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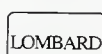
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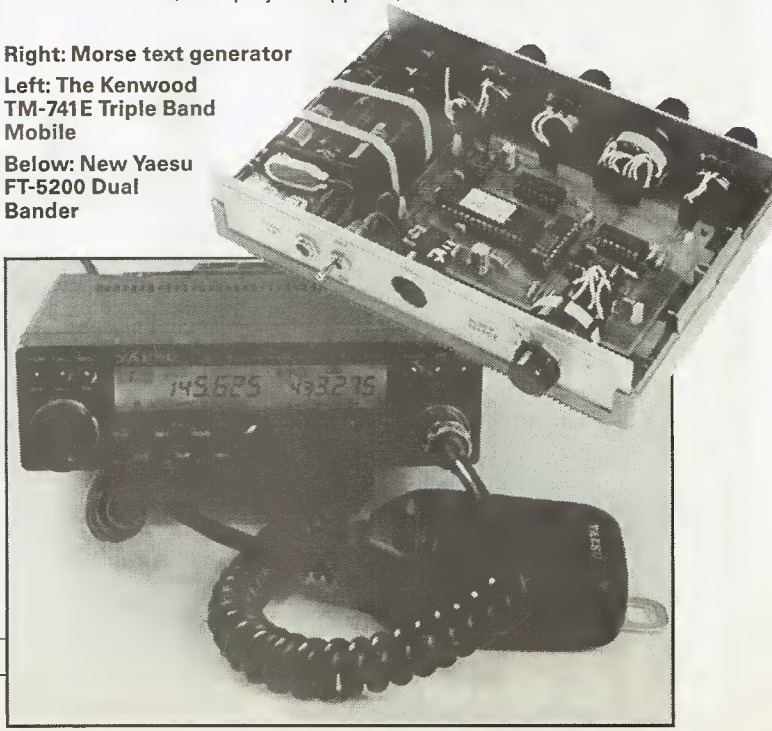
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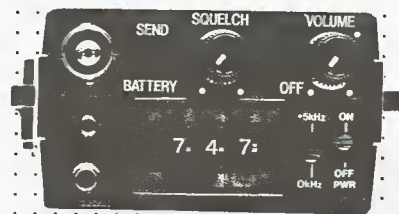
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CQ de G8IYA

New gear, old gear, and do-it-yourself gear

When buying new equipment, it is very difficult to know just which transceiver to buy out of the many hundreds on the market. As well as choosing which set has the facilities on it that you require, it also needs to have the ability to block out unwanted signals, lots of knobs and buttons don't necessarily help you when living in a highly RF populated area. There are so many sets to choose from, and little if any chance of testing them all before you buy.

So instead we at HRT do this for you. As you'll see in the magazine, even in this issue, we have the ability to get hold of the very latest equipment, many of these UK and European exclusives, and put it through their paces using top-flight test equipment. Yes, we actually know how to use these things! — our resident reviewer, Chris G4HCL, is a qualified RF design engineer with many years experience and has probably had more amateur radio equipment reviews published than any other UK reviewer. As well as telling you what all the knobs and buttons do, how many memory channels the set has and so on, we publish what the set really does in terms of performance. If one set at £500 works better than another at £1000, what's the point in paying over the odds? We're not afraid to pull any punches in our reports, if a set has a serious omission or a deficiency, we're not afraid to say so. See the Feb 87 HRT for example, where Chris asked "Tut, tut.. which designer's got the sack for this omission then?"

However we never publish our own opinions on which set we think you should be buying. Instead we actually

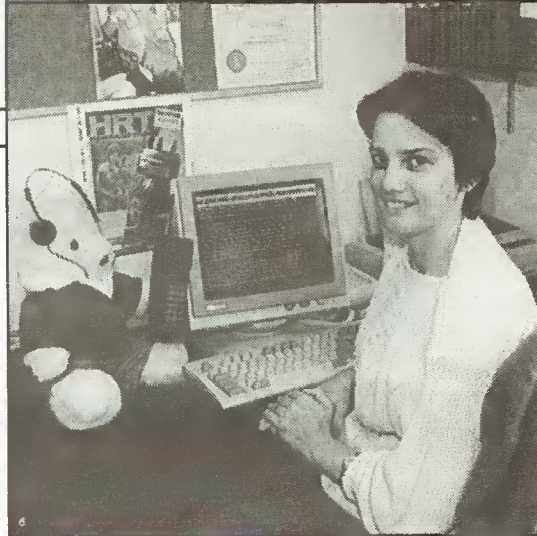
report on the radio's real performance so that you know just what you are getting for your money, and can then form your own opinions. Everyone has different requirements, likes and dislikes in equipment and we realise and respect this.

Neither do we take the easy way out technically by simply listing specifications out of the manufacturers' manuals, these are quite often inconclusive when you're trying to compare, instead we actually plug the sets in and measure the real results. These are all shown in a common form of result table so you can easily compare like with like, without even needing to be an electronics expert!

What Do The Figures Mean?

For some people the technical figures don't mean much, but have no fear! Soon I'm intending to publish a series of short articles explaining it all. These will tell you exactly what the strange-sound parameters such as blocking and intermodulation mean (hands up all those who know these can totally obliterate your 2m FM QSO from out-of-band signals — even though few if any FM rig specifications tell you how the set performs here). We'll be dealing with each individually, showing you why it's important and how we measure it, so everyone can have the benefit of the review findings. If there's anything you feel you'd like us to specifically cover, then please write and let us know.

I also receive quite a few phone calls asking in which issue certain reviews appeared in, so I'll shortly be publishing a list of these in HRT that you can see at a glance the one you require - you'll probably be amazed at the number!



Ex-PMR gear

'Black boxes' aren't everyone's choice of course. These days new gear seems to be getting more and more expensive, often out of the reach of many amateur's pockets. Amateurs may of course just want a low cost rig for their packet station, so as well as new gear, we also show you how to convert gear such as Westminsters, Europas, and Olympics, to get you on the air cheaply. These aren't difficult to modify, there are step by step easy to follow instructions and you often don't need to touch a soldering iron. Just the other week I had a letter from a club saying they'd bought a load of ex-PMR gear and converted them all for their club net. They've written a very interesting article to share their experiences with you, which will appear soon.

As these ex-PMR articles are very popular with our readers, I get even more calls asking which issue such-and-such appeared in, so I've already produced an index — you'll see this published in HRT. We have many more conversions lined up for you, including synthesised radio conversions such as a Pye MX294, Storno 900 (SM9114-PRT4) and a Storno CQM644. These will be appearing as soon as space allows, I have so many articles waiting to go in, I could fill a magazine twice this size every month for the next six months or so! Even though we have a higher ratio of editorial to advertising pages content than many other magazines, there is never enough room to fit it all in!

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Editor

Sheila Lorek, G8IYA

Consultant Technical Editor

Chris Lorek BSc (Hons) AMIEE, G4HCL

Technical Illustrator

Jerry Fowler

Direct Editorial Lines;

Tel: 0703 262105
(Mon-Sat, 9.30am-8.30pm)
Fax: 0703 263429 (24 hrs)

Creative

Design Manager: Peter Kirby

Designer: Sally Stray

Photographer: Manny Cefai

Advertising

Advertisement Sales: Donna Wells

Classified Sales; Sarah Church

Advertisement Copy Control;
Anne-Marie Quilter

Management

Managing Director: Terry Pattison
Circulation Manager: Debra Stuppel
Production Manager: Tony Dowdeswell

Group Editor: Mark Webb

Group Advertising Manager;

Paul D'Inverno

ASP Address;

ASP, Argus House, Boundary Way
Hemel Hempstead, Herts HP2 7ST
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Fax: 0442 66998

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LETTERS

Letter of the Month

For some time now, about sixteen years or so, VHF 2m (and later 70cm) repeaters have been 'carrier access', with a 1750Hz 300mS toneburst needed to turn the repeater transmitters on, a minute or two time-out timer, and an end-of-over 'K' tone. The only other basic criteria is a station ident, sent in CW upon access or every 15 minutes or so, so strangers can identify the repeater.

What has changed in UK repeaters over the years? Not much! Has the original 'experiment' ended? Has anything been technically advanced in terms of new technology or new logic control systems? I think the answer is no. The basic 'carrier squelch system' for access has remained the same, which permits any 'traffic'. But has technology advanced somewhat? I think the answer is yes!

This simple access system has spearheaded the serious and continual abuse of these 'free for all, donate a few bob to the local repeater group, if you feel like it', repeaters, which incidentally not many people donate to anymore. Anyone can transmit music, obscenities, threats, or any material they like if they have a standard 2m transceiver and are a stronger signal into the repeater than another station accessing or using the repeater. What has been said many times is; "Why should we bother? It's not our job, it's the RSGB's fault". My question is; do we care if amateur radio is regulated, do radio amateurs care about anarchy? I think we all *do* care about our hobby.

The DTI say "sorry chaps, we do not have the resources, we can only have enough budget to prosecute six people a year, we have to deal with interference to essential and emergency services, or, send a letter to the 'Amateur Radio Observation Service (AROS)' and then it will be dealt with".

The AROS is run by volunteers from all over the country, and I'm informed that AROS generally does a good job. But the letters of complaint take time to arrive, then must be vetted, possibly brought up at the next committee meeting, the long drawn out inconclusive letters rejected no

doubt, and eventually the valid letters find their way to the DTI in Waterloo Bridge House. They in turn inform the local DTI/RIS region, who if they have enough budget, may do something about it.

The net result is; the repeater jammers, many of whom are licensed amateurs and generally known well by local stations, who have a right to own the transmitting equipment and linears, use 2m repeaters and boldly give their callsigns while jamming with objectionable music and obscenities. They bait the users and the DTI/RIS to come around, even naming the local DTI officers and suggesting they 'bring an ambulance when they come around'. This adds to the whole deluge of interference, because legitimate users try to 'jam out' the jammers just to stop the racket.

The interfering stations maintain and think they have the right to 'jam' legitimate users, and to get away with it. They do so because nobody will do something about it. When was the last time *you* complained in writing to anyone?

It's about time we stopped living in the dark ages and modernised our amateur radio repeaters. CTCSS has been used for many years in PMR (business radio) in the UK. Was it not radio amateurs who used to develop radio technology and improve communication? Whatever has happened to the Marconi spirit of radio amateurs? Didn't people of our interests invent, discover and develop radio? What are we doing now to justify our radio amateur licences? The self-training in repeater abuse? We can advance technically, or do we let a small minority spoil our hobby, time and investment? Give up or ignore it all? Logic is surely the answer.

I feel this use of CTCSS for repeater access can help, to be used selectively to only allow legitimate users access, i.e. those using the tone in use at the time. Many modern transceivers can be programmed for CTCSS encode, decode or both. Almost all modern Japanese makes of hand held and mobile radios have these facilities built-in, but they're not generally used in this country because repeaters in UK do not utilise these facilities, as the normal repeater

licence does not yet specify that CTCSS tones can be used.

Here are a few suggestions and recommendations to advance and protect your hobby, time and investment. First, find out where and who the jammers are, write to AROS and copy all letters to RSGB/DTI. State clearly and conclusively the date, place, and times of transmission, enclose a recording on cassette if possible. Ask for an acknowledgement and enclose an SAE, don't forget to state your name and callsign and your day and evening telephone numbers.

Secondly, contact the RSGB, think about renewing your membership, donate a small amount of money. A few pounds from each of the RSGB members will pay for the RIS to prosecute these culprits. There should be plenty of 'change' to deal with other amateur radio interference, for instance, on the HF bands. Tell the RSGB you want this abuse stopped. RSGB members have the right to elect the management of the RSGB, the RSGB is a democratic organisation, you as a member can only change things by expressing your opinion, clearly and concisely. Elect people who are interested in furthering your interests in the hobby, to the benefit of all radio amateurs.

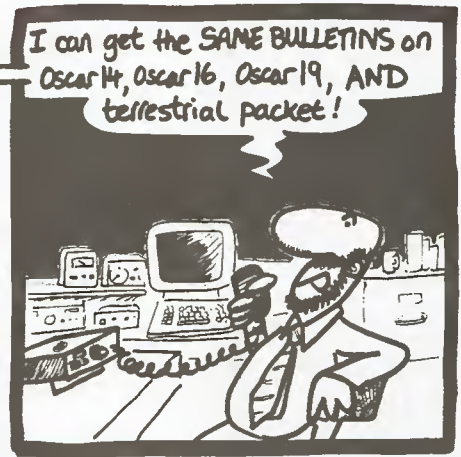
Thirdly, support your local repeater groups, join in the fun of DF hunts. Keep logs, recordings, names, addresses, callsigns, and help contribute to the running of the repeater or DF groups. You can do this by contributing time, money or expertise (just a few bob will do, who do you think pays for the repeaters?). Start to enjoy the hobby again by caring what goes on around you!

Write also to the minister of Trade and Industry, tell him you are very concerned with abuse of radio spectrum that is not being utilised to it's full potential. Tell him radio amateurs can help develop new systems and technology, which could have commercial, government and military spin-offs.

73 and 88, good luck in the hobby

G0KXT, West Midlands Repeater Group.

"TONE" BURST by G6MEN



Editorial Comment; We've been invited to meet with the RIS and AROS in Waterloo Bridge House in London, to report on their work. We'll be pleased to do this, and let our readers know the full story of what goes on! In the meantime, regular HRT readers will know we have been the only UK magazine promoting CTCSS, indeed for some time. Whether CTCSS would help in controlling non-welcome users is however debatable, although it has been shown to help prevent breakthrough from 'DX' stations in holding the repeater open for long periods to the sufferance of locals. Let's see if someone takes note of what we've been publishing. Remember where you saw it first...

£10 for the Letter of the Month
 Do you have something constructive to say on the state of amateur radio today? Perhaps you'd like to put your viewpoint to the readers, get some discussion going, or give an answer to one of the issues raised? We'll pay £10 for the best letter we publish each month. So write in with your views, to HRT, A.S.P., Argus House, Boundary Way, Hemel Hempstead, HP2 7ST.

Dear HRT,
 With great pleasure I read the last two issues, thanks for this super mag! Very interesting to read about the problems concerned with CW and the exams. We all know that ham radio is a hobby. It requires a lot of skills because we are next door to all professionals on the air, and obliged to show a kind of professional operating, combined with politeness, and the freedom of a hobby to all our partners.

At the moment we are looking for a leader of a school station we are going to install. A young lady teacher for physics is very interested but she doesn't show any interest for CW at all. On the other hand a small group of hams from our local society, is actively engaged to bring a digi-packet link into operation, which should connect the west and far east of Germany, and also perhaps follow a line to Poland. They all passed the CW exam but never used it! In these two examples we'll find reality!

The exam should be an exam measured to real needs, it shouldn't be a barrier at all. This problem corresponds with the question how to find newcomers. Learning by doing is a very good way indeed. In the Y2 area we had a system of A stations, i.e. that youngsters and SWLs are allowed to use the club call with the 'A' as last but one letter (A = German beginner) under the supervision of an experienced ham. The problem is to motivate kids to become a radio amateur. Computers for instance are much more interesting than learning ham radio law. The problems are international but we should be able to solve them for the sake of ham radio, shouldn't we? The article on the JUNO-MIR project shows a very good way, great!

Wish you all the best and success in writing such an excellent mag.

73 Dieter KI, Y41BE

Editorial Comment; Thanks for your constructive letter Dieter, it shows that we are not alone in the UK in seeking to go forward with the needs of radio technology, rather than attempting to live what the 'way it has always been'. We need to show both newcomers and the people who look enviously at our spectrum that amateur radio is up-to-date with technology and that it can be progressive in aiding new developments in communication for the World at large.

Dear HRT,
 With reference to the recent 'Metrowave' where an address was given to send for the QSB 4m newsletter.

I have had my postal order returned as the gentleman, Roger Banks G4WND, doesn't run this service any more. Could you inform your readers of this, maybe there is a reader out there who would take over the job of QSB editor?

Yours sincerely,
 Mr. P. O'Brien GW1SXN

Editorial Comment; Any keen 4m operators with a typewriter/word processor out there? Do remember the monthly HRT 'VHF/UHF Message' is here to report on what you tell us — maybe this could be used as a regular focus for news!

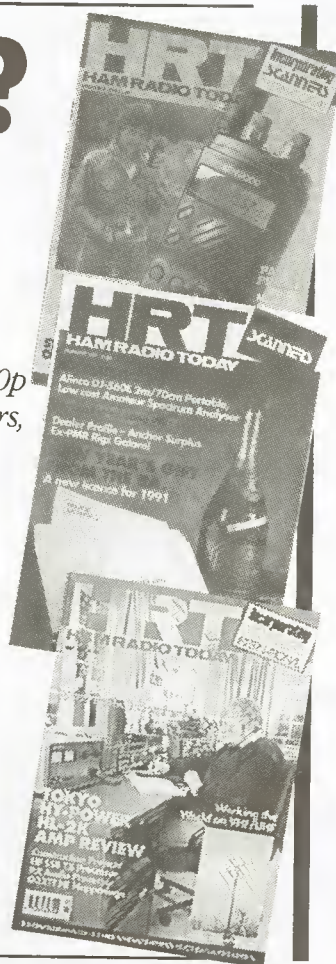
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Dear HRT,
With reference to the article 'USA Hamfest Hunting' in the June edition of HRT. I can echo all that Peter Rouse GU1DKD wrote about the Tropical Hamboree in Miami, I was also there last year.

Although second-hand radio and electronic gear is much cheaper in the USA than over here, it must be remembered that the author of the article is lucky enough to live in the Channel Islands, where there is no VAT. He mentioned an additional cost of 4.9% import duty, his only extra, but when I went through the red channel, the how-so-polite customs officer asked for 11% duty plus 15% VAT, making a total of 26%. Presumably that will now be 29.5%, which is additional to the purchase price, no small amount. You have been warned!

Douglas Byrne G3KPO/GB3WMM

Editorial Comment;
The VAT and duty aspects were detailed in Peter's article, thanks for re-confirming these. Maybe one should also bear in mind the often substantial 'excess baggage' charge if bringing heavy items of gear back on the plane! One must not forget

also to take the tax and duty 'extras' into account if considering mail-order from the USA, the customs can and do open parcels for valuation, charging the recipient the amount payable. I once spent some time explaining to my friend, who was convinced that ordering a HF aerial from the USA would work out substantially cheaper than UK purchase, that it wasn't all that simple!

Dear HRT,
With so much written about incentive licensing and Novice operators recently, I would like to say that in my opinion none of it is going to matter soon, if we carry on as we are. Why? Because in our all-out 'selling' of the amateur radio hobby, we have sacrificed quality in the interests of quantity. I spend quite a lot of time monitoring beacons, or sometimes tuning around this band, and what I hear makes me despair! Complete disregard of bandplans, lack of consideration for others etc. are all regularly heard. I once tackled someone (politely giving my name and call) who was chatting away on FM slap-bang on top of one of the UK beacons, the response I received being

very negative. Another case occurred during a recent lift on 2m when I was keeping my eye on beacon strengths from all over Europe, here a group of G4s (who should know better) plonked themselves on 144.875, I tried to work around them, but as the opening developed I had to ask them (politely, with callsign) to move to a more suitable frequency. After being ignored for a while, I was subjected to a severe grilling followed by sarcasm. They did eventually move — just a few kHz LF, on top of another beacon!

What's wrong with these people? I know the bandplans are not mandatory, they amount to a gentleman's agreement, so please gentlemen, lets behave like proper amateurs, a bit of decency and consideration doesn't cost anything.

Your sincerely,
A.J. Howlett.

Editorial Comment;
There's a clause in our licence which says we must not cause undue interference to other forms of wireless telegraphy, this sounds like a classic case. If you can't do anything locally, there are organisations such as AROS who probably can.

RADIO TODAY

Novice Morse Test — Latest

The Radiocommunications Agency have announced details of the five words per minute Novice Morse test. A pass in the test will be required in order to obtain a Class A Novice Licence. The main features of this are as follows;

It will cover both receiving and sending with the receiving test normally being taken first. For receiving, up to three candidates at a time will receive the same test piece. The sending test will be taken individually.

The receiving test will be based on a computer generated text using a pre-recorded tape which also contains voice announcements. Candidates will be required to receive a minimum of 120 letters and seven figures in the form of a typical exchange between radio amateurs. The duration of the test will be approximately six minutes.

Each character will be sent at a speed of 12WPM, with a longer than normal gap between each character and word to reduce the overall reception speed to 5WPM. Each character incorrectly received will count as one error. A group of characters, which could include figures in which more than one character is received incorrectly, will count as two errors. The maximum permitted number of errors will be six, candidates will not be permitted to write down the Morse symbols for later translation.

In the sending test, candidates will be given a text, to send by hand on a straight Morse key, consisting of not less than 75 letters and five figures. The text should be sent at not less than 5WPM, this should take approximately three minutes. The text will be in the form of a typical exchange between radio amateurs. There must be no uncorrected errors in the sending and not more than four corrections will be permitted.

The test could include any of the Q-codes, commonly used abbreviations or procedural characters as shown here. The procedural code 'CT' (commencing sign) will be sent right at the start of the receiving test but will not be part of the test for marking purposes. The details of the test are summarised as follows;

Test	Min No. of characters	length of test	Max No. of errors	speed of test
Sending	letters 75 figures 5	3 mins	4 corrected	not less than 5WPM.
Receiving	letters 120 figures 7	6 mins	6 uncorrected	overall 5WPM, with 12WPM character speed.

Note that figures and procedural characters are counted as two letters for timing purposes.

Q-codes

QRA, QRG, QRK, QRM, QRN, QRO, QRP, QRQ, QRS, QRT, QRV, QRX, QRZ, QSA, QSB, QSL, QSO, QSY, QTH.

Abbreviations

ABT	— About
AGN	— Again
ANT	— Antenna
BK	— Signal used to interrupt a transmission in progress
CPI	— Copy
CPY	— Copy
CQ	— General call to all stations
CUL	— See you later
CW	— Continuous wave
DE	— From, used to precede the call sign of the calling station
DR	— Dear
EL	— Element
ES	— And
FB	— Fine business
FER	— For
FM	— From
GA	— Good afternoon
GD	— Good day
GE	— Good evening
GM	— Good morning
HPE	— Hope
HR	— Here
HVE	— Have
HW	— How
K	— Invitation to transmit
MNI	— Many
MSG	— Message
NW	— Now
OC	— Old chap
OM	— Old man
OP	— Operator
PSE	— Please
PWR	— Power
R	— Received
RPRT	— Report
RST	— Readability, signal strength, tone report
RX	— Receiver
SIG	— Signal
SRI	— Sorry
TEMP	— Temperature
TKS	— Thanks
TNX	— Thanks
TU	— Thank you
TX	— Transmitter
TXR	— Transceiver
UR	— Your
VERY	— Vertical
VY	— Very
WID	— With
WX	— Weather
XYL	— Wife
XY	— Young lady
73	— Best wishes
88	— Love and kisses

Procedural characters and punctuation

AR	— .-. End of message
CT	— -.- Preliminary call
BT	— -.- Separation signal
KN	— -.- Transmit only the station called
VA	— ...- End of transmission
?	— ...- Question
/	— ...- Oblique
Erase	— To correct an error

CTCSS Against Interference

A number of UK repeater groups have been experimenting with the use of CTCSS to reduce interference, particularly on the crowded 2m band in the southern half of England, and this experiment is now being extended. Here's how it works;

In normal use by an amateur, i.e. without using the sub-audible tone used by the repeater, it can still be accessed in the usual way with a 1750Hz toneburst and 'standard' repeater sensitivity should result (so no question of closed repeater groups etc!). Likewise, the repeater will transmit, whenever accessed by 1750Hz, the same sub-audible tone, so users if they wish can set their receiver only to be activated when that tone is seen by their receiver. Thus they won't be troubled with interference from 'unwanted' repeaters. The GB3PE repeater uses the CTCSS frequency of 118.8Hz, and we understand they've been very pleased at the success of the facility.

The Repeater Management Group is currently considering the allocation of CTCSS tones nationally to provide a

Repeater Charges — Latest

Users of the hundreds of VHF/UHF repeaters in the UK will no doubt be aware of the recent request by the RSGB for a £25 plus VAT contribution towards the administration charges incurred in the management of these units. Although a 'deadline' for a notice of closure has now passed, with no repeaters to our current knowledge being issued with a close-down notice for non-payment, we've been told by the General Manager of the RSGB the subject is still under discussion. The eventual aim we've been told is *some* form of contribution to these costs, but we're told the original handling of this by the organisation concerned may have been a little too unpremeditated, i.e. by not initially seeking feedback from the repeater groups concerned. More news as it comes...

WAB Family Fun Weekend

This is run by the Oscar Victor Activity Group (WAB) and will be held at Bent Rigg Farm, Ravenscar, North Yorkshire, from the 23rd to the 26th August 1991. This can be found midway between Scarborough and Whitby on the North Yorkshire coastline, the Cleveland Walk also passes very close to the site.

As an entire field has been hired exclusively for the weekend, campers and caravanners are welcome, with the availability of a bunk barn for those wishing to have a roof over their heads (prices on application to the farm).

During the weekend visitors will have the chance of working either HF or VHF from the control station on site, alternatively if you'd like to enjoy the scenery then the area affords many colourful walks. Evenings on site will be spent in the company of other hobbyists, where the barbecue compliments the entertainments and liquid refreshments are readily available (how can I resist — Tech Ed!).

Further attractions include a car boot sale, sporting activities arranged for the kids (no age limit to qualify as a kid!), child minding facilities available, plus live entertainment from *SGB and The Old Crones on The Bench* ('New Kids on the Block' eat your hearts out!). With competitions promised for all the family in a very relaxed and informal atmosphere, with or without radio, it should be a fun weekend.

The cost for the use of site, including barbecues and irrespective of caravan/tent size, is; Adults and over 14s, £2.50 per day, OAPs and under 14s free. Further details can be obtained from Peter Austin G7BXA, Tel. 0532 563462 or Steve Bryan G1SGB, Tel. 0709 543747. See you there?

framework to groups wishing to use the facility. The framework will define which sub-audible tone frequency to use for which repeater, thereby allowing publicity and an easier ability for users to understand how to go about the use of the repeater using such tones.

A number of suggestions are currently being considered. One involves the use of 5 tone frequencies and dividing the country into regions for tone usage, e.g. zone B region 4 would use tone C, whereas zone B region 3 would use tone B. Another plan uses 9 frequencies and divides these up into geographical areas. Yet another plan uses only three frequencies and attempts to keep repeater group areas within a single tone allocation.

The Repeater Management Group tell us the addition of such a system won't preclude the normal user from being able to use any repeater in the usual way. They add that additional facilities will enhance the repeater, perhaps allowing an improvement in interference immunity. Don't forget the simple-to-make HRT sub-tone encoder we published in the September 1990 if you'd like to add this to your rig.

Stolen Equipment

Stolen recently from the Bury Radio Club was an Yaesu FT-980 serial number 3E010513 and a Yaesu FT-225RD serial number 9H060023. We're told the equipment was purchased by extremely hard fund raising, and this has shattered all members. If you have any details concerning this please contact the club secretary Harry Hargreaves G4ZSI, 7 Hardwood Walk, Tottington, Bury. BL8 3NT, Tel. 0204 886505, or of course your local police.

Special Event Station GB4RAF

RAF Valley, North Wales are activating a special event station to mark the 70th anniversary of the No.4 Flying Training School. The station, callsign GB4RAF, will be operational on all bands HF and 2m VHF, from 08.00 until 17.00, the station being run and co-ordinated by Dave Keely GW00GI, with assistance from the Dragon Amateur Radio Club and the RAF Amateur Radio Club. For further details, contact Dave Keely, Pensarn Cottage, Bryn Du, Ty Croes, Anglesey LL63 5SH. Tel. 0407 810996

The Worked All Britain Awards Group

As readers may be aware, the Worked All Britain awards group (WAB) makes donations to amateur radio related charities, last year for example they presented £5000 to the Guide Dogs for the Blind Association, who agreed to use the five dogs they purchased for radio hobbyists within their organisation. Their day-to-day on-air activities include contacting members throughout the country, collecting the various 'WAB squares'

At their AGM, they asked for suggestions for a worthy charity to which WAB could make a donation, adding that HRT readers may care to make a suggestion. The latest news is that after taking all suggestions into account, they've now decided on the Royal National Lifeboat Institution, and they're currently liaising with them in the hope of operating from lifeboat stations around the country. Maybe you'd like to ask about joining the group — their life membership which includes a concise records book, claims books, and lots more is just £7 inc. p/p. from their membership secretary Brian Morris G4KSQ, 22 Burdell Ave, Sandhills Estate, Headington, Oxford. OX3 8ED.

The group will be celebrating 25 years in amateur radio in 1993, and they aim to organise fund raising activities both on and off the air, they'll also be running a lottery which proved very successful during their Guide Dog appeal. Their latest fund raising event is the WAB Family Fun Weekend;

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Kenwood TM-741 Review

The TM-741



Kenwood launch their first three-band HF/VHF/UHF mobile rig, G4HCL takes it for a test run

(trio?) reception if combined audio gets too confusing!

Remote Mounting

The standard set measures 150mm (W) x 50mm (H) x 175mm (D), a rear panel mounted fan being used for cooling on transmit, thus keeping the heatsink size down. There's no microphone socket on the case, the mic lead plugs into the main body of the set behind the front panel

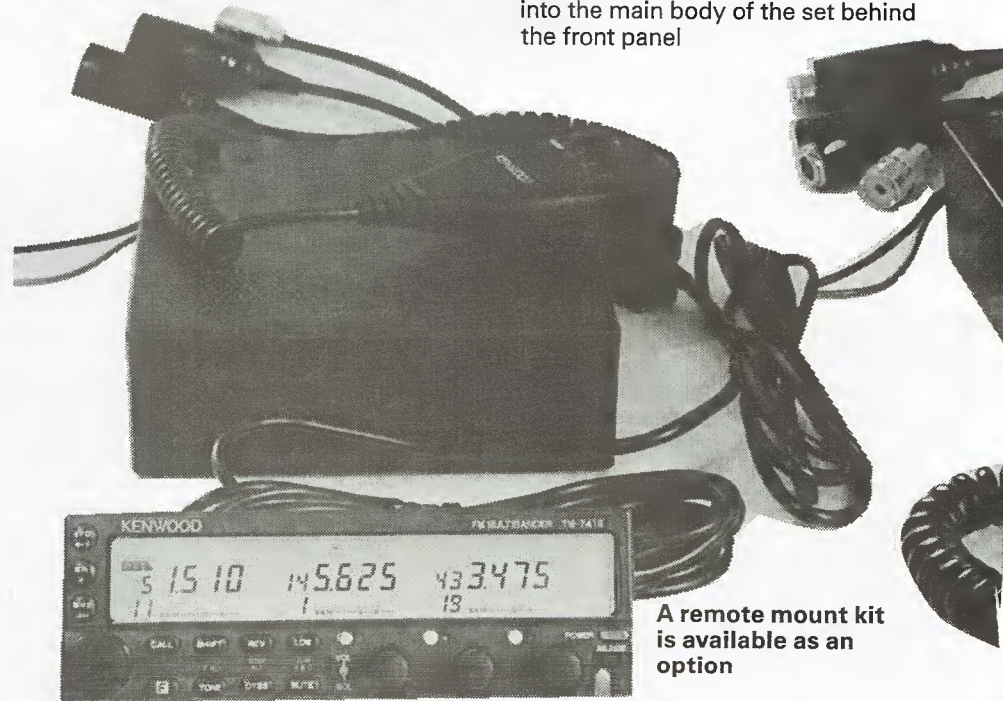
Kenwood's new 2m/70cm band mobile has a unique extra — the facility of add another HF/VHF/UHF band with an optional plug-in unit. As well as mobiling along on 2m and 70cm, you can also have the choice of operating either 10m, 6m, or 23cm from the same rig. And to keep things tidy, you can even have the option of remote-mounting the set with a 'head-up' display mounted where you can see it, the main rig being fitted wherever convenient.

I'd always wanted to give 6m mobile a try as well as the two 'usual' bands, so within days a TM-741 with 6m/2m/70cm fitted arrived at the door, all ready for a HRT review.

Multiband

The set gives TX/RX coverage on FM of the normal 2m and 70cm bands, a maximum transmit power of 50W on 2m and 35W on 70cm being provided. As well as simultaneous reception of both bands, a wideband receive facility in the set is also available in countries where this is allowed, the frequency range centred around these bands.

In standard twin-band use the set provides a dual frequency display, the third section of the display being used for a digital clock. Adding an optional band unit gives three-band operation with separate displays together with simultaneous reception facilities, any or indeed all band ranges may be temporarily disabled if needed. The optional band modules, all operating on FM, are;



A remote mount kit is available as an option

28MHz (50W TX), 50MHz (50W TX), and 1296MHz (10W TX), a 220MHz 50W unit is also available in North America.

Separate flying leads terminated in coax connectors are used for each band — you'll need to use a diplexer if you're going to use a multi-band mobile or base aerial. The set comes with a small built-in speaker, and as well as a common external speaker socket separate 3.5mm speaker sockets are provided at the rear of each module so you can have stereo

using a special 8-way connector not dissimilar in style to (but having more pins than) a UK/American telephone connector. To get to this, the front panel is unhinged using a small front panel mounted 'release' button.

The short connecting lead between the panel and the main body may be unplugged and extended using an optional lead, an accompanying mounting bracket allows you fit the front panel in a possibly more suitable position on

the dashboard than the set would otherwise allow. An extension lead for the microphone is also supplied, and because this plugs into the main body of the set it could usefully allow a more convenient microphone mounting/usage position in the car without the lead trailing across your dashboard.

Control

Three separate concentric volume/squelch knobs are fitted, one for each band, and to make things even easier you only need to press the knob corresponding to the band you wish to transmit on to shift PTT control to that band, a large 'PTT' icon being displayed next to the corresponding frequency display on the large LCD. Three dual-colour LEDs are fitted next to the knobs, and a read of the instruction manual showed me that by pressing the appropriate LED (this being cleverly linked to a push-button) I could transfer 'control' of the set to that band, i.e. all functions apart from PTT such as tuning, scan etc.

To make things easy when on the move, a remote-control microphone is

Separate controls and displays for each band



well thought out. The final 'PF' control is used as a programmable function, the default sensibly being band change.

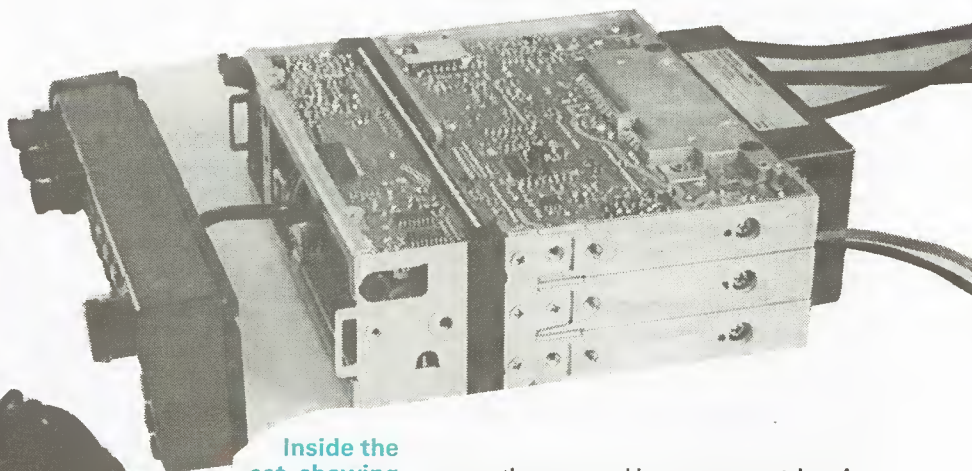
Functions Galore

As for the many functions of the set, well considering the supplied manual comes to 232 pages, albeit this covering three European languages, you may get an idea of the many control possibilities offered! There's too many to list here of course as it would fill half the magazine, but I'll try to give a general overview. All the usual memory and VFO scanning modes are fitted, the set having 100 memories arranged into 5 banks of 20 channels each, for each band fitted. You can choose between band scan, programmable band scan, a scan over a 1MHz range, memory scan, call channel/VFO scan, call channel/memory scan, and even VFO/memory/call channel scan. A useful feature of the set is an 'Auto Memory Scan', where the set scans a programmed range, any channels with a signal present for more than one second are automatically stored in empty channels in memory Bank 5 of the

individual audio tone pitch, between 523Hz and 1318Hz, identifying each digit. Other functions include an automatic band change which sets your PTT control to the band having activity present, a TX time-out timer variable between 3, 5, 10, 20 or 30 minutes to prevent the 'stuck mic key' syndrome, and an automatic 'power off' and on/off 'sleep' timer control.

Options

The set has a built-in sub-tone encoder, and a plug-in CTCSS unit is available if you'd like complete encode/decode control, for example to use for net or alert operation, the latter facility being provided by the set whenever the squelch raises. A further plug-in option is the now common 'DTSS' selective calling and paging system, where a three digit DTMF sequence is used for selective calling and paging purposes (watch out for a forthcoming HRT article on this). A DTMF microphone is available (this being supplied as standard in Canada/USA in place of the 1750Hz control mic) for use with over-the-air remote control facilities, such as autopatch



Inside the set, showing the separate band units

band in use. A memory 'consolidation' mode is even fitted where you can re-

arrange the memory bank contents around as you wish.

For either the amateur on the move with a talented knowledge of musical pitch, or for the visually impaired user, a handy facility (which may be programmed on the 'PF' button in place of band change) is a variation on synthesised speech frequency readout. Here, a press of the 'DTSS' button provides an audio tone sequence corresponding to the operation frequency, the

operation as used in some countries. An extra feature given by the DTMF mic is that it also allows digital keypad entry of the transceiver's operation frequency. Other options include various power supplies for home use, DC leads and spare mounting brackets, and most usefully a microphone plug adaptor for use with 'normal' 8-pin plugs.

In Use

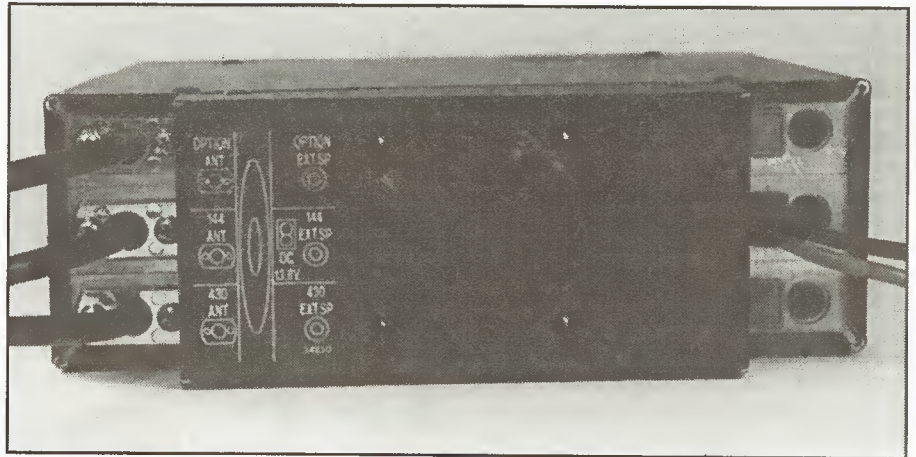
Even with the set's many operating modes, I found I was using it quite successfully within minutes of switching it on - even programming the memories was very straightforward, without the initial need for me to consult the (very thick!) manual. The sensible band change/scan initiation by using just the microphone-mounted controls I found very easy to use.

However on the move, the first thing I found was that the tiny internal speaker in the set was next to useless, giving poor audio and not enough of it without distortion. Plugging in an external speaker was a definite 'must', the audio then boomed out! I found controlling the set in general was very easy indeed, and throughout the review period I had many pleasant contacts on the most-used band of 2m. Often, another band would burst into life whilst I was chatting, here a quick press of the audio 'Att' button switched a handy 20dB worth of audio attenuation in which I found very useful. Although the set had a four-level LCD backlight dimmer facility, this needed several button pushes to operate, this wasn't too easy when I was fumbling about in the dark trying to stop glare from the set obscuring the road ahead.

At home, used with my 6m/2m/70cm rooftop aerial system and an external diplexer, the set in general gave a good account of itself in terms of strong signal handling. The sensitivity on 6m and 2m was extremely good although I felt the 70cm receiver section was less sensitive than I would have expected (see later). I found an annoying breakthrough problem on one of our local 'natter' channels, SU19, from a repetitive paging type transmission which came in at 5-9+ and often wiped out the wanted signal, this I later found to probably be image reception. I also found the 70cm transceive side to be around a couple of kHz low in frequency, this drifting badly as the set warmed up — to the point where I could no longer be heard without significant distortion through my local repeater during a 20 minute ragchew. The set ran very warm even when just in receive mode, this obviously not helping matters, but I can only presume this frequency drift to have been a 'one off' fault as the specifications suggest excellent frequency stability. This may of course have accounted for the slightly 'deaf' 70cm receive side.

The 50MHz side was very interesting, especially as over the review period several sporadic-E 'lifts' occurred with resultant Worldwide propagation. The 6m option has the facility of a switchable receiver attenuator, I found this handy when next-door's plastic-cased computer started up with its high level of radiated RF noise! (The 23cm option has the addition of a switchable AFC to help with off-tune signals at this high frequency, and the 10m module has the addition of a switchable wide/narrow band FM mode).

I would have liked to have tried the set on packet, but unfortunately the rather unique microphone connector prevented this. No doubt the optional microphone plug adaptor lead will be available from Kenwood dealers for this,



LABORATORY RESULTS: RECEIVER;

Sensitivity;

Input level required to give 12dB SINAD;

50MHz	145MHz	433MHz
0.105uV pd	0.110uV pd	0.185uV pd

Squelch Sensitivity;

	50MHz	145MHz	433MHz
Threshold;	0.07uV pd (3.5dB SINAD)	0.06uV pd (<2dB SINAD)	<0.06uV pd (<2dB SINAD)
Maximum;	0.15uV pd (20dB SINAD)	0.14uV pd (18dB SINAD)	0.32uV pd (21dB 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;

	50MHz	145MHz	433MHz
+12.5kHz;	63.0dB	64.5dB	61.5dB
-12.5kHz;	61.5dB	50.5dB	20.5dB
+25kHz;	82.5dB	77.0dB	68.0dB
-25kHz;	82.5dB	77.0dB	65.5dB

Blocking;

Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;

	50MHz	145MHz	433MHz
+100kHz;	92.5dB	90.0dB	82.5dB
+1MHz;	97.5dB	98.0dB	95.0dB
+10MHz;	98.5dB	96.0dB	97.5dB

Intermodulation Rejection;

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

	50MHz	145MHz	433MHz
25/50kHz spacing;	69.5dB	72.5dB	78.6dB
50/100kHz spacing;	69.1dB	72.5dB	75.5dB

Maximum Audio Output;*Measured at 1kHz on the onset of clipping;*

	50MHz	145MHz	433MHz
3 ohm load;	4.21W RMS	3.64W RMS	3.80W RMS
8 ohm load;	2.65W RMS	2.21W RMS	2.35W RMS
15 ohm load;	1.58W RMS	1.35W RMS	1.43W RMS

Image Rejection;*Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;*

	50MHz	145MHz	433MHz
	82.0dB	72.0dB	68.5dB

S-Meter Linearity;

Indication	50MHz		145MHz		433MHz	
	Sig.Lev.	Rel.Lev.	Sig.Lev.	Rel.Lev.	Sig.Lev.	Rel.Lev.
S1	1.57uV pd	-10.3dB	0.18uV pd	-13.4dB	0.45uV pd	-15.8dB
S3	2.64uV pd	-5.7dB	0.26uV pd	-10.1dB	0.63uV pd	-12.8dB
S5	3.10uV pd	-4.3dB	0.42uV pd	-5.8dB	1.01uV pd	-9.0dB
S7	3.92uV pd	-2.3dB	0.79uV pd	-0.3dB	1.57uV pd	-5.0dB
S9	5.14uV pd	0dB ref.	1.22uV pd	0dB ref.	2.77uV pd	0dB ref.
S9+	6.24uV pd	+1.7dB	2.13uV pd	+4.9dB	4.35uV pd	+3.8dB
S9++	8.51uV pd	+4.4dB	3.84uV pd	+10.0dB	6.24uV pd	+7.0dB

TRANSMITTER;**TX Power and Current Consumption;**

Voltage Supply	Power	51MHz	145MHz	433MHz
10.8V	High	27.5W/8.35A	29.8W/7.20A	18.8W/6.20A
	Mid	11.6W/4.80A	10.3W/4.20A	11.2W/4.80A
	Low	6.12W/3.75A	5.25W/3.20A	5.40W/3.60A
13.8V	High	50.0W/9.75A	46.4W/8.50A	34.4W/8.20A
	Mid	11.8W/4.80A	10.3W/4.20A	11.4W/4.80A
	Low	6.17W/3.75A	5.25W/3.20A	5.45W/3.60A
15.6V	High	56.9W/10.2A	46.4W/8.40A	36.2W/8.20A
	Mid	11.8W/4.80A	10.2W/4.20A	11.2W/4.80A
	Low	6.17W/3.80A	5.25W/3.25A	5.35W/3.60A

Harmonics;

	50MHz	145MHz	433MHz
2nd Harmonic;	-81dBc	-75dBc	-72dBc
3rd Harmonic;	-82dBc	-86dBc	-83dBc
4th Harmonic;	<-90dBc	<-90dBc	<-90dBc
5th Harmonic;	<-90dBc	<-90dBc	-
6th Harmonic;	<-90dBc	<-90dBc	-
7th Harmonic;	<-90dBc	<-90dBc	-

Peak Deviation;

	50MHz	145MHz	433MHz
	4.96kHz	4.89kHz	4.82kHz

Toneburst Deviation;

	50MHz	145MHz	433MHz
	4.50kHz	4.62kHz	4.39kHz

Freq Accuracy;

	50MHz	145MHz	433MHz
	-118Hz	-281Hz	-1.42kHz

but it stopped me just reaching in my parts box and wiring my TNC to the set.

Insides

The set is made up of an overall metal chassis holding the three sub-units, these each made from an alloy casting housing the surface-mounted component circuitry. A common rear panel fan assembly provides the cooling for the PA, the fan starts up when the transmit PTT is depressed and continues for a couple of minutes after the PTT is released to ensure the PA heatsink has cooled down sufficiently. A common front panel assembly handles the control side of things, this using the usual backup battery for memory retention.

Laboratory Tests

With the exception of 70cm, the receive sensitivity was extremely good, indeed I had to carefully check my test equipment here to make sure there was no signal 'leakage' affecting the results. I found the 70cm side on switch-on to be around 1.5kHz low, this increasing to 2.5kHz after a two minute transmit period, however as previously stated this I'm convinced was a 'one off' fault — in normal practice I'm sure the dealer would effect a replacement or repair. Otherwise, the transceiver gave a very good performance, the 70cm image I noted on air was due to an unfortunate mix of frequency usage. The measured image rejection I certainly couldn't complain about, and the intermodulation rejection on this band was indeed particularly good.

Conclusions

I liked the set, it was easy to use, and it gave in general a good technical performance. It's certainly unique in offering the capability, through an added band option, of true simultaneous three-band coverage. I found I needed to add an external speaker for mobile use, the unique microphone connector is also worth bearing in mind if you're re-wiring a hands-free microphone for mobile use. As for myself — I found the remote control on the supplied microphone very easy and safe to use.

The set isn't the cheapest dual-band mobile rig around, the three band facility certainly putting the cost up. However one must consider carefully what's likely to be needed when operating, the addition of a further band to 2m/70cm at sometime in the future without the need for a separate rig could be worth bearing in mind.

My thanks go to Lowe Electronics for the loan of the review equipment.

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Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the base of the IC-2SE.

Battery packs and case.

BP-81	.....	7.2V, 110mAh
BP-82	.....	7.2V, 300mAh
BP-83	.....	7.2V, 600mAh
BP-84	.....	7.2V, 1000mAh
BP-85	.....	12V, 340mAh
BP-86	.....	Case for six R6 (AA) size batteries

BC-72E, AC Battery Charger.

Desk top charger for the BP-81 - BP-85.

CP-12, Cigarette lighter cable with noise filter.

Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85.

FA-140BB, 144MHz flexible antenna.

Flexible antenna for 144MHz band operation. Same type supplied with the IC-2SE.

HM-46, Speaker/Microphone.

Combination speaker and microphone equipped with an earphone jack. Clips to your shirt or lapel.

• **HS-51, Headset.** Headset with VOX function that allows you hands-free operation.

Carrying Cases.

Carrying Case	Battery Packs, Battery Case
---------------	--------------------------------

LC-53	.....	BP-81
LC-55	.....	BP-81, BP-83 or BP-86
LC-56	.....	BP-84 or BP-85

MB-30, Mounting Bracket.

Mounts the IC-2SE in a vehicle or on a wall.

OPC-235, Mini DC Power Cable.

For use with a 13.8 V DC power supply

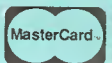
4SE 70cm
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Actual Size



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THE COMPACT HANDHELD WITH A SPLIT PERSONALITY

5 Watt Output Power.

Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers a full 5 W* of output power. Bring those distant repeaters into range.
* At 13.8V DC

48 Memory Channels.

The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

Convenient Repeater Functions.

The IC-2SE is equipped with programmable offset frequencies for accessing repeaters. All memory channels and a call channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

Power Saver for longer operating time.

The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

Built-in Clock with timer functions.

The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches a pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

Convenient Scan Functions.

The IC-2SE is equipped with VFO and memory scan.

- **VFO Scan.** VFO Scan repeatedly scans all VFO frequencies. In addition, unnecessary frequencies can be skipped.

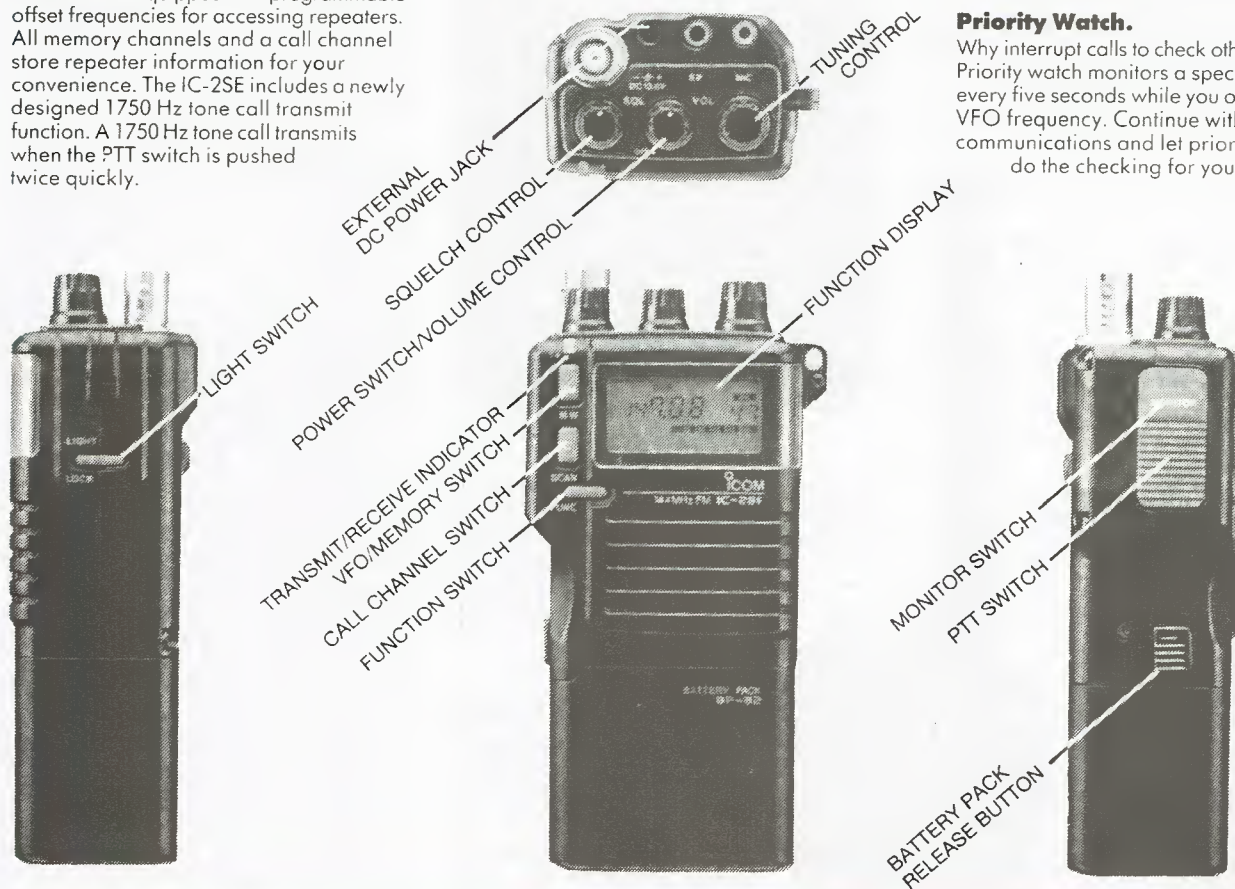
- **Memory Scan.** Memory scan repeatedly scans memory channels.

Auto Power Off Timer Function.

If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve battery pack power for the times when you need it most.

Priority Watch.

Why interrupt calls to check other stations? Priority watch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.



Icom (UK) Ltd.

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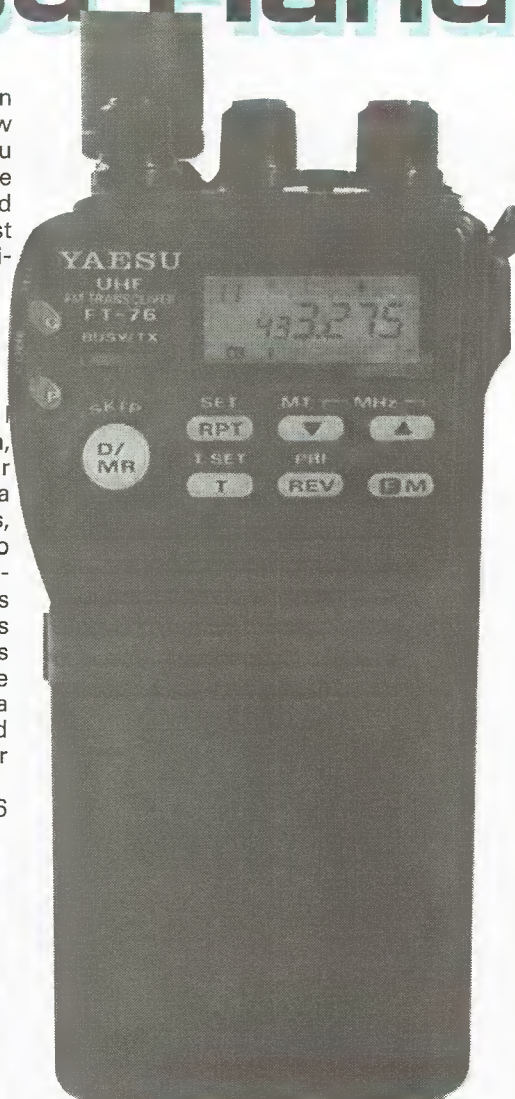
Exclusive Review — Yaesu Handhelds

We first showed you these handhelds in our HRT Leicester Exhibition Show Report last year, when Mr. Yokoi of Yaesu flew over with a couple of prototype models. The sets are now available, and true to form HRT are yet again the first UK magazine to review these latest mini-handhelds to hit the streets.

First Impressions can be wrong!

When I first handled these sets, I went 'Hmm'. This was my first reaction, when some time later I obtained a pair for review my second reaction after a few minutes worth of operation was, 'Ugh'. But you'll see later this was due to my own personal preference for a handheld transceiver with multitudes of knobs and buttons! However not all amateurs want to wander around with what looks like a combined LCD TV/Video remote control as a handheld, complete with a multi-function keypad array, instead often wanting a simple handheld just for nattering on the local repeater.

Little did I know the FT-26 and FT-76



An uncluttered front panel

transceivers could be happily used by both types of operators. To say these handhelds are wolves in sheep's clothing could be an accurate way of summing them up! Let's have a look.

Simple or Comprehensive?

The simple answer is, both! If you want a 2m handheld with just a rotary click-step tuning knob, one that automatically sets the correct repeater shift for you when you're in the repeater segment and automatically goes back to simplex on simplex channels, this hand-

held does it. Alternatively if you want multi-digit DTMF tone coded selective calling combined with CTCSS and a pager 'bleeper' to alert you when called and by whom, channel scanning, variable auto-timed switch off, priority monitoring, multiple selectable transmit power levels, multi-ratio and 'intelligent' battery saver circuits... the list goes on, you can have that as well. Get the picture? It took me a few days to!

Features

Down to facts. Each set is has virtually identical features apart from the frequency coverage, the FT-26 covering 144-146MHz and the FT-76 covering 430-440MHz. With the supplied FNB-25 7.2V 600mAh nicad, each set measures 115mm (H) x 52mm (W) x 32mm (D) excluding projections, and weighs around 350g. The set comes with a clip-on nicad, plug-in wall battery charger, carrying strap, belt clip, instruction manual and a pocket-sized 'quick reference' guide to operation.

On transmit, a power of 2W is given with the 7.2V nicad, replacing this with an optional FNB-27 12V nicad increases the maximum power to 5W, with three levels of 'low power' down to 500mW. As well use with a nicad, an external supply of 5.5-16V DC can be plugged into the top, this also charges the nicad if sufficient voltage is present. Optional mains chargers such as the NC-37 'intelligent' fast-charger are also available if you're in a hurry, this charging a completely flat nicad in one hour.

50 memory channels, together with further 'Call' memory and 'Upper' and 'Lower' limit channels are available, each of these can store frequency, any TX/RX offset, CTCSS mode and tone frequency if you've fitted this plug-in option, scan/skip mode and so on. Each memory frequency/mode can also be used as a VFO, a button push transforming this into 'tune' mode along with its pre-set parameters. The 'Function' key on the set provides a multi-purpose mode, and together with the 'Set' function this can be used to initialise the transceiver with various parameters such as 'busy' LED on/off, key bleeps on/off, keypad lock, rotary channel knob lock, battery economiser ratio, auto-power off status and time, DTMF 'pager' sequences and the like.

Yaesu's new babies — the FT-26 and FT-76 paging transceivers, tested by G4HCL



The tiny FT-26 and FT-76 handhelds



Top panel controls

Selective Calling

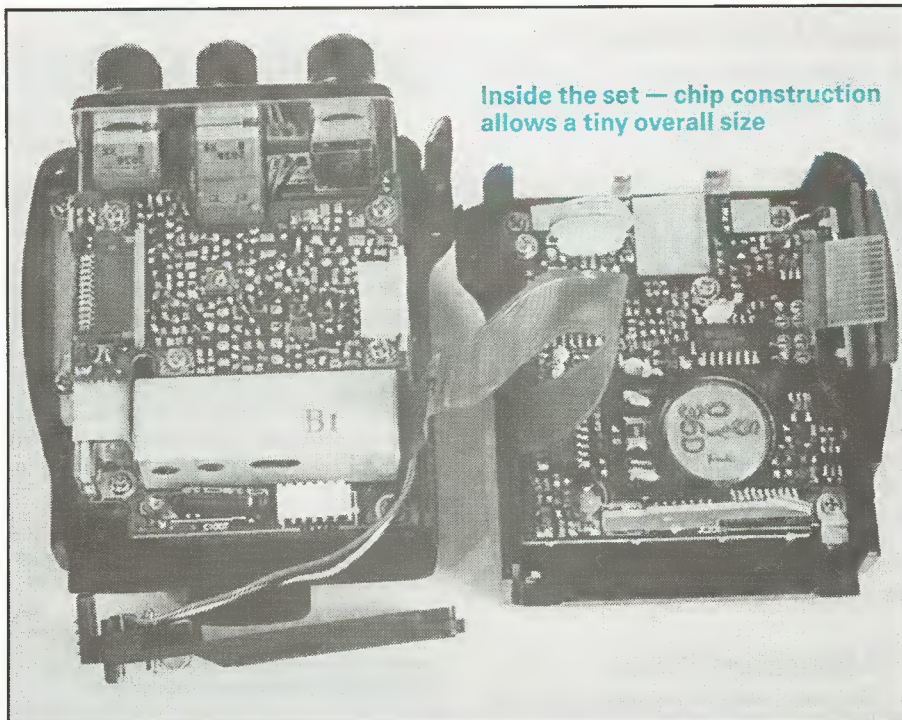
Although CTCSS (Continuous Tone Controlled Squelch System or 'sub-tone', as increasingly used on some repeaters) requires an optional plug-in board, the set comes equipped with the, now standard, 3-digit DTMF selective calling system fitted. Here, the set may be pre-set to transmit a brief 3-digit code at the start of each transmission, and in turn only allow its receiver to be 'woke up' by the reception of a given code.

Either DTMF 'paging' or 'code squelch' may be used on the FT-26/76. In 'code squelch' mode the set remains silent until the correct code is received, your set automatically sending the pre-stored sequence at the start of your transmission to open your QSO partner's receiver. In 'pager' mode the transceiver rings like a telephone when it receives your code sequence followed by the further 3-digit of the calling party, you can even preprogram the number of rings, and the FT-26/76 even displays the ID of who's called you on its LCD. The set also adds your 3-digit ID to a transmitted pager code, and both 'group' and 'individual' paging codes can be used. These functions are selected by a one-touch push of the small 'P' button on the fascia, and 7 pre-set sequences may be stored in the set.

A number of sets may have their memory contents 'cloned' by a simple lead plugged in between their respective microphone sockets, so once a given set has been programmed up, others may be 'cloned' from it one by one. This could be handy for group use to save extensive re-programming operations.

In Use

I found a thorough read through the manual was an absolute 'must', before I



Inside the set — chip construction allows a tiny overall size

got round to this (I'm always too anxious to try a set out 'on air' as soon as possible) I was making mistakes left, right and centre. This included many accidental frequency shifts whilst walking around with the set during my first weekend on air, thus making me curse somewhat due to missed calls! After I resigned myself to the inevitable, I sat down for a good read, and only then did I begin to find that the set could be 'customised' to virtually whatever mode of operation I wanted of it.

A typical example was during a shopping trip into the local city centre with my XYL, where we normally use 70cm handhelds to keep in touch. Here, I needed just a single channel, for low-duty cycle all-day operation. Also, the set's squelch going off due to local computer 'hash' or whatever in the middle of a shop can be somewhat embarrassing, so some degree of 'selective calling' was useful. No problem, recall one preprogrammed memory channel with all the required CTCSS or DTMF information in, switch in the battery economiser, then 'lock' the keyboard and rotary channel switch. Simple. Mobile operation in a new area of the country? Off with the battery (no need for that - a slide-on cover bottom cover for the set is even supplied as standard), a couple of leads (DC and aerial) plugged into the set top, and there was a rig the size of a handheld microphone. A press of the 'Up' button gave automatic scanning (unless of course, I'd locked the keyboard as before) with pre-set VFO frequency limits and auto-repeater shift, hence promoting driving safety (it's been shown in professional tests that far, far

more accidents can be caused through operating controls on a set rather than using a handheld mic).

After a while, I found the set 'grew' on me, in use I certainly appreciated the concertina-type 'quick reference guide' provided, this folding to the size of a credit card, as I could never remember how to program all the many different operating functions! The set's small handy size fitted nicely on my belt using the supplied clip, and with its reasonably inconspicuous appearance in my hand it saved the odd stare or two I usually get when wandering around with a handheld.

I generally found the performance of each set quite reasonable for a handheld, certainly the 70cm set didn't pick up anywhere near the amount of breakthrough I usually get from my very local 70cm packet node. This combined with reasonable sensitivity allowed me to use the set to operate through a semi-local 70cm repeater I normally have difficulty with in these circumstances. On 2m, I usually get mixing problems from my local fire station transmitters operating just above 2m, however I found little of this with the FT-26, likewise when off-tuning in 12.5kHz steps I found the rejection very good indeed for a handheld.

There was enough undistorted audio from the receivers to allow easy use out of doors without the need for an earphone, very good for such a small speaker. My transmitted audio was described as considerably more readable than my 'usual' (modern) handheld, although the internal microphone did tend to pick up some degree of background noise whilst walking along in

LABORATORY RESULTS:

All measurements taken at 145.0MHz (FT-26) and 433.0MHz (FT-76) unless stated.

RECEIVER;

Sensitivity;	
Input level required to give 12dB SINAD;	
FT-26	FT-76
0.130uV pd	0.165uV pd

noisy areas. However I often found in portable use that I could accidentally 'knock' many of the controls unless I 'locked' these - this needing a sequence of multiple button pushes to lock and unlock, which I felt was rather a complicated way of doing things.

Laboratory Tests

On each set the adjacent channel selectivity confirmed the good on-air results, together with the good blocking rejection measured this should allow the units to be used in the more 'RF hostile' areas we're now becoming used to. I found the 70cm IF rejection to be rather poor, especially considering the high IF of 45.1MHz used although this caused no problems in use.

With the ever-increasing performance of sets such as these, I sometimes wonder if this is a reflection of the level of RF congestion in the Tokyo area, the set's designers hence making sure they can use the sets in their local area before releasing them to the rest of the World!

Conclusions

A nice, small pair of handhelds that are modestly very powerful in terms of features offered. I found the sets to be extremely versatile, being able to be pre-programmed to a required type of operation and then simply 'locked'. With a given switch- on sequence they could even be limited to just memory channel operation, for example with operation just using the rotary knob with 'VFO' mode disabled, the 50 multi-function channels provided in the sets catering for most needs!

Even at the end of the review period I was still finding I could 'fine tune' yet more operating parameters to my needs. Although I found it difficult to remember all these functions in use, I'm sure that after a period of time these would probably become 'second nature'.

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

Squelch Sensitivity;

	FT-26	FT-76
Threshold;	0.090uV pd (5dB SINAD)	0.125uV pd (6dB SINAD)
Maximum;	0.210uV pd (21dB SINAD)	0.260uV pd (21dB 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;

	FT-26	FT-76
+12.5kHz;	64.5dB	55.5dB
-12.5kHz;	54.0dB	51.0dB
+25kHz;	73.0dB	61.0dB
-25kHz;	73.0dB	61.0dB

Blocking;

Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;

	FT-26	FT-76
+100kHz;	84.5dB	75.5dB
+1MHz;	92.5dB	83.5dB
+10MHz;	96.0dB	89.5dB

Intermodulation Rejection;

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

	FT-26	FT-76
25/50kHz spacing;	71.5dB	60.0dB
50/100kHz spacing;	70.5dB	59.5dB

Maximum Audio Output;

Measured at 1kHz on the onset of clipping;

	FT-26	FT-76
3 ohm load;	270mW RMS	245mW RMS
8 ohm load;	225mW RMS	210mW RMS
15 ohm load;	160mW RMS	165mW RMS

Image Rejection;

Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;

	FT-26	FT-76
	71.0dB	47.0dB

S-Meter Linearity;

Indication	FT-26		FT-76	
	Sig.Level	Rel.Level	Sig.Level	Rel.Level
1	Sq. Open	—	Sq. Open	—
2	0.38uV pd	0dB ref.	0.96uV pd	0dB ref.
3	0.50uV pd	+2.4dB	1.27uV pd	+2.5dB
4	0.67uV pd	+5.0dB	1.57uV pd	+4.3dB
5	0.88uV pd	+7.3dB	1.92uV pd	+6.1dB
6	1.09uV pd	+9.2dB	2.22uV pd	+7.3dB
7	1.45uV pd	+11.7dB	2.62uV pd	+8.7dB
8	1.71uV pd	+13.1dB	3.06uV pd	+10.2dB
9	2.21uV pd	+15.3dB	3.51uV pd	+11.3dB
10	2.85uV pd	+17.5dB	4.17uV pd	+12.9dB
11	3.52uV pd	+19.4dB	4.72uV pd	+13.9dB
12	4.51uV pd	+21.5dB	5.67uV pd	+15.5dB

Current Consumption;

	FT-26	FT-76
Standby, Squelch closed;	44.5mA	48.5mA
Receive, Mid Volume;	76.5mA	76.0mA
Receive, Max Volume;	99.5mA	99.0mA

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TX Power and Current Consumption;			
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FT-26	High	2.05W/950mA	4.87W/1.31A
	Low 3	2.06W/950mA	2.93W/1.04A
	Low 2	1.57W/760mA	1.57W/760mA
	Low 1	570mW/510mA	570mW/510mA
FT-76	High	1.67W/930mA	5.15W/1.47A
	Low 3	1.66W/920mA	2.75W/1.04A
	Low 2	1.51W/860mA	1.51W/800mA
	Low 1	520mW/550mA	520mW/520mA

Harmonics;		
	FT-26	FT-76
2nd Harmonic;	-74dBc	-65dBc
3rd Harmonic;	<-90dBc	-85dBc
4th Harmonic;	<-90dBc	-72dBc
5th Harmonic;	<-90dBc	—
6th Harmonic;	<-90dBc	—
7th Harmonic;	<-90dBc	—

Peak Deviation;	
FT-26	FT-76
4.65kHz	4.32kHz

Toneburst Deviation;	
FT-26	FT-76
3.21kHz	3.01kHz

Frequency Accuracy;	
FT-26	FT-76
-100Hz	-220Hz

South Midlands Co

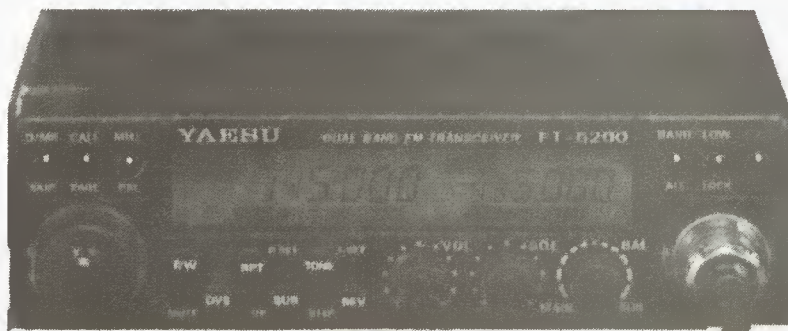
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Based on the remarkable performance and easy operation of the FT-1000, Yaesu's new FT-990, combines the basic technical features of that top-of-the-line model with several recent advances resulting in a spectacular performer at a very reasonable price.

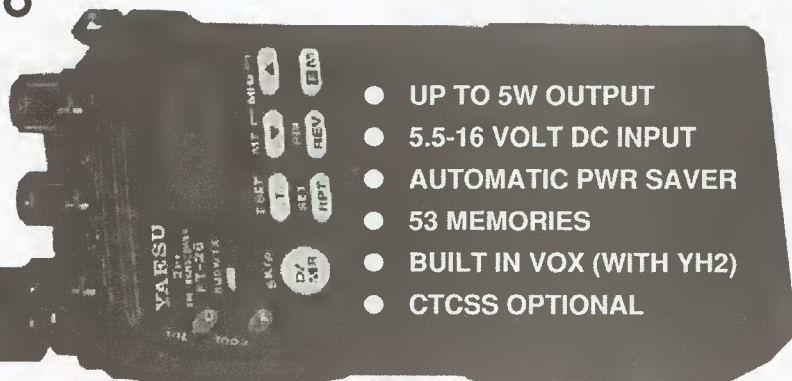
Utilising Direct Digital Synthesisers (DDS) and the extremely quiet receiver circuitry of its big brother, the FT-990 delivers silky smooth tuning, pure local signals and clear reception of even the weakest stations.

- ★ Amateur Bands 160-10m
- ★ General Coverage Receiver
- ★ 100W Output (25W AM Carrier)
- ★ 50 Memories
- ★ Built in icmbic memory keyer

So if you're looking for top performance in an HF transceiver, try out the FT-990.

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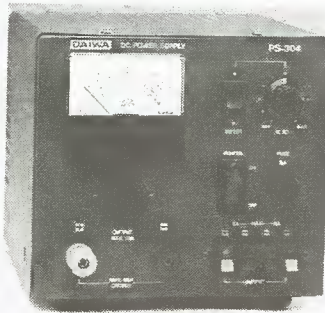
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HC100	C.T.U. 80-10M 5 band 200W P.E.P.	£109.00	B
HCF100	C.W. Narrow filter HT series	£39.85	A
HNB100	Noise Blanker HT series	£19.95	A
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HL100B/20	20m 10W in 80/160W output P.E.P.	£182.00	C
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HL36U	70cm 6/10W in 25/30W output	£138.00	B
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TRANSVERTERS

HX240	2m to HF 80, 40, 20, 15 & 10m		
	2.5W/10W in 30-40W P.E.P. output	£254.50	B
HX640	6m to HF as above	£254.50	B

COMET PRODUCTS

BALUNS

CBL-30	1:1 1.7-30MHz, 1kW P.E.P.	£18.95	A
CBL-2000	1:1 0.5-60MHz, 2kW P.E.P.	£25.50	A

HANDHELD ANTENNAS

CH72S	2m/70cm BNC 0dB/3.2dB 2m/70cm	£12.25	A
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MOBILE ANTENNAS

CA2x4MB	2m/70cm 4.5dB/7.5dB 2m/70cm	£38.50	C
CA2x4KG	2m/70cm 6.0dB/8.4dB 2m/70cm	£40.75	C

DUPLEXERS

CP-305	50/144 Duplexer UHF conn.	£25.00	B
CP416MN	144/430 Duplexer UHF/N conn.	£26.00	B
CFX-514	50/144/430 Triplexer UHF conn.	£36.75	B
CFX4310	144/430/1200 Triplexer UHF/N conn.	£36.75	B

MOUNTS

TBR	Adjustable trunk mount	£11.50	B
RS17	Mini trunk mount	£12.75	A
RS16	Mini Gutter mount	£12.75	B
CR-3LX	Mini Cable Assy for RS16/RS17	£16.25	B

MINI MOBILE ANTENNAS

CHL21J	2m/70cm 0dB/2.15dB 2m/70cm	£14.75	B
CHL23J	2m/70cm 2.15dB/3.8dB 2m/70cm	£17.35	B

BASE ANTENNAS

CA350DB	6m/10m 2.15dB/6.5dB	£139.00	D
CA2x4WX	2m/70cm 6.5dB/9.0dB	£80.72	C
CA2x4MAX	2m/70cm 8.5dB/11.9dB	£102.12	C

FILTERS

CF-30MR	HF Cut off 32MHz 1kW P.E.P.	£38.75	B
CF-50MR	6m Cut off 54MHz 1kW P.E.P.	£38.75	B
CF-30H	HF Cut off 32MHz 2kW P.E.P.	£80.75	A
CF-30S	HF Cut off 32MHz 150W cw	£19.35	A
CF-50S	6M Cut off 57MHz 150W cw	£20.35	A
CF-BPF2	2m Band Pass 150W cw	£31.65	A

METERS SWR/PWR

CM-420	2m/70cm 15-50W Mini	£36.75	B
CD-120	1.8-200MHz 15/60/200W	£76.60	B
CD-160H	1.6-60MHz 20/200/2000W	£90.85	B
CD-270D	140-525MHz 15/60/200W	£79.65	B

COAX SWITCHES

CSW-20	2 way DC-1000MHz SO239	£26.50	A
CSW-20N	2 way DC-1500MHz N	£45.95	B

ACCESSORIES

CEP-M2	Earphone 3.5mm jack	£1.28	A
CES-M2	Mini Clip on Speaker 3.5mm jack	£5.62	A
CHM-M4	Mini mic + PTT 2.5mm jack	£9.15	A

PRICES FOR POSTAGE ON ALL THE ABOVE ITEMS ARE CODED AS FOLLOWS:

A = £1.75	D = £10.00
B = £4.00	E = £15.00
C = £6.00	

STRUMECH VERSATOWER

STANDARD 13M20 SERIES

13M20P25	25FT POST MOUNT	£468.83
13M20P40	40FT POST MOUNT	£660.35
13M20P60	60FT POST MOUNT	£777.85
13M20FB25	25FT FIXED BASE MOUNT	£324.30
13M20FB40	40FT FIXED BASE MOUNT	£442.33
13M20FB60	60FT FIXED BASE MOUNT	£609.83
13M20BP25	25FT BASE PLATE MOUNT	£553.43
13M20BP40	40FT BASE PLATE MOUNT	£767.28
13M20BP60	60FT BASE PLATE MOUNT	£863.63
13M20M25	25FT MOBILE TOWER	£2226.63
13M20M40	40FT MOBILE TOWER	£2439.30
13M20M60	60FT MOBILE TOWER	£2613.20

HEAVY DUTY 16M20 SERIES

16M20P40	40FT POST MOUNT	£820.15
16M20P60	60FT POST MOUNT	£930.60
16M20P80	80FT POST MOUNT	£1457.00
16M20FB40	40FT FIXED BASE MOUNT	£658.00
16M20FB60	60FT FIXED BASE MOUNT	£780.20
16M20FB80	80FT FIXED BASE MOUNT	£1245.50
16M20BP40	40FT BASE PLATE MOUNT	£869.50
16M20BP60	60FT BASE PLATE MOUNT	£972.90
16M20BP80	80FT BASE PLATE MOUNT	£1563.93
16M20M40	40FT MOBILE TOWER	£2909.30
16M20M60	60FT MOBILE TOWER	£3031.50
16M20M80	80FT MOBILE TOWER	£3760.00

MIDITOWER SERIES

P30	30FT POST MOUNT	£500.55
BP30	30FT BASE PLATE MOUNT	£528.75
FB30	30FT FIXED BASE MOUNT	£429.09

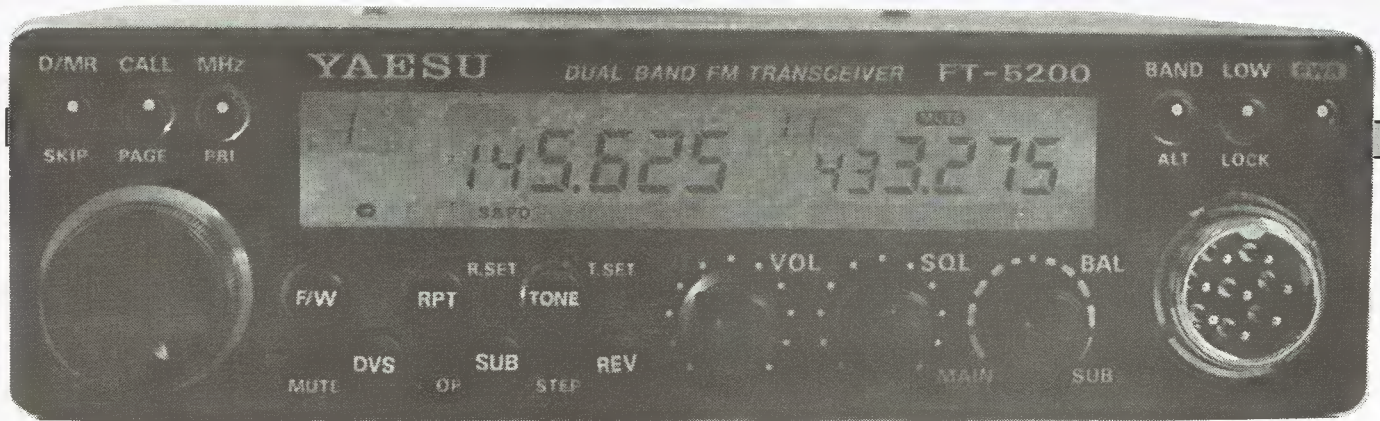
36FT VERSIONS OF ABOVE.
1 EXTRA SECTION ADD £45.83

All towers except mobiles are available from stock 13M20 and 16M20 series all supplied with auto brake winches. All are supplied with H2R head unit drilled to take GS-065 bearing. Holding down bolts for BP and FB towers are available at £29.38 per set extra.

Alternative winches and head units are available at extra cost.
Delivery is by quotation dependent upon distance.



- Free Finance on selected items, subject to status. Details available on request.
- Up to £1000 instant credit, a quotation in writing is available on request, subject to status.
- Yesu Distributor Warranty, 12 months parts and labour.
- Carriage charged on all items as indicated or by quotation.
- Prices and availability subject to change without prior notice.
- Same day despatch wherever possible.



Yaesu FT-5200

Review

*Yaesu's new remote mount dual bander —
Chris Lorek tests Yaesu's new digitised
speech mobile*

In around the same size as its single-band counterpart, Yaesu's new dual band mobile offers high power output combined with optional digital speech storage of calls you've missed. Never again need you miss that message from stations calling you! The HRT team did it again with another 'hot' review of the latest gear.

Features

The set measures a small 140mm (W) x 40mm (H) x 155mm (D), providing 50W transmit power output on 2m and 35W on 70cm with a switchable low power facility for local QSOs, an enclosed thermostatically controlled fan on the rear panel keeping the heatsink size down. A quick-release bracket is provided for mobile use, with an optional cable available for remote mounting.

The set offers the now-usual simultaneous receive on both bands with cross-band full duplex operation, twin frequency/channel displays showing you exactly what the set is up to on each band.

Easy To Use Controls

To keep operation on the move easy whilst minimising the number of controls, the separate volume and squelch knobs normally control the 'primary' band, this being changed between 2m and 70cm by the push of the 'Band' button. The primary band is always being displayed on the left hand side of the front panel LCD, and a rotary 'balance' control is used to vary the respective levels of received audio from the primary and secondary bands. Separate speaker jacks for main and sub bands are fitted, plugging an external speaker in disables the internal speaker for that band. This dual speaker capability hence lets you monitor audio from each band from different speakers, so when opera-

ting mobile you can tell which band is active without the need to take your eyes off the road.

Normally, the channel selector knob, keys, buttons, and volume and squelch control affect only the primary band and display, although this may quickly be switched to the secondary band if needed. A 'second function' can also be used to toggle the band memory selection and scanning alternately between the 2m and 70cm bands automatically as you tune, so one set of controls does for all. An 8-level automatic dimmer for the display and controls saves you being distracted by glare when driving at night.

Frequencies

The set covers the 2m and 70cm bands in the usual independently selectable steps. A programmable automatic repeater shift is also fitted which, if you

wish, automatically switches in the correct transmitter offset for you when you're in the repeater section of the band, this sub-band being set in 100kHz steps.

A total of 32 memories (16 on each band) are fitted, these being designated channels 1-13, C, L, and U, each memory channel storing single or separate receive and transmit frequencies, repeater shift, and the programmed CTCSS tone data. To get back to your favourite frequency at any stage without too much fumbling around with the controls, memory 'C' (the 'Call' channel) can quickly be recalled by a press of the front panel 'Call' button. Each of the memories can also act as a tunable VFO to provide a degree of flexibility.

As well as band and memory channel scanning, programmable sub-band limits may be set on each band, so you can confine normal operation of the set to the band segments you're interested



in, just the FM channels for example. The upper and lower limits are stored in the 'L' and 'U' channels, the automatic repeater shift if programmed also comes in when you tune to the appropriate band segment.

An alternating band function may be switched in, this alternates the memory scan between the two bands so that all active memories are scanned by a single button push, the set automatically transferring the memory in use to the 'primary' band. Two scan-resume modes are fitted, you can select either 'Pause' mode where the set pauses for as long as the carrier keeps the squelch open, or a 5-second mode where the set pauses for 5 seconds and then carries on regardless of the squelch state. If you'd just like to keep a check on a couple of frequencies on each band, then a priority channel monitor may be switched in, this checks activity on a memory channel every 5 seconds whilst you're operating on the dial or other memories.

All the stored memory data from

1' wireless microphone/controller, which duplicates the set's controls including volume and squelch adding a DTMF keypad and microphone, although at the time of writing this was not available in the UK.

CTCSS and DTMF Signalling

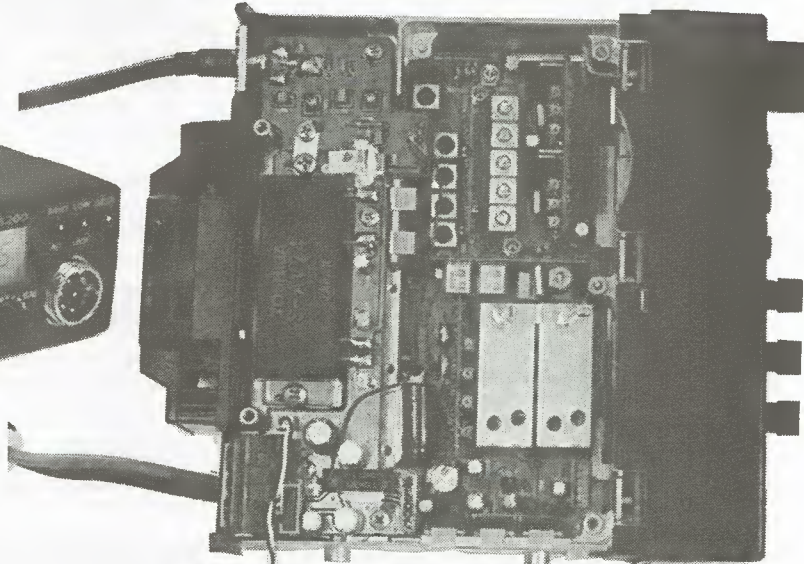
Several UK repeaters already use CTCSS with further usage planned, the FT-5200's built-in sub-tone encoder can be used here when needed for repeater access and control, the tone being pre-settable from the usual standard group of sub-tones in use. If you'd like decode facilities as well, a plug-in option provides this with fitted decoders for both bands.

In the latter case, a CTCSS 'Bell' operation also allows you to program the set to alert you with a telephone-type 'ring' for a few seconds when a signal

band, to store your ID, that of the calling station, and those of five other stations or groups for calling/monitoring. 'Full' DTMF encode for auto-patching however requires an optional keypad microphone.

Digital Voice Storage

The DVS-3 option combines all functions of the DTMF paging/code squelch option, adding digital voice recording and playback memory, allowing recording from either the microphone or the receiver, and playback through the loudspeaker or on the air. A one-megabit RAM (random Access Memory) on the DVS-3 can be used either as a single memory block, or grouped in up to eight segments, giving a total of 128 seconds of recording and playback. The microphone Up/Down buttons activate and deactivate the recording and playback, whilst the S-meter shows the relative



one transceiver can be copied to another by using a connecting lead between the two microphone jacks. The microphone connector also has all the connections required for packet radio TNC interconnection, and a receiver 'busy' squelch line output may be internally linked to this if needed.

Remote and Wireless Operation

A quick-detach front panel, this being designed primarily for remote mounting, lets you remove the small front panel and slip it in your pocket when you're leaving the car, thus reducing the possibility of theft of the rig. 3m and 6m length remote cables are available for remote mounting the set, i.e. with the control panel on your dashboard thus minimising your eye-travel distance from the road ahead, with the main body of the set securely bolted under your seat or whatever.

A unique option is that of the 'MW-

with the correct CTCSS tone appears, a small bell symbol on the LCD continuing to flash to let you know you've been called.

The set also has the optional facility of DTMF Code Squelch and Paging. This system uses a DTMF tone encoder/decoder to provide paging and selective calling using the now-standard three-digit DTMF sequence (watch out for a future HRT article on this system). Briefly though, in the DTMF code squelch mode your receiver stays silent to all signals not prefixed by your selected 3-digit code, as soon as when this is received your receiver bursts into life. The DTMF paging mode goes one stage further, where as well as alerting you to a call, your set indicates the three-digit ID of the station who's called you. 'Group' pages and so on may be used for group calling use and the like. Seven 3-digit DTMF memories can be used on each

time elapsed. I tested this system in the May 1988 HRT review of the FT-212, and I'd refer readers to this for further information and on-air results.

In Use

I found programming up the memories was very simple indeed, these I did within a few minutes. After a brief period of familiarisation in the shack, the set then went in the car for a 'real' test of how easy it was to operate on the move. Searching for activity was very simple, here I placed the set in 'Alt' mode and just hit the 'Up' button on the microphone. The set then scanned sequentially through all the 2m and 70cm channels I'd programmed, automatically selecting the 'main' band for transmit control each time. Here, when the set stopped scanning due to a signal being received, I just needed a quick

press on the mic PTT to halt the scan on that channel. After either listening for a while, or indeed having a chat, a further press of the microphone 'Up' button again started the set scanning through all the 2m/70cm channels — the height of simplicity!

A press of the 'Band' button resumed normal primary/secondary band control operation, so I could, for example, set the 70cm channel to that of my local repeater whilst scanning the 2m simplex channels using the selected band-scan limits I'd programmed. Here I found the automatic 'mute' facility handy, this saved me a bit of confusion with signals from both bands coming out of the same speaker. After a while, I fitted a single extension speaker to differentiate between audio from each band. The difference here was very worthwhile, as I found the set far easier to use with audio from separate bands coming from different speakers — a quick rotation of the 'balance' control then setting audio levels as needed.

I must say that I found some of the buttons rather on the small size for easy operation on the move, however if I kept to just the memory channels and used the microphone mounted buttons to control the rig, I gained a good degree of control. I found the receiver sensitivity on 70cm was rather 'down' on what I would have expected, with the set's transmitter on high power I could often get into distant repeaters far better than I could hear them. My audio quality however using the supplied microphone was repeatedly described as 'excellent', producing good readability without excessive background noise. I found the microphone sat in my hand nicely, the Up/Down and toneburst buttons all being naturally positioned to use without having to move my fingers around.



Sensitivity;

Input level required to give 12dB SINAD;

145MHz	433MHz
0.115uV pd	0.190uV pd

LABORATORY RESULTS: RECEIVER;

Squelch Sensitivity;

	145MHz	433MHz
Threshold;	0.07uV pd (3dB SINAD)	<0.06uV pd (<2dB SINAD)
Maximum;	0.190uV pd (23dB SINAD)	0.290uV pd (23dB 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;

	145MHz	433MHz
+12.5kHz;	37.5dB	47.0dB
-12.5kHz;	37.5dB	34.5dB
+25kHz;	67.5dB	73.0dB
-25kHz;	67.0dB	73.0dB

Blocking;

Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;

	145MHz	433MHz
+100kHz;	83.0dB	87.0dB
+1MHz;	95.0dB	94.5dB
+10MHz;	96.5dB	96.5dB

Intermodulation Rejection;

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

	145MHz	433MHz
25/50kHz spacing;	65.0dB	68.0dB
50/100kHz spacing;	62.0dB	67.0dB

Maximum Audio Output;

Measured at 1kHz on the onset of clipping;

	145MHz	433MHz
3 ohm load;	1.30W RMS	1.85W RMS
8 ohm load;	675mW RMS	1.03W RMS
15 ohm load;	380mW RMS	565mW RMS

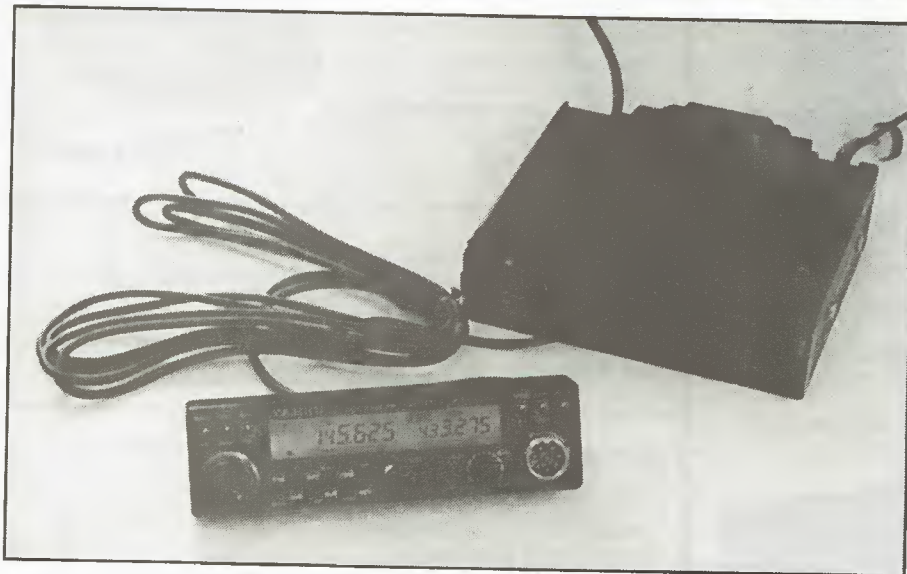
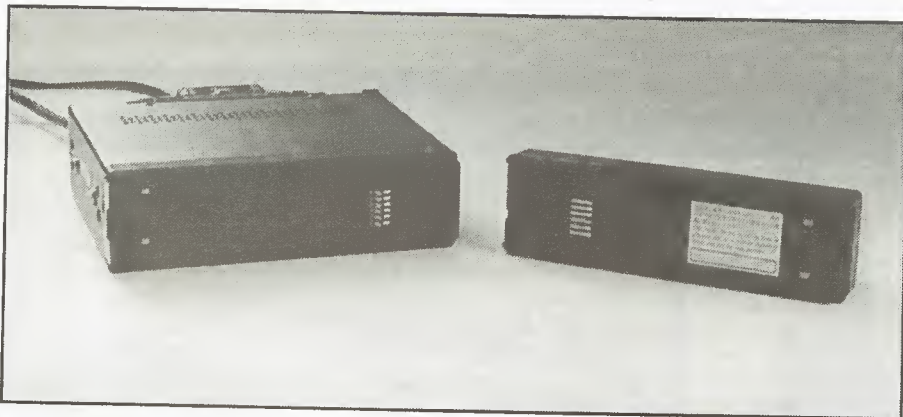
Image Rejection;

Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;

145MHz	433MHz
82.0dB	74.0dB

S-Meter Linearity;

Indication	145MHz		433MHz	
	Sig.Lev.	Rel.Lev.	Sig.Lev.	Rel.Lev.
2	0.20uV pd	0dB ref.	0.28uV pd	0dB ref.
4	0.36uV pd	+5.1dB	0.42uV pd	+3.4dB
6	0.57uV pd	+9.2dB	0.71uV pd	+8.0dB
8	1.06uV pd	+14.5dB	1.14uV pd	+12.2dB
10	1.86uV pd	+19.4dB	1.95uV pd	+16.8dB
12	3.53uV pd	+25.0dB	3.30uV pd	+21.4dB
14	7.42uV pd	+31.4dB	6.90uV pd	+49.2dB



Using the set from home, I found the rejection of signals from my local packet nodes on 2m and 70cm to be quite reasonable, but the 12.5kHz rejection, especially on 2m, was a little limiting.

Self-Contained Repeater

A very useful feature I found the set to have was that of a fully automatic cross-band repeater. In this mode, by using an external diplexer and feeding the 70cm side into a dummy load in the shack, I could happily wander around the house with my 70cm handheld on 'extra-low' power using the set remotely. Here, I could operate on a 2m channel for example by using the FT-5200's 50W output into the rooftop aerial under short-range control from my 70cm portable — very nice! (and quite legal under the standard UK licensing conditions).

Insides

The set is made from a tough alloy chassis for the main unit housing the RF circuitry, the totally separate front panel assembly housing the control circuits. On the main unit, a number of 'daughter'

boards mounted on a main 'mother' board are used, thus allowing faultfinding and repair by sub-board replacement. The rear of the unit houses the block transmitter power amplifier modules, these being in direct line of the

TRANSMITTER;

TX Power and Current Consumption;

Voltage Supply	Power	145MHz	433MHz
10.8V	High	35.2W/8.65A	20.2W/6.50A
	Low	4.98W/3.85A	4.87W/3.80A
13.8V	High	50.5W/10.15A	36.5W/8.70A
	Low	4.95W/3.90A	4.87W/3.85A
15.6V	High	50.5W/10.20A	36.2W/8.70A
	Low	4.90W/3.90A	4.85W/3.90A

Harmonics;

	145MHz	433MHz
2nd Harmonic;	-72dBc	-70dBc
3rd Harmonic;	-85dBc	-75dBc
4th Harmonic;	<-90dBc	-82dBc
5th Harmonic;	<-90dBc	-
6th Harmonic;	<-90dBc	-
7th Harmonic;	<-90dBc	-

Peak Deviation;

145MHz	433MHz
4.92kHz	4.89kHz

Toneburst Deviation;

145MHz	433MHz
3.04kHz	2.01kHz

Freq Accuracy;

145MHz	433MHz
-190Hz	-410Hz

rear panel mounted fan. Metal top and bottom lids complete the case, the internal speaker being fitted to the set itself rather than one of the lids. The limited amount of room left in the body of the set case is there just to provide space for options such as the DVS-3 speech memory — it's all squeezed in nicely!

Laboratory Tests

The measured transmitter power gave a healthy account of itself, the deviation was correct, and in all a good performance resulted. On receive the overall performance seemed reasonable, although as found on air the 70cm receiver side didn't match the very high sensitivity of the 2m receiver. The adjacent channel rejection of 12.5kHz signals was adequate, that of 25kHz significantly better of course, although this slightly wider bandwidth should help in producing better detection of packet radio data.

Conclusions

The set is a nice small size, the similarly small detachable front panel lends itself to remote mounting in even the tiniest spaces in today's car dashboards. The CTCSS encoder fitted as standard is a welcome sign with more and more UK repeaters using this system, and I'm sure the optional digital voice storage on the set could come in quite useful.

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

N.M.C. THE NAME IN INNOVATIVE COMMUNICATION PRODUCTS

The new **AR2000** predecessor of the **AR1000** with improved performance!

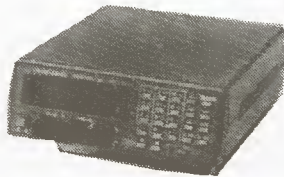
- * Extra wideband coverage **500kHz-1300MHz** (No Gaps)!
 - * **1000** Channel memory
 - * Receives **AM, FM (Narrow) FM (Wide)**.
 - * Selectable steps from **5kHz-995kHz**.
 - * Switchable Attenuator **10db**.
 - * Keypad entry or rotary tune controls
- Accessories Supplied
- * **DA900** single wide band whip aerial for VHF/UHF
 - * AC charger
 - * **4XAA** High capacity rechargeable Nicad batteries
 - * **12V DC** lead for mobile operation
 - * Soft case with carry strap
 - * Belt hook.



£255 + Carr "B"

The new **AR2500** predecessor of the **AR2002** with improved performance

- * Frequency coverage **5-550MHz + 800-1300MHz** (1.3GHZ)
 - * **1984** Channel Memory (Elephant Memory)
 - * All Mode: **AM, FM (Narrow) FM (Wide) USB, LSB, and CW**.
 - * Search/Scan speed: up to **36** channels or increments per second.
 - * Computer control via **RS232** serial port.
 - * Switchable attenuator **20dB**
 - * Keypad entry or rotary tune controls.
- Accessories supplied
- * AC Adaptor **13.8V DC**
 - * **12V DC** lead for Mobile use
 - * Mobile mount and whip aerial.



£415 +carr "C"

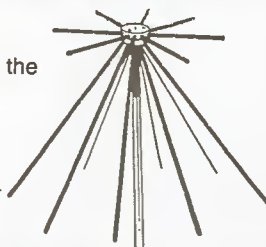
NMC3 Telephone call filter-monitor

- * Call-Screen: Displays the number of incoming call
- * Call-Filter: No more unwanted calls,
- * Call-Counter: Check number of calls on return
- * Call-Register: Stores 40 incoming call numbers and the time of call
- * Call-Monitor: Listen to any noise in your home/office by a secret code when calling,
- * Normal time display
- * Memory back-up during power cut
- * Can connect both tone or pulse telephone systems,
- * 20 phone number memories can be stored and recalled

£139 +carr "C"

DA3000 Wide Band 16 Element Discone Aerial, for external mounting

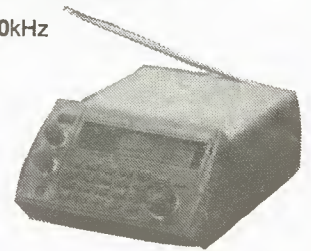
- * Frequency coverage **25MHz-2000MHz** (2GHZ)
 - * **16** stainless-steel elements to reduce the effects of weathering.
 - * Light weight **1.1kg**
- Accessories supplied
- * **300mm** aluminium support pole provided
 - * **15m** (approx) coaxial cable supplied
 - * **U bolts** and clamps provided
 - * simple to follow instructions sheet.



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The **AR3000** top of the range professional monitor receiver.

- * Frequency coverage **100kHz-2036MHz** (2.3GHz!!)
 - * **400** Channel Memory
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 - * Search/Scan speed: up to **20** channels or increment per second.
 - * Selectable steps from: **50Hz-100kHz**
 - * Computer Control via **RS232** serial port
 - * Switchable attenuator **20dB**
 - * Keypad entry or rotary tune controls
 - * **4** priority channels
- Accessories supplied
- * AC adaptor **13.8 VDC**
 - * **12V DC** Lead for mobile use
 - * Telescopic Antenna
 - * Operating manual



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ACEPAC 3 Computer control with the **AR3000**

- * **IBM-PC** based program to increase the versatility of the **AR3000**

For more details on this program please phone !!!

£115 +carr "A"

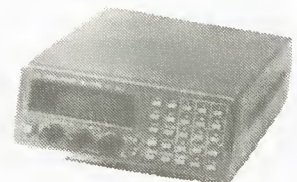
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- * Transmit frequency **88-108MHz**
- * Exceptionally good range
- * Powered by **9 volt** battery
- * Size **8 x 6.5 x 2.5mm**

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The New **AR2800** superior **SSB/CW** receive performance and versatility

- * Frequency coverage: **500kHz-600MHz** and **800MHz-1300MHz** (1.3 GHZ)
- * **1000** channel memory
- * All mode: **AM FM (narrow) FM (Wide) USB, LSB, and CW**
- * Search/Scan Speed: up to **20** channels or increments per second.
- * Search banks: **10** programmable banks
- * Frequency steps: **5kHz** to **995kHz** in **5** or **12.5kHz** steps
- * Keypad entry or rotary tune controls Accessories supplied
- * AC adaptor **13.8V DC**
- * **12V DC** Lead for mobile use
- * Mobile mount and whip aerial.



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SCANNERS

INTERNATIONAL

Here we are with yet another up-to-date review, this time of the latest Yupiteru handheld scanner to hit the market. Next month we've a £99 Realistic mobile scanner review all lined up, I've already been using this for several weeks and it certainly makes a change from Radio 1!

On the subject of listening in, the media have yet again been in contact with us, and 'Scanners International' was the only publication to get a mention in a serious feature on Airband reception in

a Sunday newspaper. Maybe we shouldn't have published our 'scandal' last month on the so-called scanning receiver advertised in their pages. On the other hand, why not - we don't want our readers to be ripped off!

As promised, this month we've the latest, up-to-date, buyers guide to scanners for you - with the Leicester Exhibition now just weeks away we know you'll find it handy. If you're visiting the event, why not come along to the Argus Publications/Scanners International stand and say hello - we'll have some of the 'big names' in scanner writers there also.

Next month, you'll be receiving a freebie insert with this magazine, entitled 'Personal Communications'. This will cover all manner of radio communications for the 'man in the street', including scanners, the amateur radio Novice licence, short wave listening, handheld transceivers, CT2 telephones, even cellular communications for the consumer (no - not the purely business person - one study has shown that around half the cellphones now bought in the UK are for personal use). Watch out for it, or better still place an order with your newsagent!

SCANNERS

Free Readers Advertisements

Want a scanner? Got a receiver or aerial to sell? Then advertise FREE in the next issue of *Scanners International*. Just fill in the coupon below and send it to:

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FOR SALE

Realistic PRO2005 scanner, 400 memories, 25-520MHz, 760-1300MHz, AM/FMN/FMW, £250 ono, boxed. Will exchange for Short Wave scanner. Contact Bob (Dawlish, Devon), Tel. 0626 862465 after 7pm.

WIN 108, unwanted gift, immaculate, £130. Contact Basil (Chiswick), Tel. 081 994 8435

JIM PSU MkIII, hardly used, as new, £15. Contact Ian on Rossendale 220863

Realistic PRO2002, 50 channel AM/FM scanner 68-88, 108-174, 410-512, 12V or mains power, boxed with automatic memory, battery charger, £120. Contact Robert Trussler (Hamilton, Strathclyde), Tel. 0698 286078

Icom ICR-100 scanner, 500kHz-1.8GHz, almost new, still under guarantee, £400. Contact Mr. K. Newton (Bromley, Kent), Tel. 081 467 4796 evenings

Realistic PRO-2006 scanner, 400 memories, 25-520MHz, 720-1300MHz, AM/

FMW/FMN, latest model, mint, £230. Contact L. Bridle (Northolt, Middx), Tel. 081 845 8292

AR-3000 communications receiver, still in box, only six months old, today's price £779, sell for £595. Contact Lindsay (Aberdeen), Tel. 0224 583110

Realistic PRO-32, VHF/UHF/Airband handheld scanner, 200 memories, four frequency bands, 68-512MHz, excellent working order, £125 ono, buyer collects or carriage extra. Contact Terry Bruce (Luton), Tel. 0582 23750

Icom IC-R1 handheld communications receiver, complete, carrying case and spare battery pack plus charger, £400. Yaesu FRT-7700 ATU, £40. (Ellesmere, Salop.) Tel. 0691 622368

EXCHANGE

Tono 550 communications terminal, Morse, RTTY, ASCII, and CW tutor with manual, for a Fax-1 unit or similar WHY? Contact Derek Griffiths (Widnes, Cheshire), Tel. 051 420 6424

PRO-2005/4 scanner wanted, in part exchange for a Yaesu FT101ZD, cash adjustment. Contact J. Tarleton (Burton-on-Trent) Tel. 0283 221870

Realistic PRO-2024 brand new, boxed, 68-88, 118-136 (AM), 138-174, 380-512, Yaesu FRG-7700 HF RX, 0-30MHz, excellent condition, no mods! Exchange for AR2800, FRG9600 (with Raycom Mk.V upgrade), R2000 (with VHF) or WHY? Haggle? Contact Tony, (Brighton), Tel. 0273 622012 anytime.

Name

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SCANNERS Free Readers Advertisements

Date

Enter your advert in the boxes below

Buyers Guide

In plenty of time for the Leicester Show in October, which is now a matter of weeks away, we present the very latest selection of the scanners you'll find on sale today. This list gives their frequency coverage, modes of operation, numbers of memory channels available for storage of your favourite frequencies, and the typical price of each one together with the date of review in either *Scanners International* (SI) or *Ham Radio Today* (HRT).



▲ AR-2800

▼ The Realistic PRO-2006 uses Hyperscan which allows very fast scanning



Handheld scanners

Make	Freq Coverage	Modes	Memory Ch.	Typ. Price	Reviewed
AR 800E	75-105 118-174 406-495 830-950	AM/FM	20	£169	HRT Sep 88
AR 900	108-174 220-280 300-380 406-470 830-950	AM/FM	100	£199	HRT Aug 89
AR 1000 MkII	0.5-600 805-1300	AM/FM/ WFM	1000	£249	SI No.3
AR 2000	0.5-1300	AM/FM/ WFM	1000	£259	
Bearcat UBC50XL	66-88 136-174 406-512	FM	10 No search	£100	HRT Apr 88
Bearcat BC55XLT	29-54 136-174 406-512	FM	No search	10 £99	
Bearcat BC70XLT	66-88 118-174 406-512	FM AM Air	20	£199	HRT Jul 88
Bearcat UBC100XL	66-88 118-174 406-512	FM AM Air	16 No.1	£179	SI
Bearcat UBC100XLT	66-88 118-174 406-512	FM AM Air	100	£199	HRT Apr 87
Bearcat UBC200XLT	66-88 118-174 406-512 806-956	FM AM Air	200	£229	SI No.1
Black Jaguar MkIII	28-30 50-88 115-178 200-280 360-520	AM/FM	16	£199	HRT Jun 88
Fairmate HP-100	15-550 805-1300	AM/FM/ WFM	1000	£249	HRT Apr 90
Fairmate HP-200	0.5-600 805-1300	AM/FM/ WFM	1000	£269	
Icom IC-R1	0.1-1300 WFM	AM/FM/ WFM	100	£369	SI No.2
Regency HX850E	60-89 118-136 140-174 406-495	AM/FM	20	£179	
Regency HX-2000	60-89 118-174 406-512	AM/FM	20	£99	HRT Jan 87
Sony AIR7	0.1-2.2 76-136	AM/FM/ WFM	30	£229	
Sony ICF PR080	0.15-108 115-223	AM/FM/ SSB	40	£299	HRT Dec 87
Realistic PRO34	68-88 108-136 136-174 380-512 806-960	FM/ AM Air	200	£249	
Realistic PRO38	68-88 136-174 406-512	FM	10	£99	
WIN108	108-143	AM	20	£179	
Yupiteru VT-125	108-142	AM	30	£179	SI Sep 91
Yupiteru MVT5000	25-550 800-1300	AM/FM	100	£249	HRT Nov 89
Yupiteru MVT7000	8-1300 WFM	AM/FM	200	£289	SI Aug 91

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SCANNER SPECIALIST

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Base/mobile scanners

Make	Freq Coverage	Modes	Memory Ch.	Typ. Price	Reviewed				
AR-950	60-88 108-136 137-174 220-290 291-380 406-470 830-950	AM/FM	100	£254					
AR-2002	25-550 800-1300	AM/FM/ WFM	20	£487	HRT Oct 86				
AR-2500	0.5-1500	AM/FM/ WFM/SSB	1984	£419					
AR-2800	0.5-600 800-1300	AM/FM/ WFM/SSB	1000	£395					
AR-3000	0.1-2036	AM/FM/ WFM/CW/ SSB	400	£759					
Bearcat UBC175XL	66-88 118-174 406-512	FM AM Air	16	£169					
Bearcat UBC760XLT	66-88 108-174 350-512 806-956	FM AM Air	100	£235					
Bearcat BC800XLT	29-54 118-174 406-512 840-912	FM AM Air	40	£149					
Bearcat UBC950XLT	29-54 118-174 406-512 806-956	FM AM Air	100	£235	SI No.1				
Icom IC-R100	0.1-1800	AM/FM/ WFM (SSB opt.)	100	£510	SI No.2 (No.3)				
Icom IC-R7000	25-1300	AM/FM/ WFM/SSB	99	£925	HRT Feb 89				
Icom IC-R9000	0.1-2000	AM/FM/ WFM/SSB/ CW/FSK AM/FM	1000	£3995					
JIL SX-200N	28-88 108-180 380-514 26-520	AM/FM/ WFM	16	£325					
JIL SX-400N	25-550 800-1300	AM/FM/ WFM	1000	£369					
Jupiter MVT6000	0.5-905	AM/FM/ WFM	100	£465					HRT May 88
Kenwood RZ-1	0.5-600 805-1300	AM/FM/ WFM	1000	£279					
Nevada MS1000	25-520 760-1300	AM/FM	400	£329					SI No.1
Realistic PRO2005	25-520 760-1300	AM/FM	400	£250					SI Jun 91
Realistic PRO2006	68-88 108-136 136-174 380-512 806-960	FM AM Air	200	£229					
Realistic PRO2022	68-88 108-136 136-174 380-512 806-960	FM AM Air	60	£159					
Realistic PRO2024	26-32 60-90 118-180 380-512	AM/FM	50	£225					
Revco RS-3000	108-143 220-380	AM	60	£255					
Signal R535	0.15-30 76-108 116-136	AM/FM/ SSB	32	£299	SI No.1				
Sony ICF 2001D	50-905	AM/FM/ WFM	100	£545					
Standard AX700	60-950	AM/FM/ WFM/SSB	100	£520	HRT Jul 87				
Yaesu FRG9600									

Yupiteru MVT-7000 Handheld Scanner

At this year's NEC exhibition, the new Yupiteru MVT-7000 handheld scanner was revealed, however before the event *Scanners* were pleased to be offered one of only two in the UK for an exclusive review!

This handheld scanner differs from its predecessor the MVT-5000 in several ways. Not only does it look different with its rounded edges but it covers the range of 8-1300MHz at full performance, you can also enter frequencies down to 100kHz into the set albeit with reduced sensitivity given. Together with this extended coverage, it adds wideband FM as a reception mode so you can listen to FM broadcast stations or even TV sound on the scanner.

Measuring 64(W) x 159(H) x 40(D)mm and weighing around 300g, it comes in a nicely styled black plastic case with a multi-function tactile keypad to-

gether large LCD panel displaying the frequency, memory channel etc.

Memories

The set can store up to 200 memory channels, these being arranged into 10 banks of 20 channels each. This arrangement allows you to separate banks of channels for your specific interests, for example 2m FM amateur frequencies in one bank, VHF FM broadcasts in another, VHF AM airband in another, HF AM broadcasts in another and so on. As well as this, you can program in 10 search bands of frequencies for general listening within a user-programmed range, the front panel keypad being marked with logos

such as 'FM', 'AIR V', 'AIR U' and so on to allow you to act as a memory-jogger for your programmed ranges (it comes supplied pre-programmed with Japanese frequency bands, which may of course be re-programmed as required). You can program the set to increment in 5, 10, 12.5, 25, 50 or 100kHz steps (50 or 1200kHz steps on WFM) on each range, hence the set can be 'personalised' to your requirements regardless of which country/area you're using the set in.

You can scan through the memory channels at the rate of 16 channels/sec (20 channels/sec in search mode), the set halting as usual on a 'busy' channel, i.e. when the receiver squelch lifts. The usual 'Delay' may also be programmed to keep



A rigid telescopic aerial is supplied for us with the set rather than the more usual flexible helical, this plugs into the set-top BNC connector and may be extended to the length required, the maximum length being 51cm. A 3.5mm jack socket lets you plug in the supplied earphone for private listening, or indeed an external speaker if you wish. The scanner runs from four AA size batteries which fit into a compartment at the bottom rear of the set, dry cells being supplied with the review sample. A small DC socket on the case side allows an external 12V DC supply to be connected, a power lead terminated in a car cigar lighter plug being supplied with the review sample together with a plug-in mains adaptor. Carrying aids supplied are a belt clip and a carry strap to help stop you dropping the receiver in use.

LABORATORY RESULTS

Sensitivity

Input level in μV pd required to give 12dB SINAD

Freq MHz	Sig. Level
29	0.18 (FM)
51	0.20 (FM)
80	0.23 (FM)
100	0.45 (WFM)
120	0.97 (AM)
145	0.24 (FM)
170	0.41 (FM)
250	1.08 (AM)
435	0.38 (FM)
934	0.25 (FM)
1296	0.27 (FM)

Adjacent Channel Selectivity

Measured on FM 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	16.5dB
-12.5kHz	17.5dB
+25kHz	47.5dB
-25kHz	46.5dB

Image/IF Rejection

Increase in level of signal at 45MHz IF image frequency, over level of on-channel signal to give identical 12dB SINAD signals

145MHz	65dB
934MHz	57dB

Blocking

Measured on 145MHz FM as increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal

+100kHz	61dB
+1MHz	84dB
+10MHz	89dB

Intermodulation Rejection

Measured on 145MHz FM as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, 50/100kHz spacing
>52dB (limited by blocking)

what of on-air performance? Used with its own set-top telescopic whip, I found the receiver very sensitive indeed, it pulled in distant signals which I could copy only slightly better on a purpose-designed handheld transceiver, very good indeed.

Connecting an external aerial showed that the set, perhaps not surprisingly, suffered from very strong signals on closely adjacent frequencies, the resultant 'noise' affecting wanted signals. Switching in the attenuator helped with more widely spaced signals, only suggesting this was due to close-in noise from the synthesiser, a quick test in the measurement lab confirmed this. Because of this, on busy broadcast bands on HF the set sometimes became difficult to use when connected to a 10m long wire outdoors, an indoor dipole instead being pressed into service here. However for a handheld this isn't surprising, and must bear in mind it's intended use with its set-top telescopic whip. Indeed an unmodified model of one other rather more expensive handheld scanner was considerably worse, showing the Yupiteru to offer far better relative performance.

The lack of keypad back-lighting made it slightly awkward to use in the dark, however the sensibly placed 'Search' and 'Scan' keys together with the rotary click-step tuning control helped here.

Conclusions

A handy lightweight set which I found to be extremely versatile, a portable companion to keep 'in on the action'. Although at a selling price of £289 it represents a significant investment it does have the capability of being 'future proof' with its wide frequency coverage and programming flexibility. I didn't like the telescopic whip, because in portable use this I feel would easily break. I'd be tempted to replace this with a flexible helical, the good sensitivity of the set making up for any inefficiencies in this.

My thanks go to Waters and Stanton Electronics for the loan of the review sample.

the set on the halted channel for a couple of seconds after the squelch closes to prevent missing replies. A 'Priority' channel check is also available, this sampling a given channel for activity every five seconds.

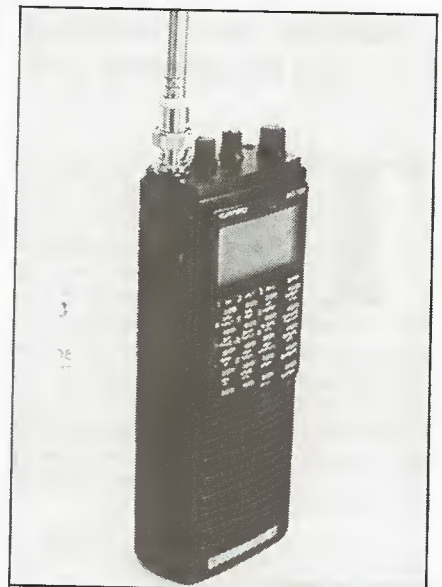
Controls and Connections

Together with the usual keypad, rotary on/off/volume, and squelch controls, a click-step tuning knob on the top panel lets you cycle through the channels/frequencies manually. Next to this an attenuator on/off button provides a degree of protection against problems with strong off-channel signals possibly overloading the receiver front end circuitry.

The set operates as a triple-conversion superhet, with Intermediate Frequencies of 592.2MHz (227.4MHz Mid/High range), 45MHz, and 455kHz on AM/FM (10.7MHz on WFM).

In Use

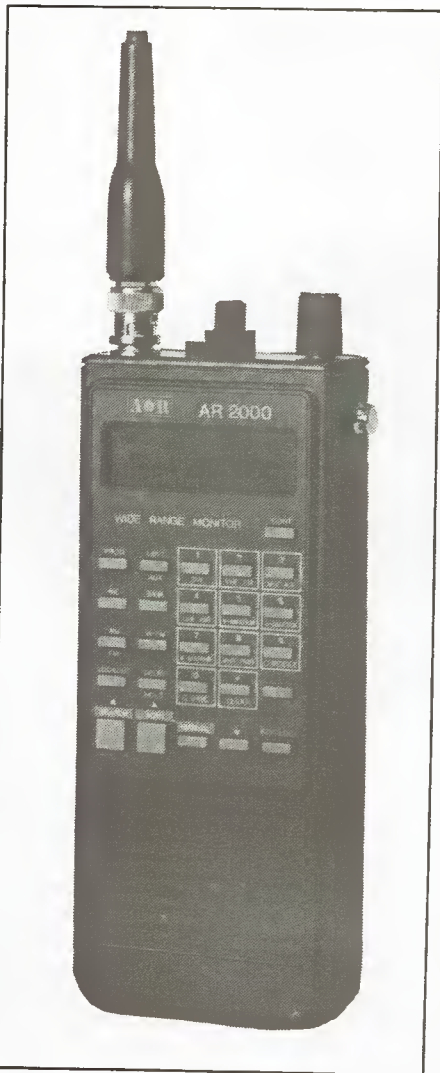
The set was comfortable to hold, the tactile keys also being easy to operate. However I sometimes found these did get accidentally pressed when I handled the set, such as when I lifted it out of my pocket - hence I got into the habit of switching in the side-mounted 'key lock' switch. I found the LCD very easy to read, there was even a small rotary LCD contrast control on the side to help here - very nice indeed. Now,



Listen to AOR

In the last decade AOR has gained a reputation for unique high performance wide band radio receivers world-wide. With the arrival of its new subsidiary AOR (UK) Ltd, UK customers may enjoy a much closer link with the factory.

AR3000 The AR3000 now extends your listening horizons further than anyone believed was possible. Covering the entire frequency spectrum from 100 kHz to 2036 MHz without any gaps in the range, the AR3000 brings the general coverage receiver to a new level of performance and versatility. Not only will the AR3000 cover this extremely wide range, it will allow listening on any mode: USB, LSB, CW, AM, FM (narrow) FM (wide). Tuning rates are selectable from an ultra-fine 50Hz step for SSB and CW, right up to 100 kHz steps for the TV bands and Band-2. A slight pull on the spring-loaded rotary tuning control will increase the tuning speed by a factor of ten for really fast tuning. 400 memory channels are provided arranged in 4 banks x 100 channels. Each memory channel will retain mode, frequency and RF attenuator setting. 15 band pass filters are used before the GaAsFet RF amplifiers, this ensures high sensitivity throughout the entire range with outstanding dynamic range and freedom from intermodulation effects. An RS232 port is provided to enable remote operation by plugging directly into most personal computers. The AR3000 is supplied with a telescopic whip aerial, 13.8V DC lead, AC power supply and operating manual. R.R.P. **AR3000 £765**



AR2000

ACEPAC3 is an exclusively developed multi-function IBM-PC based program to further increase the versatility of the AR3000. A sweep facility provides a spectrum analysis graph. The very latest version displays frequencies in X axis and squelch opening percentage on each frequency in the programmed frequency search range. This indicates 'how active' the frequencies are in the programmed search range. In addition to the graphic display, ACEPAC3 can produce a detailed numerical list from the graphic information. One memory file has 400 channels divided into 4 banks of 100 channels. More than one memory file can be created to increase the memory storage capability. If you make just one extra memory file you can store 800 memory channels! R.R.P. **ACEPAC-3 £119**

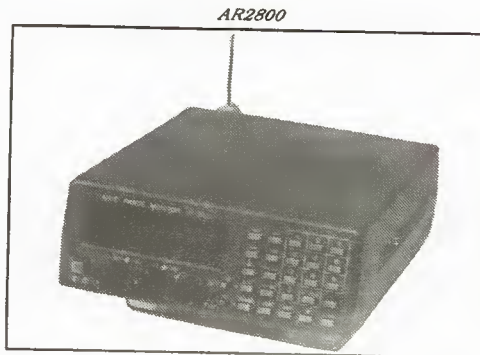
AR2000 The *NEW* AR2000 must be the ultimate portable monitor receiver. AOR have followed on from the successful AR1000 and have made the specification of the AR2000 even better. Frequency coverage of the AR2000 is now continuous 500 kHz to 1300 MHz (with no gaps) and not in two ranges as with the earlier AR1000. The receiver has also been designed to cover shortwave and has an improved performance in this area. One major change is the replacement of the 154.825 MHz crystal with a highly-stable 12.8 MHz reference and multiplier chain. The result is an improved frequency stability with a further reduction in unwanted products especially in the VHF marine band. Modes are AM, FM (narrow) and FM (wide). There are 1000 memories and 10 search banks. The receiver is powered from 4 x AA NiCads (supplied) or external DC. The AR2000 is supplied with a wide band whip aerial, AC charger, NiCads, 12V DC lead, soft case and belt hook. Everything you need is included to just switch on and start listening.

AR2500 and AR2800 Base - mobile scanning receivers featuring coverage from shortwave to microwaves. All mode operation AM, FM (narrow), FM (wide) and built-in BFO for USB, LSB and CW. Massive memory storage backed up permanently with an EEPROM so no battery is required. Operation is from a nominal 13.8V DC supply (power supply included). SSB is used by many services especially on shortwave (including Amateur band and oceanic airband) to extend the operational coverage of their transceivers. It's inclusion on these receivers isn't just an added bonus but a positive asset. The BFO allows selection of either side-band and the fine shift control ensures the very best audio quality. The *choice* between the AR2500 and AR2800 is difficult. Although both models look similar on the outside (being housed in a strong plastic cabinet), their design concept is radically different inside the cabinet. The **AR2500** was conceived in the USA where listeners desire **computer control** via the RS232 port at a budget price, IBM-PC based software should be available in the autumn. The AR2500 has a massive memory capacity (*Elephant memory*) and fast *turbo speed* search and scan. There are 1984 memories (62 banks x 32 ch) and 16 search banks. The AR2500 covers 5 MHz to 550 MHz and 800 MHz to 1300 MHz. The **AR2800's** strong point is superior SSB/CW receive performance and versatility, Amateur band CW reception is of a crisp and clean tone. The dream of listening to long distance communications from your home (with an external aerial) is now a reality. The AR2800 is *user friendly* and employs a conventional memory channel and search bank layout (similar

to the well proven AR1000). There are 1000 memories and 10 search banks. An internal rechargeable NiCad battery is now included to permit operation away from the home and car. The AR2800 covers 500 kHz to 600 MHz and 800 MHz to 1300 MHz.

R.R.P. **AR2500 £419 AR2800 £395**

DA3000 Wide band 16 element discone aerial for external mounting. Frequency range 25 MHz to 2000 MHz (2 GHz). The aerial is supplied with approx 15m of coax terminated in a BNC connector ready to plug in and use with any AOR receiver. 'V' bolts and clamps are provided, however an additional supporting pole will be required for installation. R.R.P. **DA3000 £69**

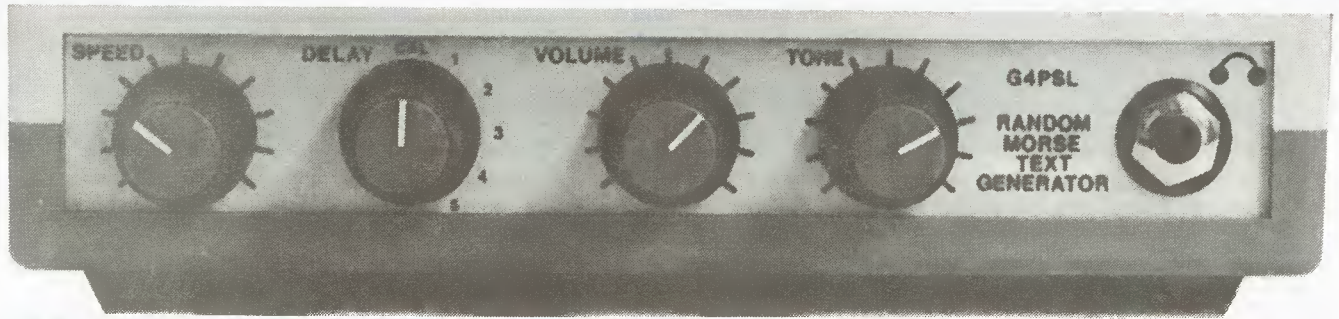


AR2800

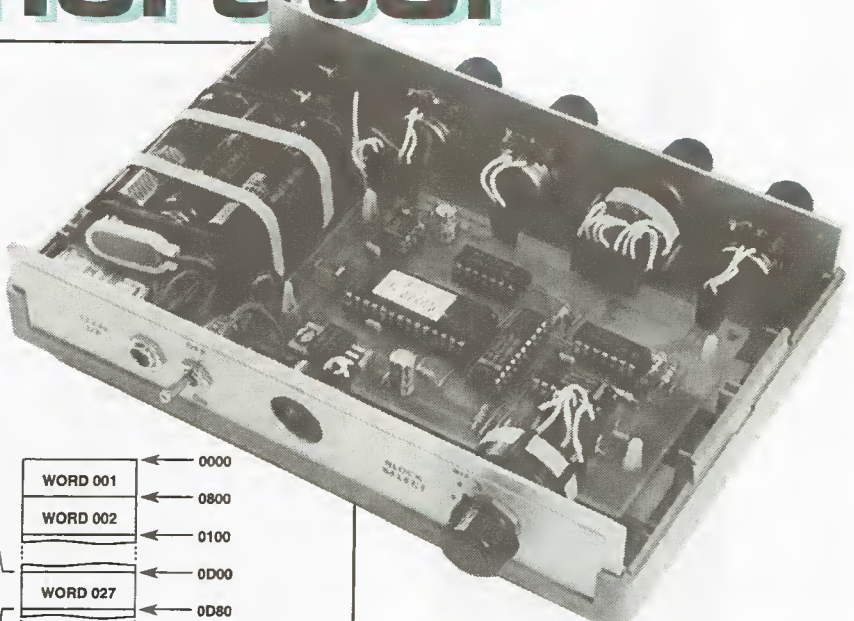
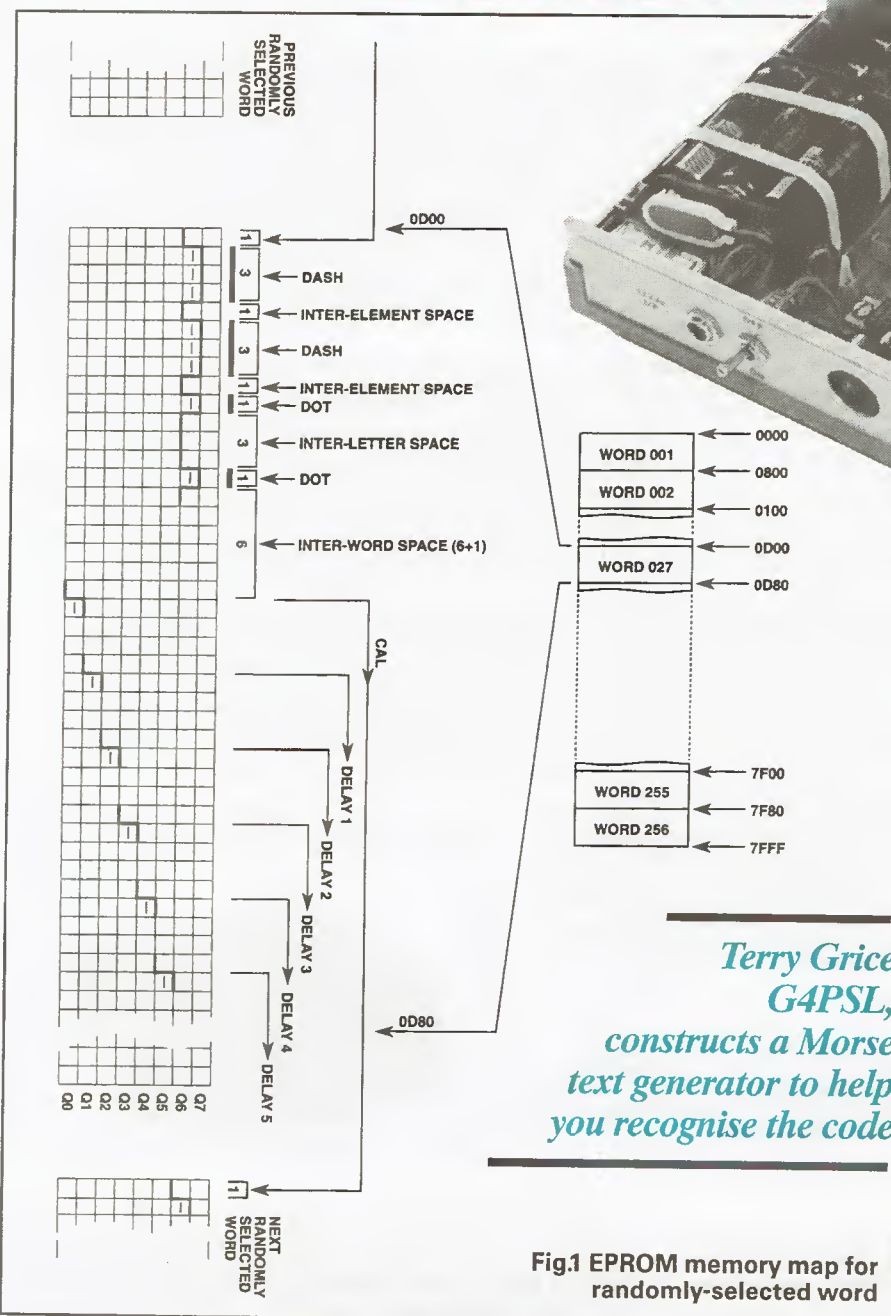
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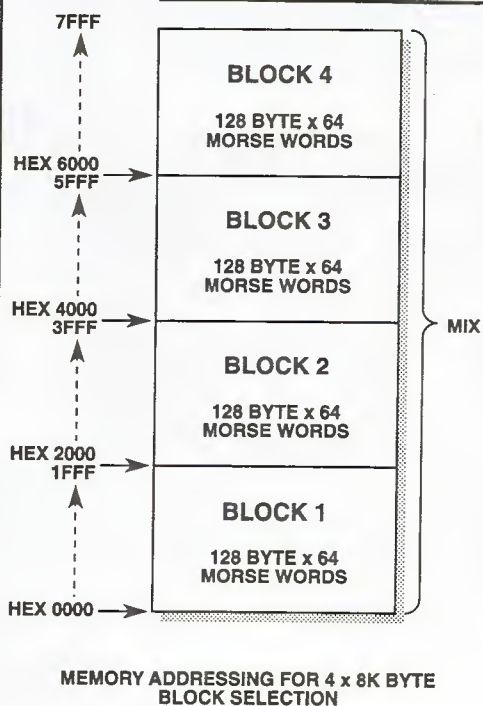
Project – Random Morse Text Generator



Amateur CW communication makes extensive use of standard abbreviations along with the internationally recognised Q-Code. Procedure signals are also used to indicate the status of an ongoing transmission. The budding CW operator as well as the potential Novice Class-A licensee will need to become conversant with at least some of this Morse shorthand, which in total has a vocabulary in excess of two hundred words.

The Random Morse Text Generator has a library of 256 Morse words, this includes punctuation and some non-abbreviated words. Block 'select' and 'delay' facilities have been included to aid the initial learning process and subsequent practice at higher speeds. Although it is not a Morse tutor in itself the generator may if desired be used alongside any program which teaches the Morse alphabet. The speed and tone pitch may be varied over a wide range to

*Terry Grice
G4PSL,
constructs a Morse
text generator to help
you recognise the code*



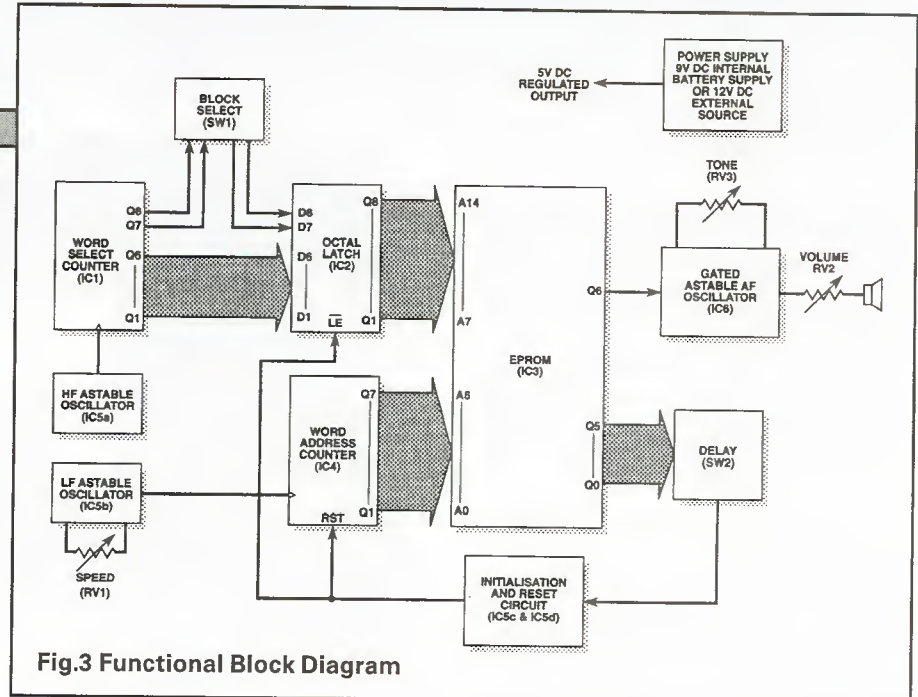
suit individual needs, the variable 'delay' facility adds a time period between characters which can simulate the method of Morse testing for the UK Novice exam, where individual characters are sent at 12WPM but with an inter-character delay to give an overall speed of 5WPM. The unit may be powered from internal batteries or an external 12V supply, and has a headphone socket for private listening as well as a small built-in speaker.

Character Storage

A plug-in EPROM is used to store the Morse words, suitable blank EPROMs are available from numerous component suppliers for home-programming to your specific needs. If you'd like a PC disk with a stored hexadecimal file of the EPROM information ready for home-programming, then send a formatted (5.25in or 3.5in, high or standard density) disk, with a pre-stamped self-addressed disk mailer marked 'Morse EPROM', to the HRT editorial address, this is a free service to HRT purchasers only. Programmed EPROMs are available from the author at a nominal cost, and EPROMs together with ready made PCBs and complete kits of parts will be available from the usual kit advertisers in the HRT 'classified' and display ads sections.

Construction.

The artwork for a single-sided PCB is given in Fig. 5, the associated component layout in Fig. 6. PCB connectors or alternatively PCB pins may be used to connect the panel mounted components to the board, 1.0mm holes are normally required here as with the regulator



pin holes. The regulator fixing hardware, an M3 x 6mm screw and M3 nut, requires a 3.0mm clearance hole. When installing the board, case drilling can be avoided by using self-adhesive pillars. The four holes provided for this purpose should be drilled to suit, 4.0mm being typical. All other component fixing holes need to be 0.8mm.

When fitting components to the PCB it's advisable to start with the passive components, i.e. links, connectors, resistors and capacitors. This includes IC sockets, recommended for all six ICs. The regulator should be the last board-mounted component to be soldered down. The ICs, which should be kept in their protective packaging until required, may now be installed, observe CMOS handling precautions with these. If you're not familiar with this, then the ICs should be handled lengthwise with thumb and finger avoiding physical contact with any of the pins.

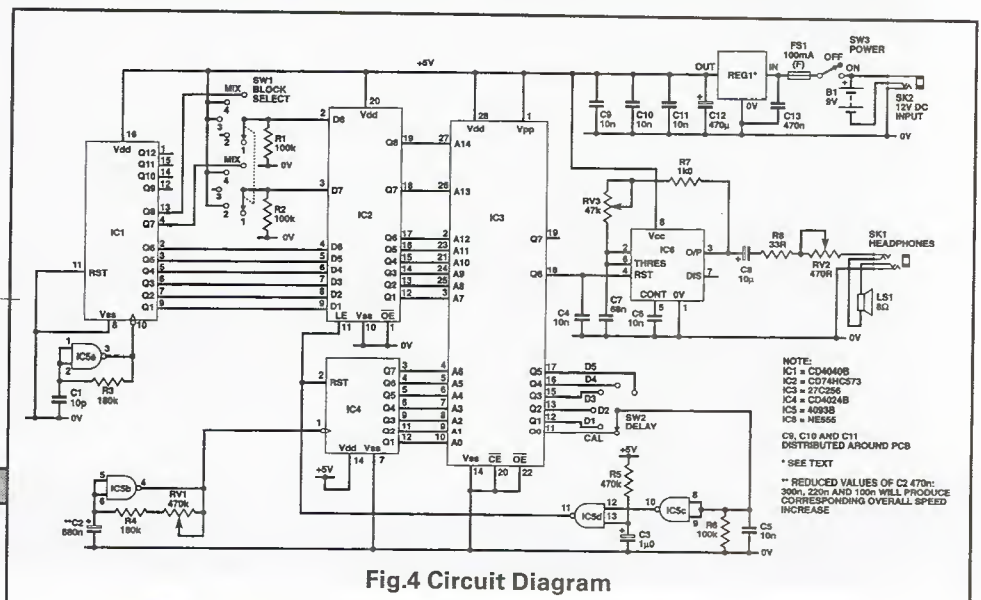
With all the board mounted components in place, a visual inspection of the foil side of the board should be carried out to ensure that no solder bridges exist and that all leads have been soldered. Check the component side for correct positioning and polarity where applicable, and ensure that none of the IC pins

has folded under the body, it's worth noting this check is also valid for IC sockets before soldering into place.

Attractive front and rear panel labels can be manufactured by copying the full size legends shown in Fig.7 onto suitably coloured A4 card. This may then be covered with clear protective film and cut to size. Temporarily position the labels over the respective front and back panels, then spot through the fixing hole centre marks with a sharp scribe or similar tool. Holes, of suitable diameter for the components used, can now be drilled and deburred, the LS1 hole expanded with a reamer if necessary. If the completed unit is required for headphone use only, the speaker may of course be omitted.

The labels can now be secured in place using glue or double-sided tape. If the latter is used it is best to attach the tape to the label underside before cutting to size. Finally, use a sharp cutting tool to clear out the fixing holes.

When attaching the threaded components to the panels, care should be taken not to over-tighten the fixing nuts, as this will wrinkle the protective film. Both LS1 and FS1 fuse holder can be glued into position, taking care to ensure that no glue reaches the cone of the



encapsulated speaker. The four fixing pillars moulded into each half of the case must be removed, this can be done using an old pair of wire cutters. Place the front and rear panel in situ in the bottom half of the box, and locate the PCB so that only slight sideways movement of the battery box is possible, allowing the case lid to fit correctly. Wire the unit as shown in Fig. 6, 7/0.2 hook-up wire or similar can be used throughout for this.

Testing.

Connect a milliammeter set to read 30mA DC or greater across the empty fuse holder contacts, observing lead polarity. Install the battery pack and switch SW2 on. If all is well the circuit should begin to generate random Morse words, and the meter should register a varying current of 20-25mA for respec-

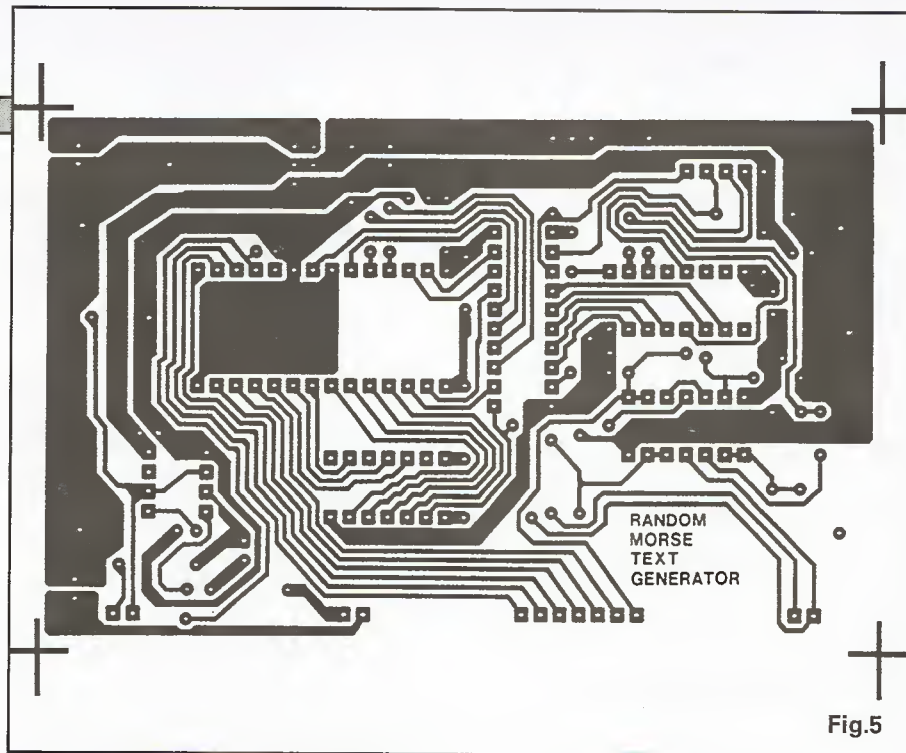


Fig.5

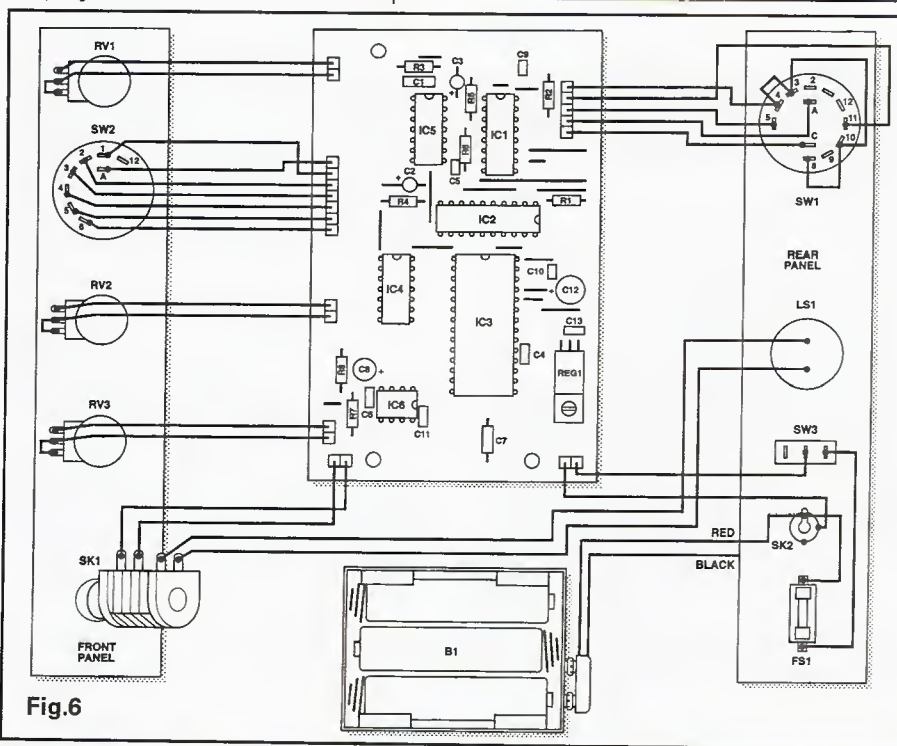


Fig.6

tive minimum and maximum volume settings of RV2. Now replace the meter with a 100mA(F) fuse, set your voltmeter to a suitable DC range, and monitor the regulator output for a reading of 5V.

Check that clockwise rotation of RV1 and RV3 increases the speed and tone of the audible output. Rotating SW2 from the 'Cal' position through to the D5 position should progressively increase the inter-word delay. Confirm that all five settings of SW1 produce an output. Inserting a pair of 8 ohm mono headphones into SK1 should mute LS1.

The circuit may be powered from an external 12V DC PSU via. SK2 which automatically switches out the internal 9V DC battery power source B1. The supply voltage is connected by power on-off switch SW3 and FS1 to the input of REG1, a LM2940 1A 5V DC low-dropout voltage regulator. This device will function with an input to output voltage differential of less than 200mV, allowing the battery source to be used right up until the end of its useful life, i.e. down to a terminal voltage of 6V.

Parts list;

Resistors; All fixed resistors 0.25W, 5% carbon film.

R1, 2, 6	100k
R3, 4	180k
R5	470k
R7	1k0
R8	33R
RV1	470k min. lin. pot.
RV2	470R min. lin. pot.
RV3	47k min. lin. pot.

Capacitors;

C1	10pF polystyrene
C2	680nF 35V tantalum
C3	1uF 35V tantalum
C4, 5, 6,	
9, 10, 11	10nF ceramic
C7	68nF polyester
C8	10uF 16V electrolytic
C12	470uF 16V electrolytic
C13	470nF ceramic

Semiconductors;

IC1	CD4040B
IC2	CD74HC573
IC3	27C256 (Maplin UH44X)
IC4	CD4024B
IC5	CD4093B
IC6	NE555
REG1	LM2940CT (Electromail (648-551))

Miscellaneous;

SW1	2-pole 6-way rotary
SW2	1-pole 12-way rotary
SW3	SPDT toggle
SK1	Mono 1/4" jack socket
SK2	2.5mm DC power connector
LS1	miniature loudspeaker (Tandy 273-090)
FS1	100mA(F) x 20mm fuse link

See HRT classified ads (back pages) and display ads for suppliers of PCBs and components.

The author may be contacted at 11 Durham Street, Wallsend, Tyne and Wear, NE28 7RZ for the supply of EPROMs.

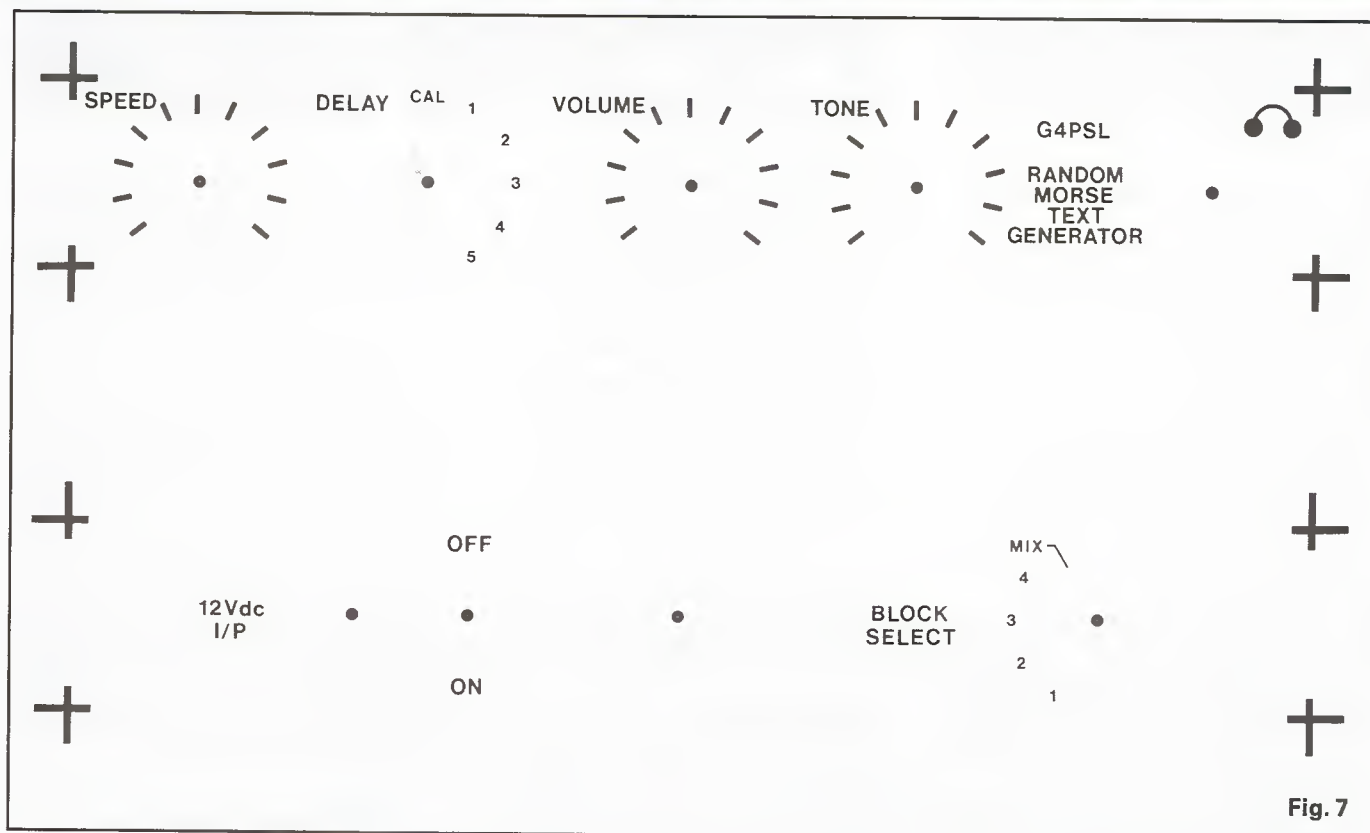


Fig. 7

Next month we conclude with a description of the stored text and technical information on the unit to allow any text to be formulated.

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Tel: Malton (0653) 697513

QRP CORNER

Now that good weather should be with us, perhaps it's time to consider a few checks on the aerial system prior to winter time, all to often the aerial is erected and then forgotten until it falls down. Unfortunately this can cause injury as well as damage. This is important to all amateurs, not just the QRP types.

Most non-QRP enthusiasts won't appreciate that to the QRP operator the aerial is the most important part of a QRP station, the rig may be the simplest circuit available but getting the RF out in the air is where it counts, and this is where the best aerial available is required.

Water is the deadliest enemy, it can get into the smallest of holes and ruin what would otherwise be a very efficient aerial or feeder. Self-amalgamating tape is widely available and is well worth the expense. The feeder needs checking for damage and wear as well.

Aerials are not so easy to check without an RF sensor, (a simple sensor was discussed in this column in the January 1991 issue of HRT). Coaxial feeder however can easily be checked with equipment that almost every amateur already has in the shack. All that is required is a dummy load and a power meter.

Coax Cable Checks

First, disconnect the coaxial feeder from the aerial and fit the dummy load to the end. Fit the power meter between the feeder to be tested and the rig, and using this set the output power at an arbitrary level, say 10 watts. Remove the power meter and place it at the other end of the feeder and refit the dummy load. Key up the rig and measure the power level. You will not get the full 10 watts, but depending on the type of feeder you will be able to calculate what the power level should be. If it is less than this, the feeder (or connectors) may be faulty and need replacing.

Typical losses in feeder can be found by referring to comprehensive radio reference book, e.g. the Radio Communication Handbook, page 23.8. This shows us that RG58/U has a loss of over 4dB for a 30m length whereas another standard cable RG213/U has a loss of around 2dB for the same length, both these figures are quoted for a frequency of 100MHz. At lower frequencies the losses are considerably less of course.

Wire aerials also need attention, which most people forget. Wire under

Dick Pascoe G0BPS warns us to check our aerials, and describes an active CW filter you can build

tension will fray at a bend, and sure as can be it will break, just as that new country comes on the band. We must also beware of high winds, so get out there and give it all 'once over' before the Autumn winds arrive. A long, hard, look at the open wire feeder will not go a miss either. This is often so cheap that it may be worth replacing anyway.

Audio Filters

When listening to CW, some stations may be difficult to copy because of other traffic on, or near the same frequency. My comments in a previous article about filter bandwidths made reference to interference. There is another way to avoid this problem from adjacent stations, and that's to use a simple audio filter with variable bandwidth. The filter supplied with my Argonaut is excellent for this, often permitting me to work stations that would otherwise be unheard.

This active filter circuit was sent to me by an American friend who rates it very highly. The circuit is quite simple and should be easily reproducible on Veroboard. It is a simple active filter using two cheap uA747 op-amps to boost the audio signal up to 6dB. The peak frequency of the filter is around 750Hz which seems to suit most amateurs. The bandwidths selectable are 350Hz, 160Hz, 130Hz and 110Hz.

The filter is simply fitted between the audio output from the rig to your speaker. Be sure to fit a bypass switch to the filter, to route the audio straight through for when you're not using CW.

Complaints

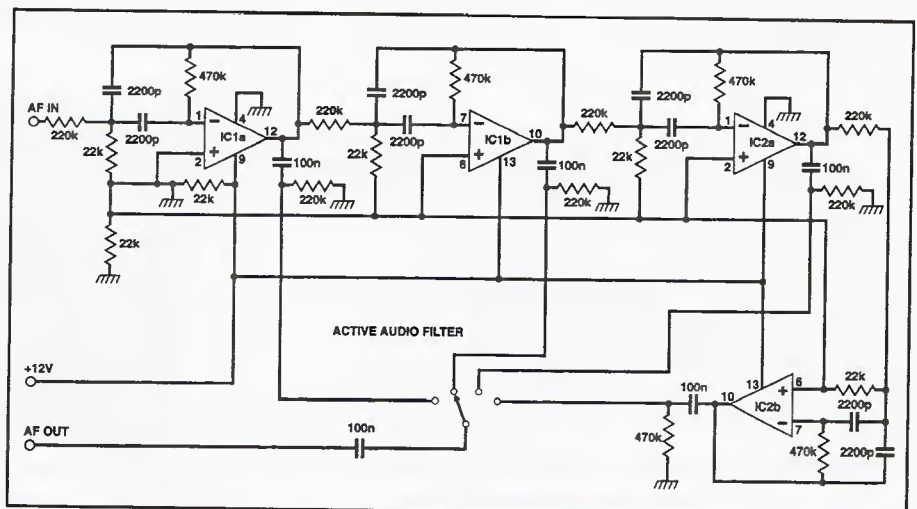
It is not often that I deal with complaints in a column like this, but Bob, G4JFN who has passed the '300 members worked' mark is still looking for some QSL cards. It is an ever increasing problem of course. 'to QSL or not', and cost must be a consideration. One suggestion made was just writing across the card *contact confirmed* and sign it, returning the card to the sender, what do you think? (this should generate some comments!). A pet hate of mine is the-QRP' station who does not put the power output (input) on their card.

QRP and Packet?

It might seem a strange relationship, but there *is* a reason for the comment. This concerns those who chase DX, be it very QRO or QRP or those who like to operate for the fun of it and add up a few countries as well. If you're fortunate enough to have a packet set-up, try your local PacketCluster, it's full of information to all who enjoy operating (look out for Don Field G3XTT's article in HRT on this system).

Well that's it for now, comments and ideas to me please either via GB7SEK on packet, to 3, Limes Road, Folkestone CT19 4AU or via the HRT Editorial Address. See you next month.

This active CW filter can be built on Veroboard





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The PacketCluster System

I vividly remember reading, in a copy of QST from the 1950s handed on to me many years ago, a spoof article about a ham who built himself a computer (all valves in those days!) to run his radio station. The computer controlled his radio, tuning it across the bands, recognising (on CW) the callsigns of DX which he needed, calling the DX, exchanging basic QSO information and printing out the QSL card. All the amateur concerned had to do was drop the cards in the mail and, hey presto, DXCC in no time at all!

Reality

In those days it may have all seemed a pipedream. Nowadays much of it is happening daily. Most modern radios have a computer interface, and there are many programs for decoding CW and RTTY, even though voice recognition may still be a little way off. However, there is a fundamental difference in the way these technologies are being used, compared with the old article I mentioned. Where this envisaged technology doing away with the operator, in practice it is being put to use to aid the operator and make him more effective, whether in contesting, DXing, or just casually tuning the bands.

Undoubtedly the one development in recent years which has done more than any other piece of computerisation to transform the lifestyle of HF operators in particular is *PacketCluster*. *PacketCluster* developed out of a packet radio conferencing system put together by AK1A. This system, which allowed a group of packet enthusiasts to chat together via a central server, didn't really catch on except with one particular group of users — HF DXers. These folk very quickly realised that, if they could all be connected together, then if any one of them ran across an interesting DX station on the bands the information could very quickly be passed to everyone else who was connected.

HF DXers in the US had been using VHF voice repeaters for mutual alerting for a long time, but packet offered a number of benefits. Firstly, the information would appear on-screen, so you didn't have to be listening to the chatter on the repeater all the time. Secondly, even if you were out of direct range of the server, the nature of packet radio allowed digipeating through intermediate stations to keep the station connected.

Don Field G3XTT explains the function of PacketClusters and the facilities they offer

Thirdly, the DX information could be stored, so you could catch up on what had been around on the bands when you got in from work in the evenings.

DXers being what they were, they very soon started asking AK1A to write enhancements to the software, to the point where nowadays *PacketCluster*, as it has come to be known, is a very sophisticated piece of software indeed.

Connecting Up

Let's look at what happens when you connect to a *PacketCluster* node. After the sign-on message you will be notified of any mail for you (which can be from other Cluster users anywhere in the UK network). You can choose to read these immediately, but more likely you will want to type SH/DX which tells the system to list the last 5 DX 'spots'. These might look something as follows:

50110.1	9L1US	15 May 1991	0909Z Dave, 449	<G4HCL>
18081.1	JD1ABC	15 May 1991	0906Z Ogasawara	<G3XTT>
21295.0	3D2RR	15 May 1991	0904Z Listening 5 up	<G4HCL>
14160.0	VR6TC	15 May 1991	0851Z Tom, 59+	<G3XTT>
14025.3	D68ZZ	15 May 1991	0840Z	<G4HCL>

You note that 3D2 is one you need, and was reported only ten minutes ago, so he might still be around. Good, there he is! But, oh dear, which direction you should turn the beam for maximum signals? No problem.. Type SH/H 3D2 and up on the screen comes the beam heading (this will be the beam heading from the Cluster node unless you have previously entered your own latitude and longitude, something you only have to do once). You work the 3D2, and want to know where to send the QSL card. Type SH/QSL 3D2RR and up pops the callsign of his QSL manager. Wonderful isn't it! While all this is going on, any spots entered anywhere in the country while you are logged on to your local Cluster will pop up on your screen within

minutes of being put into the network, so while you were chasing that 3D2 you were still in touch with what was happening on the other bands.

After the QSO you start tuning around and suddenly hear ZS8MI calling CQ on 28495kHz. While you tune up your rig you put out a spot to let others know that he is about. This is done simply by typing DX 28495 ZS8MI. You can also enter a short comment, for example 'Listening on 28500'.

Now you remember that there should be a DXpedition around from 3B8 (Mauritius). You desperately need that one on any band. Has anyone reported it? Type SH/DX 3B8 and you will get the last 5 spots from that country. The SH/DX (Show DX) command is very powerful and will let you specify how many entries you want to see, and for what prefixes and bands. Lo and behold, the 3B8 expedition has indeed been worked. You want to check, though, what might be the best times for propagation on both the HF and the LF bands. SH/M 3B8 will display the current MUF, based on the latest WWV propagation figures held in a database on the Cluster. SH/SU 3B8 will show the sunset and sunrise times for 3B8 which will give you an idea of the best time to look for the DXpedition on 40m and 80m. I'm sure by now you're getting the idea.

Databases

PacketCluster has developed primarily as a tool to the DXer, both HF and VHF, and the DX-related facilities are its prime features. However, it does also provide mail facilities for both personal mail and bulletins, and allows you to send quick one-liners to anyone connected to the system or to all current connectees. Most *PacketCluster* nodes also have a 'FILES' database holding things like recent ARRL DX Bulletins and other DX-related information. Cluster nodes will also carry databases from which you can extract data. I have mentioned the QSL Manager database and the database for WWV information, another provides details of Russian

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oblasts, and new databases are being added all the time. Has this discussion wetted your appetite?

You may now be asking how to access your nearest PacketCluster node. The accompanying table lists all currently active PacketClusters in the UK. The primary access frequency for most of them is 70.325MHz, quite deliberately keeping Cluster traffic away from the VHF BBS network on 144.650MHz in order to minimise congestion. After all, BBS traffic can be forwarded overnight, but Cluster relies on real-time networking to be effective. Nowadays most of the Cluster nodes are interconnected on 23cm, again to keep down congestion. For advice on how best to gain access, get in touch with the Sysop of your nearest Cluster. There is, of course, no charge for using the Cluster system, though Sysops will always welcome donations to the running of the system which, after all, ties up an expensive PC and some pricey software at every node, as well as the day to day costs of electricity etc. As well as those Clusters listed, new ones are planned for Ipswich, Cambridge and Central London, increasing the coverage even further. There are plans being investigated for linking to the Cluster network in Europe, not for mail forwarding but specifically to pass DX spots back and forth.

Equipment Needed

The equipment you need in your shack to access PacketCluster is exactly the same as for any other form of packet radio, in other words a PC or dumb terminal, a TNC, and a radio. Having said this, additional benefits come along if you have terminal software which takes advantage of the special features of PacketCluster. For example, the popular CT contesting software from K1EA has a Cluster window on the screen so that, during a contest, you can get all the DX spots and also send out spots to other users, while using the software for maintaining your contest log. What's more, if you have a transceiver with an RS232 interface, when a spot comes in you can hit a function key and your radio will immediately QSY to the frequency of the DX station.

Right now I am using a beta trial version of Clusterm, a Cluster terminal program from Canberra Communications

(G3WGV, of contest logging program fame). This program has some advanced features such as capturing incoming mail, WWV data, etc, and presenting them in different screen windows from DX spots. DX spots can also be filtered against a 'needs' database which you hold on your PC so that you could, for example, choose only to display spots for countries you need on pre-determined bands. As DX spots appear, details of country, beam heading, distance, etc. appear in another window on your screen. Clusterm has many other features including direct interface to those rigs with an RS232 port, and should be available by the time this appears in print. Maybe I can persuade the HRT Consultant Tech. Ed. to provide a brief review of this for HRT's *Packet Radio Roundup* (don't worry, I'll make sure he does — Ed).

I hope this brief introduction provides an idea of what it's all about — see you on the Cluster!

PacketCluster Systems in the UK

Callsign	Location	Sysop	Access Frequency
GB7BPQ	Nottingham	G8BPQ	70.325
GB7DXC	Cheltenham, Glos	G4PDQ	70.325
GB7DXH	Herts	G3OUF	
GB7DXI	Wokingham, Berks.	G4LJF	70.325, 432.675
GB7DXS	Ansty, Sussex	G3VKW	70.325
GB7SMC	Chandlers Ford, Hants	G4HCL	70.325
GB7TLH	East Dereham, Norfolk	G1TLH	
GB7WDX	Crediton, Devon	G3HTA	70.325, 144.650
GB7YDX	Bramham, Yorks	G3VMW	70.4875, 432.6795

(In many cases access is also possible via. other 6m/2m/70cm Network Nodes to a cross-band Cluster system).

From My Notebook

It's a brave soul who will venture into fault-finding in a modern amateur radio 'black box', there's still plenty of scope for getting stuck in to simpler domestic items such as the ubiquitous 'tranny'. They make a good practice ground in which to gain experience for the times when you might feel like getting more ambitious.

Although there are firms who specialise in supplying service sheets to the hobbyist, and who advertise regularly in radio and electronic magazines, it's not always possible to get hold of technical data. When you do, you'll often discover that there is very little information given about normal working voltages beyond the value of the power supply rails!

How easy it may be to find your way around the equipment and do any useful fault analysis depends very much on what sort of circuit it is. If it's a modern receiver based on just one or two integrated circuits, you may well find that the IC manufacturers' data sheets, or information reprinted in component stockist catalogues, will give 'typical' circuits which are very similar to those used in the set.

If on the other hand it's a set using discrete transistor circuitry, you're very much on your own. There are, though, a number of basic physical laws and rules-of-thumb which will help you in voltage checking and tracing in such a circuit.

Potential Dividers

Where a chain of two or more resistors are strung in series across two supply rails, it should be possible to have a stab at calculating the voltage at each point on the chain, allowing for the fact that it will be affected by current drawn off at any tapping connection (including your testmeter when you apply the probes! — see *From My Notebook* HRT May 91)

This gives you a starting point, for voltage checks on transistor base bias circuits for example.

Up the Junction

A most useful basic physical law is concerned with the voltage drop across a forward-biased semiconductor junc-

*Geoff Arnold G3GSR
guides the beginner through
the initial steps of
faultfinding*

tion. These are found not only in diodes of course, but also in every conducting transistor. If it's a germanium device, the voltage across the junction will be in the region of 200 millivolts (0.2 volts), or for a silicon device 700mV (0.7V), with some variation depending on the size of the transistor or diode, its temperature, and how heavily it is conducting. If you can read the type number on the diode or transistor, this may tell you what material it is made from (see *From My Notebook* April 91)

Thinking first of all of simple diodes, if your testmeter tells you that the anode is positive with respect to the cathode (remember that the cathode end of smaller devices will be identified by a black or coloured band), then the voltage difference should be that nominal 200 or 700mV. If it isn't, the diode is a dud!

Let's extend this idea to transistors. If the voltage across the base-emitter junction is 200 or 700mV (depending on the semiconductor material), with the base positive for an NPN transistor, or negative for a PNP, the junction is forward biased and current should be flowing in the collector circuit. The current through the collector load will cause a voltage drop across it, which will vary according to how hard the transistor is conducting. If the transistor is biased hard *on* (i.e. saturated), the base-collector junction, which under all normal operating conditions is reverse-biased, will become forward-biased as well, though it will not reach the 200 or 700mV level.

When a semiconductor junction is reverse-biased, the voltage across it may be of any value, unless of course the device is a Zener or voltage regulator

diode. Most of these contain some indication of their working voltage in the type number, though with the smaller devices a magnifying glass is sometimes needed to make out what the number is! Zener diodes are most often used to provide a stabilised supply line, but occasionally you will come across one operating as a 'DC level shifter', connected in series with a signal feed from one amplifying stage to another, where you would normally expect to find a coupling capacitor. The DC voltage across it will, of course, be the rated Zener voltage.

Maximum Swing

In a transistor amplifier stage, especially one handling audio frequency signals, working levels will normally be set by the circuit designer to allow the stage to pass a large signal with the least possible distortion.

Taking the example of a simple low-level, common-emitter amplifier, this means that the stage will be biased so that the collector normally sits at a potential half-way between the two supply rails (zero volts and Vcc). The output connection, which is taken from the junction of the collector and its load resistor, can then achieve the maximum possible symmetrical voltage swing before running into clipping.

The same will apply to complementary output stages using two transistors, regardless of whether they are true complementary (one NPN and one PNP transistor) or quasi-complementary (two NPN output transistors driven by a complementary NPN/PNP pair), and of whether the power supply is single-ended (zero volts and a single Vcc rail) or balanced (two Vcc rails sitting above and below zero volts).

Looking back now to the input side of the low-level, common-emitter amplifier stage, whenever an emitter bias resistor is included, its value will more often than not be chosen so that the emitter sits about 1 volt above the zero volt rail. This also means that, knowing the value of the resistor, you can work out the standing emitter current and have a fair idea of the collector current, too.

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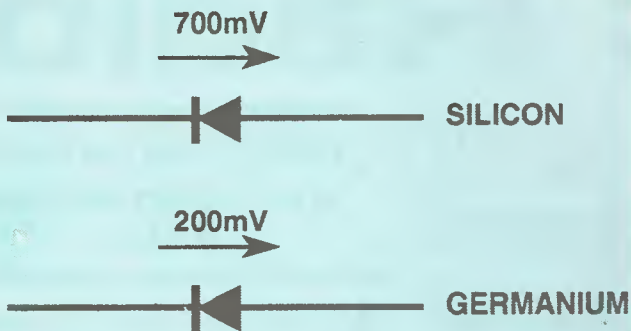


Fig. 1. Voltage drop across a diode junction

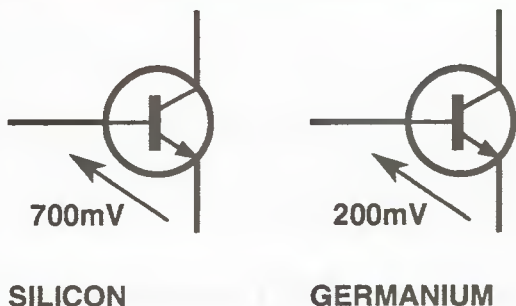


Fig. 2. Voltage drop may be measured across the emitter-base junction of a transistor, an NPN type shown here

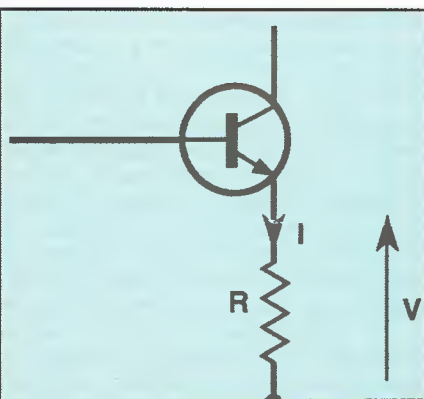


Fig. 3. The emitter current (usually almost equal to the collector current) may be found from the voltage drop measured across the emitter resistor

Tackling the Problem

Starting off from a point in the circuit where the voltage is known, proceed as far as possible along each arm of the circuit connected to it until you come to a point where it is no longer possible to

make any valid assumptions using the laws and rules described. You then need to find another point in the circuit where the potential is known (including the zero volt rail) and work as far as possible along each arm connected to it, repeating the procedure until there are no more known potential points left.

The first starting point will usually be the supply rails. If you are lucky, these will be marked with their voltages, or in the case of battery-powered equipment, the supply voltage is self-evident from the battery type.

If the supply voltages are not quoted, you will need to make some rough calculations using whatever information is given - perhaps the power transformer secondary voltages, making due allowance for the fact that the output from the rectifying/smoothing circuit will almost certainly exceed the RMS value of the secondary. As a last resort, and in the absence of any other information, the working voltages of any reservoir capacitors will set at least a possible maximum.

If there are simple voltage regulator circuits based on Zener diodes, the output levels should be obvious; more complex regulators using comparator circuits may involve calculations based on the values of resistors in the voltage sampling chain.

Summing Up

There are a number of physical laws and 'rules of thumb' which you can use to pencil in expected voltage levels in a circuit diagram, to aid you in understanding its operation, or in fault-finding.

Across any forward-biased, conducting semiconductor junction you should find around 0.2V for a germanium device or 0.7V for a silicon device.

Emitters of simple linear amplifying stages will usually be found to sit at around one volt above the zero volt rail.

The output connection of most linear amplifying stages will sit at around the centre of the two supply rails feeding it — at around half- V_{cc} for single-ended supplies, and around zero volts for stages having balanced supplies.

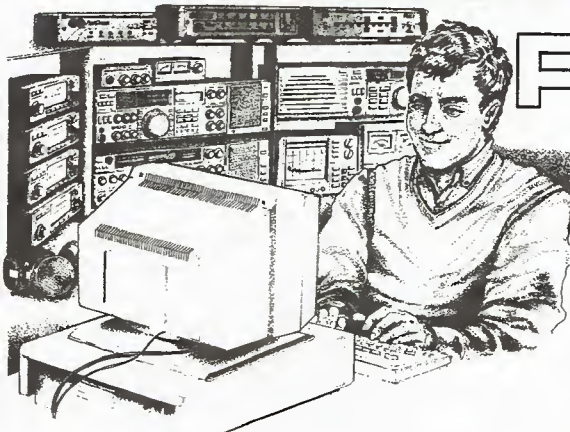
Try Your Hand

It can be very satisfying to work your way through a circuit diagram totally lacking in information on voltage levels, and to calculate likely potentials at crucial points. If you then cross-check your calculations by noting actual meter readings on the item of equipment when it is working normally, you are doubly prepared for any diagnosis and repair work which may be necessary in the event of a fault occurring at some time in the future.

Packet Radio

Roundup

*G4HCL tries out Paket4 —
a new packet program for
TNCs*



First, news about packet activity on board the Mir space station. Sergei U5MIR is currently operational on 2m, and recently a 70cm handheld was donated by Icom for use on the space station. You'll probably hear 432.675MHz activity soon from Mir, but I haven't yet had any reports of Worldwide mail forwarding through this! When Mir is in range and the packet station is on, as well as a 'direct' connection to U5MIR you can connect also to U5MIR-1, the TNC's 'personal mailbox' used by Sergei. In a 2m FM voice QSO, he asked that 'interesting' messages be left for him to provide a break from the commonplace greetings messages normally stored! You never know, you might even get a reply.

Paket 4

You may have seen reference to this on the packet network, but many packet users don't know what it is! Well it's a 'shareware' (i.e. try-before-you-buy) multi-window terminal program for the IBM PC and clones, but with a difference — this one's been written specifically for amateur packet radio. I recently obtained a copy of the program to test for HRT readers.

Many amateurs often 'make do' with a terminal program designed for telephone interconnection use, 'Procomm' being a typical example. Whilst many of these programs are very powerful, few if any can handle things like multiple TNC streams in separate windows, although specifically written commercial programs such as the Kantronics 'Hostmaster' handle this.

Paket written by Terry VK2DHU is now up to its 4th version, it comes on a standard IBM PC disk and is available from Terry direct as well as from shareware sources in the UK such as the Public Domain and Shareware Library (see later). Terry asks for a modest contribu-

tion of (Australian) \$25 or the equivalent for the program, which in my mind is worth every penny (cent?).

To run the program, all you do is enter *Paket*, the software then initialises your TNC for you with the correct time and date as 'pulled' from your computer's internal clock. No more need to reset this on your TNC every time you switch on! A useful extra is the capability for the program to pre-load up to ten command lines for you, such as 'Connect Text' and the like when getting started, and it may even add further command lines prior to the program exiting, you can set all these in the initial configuration.

In use, multiple full-screen windows are used for each stream, you use the left/right cursor keys to toggle between streams. This is great for multiple connects, it really does save the usual confusion with stream switching characters and 'jumbled' text from different users on the same screen! If you want to refer to text which has scrolled up off the screen, no problem, just hit the *Page Up* and *Page Down* buttons to scroll up and down, I found this facility very useful indeed. There's even a *Text Find* facility, so if you remember seeing some off-air data on one 'monitor' stream which you'd like to quickly find again, a few button pushes does it all.

The program handles file transfers of course, and the YAPP protocol for binary file transfers and the like is also supported within *Paket*, various file directory functions even allow you to search your disks to find the file you want to send without the need to halt the program. A *remote* mode even allows unattended file transfers if you enable this facility on the program! For log-keeping or indeed just an 'activity store', an *auto log* option can automatically log activity on a selected disk drive whenever you connect to a station, opening and closing the log file automatically for you. Other 'niceties' include a selectable telephone-ring type alert if someone connects to you and you don't reply, a type-ahead window for text editing before you send it, and several 'help' screens for when you get lost. An 80-page user manual in compressed form comes on the disk, an auto-print command simply prints the entire contents of this out for you.

Paket handles the standard command set used by TNC-2 clones, i.e. the

Tiny-2, TNC-220 and so on, as well as handling some multi-mode TNCs such as the PK-232 and the MFJ-1278. I found it had the odd incompatibility problem with Kantronics TNCs due to the different commands employed (I use the *Hostmaster* program for these instead). As with many programs it isn't entirely 'bug free', for example the 'K' stream used for the personal mailbox in some TNCs needs setting up, however I found few problems in use with my TNC-u21 TNC.

I'd heartily recommended *Paket* as a 'step up' from a 'dumb terminal emulator', as it's shareware you can of course try it first without the possibility of wasting your money.

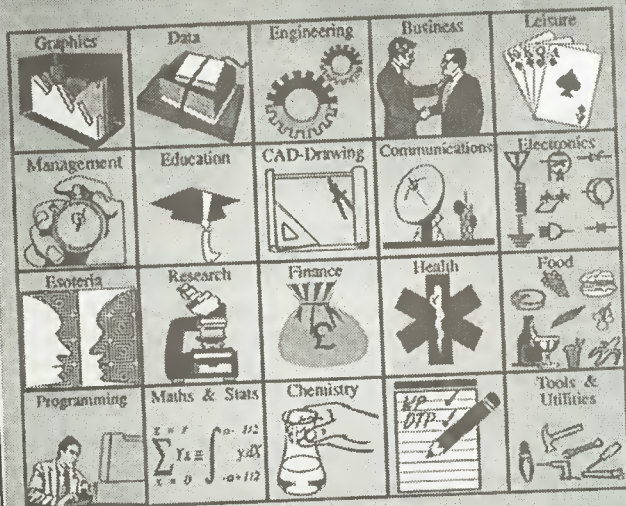
BBS Passwords?

There's been much deliberation on the possible need to provide an 'authenticity check' when logging into a packet BBS, with some users suggesting passwords as a check in a similar manner to that used for virtually every landline BBS in operation. This came to a head in the USA recently, where someone entered a commercial message on a packet BBS asking readers of the message to make a toll-call, i.e. similar to our premium-service calls, to an anti-war service. The FCC were made aware of this, and issued notices against several packet stations which forwarded the message, although the amateur holding the call sign of the originating station denied sending it in the first place. Who's to know? This also happens in the UK, I've seen it on my local BBS where a station pirated another station's call late one night, the message being forwarded on through the night before anyone was the wiser. This raises the question of whether individual BBS sysops should 'hold' all mail and 'vet' this before forwarding it — if this is done then what's the point of having an automatic network? Food for thought — let's have your views!

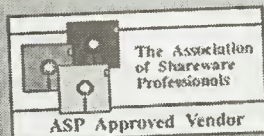
Extra 2m Packet Channels

It cannot have escaped most packet operators' notice that packet on 2m is becoming rather congested in many

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areas. A message from Peter G3UBX tells us that the RSGB VHF committee is looking at changes to the 2m band plan to add more frequencies for unattended AFSK packet operation, with the following suggestions;

- 1) The frequencies 144.6375MHz and 144.6625MHz be used,
- 2) One of the FM Simplex channels S11-S23 be designated for use,
- 3) The spot frequency 144.475 MHz be designated for use.

Of course there are pros and cons with all these, especially with the proposed use of 12.5kHz channel spacing due to equipment changes required. S12 is already allocated for AFSK RTTY use, and FM simplex operators may find further encroachment into 'their' channels unacceptable. Which leaves the third option, which 'encroaches' into the all-mode section. If you have any views on the above, you can contact Peter G3UBX @ GB7MAX. Maybe we should use the wide 50.62-50.76MHz data allocation 6m instead?

Shareware Software

I'm often asked "where can I get such-and-such packet software for my PC?", for example terminal programs, RLI and MBL BBS programs, TheNet and

BPO node software and the like. Well there's a tremendous amount of 'shareware' software available, for the uninitiated this is freely available and may be freely copied without charge. If find a program of use to you after trying it out for a while, then you're asked to send the software author a payment, an 'order form' normally being enclosed on a disk file.

For these I often refer people to specialised up-to-date sources such as software libraries, and the latest catalogue to land on my doormat from the Public Domain and Shareware Library even has a separate large section for Ham Radio programs. I've ordered many disks from this library in the past and I've always been satisfied, they charge a nominal copying and postage fee of £4.65 a disk for non-members (£3.85 for members) for 1-4 disks. Their latest addition to packet programs is Paket Version 4 as described above (Disk No. 2622), they also have many other general amateur programs such as Geoclock (real-time daylight/darkness map of the World), logbook programs, satellite tracking, Morse trainers, Doggate, Lanlink and so on. Their catalogue at £2 comes to over 100 pages, I'm still reading through it! You can contact them at Winscombe House, Beacon Rd, Crowborough, Sussex, TN6 1UL, Tel. 0892 663298, tell Rod Smith at the library that Ham Radio

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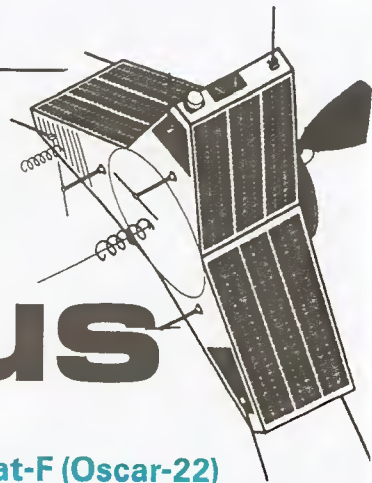
CTRL-Z, End of Message

There's now a new DX PacketCluster node operational, this being GB7TLH in East Dereham, Norfolk, run under the watchful eye of its sysop G1TLH. On the same subject, many Cluster sysops have reported problems with the latest paid-for Version 5 Cluster software from the USA, some sysops even taking it out and putting Version 4 back in. I'm glad I didn't splash out on it for the PacketCluster I help run.

As detailed last month, a new packet group for the south coast has now been formalised, this being the SUNPAC (Southern Users Packet Network) group who co-ordinate a number of nodes and BBSs in the area. The group has been formed as a non-profit organisation dedicated to the furtherance of amateur radio (now where have I heard that before?), they hold regular meetings and have an 'equipment reservoir' for node sysops and the like. Their annual subscription is £3, and you can get further details of their activities from their secretary Paul G0AFF @ GB7HJP. Keep me in touch with what you're doing on packet — I'd be pleased to share the information around!

Until next month, 73 de Chris G4HCL @ GB7XJZ

Satellite Rendezvous



As you read this, the sixth International Amsat-UK Colloquium at the University of Surrey will have just finished, with representatives from Amsat-NA, UK, DL, SA, I, 4X, ZL, F, JA, U, & LU planned to be in attendance. Thanks to all who came, we'll have plenty of photos from this in a future HRT.

Oscar 13

The current spacecraft attitude is BLON = 179.5, BLAT = 0. AO-13 suffered a computer crash on May 13, the transponders were immediately turned off and the command team started reloading the rudimentary operating system for the IHU. DB2OS says that this crash was not caused by Single Event Upsets, that is, high energy particles bombarding memory chips and causing bit flips. The IHU can easily correct one bit flip found in any of its memory but if more than one occurs then it can wreak software havoc. SEUs have caused problems in the past for AO-13's on-board computer but this crash was probably caused by a ground station commanding error. As of May 17th the complete IHU software has been successfully reloaded and AO-13 has returned to its normal schedule.

Oscar 10

Currently, Oscar-10 is not receiving sufficient solar panel illumination to support the transponder. **Please do not** attempt to use it until further notice; the period of inactivity is expected to end soon. As soon as it can support Mode-B transponder operations it will once again be released for general use. Early reports of Oscar-10's beacon returning to full strength can be sent to VK5AGR @ PACSAT-1 (aka AO-16), @ UOSAT-3 (aka UO-14), @ 8J1JBS (aka FO-20), or @ VK5WI. Alternatively tell us and we'll tell him.

Russian Satellites

Amsat-U continue their efforts to recover the receiving system of AO-21 transponder #1. It is most likely that the preamplifier is oscillating and blocking the RX, which is also used for command uplink and RUDAK. The problem

Amsat-UK information on the latest amateur satellite technology - Richard Limebear G3RWL reports

occurred suddenly at the end of March and many attempts to fix the problem by turning the attenuator Off/On failed. Using the same main- satellite command link, the transponder #1 was turned Off and transponder #1 instead was turned On on 19th May. The CW on 145.948MHz was operating perfectly giving nominal telemetry at 250mW HF output power. They still hope that after powering up transponder #1 again it will not continue to oscillate.

The digital telemetry of transponder set #2 was activated on 21st May on 145.800MHz, with about 2W output power. 30 telemetry channels are transmitted at 1100 Bit/s BPSK/FM modulation (no AX.25). 1100 bps is the speed of a popular computer interface in USSR.

On the next orbit the digital beacon on 145.838MHz was on and the 145.800 beacon was turned off. Then we noticed that the linear transponder was on and tried the Uplink. The downlink was extremely strong, giving excellent signals with only 1W uplink - the linear transponder seems to be incredible sensitive! It is to be expected that some more tests will be done and the transponder may be off again.

FO-20

Because Fuji-Oscar 20 started to experience periods of long solar eclipses commencing May 24th, the control team decided the most prudent way to prepare the batteries and satellite for this condition was to cease all BBS operations from May 16th. Digipeating for the present time will be possible but the emphasis will be on sending telemetry. In this mode, FO-20 will be sending a frame of telemetry every 2 seconds.

UoSAT-F (Oscar-22)

UoSAT-F is currently now in Kourou where it will be launched with a European remote sensing satellite and some other (non- amateur) Microsats on an Ariane 40, it will be called UoSAT-5, Oscar-22, after launch. The launch however has currently been postponed, and the launch now looks set for sometime in July.

The extra time before launch will be used to continue development and testing of flight software, most of this software is already de-bugged and in operation (either on UO-14 or on ground-based engineering models). This base of tested software should allow us to bring UO-F on line rapidly, perhaps returning the first CCD images a couple of weeks after launch. The UoS team have also been working on plans for re-conditioning UoSAT-F during this long 'hold'.

The satellite's primary non-amateur mission is to provide store-and-forward communications for *SatelLife* who will use it to start a non-profit electronic mail network for health professionals. Initially, five African medical schools will use 'HealthNet' to exchange electronic mail and receive up-to-date medical literature. HealthNet is a direct application of store- and-forward satellite communications techniques that were developed within the Amateur Service.

When not serving HealthNet on non-amateur frequencies, UoSAT-F will transmit and receive on amateur satellite service channels, using AX.25 data using 9600 bit/second FSK modulation. The uplink is on 2m and the downlink is on 70cm using the same frequencies as planned for UoSAT-Oscar-15 (which has now officially been abandoned). Stations already equipped for UO-14 operation will be able to receive UoSAT-F with the same software and hardware they already use. Many of the stations now active on UO-14 found the implementation of 9600 bps FSK much easier than expected, so newcomers shouldn't be frightened of this high speed technology. UoSAT-F will transmit telemetry, status messages, and files, in the pattern typical of UO-14. Telemetry and status messages will be in the same format as that on UO-14, files will be broadcast using the PACSAT Broadcast Protocol.

UoSAT-F's role in the amateur satellite service will be similar to that of UO-9, UO-11 and Webersat. Instead of providing a two-way communication service, it will transmit experimental data and telemetry. The most exotic aspect of this mission will be a CCD camera. The camera design incorporates all of the lessons learned from previous UoSAT CCD experiments; it has a wide angle lens (110 degrees) providing a field of view only slightly smaller than the satellite's footprint. UO-F will broadcast CCD images routinely using the Pacsat broadcast protocol. For those interested in writing their own display program, complete technical details of the image file contents will be published soon. When UoS have confirmed that the camera is working, they'll release a display program for PC compatibles.

Incidentally, the French SARA satellite which has no connection with amateur radio, on same launch as UO-F, uses 145.995MHz as a downlink!

MicroSats

Lusat has been catching up and has now passed Pacsat in orbit. Although their altitudes are sometimes very close, precession of other orbital parameters causes their minimum separation to always be at least a few km. It already caught and lapped UO-14 (the highest and slowest of the amateur payloads) a few months ago, and although Pacsat and Lusat are operationally nearly identical each have different uplink channels, hence the expected inter-satellite uplink interference is minimal. A slight decline in activity on AO-16 and LO-19 (20%-25%) has been noted, however, probably because most stations can access only one of the satellites at a time. By now, Lusat will be far enough ahead of Pacsat that the footprints will not overlap until the next 'lapping event' occurs in 1993.

The Pacsat broadcast receiving program for **UoSAT-Oscar-14** has now been updated to include the ability to 'fill holes' in broadcast files. Users can now request that particular portions of a file

be transmitted in the broadcast rotation. The implementation of the hole list feature recently became more important for implementation at UoS since the efficient reception of 300 kbyte pictures from UoSAT-F will require hole filling.

While implementing the hole list, a few other changes were made to PB;

1) Only one broadcast request per station will be placed in the broadcast rotation. If you transmit a second request, it will replace any request you already have in the queue.

2) Files are only transmitted once, then removed from the rotation. Official bulletin stations will be able to start permanent broadcasts.

After this new version of PB is fully tested on UO-14 and modified after any user feedback, it will be integrated with the Pacsat and Lusat versions of the file-server software. Please do not try to use this new version of PB.EXE on AO-16 and LO-19 at the present time until file-server software updates have been made to these Microsats.

Short Bursts

The Satellite News bulletin Via UoSAT-Oscar-11 has been dormant for a time because, not unnaturally, the UoS workers have been concentrating on building and operating satellites rather than acting to gather and distribute news. UoS recently asked Amsat-UK to take over this time-consuming task so as to allow them to devote more man-hours to their primary work. As a result of this, the service will re-commence soon (we hope within a month), the editor will be your's truly, G3RWL.

There is only enough room for 3000

(decimal) bytes of data per bulletin in UO-11 so please excuse us if, in the interests of providing more data, we do not give out name-checks to everyone who corresponds with us. News items will, of course, be credited with the source. The format is still under test, we hope you will tell us what you want to see.

NOAA-12 was successfully launched from California on 14th May. The official designation is 1991-032A, Object Number 21263. The orbit is nominal, near circular with an average altitude of about 820km, and it comes up about 45 minutes away from NOAA-10. The spacecraft will be in checkout status for the next several weeks. Currently, Beacon 1 (136.77MHz) is on, AVHRR channels 1 and 2 are being broadcast on HRPT at 1698.0MHz, and APT transmitter 1 and AVHRR channel 2 are on 137.50 MHz. If HRPT transmissions are not heard on 1698.0 MHz, then the alternate frequency of 1702.5 MHz should be checked. 1698 MHz is intended as the primary HRPT frequency. The spacecraft is expected to replace NOAA-10 as the operational morning descending spacecraft on or about 1st July.

The MicroSat Telemetry Handbook is on its way to the Amsat-UK offices from the USA, hopefully these should be available when you read this. Finally, if you want an AO-13 PSK PCB, there's only 3 left at Amsat-UK, no more, so you'd better get in contact quick if you want one!

For further information about Amsat-UK contact; Amsat-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. A large SAE gets you membership info, and SWLs are most welcome.

AO-21 Transponder #2 Frequencies

Beacon	145.948MHz, 145.838MHz, 145.800MHz,	0.2W HF 0.4W HF 2.0W HF	CW telemetry digital Telemetry (no AX.25!) " " "
Uplink	435.123MHz to 435.043MHz		100W EIRP, inverted
Downlink	145.866MHz to 145.946MHz		10W max. HF, 80kHz bandwidth

Keplers

SAT:	OSCAR 10	UoSAT 2	AO-13	UO-14	FO-20	RS-10/11	RS-12/13
EPOC:	91138.10904151	91143.12431457	91134.17571525	91139.72759653	91143.42815430	91143.92353368	91137.90824027
INCL:	25.8164	97.9001	56.8159	98.6663	99.0261	82.9259	82.9228
RAAN:	145.1928	188.8789	94.8036	219.3509	130.2865	76.7869	126.5540
ECCN:	0.6022329	0.0011150	0.7174466	0.0010544	0.0541319	0.0010299	0.0030267
ARGP:	242.7457	247.8168	254.3124	251.9463	357.6819	252.1445	6.7432
MA:	44.6724	112.1813	22.1690	108.0536	2.1784	107.8606	353.4126
MM:	2.05885438	14.66927289	2.09695394	14.29118862	12.83181075	13.72187013	13.73897721
DECY:	-1.09E-06	2.136E-05	2.31E-06	7.05E-06	3.1E-07	-8.6E-07	1.63E-06
REVN:	3162	38577	2234	6892	6038	19626	1398
SAT:	PACSAT	DO-17	WO-18	LO-19	Mir	NOAA-12	
EPOC:	91140.74452842	91142.40652923	91135.23712563	91135.98331718	91143.71699009	91142.27536671	
INCL:	98.6717	98.6726	98.6714	98.6713	51.6047	99.0288	
RAAN:	220.6798	222.3744	215.2902	216.0881	51.3249	96.8687	
ECCN:	0.0010316	0.0010230	0.0011051	0.0011268	0.0005346	0.0013025	
ARGP:	251.7012	243.7162	266.9323	263.3478	213.1303	52.1117	
MA:	108.3047	116.2938	93.0595	96.6432	146.9772	308.1236	
MM:	14.29205434	14.29292340	14.29328365	14.29405884	15.66611000	14.12149633	
DECY:	6.05E-06	6.82E-06	6.16E-06	6.25E-06	3.5932E-04	7.48E-06	
REVN:	6907	6931	6829	6840	30133	13681	

VHF/UHF Message

Ken Ellis G5KW with the latest happenings on VHF and UHF

By the time this issue appears on the bookstalls the Es season should be well under way. If indications to date are a pointer then we are in for a good season, reports of single and multi hop contacts on 2m and 6m are coming in already (see footnote — Ed).

UKSMG Contest 8/9th June 1991

Geoff GJ4ICD, the UKSMG (UK Six Metre Group) chairman says "didn't really try" but still had 78 QSOs in 15 countries; G, OZ, I, 9H, F, IT9, ZS6, ZB2, SM, GU, GM, GW, OE, ON, GJ, V51 heard and 28 squares worked. His best DX was ZS6WB, only one new square which was JO96, the Gotland DXpedition. In addition to Es and Tropo there was some MS activity from UK to OZ, SM, OE and ON. Dave G3SDL (now OZ3SDL) said his best DX was an opening between OZ and SV on the 9th June.

Aurora on 50/144/432

The first two weeks of June had solar flares, proton events, polar cap absorption and extensive and prolonged aurora. Whilst this was a mixed blessing for HF operators, it certainly provided some intriguing conditions for VHF/UHF operators. If you were involved, then individual reports would be appreciated for passing on to the propagations study committee of the RSGB.

UK Six Metre Group

The group now has a new acting secretary, Chris Gare G3WOS, Ted Collins G4UPS having recently resigned for personal reasons.

Report from Ted Collins G4UPS;

South Africa; I have heard several operators commenting recently about lack of a QSL card from ZS6CE. The current issue of the UK Six Metre Group newsletter contains an item by SM7FJE, also complaining about the difficulty of obtaining a confirmatory QSL card for a 6m QSL from ZS6CE. The answer to their problem is quite simple. Firstly, the call-sign ZS6CE no longer exists, and secondly, Etienne has moved his QTH. Etienne had his call-sign withdrawn and was issued with a new one — ZR6EMN.

His new address for QSL cards is Mr. Etienne Swart, P.O. Box 14, Honeydew 2040, Rep. of South Africa. His locator has changed from KG34 to KG33XX.

Italy; I have just been informed that Max IK8HIO is now active as IG9/IK8HIO in JM65, QSL is via. IK8IUT.

Chile; John 9H5EE informed me on the 2nd May that CE8ABF has promised to run a keyer on 50.007MHz when the band is quiet.

Martinique; Lucien FM5WD has asked me to point out that although he has a QSL manager, W3HNK, for 6m QSOs he requests QSL direct please.

Gibraltar; Steve ZB0X had his first opening into Europe on the 7th May. His QSL information is via his QSL manager, who is also his father; Mr Ron Jones, 10 Ferndale Cres, Gobowen, Oswestry, Shrops SY11 3PY.

Malta; Congratulations to George Galea who has now passed his CW to become a class A operator. However, the change also means a new call-sign. You may know George from his old call 9H5AA, and he has been fortunate enough to obtain 9H1AA as his new call! George has asked me to circulate his address, because quite a few overseas stations have been confused by this new call-sign on the 6m band. So for direct QSL cards from 9H1AA write to George Galea, 241 Dakota St. Margaret Heights, Mosta, Malta GC.

USSR; A new beacon has been activated from within the USSR. This uses the call-sign of UL8GDD and operates on 50.055MHz with a power of 5W, the beacon's locator is MN83KB. At the moment I'm unsure as to the legality of this beacon, so I'm not indicating the source of this information!

Zambia; As mentioned in my February information, Peter 9J2HN has returned from his holidays in Japan and is active on the 6m band. I believe that his first European opening was on the 25th May 1991, when he worked into ON and at least one G station, Mike G3VYF in Essex. His locator is KH45, QSL information is via. JH8BKL. So far he has only been heard on SSB. He worked more G stations during an opening on the 30th May 1991.

Malyj Vysotskij; The annual joint expedition to 4J1 was this year a very special expedition, as this time they were also active on 6m. A special permit was granted by the Russian authorities for a fixed frequency operation on

50.120MHz. 4J1FS worked into Europe including the UK on the 24, 25 and 27th May to my knowledge. QSL via OH2BU. On 24th May at 1659z Ken G8VR had a QSO with 4J1FS for the first 4J1/G. At 1716z Geoff GJ4ICD had a QSO with 4J1FS for the first GJ/4J1.

QSL address; I2LNU, QSL to Mr Luciano Crespo, I2LNU, P.O. Box 1, 10090 Rosta, Italy.

Norway; Here's some further information on the LA7SIX beacon on 50.05MHz. It runs 25W into a 4-element yagi beaming at a heading of 190 degrees. It transmits LA7SIX in JP99LO, followed then by an 80 second carrier.

As I write this (31st May), no 6m permits have to date have been issued in EA, YU, SP, despite quite a number of these being active on 6m!

What hath God wrought!

How many of you reading this paragraph realise the significance of the above four words? They signal an event which made possible the system by which both amateur and professional telegraphists are first able to communicate with each other, the Morse code! Samuel Finley Breese Morse was born April 27th 1791 and spent many years, often in poverty, working to bring his ideas to fruition before patenting his invention. In 1843, with funds exhausted, Samuel Morse petitioned Congress for a second time, and waited two months in Washington for a bill to be approved which would allocate \$30,000 for tests to evaluate the merits of his telegraph. On the last day of the session, 3rd March 1843, disappointment seemed inevitable. Any business not completed before the adjournment could be delayed for up to a year. As the evening approached, senatorial friends told him they thought the bill would not go through. In depths of despair he returned to his room and made arrangements to leave Washington the next day. At breakfast next morning he was interrupted by Annie Allsworth, the daughter of an old friend the commissioner of patents, who told him that the bill had been passed unopposed just before the adjournment at midnight. He could hardly speak at first, when he did, he promised her that she could choose the words for the first dispatch on the line from Washington to Baltimore. It was to be built with the money from Congress.

First Morse telegraph link

When the line was completed and the first official demonstration was given in front of invited observers, on 24th May 1844, Morse kept his promise. Annie



VHF/UHF DX chasers Geoff GJ4ICD and Richard G4CVI, is that their lucky mascot we ask?

Australian 6m beacons

Frequency	Callsign	Location	Grid square
50.053MHz	VK3SIX	Hamilton (1)	QF12
50.056MHz	VK8VF	Darwin	PH57
50.066MHz	VK6RPH	Perth	OF78
52.320MHz	VK6RTT	Wickham	OG89
52.325MHz	VK2RHV	Newcastle	QF57
52.330MHz	VK3RGG	Geelong	QF21
52.345MHz	VK4ABP	Longreach	QG26
52.370MHz	VK7RST	Hobart	QE37
52.420MHz	VK2RSY	Sydney	QF56
52.425MHz	VK2RGE	Gunnedah	QF59
52.440MHz	VK4RTL	Townsville	QH30
52.445MHz	VK4RIK	Cairns	QH23
52.450MHz	VK5VF	Mount Lofty	PF95
52.465MHz	VK6RTW	Albany	QF84
52.470MHz	VK7RNT	Launceston	QE38
52.485MHz	VK8RAS	Alice Springs	PG66

Ellsworth chose the first words to be transmitted, and the phrase *What hath God wrought* taken from the old testament Numbers chapter 23, v23, took its place in history.

With reference to 'Morsum Magnificans' number 19, published by G. C. Arnold Partners.

From the Mailbox

Geoff GJ4ICD found May to be another successful month. He has now received the 100 countries award from G4OUT for 50MHz, and it is believed this is the first VHF 100 countries award that the RSGB have ever awarded. Extracts from his log for May are; 1/5/91 worked IA0KM via MS. 4/5/91 large opening 1400z, ZS6 beacons at S9+, lots of ZS stations. 1600z CX/LUs at S5. 9/5/91 major opening to South America, at 1323z worked LU7DZ/S9, LU9EAE, LU8DNY, LU2DEK, LU3EX. 10/5/91 at 1740z worked LU2DEK, LU7VB/FF (very long haul). 24/5/91 new country worked, 4J1FS a GJ first.

Steve G8PYP reports;

QSOs on 50MHz; 4/5/91 1518-1704 ZS6XJ, V51SW, 7Q7RM by TEP, 9H1BT

by Es. 6/5/91 1153z long MS burst — JO21. 17/5/91 1705z IK8FPD, I7CSB, Es. 25/5/91 at 1204-1346, LA3EDA, LA9BM, LA9DL, SM3GHW, SM4BRD, and LA9DI by Es.

QSOs on 144MHz; 27/4/91 at 2333, PA3FOC by Tropo. 28/4/91 ON1AWD Tropo. 4/5/91 1849-2140 FC1MPR/P, FF1ORH/P, FD1CUA, F6CTT, FF1NZH/P, F6IPR/P, F6HPP/P, FC1CNE/P all by Tropo. 11/5/91 GU3EJL tropo. 19/5/91 at 1154-1244z GM4ZUK/P, G4APA/P, GI4KSO/P, G4ERG/P all Tropo. 21/5/91 F1ANH Tropo.

432MHz; 4/5/91 at 1955, G4CVI IO90; 2020, FGW4BYY/P Gwent IO81. 21/5/91 at 2252z F1ANH.

Eric Jamieson VK5LP writes;

Did six metres die? Following the many exotic contacts from VK to other world countries last year, amateurs were heard to say that the band had given its best of cycle 22! Perhaps the best maybe behind us, but there were still plenty of contacts to be made, and many to new countries. We had exciting openings to Europe during February and March, and since then the band has certainly not been dead. During April the band

opened to W on a number of occasions, on 17/4/91 around 2240 W6BJI was worked in VK2, 3 and 7. The openings extended to VK5 with good signals on 20/4/91 when W5s were worked between 2205 and 2400 by VK3s and VK5s.

EME News

Doug VK3UM using his new array of eight 7.7 wavelength DJ9BV aerials, and his MGF 1302 cavity preamp, made many worldwide MS contacts between January 1st and April 20th 1991. Included in his list appear G4RGK, G3LQR and G4ALH. Most of the signal reports were 449-559 with a few weaker ones. Doug actually put together sixteen 7.7 wavelength aerials, but could not bring himself to accept the possible consequences of gale force winds if he erected them all! From VK5 VHF/UHF, An Expanding World, Amateur Radio Australia. Reports from UK EME stations would be welcomed for inclusion in this column (*Ed's note — watch out for a forthcoming EME article by Richard G4CVI*).

Late news received at the HRT Editorial Office from G4CVI; On 16th June 6m stations worked on the south coast by Es included EA6/DF5JJ (JM19), EA3DZG (JN01), and HV3SJ (Vatican City). At 18.00z on 6th June, CU3/K6EDX was worked, with the Canadian beacon audible at 18.30z. 2m aurora on the 11th June brought in SP5EFO (KO02), SP2DDV (JO93), SP2OFW (JO93), RB5PA (KO21) and SP9EWU (JO90). The 2m aurora on the 13th saw HG0HG (KN07), RB5PA (KO21), and OK1SC (JO70).

That concludes another very interesting month's activities. Please send future reports to Geoff Brown GJ4ICD, TV Shop, Belmont Rd, St Helier, Jersey, Channel Islands. Tel. 0534 77067 or 0860 740727. Geoff will be writing the VHF/UHF column from the November issue and he hopes to see you at Leicester. (*Ken plans to be at the Leicester Exhibition on the Sunday — come and say hello to him and Geoff at the HRT stand — Ed.*)



RADIO SOCIETY

OF GREAT BRITAIN



The first UK 100 Countries VHF Award, issued to Geoff GJ4ICD

50MHz COUNTRIES AWARD

This is to certify that the underment the Society that he/she has com regulations governing this clas

Total of confirmed Countries on 6 = 100.

Ian L Cornes,
Ian L Cornes, G4OUT.
14th May 1991.

50 MHz 2-Way	50 MHz 2-Way	50 MHz 2-Way
80 Countries	70 Countries	60 Countries
50 MHz 2-Way	50 MHz 2-Way	
90 Countries	100 Countries	

Geoff Brown, GJ 4 ICD
NAME CALLSIGN
NUMBER 1. DATE 31st July 1990.
BY ORDER OF THE COUNCIL *Ian L Cornes* G4OUT
HONORARY AWARDS MANAGER

ENDORSEMENTS

HF HAPPENINGS

All amateurs, but especially HF operators, will be saddened by the death of Rajiv Gandhi, VU2RG. Even after he acceded to high office in India he continued to take an interest in amateur radio. I remember VU2RBI and VU2MY telling me a few years back of how they had gained an audience with Rajiv Gandhi when they were trying to get permission to mount a DXpedition to the Andaman and Nicobar Islands. Needless to say, the necessary permits were soon forthcoming.

Last month I said there was a possibility of an operation from Myanmar (Burma) by Romeo UB5JRR and others. As of the time of writing there is no harder news but I am delighted to say that UK amateurs have already individually contributed over £800 towards the cost of the operation, and donations are also likely from the Chiltern DX Club and RSGB DXpeditions Fund. Let's hope it's all worthwhile.

I'm writing this column just after the 1991 HF NFD Contest, this field day has always been a popular contest with UK amateurs. This year over 12 members of my local club, including several Class B amateurs, were on site for the whole of the contest even if only myself and G3WGV could understand the CW side of things! NFD started as a test of a club's ability to mount an operation under what might be described as 'emergency' conditions, but nowadays it's often conducted in the height of luxury. At our station we used an FT1000 transceiver with an automatic aerial switch which detected the band in use and connected the appropriate aerial without operator intervention. Our main HF aerial was a TH5 triband beam on a 20m trailer-

Don Field G3XTT provides this month's potential 'catches' for DX chasers

mounted tower. Logging was on a 386 portable PC, with the whole station powered from a generator via a UPS (Uninterruptible Power Supply) to avoid power failures. This said, at the end of the day it still comes down to the skill of the individual operators, not only in terms of their CW ability but in making good decisions about when to change bands, when to tune and when to call CQ, and so on. If you haven't taken part, then do make of point of being in on NFD next year. You may even get hooked!

The Italian Problem

I don't know whether any of you, like me, have heard British amateurs decrying southern European operators due to apparently poor operating on their part. When a group of UK amateurs went out to Loano in Italy for the first Islands On The Air Convention, their Italian hosts complained bitterly about the treatment Italian amateurs often receive from their British counterparts, unfairly they believe. In some cases this is due to their lack of understanding of English so that, for example, they may not understand that a DXpedition has just announced it is tuning for North American stations only. Another problem, but a reasonable one, is that a very high proportion of Italian HF operators are relatively newly licensed, enthusiastic but still learning the ropes. The UK amateurs were pleas-

antly surprised that the average age of attendees at the Convention was probably 15 years or more lower than it would be at a similar event in the UK. I don't know what trick they have for attracting so many youngsters (many in their late teens or early twenties) into the hobby, but we could do with finding out the secret.

Incidentally, the next IOTA Convention will be held in London in September 1992, to coincide with the 1992 RSGB HF Convention.

CDXC

The Chiltern DX Club is the largest DX Club in the UK, now catering for a membership of over 130 (membership is open to those with DXCC and an active interest in HF DXing). At its AGM in May I was elected as President for 1991/92, while Martin G3ZAY replaces me as Chairman. John G3WGV is the new Vice-Chairman, Dick G0MFO/AA6MC is Secretary, Ron G6LX becomes Treasurer and Andrew G0HSD takes over the bi-monthly newsletter. If you think CDXC may be of interest drop a line to G0MFO or to myself. Membership currently costs £10 per year.

DX News

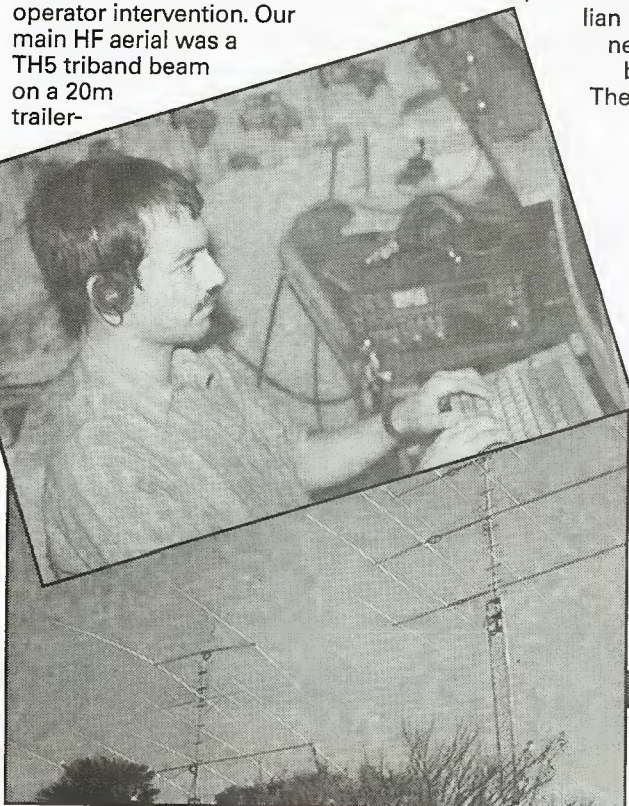
During late May and early June FR5AI/T showed up from **Tromelin Island**, mainly in French nets, while a multinational group put on a big effort from **Malyj Vysotskij Island** as 4J1FS. This latter operation included the WARC bands and RTTY, and was very easy to work despite atrocious band conditions. ET2A showed again from **Ethiopia**, this time emphasising CW operation (I managed to snag Jack on 18MHz CW as well as on 28MHz SSB).

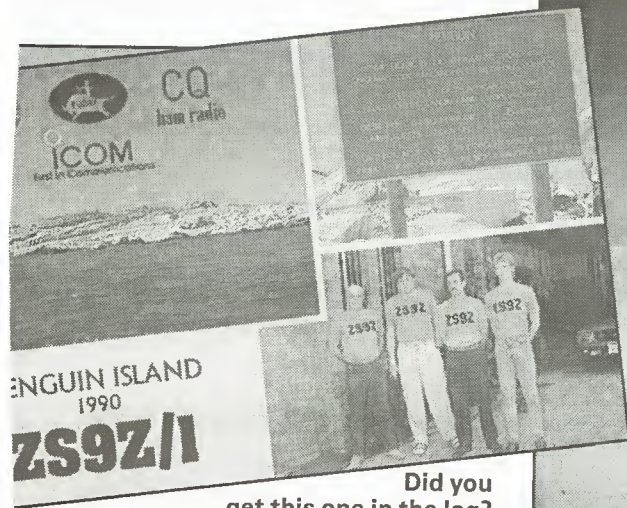
Amateur radio became fully legal again in **Mozambique** on 17th May (there were a few licensed operations prior to this date, but each was very much a one-off). Expect to see 5 to 10 newly licensed residents as well as a number of DXpedition operations, though as I write this there appears to have been a hiccup in the bureaucracy.

The other 'big one' was an operation from **Angola** by a group of Russian amateurs, who signed D2ACA as well as their own calls portable D2. I know UK stations were able to work them on the five main HF bands, plus 18 and 24MHz, so this should have made a lot of recently licensed HF operators very happy (it is 15 years or more since Angola was on the air in a big way, in those days the prefix was CR6).

Chris, ZS6BCR, probably the most active DXer, contester and DXpeditioner from South Africa, having operated from A22, 3DA0, V5, ZS9, and most recently ZS1 (Penguin Islands)

The aerial farm of ZS6BCR, doesn't it make you wish?





Did you get this one in the log?

The publication of the new 'Islands On The Air' directory has led to a flurry of activity from previously unnumbered island groups. Just check around 14.260MHz and 21.260MHz any weekend to see what I mean.

Sadly VK9NS's planned operation from Bhutan didn't come off, a very sad day for amateur radio in general, and for your scribe in particular as this was one of only four countries I still need. Jim will keep trying.

Last but not least during this roundup, I worked Steve P29DX (formerly G4JVG and author of this column) on 21MHz SSB on 8th June. He had an excellent signal into the UK, and is expecting to be very active on all bands.

Now to forthcoming DX. Firstly, 'QRZ DX' reports that seven amateurs from Montreal plan to sign CY9CWI from **St. Paul Island** between 1st and 7th August. I've no further information on this one, so keep an eye on the bands.

LA4LN and LA1SP were due to be in Iceland (TF) from 18th July to 1st August, and then in the **Faroe Islands** (OY) from 2nd to 5th August. They were planning to be active on the five main HF bands, and to include some RTTY and packet operation in their activity.

If you're still looking for **Pitcairn Island** of 'Mutiny on the Bounty' fame, then it's worth a look on 14.140MHz from 0730 on Sundays. Tom Christian VR6TC maintains a schedule with DL8FL, and some of the other Pitcairn operators show up from time to time on the frequency as well.

For IOTA enthusiasts, a group of Spanish amateurs plan to sign AN9A (or possibly ED9EAI) from **Alhucemas Island** between 14th and 18th August. This one will get an IOTA reference once an operation takes place.

Farther afield, I4ALU who has operated in the past from various European islands, as well as the Maldives, will be in the Pacific as you read this. Carlo plans to operate from the **Yasawa Islands** (part of Fiji, 3D2) from 25th to 28th July, from **Fafa Island** (Tonga, A35) between 30th July and 5th August, from **Vava'u Island**

Aerial photo of the Penguin Islands

(also Tonga) between 6th and 11th August, and from **Aitutaki Island** (Cook Islands, ZK1) from 18th to 25th August. He is taking an IC735, vertical and various wire aerials, and operation will be exclusively on CW, 5kHz up from the band edges.

Finally, there is talk as I put this piece together of an operation from **Afghanistan** by a group of Italian operators. This was due to take place between 12th and 29th July. Although UB5JRR managed to put YA0RR on the air earlier this year, licensing is still a major problem, but some of the Italian operators concerned have a good track record of putting rare ones on the air, so let's hope they manage to pull it off.

DXCC News

The DX Advisory Committee voted 9 to 7 in favour of adding the **Penguin Islands** off Namibia to the DXCC list. These islands belong to South Africa but are separated from South Africa by newly independent Namibia. The decision was subsequently ratified by a unanimous vote of the ARRL Awards Committee. Cards may be submitted from 1st September (if you send them earlier they will be rejected). This decision brings the number of countries on the DXCC list to 323. Meanwhile, the annual DXCC listing in QST magazine shows W1GKK still at the top with 375 countries (he is the only person to have worked not only *all* current countries, but *all* the deleted ones as well!). GW3AHN is the highest placed UK amateur with 368 to his credit. Tom doesn't boast a megastation, his success comes from lots of patience and operating skill over many years. Congratulations!

As well as the Penguin Islands, there are some other applications pending for DXCC status, of which the most likely contender is **North Korea**. After all these years of separation it is hard to maintain the fiction that North and South Korea

are one and the same country. Although it is too early yet for ARRL consideration, I note from the newspapers that Northern Somalia has withdrawn from the rest of the country, and has appointed its first President. Perhaps this will eventually find its way on to the DXCC list, though probably not until it has been recognised by the United Nations and generally been accepted by the World community as a separate nation.

Talking about new countries, Martti Laine OH2BH has done more than most, not only to put rare ones on the air but to get new ones added to the list. He is personally responsible for Annobon (3CO), Market Reef (OJ0), R.A.S.D. (S0) and Malyj Vysotskij (4J1) becoming 'new' ones, and over the years he's operated from well over 100 countries. Martti is a larger than life character, and his new book 'Where do we go next?' is well worth a read when the bands are dead (Martin G3ZAY is acting as UK distributor, copies are available from him at £15 inclusive of postage). It looks likely that Martti will be a guest speaker at this year's RSGB HF Convention, come along to hear him if at all possible!

Contests

September kicks off with the LZ DX Contest on 1st, then the IARU SSB Field Day on 7/8th. A week later it's the *Worked All Europe DX Phone Contest* (the one where you get extra points for so-called QTC traffic), then the *Scandinavian CW Contest* on 21st/22nd (the phone leg is a week later). Finally, one for RTTY enthusiasts. The *CQ Magazine RTTY Contest* runs for 48 hours over the weekend of 28/29th September (but see below as to what you should really be doing that weekend!), and becomes more popular each year. Mind you, in my book all these events are just the hors d'oeuvres, with the really interesting contests coming along in October. But more of that next month.

Last, but by no means least, ensure you put September 28/29th very firmly in your diary. This is the weekend of the *RSGB HF Convention*, to be held once again this year at the Penguin Hotel in Daventry. The weekend starts with a DX Dinner on the Saturday evening (tickets £18 from G3PJT), and then a full and varied lecture program on the Sunday, along with a number of displays and stands including a follow-on to last year's software demonstrations. No traders though — this is very much a social occasion. A visit to the bar will almost certainly find yours truly trying yet again to persuade the HRT Technical Editor to take up serious DXing (the planning permission's through, and the Stru-mech Versatower just needs putting up — Tech Ed!). Hope to see you there!

Club News

Acton, Brentford & Chiswick ARC meet at 7.30pm on the 3rd Tuesday of each month at the Chiswick Town Hall, Turnham Green, Chiswick, London W4. A date for your diary;
Aug. 20th QSL cards, by G0JRY, followed by a critique of the clubs performance on low power FD.
Further details from Paul Truitt G4WQO, Tel. 071 938 2561

Bedford and District ARC meet every Tuesday at the Allens Club, Hurst Grove, Bedford at 7.30pm for 8. Most meetings are social evenings, other club events include;
Aug. 13th Committee meeting.
Sep. 3rd Talk; Aerials and coax.
Sep. 10th Committee meeting.
Sep. 17th Talk; Amateur radio, another view.
Further details from their secretary Glenn G0GBI, 81 Duchess Rd, Bedford. Tel. 0234 266443

Braintree and District ARC meet at the Community Centre, Victoria Street, Braintree at 8pm on the 1st and 3rd Mondays of each month (except bank holidays). Club events;
Aug. 5th Travel talk by David G0KQV, USA and Australia.
Details from M. J. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ. Tel. 0376 27431

Bromley and District ARC meet on the 3rd Tuesday of each month, 7.30 for 8.00pm at the Victory Social Club, Kechill Gardens, Hayes, Kent. Club events include;
Aug. 20th Operating evening and barbecue.
Sep. 17th Valves, G6ODE.
Further details from Mr. Geoffrey Milne G3UMI, 142 Hayes Lane, Hayes, Kent BR2 9EL Tel. 081 462 2689.

Bromsgrove ARS meets at 8pm on the 2nd and 4th Tuesday of each month at the Lickey End Working Mans Club, Alcester Rd, Lickey End, Bromsgrove. Club events include;
Aug. 13th Eric Danks G8BKL ceramics.
Aug. 27th Night on the air. Further details from Mr. D. J. Edwards G4ZWR, Tel. 0527 546075



South Bristol ARC meets every Wednesday at the Whitechurch Folkhouse Association, Bridge Farm House, East Dundry Road, Whitechurch, Bristol, Avon. BS14 0LN. Forthcoming events include;
Aug. 7th 10m activity evening.
Aug. 14th DX broadcast TV activity.
Aug. 21st Fox hunt.
Aug. 28th General chat about club affairs.
Aug. 31st SSB field day with NBARC.
Events and dates often change, so for more information Tel. Whitechurch 832222 on a Wednesday evening.

Coulsdon ATS meet on the second Monday in each month, 7.45 for 8.00pm at St Swithun's Church Hall, Grovelands Road, Purley, Surrey. Programme of events;
Aug. 12th RSGB video evening with cheese and wine.
Sep. 9th Linear amplifiers, by John G8MNY.
Further details can be obtained from Andy Briers G0KZT, Tel. 081 668 7004 or Alan Bartle, Tel. 081 684 0610

Dorking and District RS meet on the 2nd and 4th Tuesdays at 7.45pm at various venues, details from John Greenwell G3AEZ, Tel. 0306 77236. Dates, other than the informal gatherings, are;
Aug. 11th D/F trial — venue TBA.
Sep. 7/8th IARU region 1 HF FD SSB.
Sep. 24th Digital communication part 2.

Echelford ARS meet in the Community Hall, St Martin's Court, Kingston Crescent, Ashford, Middlesex at 7.30 for 8pm. Dates for your diary;
Aug. 12th The great egg race, G0BZF/G1XHP.
Aug. 29th Club night.
Sep. 9th Keys and keyers, G3ESH.
Further details from P. Townshend G6PMT, Tel. 0344 843472

Edgware & District RS meet at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak. Events include;
Aug. 22nd SSB field day briefing.
Further details from Hank Kay G0FAB Tel. 081 205 1023 or Howard Drury G4HMD Tel. 09274 22776

Exeter Amateur Radio Society meet on the 2nd and 3rd Monday of each month at the Community Centre, St Davids Hill, Exeter at 7.30pm. Every third Monday is a social gathering in the bar, other club events include;
Aug. 12th Free and easy.
Sep. 9th Frequency measurements.
Further details can be obtained from Ray Donno G3YBK Tel. 0392 78710

North Ferriby United ARS meet at North Ferriby Football Club Social room, Church Road, North Ferriby at 8pm. Meeting details as follows;
Aug. 9th Night on the air.
Aug. 16th Field night.
Aug. 23rd Night on the air.
Aug. 30th Portability my way — Frank G3YCC.
Sep. 6th Night on the air.
Sep. 13th Construction competition.
Sep. 20th The way ahead meeting — Ken G4VKK.
Sep. 27th 'Characteristics' — Norman G3NJP.
Further details from F. W. Lee G3YCC, Tel. 0482 650410

Hastings ERC meet on the third Wednesday of each month for their main meetings, at the West Hill Community Centre, Croft Rd, Hastings, at 7.45pm. They also meet every Friday at Ashdown Farm Clubroom, Downey Close, Hastings at 8.30pm, for a social evening. A date for your diary;
Aug. 21st Constructors competition, at West Hill CC.
Further details from Ken Homewood G4UBP, Tel. Hastings 444952 or Secretary Reg Kemp G3YYF.

Horndean and District ARC meet at the Horndean Community School at 7.30pm, Barton Cross, Horndean, Hants. Their activities include;
Aug. 1st Aerials — the beginnings.
Oct. 3rd Annual General Meeting.
Further details from S. W. Swain, Tel. 0705 472846

Horsham ARC meet at the Guide Hall, Denne Road, Horsham, W. Sussex on the first Thursday of each month at 8pm. Events include;
Aug. 1st Photo quiz.
For further details contact Peter Stevens G8SUI, 11 Nutwood Ave, Brockham, Betchworth, Surrey RH3 7LT Tel. 0737 842150

South East Kent (YMCA) ARC meet at the Dover YMCA, Godwynehurst, Leyburne Road, Dover, Kent. The club have 3 Novice instructors and are currently running a Novice class with 12 students of ages 11 to 60+. The demand for the class has been so great that they already have several students for the next class which will start in July/August. Other club activities include;
Aug. 7th Nor-landing cruise, 7pm departure.
Aug. 14th 2m fox hunt.
Aug. 28th Portable operating, bring sandwiches.
For further details about Novice classes and the club contact Eileen Berridge G7HXJ Tel. 0304 372656

Keighley ARS meet at the Cricket Club, Ingrow, near Keighley every Thursday at 8.00pm. Most club meetings are 'Natter nights' other events include;
Aug. 8th Quiz.
Aug. 29th America's first 25 years in space — G4ZVD.
Sep. 12th Ideas for club events 1992.
Sep. 26th Quiz, guests Northern Heights, Pie and peas.
Further details from Kathy Conlon G1IGH on 0274 496222

Loughton and District ARC normally meet at 7.45pm in the Loughton Hall, Room 11. Their events details arrived too late for inclusion — it's now their 'Summer break'. However you can catch up with them in the Victoria Tavern on the evenings of the 9th and 23rd August. Further details from their Secretary, Mike Pilsbury G4KCK on 081 504 4581.

South Manchester RC meet every Friday at the Community Centre, Norris Road, Sale, from 8pm. A wide range of activities and talks are planned for the coming months, all are welcome to attend. Details for this month are;

- Aug. 2nd Direct conversion receiver, G8UQC.
 - Aug. 9th Novice DF
 - Aug. 16th Solar studies, by G4SNN.
 - Aug. 23rd Quiz night.
 - Aug. 30th DXpedition to Andorra, by G7FWE.
- For further information contact Edward G7FQY Tel. 061 969 1964

Mansfield ARS meet at 7.45pm at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. An event to look out for this month if you're quick;

- Aug. 1st Junk Sale
- Further details from Mary G0NZA on 0623 755288.

Maidenhead and District ARC meet at the Red Cross Hall, The Crescent, Maidenhead. Meetings start at 7.30pm.

- Aug. 1st 2m fox hunt.
 - Aug. 20th Quiz against Bracknell ARC (at home).
 - Sep. 5th Technical questions and answers.
 - Sep. 17th SSB Exciters, by Dave G3SET.
- For more information contact Neil G8XYN, Tel. Maidenhead (0628) 25952

Norfolk ARS meet at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich every Wednesday at 7.30pm for 8pm start. Dates to remember;

- Aug. 4th Club outing to Woburn rally.
 - Aug. 7th HF SSB NFD/town and country show briefing.
 - Aug. 14th 'Real Radio' evening.
 - Aug. 21st QRP activity week — hints and advice.
 - Aug. 28th 'Science for all' - Arnold Tomalin G3PTB.
 - Aug. 31st HF SSB NFD at East Tuddenham site.
 - Sep. 4th Town and country show final briefing.
 - Sep. 8th Club station demo at T&C show, Royal Norfolk Show-ground, Costessey.
 - Sep. 11th Flying kites, Kevin Appleton.
 - Sep. 18th Practical trouble shooting, Arnold G3PTB.
 - Sep. 25th Informal and committee meeting.
- For further details contact Jack Simpson G3NJQ Tel. 0603 747992

Northern Heights ARES meet on the first and third Wednesdays each month at the Bradshaw Tavern, Nr. Queensbury, Bradford, W. Yorkshire at 8.15pm. Events include;

- Aug. 7th DF foxhunt.
 - Aug. 21st Access control, by Geoff G8NWK.
 - Sep. 4th Computer controlled Jacquards.
 - Sep. 18th Repeater update.
 - Sep. 26th Visit to Keighley ARS, quiz night.
- For details contact Stan Catton G0IYR on 0274 673116



Nottingham ARC meet every Thursday at 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. Forthcoming events include;

- Aug. 1st AMTOR, by Alan G3XOF
 - Aug. 8th Forum.
 - Aug. 15th Lightning protection, Martin G6ABU.
 - Aug. 22nd 2m foxhunt and activity on the air.
 - Aug. 29th Tuning HF equipment, Ian G4JAE.
 - Sep. 5th Forum.
 - Sep. 12th Le Mans start fox hunt.
 - Sep. 19th 2m foxhunt and activity on the air.
- For further details contact Rex G1LRI Tel. 0602 733740

Porthmadoc and District ARS meet at the Harbour Cafe, The Ffestiniog Railway, Porthmadoc. Meeting details as follows;

- Aug. 15th Video evening arranged by GW6IMS.
 - Sep. 19th Talk and demo on Amateur TV, by GW8WNB.
- Further details from Ralph Taylor GW2HCJ, Tel. 0766 770637

Reading and District ARC meet at the Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading on 2nd and 4th Thursdays at 8pm. Forthcoming events include;

- Aug. 22nd Power amplifiers, by Roy Church G3KJC.
- Aug. 31st Special event station for Guide Dogs For The Blind.

- Sep. 12th Autumn 'Junk Sale'.
 - Sep. 26th Packet radio explained, by Paul G1PLT.
- Further details from Vin Robinson G4JTR, Tel. 0734 476873

Rhyl and District ARC meets on the first and third Tuesdays each month at the Scout Hut, Vale Road, Rhyl. Their forthcoming programme of events include;

- Aug. 5th Annual fox hunt.
 - Aug. 19th Homebrew construction.
 - Sep. 2nd Annual dinner.
 - Sep. 16th AGM.
- For further details contact Mr. David Bevan GW4DMR (Chairman) Tel. 0745 345078, or Mr. Edward Shipton GW0DSJ (Secretary), Tel. 0745 336939, or Mr. George Greenhalgh GW0MOH (Treasurer), Tel. 0745 350896.

Stratford upon Avon & District RS meet at the Baptist Church, Payton Street, Stratford upon Avon, at 7.30pm. Club dates include;

- Sep. 9th Open evening, 10 minute stories by members.
 - Sep. 23rd Converting PMR equipment, Bill G3TZM.
- Details from A. Beasley G0CXJ, Tel. 060 882 495.



Sutton and Cheam RS meet on the 3rd Thursdays each month, 7.30 for 8pm at Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Natter nights are on the first Monday of each month in the Downs Bar. Dates for your diary;

- Aug. 4th Woburn rally.
 - Aug. 15th Barbecue (tentative).
 - Sep. 19th The RIS, by Chris Winton, RIS District Manager.
- For further details, Tel. 081 644 9945

Three Counties RC meets every other Wednesday at the Railway Hotel, Liphook, Hampshire at 7.30 for 8.00pm. Club events include;

- Aug. 14th RSGB video and other activities.
 - Aug. 28th Junk sale.
 - Sep. 11th Wines of the World.
 - Sep. 25th Royal Corps of Signals TA.
- For further details contact Dave G4VKC.

Wakefield and District RS meet every Tuesday at 8pm on the first floor rooms, Ossett Community Centre, Prospect Road, Ossett. Club events include;

- Aug. 6th Visit rally site (Rodillian School).
 - Aug. 13th RSGB video.
 - Aug. 20th ATU/aerial principles, G3WWF.
 - Sep. 3rd Contest final preparation and On the Air.
 - Sep. 7-8th 144MHz Trophy Contest — Blakey Ridge.
- Further details about the club from John G0MVA Tel. 0924 220048

Wimbledon and District ARS meet on the second and last Fridays of each month in St. Andrews Church Hall, Herbert Road, Wimbledon, London SW19. Dates for your diary;

- Aug. 3-11th Annual camp, Barwell Estate, Chessington, Surrey.
 - Aug. 30th General activity evening.
 - Sep. 13th 'Radio with computers' by G3XTC and G4XLM.
 - Sep. 27th Surplus equipment sale.
- Further details from Chris Frost G0KEB, Tel. 081 397 0427

National and International

G-QRP Club publish a quarterly magazine devoted to low power communication, and hold regular get-togethers. Their secretary is Rev. G. Dobbs, St. Aiden's Vicarage, 498 Manchester Road, Rochdale. Lancs. OL11 3HE. Tel. 0706 31812.

The Irish Radio Transmitters Society send out regular newsletters giving details of local activities, the contact man for this is Dave Moore EI4BZ, 12 Castle Ave, Carrigtwohill, Co Cork. Tel. (Eire) 021 883555



Radio Society of Great Britain are based at Lambda House, Cranbourne Road, Potters Bar, Herts. Tel. 0707 59015. Potential Novices — contact them for details of your local Novice course. They also publish books, maps, and look after special event call signs.

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Magazines, 30 years Practical Wireless, Radio Constructor, Shortwave, and Classic Car from number 1, good condition, room wanted now retired, offers for the lot please. Contact T. Fleetwood (Upton-on-Severn), Tel. 0684 593003 evenings.

BC 624A — AM: R5019, incomplete £6. Many valves — 2 stamps for list. Digital telephone ready to plug-in, £10. White fluorescent tube 8W, £3. Switches, lamps etc, ask! Contact E. Williams, 25 Glenmore Road, Birkenhead L43 2HQ, Tel. 051 652 8799 any evening.

Fluke digital multimeter, £50. Small AVO digital, £25. Digital current clamp meter, £15. HV Probe, £12. Tacho Probe, £25. Contact Mr. Petell (Ilford), Tel. 081 554 2913 6-8pm.

Trio 120S, £300. FT-101ZD CW filter, £500. Oscilloscope 203 - 620MHz, £250. Amiga A500 plus half Meg expansion, joystick, 20 disks, full of utils etc. Microwave Modules 2m linear 50W, £90. Contact Keith Gibbons, GOMPEN (Washington), Tel. 091 4151550

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Continental Specialities Corporation Max.100, 100MHz 8 digit frequency counter, 0.6 inch LED display, £50 ono. Contact J. Mathews, 11 Trinity Gorse, Trinity Fields, Stafford ST16 1SL, Tel. 0785 46199

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held on RB10, leather case, nicads, £45. Several uncrystalled, £15 each. Contact G. Ford (Nr. Southend), Tel. 0702 205058 evenings.

Standard C5608D 2m/70cm dual band mobile, as new and boxed, 8 weeks old, cost £664 sell for £450 or exchange for HF rig, TS530, TS830, FT101ZD or similar. Contact Bob Cornish, G0DOK (Havant, Hants), Tel. 473323

Atlas 210X, built-in PSU, includes mobile bracket and attenuator, operating instructions and diagrams, £265 ono. Contact E. Newman G0GZS (Upminster, Essex), Tel. 04022 28896

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TH-27E 2m hand held, 2 months old. Includes nicad, charger, manual and box, hardly used, £170. Write to David Meers, 15 Fernlea Street, Waterfoot, Rosendale, Lancs, BB4 7JF.

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Dragon Commercial RS232 interface with manual, £45. Acorn teletext adaptor, £60. Complete AVO model 8, leads and leather case, £85. Dragon 32 complete, needs attention, £15. Manuals 9500, 2500, 3500, 120V, £3 each carriage extra. Will consider exchange for working 9600 scanner. Contact Mr. D. Thompson (Exmouth), Tel. 0395 265059

Icom 720A HF transceiver with FM fitted, includes manual and box, 10-160m general coverage, £600 ono, good condition. Con-

tact Peter Slark (Bolton, Lancs), Tel. Bolton 594584 after 6pm.

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Kenwood External VFO, DFC 230 (for TS-130S), £100 or would exchange for 2m mobile in good condition. Contact Mr. M. Barr, G16IBL (Coleraine, N. Ireland), Tel. 0265 57837 after 6pm.

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