all your eggs in one bushel. Stand up for new standards, but don't forget the last lot—they may come in useful. For instance, have you ever tried selling one third of a ten-pack of eggs? Ask the French. Having to calculate in two lots of lengths is nature's way of paying back the Brits for not learning foreign languages. (Apart from King Alfred, who learned Danish, but flunked cookery.)

Now, we must drop off our perch and foot a few furlongs to pick up a peck of pickled peppers.

£10 FOR THE LETTER OF THE MONTH

You've got a gripe about the bandplans, or you're sick of being wiped out by next door's microwave. Or maybe you've been bowled over by the excellent service from your local radio shop.

Whatever you've got to say about amateur radio say it here in the letters column and you could win yourself £10 for writing the letter of the month.

Send your epistles to: Letters Column, Ham Radio Today, ASP Ltd, 1 Golden Square, London W1R 3AB.

Bought And Old

Finally, a reply to Alan Gibson G1EUU. October?? Good grief — how did that get in there? We are going to start setting the Free Reader Ads in a smaller size to combat the tendency to fall behind with them. We can't just chuck out the ones that look superannuated, because some people send ads on old forms — they don't want to cut up current issues. It might help if advertisers were to put a date alongside their addresses.

RADIO TODAY

Dipole for HF Pair

Waters and Stanton are marketing a pair of choke traps which allow construction of a loaded two band dipole in a small space. Instructions are included for a two-band dipole 80 feet long (around 60 feet if the ends are dropped vertically) for 80 and 40 metres. Half size G5RV users can use the traps to add 80 metres to the existing aerial with only a small increase in size.

The traps are sold as a pair with instructions, rated to 500W min, for £16.95 plus £1.50 post and packing. Ask for the appropriate instructions if stretching the G5RV.

Waters and Stanton, 18-20 Main Road, Hockley, Essex SS5 4OS. Tel. 0702 206835.



CW Club Answers Newcomers' Maydays

Fist CW Club is making a kind and generous offer to "all those nervous brass-pounders who stand shivering on the edge of the pool, dipping a tentative toe into the water." — and if that description doesn't make you feel chilled through and needing comfort, your're

tougher than me. Fists has set up an index of morse operators who can be contacted by pre-first-timers and other novices and who will give them a bit of help, advice and coaching to see them through that first chilly dip. The list has over 50 names on it, and is free on receipt of an SAE to G3ZQS, Fists CW Club, 119 Cemetery Road, Darwen, Lancs BB3 2LZ.

Bands in Colour

A colour-coded chart showing all the radio frequency bands allocated to commercial and industrial uses in the UK—called the *United Kingdom Radio Frequency Allocations Chart*—has been prepared by the DTI Radio Communications Division and published by HMSO (price £2.50).

Frequencies from 1 kHz to 60 GHz are divided on the chart into primary and secondary uses. The main uses shown are broadcasting, fixed services, amateur, meteorological, radio location, navigation, astronomy, space and the maritime, aeronautical and satellite bands.

Call 01 215 4751 for more information.

Marconi Day

The Cornwall Amateur Radio Club is holding its worldwide International Marconi Day for 1989 on Saturday April 22, following the success of the 1988 event.

Stations with Marconi connections working this year include KIVV/IMD Cape Cod, VEIIMD Nova Scotia, VOIIMD St. Johns, Newfoundland. EI2IMD Ireland, IY4FGM Marconi Club Station, Italy, GN0IMD Isle of Wight, GB4IMD Poldhu Cove, Cornwall.

Work any 6 of the 7 event stations to qualify for the Marconi Award. Award is two-way only, but special SWL award can also be claimed for min. 6 Marconi stations plus their contacts. QSL cards via the bureaux or via PO Box 100, Truro, Cornwall TR1 1RX, England, with IRC/stamps if possible. All official award claims via the PO Box with £5 US or £2 UK or 10 IRCs. SWL claims \$3 US, £1.50 UK or 6 IRCs.

Preferred operation frequencies 3.770 — 3.870, 14.260 — 14.290, 28.360 — 28.380 — 29.360 FM, 7.070 — 7.080, 21.360 — 21.380, 28.760 — 28.780, 50.260 — 50,280.

France: VHF News Wanted

News from France: Pierre Redon FCIADT operating from near Bordeaux in France is looking for a very experienced VHF/UHF operator to exchange information on the bands between the UK and France.

The French REF is moving to new premises in Tours and the QSL bureau is expected to be much faster following the move. There is also to be a bureau of 18 correspondents representing the areas of France to speed up the exchange of VHF information.

The bureau, active on 1296, 432, 2320 and 144, ssb and cw, make it their business among other things to activate rare squares in France. But, says British contact Clyde Hinton GITCH, they and their Spanish counterparts feel "isolated from VHF developments in Northern Europe". There will be a meeting between EA and F at St. Sebastian from April 30 to May 1 to discuss activities.

In June '89 EA2AWD/MM should be in the Gulf of Gascony (IN74-84-85) on 23 and 70cm. In 1990 a DX pedition is going to work Portugal IN61 and Spain IN93-83-73-63-53-52, which contacts should reach G. The French want to hear the opinions of UK operators on the likelihood of contact between EA and G.

Pierre says that the ultimate aim is to form an "International Team" of active VHF/UHF expeditioners.

Pierre's address is Casseuil 33190, La Reole, France. He would like people to get in touch with him directly. Alternatively, Clyde Hinton G1TCH, c/o 17 The Dewpond, Peacehaven, E. Sussex BNI0 8EE has more information.

At Last, A Good Reason To Go To Watford

Good news: another trader shopfront. Andrews Computer Services' packet radio and computer shop, the first of its kind in the UK, opened in early February at 35A Chalk Hill, Watford, Herts, just under Bushey Arches near to Bushey BR station, the A41, M1 and M25. (Tel. 0923 229222, Fax 0923 242101).

MD Paul Andrews G6MNJ says that visitors are welcome for a chat or demonstration, 9am-5.30pm Monday to Saturday, and there is a live packet station running for the demonstration of TNCs. ACS also stocks computers, printers and peripherals, as well as a wide range of public domain amateur radio software.

Handbook Awards

The World Radio TV Handbook, a long-established source of radio receiving and (more recently) radio-related software information, has branched out still further by establishing a new annual award scheme. Details of the scheme are in the WRTH 1989, out shortly. The new edition has been extensively updated and corrected with new information, say the Netherlands-based Editors, starting with the annual winter schedules release and provisional data for the coming summer, and including information released at the start of December. Continuous updates can also be obtained from the WRTH's quarterly Downlink, available by separate subscription.

Here is a summary of the results of the 1989 WRTH industry awards: Best Communications Receiver, the Kenwood R-5000. "In the semi-professional receiver group, this set is clearly a winner. It combines all the functions needed for effortless listening, with good quality audio. Best Portable Receiver: Sony ICF-7601. "The analogue portable offers crisp reception, good performance for the price, and is ready for shortwave broadcast band expensions taking place this year. We feel that there are not enough budget analogue portables with good performance, hence the choice of this receiver." Most Innovative Soft-

ware: Shortwave Navigator. "This is a Macintosh program developed by Jim Frimmel. It is a computer card index which gives access to the schedules of many international broadcasters and programmes. His idea of recording some of the sound heard on air into a computer program deserves recognition. This approach dispels the "old fashioned wireless" image that some members of the general public still hold about international broadcasting." Best Computer Accessory: Shortwave Database. "Tom Sunstrom of New Jersey deserves credit for his active promotion of the international radio listening field. His database of monitored schedules, and the Pinelads bulletin board confirm his dedication to the medium.'

Nominations from readers for next year's awards are now being invited. These awards are not restricted to any country or language. Formal presentation of this year's awards takes place during International Radio Days in Berlin (May 26-28 1989) for the best receivers, and the Association of North American Radio Clubs convention in Florida on 20-23 July 1989 for the computer software awards.

The WRTH is published by Billboard Publications Inc., 1515 Broadway, New York NY 10026, USA. The editorial offices are at PO Box 50558, 1007 DB Amsterdam, The Netherlands.

Russian To Join

The Club of Friendship between radio amateurs of the USSR and UK, "open to all UK radio enthusiasts (licensed or not) who are interested in the language and culture of the Russian people and who would like to further their interest by direct radio, correspondence or personal contacts", has been launched by operators in the two territories.

Proposed by Andy

UA3PIP and founded by Ken Norval G3IFN and Serge Chikutov UZ3AYT with fellow enthusiasts, the club is now ready to publish a regular newsletter and provide lists of correspondents in the USSR who are seeking friends in the UK.

Membership is £3 a year, and further information can be had by sending an SAE to Ken Norvall G3IFN, 24 Ryedene, Vange, Basildon, Essex. Thanks to PRO Ken Strellis G3JDI for the information.

Package Radio

Technical Software now have a multimode receive system for the BBC computer. The RX-8 system offers auto fax with saving and tuning, VHF and HF packet operation with auto fine tune, SSTV, including colour display of line sequential and robot signals, save and printout, RTTY "virtually any station using Baudot", morse with auto speed tracking and speed lock, AMTOR/SITOR including NAVTEX receive, UoSAT 1 and 2 receive, and ASCII.

The hardware has four-pole filtering and is isolated for low noise. The software lives in a 16K eprom, and full instructions are provided for installing the eprom. Ease of use and wide compatibility have been a priority, according to Technical, and all modes except SSTV can be printed as received. SSTV can be dumped to printer.

The full package including interface, eprom, manual, all connecting leads and demo cassette costs £269; existing RX-4 users can return the demo for a £15 discount.

A detailed list of the system's capabilities is available from Technical Software at From, Upper Llanwrog, Caernarfon, Gwynedd LL54 7RF. Tel. 0286 881886.

New Sussex Repeater

A new 70cm repeater, BG3HY, is scheduled at time of writing to open on channel RB5 in the mid-Sussex area, filling the 70cm gap between Crawley and Brighton, Horsham and Lewes.

The local repeater group would like to encourage amateurs both to use the repeater, and to send reports and (whether you are a regular user or not) comments to Mr. Gordon King, G3XTH, 73 Grand Avenue, Hassocks, W. Sussex.

5 Watts for Morse

Tony Smith of the European CW Association writes to say that the G-QRP Club has announced a rise in power levels for awards to 5W RF output from the beginning of

the year. This, of course, affects the EUCW/G-QRP CW Novice Award.

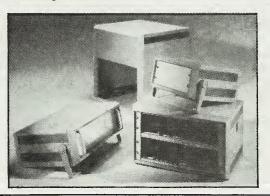
More information, send an SAE or IRCs to Tony Smith G4FAI, 1 Tash Place, London NII 1PA, England.

Just In Case

West Hyde Developments' latest offering is an easy-access 19 inch instrument case system, Series C75.

All the cases are extruded ally with steel panels and no

external screws. Panels are easily removable for maintenance. The 3U cases have optional carry handles. For more information, contact West Hyde, 9-10 Park Street Industrial Estate, Aylesbury, Bucks HP20 1ET. Tel. 0296 20441.



Angelika GOCCI would like to point out that the news item on CEPT in HRT was in fact by Nigel G4IJF.

College Knowledge?

The former Wireless College in Colwyn Bay threatens to go increasingly QSB into the rising QRM of history.

GW4ZWG is asking readers, and ex-staff and ex-students of the College, to key into recall mode and spare the time to drop him a line with any details about the College.

"Everything would be grist to the mill for this research project," says Alan, GW4ZWG.

He is looking for historical, descriptive, illustrative, anecdotal and nostalgic material, and would be delighted to hear from anyone with facts and figures, pictures, recollections and reminiscences.

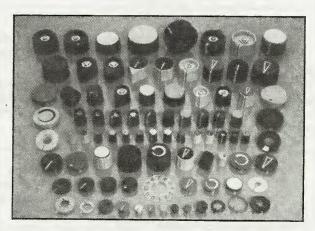
Apparently the Wireless College, overlooking the sea which played so prominent a role in the lives of many graduates, displayed an amateur callsign — a '2 plus two' GW4ZWG believes — and boasted its own theatre.

"All assistance given will be acknowledged and indefatigably followed up," promises GW4ZWG, who is QTHR.

Knobs

Bulgin's range of Multi knobs and twiddles has been expanded and now offers four basic colours, push- or colletfittings, wing, arrow and lowprofile options, caps in a wide variety of shapes and colours, and accessories including dials, stators and nut covers. DIL and MIL standard fittings, temperature stability from -20° C to $+70^{\circ}$ C.

A full catalogue is available from A. F. Bulgin & Co., Bypass Road, Barking, Essex IG11 0AZ.



Yo Ho - You're Nicked

Do you ever wonder what the Radio Investigation Service of the DTI gets up to when they aren't investigating sources of interference? They are busing pirate radios, an activity which has become an official priority following the burgeoning of unlicensed music stations and complaints from industry and the emergency services.

The RIS clocked up 444 raids and over 100 prosecutions in 1988, an increase of 50 per cent over 1987.

The prosecutions are being backed up with a 5-year ban on application for one of the coveted community radio licenses on anyone with a piracy conviction, on top of a £2000 fine and up to three months in prison. Wider powers against pirates and their suppliers are being sought.

Kanga's Cat Leaps Out

The new catalogue from Kanga Products includes a transmitter to match their dual band receiver, a morse code practice oscillator, and a T/R central board.

An innovation is the supply of bare PCBs with instructions for people who wish to use their own components. They also have a newly modified phone number: 0303 276171.



CQ and **Destroyer**

Members of the Royal Naval Amateur Radio Society have formed an HMS Plymouth Group to operate from the Falklands veteran Type 12 frigate HMS Plymouth of that ilk. HMS Plymouth, saved from its likely fate as a missile target by the Warship Preservation Society and volunteers, will be open to the public (there is an admission charge) from March 29 to October.

The intention is to set up a replica W/T office and carry on contacting on the usual HF and VHF bands. The group hopes to re-obtain the old Devonport signal letters, giving the callsign GB3GUZ.

RNARS members can join the Group for £2 sent to the Treasurer or Secretary, Mr. Chris and Mrs. Bobby Harper, 24 Cunningham Road, Tamerton Foliot, Plymouth, Devon PL5 4PS.

Not Just Any Old Iron

Antex Electronics, well known for their soldering irons to suit all shacks, have produced a colour brochure which introduces the company, describes its selection of irons, soldering stations, bits and accessories, and covers a number of topics of interest, including the benefits of temperature controlled soldering and safety. Available from Antex at 2 Westbridge Industrial Estate, Tavistock, Devon PL19 8DE. Tel. 0822 613565.



Highland Fling

The Scottish Tourist Board (Radio Amateur) Group continues its year's events with station GB2DWR at the Blair Athol Distillery, Pitlochry, Perthshire on 29/30 April, and GB2RB at the Burns House

Museum, Mauchline, Ayrshire on May 27/28. SWLs welcome, two awards available. Contact John "Paddy" McGill GM3MTH, PO Box 59, Hamilton, Scotland ML3 6QB or QTHR with an SAE for further information.

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The basic MICROWAVE METEOSAT system, no complications, a complete plug in and go package requires no computer, no software, and can be up and running, including dish alignment within ten minutes. Nothing more to buy: dish, microwave receiver, frame store, 12in b/w monitor AND ALL PLUGS AND CABLES. Designed by Timestep. £995.95 supplied by Garex

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 The basic receiver is single channel crystal controlled.
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- 2 watt audio output stage having a low quiescent current. Size: 153×33×13mm
- Requires 10-14v DC supply.

Stock Versions: (fully assembled, aligned and tested boards) 6m, 4m, 2m and Weather Sat: £49.95

Complete cased version and special options: details and prices on request. Crystals can be supplied if required; most popular 2-metre frequencies and the currently active weather satellites are readily £15.50

available. Crystal prices on request.

Mains power supply module:

GAREX VHF PREAMPLIFIERS Compact size: 34×9×15m

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and tdB compression: +10dBm

and Saturated output: +15dBm

and Supply voltage 8−17v DC at 5−10mA

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2m and Weather Sat:

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☆ HIGH PERFORMANCE ☆ 2 METRE PRE—AMPLIFIER 3 Band-pass stages for improved selectivity

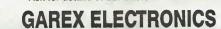
- 16dB gain with 1dB NF Switches 35 watts
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IC-228E 2 Meter FM Transceiver



Actual size

Features:

- Multicolour Liquid Crystal Display.
- 25 Watt output.
- 20 Memory channels.

Take a close look at this easy to use and compact VHF Mobile Transceiver. It's unique orange, red and green LCD highlights the numbers and letters for easy viewing. With a 25 watt output from a custom designed power module and a extra large heatsink, this transceiver does not get too hot under your dashboard.

Each of the 20 memory channels can store frequency, offset and direction, in fact all the information to work simplex or a repeater. The memory scan function will scan the memory channels and with the skip function

- Scanning.
- Call and priority function.
- Compact size.
- HM15 microphone supplied.

miss those you choose. The program scan will scan all frequencies between two programmable limits. The call channel ensures that your favourite frequency is within easy reach, and with the priority watch the call channel or memory channels can be monitored every five seconds.

This transceiver provides you with so many features, its small compact size and simple front panel design make it a superb mobile transceiver. See the IC-228E or the IC-228H 45 watt high power version at your local ICOM dealer.

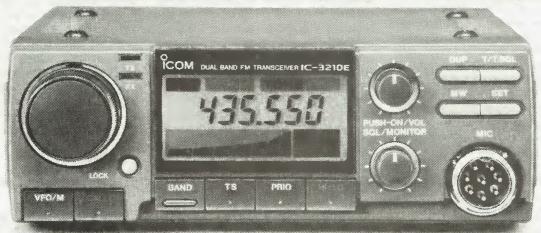
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DUAL BAND.

IC-3210E Dual Band FM Mobile



If you are newly licensed or just undecided about which band to operate first, then the new ICOM IC-3210 is just the answer. This dual band FM transceiver is ideally suited for the mobile operator. Transmit on one frequency and receive on the other and you're operating full duplex. It's just like talking on the telephone.

The simple and well laid-out front panel ensures quick and easy operation of all its many functions. A great convenience when driving. Optional accessories available are the UT40 tone squelch board. HS15 + SB mobile microphone and switch box SP8 external speaker and PS45 AC power supply.

Features:

- Full crossband duplex.
- 20 double-spaced memory channels.
- Built-in duplexer.
- 2 call channels.
- 4 priority watch functions.
- Programmed, memory and selected band memory scan.
- Variable LCD backlight intensity.
- Tone squelch and pocket beep functions (optional).
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Helpline: Telephone us free-of-charge on 0800 521145, 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.

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THIN AIR AERIALS

Since many amateurs don't wish their car to look like a 'mobile porcupine', more and more amateurs are becoming interested in less conspicuous mobile aerials for 2m and 70cm. Due to the ever inceasing performance of

keep the radiation at the horizon, where it is normally needed, rather than a long whip bending back at speed with the resultant ERP going either up into the sky or into the ground!

astounded to find it performed very well indeed. "This calls for a writeup" he said, and eventually after much reminding, here it is!

Create car class — use an aerial that hardly anyone will notice, recommends Chris Lorek

mobile transceivers, with better receiver sensitivity and higher transmit power, the need for monster aerials such as % wave 2m whips has decreased. The aerial is a very important part of the overall system, but unfortunately town planners do not take this into account with multi-storey car parks and the like! A long, shiny aerial may also attract the less desirable elements of our population when left on a car, with resultant damage to aerial, car, and possibly the loss of a valuable mobile transceiver.

Car manufacturers are responding; my own Ford Escort uses the rear windscreen heater element in combination with a preamp for broadcast radio reception, and I have for many years been been working in an attempt to reduce the visual aspect of my amateur aerials (veteran readers may refer to HRT Jan 85 for examples).

Dual Band Aerials

By using one of the many dual band aerials with a suitable diplexer, the amateur active on both 2m and 70cm may gain reasonable performance with a single whip. If the aerial is mounted on the car roof rather than on a rear wing, an improvement in performance may often be gained in comparison to a wing mounted % wave whip while keeping the same overall maximum aerial height. The still, short versions of mobile whip

Miniature Dual Banders

At the 1987 Leicester show, I saw a tiny 'Comet' dual band whip offered for sale on one of the exhibitor's stands. Measuring 29,5cm in length (the whip portion in fact was only 23cm long, the PL259 base taking up the remainder) I initially thought it was either a joke or would be very inefficient. Nevertheless, I surprised the HRT editor by digging into my wallet for one, for curiosity's sake if nothing else. On leaving the exhibition that evening with the editor in the passenger seat, heading to the hotel for the usual late night chin-wags with the traders, I replaced my usual dual-band aerial with the tiny Comet affair, and we were both



CHL-21J in use on a gutter mount.

Performance

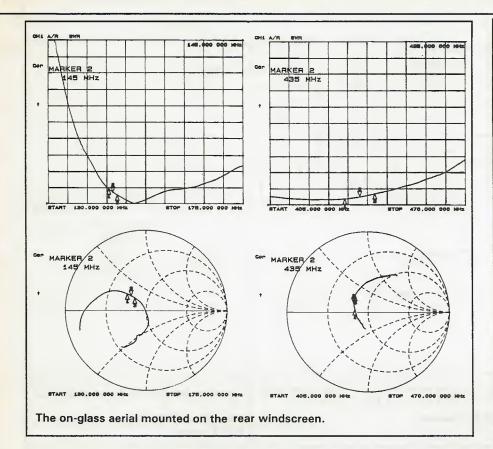
The aerial model number is the Comet CHL-21J, I used it for over a year operating into my local and notso local repeaters. Readers of my past equipment reviews will note that I have often referred to its use, regular QSOs through 50km distant repeaters on 70cm were normal practice. When gutter mounted and compared to my previous 1m long dual-band whip mounted on the rear wing, I found the average performance on 70cm to be very similar indeed, but with a slight loss in the order of a couple of dB on 2m. This I felt I could tolerate due to the advantage of its tiny size, and it became virtually a permanent fixture. A very large number of amateurs have since asked me about it, and several more are now in use.

Less Conspicuous, Greater Gain

The accompanying photograph shows the aerial in use, but I thought



CHL-23J mounted on the gutter — you can hardly see the aerial for the trees!



that the small coil in the middle made it look a little more conspicuous than I would have liked. Following this, I found that the same manufacturer made a slight longer dual bander but without any coil, the CHL-23J with an overall length of 44.5cm. This has a built-in capacitor at its mid-point, providing a more slender appearance, the whole arrangement being just shorter than a 2m ¼ wave whip. A loan of a CHL-23J for a few days was quickly arranged, just to see how it performed!

The technical specification of this claimed 2.15dBi gain on 2m, and 3.8dBi on 70cm which seemed reasonable, both figures being 1½-2dB greater than the CHL-21J. In use, this difference was just noticeable when driving around my usual routes, although in practice I feel I would have noticed very little change if I feel I would have noticed very little change if I were not performing a critical comparison.

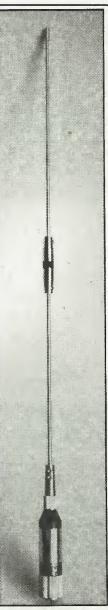
Due to multi-path propagation effects and the individual effects of aerial location on the car, I felt any ERP measurements in a static environment would be subject to inaccuracies, but for the interest of readers I took a plot of the SWR and presented impedance of the whips, when mounted on the 'Comet' hatch-

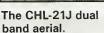
back mount fitted to the rear of my car. For this I used a network analyser with the connecting coax length normalised out, hence effectively measuring the aerial rather than the coax loss and phase effect.

From these we see that the SWR as supplied was perfectly adequate in all cases, each square indicating an increase of 1 in SWR, and makers 1, 2 and 3 representing the bottom, middle, and top of the 2m and 70cm bands. I found a worse match was presented when using my previous gutter mount, the aerial being resonant on VHF at a higher frequency. I couldn't re-adjust the resonant frequency of the whips by more than a few MHz by altering their length. Even so, the on-air performance was very good, and surprised many an amateur!

On-Glass Aerials

These have been used by cellular phone users for several years, but few amateurs have ever considered their use for amateur frequencies. The aerials operate on a given frequency range by using two plates fixed on opposite surfaces of a glass wind-screen as a 'capacitor', a small coax connection box on the inside having



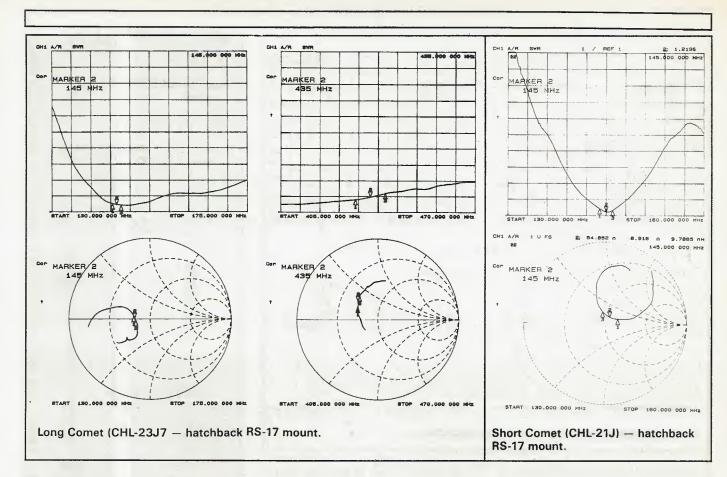




The CHL-23J dual band aerial.

a tuning network to normalise out the effect of this capacitance and provide a good 50ohm resistive match.

Recently, commercial versions have started to appear for PMR bands on VHF and UHF, and I managed to 'twist the arm' of a UK aerial manufacturer to supply one for evaluation on 2m. The aerial acts as a quarter wave, the actual length being around 4cm longer than my standard PL-259 mounted quarter wave due to the differing impedance presented. The finish is entirely matt black, the completed fitment on the top of the rear windscreen on my black car being very inconspicuous indeed, in fact people often have to look twice before noticing any aerial has been



fitted. The whip portion is screwed into place, and may be quickly removed with a twist of the hand for car washes and the like.

The whip took me less than 5 minutes to fit, following which a small capacitor in the inner box needed to be adjusted to provide the best SWR. This took me just a few minutes to perform, with a resultant

On-glass aerial.

SWR of less than 1.3:1. To check whether any adverse performance resulted, I drove around for some time using it together with my gutter mounted quarter wave, both aerials fed to a coax switch for a rapid comparison on the move. In use, I noticed no difference whatsoever, certainly less than 1dB. A 'static' test would of course provide inaccurate results in ERP again due to multipath effects and the like, because of the different mounting position, but I again took an SWR and impedance plot which confirmed an excellent match over the 2m band.

Conclusions

The 2m on-glass aerial is now permanently fitted to my car, although not available on the general amateur market at the time of writing I feel it is only a matter of a few months before these types appear for 2m and 70cm through the usual retailers. The cost of the aerial is similar to that of a gutter or mag-mounted %th whip plus mount and connecting coax, rather than the high prices often banded about for professional products such as this. As such, I feel it is only a matter of time until amateurs realise the advantages, especially drivers of leased vehicles or those who wish to sell their cars in the future in 'as new' condition, as the aerial is very easily removed without leaving a trace. My amateur friend G4POK/M quickly relieved me of the small Comet aerial for use on his car in place of his 5/4th whip!

For amateurs who prefer to change aerials around, or who already have a PL259 type mount but would prefer a less conspicuous aerial, the tiny dual-banders have much to offer. Their short length enables their fitment on a higher part of the car such as a hatchback lid, and they may of course be easily unscrewed and removed when leaving the car, the smaller version can even fit into an inner pocket. I have never been troubled with attempted theft from my car since I have not advertised the fact of valuable radios being housed within. This unfortunately was not the case several years ago when my previous car with multiple aerials was a regular target. Luckily, due to anti-theft precautions I never lost any radios and two offenders were even caught and locked away by the police (QRZ 2m FM . . . this is Cambridge Panda 276 calling G4HCL/M ... yes it happened), but that's another story...!

TX-3 RTTY/CW/ASCII TRANSCEIVE

The high performance, low cost system Split-screen, type-ahead operation, receive screen unwrap, 24 large memories, clock, review store, callsign capture, RTTY auto CR/LF, CW software filtering and much more. Needs interface or T.U. BBC-B/Master and CBM64 tape £20, disc £22. Spectrum tape £35, +3 disc £37 inc. adaptor board (needs interface/TU also).

For VIC 20 we have our RTTY/CW transceive program. Tape £20.

RX-4 RTTY/CW/SSTV/AMTOR RECEIVE

This is still a best-selling program and it's easy to see why. Superb performance on 4 modes, switch modes at a keypress to catch all the action. Text and picture store with dump to screen, printer or tape/disc. An essential piece of software for trawling the bands. Needs interface. BBC-B Master, CBM64 tape £25, disc £27. VIC20 tape £25. SPECTRUM tape £40, +3 disc £42 in. adaptor board (needs interface also). The SPECTRUM software-only version (input to EAR socket) is still available £25.

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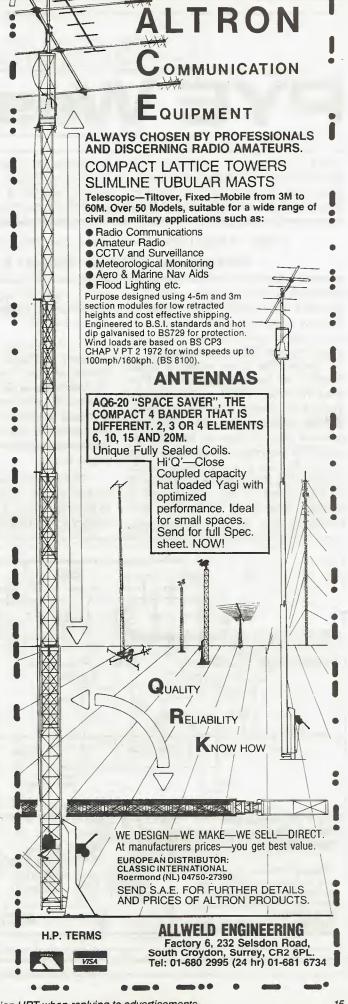
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Conversion

PYE Westminster

Large numbers of redundant Pye Westminster PMR transceivers have appeared on the surplus market. Many, suitably modified, have been

between a standard Westminster and an export model, which I owned, already on 51MHz, I was able to make a list of the necessary modifications

John Whetstone G4OUB converts the PYE Westminster PMR for 51MHz FM

tweaked for the 70MHz band. It is possible to modify this model to operate in the FM 51MHz section of the 6-metre band, helping to promote much needed F3E activity there.

Since the time when a large number of surplus Low Band Pye Westminster PMR transceivers started to appear, a fellow amateur, G1DNZ, asked me if it was possible to convert one of these to the 51MHz band. He like many others was keen to use FM on the six metre band, recognising the potential of the band to take some of the weight off 2 metres. After a lot of thought and checking the various differences

that would be required to the standard 68MHz model. Basically, these are as follows.

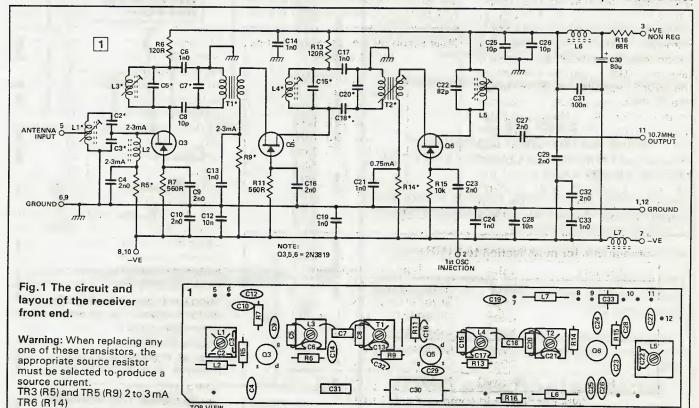
In the receiver section I left the receiver multiplier as a times two device and ran the local oscillator at 10.7MHz above the receive frequency. No modification would be needed to the local oscillator board, so that the only board in the receiver section to need modification was the rf amplifier mixer board.

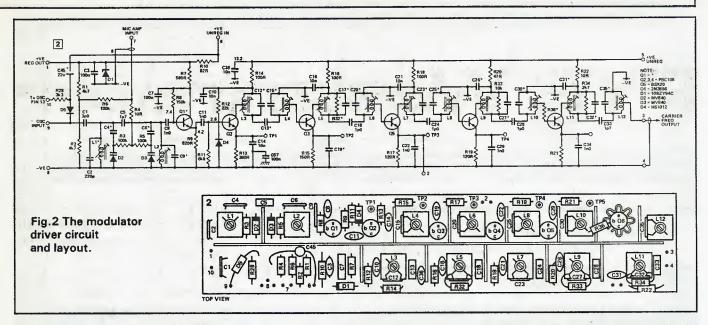
The transmitter multiplier board as it stands is $\times 24$. This would have to be modified to $\times 12$ and the PA and harmonic filter appropriately modified.

Receiver front-end

Locate L1, lift off the screening can and note there are two capacitors across this coil, one a 47pF and the other a 12pF. Remove the 12pF and put in its place a 39pF. Next, locate L3, lift off the screening can and note a 1000pF capacitor (1n) and an 8.2pF capacitor. Remove the 8.2pF capacitor and fit in its place a 22pF capacitor. Then locate T1, lift off the screening can, note a 1000pF capacitor (1n) and a 10pF capacitor. Remove the 10pF capacitor and put a 22pF capacitor in its place. Locate L4, lift off the screening can and note 100pF capacitor and an 8.2pF capacitor. Remove the 8.2pF capacitor and put a 22pF capacitor in its place. Next, locate T2, lift off the screening can and note a 1n capacitor and a 10pF capacitor. Remove the 10pF capacitor and replace with a 22pF capacitor. See Fig.1 for layout.

Finally, replace all the screening cans. This completes the modification to the rf amplifier and first





mixer unit board.

Transmitter modulator driver

Remove the transmitter modulator driver (Fig.2) board completely. It is most important that all the coils are numbered L1-L12 on the formers, to remind the experimenter which goes where. Take C2 and C9 out completely. If a grid dip oscillator is available tune L1 and L2 to approximately 4.3MHz. Note that L3 has two capacitors on it (150pF and 120pF); take 120pF off leaving the 150pF capacitor on, but, if a GDO is available, peak it at about 8.6MHz. Remove L4 and note it has two capacitors on it (150pF and 120pF); take the 120pF capacitor out leaving the 150pF capacitor on. (Sometimes one of these capacitors is mounted on the underside of the board.) Put this coil in place of L6, remove L5 and put this coil in place of L7, removing the resistor R32 from the coil (L5) and also take the 39pF capacitor off the coil and replace it with a 22pF capacitor. Put strap in to link the missing stages. This will link C13 to L4 which is in its new position (see Fig.3).

Take the old L6 coil and put this in place of L8, altering the capacitor from 39pF to 22pF at the same time. Then put the coil that was in L7 in place of L9, changing the capacitor on L7 at the same time from 47pF to 27pF.

Remove L10 and fit the coil that was L8 into L10 position and change the capacitor on it from 47pF to 27pF. Discard the original L9 and L10 (these will not be needed). On L11 leave the 2.7k resistor in place but change the

New resonant frequencies of coils for 51.51MHz = 4.2925MHzL1 4.2925MHz L3 8.585 MHz 8.585 MHz = 25.755MHz = 25.755MHz L6 L7 =51.51MHz =51.51MHz 18 MHz =51.51L11 L12 = 51.51MHz

capacitor value to 56pF. On L12 take the coil out, discard the capacitor and fit a 56pF to the coil; replace the coil.

Now replace the thin feeder cable which goes from the output of the board, (pin 3 and pin 4) with a longer piece of RG174 feeder cable. This new cable must be long enough to reach board 2 of the power amplifier unit instead of board 1. Now replace the modulator drive board in position, and re-connect all cables.

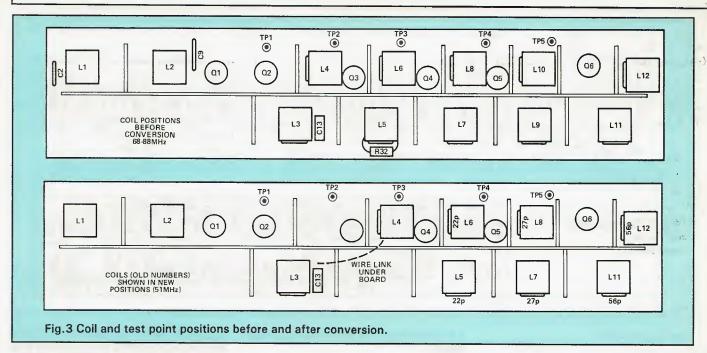
The PA board

The PA board is made up of four separate boards on one heatsink. Disconnect the wire strap which goes from the first PA board to the second one (pin 2 to pin 1). This will completely isolate the first board (which we do not need in this version). Discard the old RG174 feeder cable. Connect the now longer cable to the second board of the PA unit, pin 3 for the braid, pin 1 for the centre conductor. Next, remove board 2 from the heatsink after first unsoldering the transistor base (Q2) plus resistor and choke from the board. Add a 100pF silver mica capacitor to the underside of each trimmer capacitor, put back the board and solder back the components, and then squeeze the four-turn coil to bring the turns nearer together. Next, remove board 3 and add a 100pF capacitor beneath each trimmer. Then put back the board and solder back and components. Next, remove board 4, remove coil L10 from the board and wind another one of a similar diameter but with enamel wire (18 standard wire guage), so that the

Components	for modification	to SIMUS
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Quantity	Value	Type of component
4	100pF	Silver mica (350V)
3	68pF	Silver mica (350V)
6	22pF	Ceramic or silver mica
2	56pF	Ceramic or silver mica
2*	27pF	Cerami or silver mica
1*	39pF	Ceramic or silver mica
Reel	18 SWG	Enamelled copper wire

*Not needed if old components are used



turns do NOT short to each other. This coil should have six turns on it rather than four. Now solder it in position; reposition the board and then solder back the components.

To remove board 4 you may have to take out the complete PA assembly, because the power standoff holding down one corner of board 4 is secured by a nut underneath. The

PA assembly is removed by unscrewing the four pillar supports, one on each corner.

This completes the PA modification.

Harmonic filter

Take out the harmonic filter (Fig.5) (four screws) and remove the coax cable from each of the filters.

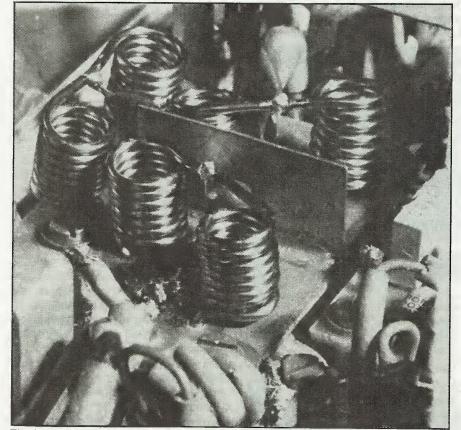
Now remove all the coils and all the capacitors. Using 18 swg enamelled wire wind the coils (see Fig.5) on a ¼ in drill bit. As with the old harmonic filter there will be three double coils. Each leg of these three coils will have 7.5 turns closely wound on it. When the three double coils are mounted on the board, solder a 68pF capacitor to the middle of each double coil, taking the other end of the capacitor to earth. Now screw the board back in and solder the coaxial cable back on.

This completes the 51MHz modifications to the transceiver.

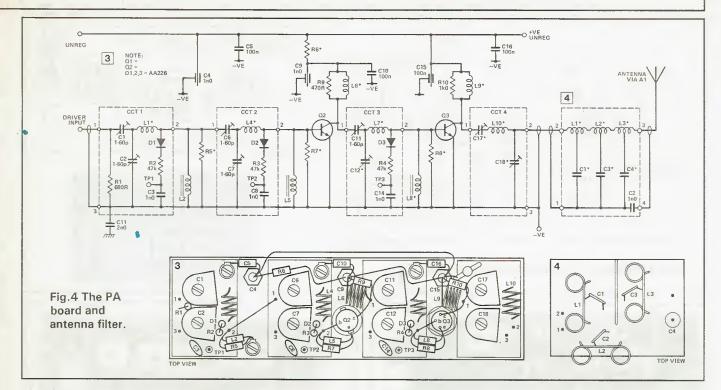
Receiver Alignment

Fit the crystals to the transceiver and locate the receiver local oscillator multiplier board (Fig.6). This is a fairly small board with three coils on it. Put the test meter on the 2.5 volt range and then put the negative lead of the meter on a negative supply point. Put the positive lead of the meter on test point 1 on the multiplier board (Fig.6). Tune L1 for maximum. Remaining on test point 1, tune L3 for a minimum dip. Now move the positive lead of the meter to test point 2 and tune L4 for maximum. Remaining on test point 2. tune L1 for maximum and then L3 for maximum. Finally, tune L1 for maximum. This completes the alignment of the ×2 local oscillator multiplier board. See Table 1 for a list of crystal frequencies.

Next, locate test point 1 on the 455kHz IF board and feed a signal source into the receiver; tune L1, L3, T1, L4, T2 and L5 on the RF board for



The harmonic filter.

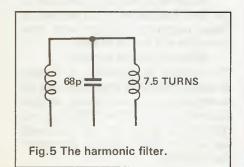


maximum signal reading on the meter, taking care to keep the signal source fairly weak. This completes the alignment of the receiver.

If a 10.7 or 455kHz IF generator is available use it as follows: transfer the positive lead of the meter to test point 3 on the 455kHz board locate the discriminator coil (in the largest screen can on the board), and with a reasonable noise-quietened signal from the IF generator, tune the discriminator coil for OV. Now the discriminator is balanced and should almost eliminate ignition interference.

Multiplier Board

Connect a SWR power meter and dummy load on to the transmitter antenna socket. Put the meter on the 10 volt range with negative lead on a negative point. Put the positive lead on test point 1 (Fig.3). Key transmitter and at once note the voltage on test point 1 before any tuning has been done. Tune L1 and L2



in sequence for maximum reading. Staying on test point 1, tune L3 for a dip in the reading. Next transfer test lead to test point 3 (test point 2 is not used) and change meter range to 2.5 volts. Tune L4 for maximum reading and them L3 for maximum reading. Remaining on test point 3 tune L5 for minimum. Transfer test lead to test point 4 and tune L6 for maximum,

and then turne L5 and L6 in sequence for maximum reading. Next, keeping on test point 4 tune L7 for minimum. Now, transfer test lead to test point 5 and tune L8 for maximum. Then tune L7 and L8 in sequence for maximum, now tune L11 for a dip on test point 5. Move test lead to test point 2 of the PA board and tune L12 for maximum, then L11 and L12 in

Table 1

51.41TX T18 4.281667 MHz 51.41RX T29C 31.055 MHz 51.43TX T18 4.2858333 MHz 51.43RX T29C 31.065 MHz 51.45TX T18 4.2875 MHz 51.45RX T29C 31.075 MHz 51.47TX T18 4.2891667 MHz 51.47RX T29C 31.085 MHz 51.49TX T18 4.2908333 MHz 51.49RX T29C 31.095 MHz 51.51TX *T18 4.2925 MHz 51.51RX *T29C 31.105 MHz	f Xtal
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51.51TX *T18 4.2925 MHz	3 MHz
	MHz
51.51RX *T29C 31.105 MHz	MHz
	MHz
51.53TX T18 4.2941667 MHz	MHz
51.53RX T29C 31.115 MHz	MHz
51.55TX T18 4.2958333 MHz	3 MHz
51.55RX T29C 31.125 MHz	MHz
51.57TX T18 4.2975 MHz	MHz
51.57RX T29C 31.135 MHz	MHz
51.59TX T18 4.2991667 MHz	7 MHz
51.59RX T29C 31.145 MHz	MHz

*Calling frequency

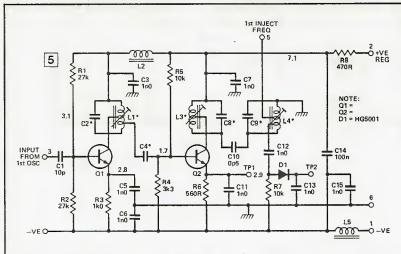
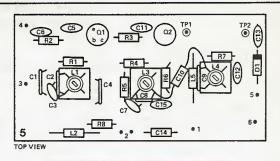
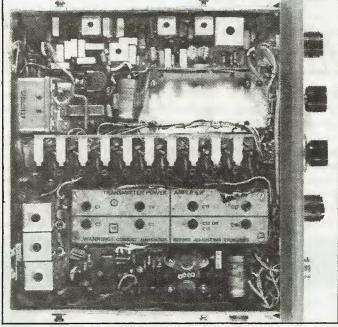


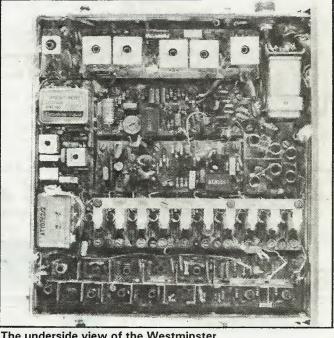
Fig.6 The oscillator multiplier circuit and layout.



MULTIPLICATION FACTORS				
CARRIER Q1 Q2 TOTAL				
68-108MHz 79-101MHz 148-174MHz	x2 x2 x3	x1 x1 x1	x2 x2 x3	



The top view of the Westminster.



The underside view of the Westminster.

sequence for maximum. Now move the meter lead back to test point 5 of the multiplier board and re-peak L7 and L8. Now put test lead back on test point 2 of the PA board and repeak L11 and L12. This completes the tuning up of the transmitter multiplier board.

PA Board

Capacitors C1 and C2 are not used, so connect the negative lead of the meter to a suitable negative point, and the positive lead of the meter on to test point 2 of the PA. Press to transmit. Tune C6 and C7 in sequence until maximum reading is

Now move the red meter lead to test point 3. Press to transmit and tune C11 and C12 in sequence for maximum power. This completes the tuning up of the PA.

At the time of writing the maximum power allowed for FM on six is 25 watts erp. Therefore, if an aerial of more than about 3dB gain is employed, it would be possible to exceed the power limit for the band with the 12-15 watt output of the transmitter. A modification was needed to reduce the output power to about 5 watts. This is simply done by disconnecting the base of the driver transistor and inserting a 47ohm, 0.5 watt resistor between where the base went and the base of the transistor, and re-tuning the PA board.

Now the reader has successfully

got the transceiver on the 51MHz, I would urge him or her to invest in a good commercial low pass filter to insert between the transceiver and the aerial as it is most important to reduce the second harmonic to a minimum, since it falls in the local radio section of the band.

It may be of interest to readers in the East Midlands to know that on Friday nights at 7.30pm local time, there is a net on 51.41MHz.

Wishing you all success.

The author is grateful to Philips Telecom (formerly Pye Telecom) for permission to reproduce several diagrams from the Westminster instruction book and to his many friends for their advice, especially Jack G5UM.









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Assembled PCB: £21.50

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73 from Dave G4KQH, Technical Manager.



SEFORUM

I always find it encouraging when I listen down at the bottom end of the bands and hear a comparatively high proportion of new GO callsigns pounding away amid the rest. One obviously expects to hear the older tried it on the air - give it a go, you may well find it very worthwhile.

Shop Window

Samson is a name which has long been associated with electronic

keyers for the amateur as well as the

professional market. Originally they

were marketed by Spacemark, but

after the owner's retirement they

includes three models: ETM-1C,

keyer module without a paddle. It is

neatly packaged in a case measuring

The range of Samson keyers now

The ETM-1C is a basic electronic

were handled by G5BM.

ETM-5C and ETM-8C.

 $36 \times 65 \times 108$ mm and has a single knob on the front for the speed adjustment from 8 to 40 works per minute. It also includes dot dash memories, self completing dots and dashes, a built in sidetone generator and a iambic mode for squeeze keying. The unit is battery powered, but as it uses CMOS logic the idling current is below 1 microamp.

The next unit in the range is the ETM-5C. This kever incorporates all the features of the ETM-1C but has its own integral dual paddles. The case is virtually the same as the ETM-8C shown and measures $45.5 \times 113 \times$ 160 mm. In addition it incorporates either transistor or relay keying which can easily be altered via an internal link. There is also an external adjustment for the dot dash ratio. This is very useful because a slight adjustment of this can make the CW sound

At the top of the range there is the ETM-8C. This keyer has all the functions of the ETM-5C but it also includes eight 512 bit memories for stored messages such as CQ calls or the like. Although the keyer

more "musical" and easier to read.

As time went on I obviously progressed to a more normally operates between 5 and 40 words powerful transmitter, but time. Looking back it was a very good training, and one I value far more than power if I had been let loose on a high Enough reminiscing, but just a

Three Samsons are better than one in the temple of morse keyers, reckons Ian Poole G3YWX.

hands there, but with all the other modes available to the new licensee it can often be easier to stick to phone or one of the many new data modes which are available. I can still remember my first contact. Being a penniless schoolboy at the time I could only stretch to a very QRP transmitter and when the first station came back to one of my CQ calls I was so surprised and excited I could hardly read him!

as I could work DX only on CW I used it virtually all the

SSB transmitter.

word to those who are new to CW keep it up, and to those who have not per minute, I am told that a simple resistor change on the board enables it to operate up to 200 words per minute. This makes it ideal for meteor scatter operation.

The overall finish on the keys is good, and I have been more than satisfied with my ETM-5C which I have used without trouble for the last five years. The paddle is nice, having adjustment for both spacing and tension. Also the use of Cmos circuitry means that the current consumption is very low. Personally I never turn mine off and I have only replaced the batteries after two or three years in case they started leaking. Using internal batteries and being self-contained saves the necessity for a psu which means yet another cable across the operating table.

Another advantage of having a completely self-contained keyer is the lack of RF pickup. If a separate paddle, keyer and possible power supply are used external leads have to be used which can increase the risk of RF pickup and lead to some unexpected results or erratic operation.

Prices for the units are: ETM-1C £34.00 plus £1.25 p&p. ETM-5C £85.00 plus £2.55 p&p. ETM-8C £139.00 plus £2.55 p&p.

Further details or the units themselves are obtainable from Frank Watts G5BM, Woodland View, Birches Lane, Newent, Glos. GL18 1DN. Tel: 0531 820960.

Correspondence

A number of people wrote in asking about the RNARS (G3BZU) QRQ runs. Unfortunately the time seemed to drop out of the system somewhere. My apologies. So just to put the record straight, it is transmitted on the first Tuesday of the month on 3520 I QRM at 2000 local time, ie BST or GMT, whichever is being used. Speeds range from 15 to 40 words per minute.

Peter Fox GOGQL was another correspondent. He put in a word for the original "bug" key. He mentioned that he first came across one in Egypt during the war when one of his radio mechanics made one using a piece of clock spring and an assortment of junk. Apparently it worked well, so it goes to show what can be done.



Peter went on to say that he uses a Vibroplex key (very nice) and that bugs retain a degree of individuality which is absent with today's electronic keyers. This is very true, but it sometimes has the advantage that it makes people's morse easier to read.

News and Events

For those who do not know, an EUCW net is run every Tuesday at 1900 GMT. The frequency is nominally 3.555MHz plus or minus a few kilohertz for the QRM. The net is normally directed by SM7GWF with OZ80 and DL2ZAV giving assistance.

The net is normally intended for EUCW representatives to meet and get to know each other. Even so all CW operators are welcome to check in and have a chat. In fact many people will QSY off frequency after they have checked in to chat to someone in particular.

Many EUCW member clubs are re-naming their events as EUCW ones. One club which has done this is the Scandinavian CW Activity Group (SCAG) whose midsummer straight key day is now called the EUCW Straight Key Day. It is to be held on Saturday 24th of June and it is open to all amateur CW operators who enjoy using hand keys. There is also an incentive that anyone receiving at least two votes for best fist will receive a Straight Key Award free of charge.

The CW Fists Club (which is also a member of EUCW) is continuing to grow. At the last count membership had risen to over 400 and was still rising. They are also issuing attractive membership certificates now, and members can obtain discounts on amateur products with some dealers. Further details from Geo Longden G3ZOS.

Band Reports

There has been quite a lot of activity over the months under review. Band conditions could have been better, but with ten metres now open and a number of contests, there has been plenty on offer for those who enjoy contests of DXing.

Unfortunately I had few equipment problems over this period. My ten metre dipole needed some attention and a power supply I was borrowing for the rig had to be returned. This reduced operation to QRP only. Even so it was still possible to work a few stations. On ten the best of the bunch was TA2/G3UIN and on twenty contacts were made with EA2EA, KP2A, PJ1B, P40V and SV1RP/2 amongst others.

Richard Everitt, G4ZFE, had a much better haul over this period with an FT101ZD and either a vertical or a GM3HAT dipole he managed contacts with the following: 28MHz -P40ZO, XE3ARB, CE3DXP, CW5A — 9J2AL, YX5A, HC2G, NP4CC, LT8WW, LR1V and FR/DL4BBO. 21MHz only produced P40V, FR/DL4BBO, KP2A and D44BC while 14MHz gave contacts with P40V, VQ9QM, FY5YE, PJ1B, VP2MW. PZ/N3JT, FR/DL4BBO, HC5M and ZS6BCR. 7MHz also produced some good DX in the form of PJZ1B, YX5A, P40V, P40R, KP2A, Su1ER, HD8EX, VP2MW, ALG7G and HC5M. Not a bad list at all!

Sign Off

So that's about all for now. Please remember to send in any news, views or band reports you may have. My address is in the call book, or if you do not have one to hand it is 144 Worple Road, Staines, Middlesex TW18 1EQ. Till next time 73s es BCNU de Ian.

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Yaesu FT411 Handheld REVIEW

When HRT first published our exclusive review of the tiny Yaesu FT23R portable, we marvelled at its small size. The latest from the Yaesu stable, described in our exclusive Leicester exhibition report, is the FT411, exactly the same size as the FT23R but offering a whole host of operating features. We promised you the writeup, so in line with the HRT tradition of 'first ever reviews' here we go . . .

Fully Featured

The basic features of the FT411 are very similar to the FT23R, both sets covering 144-146MHz in selectable tuning steps, with top mounted volume on/off/volume and squelch controls and a rotary click-step VFO/Memory channel knob. Depending on the voltage of the battery pack chosen, the transmitter output power varies between 2.5W (FNB-9/FNB10/FNB14 7.2V packs) and 5.0W (FNB-11/FNB12 12V packs), the set itself being capable of operation at any supply voltage between 5.5V and 15.0V DC. All the usual FT23R accessories may be used, such as dry battery cell cases, speaker microphones and the like.

Remote Battery Pack

One such accessory that could prove useful is the PA-7 battery cable, where the tiny set complete with helical but minus the battery may be clipped onto your lapel, with the heavier battery pack fitted to your belt or whatever, linked to the set with the curly DC supply cable. This would allow more comfortable all-day operation using a large battery pack and the helical positioned up in the clear; alternatively the tiny FNB-9 200mAh pack could enable the entire set to be clipped onto your lapel or into a shirt pocket.

With the FNB-10 pack, the set measures 139mm (H) x 55mm (W) x 32mm (D), and weighs 430g. Compared with its FT23R cousin, the control features of the FT411 are significantly more comprehensive, a

Chris Lorek G4HCL finds more and more functions stuffed into a small space. real case of 'microprocessors with everything' to give operating flexibility such as automatic repeater shifts. This does not suit everyone's taste, which is why the FT411 complements rather than replaces the FT23R, however, being a committed 'gadget freak', I quickly started with the instruction book to see exactly what the set was capable of.

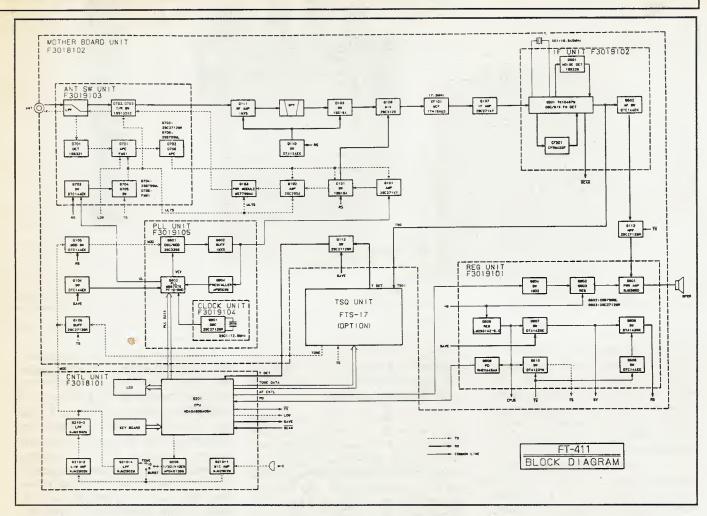
VFOs

Two digital VFOs are provided, tuning in independently selectable steps of 5kHz, 10kHz, 12.5kHz, 20Hz or 25kHz. Frequency change is performed with either the rotary clickstep tuning knob on the top panel, or by the keypad mounted up/down buttons. For a rapid QSY, 1MHz steps are selected by a press of the keypad 'F' button, or direct frequency entry is possible using the numeric keypad buttons. An 'Automatic Repeater Shift' function may be enabled, so that whenever the set is tuned to the 145.600-145.800MHz segment a minus 600kHz TX shift is automatically selected.

Memories

A total of 46 memory channels are provided for storage of operating frequencies, TX offset, sub-tone information and scanning status. Any +/- transmit/receive split may be programmed and stored. An 'instant access' call channel may also be programmed, for rapid switching to your favourite local repeater or natter channel, selected by the large button on top of the case.

Memory channels are accessed by the 'MR' button on the keypad, switching between channels by using the rotary tuning knob at the top of the set or the keypad up/down buttons and direct channel access by entering the memory channel number on the keypad. One can QSY up or down from the memory by pressing the 'MR' button again. You can QSY away from the memory channel as required, a bar appearing under the



memory channel number. A further press of the 'MR' button returns you to the original memory.

Scanning

Either the whole band or any desired portion, may be scanned in the selected tuning steps. For the programmed band scan where a section of the frequency range is sampled, two further memory channel's 'L' and 'U' are used to store the lower and upper limits. Scanning of memory channels is initiated in the same way, and any of the memory channels may be skipped as required to prevent the set locking up on busy channels. In each case, the scan is initiated by keeping one of the up/down buttons pressed for more than half a second, halting as soon as a signal strong enough to raise the squelch is received. Two modes of scan resume are provided, the first continuing when the received signal disappears, the second continuing after a pause of 5 seconds after the scan halts regardless of the squelch status.

A priority channel watch is also

available, where the set checks any memory channel every five seconds, locking onto this channel for the duration of any received signals. Any number of memory channels may be sequentially checked. This function can be used with any other receive or transmit function, so you can be monitoring a repeater while keeping a watch on the local simplex channels.

Sub-Tone

When fitted with an optional FTS-17 CTCSS board, sub-audible tone squelch operation may be selected for busy channel monitoring, or



for operational control with a repeaters having this facility. Any of the standard CTCSS tones may be programmed for encode or encode/decode operation; in the latter case the set remains silent unless it receives a signal with the correct subtone frequency.

As well as this silent monitor facility, a pager mode can activate a tone sounder on the set when the correct sub-tone is received, flashing a bell symbol on the LCD if you have been called in your absence.

Individual sub-tone frequencies may be stored in the memories on a channel by channel basis for automatic selection. With other selective call applications (such as digital voice message storage in the remote transceiver) the keypad acts as a DTMF Touch Tone pad in transmit mode. A 10 sequence DTMF memory stories up 15 characters per sequence for single-key activation.

Battery Saver

A refinement to the usual type of battery economiser enables the user to select one of nine receiver on/off



ratios to allow the average receiver battery drain to be reduced. The receiver is switched 'on' for 30mS and 'off' for a pre-set time of between 30mS (1:1 ratio) and 1 sec (1:33 ratio). This can be disabled for packet radio and the like. An auto power off facility may be selected to prevent you flattening your batteries by forgetting to switch the set off. The set goes into a power-down mode after a user pre-set time of 10, 20 or 30 minutes following no PT1 or manual channel change, sounding a short warning melody from the speaker a minute before hand

On The Air

I started by programming memory channel numbers 9-23 with simplex channels \$9-\$23 for logical selection, followed by my local repeater channels, the 46 available memories being more than adequate. At first, I found the small keypad a little tricky to use, however, after the initial programming operations I found I rarely needed to use it, relying mainly on memory channel switching by using the rotary tuning knob.

Over the review period of several weeks, I used the set as a portable with the supplied stubby helical, as a mobile using my glass-mounted whip, and as a base station with a roof-mounted colinear. I was very pleased to get good audio reports on transmit; through my semi-local repeaters in Cambridgeshire and Herts my usual QSO partners were unaware that I was using anything different than my normal ex-professional tranceiver. Wandering around the city centre, the short helical whip

allowed me to carry the set in my inside pocket without the helical jabbing me each time I turned around, although not surprisingly I found it slightly less effective than one of the usual 20cm long affairs.

On receive, the set was adequately sensitive so that I could always hear stations who could hear me, although in noisy surroundings I found I did sometimes have to hold the tiny speaker up to my face to prevent distortion caused by turning the volume up too high. I found the maximum audio level just enough for use when driving around, although plugging in my external dashboard-mounted speaker brought a useful increase in volume.

When used from home with the rooftop colinear, I found the rejection of signals spaced by 12.5kHz very good indeed. I could easily operate using these spacings on the lower portion of the band at busy periods in the presence of other stations on adjacent channels. This however also meant that the odd station who was running over the top deviation, in the order of 6-7kHz, or was off frequency like the chap I received who was 3kHz, did come through rather distorted.

Pressing the portion of the PTT bar just above the PTT button itself transmitted a 1750Hz tone for repeater access, which I found very easy to use. Above this was a button which backlit both the LCD and all the operating keys, again this was easily located especially when in the dark! With the sensible positioning of these controls, I found I could operate the

portable totally one-handed with just my thumb and forefinger.

Throughout the review period, the supplied FNB-10 battery never went flat I could happily monitor for much of the day as well as have the odd QSO or two just by giving the set an overnight charge. Although not supplied, I felt the optional battery cable together with a highercapacity, higher voltage pack giving higher transmit power) would have been very useful indeed. I could then have walked round looking just like one of the 'professional' radio users with the speaker and mic right where it was needed, up near my face with the set clipped to my lapel.

Insides

The set is built on a die-cast metal chassis with the RF circuitry housed on a motherboard on the main chassis, with several daughter boards on it. The digital circuitry is on a further board, this time mounted on the front panel, linked to the RF section with a multi-way plug and socket combination. For system use, all programmed memory information may be cloned from one FT411 to another through a wire link between the external microphone connectors.

On receive, a double conversion superheterodyne arrangement is used, with a switched wideband front end. A first IF of 17.3MHz is used, with a pair of monolithic dual crystal filters providing adjacent channel selectivity, the 455kHz second IF employing a further ceramic filter giving additional selectivity. On transmit, a directly modulated final frequency VCO is

used, together with the usual PA module to amplify the transmitted signal to the 5W level, a 3-section low-pass filter follows this to suppress harmonic levels. By using a wideband synthesiser together with the associated receiver circuitry, the set is actually capable of receiving over any pre-programming, with transmission capability restricted to the 144-146MHz band.

Laboratory Results

As found on-air, the receiver sensitivity was reasonable, but adjacent channel rejection measured was very good, especially that of 12.5kHz spaced signals. This should ensure compatibility if this channel spacing is formally adopted in the future, as well as being suitable for current use in heavily congested areas. The intermodulation rejection was quite reasonable although not up to the performance of purposedesigned mobiles and base stations. The blocking performance was quite good, especially the out-of band rejection.

On transmit, an adequate power output was measured with the harmonics well suppressed, the low power level being a constant level regardless of battery voltage showing good regulation. The battery current reduction on lower power however, in common with many other portables, does not match the transmitter output power reduction, showing that battery life in low power mode would not be extended by much.

Conclusions

The FT411 lives up to the tradition of being a simple-to-use portable, by using just the top-mounted knobs in conjunction with the memories, but having the versatility, if required, of a fully featured rig by the use of the multi-function keypad. It certainly is very small, fitting easily into a shirt pocket. Having a large number of common accessories to its cousin the FT23R (readily available both new and secondhand) extends its versatility. The provision for extended receive coverage, while keeping its transmission capability limited to the 2m range and not running foul of the law, may be of interest to the scanner enthusiasts amongst us.

My thanks go to South Midlands Communications Ltd. for the loan of the review transceiver.

LABORATORY RESULTS

Receiver

Sensitivity

Input level required to give 12dB SINAD;

144MHz 0.172uV pd

145MHz 0.160uV pd

146MHz 0.158uV pd

Squelch Sensitivity

Threshold 0.078uV pd (5dB SINAD) Maximum 0.351uV pd (18dB SINAD)

Adjacent Channel Selectivity

Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal

+12.5kHz 55.5dB

-12.5kHz 64.5dB

+ 25kHz 70.0dB

72.5dB - 25kHz

Current Consumption

SINAD signals > 100dB

Blocking

channel signal

+ 100kHz

+1MHz

clipping

3ohm load

8ohm load

15ohm load

Image Rejection

+ 10MHz

Standby, Economiser Operating (1 sec) 6.5mA average

Increase in level of signal at first IF

image frequency over level of on-

channel signal to give identical 12dB

Increase over 12dB SINAD level of

interfering signal modulated with 400Hz at 1.5kHz deviation to cause

6dB degradation in 12dB SINAD on-

Measured at 1kHz on the onset of

215mW RMS

178mW RMS

136mW RMS

91.0dB

98.0dB

109dB

Maximum Audio Output

Standby, No Signal; Receive, Mid Volume;

42mA 71mA

Receive, Max Volume; Power Down mode;

154mA 6mA

Intermodulation Rejection

Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product

60.5dB 20/50kHz spacing 50/100kHz spacing 61.5dB

S-Meter Linearity

Indication	Sig.Level	Rel.Level	
2 t.,	0.49uV pd	OdB ref.	
4	0.76uV pd	+3.8dB	
6	1.40uV pd	+9.1dB	
8	2.16uV pd	+ 12.9dB	
10	3.21uV pd	+ 16.3dB	
12	3.89uV pd	+ 18.0dB	

Transmitter

TX Power and Current Constumption

Freq MHz	Power	7.2V Supply	9.6V Supply	13.8V Supply
144	High	2.05W/910mA	3.95W/1.24A	6.00W/1.41A
	Low	610mW/535mA	610mW/535mA	610mW/535mA
145	High	2.20W/915mA	3.95W/1.23A	6.05W/1.42A
	Low	615mW/535mA	615mW/535mA	615mW/535mA
146	High	2.15W/915mA	3.95W/1.23A	6.00W/1.41A
	Low	615mW/535mA	615mW/535mA	615mW/535mA

Harmonics/Spurii

ı	2nd Harmonic	-87dBc
ı	3rd Harmonic	-82dBc
	4th Harmonic	- 96dBc
	5th Harmonic	< - 100dBc
	6th Harmonic	< - 100dBc
	7th Harmonic	< - 100dBc
l	Spurii	< - 100dBc

Peak Deviation	4.96kHz
Toneburst Deviation	3.86kHz

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TS-940S £1,995

This is the most respected HF transceiver in the world, and has maintained its lead over all the competition. Check what the leading contest stations are using, and you will find the TS-940S at the top of the list. Uncompromising performance, unrivalled facilities, and uncanny ease of use make the TS-940S the HF transceiver which you will want to own one day.



TS-440S £1,138

The TS-440S is probably the most successful HF transceiver ever made by Kenwood, and this is no surprise when you realise that it is virtually a mobile version of the TS-940S. I can't put it better than Geoff Arnold in his review of the TS-440S: — "The receiver in particular is a joy to use". He was not wrong, and just ask any TS-440S owner to confirm it. All band, all mode operation, with a receiver covering 100kHz to 30MHz; the TS-440S is unbeatable at any price.



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£862

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The TR-751E is one of those transceivers which actually has no competition at all, combining as it does the all mode performance of a 2 metre base station with the convenience of mobile use as well. Whether you want to operate on FM, SSB, or CW, the TR-751E will do the trick. Real ease of use (in the Kenwood tradition), and sensible facilities, have made the TR-751E a firm favourite all over the world. Call in to any of our branches and see for yourself.

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25 YEARS IN AMATEUR RADIO

Random Ramblings.

Joseph Addison wrote, sometime around 1690 — "Unhurt among the war of elements, The wrecks of matter, and the crash of worlds". In other words, he had chosen an aerial rotator which wouldn't hold his beam in a high wind

It is foolish to economise on your aerial rotator, because if you do, and install it on top of a pole or mast, you will be extremely sorry when it breaks and you have to take the whole thing down again. When it comes to top quality aerial rotators, it's hard to beat those from DAIWA. The MR-750 series rotators are capable of holding the aerial still and rotating the house, but one has inevitably to pay for such performance.

We have just started selling two rotators from the EMOTO company, which was founded by a respected mechanical engineer, and has built a substantial reputation in Japan for high quality mechanical design. These rotators complement the DAIWA MR-750, and give you a real choice for your rotator requirements. They all use a safe 24 volt ac supply to feed the motors, and the controllers are easy to use and easy to read.

I can only give the briefest of details in this small space, but when you need further advice, give us a call or drop a line, and we will explain in great detail why these rotators are the best, and tailor the right one for your needs. As I started with a quotation, I may as well end with one equally appropriate:-

"Down, thou climbing sorrow, thine elements below", which comes from King Lear, so even poor Shakespeare had his beam fall down.

DAIWA MR-750PE...£290

Turning torque...700kg/cm to 2800kg/cm (depending upon number of motors)

Braking torque...6000kg/cm to 21000kg/cm (depending upon number of motors)

The MR-750PE is unique in that the rotator is supplied with one drive motor fitted, but up to three additional motors can be fitted, each one multiplying the turning and braking torque. With all four motors, the MR-750 could almost be used for powering a railway engine turntable, such is its turning power. Must also mention that the additional motors can be fitted without dismounting the rotator from the aerial system.

EMOTO 105SX...£159.69

Turning torque...520kg/cm Braking torque...3000kg/cm

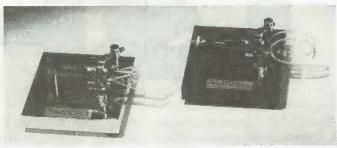
EMOTO 747SRX...£347.24

Turning torque...700kg/cm Braking torque...7000kg/cm

Both EMOTO rotators are extremely well made and weatherproofed, with hard epoxy based paints and stainless steel hardware. The controller scales are particularly easy to see and interpret.

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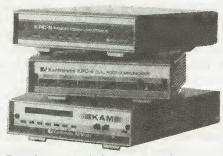
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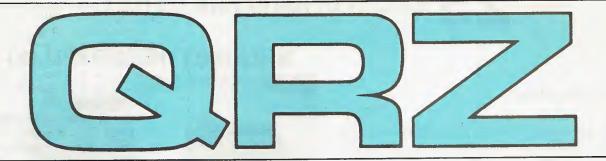
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In the last "QRZ", I reported on the ARRL's decision to accept Malyj Vysotskij Island as a new DXCC "country". Since writing that, I have received my 4J1FS QSL card from MV Island for my QSO on 9th July

team, revealed that there could be another operation from them this summer, possibly at the end of May.

So that's the story of M-V Island — whoever said HF DXing and country chasing wasn't educational? Not

arrived very quickly via the Heard Island DX Association, c/o Jim Smith, VK9NS, on Norfolk Island.

QSOs in exotic places with exotic DXers can lead to some pretty exotic QSL requests...

last year. The QSL, which is a fourside folder rather than a card, has two sides in full colour and also gives the full story of the expedition, which makes quite interesting reading.

The front of the card shows a map giving the location of Malvi Vysotskij in the colours of the Finnish and Soviet flags, while on the back is a colour photo of the operators taken on the island with their gear. The QSL gives the following information about the expedition: "Malyj Vysotskij -M-V Island - is situated at 28° 34' E and 60° 38' N within Soviet territory in the Baltic Sea. The island is about a mile long - lush but desolate and uninhabited. Its dilapidated houses and alleys green with thick vegetation suggest that the island was left alone decades ago. It was on September 27, 1962 that Finland leased M-V Island from the Soviet Union along with the Siamaa Canal which serves as a gateway for shipping from the Finnish lake district to the seven seas. A total of 14,765 contacts were logged in 96 hours of operating (that's over 21/2 QSOs every minute for the entire period of operation - G4JVG) . . . On November 17, 1988 the ARRL reaffirmed its original decision to add M-V Island to the DXCC Countries List - another new country was born. In a related development, the Radio Sport Federation of the USSR had recognised M-V Island six weeks earlier, on September 30 . . ." A short QSO with Martti, OH2BH, one of the 4J1FS

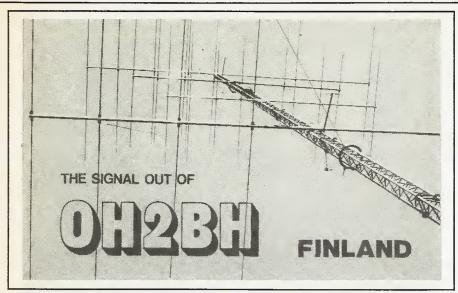
very many people other than HF DXers will have even heard of Fernando de Noronha Island, either. I had always assumed it was a single island, belonging to Brazil and in the Atlantic Ocean, but a QSL from PYOFZ, operated by Fred Souto Maior, PY 7ZZ, taught me differently. The QSL states that the archipelago of Fernando de Noronha is composed of twenty islands and lies in the South Atlantic at 3° 50'S and 32° 25'W. Fernando de Noronha Rata are Rasa are the two main islands in the group. Fred was active from PYOFZ at the end of November last year, and he also used the callsign ZYOF in the CQ World Wide CW contest. The QSL

Geographical Insight

For me it is always a pleasure to receive QSLs like the ones from 4J1FS and PYOFZ, which give some geographical or other information about the place contacted, and it is for this reason that I printed some historic details about Cocos (Keeling) when I visited those islands last October. That is all very well if you are lucky enough to live in, or operate from, a rare or otherwise interesting place, but if you are operating from England or Italy it makes it a little more difficult to decide what to put on your QSLs - and I must admit my standard G4JVG QSLs are best described as merely "functional". However, I1KFB, Franco Amoretti in Genoa, has a splendid colour QSL showing his station taken, I suspect, several years ago. There is a most impressive line-up of mainly Collins equipment, although on the back of the QSL Franco says he was using a Drake TR7 transceiver, which is not



4J1FS ops, OH2RF, OH2BH, UZ3AU, UW3AX, UR2AR and OH5NZ, with their gear, a Kenwood TS940S and TL922 linear, on Malyj Vysotskij Island.



OH2BH's antenna system, with 6 ele KLM beams on 10, 15 and 20 metres. The whole tower, which is 43m (140 ft) high, is rotated by a heavy duty rotator at the base.

in evidence in the photo. I would be interested in receiving pictures of your shack, or examples of your QSLs, for inclusion in future "QRZ"s.

Talking of Coco Keeling, if you missed my AX9YG/VK9YG operation in October last year, you may be interested to hear that probably the next operation from there will be in October this year, when Cris Henderson plans to visit Cocos Keeling. Callsign is not known at time of writing, but will almost certainly be in the series VK9Y followed by a further single letter. Knowing Cris, operation will be on both CW and SSB.

Despite the 100,000 or so QSOs made by the Hungarian group who operated from Vietnam in October and November last year, there is still a lot of interest in contacting that country. This is proved by the fact that, at the time of writing, 3WOA is active on 14195 and generating a large pile-up of European callers. This operation, which is using the call 3WOA on SSB and CW and 3W1A on RTTY, is by a group of four Soviet amateurs from the RL8PYL club station in Kazakhstan. There are rumours, unconfirmed at the time of writing, that one or two of the group will be permitted to operate from one of the Vietnamese-occupied islands in the Spratly Islands group, some of which are also claimed by Taiwan, China and the Philippines.

In the past, attempts to activate the Spratly Islands without the permission of the Vietnamese authorities which occupied the island ended

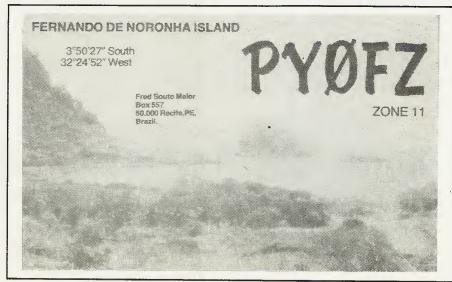
in disaster when a German boat was fired on, causing loss of life. The South China Sea, where the Spratly Islands are located, is also known as one of the most notorious areas of the world for pirates (sea pirates rather than radio pirates), so it is not particularly welcoming. While it is good to see that glasnost and perestroyka are now permitting Soviet amateurs to go on DXpeditions to countries outside the USSR, has anyone else been annoyed by Russian amateurs now virtually demanding QSLs direct with IRCs, instead of via P.O. Box 88 Moscow? I have also received many QSLs direct from Russian amateurs for my VK9YG operation, all expecting replies direct, but without their enclosing either an

sae or any IRCs. A few have said that it is impossible to get IRCs in the USSR (although some have sent them, so it cannot be!) but as the USSR is a member of the Postal Union that is a problem of distribution in their country.

It is not reasonable to expect DX stations to QSL to you by mail unless you send them a self-addressed envelope and some form of return postage; if not you can expect your reply via the bureau. (My postage bill was over £200 to answer the QSLs sent direct to me for VK9YG QSOs: I would not expect to have to pay that myself.) On the other hand, some amateurs send their replies to all QSLs via the bureau, even when they have received self-addressed envelopes and IRCs or even sometimes dollar bills. To me, this is even less acceptable, although I suppose it is slightly better than the stations who do not reply at all: I am still waiting for my FR5DX QSL card.

Albania Efforts

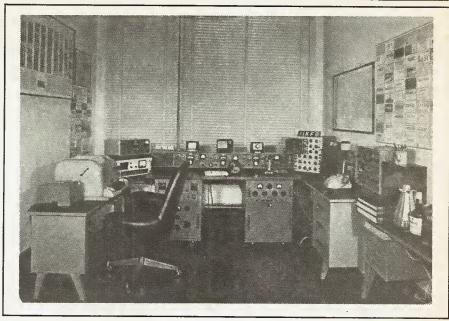
Earlier, I mentioned the Hungarian group who activated Vietnam as 3W8DX and 3W8CW for the first time since the American pullout of Saigon during the Vietnam war. Now there are very strong rumours that they will return to South East Asia very shortly and operate from Laos, which has also been inactive for many a long year. Callsigns are reportedly XW8DX and XW8CW, although if the operation does come off it will probably be history by the time this is read. While on the subject of rumours, there are always rumours flying around the



QSL from PU0FZ on Fernando de Noronha, operated by Fred, PY7ZZ.

bands of upcoming activity from Albania, which figures in most DXers' top three most wanted countries list. The latest rumour has it that G3FNJ is organising a group of Greek amateurs to operate from an uninhabited Albanian island off the coast of Corfu. Certainly Norman, G3FNJ, is presently in Greece and speaks fluent Greek, but he once told me that, despite this ability and attempts for over 20 years, he was unable to even get a Greek licence, as there is no reciprocal licensing agreement between the UK and Greece. Hopefully this will change in the near future, with the advent of the CEPT licence, a soon as Greece ratifies it, but presumably this means that previous operations by other British amateurs from Greek islands have been illegal? We wish Norman luck with his attempts to activate Albania, and if it comes off he will be much in demand.

As an amateur who enjoys travelling, especially with a transceiver, I welcome the CEPT licence, but my initial euphoria wore off somewhat when I studied the details. It apparently only permits you to operate your own station when abroad as a mobile or portable set-up, so theoretically you will not be able to set up a station in an hotel room, or hire a selfcatering apartment or villa for your DX pedition to Liechtenstein or wherever. Another big disadvantage is that, according to the February Radio Communicaton, if you visit Sweden, for example, you must operate your station in accordance with that country's "T" licence, even if you



QSL of the Month: from Franco Amoretti, I1KFB. The original is in full colour.

hold a British class "A" licence. The Swedish "T" licence is very similar to our "B" — fine if you want to operate 2 metre FM mobile, but not much good if you want to talk to your mates back home. Presumably the advent of the CEPT licence will not negate the proper reciprocal licensing agreements, where they already exist, which give the same authority as residents rather than the very restricted operating possiblities of the CEPT licence? Or will it?

Ten metres has continued to be a very good band recently, with excellent openings to the States and South America almost every afternoon. One station who has been very active, almost always around 28520-28525 kHz, is HKOHEU from San Andres

Island, a Colombian island in the Caribbean Sea. If you hear or work him, QSLs go via HKOFBF. He has been on the air almost daily around 1300-1400 GMT, Two Japanese DXers have recently been on a DXpedition to Dominica, also in the Caribbean, and have been very active as J79ROJ and J79OUT. I heard J79ROJ on 28550 with very strong signals around 1500, when he announced that he was going to move to 28025 CW, but both stations have been reported on 80, 40 and 20 metres as well. What is interesting is that they are giving RA4HA as their QSL manager: I have certainly never heard of non-Soviet operations from countries outside the Eastern bloc using a QSL manager in the USSR before, and indeed even the 3WOA Soviet DX pedtion to Vietnam is using an American QSL manager, W4FRU.

Finally, another station which has been very active recently is HV3SJ from the Vatican City, one of only three stations from that mini-State. They have been worked on 40 metres SSB and also, when I worked them, at about 1730 on 14195. I don't think I remember ever hearing this station with less than a 59+10 dB signal; their full-size 2 element quad high above the Vatican's buildings probably has something to do with it. QSLs for HV3SJ go via IODUD. Please send any news for "QRZ" or pictures of your shack or antenna or examples of your QSLs to Steve Telenius-Lowe, "Penworth", Tokers Green, Reading RG4 9EB.



QSL from HV3SJ, one of only three stations QRV from the Vatican. HV3SJ has been very active of late.

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The proper place for Preamps

How much improvement may be achieved by fitting a pre-amp? And at what cost to the receiver parameters?

The answers to these questions will be different for individual cases. One adds a pre-amp in order to hear weaker signals or work dx further

system. The noise figure is in itself a rather subtle subject which cannot be dealt with in depth in an article of this nature. However, some introduction is necessary as noise figure (NF) is generally accepted as the most important single characteristic of any receiving system.

When is a preamp productive? R L M Girdwood G4TUG presents the calculations for consideration.

afield. However, whether this purpose is fulfilled will depend upon the existing receiver performance, the station location, the signal environment and the performance of the preamp, eg, noise figure, gain, dynamic range, intermodulation performance, selectivity, etc.

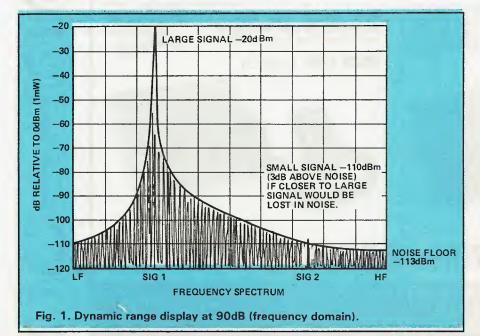
Not all these characteristics are easily or clearly specified and definitions often vary from vendor to vendor (and purchaser!).

As this subject is not covered in the RAE, I am attempting to provide some understanding of the total effect a pre-amp has on a receiving At this stage it seems appropriate to simply and loosely define the terms used.

Definitions

Dynamic range is the difference in magnitude (in dB) between the smallest and the largest signals that may be intelligibly resolved (without alteration of the attenuator or RF gain controls, usually).

If a small signal and a large signal are present simultaneously then the closer they are together, the more difficult the task of the receiver. See fig. 1.



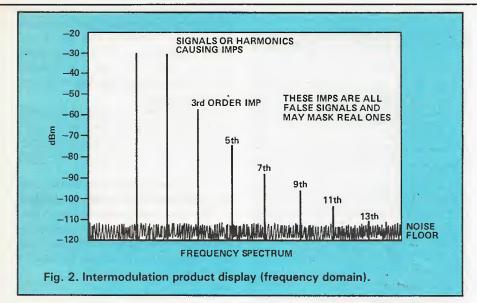
Intermodulation products (IMPs). When two or more signals simultaneously impinge on a mixer (or other non-linear stage) other signals are produced. These signals do not exist outside the receiver and are therefore unreal, but nonetheless may be really troublesome. Suffice to say that these are known as "orders" of intermodulation products. eg third order imp. The number of the order is determined by the signal and harmonic relationships. The higher the order of imp, the greater will be the interference to real signals. See fig. 2.

Noise figure. This is sometimes called noise factor. Perhaps the least understood, and yet believed by most engineers to be the most important characteristic of all when assessing a receiver's performance, noise figure (NF) is a figure of merit expressed in dB or degrees kelvin (K) that tells us how much worse a receiver is than the unachievable perfect noiseless receiver. Therefore the lower the NF the more sensitive the receiver.

The signal to noise ratio at the input to the receiver will be degraded by the noise of the receiver itself. This results in a smaller signal to noise ratio at the output — the end to which we wish to listen! A signal only just above the noise at the input may disappear completely into the receiver's noise floor. See the small signal in fig. 1.

Gain. This is simply the ratio of the magnitudes (expressed in dB) of input to output signals across any device, stage or system. The definition applies to loss as well. It may seem curious that, when adding a pre-amp, it is not necessary to consider the gain of the receiver. However, as will be seen further on, the gain of the pre-amp is very significant indeed, but not as important as the NF.

The signal with noise already on it will arrive at the antenna which is being bombarded with noise from many sources as near and as far as



the limits of our imagination and perhaps beyond! The signal and noise is then passed to the noisy pre-amp (and noisy receiver) via a noisy feeder. The signal, especially a small one, has a great deal of competition before it eventually reaches our (noisy?) ears. See fig. 3.

Before moving on, let's summarise the situation so far:

- 1. When the receiver is switched on it will produce noise, even without any input connection whatsoever. In fact, even with an impossible noiseless termination at the antenna input socket, the receiver will still produce noise.
- 2. Any signal received must, in order to be resolved, be of greater amplitude than all the combined noises with which it competes. In modern times computer enhancement helps to achieve this in difficult cases (at processing stage).
- 3. If strong signals cause the receiver to produce IMPs, the wanted signal may be masked or unreadable. This is one form of "overload".
- 4. The dynamic range of the receiver stretches from its "noise floor" to its overload or "ceiling".

A pre-amplifier can improve dx capability by improving sensitivity (noise figure) but only at some cost to other parameters.

Sensitivity. This is the lowest level at which a weak signal may be received and utilised. A receiver with good sensitivity will receive weak signals and will have a low noise floor or low NF. Receivers have different sensitivities according to band, mode, age, alignment, state of the art at time of design, price, manufacturer and many other variables.

The main reason for adding a preamp is to effectively reduce the NF of the receiving system. In fact, as will soon become apparent, the noise figure of the receiver plus pre-amp is very little higher than the NF of the pre-amp only. Therefore, the poorer the sensitivity of the receiver, the greater could be the improvement of dx capability by adding a pre-amp.

Consider the following three cases:

1. Operator one, who has an ageing two metre rig with a 10dB NF. She only has local QSOs.

Operator two, who has a two metre rig with a 6dB NF. He only has local QSOs but works further afield than operator one. Works some dx occasionally too.

Operator three, who owns a super new all-singing, all-dancing multimode two metre rig fully equipped with bells, buzzers, flashing lights and a NF of only 3dB. Works lots of dx.

All three operators run similar antenna systems, feeders, cable lengths and share the same QTH (very hypothetical). Only the rigs differ as above.

Each operator now tries the same pre-amp to see whether it improves their system performance.

Let us assume the pre-amp has typical characteristics, eg gain = 20dB (ratio 100) and NF = 1.5dB.

It now becomes necessary to introduce a formula in order to calculate the effect that the pre-amp will have on each rig.

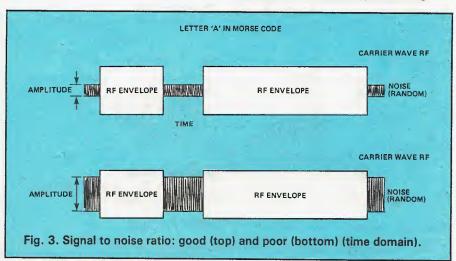
$$\mathsf{Ft} = \mathsf{Fa} + \frac{\mathsf{Fr} - \mathsf{1}}{\mathsf{Ga}}$$

when:

Ft = total NF (Rx plus pre-amp)

Fa = pre-amp NF Ga = pre-amp gain Fr = Rx NF

There is no need to consider the receiver gain Ga, which does not appear in the formula. No account has been made of the antenna and feeder NF, although it is very significant to the station performance. The measurement would be a little more complex and probably not contribute very much to the point of this particular article which is concerned with the pre-amp. All the dB ratios must be converted to numerical ratios when making the calculation, the result then being converted back to dB NF. See fig. 4. Inter connection losses have not been considered here though very signifi-



cant. Operator One's receiver plus pre-amp will now have a NF of:

$$1.5dB + 10dB - 1$$

20dB

Converting to numerical ratios:

$$1.413 + 10-1$$

$$= 1.413 + 0.09 = 1.503$$

Converting back to dBs = 1.769 dB Operator One's NF has fallen from 10dB to 1.769 dB.

Operator Two's receiver plus pre-amp will now have a NF of:

$$1.413 + 4 - 1$$

$$= 1.413 + 0.03 = 1.446$$

NF = 1.600dB Operator Two's NF has fallen from 6dB to 1.600dB

Operator Three's receiver plus preamp will now have a NF of:

$$1.413 + \underline{2 - 1}_{100} = 1.423$$

NF = 1.532dB Operator Three's NF has fallen from 3dB to 1.532dB

While all three stations have benefitted, clearly Operator One's has seen the largest improvement, but, perhaps surprisingly, all three stations finish up with very similar noise figures, and therefore similar dx capability.

It may now be shown that the gain of the pre-amp is very significant.

If a similar experiment is carried out with a pre-amp of 1.5dB NF and 10dB gain (ratio 10) the result would be as follows:

$$1.413 + 10 - 1 = 2.313$$

NF = 3.641dB

$$1.413 + \underline{4 - 1} = 1.746$$

NF = 2.42dB

$$1.413 + \frac{2-1}{10} = 1.513$$

dB Ratio	Numerical Ratio (n:1)
1.5	1.413
1.504	1.414
1.511	1.416
1.529	1.422
1.6	1.446
1.769	1.503
1.798	1.513
2.42	1.746
3	2 (1.995)
3.641	2.313
6	4 (3.981)
10	10
20	100
30	1000
90	1,000,000,000

Fig. 4. Conversion of dB to numerical power ratio based on the equation dB = $10 \log P_2/P_1$. The voltage ratio dB = $20 \log V_2/V_1$ has not been considered here, because noise is power, even in receivers.

NF = 1.798dB

In the above three cases, the NFs have all ended up larger with the 10dB gain pre-amp than with the 20dB gain pre-amp.

It is worth doing the exercise once more using a pre-amp with 1.5dB NF and 30dB (ration 1000) gain.

$$1.413 + \underline{10 - 1} = 1.422$$

NF = 1.529dB

Operator Two:

$$1.413 + \frac{4 - 1}{1000} = 1.416$$

NF = 1.511dB

$$1.413 + \underline{2 - 1} = 1.414$$

NF = 1.504dB

Two significant points emerge from

the high gain example: all three noise figures are virtually the same (or differ insignificantly), and all three noise figures are only fractionally higher than the noise figure of the pre-amp alone.

It may seem surprising to some that an old 'noisy' receiver with a preamp can be just as sensitive as a new "quiet" receiver with pre-amp. However it is so.

Another surprise may be that the RF gain of the receiver may be backed off almost completely without any loss of sensitivity but considerable reduction of Rx noise. Remember, the receiver gain Gr does not appear in the formula

$$Ft = Fa + \frac{Fr - 1}{Ga}$$

How often one hears an operator give a signal report "You're an \$8 on my meter but I've fitted a pre-amp and have a permanent noise level of S5." By reducing the RF gain control of the receiver the S-meter may possibly be set to read zero (or very low) under no incoming signal conditions. The calibrations will almost certainly not follow the original AGC law, but at least it will have some relative use (which is all an S-meter has anyway!). And the background noise in the loudspeaker will not appear abnormally high. It is possible to put attenuation between the pre-amp and receiver to minimise or eliminate receiver overload. It is even possible to control the pre-amp with a form of AGC. One could also calibrate the Smeter, but all these things are beyond the scope of this article. However, it may be seen that the action of the pre-amp is to deliver to the receiver a signal which is sufficiently above the receiver's noise level to be suitably detected and processed.

Such a system produces excellent results when the station is in a 'quiet' radio environment, free of other relatively close or relatively strong transmissions. That proviso is the major disadvantage of a pre-amp. Although it is very good at small signal handling, it can suffer considerably from the effects of strong signals which either overload the pre-amp or cause the pre-amp to overload the front end of the receiver.

If the receiver has a dynamic range of say 90dB (1,000,000,000 to 1) with a noise floor of -110dBm, then the maximum signal it can

handle will be -20dBm. Adding a pre-amp which drops the noise floor by say 10dB to -120dBm will also drop the ceiling by 10dB to -30dBm (assuming sufficient dynamic range of the pre-amp). If signals larger than -50dBm are presented to a pre-amp with 20dB gain, the receiver will overload, producing IMPs and other unwanted effects. See fig. 2.

So, a pre-amp would not be a lot of use to a station well located atop an exposed hill, surrounded by other ham stations, radio taxi bases, fire, police and ambulance stations, a local broadcast repeater, microwave food processing factory, and for good measure, an international airport thrown in! The solution here would be to have a switchable pre-amp (if at all).

The task of the receiver designer is to offer optimum performance, suitable for most users, uses and situations likely to be encountered, and maximum sales! Fitting a preamp becomes more of a special application, for better dx hunting or improving a station in a 'black hole' location.

The state of the art at present is not such as to permit the design of receivers with very low noise floors and wide dynamic ranges and superb IMP performance, all at an affordable price.

The motor industry has an analogous problem. It can build a car that will travel at 200mph or achieve 90mpg but not both at the same time. Receivers can be produced to operate very well indeed under certain conditions, but only at the sacrifice of performance in other conditions. Like most things, they are a compromise. That is why a pre-amp can be a very useful addition to a station in the appropriate situation.

Hang 'em High

The pre-amp is more effective at the mast head because it can present a good signal to noise ratio to the feeder which is itself lossy and noisy. The signal the antenna offers to the feeder is better than the signal the feeder offers to the receiver, therefore the larger the signal to noise ratio at the antenna end of the feeder, the less work the receiver has to do.

I believe that I previously operated from a "black hole" location: 200 feet below the top on an ironstone hill surrounding the QTH on



OH, YES, THE RIQ ITSELF IS VERY SMALL AND LIGHT.
-BATTERY PACK A BIT BIGGER THAN IT LOOKS IN THE CATALOGUE THOUGH!

three sides. The fitting of a cheap but good pre-amp (costing just a few pounds) inside the receiver transformed the station. However, it must be stated that this particular 'black hole' is very free of interfering signals.

Pre-amps seem to be most useful above frequencies of about 28MHz. Ambient noise below this frequency limits the usefulness of pre-amps.HF rigs seem perfectly satisfactory without pre-amps and meet all dx conditions if a good antenna is used, of course.

It is worthy of mention that many years ago professional communicators learned that money spent on improving their station was much more effectively put into the receiver than the transmitter. Massive increases in transmit power are necessary to achieve small increases in range. Small improvements to a receiver front end can extend range considerably. While serving in the

RAF as a member of a trials team operating UHF, I worked an aircraft to a range of 240 miles at 20,000 feet with 10 watts of power. Experimentally increasing to 150 watts only extended the range to 250 miles. A 4% increase in range for a 1,500% increase in power! The range limit in this case was, of course, line of sight — 120 miles at 10,000 ft.

Constructors should line up their pre-amps for minimum noise figure rather than maximum gain, the former being more important. Manufacturers optimise noise performance and then just measure the gain to ensure that it meets specification.

For in depth understanding of noise figure I recommend Noise Performance Factors in Communications Systems by W W Mumford and E H Scheibe, Published by Horizon House — Microwave Inc. Dedham, Massachusetts, and RadCom, Sept '84, page 778 How's your front end?

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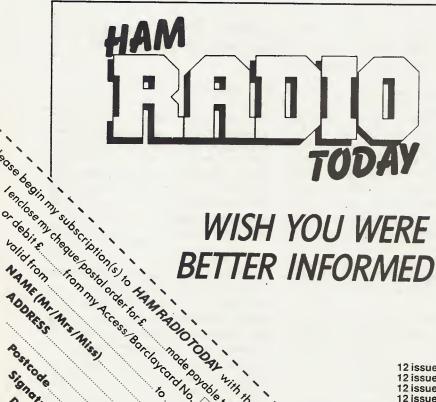
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Packet Radio

Roundup

First of all, welcome to all our readers who are either currently active on packet radio, or just 'thinking about' it. Our pioneering series in HRT has certainly stirred up a great deal of interest, and I must thank the very large number of amateurs who sent me packet messages through the national BBS system.

As packet radio is clearly heralding itself as 'tomorrow's mode today', with amateurs pioneering this communication technology in the traditional manner, this column is the start of a regular 'Packet Page' in HRT. I'll be describing current and future trends, the latest software, new TNC hardware, club news, events, and the rapidly evolving UK and International packet network.

Licensing

With the revised licence the use of packet radio has at last become legal! Before this, it was generally accepted as 'custom and practice', with unattended digipeaters, mailboxes and the like being 'ignored' as far as licence conditions went. The current licence made formal what is, and what is not, allowed on packet. For instance, it is perfectly OK to sit back in your shack while Joe down the road on 2m connects into your VHF/HF gateway and uses your 20m 100W transceiver to have a QSO with a foreign amateur. It is also legal to leave your 25W ERP 2m rig running as a digipeater and a personal 'message store' while you go shopping.

There is, however, one practice that was previously accepted but has apparently been firmly stamped upon by the DTI RIS, which is the facility available on many PBBSs of storing third party messages. Several amateurs throughout the country have received letters instructing them to remove this facility, which meant switching their personal message store facility completely off.

Some software from suppliers such as Siskin Electronics in the form of a plug-in Eprom inside the TNC already had the facility of third party Chris Lorek G4HCL
embarks on a new
regular page for
present — and future?
— packet radio
enthusiasts.

on/off switching; others were less fortunate. Kantronics also have been quick to repond to the new UK needs with a special 2.85(UK) version upgrade, with periodic CW ident and third party on/off PBBS facility, as well as several other useful features on the built in KA-Node. I understand this upgrade is now available ex-stock from UK Kantronics dealers such as Lowe Electronics. Yours truly is now again legal . . .

Packet Radio Guides

A common moan is that of little information being available for the beginner. For the owner of a shiny new TNC, the first few days of operation can be very daunting as well as possibly confusing. If you missed the HRT Beginners' Guide series, there are a few publications that could help you on your way. One of these is the Packet Starter Pack by the East Suffolk Data Group, produced by G7ANH and G0JVU. Unlike other publications which rapidly become out of date, this information pack is regularly updated and reprinted as required to reflect the rapidly changing face of packet radio. Copies are available for a nominal donation to club funds (currently £1 plus large SAE) simply to cover their expenses, with annual membership standing at £5 at the time of writing. Their secretary is Dave Archer G4GKE, 121 Parliament Rd, Ipswich. Suffolk IP4 5EP.

Data Groups

Throughout the country, Network 'nodes' relay packets day and night, bulletin board stations run to

disseminate information providing a service to all amateurs, but many users take these purely for granted. The day to day running expenses of these are certainly not funded by organisations. They are run by local groups of amateurs, and sometimes by individuals. A quick word of thanks never goes amiss, and if your area is served by a Packet Radio group, then do consider joining. One such society is Maxpak, and their quarterly journal *Digicom* is well worth a read. Their Membership Secretary is Richard Nicol G1NZZ, 37 Thicknall Drive, Stourbridge, West Midlands DY9 OYH

New Hardware

The latest news is that the well-known industry 'standard' TNC-220 has now been updated with the introduction of the TNC-225, provisionally priced at £179. New additions are a PMS (personal message system) with enabled/busy/pending indicators, the facility for Amtor and RTTY modes with a replacement Eprom, and a built-in HF multicolour bargraph tuning indicator. It uses the Texas TCM3105 modem on VHF, with EXAR 2206 and 2211 ICs together with a six-pole active filter on the HF port.

For 9600 baud FSK usage, either for satellites or for high speed linking between groups, I am informed the G3RUH modem is now available in chip form to enable it to be fitted inside a standard TNC.

End of Message — CTRL-Z

This regular feature must of course be a two-way affair for it to reflect what is happening, so please get in touch to let me know what the latest is in your corner of the world. I can be reached via packet with a message routed to G4HCL @G87XJZ-2, or via Prestal Mailbox 011138096. If you prefer pen and ink, letters addressed to Chris Lorek, c/o Ham Radio Today, Argus Specialist Publications, 1 Golden Square, London W1R 3AB will also get to me.

50 MIZ MESSAGE

After many years of frustrating negotiation by the Radio Society of Great Britain with the licensing authorities, the pioneer work done by a small group of British amateurs working crossband ten/six metres with dedication and enthusiasm was recognised on February 1st 1983 when permits were granted for two-way

America by what is now known as Transequatorial Propagation (TBP). ZS1P in Cape Town had been regularly receiving the Alexandria Palace TV and MD5KW had been receiving All India Rado and commercial stations from Africa and Europe, so in 1946 he installed a beacon on 50.010 beaming alternatively north south

Due to successful negotiations by the ARRL with the FCC, US amateurs did not have the same TV problems as Region 1. From March 1 1946 the 6 metre band (50-54MHz) became generally available. The early pioneers utilised CW, AM and even NBFM. Antennas included rhombics, corner reflectors, folded dipoles, to name a few. The first 2-way QSO involving "skip" was reported to have taken place on April 23, 1946 when W1LSW new Hampshire worked W9DWU of Minneapolis distance 1,100 miles. By August 1946 6 metre operators were popping up all over the country in all but 18 of the US. By this time about 30 Canadians were on the band. In the Pacific, Australia and New Zealand had their share of experimenters also. Some of the early VKs incuded VK2WJ, VK2BZ, VK2IS, VK2LZ and VK2NO. Some phenomenal low-power DX contacts were made around this era; on November 29th W1MUX raised G5BY with an input of three watts. Numerous W6s with converted M5Ks running 3.5 watts worked the East coast. The miles per watt must go to W2RRG NJ who worked W7ERA Oregon with an

Ken Ellis G5KW looks back and forward on the 6 metre band.

operation on the band. Unfortunately this came after the peak of sunspot cycle 21 when propagation conditions had started to decline; however some remarkable results were achieved, giving an indication of what to expect in the future.

The 50MHz band is not a Region 1 allocation in Europe due to the extensive use of TV on Band 1. At the last IARU conference a strong case put up by the RSGB was defeated by three votes, but despite opposition put up by neighbouring countries the DTI areed to grand restricted operation to Class A and later Class B UK operators on a 'Non interference basis'.

Early History

We have to go back over 40 years to trace the start of activity in the band by UK operators, some still alive and active. The peak years of cycle 19-1946/47 are of historical interest, when extensive and successful tests were carried out from UK to North America and Africa. Denis Heighton G6DH, Hilton O Heffernan G5BY, Ed Tilton W1HDQ, Ken Ellis MD5KW (now G5KW), VQ2PL, ZS1P, ZS1T, and others combining to make some historic two-way QSOs at that time.

During the run up to cycle 19 a considerable number of TV and commercial stations had been heard over the north/south path in both Europe-South Africa and North-South

every 30 minutes.

A remote watch was kept on 28.100 for reception reports. A few temporary permits were issued in UK early in November. G5BY received his permit on November 5th. He worked all night building a rig for 50MHz completing it about 0430z. After sleeping for two hours he had his first two-way 50MHz QSO — with ZS1P a distance of over 6,000 miles. 45 minutes later he had a QSO with W1HDQ and another later with a local. Within 1 hour and 15 minutes three QSOs and three continents!

What a start on a new band. Between November 6th and December 1st G5BY completed 175 QSOs with 93 different stations in North America, South Africa, Egypt and Suez Canal Zone. Actually G6DH was the first "G" to work the USA, contacting W1HDQ on November 6th at 1502z. Later at 1620 G5BY worked VE1QZ for the first G-VE QSO. In addition to the numerous trans-Atlantic openings which took place rare DX in the form of MD5KW (Suez) and SU1AF (Egypt) graced a few logs. G6DH was the first G to work MD5KW (now G5KW) this took place on November 10th 1947 with MD5KW running 35 watts to an HK54 an S27 receiver and a 4 element beam at 35 feet near the shores of the Great Bitter Lake, Suez Canal.

Geophysical Year (IGY) 1957

input of 0.3 watt!

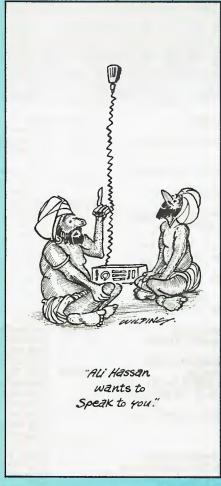
The IGY - an international cooperative research program concerning the geophysics of the earth, included major studies of the ionosphere. To further these studies many countries not normally operational on six metres granted temporary permits. This authorisation included Azores CT2, Madeira CT3, Sweden, Norway, Poland, Switzerland, UK and Ireland. Probably one of the most successful European operators during the IGY was the late Harry Wilson EI2W. During the four months from October 27th 1957 Harry worked 190 stations in 35 US states and 2 Canadian Provinces. Four QSOs were

made with California, XF1PFE for the first Europe-Mexico contact on this band. In England Gordon Spencer G4LK in Newcastle who had been granted a 50MHz permit for a few months, carried out test with South African stations, and had QSOs with W-VE stations.

Solar Data

Although the accurate forecasting in advance of periods of good propagation is difficult, there are certain aids and guidelines to consider. It is necessary to appreciate the significance of information about solar and geophysical events which either have affected or may effect radio propagation, together with forecasts of likely conditions. Every Sunday the RSGB GB2RS news bulletin includes information prepared by Charlie Newton G2FKZ of events which have affected, or may affect radio propagation. Bulletins include both factual data and propagation forecasts. The factual data usually refers to the week up to the Tuesday preceding the transmission. This is as up-to-date as can be arranged, because the information is received from many sources. Each 27 day rotation has its Carrington Rotation number (a solar rotation base map is prepared each year by R. G. Flavel G3LTP, Chairman of the RSGB Propagation Studies Committee. We understand that a copy of the current map will appear in the 1989 RSGB Callbook). Interesting activity centres, such as major sunspot groups, flares, coronal holes etc, can be referred to in latitude north and south and heliographic longitude, which gives both position on the disc and the date of central meridian passage.

Frequently the radio effects of solar events are experienced around the time of central meridian passage, but this is not always the case. large flares can have almost instant effect on the ionosphere regardless of their position on the disc, whereas auroral effects usually occur 30 to 50 hours after the event. The general background flares and sunspots, mostly small in size and short in lifetime, are what is known as 'solar activity'. This varies depending on the number of active regions and the type of flare emissions that occur, both in the optical X-ray, and radio spectrum in general. The effects are classified as Solar Quiet - no active regions



erupting; Solar Moderate — active regions erupting, but with low intensity; Solar Active — one or more active region erupting, but with high intensity bursts or new regions forming, or both.

Solar Flares

These are divided into three types: C, M and X. C type flares are very common and are of low inten-

Relationship of the K and A Indices

Relat	ionship	of	the	K	and	Α	Indic
	K Index	A		eor	negn	etic	
	0			uie			
	1	3	3 0	uie	t		
	2	7	7 0	uie	t		
*	2 3 4	15	5 U	nse	ttled		
*	4	27	7 U	nse	ttled		
*	5	48	3 U	nse	ttled	to r	minor
			S	torn	n leve	el	
**	6	80		1ajo	r sto	rm I	evel
***	7	140		lajo	r sto	rm I	evel
* * *	8	240		lajo	r sto	rm I	evel
***	9	400) N	1ajo	r sto	rm I	evel
(*) (**) (***	Aurora Aurora	a on	6m v			/	

Note:— Geographic location has a direct bearing as to whether or nor aurora is workable. Stations further north will obviously experience more openings. sity, about 80 to 100 per week at the present time, in effect they give the general background to the solar flux. M type are of increased intensity over C and can cause events such as magnetic storms and short wave fadeouts (SWF) of varying amounts. These are sub-classified in M1 to, say M4. The resulting magstorms of M3 M4 type flares usually give Scottish type weak auroral events. X type are violent, big and accompanied by X-ray type emissions. They usually cause widespread blackouts of the spectrum.

WWV Solar Data Reports

Every three hours the geomagnetic field is measured in three dimensions: horizontal(H), declination(D), and vertical (Z). The one showing the greatest variation at any time is for computing the three hourly K index. Sometimes the bulletin will refer directly to this K index, but more often it will express magnetic activity in terms of the 24 hours A index. The A index is derived from the K data.

WWV Geoalert Broadcasts

The National Bureau of Standards (NBS) transmits information regarding solar activity via WWV on 2.5, 5.0, 10, 15 and 20.0 MHz, at 18 minutes past each hour. These messages are changed every six hours at 1800, 0000, 0600 and 1300 UTC. The first bit of information is solar flux; measured at 2800MHz in Ottawa, Canada, It is a measure of the solar electromagnetic radiation hence it is related to sunspot and flare activity. Given next is the A index which is a measure of geomagnetic activity for 24 hours, ranging from C (very quiet) to 400 (very disturbed). It is measured at Virginia, USA.

Following this is the K index, which is a logarithmic index of geomagnetic activity ranging from 0-9 units. The K index is measured every three hours at Bolder, Colarado, USA. These measurements are then averaged to determine the A index for the next 24 hour period. The last piece of information by WV is a forecast of terrestial conditions for the next 24 hours as they correspond with solar activity such as flares and the geomagnetic field. By monitoring WWV on a regular basis and by paying special attention to the A and K indices given, it is possible to predict auroral conditions (see figure 1).

6m Liaison Frequencies

In order to exchange information between national and international operators two active nets are in operation: 28.885 for world-wide use, and 3.817 for European use. The 28.885 is open all day-most days during good conditions and many well-known DX operators exchange

current information and arrange skeds for 50MHz operation. The European net is operating most mornings from 0800 GMT for arranging skeds and exchanging information.

	0'	SV/1DH/S	SZ2DH: Dr. C. Fimerelis, 23 Elianou St, Athens 112 54, Greece.
	Six metre DX QSL Information		Francisco Capuano, 16 Ave 17 20, Zona 10, Guatemala
	QSL Mngr. W400, Gene Sykes, 6510 Carmabola Circle, W. Palm Beach. FL.33406	TI2CF:	
CT3BX:	Via KD3VR Hernani Correia, Verda Bala Vista 3, P-9000 Funchal, Madeira Island.	TI2HL: TI2KD:	Rica. Heinz Lazarsfeld, Box 8-4750, San Jose, Costa Rica. Carlos Diez, Box 891, San Pedro, San Jose 2050,
CT4KQ:	Serafim. Matos da Silva, Estrada da Azenha, 3500 Viseu, Portugal.	TI2NA:	Costa Rica. Erik Roy Jiminez, Box 661, San Jose 1000, Costa Rica.
CX4HS: CX8BE:	Alberto Symonds, PO Box 274, Montevideo, Uruguay. Jorge De Castro Alves, Lieja 7184, Montevideo,	T70A:	Via T77C; Antonion Ceccoli, Via Belle Carrare 67, 47031 Murata, S. Marino.
C6ANY:	Uruguay. Lowell Albury, Box N-1712, Nassau NP, Bahama Islands. OSI Magra W2014. Study F. Mayor 2417, Navyton St.	V2AR: V2AYL:	Mickey Matthew, Box 550, Golden Grove, Antigua & Barbuda Leeward Is.
D44BC:	OSL Mngr: W2GHK, Stuart F. Mayer, 2417, Newton St, Vienna, Virginia 22180. Julio Vera-Cruz, PO Box 36, Mindelo, Republic of Cape	V31AB:	Hyacinth Matthew, Box 550, Golden Grove, Antigua & Barbuda Leeward Is. Wayne: QSL via WA4WIP.
EA1MO:	Verde. Manual De La Torre, Padre Claret 9, Valladolid, Spain.	V31FB: V31PC:	Wayne Blanton, Box 108, Corozal, Belize. Box 7, Punta Gorda, Belize, Central America.
El6AS:	Albert latham, 226, Belgard Heights, Clondalkin County, Dublin, Eire.	VP2MJ:	
EI9Q: FC1GTU:	Dick madigan, 18 Manor St, Waterford, Eire. Daniel Lauseille, La Grang, Champcevinel, 24750	VP2MN:	Leeward Islands.
FM3AG:	Perigueux, France. Jean Louis Bibas, Ecole d'Apprentissage Maritime, Beause Jour, F-97220 Trinite, Martinique.	VP2MO:	QSL Mngr: WB2LCH, Gene Ege Snr, PO Box 64, Gloucester, N.J. 08030-0064. Errol "Bobbie" Martin, Box 113, Plymouth, Montserrat,
FM3BY:	Gerard Josepha, Les Hauts du Port, ESC F Apt 61, F-97200, Fort du France, Martinique. Or PO Box 1130,	VI 2.1110.	Leeward Islands. QSL Mngr: WB2LCH (see above VP2MN).
FY5AU:	Fort de France. Leslie Thomas, PO Box 999, F-97300, Cayenne French	VP5D:	Robert B. Cooper Jr, Providenciales, Tuks & Caicos Islands.
HC1BI:	Guiana, South America. PO Box DX, Cuenca, Equador.		QSL Mngr: W3HNK, Mr. J. L. Arcure Jr, Box 73, Edgemont, PA 19028, U.S.A.
HC2FG: HC5K:	PO Box DX, Cuenca, Equador. QSL via KT1N, or via PO Box DX, Cuenca, Equador.	VP8PTG	: Mr. Fred Simpson, Walker Creek, Falkland Islands, South Atlantic.
HC8VB:	Equador.	A. VE EMIN	OSL Mngr: G4RFV. Mr. B. Adams, 38 Waterloo Rd, Darbys Corner, Poole, Dorset BH17 7LF, England.
HH2C: HH7VP:	Serge Cuville, Box 1774, Port au Prince, Haiti. Patrick de Verteuil, Abricots, Jeremie, Haiti. QSL Mngr: K3EST, Robert Cox, 6548 Spring Valley	YN3CC:	QSL via KOTLM. Jose Cespedes, Box 2871, Managua, Nicaragua. Edguardo Bruse, Calle los Sisimiles, 3248, Miramonte,
	Drive, Alexandria, VA 22312. Waldo Pons C., Calle A. Lara No 35, Santo Domingo,		Box 05-43, San Salvador, El Salvador. OSL via N4CID.
	Dominican Republic. Cliff Hubert, Volcan, Chiriqui, Republic of Panama.	ZD8MB:	
HZ1HZ:	QSL via KA4MVK. Ahmed Zaidan, PO Box 1999, Jeddah, Saudi Arabia.	ZF1RC:	Roger Corbin, Box 1549, George Town, Grand Cayman, Cayman Islands.
J52US: J6LOV:	Dave, QSL via WA8JOC. Errol David Reid, Box 115, Castries St, St. Lucia,	ZS3AT:	Thomas Freidrich, PO Box 21602, Windoek, Namibia, S.W. Africa.
	Windward Islands. QSL Mngr: K2QIE, Ed Mason, 129 Cherry Hill Rd,	ZS3E:	QSL Mngr: K8EFS, Mr. M. D. Anderson, Box 54 R 4 S Cochran, Charlotte, MI 48813, U.S.A.
J6LB:	Maine, NY 13802. Bernard Thomas, La Clery, Castries, St Lucia, Windward Islands.	4U1UN:	QSL Mngr: NA2K, Mr. Harry Westervelt, 72 Kuhlthau Ave, Milltonw, NJ 08850, U.S.A.
KG6DX:	Joel Chalmers, 93 Gardenia Ave, Latte Heights, Guam 96913.	4S7EA: 4X1IF:	Ernest Amarasinghe, 275 6 Colombo Rd, Divulpitiya, Boralesgamuwa, Sri Lanka, Bolah Persona, Sri Lanka, Bolah Persona, 175 Kbalam St. Bolah Persona 42561
KP2A:	John Ackley, Box 10245, Charlottte Amalie, Virgin Islands 00820.	4X6IF:	Ralph Rosenbaum, 17 Shalom St, Ra'anana 43561, Israel. Danny Rosenbaum, 17 Shalom St, Ra'anana 43561,
KV4AD:	QSL Mngr: N6CW. William B. Fageol, 19-A Solberg, Box 2126, St.	5B4AZ:	Israel. Neoklis Kyriazis, PO Box 1662, Limassol, Cyprus.
KV4FZ:	Thomas, Virgin Islands 00801. Herbert Schoenbohm, Box 2570, Christiansted, Virgin Islands 00820.	5B40G:	Ted Ross, 16 Ifiynias St, Larnaca 309, Cyprus. 5NO: Sqdn Ldr Roy Handley, 16 Ybryn, Glan Conway, Colwyn
OX3LX:	OSL Mngr: W2GHK, see C2ANY for address. Bo Christensen, Box 187, DX-3920, Julianehaab,	6Y5IC:	Bay, Clwyd LL28 5NJ, North Wales. Wenty Bethune, Hampshire House 12, 4 Rekadom Ave, Kingston 10, Jamaica.
	Greenland. Bo also is active as OZ1DJJ when he returns to OZ. OZ1DJJ: Bo Christensen, Bergthorasgade 9-3,	8P6CX:	Paul Burleigh, Wayne, Rockley, St. Michael, Barbados. QSL Mngr: K2QIE, Ed Mason, 129 Cherry Hill Rd, Maine, NY 13802.
OX3RA:	DK-2300 Copenhagen S. Herluf Rasmussen, Box 165, DK-3920, Julianehaab,	8P6KY: 8P6JW:	Frank Freer (Barbados), QSL Mngr: K2QIE (see above). John Webster, 31 Atlantic Shores, Christ Church,
PJ2DEW:	Greenland. William de Wipte, Box 3383, Willemstad, Curacao,		Barbados. QSL Mngr: K2QIE (see above 8P6CX).
	Netherlands Antilles. QSL Mngr: WA2SPL: J. B. Krone, POB 373, Alburg,	8p6LL:	Elsa Webster (see above 8P6JW — XYL) QSL via K2QIE (see above).
PJ7GIL:	Vermont 05440, U.S.A. Robert Gilmoor, 24 Cole Bay Lagoon, St. Marten,	8P9AY:	David W. Penttila, Rockley Beach, Christ Church, Barbados.
PZ1AP:	Netherlands Antilles. Arnold J. Polsbroek, PO Box 566, Paramaribo,	9H1BY: 9H1OG:	Paul Galea, 63 Ellul Mercer St, Dingli, Malta G.C. Joe Vella Brincat, PO Box 10, Zabbar, Malta G.C.
P43AS:	Suriname. Juan Noguera, PO Box 2380, Stl Nocholas, Aruba.	9Q5NW:	Tom Gregory, QSL via AL7EL. Samuel Harrell, Box 368, Stockbridge, GA 30281, U.S.A.

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Argus Specialist Publications, Argus Books and Argus Specialist Exhibitions are moving from their existing offices to a new headquarters building at Easter.

FROM TUESDAY MARCH 28th THE NEW ADDRESS WILL BE:

ARGUS HOUSE BOUNDARY WAY HEMEL HEMPSTEAD HP2 7ST

> THE NEW TELEPHONE NUMBERS. FROM THE SAME DATE, WILL BE:

Central Switchboard Hemel (0442) 66551

Classified Tele-sales Hemel (0442) 66650

Fax

Hemel (0442) 66998

Telex:

827797

RADIO - TOMORPOW

On these club contacts and forward diary pages, dates are shown approximately from the week of publication to the end of the cover month, and further into the year where dates have been supplied. If we get a yearly schedule, we will incorporate half-yearly slabs, to save space and admin and allow for alterations. We need dates at least three calendar months in advance to get them into the nearest issue. For example: the last possible issue for dates from mid-August to mid-September is the September issue. The September issue normally appears on the first Friday in August, and we need club dates by the second Friday in June. Club dates received well in advance will normally be run in more than one issue. Also, please write and let us know if your club has ceased, or changed its name or contact.

SCOTLAND

Aberdeen ARS. Contact: Don Tel. 04676 251.

Ayr ARG. Contact: GM3THI Tel. Ayr 42313.

Dunfermline RS. Contact: GM0DYD Tel. 0383 413440.

Galashiels DARS. Contact: GM3DAR Tel. 0896 56027.

Inverness ARC. Contact: Brian Tel. 0463 242463.

Lothian RS. Contact: P. J. Dick GM4DTH, 21 West Maitland St, Edinburgh EH12 5EA, Prestel mailbox (NOT phone)

Edinburgh EH12 5EA, Prestel mailbox (NOT phone)
314471210. Meetings: 2 and 4 Thursday 7.30pm at the
Orwell Lodge Hotel, Polworth Terrace, Edinburgh. Apr 12
Faultfinding including the Orwell DF Rx; Apr 26 Outside visit;
May 10 Construction competition and DF tuneup; May 24 DF
hunt; Jun 14 AGM; Jun 28 Barbecue.

Louth DARC. Contact: G1IZB Tel. 047286 595.

Mid Lanark ARS. Contact: David Williams GM1SSA, Tel.
Holytown 732403. Open Day 1989 Sunday June 11,
Community Education Centre, Newarthill, by Motherwell
A723, 1½ miles south of Newhouse interchange M8/A73.
Traders, bring and buy, packet radio demos, RTTY, QRP,
lectures, EHI annual trophy award. Talk in on S22.
Refreshments. Book Morse tests with RSGB Potters Bar in
good time.

Waterside SWC. Contact: Bernie Lyford Tel. 0703 893937. Westmoorland ARS. Contact: G. Chapman Tel. 0539 28491.

NORTH EAST ENGLAND

Barnsley ARC. Contact: Ernie G4LUE, 8 Hild Av, Cudsworth. Bourne DARS. Contact: Vince Cawthorn G4ODG, Lincs PE10 9QJ. Tel. 0778 422795.

Denby Dale DARC. Contact: G3SDY Tel. 0484 602905.

Derby DARC. Contact: Kevin Jones G4FPY Tel. 0332 669157.

Meetings: 119 Green Lane, Derby. 7.30pm. Most Wednesdays.

Doncaster ARC. Contact: K. McMahon Tel. Doncaster 852938.

Droitwich DARC. Contact: G4HFP Tel. 0299 33818.
Gt. Lumley ARES. Contact: G4MSF Tel. 091 4693955.
Halifax DARS. Contact: D. Moss Tel. 0422 202306.
Hornsea RC. Contact: Richard Tel. 0401 62498. Meetings: The Mill, Atwick Rd, Hornsea. 8pm. Apr 12 Addu Attoll by Harry SWL.

Hoyland ARC. Contact: M. Wardle, 11 Sokwell Ave, Barnsley.
Keighly ARS. Contact: K. A. Conlon G1IGH. Tel. Bradford
496222. Meetings: Wednesdays, 8pm, The Clubroom, rear of
Victoria Hall, Keighly, Yorkshire. Apr 25 Junk sale; May 2
Night on the air with G0KRS; May 16 Annual foxhunt; May 30
Programmable devices by G3YEE; Jun 27 Wildlife on the
Falklands, slides by G0FRQ.

Falklands, slides by GOFRQ.

Leeds DARS. Contact: G1EBS Tel. 0274 665355.

Liverpool DARC. Contact: W. H. G. Metcalf G6VS, 38 Kempton Rd., Wavertree, Liverpool. Meetings: Tuesdays, Conservative Club, Church Rd., Wavertree, Liverpool. Apr 11 Construction and club on air; Apr 18 Technical topics by Jim G4DKQ. Apr 25 Surplus equipment sale; May 2 Interclub quiz; May 9 Construction and club on air; May 16 G3IQO DF Foxhunt Cup event; May 30 NFO preparations.

Loughborough ARC. Contact: Philip Tel. 0509 412043.

Mansfield ARS. Contact: J. M. Coates G4GYU Tel. 0623 27257. Meetings: Fridays. Apr 14 Guest speaker; Apr 28 Inter-club quiz; May 12 AGM.

Morecambe Bay ARS. Contact: G4ZJL Tel. 0524 52042.

Pontefract DARS. Contact: Colin Mills G0AAO Tel. 0977 43101.

Rotherham ARC. Contact: F. Moody Tel. Rotherham 552925.

Scarborough ARS G4BP. Contact: I. G. Hunter G4UQP, Station Road, Scalby, Scarborough, N. Yorks Y013 0QA. Tel. 0723 376847. Scarborough ARS Rally 1989, 30 July at the Spa, Scarborough, on the south shore seafront. Open 11am. Talk-in on S22. Trade stands, bring and buy, refreshments and bar.

Near the town entertainments.

Sheffield ARC. Contact: Alan Pemberton. Tel. Sheffield 670866.

Sheffield Packet Group. Contact: P. Green, 8 Yews Close, Worral.

Spalding ARS. Contact: Terry G4TWR Tel. 0775 2940. 4 Jun`

Rally at Springfield Gardens, Spalding, Lincs. 10am.

Stockton DARS. Causeway Community Centre, Billingham.

Tyneside ARS. Contact: G. Lindsay G4KOT, 12 Augusta Court,
Harrian Park, Wallsend, Tyne & Wear NE28 9QZ.

Wakefield: North Wakefield RC. Contact: J. M. Hotchin, White Horse Inn, Fall Lane, East Ardsley, Wakefield.

Wigston ARC. Contact: G6HAJ Tel. Leicester 403105.
Worksop ARS. Contact: John Huggins G0DZX Tel. 0909
565856. Meetings: The Clubhouse, West St, Worksop.

NORTH WEST ENGLAND

Aire Valley RS. Contact: G6NPT Tel. 0532 44597.

Bolton ARC. Jun 4 1989 Rally, Deane Sports Complex, New York, Junction Rd., Bolton, Gtr. Manchester. 10.30 to 5pm. All the usual, plus food and bar, free parking, 16,000 sq. ft. of hall. Contact: Glenn Bates G6HFF Tel. 0204 63459.

Chester DRS. Contact: Dave Tel. 0244 336639. E. Lancs ARC. Contact: Stuart Tel. 0227 68913.

Fylde ARS. Contact: Frank G4CSA Tel. St. Annes 720867. Meetings: South Shore Lawn Tennis Club, Midgeland Road, Blackpool. 2 and 4 Thursdays. NB new venue. Apr 13 RSGB regional officer visits; Apr 27 Informal; May 11 Equipment sale; May 25 Informal and preparation for field day.

Isle of Man ARS. Contact: J. Wrigley, 20 Fairy Hill Close, Ballafesson, Port Erin, Isle of Man. Tel. 0624 834257.

Morecambe Bay ARS. Contact: D. H. Wood G4ZJL Tel. 0524 52042. Tuesdays 7.30. Trimpell Sports and Social Club, out Moss Lane, Morecambe, Lancs.

Staffs ARS. Contact: Bill G4WPT Tel. 0782 514741. Oswestry DARC. Contact: Brian Tel. 0691 831023. Preston ARS. Contact: George Tel. 0772 718175.

Stockport RS. Contact: John Verity G4ECI Tel. 061 439 3831.

Meetings: Dialstone Community Centre, Lisburne Lane off Dialstone Lane, Offerton, Stockport. 8pm. 2 and 4 Wednesdays.

Warrington ARC. Contact: Paul GOCBN Tel. 0925 814005. Wirral ARS. Contact: A. Seed G3LCI Tel. 051 644 6094.

WALES

Abergavenny and NH ARC. Contact: GW4XQH Tel. 0873 4655. Aberporth ARC. Contact: GW0DPR Tel. 023987 274.

Bridgend DARC. Contact: D. E. George GW10UP Tel, 0656 723508.

Conwy Valley ARS. Contact: R A Hinton Tel. 01 301 1864.

Delyn RC. Contact: Stephen Studdart GW7 AAV Tel. 0244
819618. Meetings: Daniel Owen Centre, Mold, Clwyd. Every other Tuesday. Mar 14 AGM Mar 28 RSGB film or video.

Newport ARS. Contact: GW6ZUQ Tel. 02912 6867.

North Wales: Dragon Amateur Radio Club/Clwb Radio Amtatur Y DDraig GW4TTA. Contact: Tony Rees Tel. 0248 600963. Meetings: At the Four Crosses, Pentraeth Rd., Menai Bridge. 7.30pm. 1 and 3 Mondays. May 1 Bank Holiday informal get together; May 15 Demonstration on metostat by Peter Higgs GW4IGF "Let us find out what the summer weather will be." Jun 5 Aerials for DX by Bert Hewit GW3YNM; Jun 19 Security in the home and shack by John Parry GW3VVC.

THE MIDLANDS

Birmingham: Midland ARS. Contact: Paul O'Connor G1ZCY Tel. 021 443 5157. Meetings: Thursdays 7.30 at Unit 16, 60 Regent Place, Jewellery Quarter, Birmingham. Apr 11 BBC computer club; Apr 24 BBC computer club; Apr 25 Raynet; Drayton Mobile Rally at Drayton Manor Park and Zoo, 14 May 10am. Parking, talk-in. Disabled parking not open till 11am. May 23 Raynet; May 29 BBC computer club. 19 Nov Mars Mini Rally at Stockland Green, Birmingham. Details to come. Morse tuition 7pm Mar 8, 15, 22, 29; Apr 5, 12, 19, 26; May 3, 10, 17, 24, 31.

Coventry ARS. Contact: Johnathan Ward G4HHT Tel. 0203 610408. Meetings: Baden Powell House, 121 St. Nicholas St., Radford, Coventry. 8pm. Fridays.

Dudley ARC. Contact: J. Barry Clarke G4XMT Tel. 09073 5720. Kidderminster DARS. Contact: Tony Tel. 0562 751584. Midland ARS. Contact: G8BHE Tel. 021 422 9787.

Mid Warwickshire ARS. Contact: G4TIL Tel. Southam 4765. Stourbridge, West Midlands DY9 0YH.

Rugby ATS. Contact: Kevin Marriott G8TWH, 77 Lloyd Crescent, Stoke Hill, Coventry CV2 5NY. Meetings: Cricket Pavilion, BTI Radio Station, B entrance, A5 Trunk Rd., Hillmorton, Rugby. Tuesdays 7.30. Apr 18 AGM; May 2 Annual Construction Competition judging; May 16 DXpedtion to Lundy by Lionel Parker G5LP; May 23 DF hunt under new rules; Jun 27 Top band DFing by Geoff Foster (provis).

Stratford on Avon DRC. Contact: David G0HWZ. Tel. 0789 750584. Meetings: 2 and 4 Mondays, 7.30pm, The Baptist Church, Payton St., Stratford on Avon. Apr 10 Visit RAF Broughton; Apr 17 80m QRP club project by Mike G300Q; May 8 The heyday of Wireless; May 22 Technical topics; Jun 12 Foxhunt on 2m; Jun 26 Worked all Britain by Dr. Robert Nash G4NEE; Jul 10 Amateur satellites; Jul 24 Constructors competition.

Stourbridge DARS. Contact: C. Brunn G1WAI Tel. 0?562 885602. Meetings: Robin Woods Centre, Beauty Bank, Stourbridge, Worcs. 1 and 3 Mondays.

Telford DARS. Contact: Tom Crosbie Tel. 0952 597506.
Welland Valley ARS. Contact: J. Day Tel. 0858 32109.
West Bromwich Central RC. Contact: Bill Oakes G1YQY Tel. 021 556 3183.

Wolverhampton ARS. Contact: Keith Tel. 0902 24870.
Worcester DARC. Contact: D. Batchelor Tel. 0905 64173.
Wythall RC G4WAC, G1WAC. Contact: Chris Pettitt G0EYD. Tel. 021 430 7267.

SOUTH WEST ENGLAND

Bath DARC. Contact: G4UMN Tel. Frome 63939.

Bristol: North Bristol ARC. Contact: Alan Booth Tel. 0272
690404

Bristol: South Bristol ARC. Contact: Len Baker G4RZY Tel. 0272 834282. Meetings: Whitchurch Folk House, East Bundry Rd., Whitchurch, Bristol BS14 0LN. Most Wednesdays. Apr 12 Activity evening; Apr 19 Practice morse tests under exam conditions; Apr 26 Activity evening; May 3 Video Travels in South Africa; May 10 HF Activity evening; May 17 Construction evening; May 24 Club station..

Cornwall: N. Cornwall RS. Contact: J. West Tel. 0288 4916.

Evesham: Vale of Evesham DARS. Contact: John G3DEF Tel.

Evesham 6407. Meetings: 1 Thursdays at 7.30pm at the MEB Club, Worcester Road, Evesham. (B4084 on left entering town). May 4 Visit by Howes Communications.

Exeter ARS. Contact: Roger Tipper Tel. 0392 68065.

Plymouth ARC. Contact: G4SCA Tel. 0752 337980 Plymouth RC

Mobile Rally, Plymstock School, Church Road, Plymstock,
Plymouth. May 28 from 10am. Large free car park,
refreshment, raffles, usual trade stands, demonstrations and

refreshment, raffles, usual trade stands, demonstrations a talk-in on S22. Full details from Joe G1RXR Tel. 0752 509855.

Poole ARS. Contact: G0EQV Tel. 202 674802. Salisbury RES. Contact: Neil Tel. 0980 22809.

Thornbury DARC. Contact: Tom Cromack G0FGI, Rose Cottage, The Naite, Oldbury on Severn, Bristol. 1 and 3 Wednesdays, 7.30 United Reform Church, Chapel St., Thornbury, Evesham. Apr 19 Project evening; May 3 Raynet; May 17 HF activity.

Torbay ARS G3NJA, G8NJA. Contact: Bob McCreadie G0FGX Tel. 03646 233. Meetings: the ECC Club, Ringslade Rd., Nr. Highweek. Natter nights most Fridays. 7.30pm.

Trowbridge DARC. Contact: Ian Carter GOGRA. Tel. 0380 830383. Meetings: Usually 4 Wednesdays, 8pm, TA HQ, Bythesea Road, Trowbridge. Apr 26 Residual current devices by GOHFX; Jun 21 6.30am 2 metre fox hunt; Jul 19 6.30am Picnic.

Yeovil ARC. Contact: David Bailey G1MNM, QTHR. Meetings: The Recreation Centre, Chilton Grove, Yeovil. 7.30pm, every Thursday. Apr 13 Multimeters by G3GC; Apr 20 AGM; May 4 Briefing for GRP Convention; May 7 QRP Convention, Preston School, Yeovil at 9am. Two lectures, plenty of traders and refreshments. Contact: J. W. Howard G1MNM, 7 Thatcham Close, Yeovil, Somerset.

SOUTH EAST ENGLAND

Basingstoke ARC. Contact: D. Deane G3ZOI Tel. 0734 332777 (hm) 0734 787930 (wk). Meetings: The Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. 7.30pm. 1 Mondays. Club net Sunday evenings on 144MHz.

Bedford DARC. Contact: Ray G0EYM Tel. 0234 244506. Special Event Stations GB2WW and GB4B0B commemorating World War 2 during 1989. Locations include RAF and USAF bases in the Bedford area.

Biggin Hill ARC. Contact: Geoff Milne G3UMI, 142 Hayes Lane, Hayes

Braintree DARS. Contact: N. Willicombe Tel. 0376 45058.

Meetings: Braintree Community Association Centre, Victoria St. 7.30pm. 1 and 3 Mondays. Club net C6BRH or G4JXG, 2m 2 and 4 Mondays, 8pm.

Bredhurst RTS GOBRC, G7BRC. Contact: Kevin Fay Tel. 0634 376991.

Brighton DARS. Contact: Peter Tel. 0273 607737. Meetings: 1 and 3 Wednesdays, Roast Beef Bar, Brighton Racecourse, Elm Grove, 8pm.

Bromley, Kent: Tel. 01 462 2689. Meetings: The Victory Social Club, Kechill Gardens, Hayes, Kent. 7.30pm. 3rd Tuesdays. Club net 145.350MHz FM 11am Sundays.

Burnham Beeches RC. Contact: G6EIL Tel. 0628 25720.
Cambridge DARC. Contact: D. Wilcox Tel. 0954 50597.
Chesham DARS. Contact: L. Cabban Tel. 09278 3911. Meetings:
The Stable Loft, Bury Farm, Pednor Rd., Chesham. 8pm.

Cheshunt DARC. Contact: Roger Frisby G4OAA Tel. 0992 464795. Meetings: Thursdays 8pm Church Room, Church Lane, Wormley, Herts.

Chichester DARC. Contact: C. Bryan G4ZTD, Tel. Chichester 789587. Meetings: St. Pancras Hall, St. Pancras, Chichester. 7.30. Club net G8WSX on S11 Mondays 7.15pm. 1st and 3rd Tuesdays. Jul 16 Sussex Amateur Radio and Computer Fair, Brighton Racecourse.

Cornwall RAC. Contact: Mike G4WQL, PO Box 100, Truro, Cornwall. Apr 22 International Maraconi Day on the air.

Coulsdon ATS. Contact: Alan Tel. 01 684 0610. Crawley ARC. Contact; Jack Tel. 0294 28612.

Dover: South East Kent YMCA ARC. Contact: Des Edwards Tel 0304 203073. Meetings: Dover YMCA, Godwynehurst, Leyburne Rd. Dover Kent CTI6 15N Wednesdays Act 12

0304 203073. Meetings: Dover YMCA, Godwynehurst, Leyburne Rd., Dover, Kent CT16 1SN. Wednesdays. Apr 12 AGM; Jun 24-25 Waldershare Vintage Weekend special event station GB2 WYV; Jul 19 Morse tests; Nov 15 Morse tests.

Dunstable Downs RC. Contact: Tony Kelsey-Stead Tel. 0582 508259. Meetings: Room 3, Chews House, 77 High St. South, Dunstable, Beds. Fridays. Apr 29 Wolfsburg Amateurs visit; May 1 DF/Treasure hunt; May 6.7 Germans leave; Jun 18 DF/Treasure hunt; Aug 20 DF/Treasure hunt. Sep 10 6th National Amateur Radio Car Boot Sale at The Shuttleworth Collection, Old Warden Aerodrome, Nr. Biggleswade, Beds. 10am. Fly in is available — permission from Northill 288.

Eastbourne EARC. Contact: G1BRC Tel. 0323 29913.

East Kent ARS. Contact: Stuart Tel. 0227 68913. 13th Annual East Suffolk Wireless Revival 1989. Contact: Jack Tootill G4IFF Tel. 0473 464047. Stand space from Colin Ranson G8LBS Tel. 0473 688204. Sunday 28 May at the Civil Service Sportsground, Straight Rd., Bucklesham, Ipswich, Suffolk. Traders, bring and buy, RSGB book stall, car boot sale, aerial testing range, transceiver clinic, packet radio demo, cw pile-up, vintage radio display, other stalls, play area, model flying display, refreshments. £1 including car parking. Talk-in on S22, BG3PO and GB3IH.

Edgeware DRS. Contact: Ian Cope G4IUZ, Tel. Hatfield 65707. Meetings: Watling Community Centre, 145 Orange Hill Rd., Burnt Oak, Edgware. 2 and 4 Thursdays.

Felixstowe DARS. Contact: G4YQC Tel. 0473 642595.

Grafton RS. Contact: Rod Harrigan GOJUZ Tel. 01 368 8154.

Meetings: Holy Trinity Church Hall, Stapleton Hall Rd., London N4. 2 and 4 Fridays.

Great Peterborough ARC. Contact: Stan Tel. 0733 69822.
Hastings ERC. Contact: Dave Shirley Tel. 0424 420608.
Haverhill DARS. Contact: Rob Proctor Tel. 0787 281359.
Horsham ARC. Contact: P. Godbold Tel. Steyning 814516.
Meetings: Guide Hall, Denne Rd., Horsham, Sussex. 8pm.
First Thursdays.

Itchen Valley RC. Contact: G1IPQ Tel. Southampton 736784.

Loughton DARS: Contact: J D Ray G8DZH Tel. 01 508 3434 (ev); 015083434 Micronet 800 mailbox, TeleGold 74:MIK1824; packet G8ZDH at GB7ESX. Meetings: Loughton Hall, Rectory Lane, Room 20, 7.45pm. Fridays. April 21 RSGB film night; May 5 Radio navigation by Tony Mathew; May 19 Planning night for Aylmers Farm; May 26-28 Aylmers Farm weekend GB2LRS; June 2 Birth of the multi-band receiver by Jack Atkinson G3OPA.

Maidstone YMCA ARS. Contact: G0BUW Tel. 0622 30544.

Meetings: YMCA Sports Centre, Melrose Close, Maidstone, Kent. Fridays 8pm. Apr 21 Rally meeting; May 5 HF NFD planning meeting; May 19 Rally planning meeting. May 28 Radio Rally A229 Loose Village (indoors) ATV demo, beer tent, children's playroom, GB2YSC on air. 0622 50709 details, 0622 890167 trade bookings.

Mid Sussex ARS. Contact: GOGMC Tel. 07918 2937.

Milton Keynes DARS. Contact: Mike GOERE Tel. 0234 750629.

Norfolk ARC. Contact: Craig Joly GOBGD 0303 485784 QTHR.

Meetings: The Norfolk Dumpling, the Livestock Market, Hall Road, Harford, Norwich. 7.30. Apr 26 Home construction contest.

Reading DARC. Contact: M G Anthony G4THN, 9 Paice Green, Wokingham. Berks RG11 1YN.

Peterborough RES. Contact: Peter G4PNW QTHR.

Petersfield — Royal Naval ARS. 29th Annual Mobile Rally, June 11 HMS Mercury, Petersfield, Hants. Trade stands etc., amusements for children, non-radio stalls including toys, jewellery, plants, garden gnomes (eek), DIY archery, handicrafts, vintage engines, radio controlled models, marching bands, etc. Flypast by Faery Swordfish. Parking, refreshments, talk-in on 2m and 70cm. Adults £1, children free, 10am-5pm. Contact: Cliff Harper G4UJR QTHR. Tel. 0703 557469.

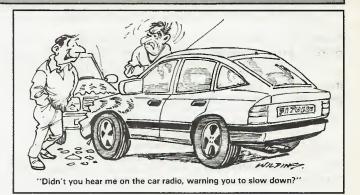
Reading ARC. Contact: Mike G4THN Tel. 7434 774042. 2 and 4 Thursdays, Caversham Conservative Club, Caversham, Reading, Berks.

St. Albans: Verulam ARC. Contact: Hilary G4JKS. Tel. St. Albans 59318. Meetings: RAF Association HQ, New Kent Rd., off Marlborough Rd., St. Albans. 7.30pm. 2 and 4 Tuesdays. Apr 25 Visit from Howes Electronics.

Sevenoaks DARS. Contact: Barry Leggett Tel. 0732 741222 ext. 245 office hours. Meetings: Emergency Control Centre, Sevenoaks District Council Offices, Sevenoaks, Kent. 8pm 3 Mondays.

Shefford DARS. Contact Tim Stellar G6RCT Tei. 0707 372211.
Meetings: Church Hall, Ampthill Rd., Shefford, Beds. 8pm.

Southend DRS. Contact: S. Blinkhorn G1XGP, 102 Lord Roberts Ave., Leigh-on-Sea, Essex SS9 1NE. May 7 Southend DARS rally and boot sale, Roachway Youth Centre, Roachway,



Rochford, Essex. 10am. Contact: Ted G4TUO Tel. 0702 202129.

Southgate ARC: Contact: Brian Shelton Tel. 01 360 2453. Meetings: Holy Trinity Church Hall, Winchmore Hill, London N21. 7.45pm. 2nd and 4th Thursdays. Apr 13 Grand Surplus Sale; Apr 27 Introducing Youth into Amateur Radio.

South Kent (YMCA) ARC. Contact: Des Edwards Tel. 0304 203073. Meetings: Dover YMCA, Godwynehurst, Leyburne Rd., Dover. Tuesdays. Apr 12 AGM; June 24-25 Waldershare Vintage Weekend special event station GB2WVW; Jul 19 Morse tests; Nov 15 Morse tests.

Stevenage DARS. Contact: G6EDA Tel. 0438 724991.

Welwyn Hatfield ARC. Contact: Roger Curtis G0CYC Tel. 0707 324958. Meetings: Lemsford Village Hall, Brocket Rd., Welwyn Garden City, 1 Mondays, 8pm. 9th WGC Scout HQ, Knightsfield, WGC 3 Mondays. Regular nets. Apr 17 On-air chance to contact G3BYG and G4WM; May 1 The black art of heatsinking by Martyn G7AJV; May 15 HF field day preparation; JUN 3.4 HF field day, Hill Farm, Ayot St. Lawrence; Jun 5 Summer Social Barbeque and model aircraft display.

West Kent ARS. Contact: B. Guinnessy Tel. 0892 32877. West Sussex ARS. Contact: M. Mundy, 142 Junction Road, Burgess Hill.

Wimbledon DARS. Contact: Nick Lawlor G6AJY Tel. 01 330 2703. Meetings: 2 and 4 Fridays. St. Andrews Church Hall, Herbert Rd., Wimbledon, London SW19. 7.30pm. Apr 14 Surplus equipment sale; Apr 28 Desert Island radio competition; May 26 Quiz with Coulsden Soc; Jun 9 Cellular Radio by Ian Lamb G8KKQW; Jun 30 HF antennas and feeder systems by Louis Varney G5RV.

IRELAND

Armagh and Dungannon DARC. €ontact: J. Murphy Tel. 0861 522153.

Donegal ARC. Contact: EI3BOB Tel. 074 57155.

Mid Ulster ARC. Contact: Jim Lappin Tel. 0762 851179.

Meetings: 2 Sundays (not July and Aug) 3pm Guide Hall,
Gilford, Co. Down. May 21 Parkanaur Radio Rally, Silverwood
Hotel, Lurgan, Co. Armagh from 12 noon. Trade stands, bring
and buy, books, QSL bureau etc. Talk-in S22. £1. Proceeds to
Stanley Eakins Memorial Fund.

NATIONAL AND INTERNATIONAL

AMRAC. Contact: Phil G6DLJ Tel. 0703 847754.

British Amateur Television Club. Apr 30 convention/rally,
Founders Suite, Coventry Crest Hotel A46 near M6 junction
2. Traders, demonstrations, lectures. 10am, Members free,
non-members 50p. Contact: G8CJS or G8OZP QTHR.

British Amateur Radio Teledata Group. Contact: Pat Beedie GW6MOJ Tel. 0558 822286. Ffynnonas, Salem, Llandeilo, Dyfed SA19 7NP. SAE for more information. GB2ATG amateur radio news service transmits on 1 and 3 Sundays, on 3.590MHz, 14.090MHz and 144,600MHz. Operated by volunteers, BG2ATG welcomes amateur radio news for possible transmission, especially concerning radio data actaivity (RTTY, Amtor, packet, fax, etc.).

International Short Wave League. Contact: Y. Blain, 167
Wombridge Road, Trench, Salford, Shropshire TF2 6QA.
Journal: Monitor.

UK FM Group, Northern. Contact: L. Laughton, Clairemont, Main St., East Ardsley.

HRT PCB SERVICE

Ham Radio Today can supply ready-made, pre-drilled printed circuit boards for some of our published constructional projects. The first board to become available is the Morse Keyer, published in the January 1989 issue of HRT. The board reference number contains the essential information for identifying and ordering a board from our PCB Service. The first two digits give the year of publication, and second two the month. The extension number gives the number of projects available from that month's issue.

Please send orders to: HRT PCB Service, ASP Readers Services, 9 Hall Road, Hemel Hempstead, Herts HP2 7BH. Please make cheques out to ASP Ltd. Payment can also be made through Access and Visa cards by telephone on (0422) 41221 during office hours.

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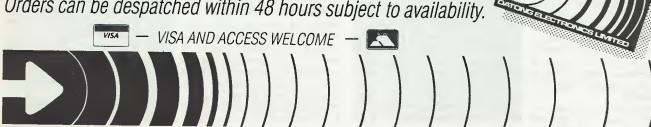
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Free Readers Ads

FOR SALE

BEDRIDDEN Amateur with little money seeks radio equipment, doesn't matter what it looks like, just hoping it works; anything radio related; 2m, 4m, 6m, 70cms, HF. GI4LXL, 63 Glenariff Crescent, Ballymena BT43 6ET. Tel. 0266 45527, thank you.

I HAVE in my possession possibly the only two Racal RA17L receivers in the country; these sets are identical to the RA117L receivers with signal strength meters; also these sets come fitted with the very rare Astro Communications seven digit LED digital readout units fitted in Racal steel cabinets; concours condition; £500 each. (0306) 712878.

TS120S with PAU 20 amp VFO; 250c/s C.W. filter; would separate C/W300i. Abersoch 2675.

FOR SALE, Racal model 1771; fully synthesised, freq. range 15kHz-30MHz; £350. Wanted: Racal 1992. — Phone 01-235 5422, ext 251.

GOOD Eddystone 640 HF receiver £45; laboratory type variable PSU, 0-5v, 2 amp stabilised, £45; FT200 transceiver, mint, boxed, £225; have KT66's GZ34's (new), EF86's etc, swap for EF54's and EF39's; vintage Zetavox radio, offers? Phone Del 01-657 0716 (GODLN) QTHR.

FOR SALE, Yaesu FT-707, boxed with YM-37 microphone, £340, will try and deliver. Tel. 021 558 3522, Birmingham.

TONNA 23cm 4×23 antennas, type 20696 with power splitter, stacking frame and phasing harness, cost £160, vgc £70. Also Jaybeam 12×Y 70cm Yagi with circular polarization phasing harness, vgc £14. Phone 0705-255459, any time.

REALISTIC DX-302 0-39MHz, digital readout, mint condition, £120. Yaesu FT77, 100 watts, vgc, £400. Tono 550 CW/RTTY reader, vgc, £150. Buyer to collect or pay postage. Tel. Cambridge 0223 243581, anytime.

FOR SALE, Fax-1 weather fax system, with power unit, CP80 peripheral printer, paper, etc, all very good condition, £250. Brother HR5 thermal transfer printer, new, never used, with interface for Spectrum computer, £75. Ring Richard 0244 816435, Clywd.

SAISHO SW5000, virtually unused, only three months old, 3 year guarantee, £60 including postage, for quick sale. Canterbury (0227) 67831.

TRIO 930S Tx/Rx, mint condition, no mods, boxed and manual,

£1000 ono. Capco SPC-300 ATU, £130 ono. Epson FX-80 printer, excel cond, all leads to fit BBC-B £130 ono. Mon/Fri after 6.30pm: 01-761 5470, all Sat/Sun 0760 338416. Fred G4RJS.

FOR SALE, Yaesu FT102 C/W AM/FM board rptr, t/burst, YM40 f/mike, FV707DM digital VFO scan 12 memories, FTV107R C/W 2m module, SP102 spkr, all manuals, £895. Nentone PSU 12a VHF supp £60. Tel. Brian G1UWV, New Milton, Hants. 0425 615860.

BC 221-AH, mains PSU built in, £15; Ericson professional morse key £5. Phone Stratford-upon-Avon 731516.

PARAGON Ten-Tec transceiver, matching power supply speaker; all optional filters fitted; used only on receive, mint, £1,500. Pocom AFR-2010 decoder, fitted with four software modules, cost £1,200, selling for £700. Ring (0772) 704009, after 6pm or Sundays AM.

HALUCRAFTER Receiver for sale, five band, S120, MW + 1.6MHz to 30MHz, converted to 240V AC with PSU, £40. MW & SW's DX'rs receiver, 240V AC, bandspread 5ch £30. G8BSK, 290 Priory Road, St Denys, Southampton SO2 1LS. Buyer collects.

FOR SALE, UBC 175XL desk top scanner, BV131 Zetagi linear amp, CTE International pre-amp, lots of other goodies for sale. Offers welcome. Phone Chris on 05205 251, weekends only.

CBM+4 with disk drive, data cassette manuals, £85. Rule 12 volt Winch as new £250. FT780R 70cms Multimode £275. Yaesu MD1 base mic £48. Wanted 70cms and 6mtr modules for FT726R; px any above or phone price. G6WWW QTHR 01-302 6985.

FT480R all mode 2 metre Tx/Rx, mint condition, boxed with manual, £300 ono, 0273 566455, Brighton QTHR.

TRIO 2000 with VC10 VHF converter box and manual, £425. Phone 01-556 5131 (London).

PLESSEY PR155G communications receiver 0.6-30MHz with ISB adaptor £300. Bob, Tel. Dartford (0322) 330991 or work 01-839 1994.

FOR SALE, Yaesu FT747GX with FM board and general coverage transceive. Worked all over world with simple antennas, as new and boxed, £600 ovno. Contact Mike GOEIG on Leyland 424878, after 6pm, buyer collects and cash only. Genuine reason for sale.

COMPLETE 2 metre all mode station, FT480R, immaculate con-

dition, never used mobile £285. MML 144/100S 100W linear amp £110. 20A 13.8V DC PSU, twin meters, volts & amps £50. All three together £435. TR 2300 FM, 2 metre portable with nicads & charger, £110. All carriage at cost. Terry G40XD, 0462-35248, after 6pm.

ICOM 1200E 23cms 10W mobile/base rig, latest model, perfect; few months old, £440. Black Star 600MHz frequency counter £100. Kenwood SW200 (2 metre) SWR/PWR meter/SWC2 (70cms) head £100. Jaybeam parabeam 70cms antenna (new) £23. Tel. Paul G4XHF (0293) 515201.

YAESU FRG7700 HF receiver, 0 to 30MHz, all mode plus FRV 7700 convertor, 120 to 170MHz, both as new; bargain £350. Tel. (0698) 745750.

EXCHANGE realistic DX 440 digital HE receiver, AM & SSB, 150kHz to 30MHz continuous & 88MHz to 108MHz scanner, must cover 2m-70cms ham bands. Phone Ken, Tyneside (091) 5487041 or write to 1 Malvern Gardens, Roker, Sunderland, Tyne & Wear SR6 9LB. MMT 28/144 transceiver, 2 metres out, with 7dB input attenuator, ideal for FT290, new, unused in box, £75. Phone 0926 498388. SPECTRUM Analyser, FTS Mk1 cable portable, 9×9×14, 12 volts dryfit chargeable, 5 band widths, 1-2-5-10-18MHz, 3" sq screen with heavy/D. leather cae, working 100%, cost £2-3000, made by Sonic Instruments Inc, USA/UK. First buyer £150 + postage. Ring, 9 to 5, Peter 0473, 85203.

DATONG D70 morse tutor. Ring Adrian, office Southport 0704 46011; home Preston 0772 813458.

FOR SALE, FRG-7 general coverage receiver, mint cond, £125; FDR 700-E 2m FM mobile with mount, 1-25 watts, £115; RN Electronics BM transverter, 25 watt O/P with 4 ele beam and filter, £160. Contact Mark, G1P1Z, O362 695772 night, 0953 607472 day. TRS-80 extended colour computer joy sticks, data recorder, still boxed, few games, swop for 934 Tx/Rx, no Reftec-Comtel or Delta, in working order. Please ring after 5.30pm, 021-743 7519.

RECENTLY purchase Robot 1200 and high res RGB monitor, also Wrasse compatibility Eprom, 3 extra 72 sec memories, G3NOX programs + interface for BBC B Micro, £1300 the lot or £1100 without monitor. 0206-851343. FT726R 70cms module, boxed, £195; will swap for 6m module or

HF module; will consider FT290 or FT690 + cash adjustment. Tel. 0772 433610, evening time.

SONY ICF2001D portable communications receiver with AN-1 active antenna, excellent condition, £245 ovno. Tel. 021 778 1719, evenings.

WIRE Antennas made to order, all types G5RV, Delta Loops, Dipoles, Three Half Waves in phase, T2FD, Traps, etc, etc. For details write to lain Fisher, 21 Rathdown Park, Greystones, Co. Wicklow, Ireland, or phone 0001 874904.

CAN ANYONE help, unemployed family man requires cheap scanner or shortwave Rx to while away the hours when new baby is keeping us awake, must be reasonable price or I might have something to swap. Dave 01-242 5409, evenings.

YAESU FRG7 communications receiver, immaculate, boxed, with manual, £130, no offers. Home brew ATU £10 or £135 both. Would exchange for hand held 2 mtr or 70cm. Also Icom IC240 2 mtr mobile £110. Sell or swap, W.H.Y. Phone Ian 0229 52867.

TRIO TS780 dual band 2m 70cms base multimode, immaculate condition, just serviced, £675. R&N transverter, 6m from 2m, immaculate £135. R&N 7dB attenuaror for above £15. 50 watt 2m MM linear amp, inc pre amp £75. Telephone 050 786 736.

HAMGEAR Super ATU with pre selector £25; Atlas 210 100 watt HF tansceiver, exchange 2m rig. Geoff 0484 645923.

TRIO TR7800 2m 25w mobile nicads, slide bracket mag gutter mounts, % % whip mic, etc £190 ono. Nacom computer floppies CPM monitor offers terminal RS232 £30. Wharfedale Denton 2xP, good condition £30; hard disc £20. Steve, Derby 0332 763307.

YAESU 726 satellite module (Sat/726) £40, Cue Dee 17432 17cms antenna (new unused) £38. Jaybeam Dis/15 23cms Yabi (new) £32; Icom 1200E (latest model) 23cms Xcvr, as new, £410; Yaesu SP102 extension speaker, mint, £55. Phone Paul G4XHF (0293) 515201.

EXCHANGE immaculate Commodore C64 computer, disk drive, tape recorder, star NL10 dot matrix printer, 1200/75 Bd modem, mouse, many accessories, books and software, for Trio TS130S transceiver, in good working condition. Contact Eddie Aldridge, 0533-537534, or evenings 0533-393628.

FOR SALE Grundig Satellit 650 receiver, only ten months old,

service manual, spares, despatch by Securicor, £300. Tel. (0472) 358896, anytime.

TRIO TS530SP 10m-160m Tcvr, mint condition, £625 ono. Buyercollects. Telephone 0287 38103 after 6pm Mon-Fri, anytime weekends.

TRIO 830S, as new, with CW Rx Xtal filter fitted £700; 230 digital VFO/memories, £120; Daiwa auto ATU, -100; microwave modules MMS1 "morse talker" £80; microwave modules 2m-10m converter, £20; Hi-mound HK-702 morse key £30. Phone Aldershot (0252) 27863.

VIDEO with 20 tapes, working but needs attention, cash and carry £50. G2PU, 39 London Road, Harston, Cambridge CGB2 5QQ. Tel. 0223 870454.

EXCHANGE Crotech 3132 oscilloscope, 20Mhz, dual trace, component tester, 8 × 10cm screen, as new condition, for HF transceiver (FT77, TS130S). Phone Keith 0543-360372 (West Midlands). SEM EUROPA-C VHF transverter matching Europa power supply, type CPS 10; also Butternut HF6V, the one that's taking the UK by storm. Open to offers, or W.H.Y. Tel. 0266 45527.

FOR SALE, Sanyo RP8900 8-band receiver 5.95 to 21.75MHz; also FM MW, excellent condition, £35. Tel. Doncaster (0302) 841160.

SONY 7600D nicads charger £100; Sony Air7 nicads charger £120; Yaesu FT203R two meter transceiver; 2 sets nicads charger; ext mic bracket etc; vgc £125; Yaesu FT290R Mutek case ¼ + duck; two sets vgc nicads charger headset £275. All items vgc. 0332 768048

MAGAZINES, back issues for sale. HRT, REW, AR, Radcom, PW, etc. LSA lists, Eddystone EC10/10A service manual copy £5. Giant book CB circuits, £5. Mr. Small, 8 Cherry Tree Road, Chinnor, Oxon OX9 4QY.

FT726R 2m, 70cms, HF and satellite modules, offers. Icom R70 comms Rcvr with FM, offers. Kenwood TS680S HF and 50MHz Tcvr £750. Money needed to start business. 0302 875330, Mike, G1XGM, 21 Marton Road, Toll Bar, Bentley, Doncaster, Yorkshire DN5 ORF.

COMPLETE HF base station. Yaesu FT101E CW/SSB/AM, excellent con dition with L.P.F., microphone and key, £210; Butternut six band vertical, virtually new, £125; complete station £320, includes coaxial, plugs, etc. Genuine reason for sale. Ring G3HNP, Winterton on Sea 560 (Norfolk).

YAESU FT480 and FT780, 2 metre and 70 cem's 10 watt multi modes, plus matching console/PSU/clock and base, scanning mic. G1BIC. Tel. 0724 782970.

SWANN 700CX £350; HF5 vertical + radial kit £35; Oscar 2m ×

70cm £20; No. 19 set, all accessories, working; offers. G4JWY. Tel. Eyke 460321 (Suffolk).

FT290R Mk1 with Mutek front end, nicads, charger and soft case, £250. Tel. 0959 74275, after 6pm.

TWO-METRE Hand-held Trio 2500, mint condition, extras include battery pack, leatherette case and complete service manual, £140. Telephone 02407 3696 (Bucks).

YAESU FT101ZD MkIII, W.A.R.C. C.W. filter, F.M., mint condition, original packing, new 6146 B's fitted, full service manuals, £500; FV101DM remote digital, V.F.O. £200; Drake R4B T4XB AC4 MS4, recent complete service, new valves. G4LW QTHR, Trowbridge 0225 753166, any time.

SCANNER for sale, AOR2002, covers 25-1300MHz, many features including: 20 memories, predefined search, 10 segment LED 'S' metre (two colour), manual tuning knob, AM / NFM / WFM modes, socket for RS232 interface, very sensitive; boxed; only 8 months old; £370. Call 0273 (Brighton) 503958.

11 METRE Crystals for sale, suitable for Yaesu FT101E, 3 crystals in all, £10. Leighton Smart, 33 Nant Gwyn, Trelewis CF46 6DB, Mid Glam, Wales. Sorry, no phone. FOR SALE, (going HF), FT-290R Mk1 listen on input, switchable 5MHz coverage, good condition with charger, flexiant, soft case, 25W amp, 8 element Yagi, rotator, £325 the lot. Telephone Gareth (G1LVN) 0532 784887 (Leeds). FT-227R 2 mtr FM, mobile mount. vgc, manual and data for scan. mods, £125; Maplin Matinee Electronic Organ, professionally built, 2×49 keyboards, 13 pedals, 30 rhythms, mint circuit manual, £325. G3XKA QTHR, Woking 73620.

TRIO TS830S HF transceiver, excellent condition, complete with ATU; AT230 and VFO, VFO 240. Reason for sale, going QRT. £800 ono. Porth 0443 683912.

FREQUENCY meter, Thandar PFM200 handheld. 20HTz to 200MHz, as new, complete with input adaptors, pickup antenna, mains unit, users manual, £40 including postage. Phone 0483-66317 (Guildford).

EXCHANGE Atari 520 St FM plus software (games, blank discs, etc). Wanted Morse Tutor, 2m multimode, HF ATU, or W.H.Y.; don't be shy, ring me and ask! G6IEF, Key, phone Fleetwood (03917) 5490 or QTHR.

R2000 TRIO G.W.O., separate ATU and Sony A.N.1 active antenna available; price £400. Contact Harry on Bath 0225 337143.

CAPCO/300 1K PEP, 28/2 Tnsvtr FT902 AC/DC leads, new; SMC10FM FM Tncvr 070 25 watts 143/149MHz; Hytech computer/ communication course, 5 volumes; National radio course 20 books; H/duty towing bracket for whip. Phone, anytime, 0473-830147, G4YUG.

SALE BOOKS, Second Thoughts on Radio Theory 1956; Radio Designers Handbook; Wireless Telegraphy Telephony 1940; Radio Mathematics 1957: Practical Wireless Service Manual FJCAMM 1940. Offers. John, Inter-Nos, Swanton Morley, Dereham, Norfolk NR20 4NU. Phone S.M. 8142. MASTS, Tripod type, 7 off, 65 feet height, three sections, base 3 feet across, top 9 inch connections for extensions, 11/2 inch steel tubes, 1/2 inch diagonal bracers, galvanised. new condition, offers each or seven accepted. 0698 372736. CAMERAS, variety of 1920-30 plate and roll including Shackman time lapse camera; exchange for radio gear, transceiver etc, cash balance either way or sell. Full list, Lucking, 62 Ember Farm Way, East Molesey, Surrey KT8 OBL. 01-398 3603.

FOR SALE, Sommerkamp SRG 8600DX (exactly same as FRG 9600!), extended coverage 60-950MHz. Also 100MHz converter to cover 60MHz-150kHz. Boxed as new, vgc, £425 ono. Phone Peter 0932 787628.

TRIO R1000 with FM board, sensitive, good condition, £235 ovno or P/ex for 144-148MHz handheld, FT690 Mk1, W.H.Y. Concorde Lo-Lo's — Hi's multimode built in SWR metre. Good working order £70 (conversion?), Midland 2001, vgc, £20; Wanted Audioline 100/200 or Uniden equivalent. Ian 01-517 8277.

80W LINEAR £40. 10M convertible multimode Tristar 747 £70. Wanted: 10A ro more PSU. Wanted: 27 and 13.99 range crystals. Mark, 0296 88064, evenings.

YAESU equipment, FRG-7 communications, no mods, £120; FRG9600 VHF/UHF multimode receivers, £395; FT790R 432MHz multimode transceiver with accessories, 1 watto ouput, £285; NEC PC8201A 64K Cmos Laptom computer £150. Phone Bob, Waterlooville 0705 250830, after 6pm.

FOR SALE, Drake TR7A Transceiver PS7 PSU MN Y ATU with Balum 1000 on rear, 1.5 to 30 meg; all in perfect, no marks, condition. Buyer to inspect and collect; including filters £1200. Ring 0282 51416. Health reason for selling. FOR SALE, Yaesu FT101E HF transceiver, complete with CW filter, inverter etc. No mods, vgc. Genuine reason for sale. G4ELW (ian), 0270 428054, after 7pm or weekends.

EXCHANGE Amstrad Software plus 5¼" external drive for 2m handheld or mobile Tx/Rx. Telephone 0780 56672, evenings or write Hollands, 9 Airedale Road,

Stamford, Lincs PE9 1DJ. FT601DE, good condition, FM fitted, CW filter fitted, £500 ono. Transverter 28IF, two meters out, £75. Consider PX, mobile equipment. W.H.Y. Martin, Telford 616166.

AMATEUR TV Txcvtr £140; FT780R 70cms multimode £325; PRO2004 scanner £300; Yaesu YO-901P scope and band scan £400; Heil fist mike £25; BT cordless phone £75; Yaesu DC-DC converter £40; CBM 64 home business micro computer £350. Martyn. Tel. 0924 495916.

COMMODORE 64 with disk drive C2N cassette Amateur interface, business games and utility software, only £350; Yaesu multimode £325; Realistic PRO2004 scanner £300; Amateur TV Rx and Tx, only £140; 18 carat gold and diamondring. Martyn. Tel. 0924 495916.
FOR SALE,Eddystone 880/2 £165; Racal RA17L with LF converter £145; Valves 812A, KT88, QV05-25, TYZ-125 offers. Wanted: back issues QST magazine. Phone Wokingham 782236.

1KW DUMMY load, DL1000, in large h/duty finned heat sink, £75. Tel 0602 609345.

MORSETUTOR, Datong model D70, £27, plus cost of postage. Roger Osborne, Tel. 056884-843 (Hereford) or write 24 Brockington Road, Bodenham, Hereford HR1 3LR.

VERSAPOD, flat roof mounting for HF/VHF, dish antennas, specially designed by Stromech. Heavy duty triangular lattice tripod, with 5' base footprint; H2R-Rotor head unit, KSO65 thrust bearing, galvanized, free standing 10'6" height, plus stub mast, £425 ono. Tel. 0602 609345 (anytime).

COLLECTION magazine back issues including HRT, AR, REW, PW etc. Singles or complete years. Send LSAE for lists. Also few Pye manuals, photocopies, W15AM, W15FM, W30AM, £6 each; Vanguard U30FM. Mr. Small, 10 Sibleys Rise, South Heath, Great Missenden, Bucks HP16 9QQ.

YAESU FT690 MkII with matching 10 watt clip on linear amp and nicads, carry case, etc, in excellent condition, £295. Phone Halifax 44435.

IC240, probably the best ever 2M mobile 10W fitted 8 repeater 14 simplex channels, mounting cradle magmount antenna, handbook, reason for sale: giving up motoring, only £120 cash. G5UM QTHR. Leicester 416473.

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