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# HRT

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VOLUME 9 NO 1 JANUARY 1991

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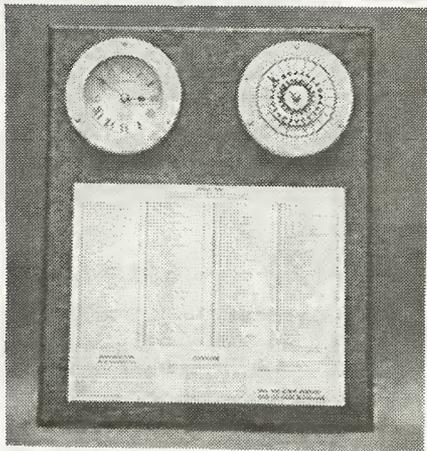
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We're sorry that we can't publish Geoff Arnold's Notebook this month, as Geoff is recovering from illness. We're sure we join our contributors in wishing him a speedy recovery.



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AR-1000



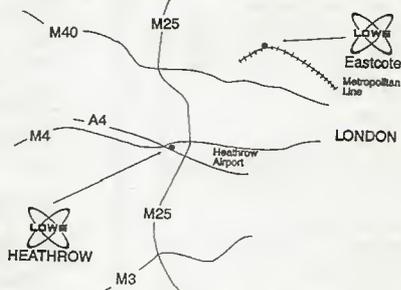
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WIN-108

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Leave the M4 at junction 5 and take the A4 from the roundabout towards Heathrow Airport and London. After about 200 yards you will see a gap in the brick wall on the left hand side. We are directly through the gap - next door to a fish and chip shop if you are feeling hungry! You can either pull up on the grass verge and walk through the gap, or alternatively carry on another 300 yards and turn first left at the lights into Sutton Lane then first left again into Trent Road. This will bring you out right in front of the shop, where you can park for free without a yellow line in sight.

# CQ de G8IYA

It's been great to hear from you about how you all like the 'new look' HRT, and it's significant to note that amongst the many letters of support not one reader has expressed dissatisfaction! Not surprising really, because if you take a look around, HRT now has more editorial pages than any other UK radio magazine. We don't just fill half the magazine with adverts, instead we give you the go-ahead, up-to-date articles you want to see! The big advertising names are of course here for when you're shopping for your new rig, the famous HRT exclusive reviews being unique as well, and we even provide free reader's adverts, to let you get a bargain.

member gets a club net radio, to keep! What a great way to introduce a new blood to the hobby. It can even get potential Novices involved, and having a rig crystallised on receive sitting there it would give them a great incentive to get their license. Once they get it, the club gives them the plug-in transmit crystal, the rig already having been tuned up and ready to go! Newcomers need involvement, they need a feeling of 'belonging', I've said it before and I'll say it again, while we're active, our hobby will thrive.

## We're Getting There

Listening around both on the airwaves and on the VDU from the amateur



action.

There are of course many 4m packet nodes around the country, linked of course to the national multi-frequency node and BBS network, and people who complain of congestion on packet could do well to pay £5 or less for a P band Europa, or Westminster as detailed last month, to get a 'breath of fresh air'. Equipment for other bands is of course widely available again at very low cost, and we've already planned more conversions for future pages. Remember the offer we gave you in the last two issues of HRT? If you take out a subscription using the coupon, we'll send you a free copy of Chris Lorek's 'Surplus Two-Way Radio Conversion Handbook', otherwise costing you £10.95 plus p/p. We're doing our best to get you going at low cost.

## *Stirring stuff from our Editor, Sheila Lorek*

### There's More

We've planned some more surprises for the future, we're listening to what you want, both in content and in the quality of the magazine. Just wait and all may soon be revealed! Here's a hint, all the new features will still be here, but a new meaning will be taken to the 'new look', besides the new front cover and features we've introduced.

### Club Nets

The HRT Consultant Technical Editor has been invited to numerous radio clubs to lecture on ex-PMR conversions, and at every single one the response to the talk has been tremendous, members realising this was just the thing for a club project, leading to low cost equipment for club net use. Remember the 'old days' where every week we'd gather on Top Band (160m) AM for the usual 'round table', scores of newcomers to the hobby were introduced this way. Nowadays, potential newcomers are often scanner owners, so wouldn't it be great if we could revitalise club nets on VHF and UHF FM, so scanner users can tune in? With equipment often costing just a few pounds, there's little excuse.

Maybe your club could obtain a couple more rigs for 'stock', then for a 'joining fee' of a few pounds the new

packet network, it looks like we're getting things stirring. Already there are flood bulletins going out saying that the 'traditional' radio press is only preaching to the converted, and that to draw new blood into the hobby then publicity has to be aimed towards others who may not have bothered to consider an interest in radio. Guess what 'Scanners International' is doing! As I write this, just last night there was a net of amateurs on GB3CF discussing the work this magazine is doing. Remember what I said in this column a couple of issues ago, that's right — we're getting you talking about it on the air!

### The Radio Revolution

You'll see that in this issue, we're showing you how to get onto 4m FM for just a few pounds. So what's on 4m? Well if you're a HF DXer, you'll no doubt know of the tremendous power of the DX PacketCluster, with up to the minute information on who's working from what remote island and on what frequency. This is in stark contrast to reading about it in a DX newsletter or whatever after you've missed the DX! And what frequency do the DX Clusters operate on, 70.325MHz FM. We've already shown you how to get a complete station together for packet for less than £50, and our latest project gets you right in on the

### Clean Up the Airwaves

HRT recently listened to Steven Spivey, who is the Head of the Radiocommunications Division of the DTI, telling us about how we must 'clean up our act'. Abuse of the airwaves is no laughing matter, and indeed the Radio Investigation Service are now taking a very hard line on such abuse. It would be foolish to believe that all is rosy on amateur radio, it isn't, and just as with most developed societies there is a small minority out there to spoil things for the majority.

Repeaters and the packet network are taking some of the blame, but is this right? An inanimate object such as a voice or packet repeater cannot originate abuse, it only relays what the originating amateur instructs it to. We need to attack the root cause, not the useful and constructive medium that is shared by everyone. It's like saying 'Take the bus shelters away because they could get vandalised', the vandals will then just find something else to destroy. The recent Bouvet Island DXpedition was an alternative example, should we stop all amateurs working DXpeditions? Let's hear your views. In the new year, we have been invited to meet with the Radiocommunications Agency on this matter, so let's give them your views, write to us.

# LETTERS

## Letter of the Month

You are of course correct in your footnote to my letter (HRT Nov 1990); if true democracy is taken as that of the Greek city— states, even the 21,000 citizens of Athens in 317 BC could possibly have crammed into the market square, the 10,000 resident aliens and 400,000 slaves not being entitled to seek or vote. No doubt a motion in favour of slavery would have got through very comfortably, as would a motion in favour of retention of the Morse test at RSGB Council today. Now we know that Council has effectively been self perpetuating and we know that is held to be proper, for we have been told by Council members, and indeed by the Secretary, that the attribute we should vote for is competence in Council affairs and that is only acquired by extended membership of council. This might be interpreted as reflecting upon the attainments of Council members to date, but considering it must be plain to anyone that other RSGB members have both ability and relevant experience developed in other bodies of at least equal weight, we may think it is really meant that only those fully adherent to orthodox doctrine are wanted.

There is a message in this for all who hold it is time for compulsory Morse to go. I have before me a letter from the RA. I quote, *verbatim*; "At a recent meeting of the Conference of European Postal and Telecommunications (CEPT) administrations, where harmonisation of amateur frequencies was discussed, the *majority* (my italics) of administrations were in favour of retaining the Morse requirement for the use of amateur frequencies below 30MHz." Now it is seen at least there was an enlightened minority, which our administration could just as well joined and enlarged, so it may be wondered why it did not, given that it now justifies its position merely by that being among the majority? On earlier occasions I have been told by the DTI predecessors of the agency in effect that amateurs wanted the Morse test because the RSGB representing them said so; this is doubtless easy to accept because it is least trouble to maintain the *status quo*. That the RSGB suppresses the views of

radio enthusiasts who disagree with it is likewise easy to overlook and if I write to the RA 500 times it will make no odds. But if 500, or better 5000 of us write once it will be noticed. It is only necessary to refer to suitable published argument and declare agreement. Remember that the other side is busy.

I wish some Morse enthusiasts would spend more time on the air rather than agitating to prevent others having 'phone privileges; I see that a correspondent once again slights those who proclaim against the Morse test, which reminds me that I have been asked why I still so proclaim, having gained the A licence. The answer, I hope, is that I would feel unhappy at adopting what would be a selfish 'haul up the ladder, Jack' attitude. I will not rehearse again the arguments against compulsory code, except to note that amateur Morsemen are not today being rounded up for the Gulf.

But I wonder if a fresh aspect could be added to the debate by putting some simple questions to the compulsory Morse protagonists based on a case which may be taken as hypothetical. A person very interested in radio finds out in youth that, like others, he has no aptitude for Morse whatsoever, and is barred only by this from HF amateur radio for several decades. He then, by virtue of a fortunate combination of unlimited time to spend on the test format over many months, extreme patience exhibited by another, and luck, scrapes through the test. He does not want to, has no intention of trying to, and in fact never could learn to carry through a real Morse QSO, he still regrets the loss of years through no good reason. What real purpose did all his efforts serve? Is it not ridiculous that he was so long kept out, and wrong that others like him in all but good fortune should still be kept out? Or, if that is not granted, is it then held that he and other 'test only' amateurs should be thrown off HF again by some device, as seems in that case to be demanded by logic? Is amateur radio really not about goodwill at all? In fact, are more amateurs truly wanted or is the Novice exercise just a contrivance to entrench Morse?

I am very happy that those who can

employ Morse should do so, and proselytise to their heart's content; if they feel that a test is required before Morse is permitted to be transmitted on any band let that be. I object absolutely to a Morse test remaining as a barrier to phone transmission.

The matter of reform of the RSGB I leave, save to remark that while I scarcely hoped to see it in my lifetime that was also true of things which have now come about in a larger field, further East. Perhaps the subject could be one for 'Tone' Burst, since his colleague R. F. Byrne would hardly be allowed to touch it!  
Sandy, GMOIRZ.

## Editorial Comment

*The Americans have an old average age to their amateur population, with a declining number of amateurs. They're very worried about it. They don't want a no-code licence.*

*The Japanese have a young average age to their amateur population, with a growing number of amateurs. They don't need to pass a Morse test for HF unless they want to use Morse. They probably made your rig, your car, your TV, your Hi Fi....*

*"Mummy, I want to get a Novice licence so I can send messages through the satellites with my computer and the portable rig you said you might buy me, what do I have to do?"*

*Explanation follows....*

*"But Mummy, I don't want to use Morse, why do I have to learn it?"*

*Excuses follow....*

*"Oh, well I'm not going to bother then."*

*True story, it happened last week in this household. One more disinterested 9 year old, one less future amateur. Unless something changes.*

May I comment in your publication on what I consider to be excessive carriage charges being charged by one amateur dealer I recently purchased equipment from. I recently ordered a board for a Standard C-520 from this dealer, I was a little suspicious of a £3 carriage charge when ordered but I thought that, like many companies nowadays, they used some form of express carrier or post.

## £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, P.O. Box 73, Eastleigh, SO5 5WG.

# 'TONE' BURST



DRAWN BY G6MEN



I was very surprised when the package eventually arrived to find there was 30p postage on it. It was in a Jiffy bag which costs about 70p in a local shop, but would be far cheaper in bulk. So I was charged over £2 for putting a box in a jiffy bag and sticking a label on the outside. The 30p does appear to be first class letter post rate but the company had not bothered to mark the package as first class, so it seems to have gone by normal second class post. Perhaps it would have been another £2 or £3 to write or stamp 'First Class' on the envelope!

I wrote to the firm to ask for some form of explanation but at the time of writing I have not received any reply from them.

J.M. Briscoe, GM8AOB

## Editorial comment

The carriage charge levied by many retail shops is not, of course, just postage, it must cover the extra costs incurred by their staff over and above you walking into their shop and buying it over the counter. This includes going out and buying the packing, wrapping it up, weighing it, buying the stamps, and taking it to be posted.

Overheads have 'killed' many a traditional retail shop in the past where the owners have chosen to absorb costs such as these themselves, and it is a fact of life that everything must be paid for one way or the other. The £2 you quoted will nowadays buy a few minutes of someone's time in a typical electronics organisation. As regards express carriers, we at the HRT editorial office have to pay a minimum of £14 for a lightweight Datapost letter, £3 nowadays doesn't approach the cost of any express carrier service to our knowledge.

Having said this, the Editor personally gets sick and fed up of certain mail order

only outfits (i.e. 'box shifters') who insist on postage and packing fees of around £3 above their advertised goods cost, especially when the item is only something like a small envelope of sticky labels. Here, the purchaser has no other option than to pay this extra charge, as unlike the firm you dealt with, certain others won't allow you to collect the goods. In our personal opinion, these mail order only firms are misleading the public in the real cost of their goods due to the addition of 'small print hidden charges', and we personally often refuse to buy goods from such firms because they often do not suffer the high overheads encountered by many retail shops, such as demonstration facilities and trained staff. Luckily, no amateur-only outlets engage in such practices to our present knowledge, unless of course our readers know different.....

May I enlarge on one or two matters mentioned in Mike Bedford's interesting article 'Manifold Morse' in the October issue of HRT? Although the Morse transmitting tablet, Fig.3, was invented by Morse there is no record that it was ever used on American telegraph circuits. The tablet shown bears a code used by one German state at the time when each state had its own code — a state of affairs that led to unification of the different systems in 1851 and the adoption of the Austro-Germanic code which later spread across Europe, finally becoming the International code as we know it today.

Samuel F. B. Morse originally invented a numerical code, associated with a code dictionary, which was used for the first public demonstrations of his invention. A first alphabetical code replaced the numerical code in 1837, and this in turn was replaced by what is now known as American Morse in 1844.

Mike suggests going one step beyond

straight key events by having 'Original Code' events, but these already exist in the USA and Canada! For members of the Morse Telegraph Club, American Morse is the mother tongue. They have annual hook-ups by 'wire' (via the public telephone service), using old time instruments to celebrate the birthday of S. F. B. Morse. They also have a number of amateur nets using the original code, and non-amateur members exchange code tapes. American code, however, has never been used for tone signalling; it is always read from sounders, the early receiving instruments which simply replicate the clicks of the sending key. This is achieved today by using converters driven by tone signals to activate local sounder circuits.

The 200th anniversary of the birth of Samuel F. B. Morse occurs on 27th April 1991, and various clubs and organisations around the world will be mounting special CW stations to celebrate the event. At the same time the European CW association will be launching a new award, bearing a map of Europe at the time of S. F. B. Morse, with double points for qualifying contacts allowed on the first day only to encourage celebratory activity.

It is hoped that all CW enthusiasts, of all abilities, will make an effort to get on the air for some time of the day to celebrate this important occasion. They will be paying respect to a man whose original invention led to a world communications revolution long before radio, whose modified code made early radio communications possible, and whose name is still associated with an important section of amateur radio. Tony Smith, G4FAI

## Editorial Comment;

Well, we're speechless.

# RADIO TODAY

## Mir Space Station on 2m Helps Schools

Just received from the 'Compuserve' Hamnet network comes exciting news for schools interested in receiving messages from the orbiting MIR (Russian for 'Peace') space station. A joint radio venture between the Russian Radio Sports Federation and Austrian amateurs is due to commence next month, and the following details are reported from Wolf Hoeller OE7FTJ, who is also responsi-

ble for the satellite group of the Austrian Amateur Radio Society (OeVSV), translation comes courtesy of Alexander Czernin-Morzin, OE3ACC;

The Austrian Amateur Radio Experiment (AREM) will fly in the first phase, scheduled for January 1991, of the MIR experiment. Besides their normal 2m voice transmissions, an automatic beacon transmitter will be used. This beacon will broadcast information in packet radio and in synthesised language. To further ham radio and

especially to use satellite transmissions in education, a special program will be prepared for use by school teachers who hold an amateur license. In the space station, a laptop computer will be connected to both a TNC and a voice synthesiser, which in turn will feed the 144MHz transceiver. An external 2m antenna attached to MIR will be used for the transmissions.

Power will be taken from the MIR supply, 1A max. at 28.5V, a DC to DC converter will be used to supply the required 5V and 12V. The TNC will use 1200 bps AFSK with the usual AX25, so that all earthbound stations can receive the transmissions with their normal packet radio equipment. The voice synthesiser will use delta modulation. The advantage of this modulation is that the digitised speech uses relatively few bytes, and can be trans-

mitted via the modulator. Messages with greetings and general information will be transmitted in English, Russian, and German, data transmissions will alternate with voice. The cosmonauts and one of Austrian cosmonauts who are currently in training at Star City can, if time permits, switch off the beacon, and grab the mike for a QSO.

The equipment will stay on board MIR and will be available for hams and school use. Phase two (scheduled for November 1991) envisages an uplink and the use of simple BBS software.

Interested parties requiring further information can contact Wolf Hoeller OE7FTJ, Amraserstrasse 19, A-6020 Innsbruck, Austria. His home telephone number is INT+43 512 44 158, they are currently at GMT + 1 hour so do try and make it a sociable hour if you need to call!

## DTI Young Amateur of the Year

HRT were pleased to be in attendance at this year's presentation of awards to the DTI Young Amateur of the Year, the 1990 title being awarded to David Martin GMONVE.

Steven Spivey, Head of the R2 division of the Radiocommunications Agency presented David with his prize of a cheque for £250 and his invitation for a guided tour of the RA monitoring station at Baldock. David also received an AMR-1000S 2m FM transceiver presented on behalf of Navico, a 'Tiny-2' packet TNC presented by Siskin, a homebrew 20m receiver presented by the RSGB, and a digital multimeter presented by Cirkit.

David who lives near Glasgow is a Venture Scout leader, and has converted several ex-PMR rigs onto the bands for use by himself and other amateurs, as a low-cost method of getting on the air. He is the co-founder of the active and dynamic 'YAGIS' (Young Amateur Group In Scotland), with several members of the group studying for their RAE. David also runs a young amateurs' net in his area.

This year's runner-up was Simon G7DCY from Coventry. As well as helping other local amateurs in their hobby, Simon is a committee member of the Coventry Radio Society. He founded his school's Remote Imaging Group which becomes involved with reception of data and satellite pictures, the group mounting demonstrations for parents and pupils alike. At this year's presentation, Simon received a bag full of 'goodies' from Dennis Goodwin of Icom UK, towards the end Dennis just happened to find a 2m portable rig in the bottom of the bag!



The DTI Young Amateur of the Year presentation, winner David Martin with Mr. S. Spivey of the RA.

## VHF Communications

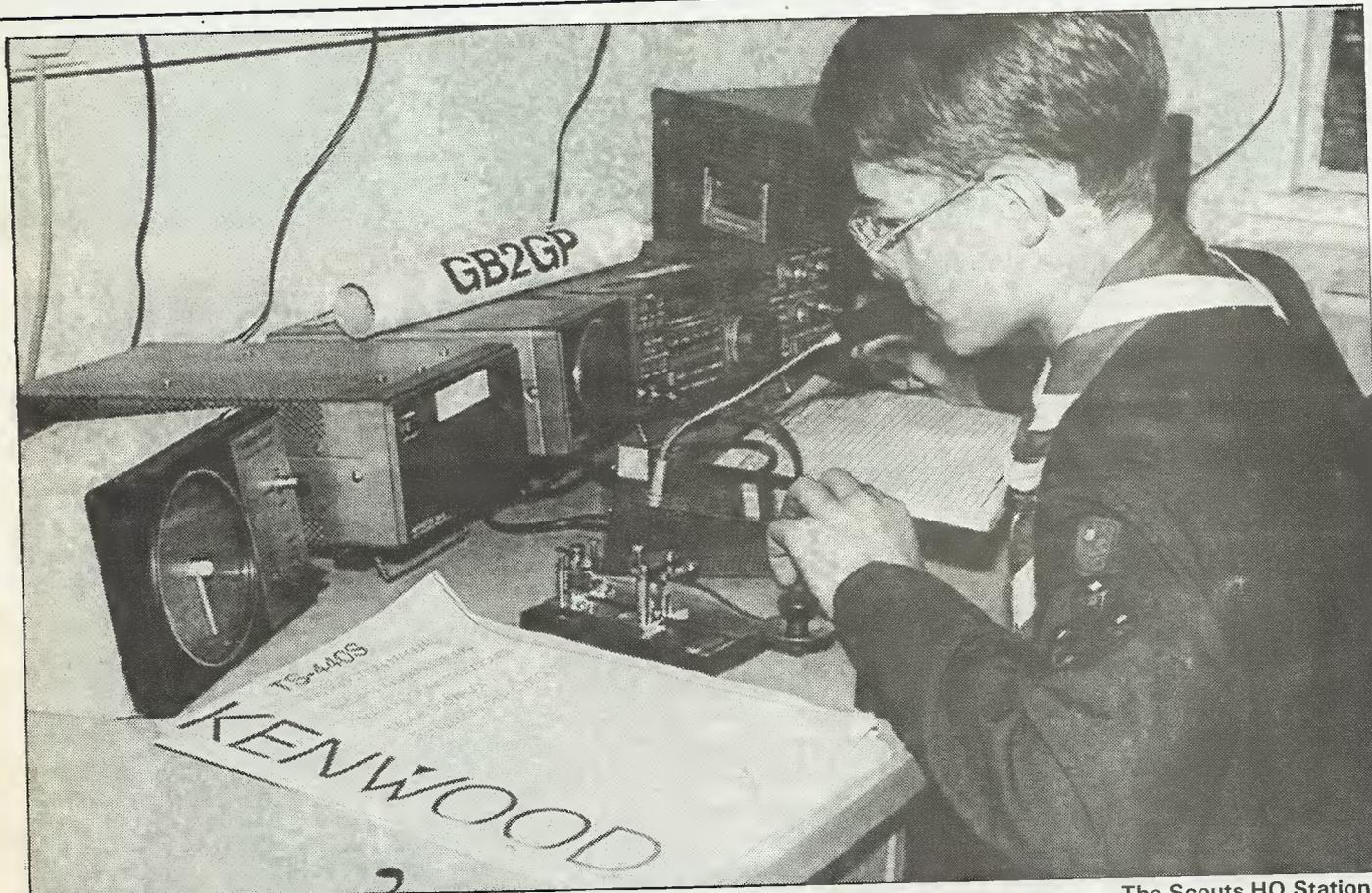
From 31st December, UKW Berichte will cease the publication of the English language version of this magazine. This is essentially due to their wishing to concentrate on the German version and other aspects of

their business. However, all is not lost, as a UK company, KM Publications, tell us they have negotiated the publication rights and intend to publish VHF Communications in the UK. This will ensure the continued existence of this VHF, UHF and above specialist

magazine for the amateurs interested in construction.

KM Publications tell us the only noticeable change will be an increase in the annual subscription rate from the current £9.75 to £12.00, for the usual four issues per annum including UK postage

and overseas surface mail, airmail being charged extra. Further details on this magazine (to which our Tech. Ed. has subscribed to for many years and will continue to do so!), are available from KM Publications, 5 Ware Orchard, Barby, Nr. Rugby, Warks. CV23 8UF, Tel. 0788 890365.



The Scouts HQ Station

### Scouts HQ Station

A complete HF and VHF amateur radio station has, earlier this year, been installed at the Scouts' HQ station at Gilwell Park in the UK. To this date, the station has given thousands of young people the opportunity to learn about radio

communication and talk to people throughout the world.

John Wilson of Lowe Electronics, who supplied the Kenwood HF/VHF station and the Lowe HF-225 HF receiver, said they "Were happy to supply the equipment to

demonstrate the company's total commitment to supporting the Scout movement. A movement which aims to encourage and educate young people to participate in the hobby of amateur radio".

The licence to operate the

station was handed over by the then Head of the Radio Communications Division of the DTI, Mr. M. Coolican who warmly welcomed the project as Britain faces up to a rapidly growing shortage of skills in the world of electronics.

### TOPS 80m CW Activity Contest

This contest is held every year on the first weekend of December, and this year it will run from 18.00 UTC on the 1st December to 18.00 UTC on the 2nd. Frequencies to use lie between 3.500 and 3.560MHz, with 3.500-3.512MHz to be used only for DX contacts. Call 'CQ TAC' or 'CQ QMF' (QMF stands for 'Fists Make Friends'), don't call 'CQ TEST'. Exchanges consist of RST followed by a serial number 001 upwards, and TOPS members also give their membership number, e.g. 599001/883. Points are scored with one point for each QSO with your own country, each call area in JA, PY, U, VE, VK and W counts as a separate country in this contest.

2 points are scored for a QSO with your own continent.  
6 points are scored for a QSO with another continent.  
6 points are scored for a QSO with a /MM station.  
2 bonus points are scored for a QSO with a TOPS member.

3 bonus points are scored for a QSO between TOPS members (as TOPS members have to send longer exchanges throughout the contest)

10 bonus points are scored for a QSO with GB6AQ.

Each different prefix worked is a multiplier, with prefixes defined as for the WPX award, e.g. SM3, SK3, SL3, Y21, Y22, Y23 are classed as different prefixes.

The total score is your total number of points multiplied by your multiplier.

There are three classes, 'A' — Single operator, 'B' — Multi operator, and 'C' — QRP up to 5W output, single operator. Certificates of merit will go to the highest scores.

The log deadline is January 31st, and a list of results will be sent via the bureau to all stations that send in a log, those who include an IRC will get the results direct. Send your logs to; Helmut Klein OE1TKW, Nausegasse 24/26, A-1160 Wien, Austria.

TOPS is an international club for CW enthusiasts, and was originally founded in the UK in 1946, its headquarters are still in the UK. It seeks to encourage CW operation, particularly on 'Top Band', and to become a member you must first be proposed by another TOPS member. Further details from Chris Hammett G3AWR, 48 Hadrian Road, Newcastle Upon Tyne, NE4 9QH England.

# ICOM

## IC-751A HF ALL-BAND TRANSCEIVER



- **Amateur Bands 160m - 10m.**
- **General Coverage Receiver.**
- **105db Dynamic Range.**
- **100W Output (40w A.M.)**
- **32 Memories.**
- **Electronic Keyer.**
- **CW Semi/Full Break-in.**
- **HM36 Microphone.**

The ICOM IC-751A was created for the ham operator who demands high performance whether entering contests, chasing DX or just simply enjoying the shortwave bands. It is an all mode solid state transceiver with a host of features designed for the crowded HF bands of today.

Additional features include 9MHz notch filter, adjustable AGC, noise blanker, RIT and XIT. A receiver pre-amp and attenuator provides additional control when required. The FL32 9MHz/500Hz CW filter is fitted as standard with CW sidetone on Rx and TX modes. On SSB the new FL80 2.4Khz high shape factor filter is fitted.

The transmitter is rated for full 100% duty cycle with a high performance compressor for better audio clarity. With 32 memory channels and twin VFO's, scanning of frequency and memories is possible from the transceiver or the HM36 microphone supplied.

The IC-751A is supplied for 12v operation but can be used with either internal or external A.C. power supply. It is fully compatible with ICOM auto units such as the IC-2KL linear amplifier and the AT500/100 antenna tuners.

Options available:- PS35 internal AC power supply, PS15 external AC power supply, EX310 voice synthesizer, SM8 desk microphone and SP3 external loudspeaker.

**Icom (UK) Ltd.**

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

# Count on us!

## IC-726 HF/50MHz ALL MODE TRANSCEIVER HOT ACTION ON THE HF AND 50MHz BANDS

Now that the HF and 50MHz bands enter a period of intensity, conditions for long distance communications have never been better.



The new ICOM IC-726 is a compact, easy to use transceiver which covers the amateur bands from 1.8 to 50MHz. It can be used in your home, car and in portable locations on SSB, CW, AM and FM modes.

With minimal switches and controls enjoy uncomplicated operating for beginners or veterans alike. And ICOM have incorporated their superior DDS (Direct Digital Synthesizer) system, a feature that enhances PLL lock up times. The same feature is built into ICOM's state-of-the-art IC-781 advanced H.F. Transceiver.

Other features include a general coverage receiver, dual VFO's, band stacking registers, attenuator, pre-amp, noise blanker, RIT, memories and much more. R.F. output is 100W on the H.F. band and 10W on 50MHz band from separate antenna sockets.

An optional AH-3 H.F. Automatic Tuner will allow you to operate on the H.F. bands in any location. Just push the tuner switch on the IC-726 and the tuner automatically adjusts for a minimum VSWR. The tuner can match a 12M longwire across the 160-10M bands. Use the weather resistant AH-3

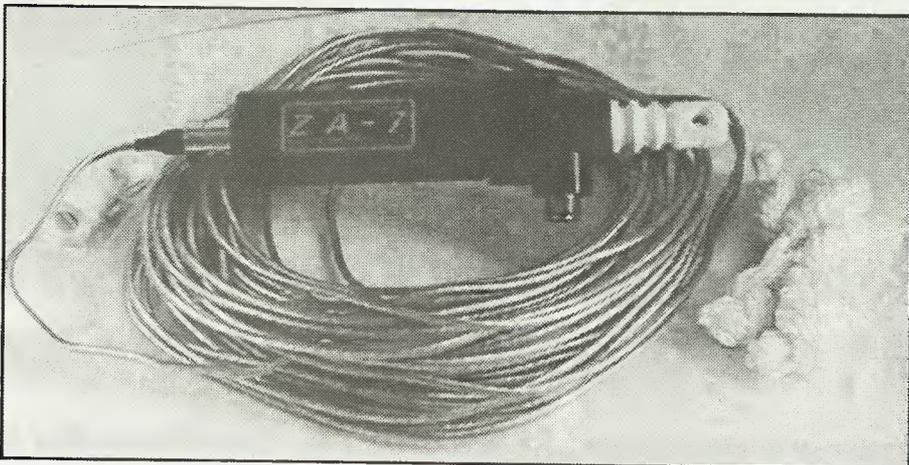
in your car (with AH-2b mount and whip) boat, at home or in the field.

### Options and Accessories:

<b>AH-3</b>	H.F. Automatic tuner
<b>AT-150</b>	A.F. Automatic matching tuner
<b>PS-55</b>	AC power supply
<b>CR-64</b>	High stability crystal
<b>FL-100</b>	CW narrow filter 500Hz
<b>FL-101</b>	CW narrow filter 250Hz
<b>SM6/SM8</b>	Desk microphones
<b>SP7</b>	External loudspeaker

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Dept HRT, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour. Fax: 0227 360155.  
**Visa & Mastercards:** Telephone orders taken by mail order, instant credit & interest-free HP.  
Despatch on same day whenever possible.





### R. F. Byrne's Unpublished Masterpieces

by Paul Thompson G6MEN

R. F. Byrne is a chappie not totally unrelated to the monthly HRT character 'Tone' Burst, and in this collection his originator Paul G6MEN takes a light-hearted and sometimes satirical look at amateur radio through the medium of his cartoon character. A lot of what goes on in the book indeed makes the amateur realise it's only a hobby, but also shows what it's made up of. Which ever way you look at it, it's a collection designed to keep one amused for some time, yours truly couldn't put it down until he's read it through. *Priced at £4.09 inc. UK p/p, you*



# Christmas Review

## Sagant 'Zepp' Half Wave Aerial

HF operators often use the roof or wall of a house or other high vantage point for one end of a HF half wave wire

to take along on car outings, to use for a bit of portable operation with the aerial end thrown up to a convenient tree or similar. Priced between £49.00 and £55.00, the Sagant Zepps are available from Waters and Stanton Electronics.

*can get it from the Radio Society of Great Britain (Tel. 0707 59015), if you're a member they'll let you have it for £3.48.*

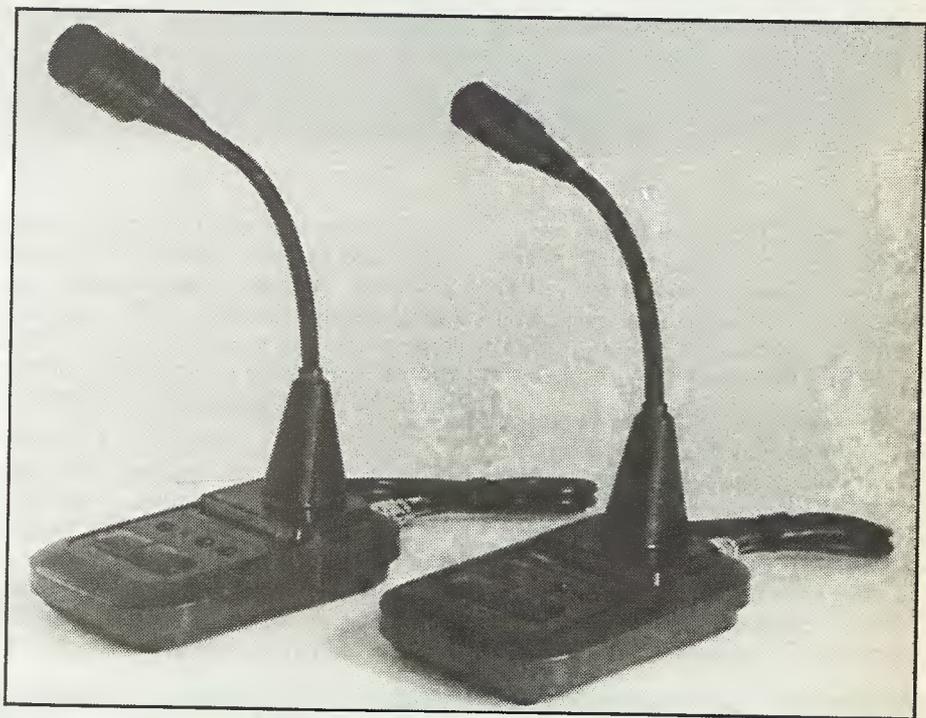
## New Adonis Desk Microphones

Also from Waters and Stanton are a new range of desk mics for the shack, the AM-308 and AM-508 models shown here. Coming in a smart matt black finish with a black gooseneck, they provide a ceramic microphone together with Up/Down frequency switches next to the PTT bar on the microphone base. A microphone amplifier is built into the base

## A roundup of Christmas stocking fillers, by the HRT Consultant Tech Ed.

aerial, the other end going to the bottom of the garden or whatever. But what to do with the coax coming from the centre of the ubiquitous dipole used? In the days of Zeppelins, an end fed half wave was often used, with it's high impedance feed point suitably matched. Hence the 'Zepp' aerial, but with its requirement for high impedance open-wire feeder coupled to a matching unit, it hasn't always found favour with today's amateurs. Well there's an easier way, a purpose-built Zepp aerial complete with matching unit for a 50ohm coax feed, coming from Sagant in 80m, 40m, and 20m versions. No more coax hanging from the middle, no more distorted radiation pattern because of the centre support that's often needed.

The ZA-7 7MHz version Sagant Zepp tested at this QTH worked perfectly after I'd just 'thrown' the wire out of the window and secured the end at the bottom of the garden, the coax end secured to the shack window frame. An SWR of less than 1.5:1 across the band, and with good signal reports, what more can I say? This could also be rather useful



# R. E. BYRNE'S



## UNPUBLISHED MASTERPIECES

GENEX

355mm, with two clocks fitted together with a metal plaque which alphabetically lists 174 locations worldwide.

The first thing that struck me was the sheer quality of the unit, with even the clock bezels having been machined out from solid brass. The left hand clock is a normal 'local time' clock, fitted also with a prominent red second hand. The second clock however is quite unique, and much thought must have gone into its design. It consists of a rotating disc marked with coloured letters corresponding to those on the plaque, this disc completing one revolution every 24 hours, plus an 'Minute' hand similar to the local time clock. Besides giving you the time in GMT for logging purposes, this can easily dispel the mysteries of time zones.

Now time zones confuse many amateurs and listeners, especially the date involved and whenever 'Summer Time' is used. Some countries have even found it convenient to change their standard time by amounts which may range from 15 minutes to 2 hours, this often needs something more than the usual radio wall map to work out! 'Zonaltime' claims to offer a solution to this, as well as possibly making a nice talking point for visitors to the shack.

By referring to the plaque, you look at the corresponding coloured letter, and by viewing this on the right hand clock you instantly see the time in hours and minutes at the place required, plus an indication of whether they're behind or ahead of us so that you know the date there as well. Where the time at any location is subject to a local variation, e.g. plus 30 mins, minus 30 mins or whatever, this is also shown on the plaque. The clock even comes with a small chart listing the countries which adopt 'Daylight Saving Time', to keep you at the right time in each case.

Priced at just under £100, it's a very elegant accessory for the amateur's shack, as well as being fast and easy to use when you're in QSO. And it's British craftsman built, in Lancashire. I'm now just trying to persuade the HRT Editor (i.e. the XYL) to let me keep it for my office!



# New Special

## Books for Christmas Amateur Radio Software Reviews

Edited by Don Field, G3XTT

Personal computers are used in many an amateur's shack, either as an aid to the amateur's on-air activities or indeed forming an integral part of them. There are many programs available for aerial designs, propagation prediction and the like, and the latest UK license conditions now also allow us to keep our logs on computer disc.

In conjunction with his well attended lecture at this year's HF Convention, Don G3XTT has edited a collection of software reviews that in the Technical Editor's opinion would be of great use to anyone looking for amateur radio software. In over 50 A4 pages, Don covers 12 types of logging software such as DXLOG, ARIES-2, Amateur Radio Log Database, Swisslog, Shacklog, CT contest log and the like, together with Minprop, TMUF and loncap propagation prediction packages, MN, Yagi-Optiiser, Elnec and ON4UN Yagi aerial design programs, and various other programs.

The publication is available at a cost of £4.00 inc. UK p/p from Don Field, 105 Shiplake Bottom, Henley, Oxon. RG9 5HJ.

## Zonaltime Clock

Coming just in time to add to one's Christmas present list is the elegant 'Zonaltime' clock system by GRM Ltd., an evaluation sample of which just yesterday arrived at the HRT Editorial office. 'Zonaltime' consists of a very smart oak finished plinth measuring 280mm x

## Amateur Radio Software Reviews

Don Field, G3XTT  
Paul Evans, G4BK1  
John Bazley, G3HCT  
Dick Dievendorff, G0MFO/AA6MC

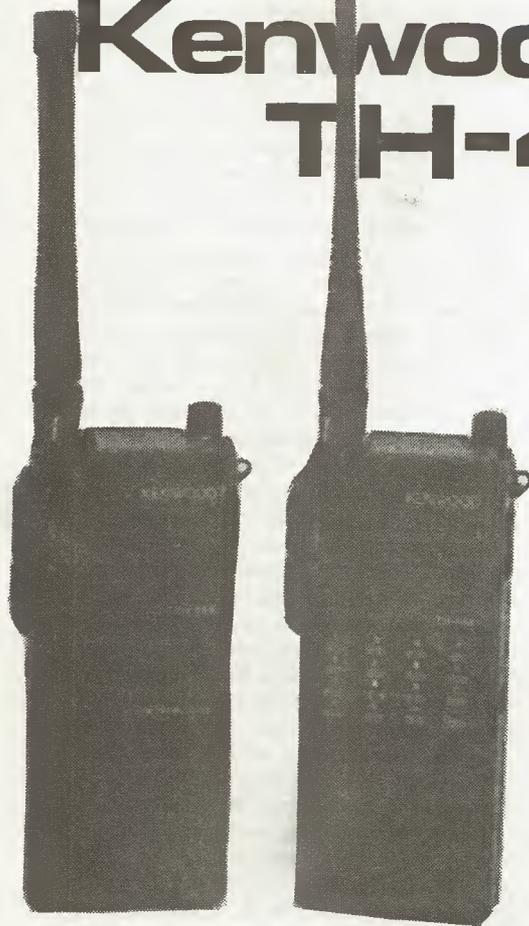
RSGB HF Convention 1990

Price £3.50

of each unit, drawing a just 2-3mA this is powered from a pair of AA size batteries housed in the base.

The microphone units are broadly similar apart from the AM-508 which is also fitted with a compressor amplifier, thus giving a constant output level to your rig regardless of your level of speech, the compression being selectable between High (45dB) and Low (10dB) levels. A switch on the bottom of the microphone base lets you switch between a wide audio bandwidth for FM, and a narrower bandwidth for SSB, and plug-in connecting leads allow you to use a single microphone with different transceivers. Each microphone measures 100 x 155 x 35mm plus of course the gooseneck.

# Kenwood TH-26E and TH-46E Review



## New Licence Conditions

Did you know that in the UK we can now legally operate our amateur station remotely, over the air? This means that with a base station installation at the bottom of the garden you can use a handportable to listen to re-transmitted received HF signals, transmit back, and even tune around the band, all from the comfort of your fireside armchair. So what's the catch? Well our licence tells us that we must restrict the ERP from our 'control' so as not to be receivable from outside our premises. So guess what the TH-26E and TH-46E can do — that's right, an 'extra low' transmitter output power of just 20mW can be switched into operation.

We at HRT already have plans to publish a 'remote control' article in a future issue, using CTCSS and DTMF control signalling from a portable to control a high power base station, but that's another story. For this 'mini-review', HRT were pleased to receive both a 'standard' 2m TH-26E portable, together

a row of buttons for VFO and memory channel selection, a quick user-programmed 'Call' channel access, and a 'MHz' button for fast QSYing over a large frequency spread such as from one end of 70cm to the other. Holding the 'VFO' or 'MR' buttons down for more than a second starts the set scanning through the VFO or memory channels respectively, pausing when it finds a signal. An adjacent small 'T Alt' button triggers the set's 'tone alert' function, where the set beeps at you for a few seconds when you've been called together with flashing an LCD 'bell' symbol until you cancel it.

At the top of the transceiver's rear panel are a row of four tiny rubberised push buttons, these control other functions such as the CTCSS encode/decode selection, repeater shift, and reverse repeater checking. Various 'second functions' such as bleep tone on/off, CTCSS frequency programming and the like can be carried out by the use of these in conjunction with the main top panel controls.

## Power

A 7.2V 600mAh ni-cad is supplied with the set, using this a transmitter power output of around 2.5W (2W 70cm) may be achieved together with switchable 0.5W 'LO' and 20mW 'EL' power levels controlled by a tiny slide switch below the side-mounted PTT (Push To Talk) bar. With a 10%/10%/90% TX/RX/Standby ratio the supplied battery should give you around 5 hours operation, using the 20mW power level usefully increases this to 15 hours worth. A socket is fitted so that you can, if you wish, power the set from an external power supply of 6-16V DC, the transmitter then giving over 5W output on the 'High' power setting with a 13.8V supply. Various optional battery packs are of course available, including a 12V 600mAh pack and an empty battery case for non-rechargeable batteries.

An external speaker/microphone may be plugged into the side of the set if required, a range of these being available including the HMC-2 headset with VOX control, and an SMC-33 'remote control' handheld speaker/microphone with three buttons fitted for remotely controlling selectable transceiver functions. The set comes supplied with a plug-in flexible whip for handheld use, carrying strap, belt clip, and a plug-in mains charger for the supplied ni-cad. Various carrying cases are available as options if required.

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## *Kenwood's simple-to-use portables, tested by Chris Lorek G4HCL*

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Not everyone wants a 2m or 70cm handportable that's filled with keypads, button arrays and knobs, requiring a degree in computer programming to operate. In these cases, the TH-26E and TH-46E rigs with their simple to use controls could fit the bill.

### Wolf in Sheep's Clothing

Facilities such as memory channels, scanning and the like are fitted as well, but reading through the operator's handbook shows that a wide variety of other facilities are also available if you want them, such as programmable band and scan limits, auto power-off, a tone alert system, automatic memory storage, memory QSY, an optional DTMF selective calling system together with 15 digit DTMF memories, and the like. However, for 'normal' use the controls can still remain simple to use. Even devoted fixed — station only operators could find a use for one of these transceivers. Why?...read on....

with a matching 70cm TH-76E but fitted with optional DTMF (Dual Tone Medium Frequency) 'Touch Tone' keypad and memory unit, and an internally fitted CTCSS decoder.

### Features

Apart from frequency coverage, the two transceivers offer basically similar features. Each transceiver covers the 144 — 146MHz or 430-440MHz band in selectable 5, 10, 12.5, 15, 20 or 25kHz steps, a click-step rotary knob on the top panel acting as a tuning control. Twenty memory channels are fitted, these may store the operation frequency, repeater shift, and CTCSS tone status and frequency, a CTCSS encoder being fitted as standard.

An LCD (Liquid Crystal Display) panel on the top panel of the set gives you the usual indications, such as your operating frequency, memory channel and suchlike, together with a bar-graph S-meter on receive and a relative battery voltage indication on transmit. Below the LCD are

Without any fitted options, the TH-26E is currently priced at £249 and the TH-46E at £269.

## In Use

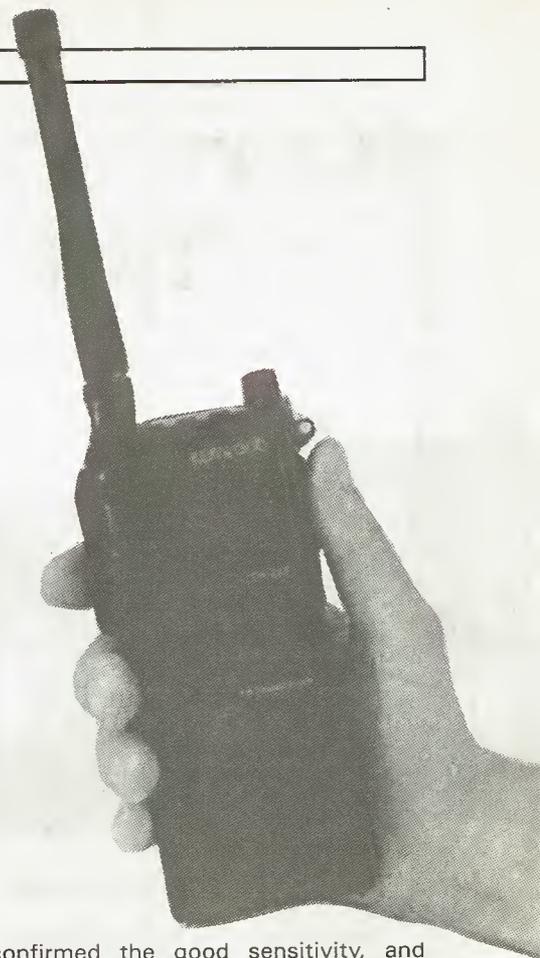
Well first of all I just started off by using the main tuning knob, following a quick read of the relevant section of the operating manual I found out how to program the memory channels and then start scanning through them (some of the 'second functions' of the rear panel buttons). One thing I immediately found was that the set gave a loud 'bleep' every time it went through one cycle of the memory channel bank, and try as I might

I couldn't at first switch it off! So I had a sit down with a cup of coffee, and resigned myself to a good read through the comprehensive manual!

Having read about the many possible operating modes and default settings available, it struck me that this was certainly a comprehensive little set, and I enjoyed experimenting with the 3-digit DTMF selective calling function provided on the TH-46E fitted with these options. After a period of use, I found the operating frequencies, CTCSS functions, and DTMF codes could be stored in the various memory channels, and I could even then change the LCD to simply display 'Ch 1' through to 'Ch 20' in large digits instead of the operating frequency, to place the set in a suitably 'easy' mode for every day use. Just like the 'old days' of crystal controlled FM rigs, where you just turned the channel knob to the one you wanted without the need to worry about switching in repeater shifts and the like!

The receivers on both sets I found to be very sensitive indeed, I could copy distant repeaters with ease and often found that my 2W or so couldn't get back into them! However this would certainly increase portable-portable range with similar sets used at each end, thus conserving battery power nicely. Whilst walking around, I found the internal speaker on the set not quite efficient enough for listening without the set held up to my face, the audio tending to distort somewhat at high volume levels. One other problem, although maybe due to finger trouble on my part, was that at night attempting to switch the LCD backlight on often made me a repeater 'phantom bleeper', the light switch being the same as the 1750Hz tone button. To activate the LCD backlight, you must first press one of the tiny rear push-buttons, then the tone button within a few seconds, not an easy thing to do while walking along on a dark night!

Plugging in an external aerial to the set top BNC connector



confirmed the good sensitivity, and surprisingly enough I found few problems from blocking effects from other transmitters, (I currently share my QTH with my seven VHF/UHF packet radio nodes!). However, taking the set out and about I did come across the odd problem on 2m from a fire brigade transmitter site with its multiple constant carriers, but then one can't expect base station performance from a tiny portable.

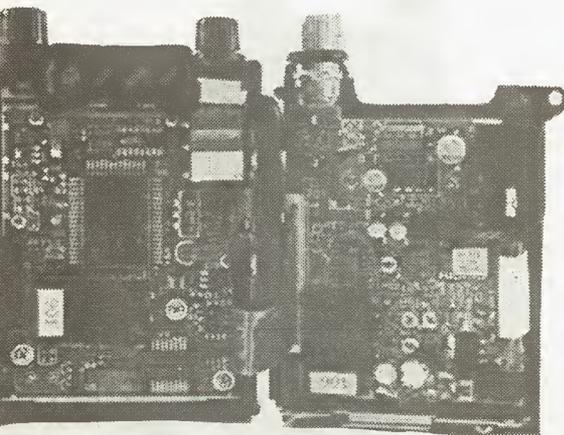
I found that reports on my transmitted audio were quite good, with clear audio not affected by the 'huff and puff' breath noises that I sometimes get while walking along using a portable with high microphone gain. The rear panel of the case did become very hot though when nattering away on 70cm, and using the set with an external 13.8V DC supply was very difficult after a few minutes of transmission on high power. Eventually I just turned the power supply down to 7V and the sets worked quite nicely, this also gave me a chance to charge the ni-cads up as unfortunately the plug-in charger disconnects the set's battery supply when in use, so I couldn't 'float charge' the set while just listening in the shack.

## Inside the Box

The set is made up from a tough plastic front panel section combined with a painted metal back panel, the latter acting as a heatsink for the transmitter power amplifier block. After unscrewing the tiny panel screws, the set opens up to



reveal several PCBs laden with tiny 'chip' components, the front panel section housing the control functions and the main body housing the RF, IF and audio circuits on a pair of stacked PCBs. The DTMF selective calling unit and CTCSS decoder options plug into two sockets on the internal PCBs, the DTMF keypad also providing a replacement front panel section to the set, a flexible length of PCB



strip connecting this to the main control PCB.

On receive, a first IF of 16.9MHz is used on 2m with 30.825MHz on 70cm, a pair of cascaded monolithic dual crystal filters being used here to provide adjacent channel selectivity. This is followed by a ceramic filter at the second IF of 455kHz where further amplification and demodulation takes place. A final frequency VCO (Voltage Controlled Oscillator) is used together with a single MB1504 IC synthesiser chip on both versions to generate the transmit and receiver local oscillator signals, no additional prescaler being used.

### Laboratory Results

The receivers on both units were very sensitive, the TH-26E exceptionally so, and as found on air the blocking performance was still very good. The intermodulation performance, i.e. the effect of off-frequency signals mixing together to provide an unwanted signal on the tuned frequency, wasn't all that good, this possibly explaining the breakthrough I sometime came across on 2m.

On transmit the harmonics from both sets were exceptionally well suppressed, the deviation correctly set at below the 5kHz absolute maximum level, and the transmit power on low power settings well regulated. On high power, the maximum power varied with the supply voltage of course, although the 2m power level on a 7.2V supply was a bit on the low side. Sliding on a freshly charged ni-cad, the voltage of this is being slightly more than the nominal 7.2V, brought the power up to around the 2W mark though.

### Laboratory Results: Receiver

#### Sensitivity

Input level required to give 12dB SINAD:  
145MHz; 0.13 $\mu$ V pd  
435MHz; 0.17 $\mu$ V pd

#### Squelch Sensitivity

	145MHz	435MHz
Threshold;	<0.06 $\mu$ V pd (<2dB SINAD)	0.08 $\mu$ V pd (2dB SINAD)
Maximum;	0.19 $\mu$ V pd (22dB SINAD)	0.20 $\mu$ V pd (18dB SINAD)

#### Adjacent Channel Selectivity

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

	145MHz	435MHz
+ 12.5kHz;	37.0dB	46.0dB
- 12.5kHz;	25.0dB	29.5dB
+ 25kHz;	75.0dB	74.5dB
- 25kHz;	73.0dB	74.5dB

#### 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;

	145MHz	435MHz
+ 100kHz;	84.0dB	86.5dB
+ 1MHz;	91.5dB	94.5dB
+ 10MHz;	94.5dB	89.5dB

#### Intermodulation Rejection;

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

	145MHz	435MHz
25/50kHz spacing;	61.5dB	54.0dB
50/100kHz spacing;	62.0dB	54.5dB;

#### Image Rejection;

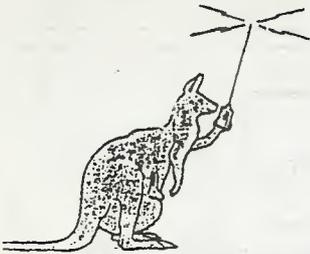
Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;

	145MHz	435MHz
	- 61.0dB	- 62.5dB

#### Maximum Audio Output;

Measured at 1kHz on the onset of clipping;

	145MHz	435MHz
3ohm load;	340mW RMS	310mW RMS
8ohm load;	315mW RMS	320mW RMS
15ohm load;	225mW RMS	220mW RMS



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## Conclusions

The TH-26E and TH-46E are handy little sets, generally being easy to use after suitable pre-programming of the memories. The extra-low power level of 20mW could prove quite useful for all-day use around a given site, indeed one could use this for remote control of some twin-band mobile and base transceivers placed in 'talkthrough' mode, the remote set transceiving on, say, 2m using an external aerial and providing 'talkthrough' with suitable CTCSS/DTMF control on 70cm, its transmitter operating on low power into a dummy load or similar to restrict radiation. A quick switch back to high power on the portable, and you've got a 'take-it-anywhere' rig for portable use out and about.

Our thanks go to Lowe Electronics Ltd. for the loan of the review sets.

Toneburst Deviation;	
145MHz	435MHz
3.04kHz	3.16kHz

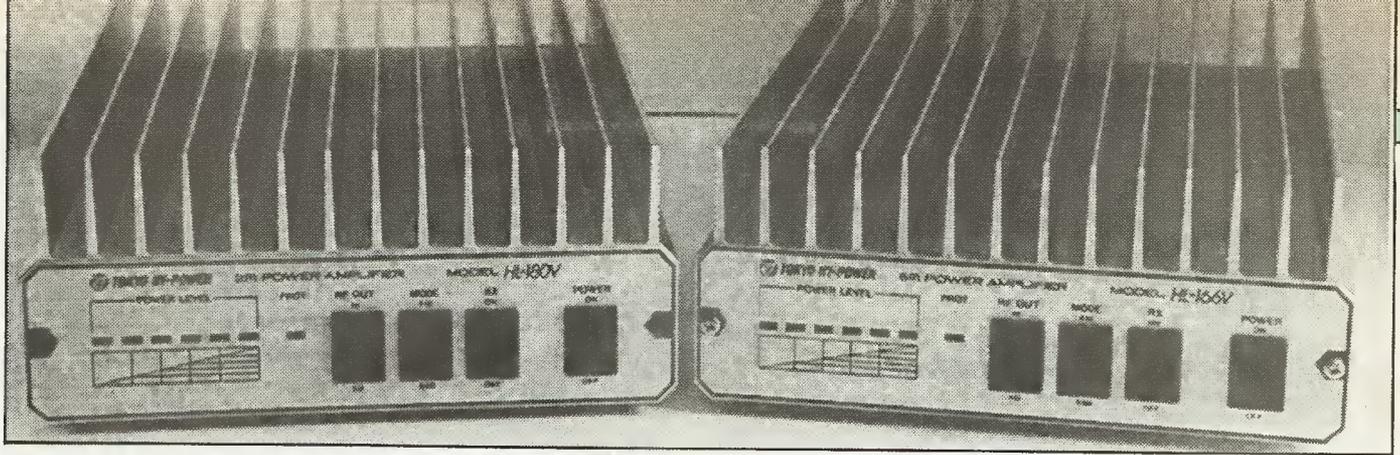
Peak Deviation;	
145MHz	435MHz
4.96kHz	4.38kHz

Current Consumption;		
	145MHz	435MHz
Standby, Economiser on;	12mA av.	14mA av.
Receive, Mid Volume;	98mA	96mA
Receive, Max Volume;	164mA	173mA

## Transmitter;

TX Power and Current Consumption;				
Freq MHz	Power	7.2V Supply	12.0V Supply	13.8V Supply
145MHz	High	1.16W/770mA	4.44W/1.18A	5.05W/1.21A
	Low	440mW/470mA	440mW/471mA	440mW/471mA
	E Low	25mW/102mA	25mW/106mA	25mW/108mA
435MHz	High	1.88W/1.20A	5.05W/1.59A	5.66W/1.60A
	Low	480mW/595mA	480mW/605mA	480mW/608mA
	E Low	22mW/119mA	22mW/123mA	22mW/126mA

Harmonics;		
	145MHz	435MHz
2nd Harmonic;	< -85dBc	-76dBc
3rd Harmonic;	-81dBc	< -85dBc
4th Harmonic;	< -85dBc	< -85dBc
5th Harmonic;	< -85dBc	-
6th Harmonic;	< -85dBc	-
7th Harmonic;	< -85dBc	-



# Tokyo Hy-Power Amps

## Review

Ever felt the need for higher power from your base station or even from your new 6m mobile setup? The latest amplifiers from Tokyo Hy-Power again come as a HRT 'exclusive' review, just in time to add to your Christmas present list to warm the winter airwaves up!

### High Power

In the 'top power range' of their solid state amplifiers, Tokyo Hy-power offer the HL-166V 160W amp for 6m, the HL-180V 170W amp for 2m, and the HL-130U 120W amp for 70cm, each amplifier having similar operating specifications.

The amplifiers each provide automatic input switching circuit

relay chatter on SSB. A socket on the rear panel allows a 'hard wired' TX connection to be made to your transceiver if required, with both ground and positive voltage switching catered for. Further LEDs indicate power on, preamp on, TX status and the like.

Each amplifier comes in a silver coloured metal enclosure built around a large extruded heatsink, the overall unit measuring 183 x 78 x 263mm and weighing around 2.6kg. A mobile mounting bracket, connecting leads, and a manual

quarter wave mobile aerial used. No more weak signals with the XYL when operating mobile at extremes of range though, I even found myself not needing to make some calls home on the Band III system we use for communication when out of direct amateur band range (Band III's a lot cheaper than a cellphone!).

At home, again the expected large increase in signal strength occurred, using the amplifiers driven by my HF rig and 6m/2m/70cm transverter system. I found I needed at least a 25A power supply to operate the units in high power mode, this of course could be worth noting when considering an overall budget in comparison to a shack valve-based amplifier. I rarely needed the 6m preamplifier switched in from home, external band noise normally being the limiting factor from my particular location, although amateurs in 'quieter' locations could of course find this useful. However, the 2m and particularly 70cm preamps were occasionally useful for dragging a 'weak one' a little further out from the noise. On transmit, reports on my SSB signal quality were little changed from my 10W drive apart from the increased overall strength, suggesting good linearity in the amplifiers.

Overall, a very good on-air performance.

### Laboratory Results

The SSB linearity, as found on air, was often limited by my driver transceiver, particularly with the amplifier in 'Low' power mode where the close-in IMD products were identical to my driver. Reducing the drive power to 3W automatically selecting the more sensitive input stage, in fact cleaned up the output signal to a narrower overall

### Three Amplifiers tested, G4HCL reports

arrangements to always provide the correct maximum output power level, thus catering for different drive levels as found on most transceivers. The input power sensor detects a transceiver drive level of 3W, 10W or 25W (3W and 10W on 6m), with the amplifier then selecting the appropriate internal input attenuator. A high/low switch on the front panel allows you to switch to either maximum power output, or approximately 50% output for when you want to give either the airwaves or your battery a rest, and switching the amplifier off provides a 'straight through' connection on transmit. Each amplifier also has a switchable receiver preamp, this using a JFET on 6m and a GaAsFET on 2m and 70cm, to give your receiver sensitivity a boost on weak received signals.

### Protection

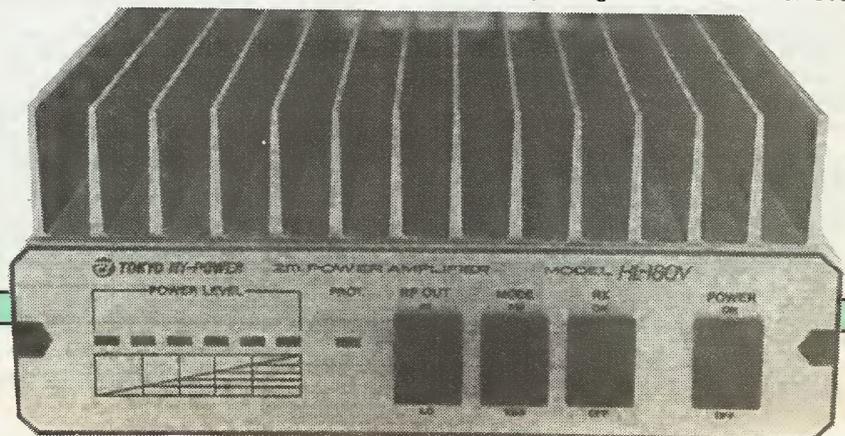
Protection circuits are built in to guard the power output transistors against high SWR and excessive DC voltage supply, a 'Prot' LED lighting on the front panel to also warn of this. An LED bargraph also on the front panel gives an indication of the relative power output, and combined with automatic RF detection for TX switching, an SSB/FM switch adds a delay of around a second to the TX/RX switching time to prevent

giving full operation and circuit details is provided.

### In Use

Connecting the amplifiers up was simple, with just a positive and negative voltage lead to wire and a ready-made coax lead supplied with the amplifier little really could go wrong. Then it was just 'switch on and talk!' Using one of the FT-290R series transceivers (plus the FT-790 70cm and FT-690 6m versions) I found the transceiver/amplifier pair in each case made a great mobile setup, however I'd have to wait for the restrictions on 6m mobile and portable to be lifted before I could use it that way - but what a lovely DX mobile station it would make!

On transmit, not surprisingly I found a whale of a difference, although I had to be careful with the power rating of the



bandwidth that the unamplified 10W drive signal!

In general, the transmit harmonics were reasonably well suppressed, although I wasn't too happy with the 6m second harmonic level. Good practice suggests always fitting a low pass filter on 6m in any case, as the second harmonic of this band falls right in the middle of the FM broadcast band, I would strongly advise this to be done especially when using such an amplifier, otherwise

### HL-180V, 2m

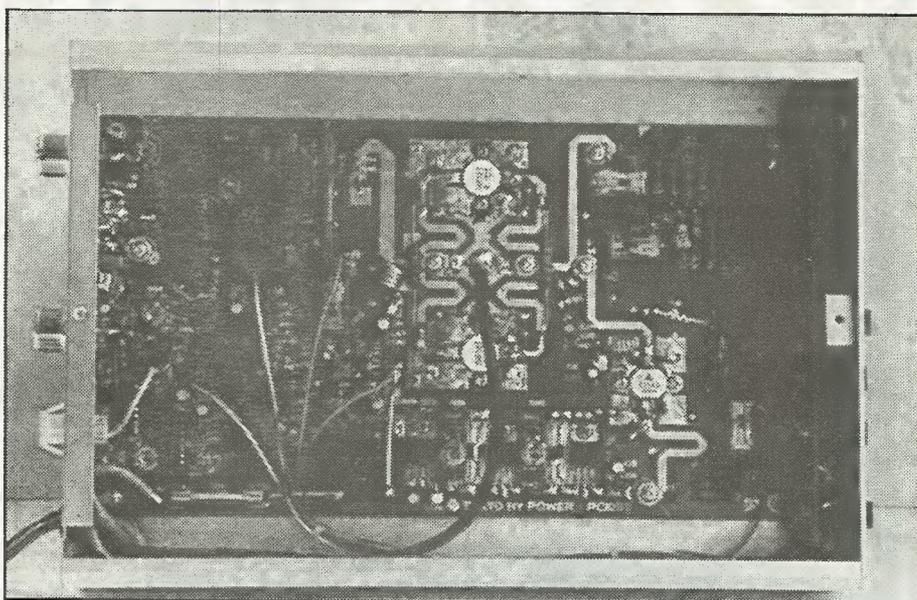
#### Power Output;

High	—	185W	(24.1A DC)
Low	—	80W	(12.9A DC)

#### Harmonics;

2nd;	—70dBc
3rd;	—84dBc
4th;	<—85dBc
5th;	<—85dBc
6th;	<—85dBc
7th;	<—85dBc

RX Preamp gain; 16.9dB



#### TX IMDs;

	Low Power	High Power
3rd order	—19/—18dB	—18/—17dB
5th order	—30/—25dB	—25/—22dB
7th order	—33/—36dB	—31/—31dB
9th order	—52/—36dB	—33/—42dB
11th order	—40/—39dB	—46/—51dB
13th order	—42/—46dB	—45/—44dB
15th order	—47/—53dB	—43/—44dB

### HL-166V, 6m

#### TX IMDs;

	Low Power	High Power
3rd order	—22/—25dB	—17/—20dB
5th order	—32/—35dB	—27/—28dB
7th order	—40/—53dB	—33/—32dB
9th order	—45/—48dB	—42/—40dB
11th order	—50/—51dB	—58/—55dB
13th order	—53/—53dB	—50/—53dB
15th order	—54/—55dB	—49/—52dB

#### Harmonics;

2nd;	—47dBc
3rd;	—75dBc
4th;	—78dBc
5th;	—79dBc
6th;	—82dBc
7th;	—79dBc

RX Preamp Gain; 15.1dB

you might get a visit from your local friendly RIS man! I understand a good 'Comet' filter is available for this.

### Conclusions

A nice amplifier range, and a great match for one of the many multi-mode single band rigs available nowadays. I had great fun using them, the improvement in signal strength when needed due to operating or propagation conditions often making their addition invaluable. But make sure you use a good low pass filter, or at least a second harmonic coax 'trap' on the 6m one though!

Our thanks go to South Midlands Communications Ltd. for the loan of the review equipment.

### Laboratory Results

All TX measurement performed with 10W drive power, 13.8V DC supply, 'High' power setting unless otherwise stated, dB figures given relative to max. PEP.

### HL-130U, 70cm

#### Harmonics;

2nd;	—61dBc
3rd;	—53dBc
4th;	—62dBc
5th;	—
6th;	—
7th;	—

RX Preamp gain; 18.2dB

#### Power Output;

High	—	161W	(20.5A DC)
Low	—	58W	(12.2A DC)

#### Power Output;

High	—	110W	(12.9A DC)
Low	—	80W	(12.9A DC)

#### TX IMDs;

	Low Power	High Power
3rd order	—23/—26dB	—19/—20dB
5th order	—40/—33dB	—28/—26dB
7th order	—53/—35dB	—36/—31dB
9th order	—42/—39dB	—37/—35dB
11th order	—41/—46dB	—41/—47dB
13th order	—48/—48dB	—52/—53dB
15th order	—55/—54dB	—68/—57dB

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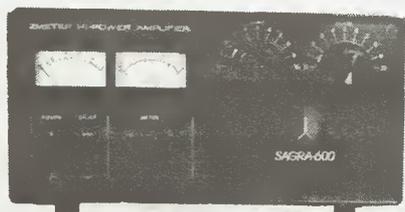
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HL62V	2m 10W in 60W out RX Preamp	<b>£135.00</b>
HL110V	2m 2/10W in 100W out RX Preamp	<b>£215.00</b>
HL180V	2m 3-25W in 120W out RX Preamp	<b>£295.00</b>
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# FT-990 Review



*Another HRT Exclusive, by Chris Lorek G4HCL*

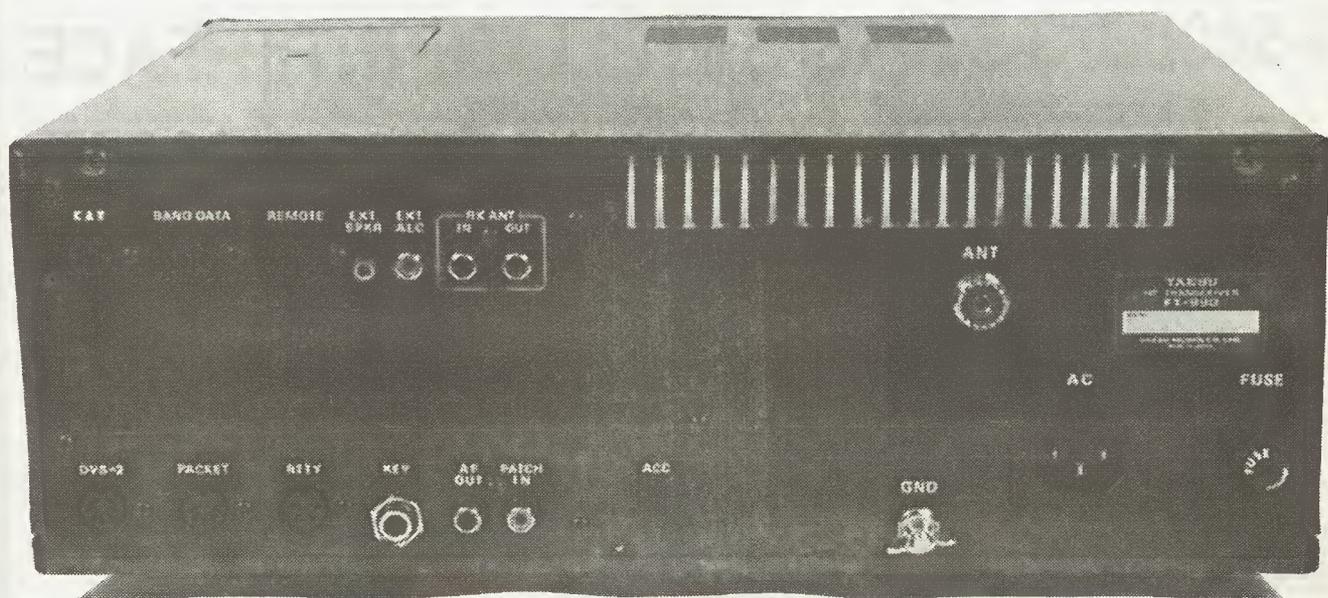
At this year's Leicester Show, Seiji Yokoi of Yaesu Japan flew over to launch their latest HF transceiver, the new FT-990, an all mode base station transceiver with a multiplicity of functions. HRT were very pleased to come away from the show with the only review sample in Europe, although we had to give it back quick as it was needed for another European show the following week!

## Features

Much of the transceiver's circuitry is based upon the FT-1000 transceiver, with the same quadruple FET balanced mixer combined with a Direct Digital Synthesiser for the local oscillator, thus giving a very 'clean' receiver without much of the usual synthesiser 'phase noise' found in earlier sets. In the never-ending battle against QRM, as well as

variable IF shift and notch controls on the front panel further variable digital filtering is employed, with individual low and high audio tailoring controls to act as a sharp variable audio bandpass filter. Crystal filter bandwidths of 250Hz, 500Hz, 2.0kHz and 2.4kHz may be independently selectable, with a choice of LSB, USB, CW, AM, FM, RTTY and Packet modes being offered. A separate filter of 6kHz bandwidth is also fitted for AM and 10m FM use. The receiver covers the range of 100kHz to 30MHz continuously, with transmission limited to the amateur band ranges.

On transmit, a 100W power output



is offered from the wideband PA, with 25W available on AM if you wish to use that also. An ultra-linear wideband power amplifier is used, the claimed IMD products from a two-tone test being at -36dB relative to carrier, challenging that given from traditional valve PAs. An automatic ATU is fitted also, this matching an input impedance of between 16.7 and 150 ohms to give a resultant SWR of less than 1.2:1 to the PA, note this will match many non-resonant aerials but is not a replacement for an ATU used with, say, long wire or G5RV type aerials.

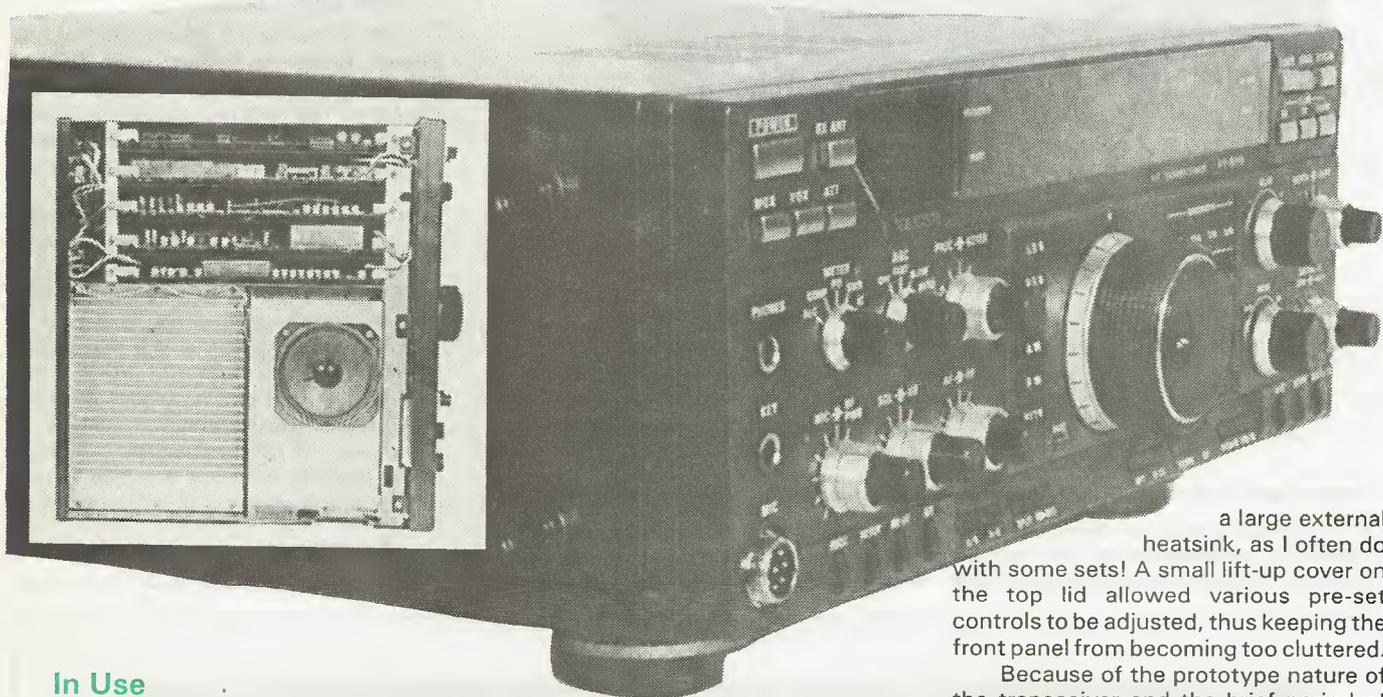
The transceiver comes with an internally fitted switched mode power supply, and an internal fan cooled heatsink is used for the transmitter PA to keep the overall transceiver dimensions and weight down.

if required, to keep away from having too many leads coming out of the front of the transceiver, the internal CW iambic keyer an full break-in facility combined with the 'razor sharp' IF and AF filtering no doubt appealing to the CW devotees out there. A handy feature is the DVS-2 digital storage module which could also be plugged in, to automatically record incoming signals and even store the odd 'CQ' call or whatever. One of these days, I'll also get round to controlling the CAT (Computer Aided Transceiver) port through my UHF handheld, so I can sit by the fire calling CQ on HF! The front panel controls were sensibly placed, but I found the 'M Scan' button on the very top right hand corner could easily be knocked, with a resultant loss of the tuned signal as the set commenced scanning through the

A total of 39 ATU memories were held in the set's microprocessor, so that when I tuned to another band the ATU would automatically set itself to the last known match for that frequency. A front panel 'High SWR' LED would give a warning if a match couldn't be found, for those who insist on plugging a long wire or whatever directly into the aerial socket.

### Inside the Box

Opening up the set shows an array of plug-in PCBs are used, these should provide the ability of easy servicing if the need arises as long as the required extender cards are available in the workshop. The large internal PA heatsink was ducted through air ports in the rear panel, this having the advantage of helping a user fumble around the rear panel to plug an external speaker or whatever in without burning his hand on



### In Use

Operation of the transceiver is very similar indeed to the FT-1000, the main thing missing being the second receiver which otherwise allows you to listen on two frequencies, anywhere in the HF range, simultaneously. Living up to the latest changes in amateur interests, the multiplicity of connectors on the rear panel allowed any 'add-ons' to be directly connected, even with separate sockets provided for an RTTY terminal unit and a Packet TNC, each being switched into operation when the front panel mode button was selected. The 'Packet' mode cycled between FSK packet, i.e. SSB style for 300 Baud, and AFSK packet using modulated FM, the front panel microphone connector being disabled in each case.

Even two CW sockets were provided, this way I could plug the key into the back

memories!

On air performance was found to be, not surprisingly, very similar to the FT-1000 apart from the lower level of 100W transmit power supplied, as such the receiver was essentially free from some of the problems I get on 40m during the evening, although owners of monster aerial systems (I wish I had one) may find the front panel attenuator button handy, I never needed it though. When switching between bands, the last-used frequency, mode, and filter bandwidth was automatically switched in, this I found very handy to save a lot of dial-twiddling between bands. I'm sure this would be very handy for contest use also.

The Auto-ATU was enabled by a quick push of the front panel 'Start' button, the multi-function meter showing the SWR level as the ATU found a match.

a large external heatsink, as I often do with some sets! A small lift-up cover on the top lid allowed various pre-set controls to be adjusted, thus keeping the front panel from becoming too cluttered.

Because of the prototype nature of the transceiver and the brief period of loan, it was felt that a full in-depth technical review would not be warranted, (the FT-1000 performance exceeded that of the test equipment in many cases), however we'll probably list in-depth laboratory results in a forthcoming issue.

### Conclusions

During this 'mini review' in the HRT 'Christmas special' collection, I found the FT-990 could have much to offer the amateur who doesn't want to spend over £2000 or so on a HF transceiver, but still wants the 'ultimate' in performance. The FT-990 could fill this gap, although I would have liked the facility for transverters to have been plugged into the rear for VHF and UHF use.

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

# Dual Band Amplifier Review



## *A Dual Band Power Amplifier for Dual Band Portables — G4HCL puts it through it's paces*

OK, you've got your super new dual-band portable rig, or maybe one might even turn up in your Christmas stocking (wish one

would in mine!). Chatting away on one band while you're listening out on another can be great, either while out and about

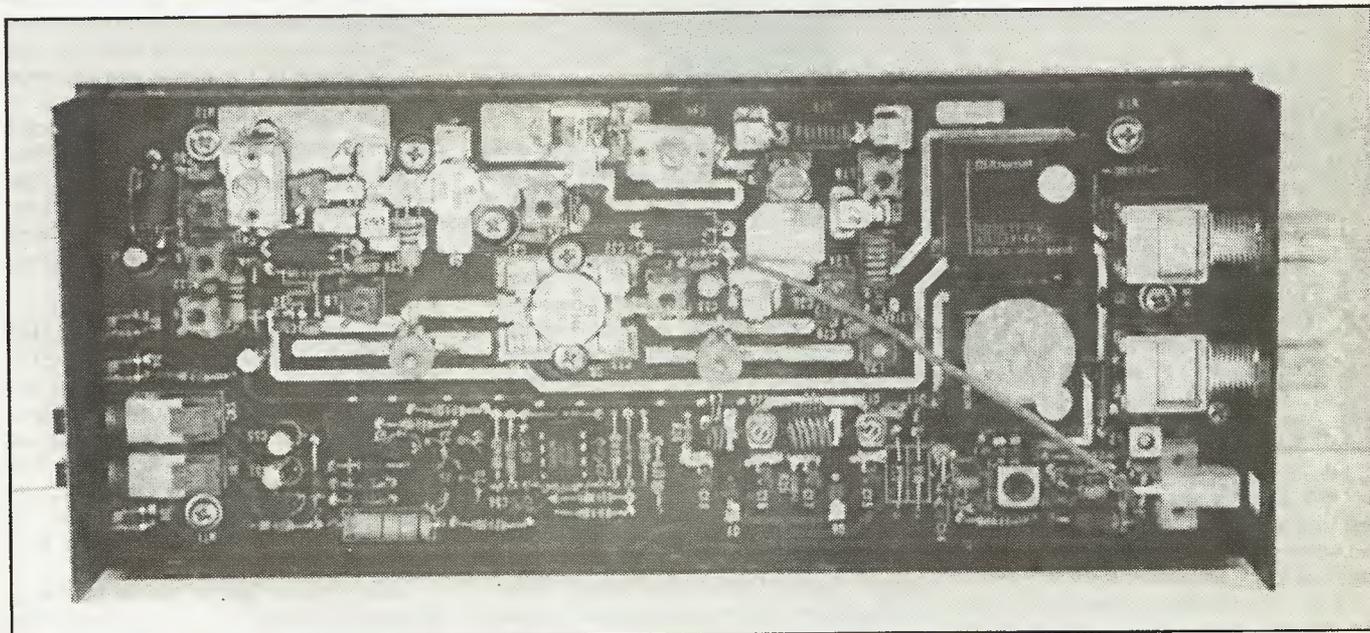
portable, or from home or your car while using an external dual-band aerial. But sometimes, you may feel you could do with the higher transmit power of a mobile rig to reach those distant repeaters you can hear but just can't get into reliably. But a dual-band mobile rig often comes with a significant price tag! Well here's the answer, the first ever dual-band amplifier designed especially for use with handhelds, and yes you're right, it's another HRT exclusive!

### RF Concepts

RF concepts is a division of the well-known American packet radio firm of Kantronics, the amplifiers being built in the USA. The unit is a dual band power amplifier and a switchable dual band receive pre-amplifier, combined in a single box. The unit automatically senses when you transmit, and indeed which band you're transmitting on, by using tuned circuits on the detection circuitry. This switches the pre-amp out of circuit and the transmit power amp in circuit, each as required depending on your selected operating mode from the front panel switches. There are individual transmit amplifiers and receiver pre-amplifiers for each band, with automatic DC switching of the relevant transmit amplifier appropriate for the transmit band in use.

### Features

Currently priced at £239, the ampli-







to 'con' unsuspecting purchasers — we've warned you of this before and we know it still happens!

Next to the 'Cat. No.' on the rear label will be the type designation, either MF5FM (8W VHF), MF25FM (25W VHF), or MF5U (5W UHF). This will often be followed by the channel spacing, 'S' signifying 12.5kHz and 'V' signifying 25kHz, then a digit of either 3 or 6 to signify the number of available channels that may be switched from the front panel.

Below this, next to the 'Code' panel will be the channel spacing (S or V), followed by the TX frequency band code

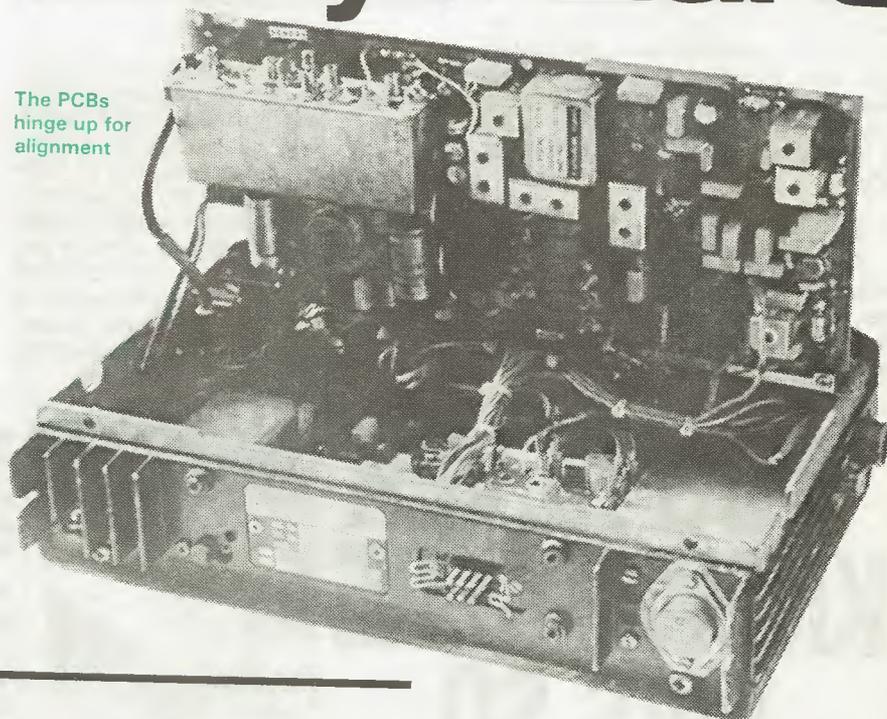
# P-Band Pye Europa

Veteran readers of HRT or owners of the 'Surplus Two-Way Radio Conversion Handbook' by Argus Books, will know the VHF Pye Europa is a neat, self-contained 8W or 25W FM transceiver capable of operation on up to 3 or 6 crystal controlled channels. Just the thing for packet radio use, or for a low cost rig for club net use and the like. The recent growth of DX PacketClusters on 4m has significantly prompted the need for a low cost 4m FM rig by users wishing to be 'in on the action', with no commercial transceivers currently available for the band.

## P Band

There have recently been a very large number of 'P' band Pye Europas placed onto the surplus market. Although capable of transmission on 4m without circuit modification and only a re-alignment being required, at first glance these may not be deemed suitable for use as a transceiver due to their receive frequency coverage range of 79-101MHz,

The PCBs hinge up for alignment



*Our resident conversion expert G4HCL transforms a low cost P-Band Pye Europa on 4m FM.*

this often being too high to 'tune down'. It has certainly not in the past been worthwhile paying a high price for sets such as these, when 'E' band (68-88MHz TX/RX) Europas have been commonly available. However, with typical rally prices now of £5 each complete with microphone, power lead and mounting bracket for P band sets (the rally stand we bought several at still having a large pile left at the end of the day) we at HRT weren't blinkered, and the conversion team went into action!

## Identification

First of all, make sure you know what

you're buying! The accompanying photograph will show what the Europa looks like, but be warned, as besides the rear panel label there is no obvious outer difference between Europas made for P Band RX (79-101MHz), E band (4m), B or A band (2m) and T or U band (70cm). Avoid the 'M' band equipments, for the present at least unless of course you fancy designing your own modification details (but watch this space!).

Inspect the rear serial number plate, this being riveted onto every set. Beware the set with no identification plate on the rear, don't touch it with a bargepole, as the seller may well have forcibly removed this

letter as detailed above, then the receive frequency band, then again the number of channels.

The 'P' band Europa is thus typically identified by a code of 'SEP6', signifying 12.5kHz channel spacing, E band TX, P band RX, 6 channel.

Tuning details for the A, B, T and U band sets are given in the Argus 'Surplus Two Way Radio Conversion Handbook', which we'll even give you free if you subscribe to HRT using the coupon in last month's issue. Much of the following alignment information is indeed based on information from that source.

## Conversion

The transmit section of the set is identical to an E band set, hence for 4m there is no conversion required at all, just a retune as I'll describe later. On receive, the set covers 79-101MHz, and if you

attempt to simply re-tune the receiver multiplier section using positive side oscillator injection as used for P band, you'll probably be able to achieve a tune-up as I did on several sets, although the receiver will not be as sensitive as a correctly modified set, with also the possibility of instability. Better to spend a few pence on six capacitors....

Through a degree of detective work, I have found the receiver multiplier coils are physically identical between the P and E band equipments, therefore by simply replacing a few capacitor values you'll have an E band multiplier circuit. By unsoldering and removing the double

size used for the six channel set. If you need to order them specially cut, you may find it useful to quote the original specification type T25 (3 Chan) or T80 (6 Chan), although to save money it may be worthwhile to request an 'amateur spec' version of these.

4m frequencies commonly used are 70.450MHz for general FM calling, with 'working' channels (if needed in busy areas) of 70.425MHz and 70.475MHz, a traditional 'mobile channel' used in some areas is 70.260MHz. Packet nodes and DX Clusters use 70.325MHz, other nodes use 70.4875MHz. Therefore just one or two crystallised channels are all you should

need on 4m FM for either packet or voice.

## Preliminaries

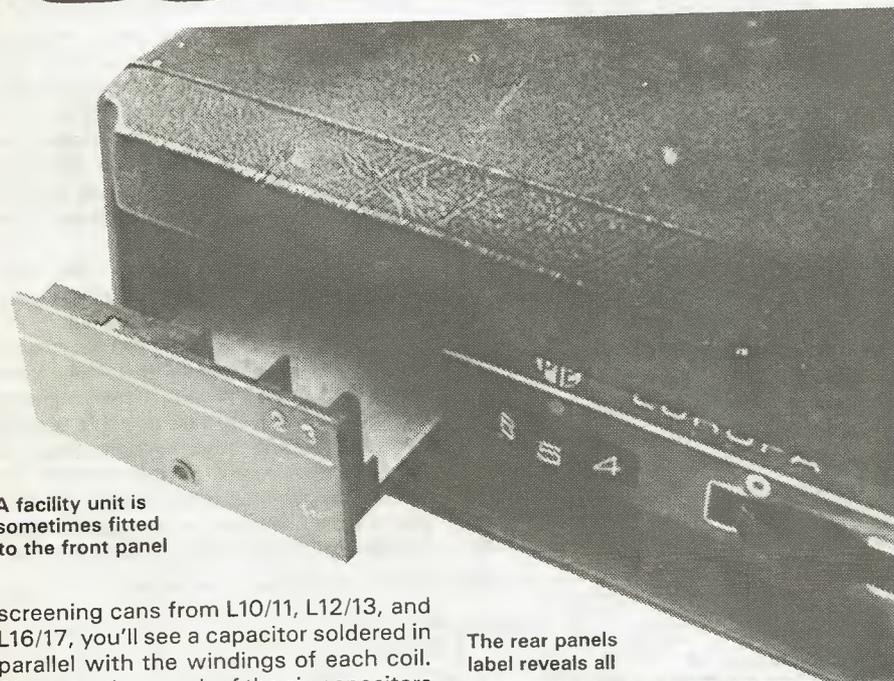
Remove the top lid of the equipment by removing the two screws at the rear of the case, then remove the three screws securing the RX PCB and hinge this upwards. Plug your crystals into their respective sockets on the TX and RX PCBs. Check that Pins 8 and 12 are linked on the facility socket on the lower TX board (pin 1 is at the left looking from the front of the set), either by a PCB link on a blanking board or by a wire link at the rear of the socket. If a tone option board is fitted here, I would recommend removing the board and fitting the appropriate link in its place.

If you don't have a couple of suitable non-metallic alignment tools, you'll have to either buy, borrow, or fabricate some to suit the slots in ferrite cores, and the trimmer capacitors in the TX PA. A filed-down plastic knitting needle or similar object works very well here. **Do not** under any circumstances be tempted to use metallic items such as jeweller's screwdrivers, you will not be successful due to their de-tuning effect and you could easily destroy the ferrite cores in the set.

For the receiver tune-up, you'll need a multimeter and also a variable level of signal at the receive frequency, if you have access to a signal generator then all well and good, otherwise a friendly local amateur transmitting a signal to you may be useful, combined with variation of transmit and receive aerials, or of course for a linked packet node you can 'connect' to it via a different band, then get it to send a signal out for you with a TheNet 'CQ' command.

On transmit, as well as a multimeter you'll need some form of RF power meter, and a dummy load if available. A

# a Conversion



A facility unit is sometimes fitted to the front panel

screening cans from L10/11, L12/13, and L16/17, you'll see a capacitor soldered in parallel with the windings of each coil. Simply replace each of the six capacitors with a capacitor value as I've shown in Table 1. Keep the capacitor leads as short as possible, then after trimming the leads carefully replace the screening cans, making sure no leads become shorted.

## Crystals

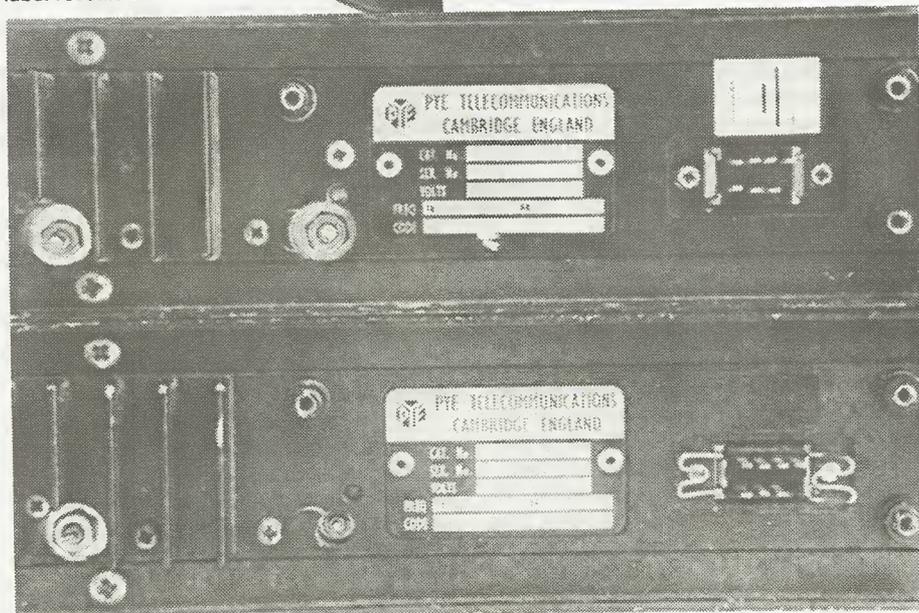
You'll find that some crystal suppliers may keep popular 4m frequencies in stock for the E band Europa, these will work fine in the P band set modified as described, otherwise you can obtain specially made crystals providing you don't mind waiting. The crystal frequencies required are;

$$\text{TX Xtal Freq (MHz)} = \frac{\text{Tx Freq (MHz)}}{16}$$

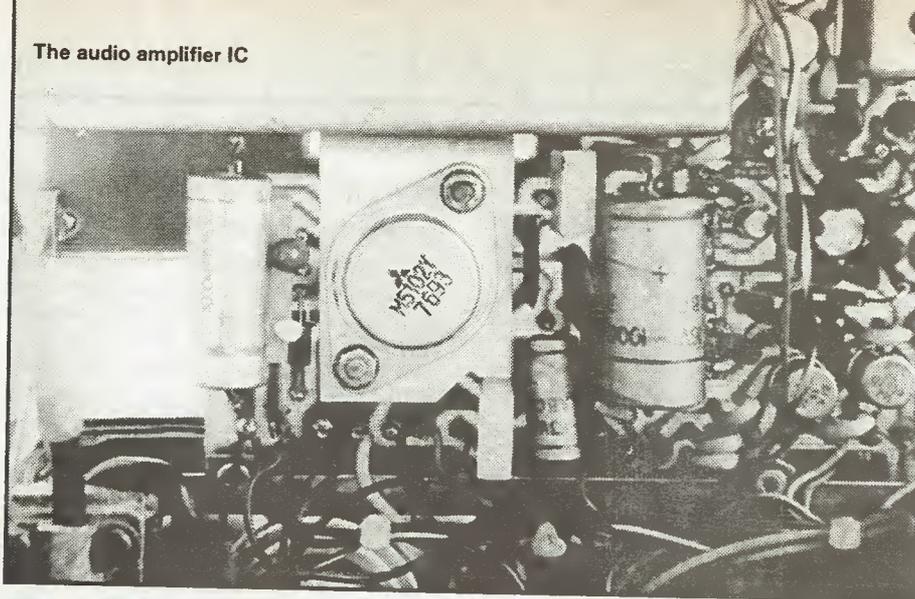
$$\text{RX Xtal Freq (MHz)} = \frac{\text{RX Freq (MHz)} - 10.7}{8}$$

The crystal case size for the 3 channel set is HC6/u, the smaller HC25/u

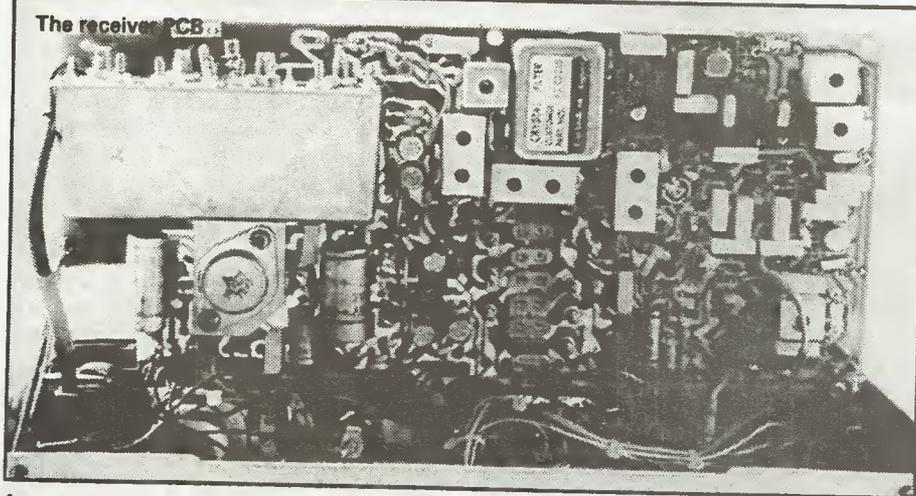
The rear panels label reveals all



### The audio amplifier IC



### The receiver PCB



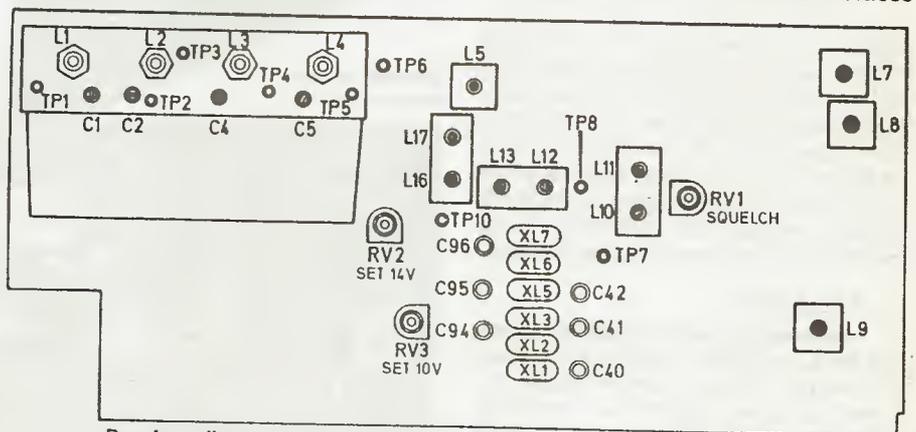
frequency meter helps but an off-air report from a helpful amateur with a centre-zero meter on his transceiver is usually quite sufficient. Correct setting of the deviation may be done by a listener comparing the peak level of your audio with that of another source such as a packet node or an alternative station.

### Connections

The microphone connections are shown in Table 2, a 5-pin 270 deg. DIN type plug is used for this although note that the pins are numbered logically as 1 to 5 around the socket, not to the 'DIN' numbering convention. TX PTT control is performed by switching the +10V line between pin 3 and pin 5, if you are connecting a packet radio TNC to this then bear the polarity in mind. If you want to use a 'ground to transmit' line from your TNC then connect this via a 2k2 series resistor to the base of a PNP switching transistor, the collector to pin 3 and the emitter to pin 5.

Note that the receiver audio output is available on the two-pin socket on the rear of the set, but this is a floating line, so **do not** connect one of these to earth, you could easily destroy the audio IC which is rather expensive to replace, this incidentally is the most common cause of a faulty set. To connect received audio to your packet radio TNC, link its audio input

to the RX PCB pins 12 (live) and 11 (Screen) at the rear of the plug-in facility PCB, this is the squelched audio feed to the volume control. If you need a 'busy' squelch line output, the collector of TR14 on the RX PCB switches between 0.9V



Receiver alignment points

(busy) and 8.4V (no signal).

The rear panel 13.8V DC power connection needs a special 7 pin socket, so try and obtain one with the set if possible, but otherwise you'll have to wire up your own socket or flying leads. In this case you will need to link pin 2 to 3, and pin 4 to 5, connecting positive DC to pin 1 and negative DC to pin 7, all these are

identified on the inner rear panel of the set. Use a 5A fuse in the DC power lead with an MF5 set, and a 10A fuse in line with an MF25 set.

### Receiver Alignment

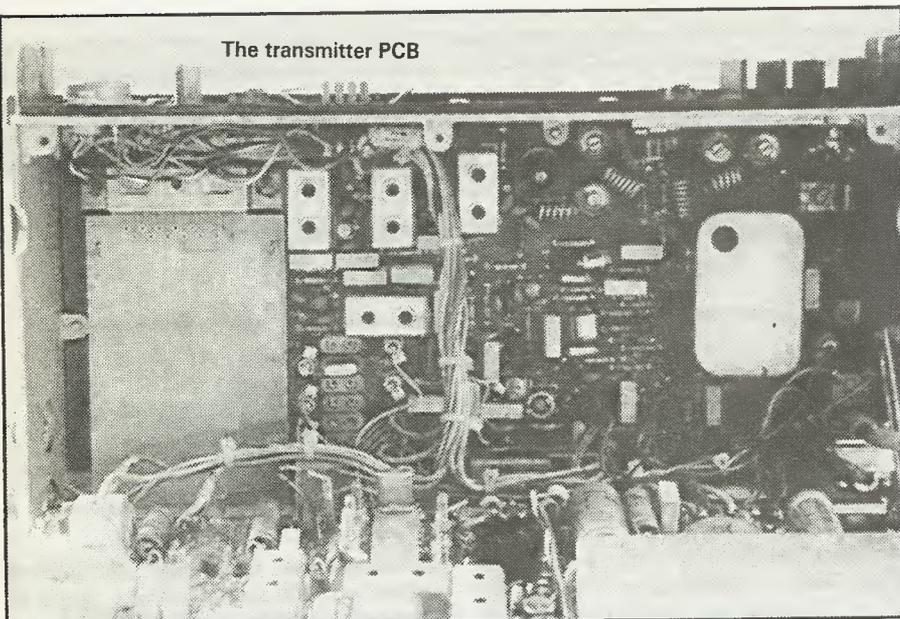
Start by switching to the appropriate channel for your installed crystal, and connect your multimeter negative lead to the DC supply negative line. Switch the multimeter to its 10V DC range, and connect the positive lead to TP7. Tune the core of L10 very carefully, looking for a tiny 'dip' in the meter reading, re-adjusting carefully for minimum voltage reading. I found this very hard to detect on the sets I tried, so take care. Now transfer the positive lead to TP8, and tune L11 and then L10 for maximum reading, re-tune again for absolute maximum and then tune L12 for a 'dip', e.g. minimum voltage. Transfer the positive lead to TP10, and tune first L13 and then L12 for maximum, then tune L16 for a dip. Transfer to TP6, and tune L17, then L16 for maximum, re-tuning again as required for absolute maximum. This completes the crystal multiplier alignment, now we go on to the RX front end.

Start off by screwing the four threaded metal trimmer rotors (the ones with small screwdriver-type slots in them) in towards the die-cast metal case, until they protrude only around 3-4mm from being flush with the case. Now you need to receive a signal at the aerial connection, and start by adjusting the relevant multi-turn crystal trimmer to ensure your crystal is on frequency, until you are sure you are receiving the right frequency, it could save a lot of fruitless

front end tuning! Open the receiver squelch by adjusting RV1 which is the squelch preset control.

If you are already receiving a controllable signal, simply tune the four adjusters on the front end metal block for best signal, peaking finally for absolute best reception on a weak signal, you don't need to use a non-metallic tool for this. Otherwise continue with the following.

The transmitter PCB



Short TP4 to the 10V line, (this being the adjacent pin 1 on the PCB linking to the feedthrough capacitor on the front end block). Tune the C5 adjuster, for best quieting of the received signal. Once you have done this, remove this DC link and instead link TP5 to chassis, then tune C4 for best quieting. Transfer the link now to connect TP1 to chassis, and tune C2 for best quieting. Transfer the link again now connecting TP2 to chassis and tune C1 for best quieting, and then carefully re-tune L17 and L16 for best quieting using your ferrite adjuster for the latter two. Now remove the link, and give all four capacitors on the front end a final adjustment for absolute best sensitivity, i.e. maximum quieting of a weak received signal.

Although I did not have any problems, if you find that the front end capacitor adjusters are 'right in' the die-cast assembly hence preventing a peak tuning point being obtained, you'll need to add extra capacitance in parallel with them. To do this, first undo the four retaining screws holding the block to the PCB, then undo the six small screws securing the case to the top of the assembly. Hinge the assembly up at the rear, then carefully slide the metal casting

away. Add a 1p8 capacitor in parallel with each of the variable capacitors, note you'll need a high-wattage soldering iron for this. Again checking for shorted leads re-assemble the front end and re-tune the four variable capacitors.

That's the receiver modification and alignment completed, so now on to the easy part.

### Transmitter Alignment

Connect your power meter to the aerial connection, switch to your crystallised channel and key the TX, remembering to keep it keyed when taking readings. Connect your multimeter positive lead to TP1 on the transmitter board, keeping the range at 10V DC. Initially tune C48 for maximum, then tune L3 for minimum. Transfer the multimeter positive lead to TP2, and tune L4 then L3 both for maximum, then L5 for minimum. Transfer the positive lead to TP3 and change the multimeter range to 2.5V DC. Tune L6 and then L5 for maximum, then L7 for minimum. Transfer to TP4, tuning L8 and then L7 for maximum, then L9 for minimum. On to TP5 and tune L10 and then L9 both for maximum. Now remove the multimeter leads, and connect the positive lead to the DC positive supply,

and the negative lead to TP6. Tune C90 and C92 using a flat-bladed non-metallic adjuster for maximum indicated voltage. Now remove the positive multimeter lead, change the range to 250uA DC, and connect the negative lead to TP7. From now on, keep the TX keyed only for as long as it takes you to make an adjustment, to prevent overheating of the PA.

MF5FM; Tune C98 and C99 for maximum indication on your multimeter, you should now have an indication of RF power, so disconnect the multimeter and tune C106 and C108, the latter accessible from a hole in the screening can, for maximum power, re-tuning the PA capacitors as required for absolute maximum, repeating several times to get the absolute maximum.

MF25FM; Tune C98 for maximum current indicated on the multimeter, then watching the RF power meter tune C106, C107, C111 and C112 in that order for maximum RF output. Re-tune all the PA capacitors again for absolute maximum, repeating as required.

You may now find it useful to go through the multiplier and PA alignment stages again to squeeze the last drop of RF power out of the set. Then set the relevant crystal trimmer for the correct transmit frequency, and while modulating the transmitter adjust C48 for maximum deviation as heard on a monitoring receiver. RV1 which sets the mic gain will already be set fairly accurately, but RV2, the TX deviation control, may need adjustment to give the required peak deviation, this being 2.5kHz peak for 12.5kHz channelling as used on 4m.

### That's It

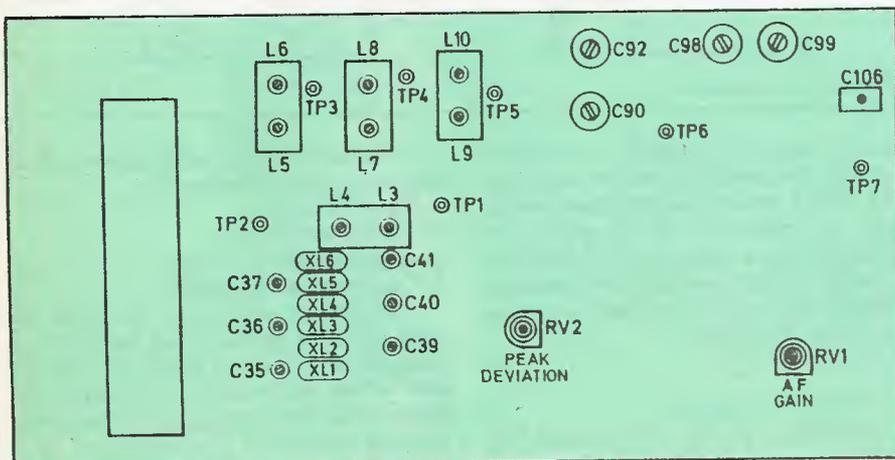
So now you have a fully working 4m rig, all ready to use for your club net, for mobile use on 70.450MHz, or for packet use into your local node or DX Cluster. Have fun on the air!

Table 1 Receiver Modifications

Capacitor	Original Value	New Value
C49 (L10)	39p	82p
C51 (L11)	39p	82p
C53 (L12)	27p	56p
C55 (L13)	27p	56p
C65 (L16)	8p2	22p
C66 (L17)	8p2	18p

Table 2 Microphone Connections

- Pin 1 Mic Live
- Pin 2 Mic Ground
- Pin 3 +10V for TX
- Pin 4 Not Used
- Pin 5 +10V



Transmitter alignment points

Throughout my on-air activities, I have often found a certain pair of add-on circuits invaluable to my receiver, these often being present on many 'up-market' transceivers designed for the 'cheque-book' amateur. These are an adjustable audio peak filter (APF) and a similarly styled adjustable notch filter (ANF). With the 'new look' HRT, it was suggested these could make an ideal project for readers to construct, using 'junk box' or surplus components wherever possible.

### Testing

After getting the text books and soldering iron out, a prototype pair were constructed and tested, although a house move did somewhat delay things! Upon testing, I was surprised that given the incredibly simple and almost arbitrary design of the units I built, they were incredibly effective. The APF 'rang' in a fashion reminiscent of the RA17 100Hz crystal filter. However the adjustable nature of the filter meant that both the bandwidth and centre frequency could be adjusted for both phone and CW working. In the latter mode, the APF does have a tendency to 'ring' and blur incoming CW. Many CW operators find this characteristic unacceptable, but I find that the effect often helps to make a weak signal more distinctive from surrounding stations thereby making it easier to copy.

### Filter Advantages

Another distinct advantage is the ability to tune the APF onto an incoming CW signal, i.e. not having to invoke the transceiver RIT to move the signal into the bandwidth of a narrow filter at 800Hz away from the carrier frequency. The author has got heartily fed up with listening to the monotony of 800Hz dit and dah tones, and it's nice to be able to receive a beat note between 400Hz and 1000Hz as the fancy or indeed conditions takes me.

The notch filter was not quite so dramatic, but included a frequency and phase control allowing very deep notches to be placed in the audio bandwidth. The only major problem was encountered when the station was on transmit, both units howled in protest due to RF break through. This was caused by a lack of adequate screening and the excessive number of patch leads between the units and the transceiver, hence the final version was designed to overcome this.

### Construction

Having enjoyed the flexibility and performance offered by these small units, it was decided that a HRT project with the same overall facilities would be constructed. It is presented here as a project for an 'advanced beginner', since the complete unit is broken down into four small modules that may be constructed

# Project - Audio Processor

The first part of our HRT DX Audio Processing system, by G.W. Goodrich, G4NLA

and tested separately with confidence. Whilst I had considered preparing printed circuit boards for the project, this approach was rejected on the grounds of flexibility and the need to accommodate components from varying sources.

Bearing in mind the frequent pleas for easier projects for newcomers, I decided to use good old Veroboard. My own feelings are that Veroboard is the ideal electronic construction medium for the novice, since all those lovely little holes

illustrates the functional component blocks and the relationship in terms of connectivity between them. The unit consists of the following blocks;

1. Input buffer amplifier
2. Audio peak filter
3. Audio Notch Filter
4. Post Filtering buffer amplifier
5. Audio level meter
6. VMOS audio power amplifier
7. A dual rail (+12-0-12V) power supply unit

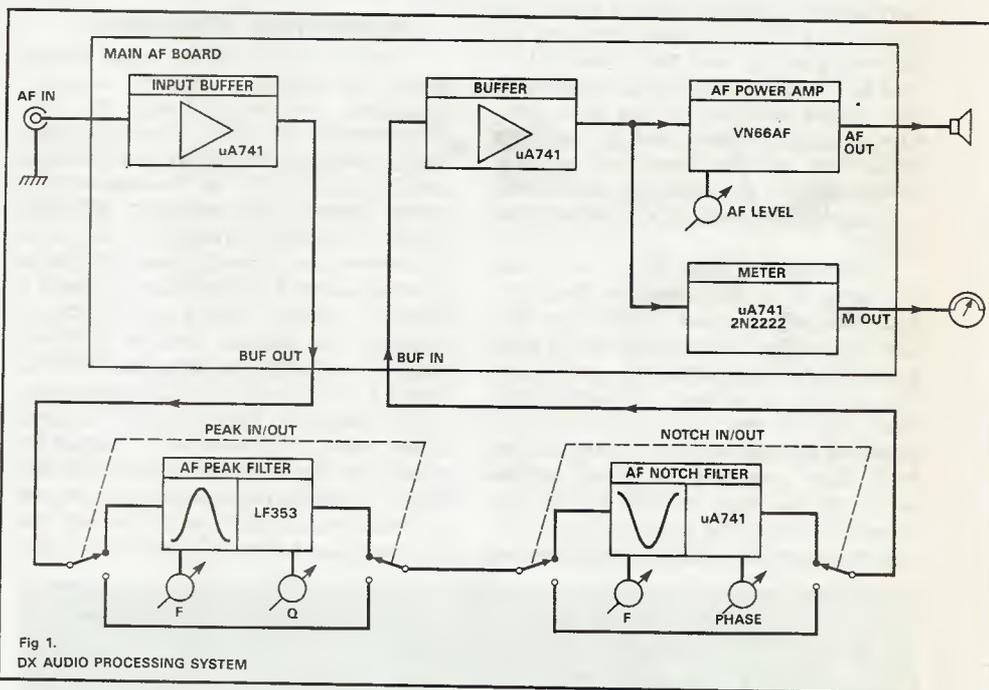


Fig 1. DX AUDIO PROCESSING SYSTEM

can be used to relocate or correct mistakes. It also encourages the novice to think about the physical circuit being built, as opposed to plugging in components in a manner akin to painting by numbers. Such exercises then become valuable when our intrepid novice comes to plan his first PCB!

### Unit Overview

Reference to Fig 1 illustrates the block schematic of the project. As such, it is not a detailed diagram, rather it

These stages are constructed as four separate boards or modules;

1. Main Module
2. Audio Peak Filter
3. Adjustable Notch Filter
4. Dual Rail Power Supply

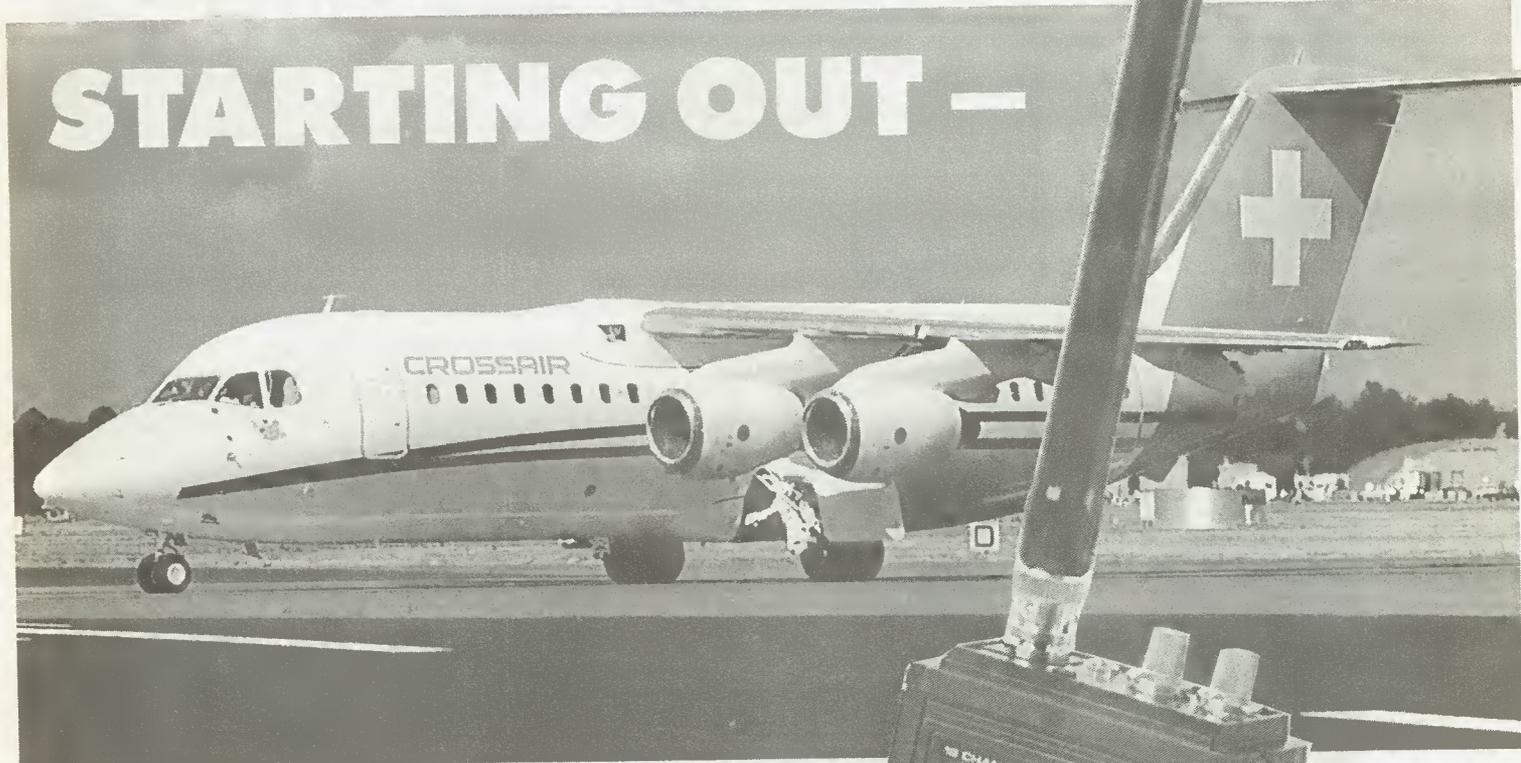
The construction and operation of each of these modules will be detailed throughout this short multi-part series, and where appropriate I will introduce some basic theory to get the newcomer to think about the characteristics of a particular circuit element. See you next month!

JANUARY 1991

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# SCANNERS

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**A**t this year's Leicester Radio Show, we welcomed many readers to our large Scanners International stand, and many readers also took out subscriptions to their favourite magazine just to get Scanners International every month!

Scanners International contributors Peter Rouse, Alan Gardener, Kevin Fox, Jonathan Clough and Chris Lorek chatted with many visitors to the stand, and it was great to hear how much you liked the magazine.

The hobby of scanning is becoming more and more well known, with several high-street retailers selling keyboard-entry receivers for short wave and often the VHF aircraft band as well. In last month's Scanners International we gave you a comprehensive listing of the frequencies used by most of the major UK airports, together with the many 'company' frequencies in use by the various airlines. Our regular Airband contributors of Peter Rouse, Kevin Fox and Jonathan Clough detail what you can hear on these frequencies, and this month Jonathan guides us through a selection of receivers, But what do all the buttons mean? What do the Scanner International review figures of sensitivity, blocking and intermodulation mean? Well starting this month, we have a step-by-step guide to selecting your scanner, how to choose on to suit your interests and needs rather than just what the shopkeeper has in stock and wants to sell you!

Scanners in the high street aren't just about VHF and UHF though, many sets including virtually all the latest handhelds now also have the capability of tuning to HF (High Frequency, or Short Wave) signals, such as those from international broadcasters. I fondly remember listening some time ago to a news broadcast about an international spying incident on the 'Voice of America', then a few minutes later to a bulletin on the same subject on 'Radio Moscow', the difference had to be heard to be believed! Needless to say, each country put it's own viewpoint across, yet listening to the 'BBC World Service' then gave a different but apparently factual report, allowing the listener to make his own mind up!

Scanning through each of these stations in turn was certainly a pleasurable pastime, and with today's never ending worldwide scene of political differences we thought you might like to join in the listening fun! Hence this month's 'Frequency Finder' will show you a selection of who's transmitting where, including a few frequencies of 'unofficial' (often anti-local government) stations known to be broadcasting in case you're reading this in a country where you won't get locked up for listening in to these. Whenever there's a political crisis, there's bound to be one or two 'unofficial' stations crop up to spread an alternative viewpoint. But remember, we're not allowed to encourage readers in certain countries, such as the UK, to listen to these naughty stations. So please don't do it, as otherwise you could be listening into things your government doesn't want you to hear.

Hold on, someone's just mentioned the declaration of human rights, oh yes, I'm supposed to freely be able to receive information I want to listen to. Ah well. Good job the USSR let

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radio amateurs from other countries go up to their MIR space station and tell the world about what they're doing up there, as well as allowing it to be used as an 'orbiting repeater' for radio amateurs around the world to communicate with each other (see this month's HRT). Never heard of any other county, even those claiming also to be 'open', doing that. I'll leave you with that thought, until next month!

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# STARTING OUT IN Scanning

by Chris Lorek G4HCL

**S**o you're new to the world of scanning? Or maybe you'd just like to know more about what all the buttons do, or how to interpret our exclusive 'Scanners International' reviews

we want and listen to it. The situation is quite different on other frequencies where the transmitting stations operate only intermittently, such as on the VHF aircraft band or the Marine band where the transmitting station, be this the pilot,

another channel to continue their conversation, leaving the 'calling' channel free. In the case of aircraft communication, different frequencies will often be used for the tower, approach, radar and so on. So listening in while standing at an airport observation platform say, would therefore mean you would have to be constantly switching between channels, listening each time and stopping if a signal was there, to make sure you didn't miss anything.

## Memory Scanning

Now this is exactly what a scanner does, automatically. You can tap all in the frequencies you want to listen to, for example by using the 'Frequency Finder' series every month in *Scanners International*, and store each of these into separate 'memory' channels in your receiver. Then by hitting a 'scan' button, the receiver automatically cycles through each of the channels in turn. A detection circuit in the receiver looks at each channel and senses if a signal is present there, if so it automatically stops the receiver scanning process, holding the receiver on the 'active', or 'busy', channel until the signal disappears.

As such, this saves you a lot of button pushing and knob twiddling! And of course it lets you check a large number of frequencies in a very short space of time, a typical scanning rate being in the order of 20 channels per second. In cases where a transmitting station is only active occasionally on a given frequency, without a scan facility you could often be listening to pure silence most of the time!

## Volume and Squelch

All readers will be probably be familiar with a volume control, and many with what a squelch control does. The latter is used because, in the absence of a signal in an FM receiver, a high level of 'noise' is present which, in the absence of a



*Aircraft communications may use several frequencies at once* ▲

with all their strange sounding figures? This short series should hopefully dispel the mysteries and jargon, and make you into a scanner 'expert' to be the envy of your friends!

## Basics

Right then, so what's it all about? Well basically a scanner is a radio receiver which is capable of monitoring several frequencies sequentially, i.e. one by one. We all know about our local 'broadcast' stations which transmit continuously, on Medium Wave or the VHF Broadcast Band II, here we just tune in the station

tower controller, skipper or coastguard, transmits his messages only when needed rather than sending out a continuous monologue! The frequencies are often 'shared' between a number of different users also, so each user must get a chance to communicate when the need arises.

## Frequencies

Often, several frequencies are also used, for example a general call from a coastguard to a ship may be made on the Maritime VHF channel 16 (156.800MHz), and upon establishing communication the two stations will shift operation to

signal (which can often be most of the time on a given channel), can be rather tiring on your ears. The squelch facility is a variable control to 'squelch out' this noise, you rotate the knob with the scanner set to an empty channel, i.e. one without a received signal, until the noise just disappears.

This is the most sensitive position, where the squelch circuit will be automatically defeated when a signal appears on that frequency. If you rotate the squelch control further, you'll find that a much stronger signal is needed to again defeat the circuit, although this of course can sometimes be handy if you don't want to listen to weak signals!

Another very important point about the squelch facility is that it is normally the 'deciding factor' when scanning as to when to halt the receiver on an active channel. Because the squelch defeats or 'raises', only when a signal is present, it is handy to use this in scan mode to decide whether your receiver should stop on that frequency when a signal is present. As such, to make sure your radio does scan, you need to adjust your squelch so that it closes when a signal isn't there. If you keep it open, your receiver will think that it's receiving a signal, and hence won't scan properly! It may sound obvious, but this is the most common cause of new users having difficulty with their scanner.

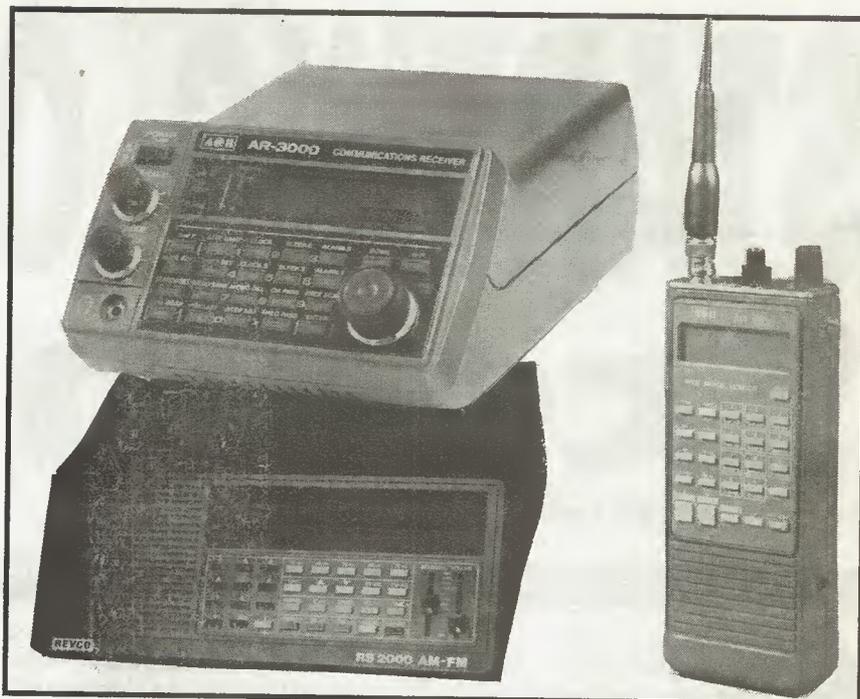
## Scanning Modes

So you've got your wonderful new multi-channel scanner in front of you, but what's all this about 'lockout', 'memory bank', 'delay scan', 'search', AM/FM/WFM switching and so on? Let's take these one at a time.

Very often, you may have a large number of memory channels, all programmed up with interesting frequencies you've entered from your collection of our monthly 'Frequency Finder' lists. But all these could be different services, for example you could have some amateur radio VHF and UHF frequencies, some aircraft frequencies including VOR (constant meteorological information transmissions) channels, some marine channels and so on. But say during one period you just want to listen to the aircraft channels, without being 'interrupted' with other active channels also being scanned with the receiver stopping on these also. Well there's two ways to do this.

## Lockout

On virtually every scanner there is a channel 'lockout' facility, here you select the memory channels, one by one, which you don't want the scanner to halt on, and enter the 'lockout' facility on these. This is normally a single button push operation with a suitable indication being given on the receiver's display to show that channel has been 'locked



*You don't need to spend £765 pounds on the AR3000 to start scanning* ▲

out' of the scan mode. So when you next press the 'Scan' button, your receiver automatically ignores those channels while searching for activity, even though the frequencies are still stored in there and you can indeed select them manually if you want to for continuous listening purposes. This is quite handy for, say, a VOR channel that transmits all the time, you may want to listen to it sometimes but you won't want your scanner 'locked' onto it when you're scanning all the other airband channels.

Whenever you want to place any of the 'locked out' channels back into the 'hunt list', you simply select that channel again and defeat the lockout on it, usually again a single button push. As such, depending on what you want to listen to at the time, you can selectively lock channels in and out as you need.

## Memory Banks

Often found on scanners with larger numbers of memory channels are memory 'banks'. Here, the total number of channels are sub-divided into memory banks, typically 200 channels into 10 banks of 20 channels each or 1000 channels into 10 banks of 100 channels each. Now this can be quite useful to save you a lot of button pushing performing individual memory channel lockouts.

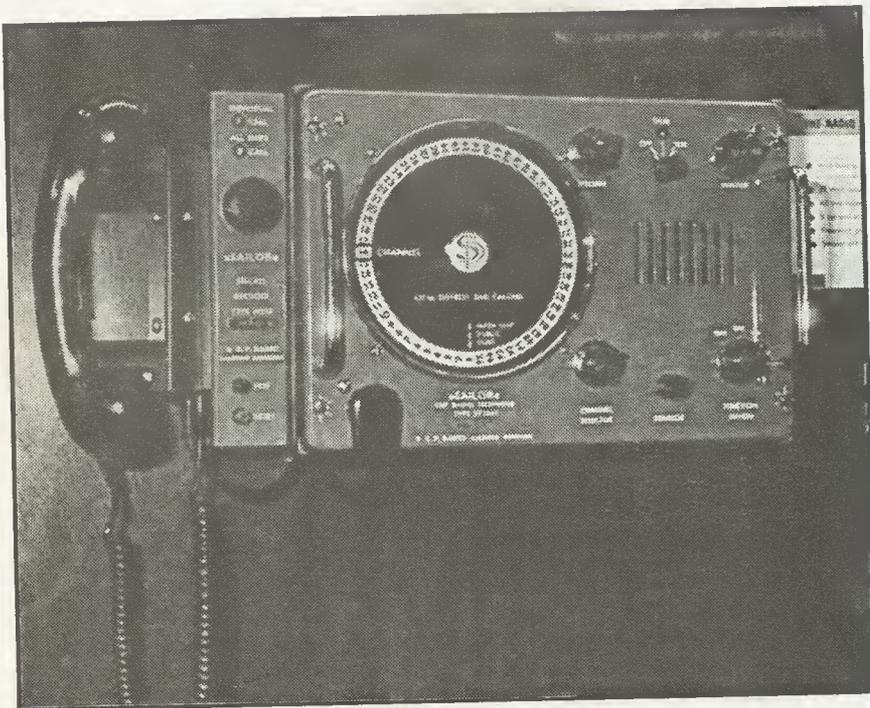
What you do is program all your Airband channels into one bank, your Marine channels into another bank, Amateur Radio channels into another and so on. Then, you simply scan one bank or more at a time, locking out 'banks' rather than a large number of individual memory channels when you just want to listen to one type of service. You can normally get even more flexibility with this because within each bank

you can normally also lock out individual channels, hence again you can store some channels in a given bank to let you quickly remember where you've stored them and select them manually, handy eh?

## Delay Scan

Very often in a 'simplex' system (where each party communicates on the same frequency), a transmission occurs on a given channel and there is normally a short gap in between one station letting go of his 'Push to Talk' button and the other party replying. During this time, your scanner thinks 'Ah, no more signal, I'll carry on scanning' thus going through all the other channels you have programmed before getting back to that one, stopping on any other active ones of course. Now this can be quite annoying if you want to listen to the conversation on the first active channel. With this in mind, most scanners have a selectable 'delay' circuit built in, so that if the scanner stops on an active channel, when the transmission ceases it pauses for a couple of seconds before it decides whether to start scanning again. So if another signal appears on that channel, it again stays there, until the conversation has ended and no further signals have appeared for several seconds, the scanner then continuing as normal.

To make life even more flexible, on many scanners you can individually program your 'delay' as needed into any of the stored memory channels of your choice. Here you can have the best of both worlds, for example where some stations use a different frequency for transmit and receive in a semi-duplex system (more of this in forthcoming sections of this monthly guide).



▲ A marine radio telephone for ship-to-ship & ship-to-shore communications

## Search

There may come a time where you'd like to see what's happening anywhere in a given frequency range, but without having to program in every possible frequency within this range manually. Here's where 'Search', or 'Band Scan' as it's sometimes called, comes in. Let's say you want to monitor the range between 144MHz and 146MHz, i.e. the European 2m amateur band, to see who's around in your part of the world. Many scanners allow you to do this with a 'Search' facility, this being quite different to 'Memory Scan'.

Here you enter the 'lower' frequency, hit a button to enter this, then the 'upper' frequency, and hit another button, the scanner then stores this range so you can search through it whenever you like. Often you can also enter the tuning 'step size', for the international VHF aircraft band and VHF marine band this needs to be set to 25kHz, however many other European services use a frequency interval of 12.5kHz.

Some scanners designed primarily for the North American market only allow you to scan in 5kHz steps on FM, with no other choice. Although this will often be satisfactory in that you can get 'spot on' to 25kHz channels and 'near enough' on frequency to 12.5kHz channels to give reasonable reception, the search of say, a band using 25kHz spacing will often take five times as long because the scanner goes in 5kHz steps instead of 25kHz steps.

Note that some low-cost scanners don't have this often very handy search facility, so watch out before purchasing if this is important to you, our periodic 'buyers guide' will highlight this also.

## AM/FM/WFM

This refers to the 'mode', or type of transmission being received. Narrow-band FM, often just called 'FM' on scanners, is normally used for many two-way radio services, but with some notable exceptions as we'll see later. The advantage of FM is termed 'capture effect', here if there are two signals on one frequency the strongest one often comes through, totally overriding the weaker one. Wide band FM, or 'WFM' as termed on scanners, is used for broadcast band transmission for this very reason, to ensure

good entertainment quality reception.

Around the world, AM (Amplitude Modulation, the type used on the Medium Wave and Short Wave broadcast bands) is also used universally for aeronautical communication. Think of the interfering 'whistles' heard on Short Wave and Medium Wave station at night, when several stations are present on around the same frequency. Well this effect can be useful in some cases, where a distant aircraft signal is trying to get through to an airport tower controller, to call for help for example, while a local aircraft is being 'talked in', the controller then knows there is someone else calling him. For this reason, some emergency services also use AM in preference to FM, and indeed some two-way PMR (Private Mobile Radio) services in the UK also use AM through historical reasons (AM was used a long time before FM!).

Some low-cost scanners only receive narrow band FM, they cannot be switched to AM, trying to receive AM on and FM receiver results normally results in weak audio with lot of distortion. Other receivers which also scan the aircraft band, sometimes automatically switch to AM when the airband frequency range is selected without manual selection being needed, sometimes without an AM/FM switch being fitted. With this in mind, we've already got a few manual AM/FM switching modifications lined up for inclusion in future issues of *Scanners International*.

If your scanner also covers the VHF Broadcast Band II (88-108MHz) and possibly the UHF TV channels (around 470-860MHz), WFM reception can be handy for listening to the sound channels from broadcast radio or TV stations, these signals will sound very distorted in normal 'FM' mode.

## Next Time

Next month, we'll be taking a closer look at channel spacing and receiver selectivity, i.e. the capability of the scanner to discriminate between signals on nearby channels, together with blocking effects and the like where strong signals can get the better of the weaker signals you may want to listen to on your scanner. You'll learn how to interpret our review technical results here. Further on in the series, we'll be taking a look at the way several two-way services operate, i.e. the many reasons why you can only hear one side of the conversation and how you can sometimes easily hear the other, together with the benefits or otherwise of add-on antennas, pre-amplifiers and the like.

*See you next month!*

# PC-Monitor Professional

by Chris Lorek G4HCL

**M**any readers appreciate using either a wide band scanner or indeed a HF receiver at their home monitoring station, to tune into everyday happenings on the VHF/UHF or HF bands. Quite often, the 'listening post' also houses a computer, as users of scanners also tend to be akin with up-to-date technologies. Home computer databases are of course very handy for holding frequency listings and the like, and indeed computers often find uses as a terminal for received data signals and to display weather satellite pictures and the like. But there's another use. You can indeed use your computer to vastly extend the facilities of a scanner.

Simon Collins G4SGI has for some time now been hard at work writing software to control the Yaesu FRG-9600 VHF/UHF receiver and the FRG-8800 HF/VHF receiver in each case via the FIF-232 level interface, his latest effort being entitled 'PC-Monitor Professional'. We briefly told you about the program in last month's *Scanners International*,

and here's the promised review!

The FRG-9600 in its standard form is a 60MHz-905MHz scanner receiver with SSB reception facilities as well as the usual AM and FM/WFM, and modified versions are available from various UK dealers which extend its range over 60-950MHz or 100kHz-950MHz. The FRG-8800 is a sophisticated HF receiver covering 100kHz-30MHz, with an internally fitted VHF option to extend its coverage to the VHF region also. The PC-Monitor professional software, which comes as a disc for use on IBM PCs and 100% compatibles, allows the user to control the frequency and mode of these receivers as well as certain other features.

## Frequencies

In use, frequencies can be selected on the computer keyboard using the numeric keys, the received frequency can also be stepped up and down in selected step sizes using the computer 'cursor' keys. Mode selection, i.e. between AM, LSB, USB and the like, is done using the computer function keys, and you can

even choose for the computer to give you an optional identification in Morse code of the mode as you select it from the keyboard.

## Memories

Forget any memory limitations of your receiver, as with this software no less than 1000 mode sensitive memory channels are provided. Each memory channel has the storage facility of two frequencies corresponding to 'VFO A' and 'VFO B', and you can also add a 50 character comment to the line displaying the memory channel frequencies as a 'memory jogger'. With 1000 memories, you'll probably find this quite handy! The author of the software tells us he can also supply a data base containing information on HF broadcast stations, standard frequency stations, and HF WEFAX stations, which may be 'imported' into the program if required.

## Scanning

Scanning of the memory channels can be done either by scrolling through them

```

14:44:17      YAESU RADIO MONITORING SYSTEM USING FRG-9600MKII  THU 08-NOV-90
-----
VFO A: 145500.000 kHz / FM Step: 25.0 kHz
VFO B: 145500.000 kHz / FM
S-METER:      --S1--S3--S5--S7--S9--+20dB--+40dB--+60dB
MODE          <<<DN  STEP  UP>>>
<<<<<<  ....  >>>>>>
-DEFAULT MEMORIES-----
Chan+- Programmable Band Scan ----- [PAGE UP]-----
0. |
1. |
2. | What is the lower band edge (kHz) ? @
3. |
4. |
5. |
6. |
7. |
8. |
9. |-----
10. | 145500.0 FM 145500.0 FM
11. | 145500.0 FM 145500.0 FM
12. | 145500.0 FM 145500.0 FM
13. | 145500.0 FM 145500.0 FM
14. | 145500.0 FM 145500.0 FM
-----
LOGBOOK  HELP  NEW BANK  AUTOSCAN  MANUAL  PROG SCN  BACKUP  [PAGE DN]---
EXIT

```

Setting up the programmable band scan in Manual Tune Mode ▲

```

14:49:17      YAESU RADIO MONITORING SYSTEM USING FRG-9600MKII  THU 08-NOV-90
-----
VFO A: 145500.000 kHz /  FM Step: 25.0 kHz      LOGBOOK MODE
VFO B: 145500.000 kHz /  FM
S-METER:  --S1--S3--S5--S7--S9--+20dB--+40dB--+60dB      MODE  <<<<DN  STEP  UP>>>>
                                     <<<<<<  ....  >>>>>>
- SHORTWAVE LISTENERS RADIO LOGBOOK -----
Dat+ Logbook Entry Form -----+ Mode
>08/ |                                     | FM <
 | Entry number : Edit buffer          |
 | Date : 08/11/90                    |
 | Start time : 14:49                 | Finish time : **:***
 | Station Name : *****            |
 | Frequency : 145500.0               | Mode : FM
 | Report given : *****            |
 | Comment :                          |
+- <ESC>-Reject -----+ <F10>-Accept. -+
-----
[F1=ADD F2=EDIT F3=DEL F4=INS F5=PRN TAB=SHIFT ESC=ESC ALT-H=HELP]

```

### Storing station details onto disk in Logbook Mode ▲

manually by using the cursor keys, or by selecting channels you would like included in an automatic scan, a small 'tick' appearing next to the memory channel in each case. When using the program in conjunction with the FRG-8800, 10 seven day timers are also provided. Now it's a fact that many short wave broadcasts you'd like to listen to occur either in the middle of the night or while you're out at work. No problem, with the software just connect up a remote switched tape recorder and use the timer facility, just like a video recorder!

### Logbook

The program also contains a computerised 'logbook', to let you store details of your received stations onto disk. By hitting the correct buttons, you can also achieve a 'hard copy' of this onto a printer connected to the parallel port of your computer. A text based diagram of the Region 1 band plan can also be displayed whilst the software is being used, to remind you of which HF services operate at which parts of the band.

### Helpful

As well as the supplied 38 page manual that comes with the disk, several pages of help information can be read from disk for display on the computer screen. There is also a quick reference display that can be used as a reminder of keyboard operations.

The software also supports a Microsoft Mouse, or a mouse that uses a Microsoft compatible driver (for example, the software is claimed to work with the popular Genius serial mouse, which uses interrupt 33H). The mouse can be used to select VFO A or B simply by moving

the cursor over the status display and pressing the left hand mouse button, similarly tuning step sizes can be selected and the received frequency can be stepped using the mouse. Memory channels can be paged through quickly and recalled by 'clicking' the mouse while the cursor is positioned over the memory display part of the screen.

### In Use

After making the obligatory 'backup' copy of the supplied 5.25 inch disk, I started off by performing the software 'installation' according to the instructions given in the manual. This is where I hit a snag, and after an hour or so of following the instructions with still no success I was starting to tear my hair out! After some detective work, I found the software provided was configured so that it could be installed onto either a hard disk on drive 'C', or onto a floppy disk in drive 'B'. Well my main PC uses drive 'D' as the main hard disk, my secondary computer uses a 3.5 inch drive as 'A', and a 5.25 inch drive as 'B'. Ah well.... However, following an editing session of the supplied installation 'Batch' file using my word processor, I altered the commands so that I could eventually install it on my hard disc. To be fair, the supplied instructions informs you of this, but the process does require some degree of DOS (Disc Operating System) knowledge.

Following this alteration and subsequent installation, the software operated very well indeed. I used the Microsoft 'bus' mouse on my PC clone to great success, this allowed me to speed up my programming session of the many memories provided, but even at the end of the review period I still had plenty of

memory channels spare for future use!

The capability of adding a short line of information next to each channel I found most useful, this allowing me to instantly recognise what the frequency was used for rather than having to rack my brains each time! Transferring the software to my other computer, this one an Amstrad model having a VGA (i.e. colour) monitor, showed that the on-screen display was nicely colour-coded between various sections, although the fitted Amstrad mouse would not drive the PC Monitor software (it won't drive several other programs that need Microsoft mouse capability either!).

A nice touch was that for HF use, the software had the facility to temporarily clear the computer screen of displayed information, in cases where computer 'noise' on the received frequency was a problem due to high frequency information being radiated from the computer monitor connecting lead, this often acting as an aerial.

### Conclusions

I found PC Monitor Professional to extend the capabilities of my receiver tremendously, on VHF and UHF the numbers of provided memory channels with their scanning facilities gave a new lease of life to my listening activities, and on HF I found the 'information line' next to each frequency gave me an instant 'memory jog' of which HF Broadcast station or whatever used that frequency. Highly recommended as a worthwhile addition to a listening post using the FRG-9600 or FRG-8800.

*My thanks go to B. Jenkins for the loan of the review software.*



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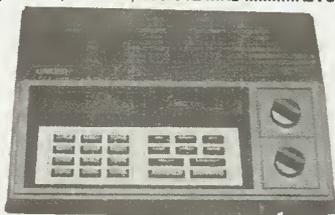


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Independently tested by a European magazine, the Black Jaguar was found to be the most sensitive handheld scanner on the market! That probably explains why it is still so popular. Features include 16 channel memories, selectable AM/FM and the facility to power the set from the mains/car using one of the many accessories now available. Covers civil and military airbands plus lots more! Frequencies: 28-30, 50-88 MHz, 115-178 MHz, 200-280 MHz, 360-520 MHz. ....£199



## BLACK JAGUAR ACCESSORIES

(SUITABLE FOR ALL MODELS, BJ200, CHALLENGER ETC.)

Mobile Mount .....	£6.95
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BJ1 Car Supply (Mk111 version only) .....	£14.95
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Airband Rubber Duck Ant .....	£6.75
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BCA3 Mobile Antenna Charger .....	£14.95

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Essential for optimum performance with wideband UHF scanners. We have directly imported this cable which has exceptional low loss and is good for frequencies up to 3 GHz. Loss at 1 GHz for 10 mtrs is 1.3 dB  
 MODEL 8D (11.1mm) .....£1.40 per MTR  
 MODEL 5D (8.1mm) .....£0.56 per MTR

## YUPITERU

We are pleased to announce our appointment as UK distributors for this comprehensive range. Working direct with Yupiteru enables us to reduce prices and introduce new models for the UK! All models have full service backup - naturally!

## VT 125 AIRBAND RECEIVER

A small but sensitive airband radio that is set to take off in the UK!

- \* Covers 108 - 142MHz
- \* 30 Memory Channels
- \* Priority Monitoring
- \* Pass and Delay Functions
- \* Supplied with UK Charger
- \* 50/100kHz Channel spacing

**NEW**  
£179

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(25 - 55MHz, 800 - 1300MHz) .....	£299

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**NEW**

We are ICOM specialists and carry the complete range in stock including these NEW models:-



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**IC-R100** Mobile or base extra wideband scanning receiver covering 500kHz to 1.8GHz with 100 memory channels and reception of AM, FM, WFM ..... £499

**IC-R72** A new HF communications receiver covering 100KHz to 30MHz. Receivers SSB/AM/CW with FM board as optional extra 99 memory channels and 10dB pre-amp fitted as standard ..... £645

**IC-R7000 ICOMS** Most popular communications receiver. Covers 25 MHz to 2 GHz with 99 memories and all mode reception ..... £925

Call Paul our ICOM specialist for details of other ICOM amateur radio products we stock - or for details of the latest models and prices.

## BOOKS

Short Wave Confidential Freq List .....	£8.95
VHF/UHF Frequency Guide .....	£5.95
Marine Frequency Guide .....	£4.95
VHF/UHF Airband Guide .....	£3.50
Comprehensive Airband Guide .....	£5.99
Scanners II by P. Rouse .....	£7.95
Scanners 3rd Edition .....	£8.95
Flight Routings Guide 1990 .....	£4.95
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## ASA DIGITAL AIRBAND RADIO

This new low cost receiver is designed for aviation enthusiasts featuring a digital display for accurate reception and tuning. Coverage: 85-108MHz FM, 118-136MHz AM, 162-165MHz weather, 520kHz-1.6MHz. ....£59.95



## FAIRMATE

As the UK distributor for Fairmate we are constantly working with them to update and produce new features and models.

This month we can announce the arrival of the new **FAIRMATE HP200**

1,000 CH Handheld Scanner exclusive to Nevada dealers!  
 Freq Range:- 500kHz - 600MHz  
 805MHz - 1300MHz

Modes:- AM - FM - Wide FM  
 A much improved version of the HP100E / AR 1000.

The new HP 200 has superior performance and stability.

Accessories included as standard are:-

- \* VHF Antenna
- \* UHF Antenna
- \* Telescopic Antenna
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- \* Earphone
- \* Carrying case

NOTE: Sensitivity below 2 MHz:- 10µV for 20dBQ AM 60% Mod.



£269

## NEVADA MS1000

The worlds first 1,000 channel mobile scanning receiver. Freq Range:- 500kHz - 600MHz  
 805MHz - 1300MHz

Modes:- AM - FM - Wide FM

### NEW FEATURES

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## UNIVERSAL SCANNER

### BASE UNIT PSU101 MkIII

A mains operated unit which will both charge and power the handheld scanner.

Complete with convenient desktop stand for use at home. Suitable for the following models:-

- Fairmate HP100E, Yupiteru, AOR 1000, ICOM IC-R1, Uniden BC 50XL, Uniden BC 55XL, Uniden BC 70XLT, Realistic PRO 38, Uniden 200 XLT, Uniden 100 XLT.

£29.50

**NEW VERSION**



## NEW NEVADA MS 1000 BASE/MOBILE SCANNER



# ULTRA HIGH FREQUENCY **Airband**

by Jonathan Clough

**T**his month we shall take a quick look at some of the 'home base/mobile' scanners which are available at the moment and suitable for the UHF airband listener. The handheld scanners are certainly the most popular at the moment in terms of numbers sold, but their larger counterparts still have a

ply buying something that somebody else has or says you should have is not necessarily the best course of action. If your main use is at home, and you visit an airfield on the 'odd' occasion, the sacrifice of not being able to walk about with your scanner is a small one to pay for the better performance you will obtain in terms of signal handling and audio

## AOR AR2002

This replaced the AR2001. There is no difference in performance for the airband listener, the addition of a signal strength meter is useful but not essential, while some find the buttons easier to use than the pressure pad keys found on the 2001. The unit still has only 20 memory channels which is really not enough in my opinion. Performance is excellent and it is still used as the reference as judgment for other receivers, i.e. "Is it as good as a 2002?"

## AOR AR2515

The wider frequency coverage of this unit has little advantage, but the increase in memory channels to 2,000 and considerable faster scan speeds soon make up for that - no problem here with running out of spare channels. The memory channels are organised in banks of 32, each bank being automatically sorted into numerical order to assist the PLL, a little different to start with but easy to get the hang of. With the extra speed, it is far easier to search a certain part of the spectrum and find those elusive discreet frequencies. Overall performance is very good.

## AOR AR950

A very lightweight receiver which seems to lack the build quality associated with the AR2001 & 2. One move in the right direction from AOR was the increase in memory channels to 100, and a far faster scan speed mean that this set is worth thinking about. The receiver does not have complete UHF airband coverage stopping at 290MHz, restarting at 291MHz and then finishing at 390MHz, so if you resided near Finningley for example, the approach on 398.50MHz is off limits. The sensitivity however is very good but the audio quality can sometimes be a little poor.

quality on a base station, in particular when connected to an external aerial.

## AOR AR2001

No longer available new but often obtainable secondhand, the AR2001 was the first scanner readily available with complete UHF airband coverage. The set has excellent performance and is easy to use, but unfortunately has limited memory (20 channels) and scans very slowly compared with the newer sets. However at the right price it's still a good buy.



*Listening in to pilot chat at airshows is easy, with the right scanner* ▲

lot to offer and depending on your own particular requirements can be the 'better bet'.

The only real disadvantage of the non handheld scanners is the obvious fact they are not as portable. They are in the main however all suitable for 12V DC operation, and can be run direct from a vehicle supply.

## Choosing a Scanner

When starting to choose a scanner it is important to decide how and where you intend to mainly use the receiver, sim-

## Signal R535

VHF/UHF airband only and undoubtedly one of the best scanners currently available. Sensitivity, selectivity and audio are all excellent but a few more memory channels above the 60 provided would not go amiss. The early R535s stopped at 380MHz which was a bit of a pain for certain users, but all the current models give complete coverage up to 399.975MHz. The unit is very neat, compact and pleasing to look at, and is around the size of a standard car radio. I would suggest this set should be somewhere near the top of your list.

## Tandy Realistic PRO-2004

When the Pro-2004 arrived on the scene it soon became a very popular set. Performance was not brilliant to say the least but the 300 memory channels and fast scan speed made up for that (an extra 100 channels can easily be added). The receiver is rather on the large size, not least due to its internal mains transformer, so it's a little bulky & heavy for use in a car. Its programming and operation is simple enough, and although no longer available new is still a good buy on the secondhand market.

## Tandy Realistic PRO-2005

A revamped, new look PRO-2004 with addition of an extra 100 memory channels. Other than that, not a lot different, and now replaced by the PRO-2006 with 'Turbo Scan' but it's still good value for money.

▽ *If you visit airfields infrequently, then portability is not an important factor*



▲ *Most home base/mobile scanners can be powered from a 12v car battery*

## Yupiteru MVT-6000

One of the neatest and most attractive scanners available with UHF coverage, 100 memory channels and good scan/search speeds. The unit can sometimes suffer from strong signal overload depending on your location, but the performance is very good and the audio quality better than average. A very neat and compact unit.

## Icom R100

The latest from Icom has probably the best display to be found on any scanner, but the programming is awkward with most other scanners offering simpler operation. 100 memory channels are provided with a variety of scan modes, including 'Auto Write' which will store

frequencies found while searching into the last few memory channels - clever with good overall performance, but not one I would personally recommend solely for the UHF airband.

## Others

There are just a few other scanners available with the UHF airband coverage not included here. I have omitted the AOR3000, Icom R9000 and R7000 on the grounds of price but we may look at these in a later issue. The Standard AX-700 as exclusively reviewed in this magazine a couple of months ago is another, but again not one I would recommend solely for airband use. Anybody looking for a bargain on the secondhand market might keep their eyes open for the Fairmate AS32320. This was available several years ago and had a very short life, it does not have complete UHF coverage but should be 'picked' up relatively cheaply. New base/mobile scanners on the immediate horizon appear to be coming from Fairmate with a desk top version of their HP100, and a unit from the Japanese company of Shinwa who have a scanner with remote control in production.

## Next Month

Having covered the hardware side, next month I'll look at the ATCC centres, London Military (which includes Eastern Radar), Scottish Military and Border Radar.

If you have any questions or points you would like to raise, please drop me a line, c/o the editorial address.

# Avantek MSA series amplifiers

Peter Rouse GU1DKD looks at these inexpensive devices and how they can be used to build a VHF/UHF preamplifier and an adaptor to run your scanner off a car radio aerial.

## Higher ICs

**A**vantek specialise in manufacturing transistors and ICs for use at UHF and microwave frequencies. Their MSA range consists of a large number of devices which can be configured as complete amplifiers with the minimum of external components. They are available in small quantities from Wave Distribution Limited (address at the end of the article) and it is refreshing to find an industrial component supplier who will not only deal with the amateur but will do so in a cheerful and helpful manner.

The MSA range is quite wide and upper limits of amplification range from LF to about 2.5GHz on some devices and as high as 6.0GHz on others. They are supplied as 4-pac, Micro-X, 70mil hermetic or 85mil plastic packages all of which are fairly similar and look a little like VHF/UHF transistors. The amplifiers all have 50 Ohm inputs and outputs. For amateur use only a handful of these devices are likely to appeal and those are the ones I have listed.

## Using the devices

Although details are shown for a scanner preamplifier readers should note of course that these devices are highly suited to a variety of circuits requiring gain

blocks such as Amateur microwave circuitry, pre-amplifiers for digital frequency meters, etc. The circuit shown can be cut down and 100pF capacitors used for input/output with voltage being fed to pin 3 simply through the appropriate bias resistor. This latter item is important and will vary depending on the device and the supply voltage. Look up the device voltage and current and calculate as follows: Bias resistor (Ohms) = supply voltage minus device voltage divided by current (as decimal amps). As an example the MSA 0685 runs at 3.5 Volts drawing 16 mA. If we use a 12 Volt supply then the formula is:

$$(12 - 3.5)/0.016 = 531 \text{ Ohms.}$$

The nearest preferred value is 560 Ohms.

## Preamplifier

The idea of boosting signals from your antenna with an amplifier is very appealing but I do urge some caution. Such amplifiers often cause more problems than they solve. If you intend fitting an amplifier simply because your aerial and feed system is poor then you are asking for trouble and remember that cannot amplify signals that are not there in the first place. Readers should also be aware that broadband amplifiers are prone to problems if there are very strong signals in the area. These can cause such effects as overload, blocking

and intermodulation not only in the amplifier but also in the scanner. However, the preamplifier is certainly useful for perking up the performance of some older scanners that may lack sensitivity,

A look at the circuit will show that the antenna input is fed by a two stage high pass filter which cuts off at around 30MHz. This keeps strong HF transmissions out of the amplifier as they could lead to instability. The circuit is built on a simple double sided PCB and for the sake of stability the through pins must be used to the lower ground plane. Incidentally, several PCBs have been made simply by using a sharp modeling knife to cut the copper foil. Unwanted areas are peeled away and this is actually quicker than etching a board. As shown the amplifier works well over the 30-1300MHz range and has a gain of about 16dB at 500 MHz. There is no reason why the preamplifier cannot be mounted in a waterproof case at the antenna although experiments so far have shown that the circuit does not appear to work well when line powered so a separate voltage feed wire will be needed.

Finally, you may care to try the car aerial adaptor version. This is ideal for anyone who does not want to drill extra holes in the bodywork. The coupling transformer consists of two sections of

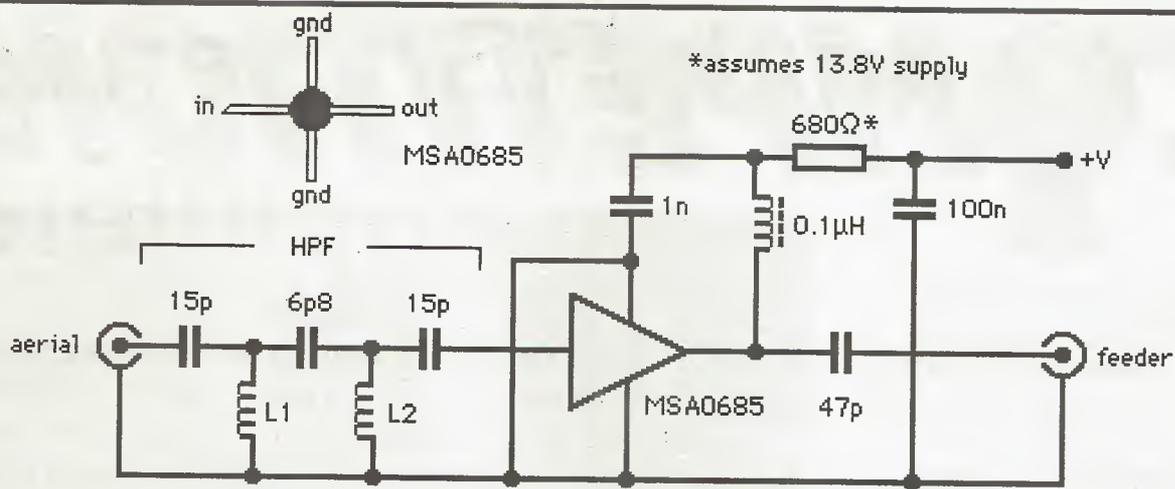
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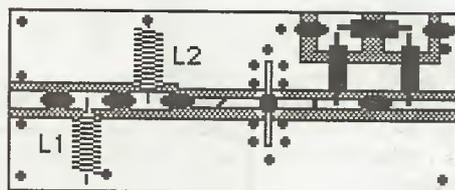
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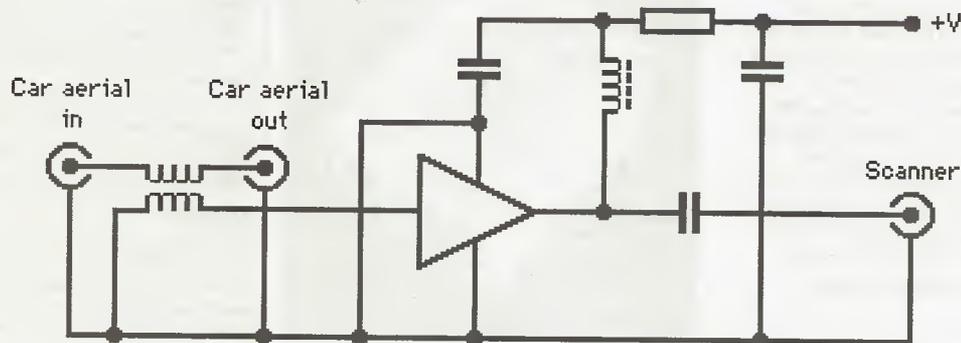
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Preamplifier with high-pass filter. L1/L2 are 15 turns space wound 18 gauge on 5mm



Suggested PCB and component layout. The dots indicate through wire connections to the lower ground plane.



Experimental car aerial/scanner adaptor. All component values as for the main circuit diagram (see text for the transformer details)

about an inch and a half of enamelled wire. These are twisted together and connected as shown. You may need to experiment a little with this transformer as my own tests have shown that the lengths of the wire and twist rate can have detrimental effects on some makes of car radio particularly on their VHF/FM range. There is no need to switch the preamplifier off and on as the current drawn is so small it will have little effect on the car battery.

The devices are available from *Wave Distribution Limited, Laser House, 132/140 Goswell Road, London EC1V 7LE. 071-251-5181*. You should ring to check current prices and note that there is a small order charge for handling and

postage (£2.50 at the time of writing). In those circumstances you may find it worthwhile to order a few devices (the cheapest are about a couple of pounds) to experiment with.

Device	Max Fcy	Gain (0.16MHz)	Noise	Voltage	Current
MSA0104	3.5GHz	18.5dB	6.0dB	5	17mA
MSA0635	4.0GHz	20.5dB	3.0dB	3.5	16mA
MSA0835	6.0GHz	32.5dB	3.0dB	7.8	36mA
MSA0685	4.0GHz	20.0dB	3.2dB	3.5	16mA

# COMPETITION



**Prize is the JIM PSU-101** regulated scanner power supply and stand, kindly donated by *Solid State Electronics, Southampton*. This is designed as a table top unit, and allows you to use your handheld at home by plugging in an external antenna whilst the scanner's battery is being recharged by the unit.



**Prize is a BC14A nicad** charger, again from *Solid State Electronics*. This unit is mains operated, and comes with a standard 2.1mm plug for the DC output to plug into the side of your scanner or alternatively to the combination of AA battery holders supplied with the unit. An auto-timer switches off the charger after a pre-set period to guard against over-charging.



**Prizes are purpose designed** handheld scanner desk stands, kindly donated by *Carrera Supplies of South Glamorgan*. These are smart transparent angled mouldings, with tiny rubber feet at the base to prevent your scanner sliding around the table in use. The handheld scanner is placed against the unit, placing the scanner keypad controls and display at a comfortable operating angle. To enter the competition, all you need to do is to fill in the correct answers to the following easy questions. You'll find all the answers in this month's issue of *Scanners International!*



*The JIM PSU- 101 regulated power supply and stand* ▲

*The BC14A nicad charger* ▼



## November Competition Results

On the *Scanners International* Stand at this year's Leicester Radio Show, *Scanners International* Features Editor Sheila Lorek pulled out the winning coupons from the large box of entries. They were:



**Prize - AR-1000 handheld scanner**, kindly donated by *Lowe Electronics* from Matlock, Derbyshire. Won by *Ciaran McCarthy*, from Galway in Ireland



**Prize - BC-55 Handheld scanner**, kindly donated by *Nevada of Portsmouth*. Won by *S. Dunn* of Liverpool, England. These two winners will by now have received their prizes, but there's a change to win one of many items to go with your handheld scanner.

## Scanners International Official Competition Entry Form

### Questions;

- 1) What station will you find on the frequency of 9.045MHz?
- 2) What does 'GMC' stand for?
- 3) How many memory channels does the Yupiteru MVT-6000 scanner have?

Send your entries to:

**Scanners International**  
**P.O. Box 73, Eastleigh, Hants.**  
**SO5 5WG**

to arrive no later than 20th January, 1991. The first four entrants with the correct answers to be drawn out of the box will receive their prizes in the post.

### Details

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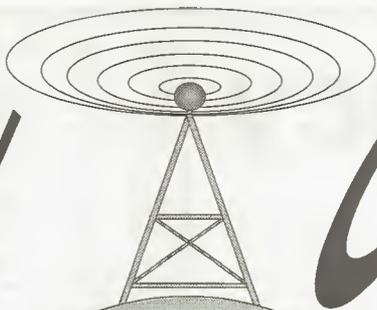
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Frequency lists, Our UHF & VHF airband lists are produced and ammended regularly, enabling us to keep them as up to date as possible. Our VHF list includes LATCC transmitter sites/freq tie ups, squawk, codes, and the ICAO 3 letter airline decode. Our UHF list is probably one of the most comprehensive available and is updated regularly to keep pace with the changes. How many have the new Eastern frequencies?

#### AR900 ACCESSORIES

Spare battery packs £15.50  
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# Frequency Finder

This month, we present some frequencies you can tap into your wideband scanner to keep you in touch with the world, hearing the news as it happens.

Freq. (MHz)	Station	Country	Start (GMT)	Country	Start (GMT)
3.200	TWR	Swaziland	03.00	Hungary	00.30
3.225	Radio Occidente	Venezuela	Evenings	Italy	01.00
3.270	Radio Namibia	Namibia	04.00	Australia	12.00
3.300	Radio Cultural	Guatemala	02.30	Holland	03.30
3.320	Radio Suid Afrika	S. Africa	03.00	Uzbek SSR	12.00
3.370	Radio Tezultlan	Guatemala	01.00	Denmark	23.00
3.480	Voice of Nations	Korea	11.15	Canada	13.00
3.965	Radio France Int.	France	05.00	Finland	15.15
4.300	Radio Moderne	Peru	Evenings	Yugoslavia	22.00
4.485	Petropavlosk Radio	USSR	12.00	Sweden	02.00
4.760	ELWA	Liberia	06.00	USSR	02.00
4.810	SABC	S. Africa	03.00	Iraq	04.00
4.820	HRVC	Honduras	Evenings	Ecuador	01.00
4.915	Radio Ghana	Ghana	05.30	Vietnam	11.00
4.955	Radio Cultura	Brazil	02.00	USA	00.00
5.020	SIBC	Solomon Is.	08.30	USSR	03.00
5.286	Radio Moundou	Chad	05.00	Bangladesh	02.00
5.875	BBC World Serv.	UK	Evenings	Bulgaria	04.00
5.930	Radio Prague	Czechoslovakia	Evenings	China	02.00
5.945	Radio Austria	Austria	22.30	Cook Islands	06.00
5.956	Radio Berlin	Germany	04.45	Brazil	21.30
6.020	Radio Netherlands	Holland	00.30	Cuba	01.00
6.025	Radio Amanecer	Dominican Rep.	10.00	USSR	08.15
6.050	HCJB	Ecuador	06.00	UAE	21.00
6.090	Radio Luxembourg	Luxembourg	23.30	Germany	05.00
6.130	Radio Portugal	Portugal	06.00	Jordan	05.30
6.135	Swiss Radio Int.	Switzerland	01.30	Pakistan	12.00
6.140	ABC	Australia	09.00	Iceland	14.10
6.175	BBC World Serv.	UK	Evenings	Kiribati	06.00
6.185	WRNO New Orleans	USA	04.00	Lao	11.00
6.248	Vatican Radio	Vatican	03.00	Budapest	03.00
6.540	Radio Pyongyang	N. Korea	10.00	Libya	22.15
6.955	Radio Beijing	China	11.00	Australia	00.30
7.115	Radio Moscow	USSR	Evenings	Phillipines	12.15
7.125	AWR	Italy	06.00	Romania	01.00
7.145	Radio Polona	Poland	04.00	Morocco	20.30
7.165	Radio Liberty	Germany	01.00	Argentina	18.00
7.205	Radio Australia	Australia	12.00	Finland	13.00
7.255	Voice of Nigeria	Nigeria	05.00	Sri Lanka	15.15
7.265	Sudwestfunk	Germany	07.00	USSR	19.00
7.300	Radio Tirana	Albania	00.00	Uzbek SSR	12.00
7.375	RFPI (USB)	Costa Rica	01.00	Gabon	18.00
7.400	Radio Kiev	Ukraine	23.00	New Zealand	03.00
7.412	All India Radio	India	12.00	Kuwait	03.00
7.430	Voice of Greece	Greece	Evenings	USSR	03.00
7.440	Radio Moscow	USSR	04.30	USSR	13.00
7.445	Voice of Asia	Taiwan	11.00	Korea	14.00
7.475	RTT	Tunisia	04.30	Pakistan	13.15
9.022	VOIRI	Iran	04.00	Afghanistan	11.60
9.045	Iran's Flag of Freedom	Iran	03.30	Morocco	14.00
9.360	Spanish National Radio	Spain	01.00	Gabon	15.00
9.400	Radio Iran	Iran	02.00	USSR	23.30
9.470	Radio Cairo	Egypt	02.00	China	11.00
9.505	Radio Japan	Japan	12.00	New Zealand	06.00
9.515	XEWW	Mexico	12.15	Colombia	01.00
9.520	Radio Budapest			Oman	14.30
9.575	RAI			Japan	01.00
9.580	Radio Australia			USA	19.00
9.590	Radio Netherlands			Ecuador	18.00
9.600	Radio Tashkent			Australia	13.00
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9.635	Radio Canada			South Africa	15.00
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9.660	Radio Yugoslavia			Kuwait	16.00
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9.700	Radio Moscow			USA	16.00
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10.010	Voice of Vietnam				
11.580	Voice of America				
11.670	Peace and Progress				
11.705	Radio Bangladesh				
11.720	Radio Sofia				
11.745	Voice of Free China				
11.760	Radio Cook Islands				
11.780	Nacional Amazonas				
11.910	Radio Havana				
12.010	Radio Tickhy Okean				
13.065	Voice of the UAE				
13.610	Radio Berlin				
13.655	Radio Jordan				
13.665	Radio Pakistan				
13.810	ISBS				
14.918	Radio Kiribati				
15.190	Lao National Radio				
15.220	Radio Budapest				
15.235	Radio Jamahiriya				
15.240	Radio Australia				
15.240	Radio Verita Asia				
15.255	Radio Bucharest				
15.330	RTM				
15.345	RAE				
15.400	Radio Finland				
15.425	SLBC				
15.455	Radio Moscow				
15.470	Radio Tashkent				
15.475	Africa No. One				
15.485	Radio New Zealand				
15.490	Radio Kuwait				
15.525	Radio Moscow				
15.535	Peace and Progress				
15.575	Radio Korea				
15.605	Radio Pakistan				
17.540	Voice of Untity				
17.595	RTM				
17.630	Africa No. One				
17.665	Radio Minsk				
17.680	Radio Beijing				
17.680	Radio New Zealand				
17.715	Radio Nacional				
17.735	Radio Oman				
17.775	Radio Japan				
17.775	KVOH California				
17.790	HCJB				
17.815	Radio Cultura				
17.820	Radio Canada				
17.825	Quatar Broadcasting				
17.855	Radio Beijing				
17.870	Vatican Radio				
17.875	HCJB				
17.890	UAE Radio				
21.470	HCJB				
21.525	Radio Australia				
21.565	RFPI				
21.590	Radio South Africa				
21.605	UAE Radio				
21.657	Radio Kuwait				
21.790	Voice of Israel				
21.840	WHRI Indiana				

# Packet Radio

## Roundup

Following a well attended meeting of the South Coast node and BBS sysops at the G4HCL residence last week, (i.e. a dozen chairs weren't enough!) its clear to see that funding is a major issue for the provision of new inter-node and BBS links. However, the thankless saga of UK packet node and BBS sysops goes on, these individuals contributing much to many. Did you know that, after my node system with it's seven TheNet ports and associated transceivers had been in operation for a total of one and a half years, the very first 'thank you' message from a local amateur was received yesterday. Ah well, it's not quite a thankless job anymore. Think of how

of getting through the QRM.

Although not claiming to receive signals others won't, the latest offering from L. L. Grace is the DSP-12 Multi-Mode Communications Controller certainly offers the flexibility associated with DSP, in providing no less than 40 'modems' in the basic unit. For packet this includes 300 and 1200bps for HF and VHF/UHF AFSK, 400 and 1200bps PSK, 9600bps direct FSK and V26 2400bps. It also offers RTTY and CW modems, plus WEFAX, SSTV, AMTOR and SITOR to come in the future with an offer of free software upgrades.

The DSP-12 uses a Motorola DSP56001 DSP processor with PC-

Much of the other equipment, such as transceivers and TNCs, will be provided by two local TheNet Node sysops, and placed in operation from the G4SMC/G6SMC radio club station to ensure continuous operation under the present licensing regulations for unattended nodes (i.e. no node 'shutdowns' to worry about when an individual sysop goes on holiday!).

The callsign of the Cluster will be GB7SMC with access ports as follows :-  
50.650 1200 Baud (G4SMC)  
70.325 1200 Baud (GB7SMC)  
144.625 9600 Baud (G4SMC)  
144.650 1200 Baud (G4SMC)  
144.675 1200 Baud (G4SMC)  
432.675 1200 Baud (GB7SMC)  
1200.000 9600 Baud (G4SMC)

The DX Cluster working group tell us that in addition to user access to the Cluster, which should not be too difficult considering the wide variety of ports available, it is intended to set up 9600 Baud links to GB7WDX, near Exeter, and to the proposed GB7DXS Cluster near Handcross, West Sussex. The GB7DXS Cluster will be linked to the first of the UK DX Clusters at Wokingham (GB7DXI) and, together with the GB7SMC Cluster, will form the long awaited link between the Cluster in the South East and the others. Development of the UK DX Cluster network continues, and the group hope it will not be long before nearly every UK DXer is sufficiently near to a Cluster to be able to benefit from, and contribute to the system.

You can get further information on the activities of the DX PacketCluster working group from their Secretary Ron GW3YDX @ GB7PMB, or any of the cluster sysops.

### G4HCL looks at the latest digital signal processing offerings

much other people pay in equipment and electricity, for you to use at no cost. Wouldn't it be terrible if the minority of amateurs who abuse the system cause it's loss for all amateurs? Don't take the system for granted.

#### New DSP TNC

DSP modems have been awaited for some time now, with their promise of a wide number of operating modes through the use of digital rather than analogue technology. For those not familiar with this, it briefly means that rather than employing analogue filtering and the like, digital processing is instead used which has the capability of almost limitless possibilities, almost like computers, purely dependent upon the processing speed used and the amount of digital storage available, coupled of course with a suitable stored operating 'program' (this is where the human element is needed!). Thus by using a single circuit, several types of operating 'modems' may be synthesised rather than having separate modems, each with their individual op-amps, capacitors, resistors etc. It is also through techniques such as these that digital signals of many dB below the noise can be decoded, although this is the 'next step along', but confirming the fact that digital communications can get through where earlier manual (I'd better not say 'outdated') modes don't stand a chance

compatible architecture in a V40 to provide amateurs out here the facility to develop programs for use with it, this allows the use of normal PC development tools and languages. The manufacturers also tell us the V40 source code is available for custom applications to suitably qualified users, and they say that optional 8 channel A/D and DAC add-ons are available for voice and telemetry needs.

The current price in the US is \$595 which isn't cheap, but then again it does claim to do virtually everything. Could this be the beginning of packet telephony on the airwaves?

#### New DX PacketCluster

Ron GW3YDX, who is the secretary of the National DX Cluster Working Group, has confirmed that a new DX Cluster will soon be on the air from the premises of South Midlands Communications Ltd. in Chandler's Ford, Hampshire.

Ron tells us that SMC has been exceedingly generous in not only providing premises, but also underwriting the cost of electricity to run the system, paying for the software, and providing a PC. Although the NoV (Notice of Variation) for the Cluster specifies only 70.325MHz as the Cluster input frequency, a multi-frequency node will be co-located with the Cluster.

#### CTRL-Z, End of Message

It's nice to know that we'll shortly be having an orbiting packet station in operation on the MIR space station, I'm going to have to brush up on my Russian! A short roundup this month, to fit all the other editorial goodies into the magazine. I've just received the latest BPQ version of node software for the Kantronics Data Engine, so next month I plan to detail a typical dual port 1200baud/9600baud system using this. Please let me know what your group is doing, I can be reached either via the editorial address or through a message on the network to G4HCL @ GB7XJZ.

# Experimenters File

Along with the new look to HRT, *Practicalities* is being revamped as well. Looking back, the series has been with the magazine almost since the beginning, in fact the first *Practicalities* appeared in the August 1983 Issue. That seems ages ago now!

This series will include a good measure of practical hints and tips for use around the shack. In addition to this, it will cover some of the latest ideas in practical technology which affect amateur radio. It's intended that the series should provide a useful pot-pourri of ideas for the radio experimenter, or anyone interested in amateur radio.

## Heatsink Compound

I recently had the misfortune to blow up the PA on my trusty Ten Tec Argosy. I have to admit that it was my fault as I was trying to squeeze the last Watt out of it to contact a DX station on 20m, and I had not checked the VSWR.

the transistor itself.

It is interesting to see what the manufacturers say about ensuring that a good thermal path is obtained, as particularly on high power FETs the surface finish has to be very good. Here, a small amount of heatsink compound is specified, and finally the tightening torques are given for the mounting screws. All this is aimed at giving the best contact between the transistor and the heatsink metal. Remember that metal to metal contact is the best, not a layer of heatsink compound in between, this must *only* be used to fill in the gaps. Hence if there is too much heatsink compound, you're making matters worse rather than better.

## Front Panel Labelling

One of the major difficulties in building equipment from scratch at home is being able to gain a suitable 'professional looking' finish. Often, projects which are very good electrically are ruined by a poor

one is not careful. One way of overcoming all of this whilst still maintaining a good finish is to cover the whole of the panel with the clear adhesive film which is often used for covering books and the like.

Once the labelling has been completed and all the controls removed, the film should be carefully laid over the panel. Care has to be taken not to get any creases or air bubbles in, there is only one chance. If it's necessary to subsequently remove the film, then most of the Letraset will come with it. Hence it's worth practising a couple of times on a spare panel before covering the real one.

Once the film has been applied to the panel, holes can be made in the film where the control shafts must go, and the excess around the sides can be folded over the edges or trimmed back as necessary. This approach has given me a good finish on a number of occasions, in addition to this it is very hard wearing, even working well in a factory environment.

## Ian Poole's forum of practical and technical ideas for the shack

One thing I did notice when replacing the transistor was how little heatsink compound was used. There is always a temptation to plaster a good amount of it onto the transistor and do it up nice and tightly, so that the compound oozes out all around the sides. Although this may make one feel that a good job has been done, it is *not* the best way at all. Instead, only a *thin* smear should be used, just enough to fill in any roughness on the metal surfaces. Then the transistor should be tightened down. It is important *not* to use too much torque on the screws, otherwise there is a danger of distorting

mechanical finish, and sometimes even if the metalwork is good these projects all too often have no front panel labelling. Switch positions are thus blank and there is no knowing what the other controls do!

Unfortunately very few people have any facilities which enable a panel to be marked up properly. Probably the best solution open to most people is to use 'Letraset' or one of the other similar lettering systems. The main drawback for this is that it may peel away after a little use, even if clear varnish or lacquer is used. In addition to this, the lacquer can become discoloured quite easily, or run if

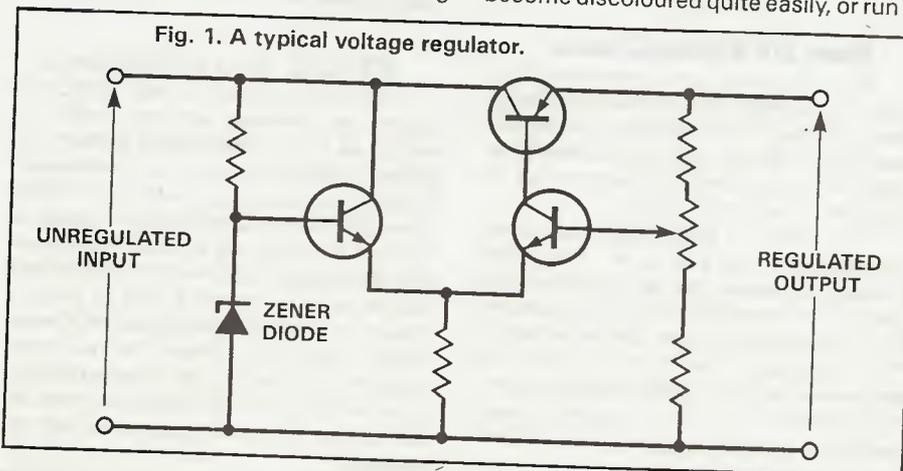
## Stable Voltages

There is often a need for a stable voltage reference in one project or another. Any oscillator circuit for example will need a regulated supply, probably regulated down from the main supply to reduce the noise levels and decouple it properly. If an exceedingly stable voltage is needed then one of the special regulator ICs can be used, however in many cases components out of the junk box can be utilised, as described in *Geoff Arnold's Notebook* in recent HRTs. Following on from this, Fig. 1 shows a typical circuit that is quite stable and adequate for many purposes.

As one would expect, the output voltage stability with temperature is mainly dependent upon that of the Zener diode, this means the choice of diode is important. The best choice is a diode having its reverse breakdown voltage between 5V and 5.5V, the reason for this is that there are two different breakdown mechanisms. Below about 5V the zener effect predominates, whereas above about 5.5V the avalanche effect is the main one. These effects both have different temperature coefficients, and in the region between 5V and 5.5V where both effects are active the temperature coefficients tend to cancel one another out.

In a circuit like the one shown in Fig. 1 it is possible to pick a 5V zener and use the adjustment to set the right voltage. In circuits where higher voltages are needed zener diodes can be placed in series.

Fig. 1. A typical voltage regulator.



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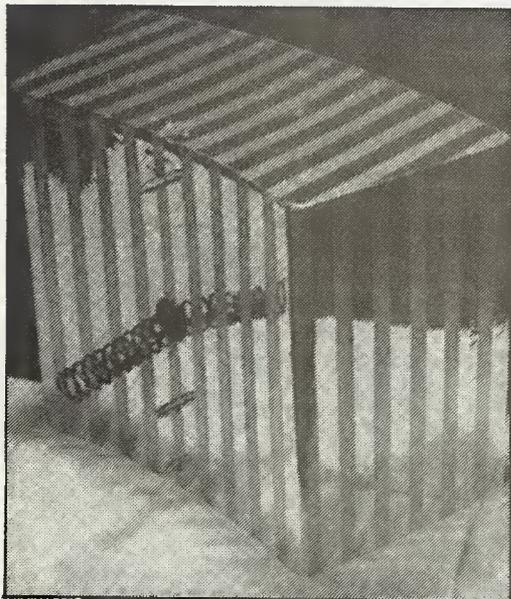
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# Getting Started on Satellites



The very first simple amateur radio satellite, Oscar 1. (AMSAT)

is likely to meet the disapproval of one's neighbours. You can work DX much more easily via satellites, you can probably do it more cheaply this way and you can do it much more reliably as you don't have to use the unreliable ionosphere to do it. And if you are interested in the technical aspects of amateur radio you will find satellites will fulfil this side of your interest completely.

## The Beginning

It is interesting to recall that the idea of an amateur radio satellite probably owes its inception to a small group of radio amateurs in the Los Altos area of California, who were VHF enthusiasts. They were dissatisfied with the limited range of these frequencies and decided they would try to build a satellite from which they could reflect their signals down to earth and thus reach out to distant VHF stations. One of them, Don Stoner, wrote an article in one of the radio magazines outlining their ideas, which

resulted in a committee being set up to see what could be done.

This became the 'Project Oscar' organisation — OSCAR, standing for 'Orbital Satellite Carrying Amateur Radio'. In due course, a small satellite was built by the group. Each member of the group devoted their specialist knowledge to the project and after two years a satellite carrying a simple radio transmitter sending the signal 'HIHI' in the 2m band was successfully completed. Its launching into space probably presented what might have appeared to be more of a problem than what was entailed in its construction. However it was known that with professional satellites the weight of the launch vehicle had to be exactly right at take-off and adjustments to this were usually made by adding some extra weight in the form of ballast.

So a request to use OSCAR 1 as part of the ballast on a forthcoming launch was obtained from the powers that be, and it was launched on 12th December 1961 from the Vandenberg Air Force Base. Everything worked out just as planned. Over 5000 listener reports were sent in from over 500 amateur radio enthusiasts in 28 countries. It completed 312 orbits before re-entering the earth's atmosphere and burning up. Thus was borne the concept of amateur radio satellites.

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## Arthur Gee G2UK, Chairman of AMSAT-UK, starts his beginners' series.

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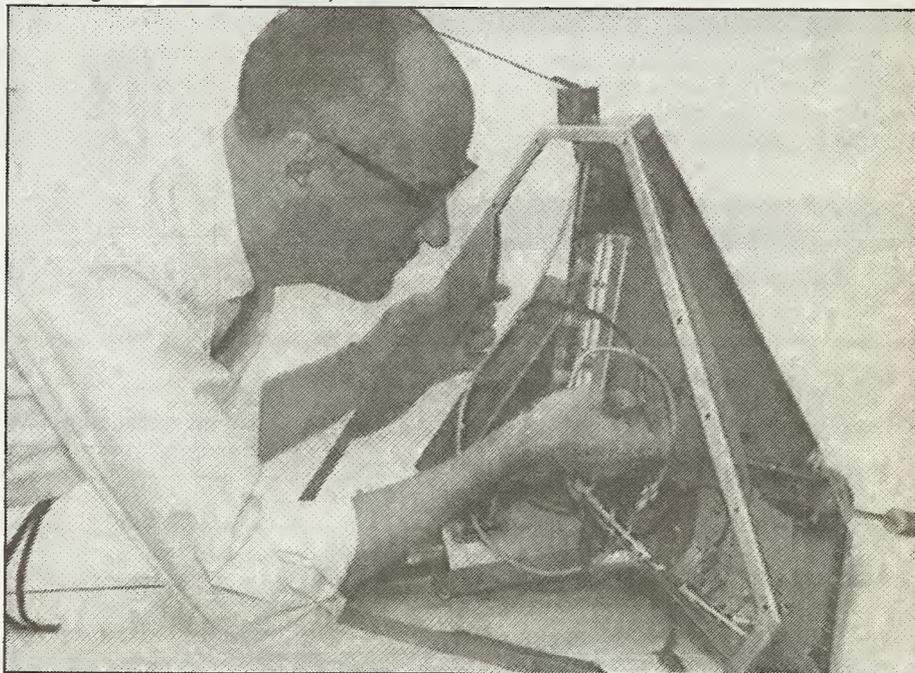
Of the recent advances in the amateur radio scene, satellite communication must be one of the most interesting. However, no doubt because of the very sophisticated nature of the professional satellite scene, the idea seems to have got around that this aspect of amateur radio is very complicated, very expensive, very high-tech and does not give the satisfaction its involvement deserves.

### New Methods of DX

One of the most popular aspects of amateur radio has always been that of communicating with distant countries — 'working DX' as the jargon goes — this is a very worthwhile activity as it has a lot of spin-offs — one gets to know about the rest of the world and to accomplish it satisfactorily one needs to have one's amateur radio station at the peak of its performance which in itself is a creditable activity.

However, the traditional way of making DX QSOs is expensive, time consuming and needs an aerial system which

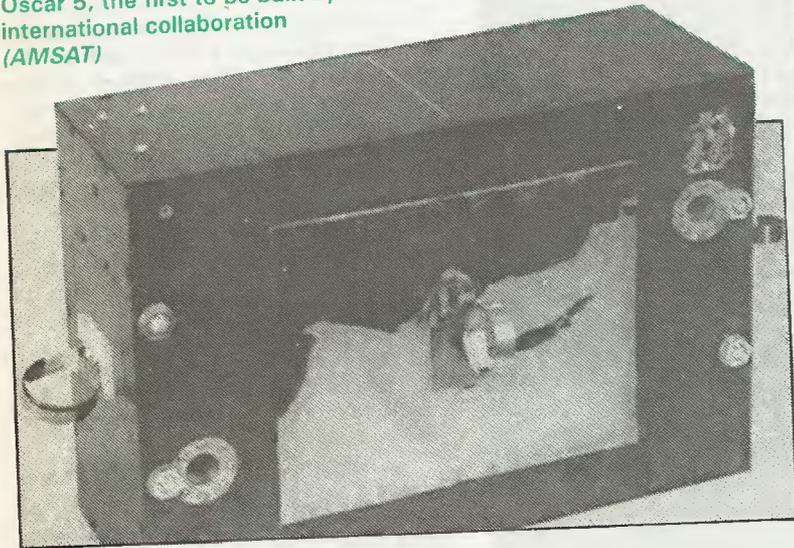
Working on Oscar 4 (AMSAT)



## More and More

Encouraged by this success, a second one was built and successfully launched six months later. It transmitted Morse code signals, giving its temperature by increasing or decreasing its keying rate according to the rise and fall in its temperature. Following this, OSCAR 3 was built and successfully launched. This was the first true communication satellite for amateur radio use. It was launched on 9th March 1965 into a 570 mile high orbit and carried a 2m receiver and transmitter. Signals were received from ground stations operating on a frequency at one end of the 2m band and re-transmitted back to Earth at the other end of the band. 176 two-way QSOs were made by 98 stations in North America and 31 in Europe. By now it was apparent that amateur radio satellites were a very feasible project and the construction of further improved models continued.

## Oscar 5, the first to be built by international collaboration (AMSAT)



## Setbacks

The next one, Oscar 4, unfortunately came to grief as there was a malfunction of the launch vehicle and it did not go into its intended orbit, however it did stay up long enough to enable the first ever amateur radio satellite QSO to take place between the USSR and the USA. OSCAR 5 Pushed amateur radio satellite technology ahead very considerably. It was designed and built by students at Melbourne University, Australia. The organisational aspect of the project was carried out by a new satellite group in Washington D.C., USA. This was called AMSAT — the Amateur Radio Satellite Corporation, and the group worked with many of the original Project Oscar constructors.

Oscar 5 weighed 18kg and measured 300 x 430 x 150mm, carrying 9kg of batteries, as at this stage of development solar panels had not come into use for amateur satellites. It was launched from

a Delta N rocket on 23rd January 1970. It transmitted data only, signals being radiated in both the 28MHz and 145MHz bands. It carried two bar magnets in an effort to stabilise its motion in space and thus prevent the tumbling which earlier satellites experienced causing fading of its signals. It was the first satellite to be used by the Talcott Mountain Science Centre at Avon, Connecticut, USA, in their science educational programmes.

## More Oscars

Oscar 6 and 7 which followed, were primarily communication satellites. They were the first to use solar panels as their power supply. Up until then the power supply was by batteries which of course ultimately ran down, thus ending the life of the satellite. These early solar panels

## Russian students at the ISKRA design office of the Moscow Aviation Institute with some of their satellites



charged batteries which were then hoped to give the satellite a life of a year or so, which in fact was greatly exceeded. Sub-systems for each of these satellites were developed and built by amateurs in several countries, the final assembly being carried out by the USA.

A linear repeater was developed and built by radio amateurs in the University of Marburg in West Germany, it had an input frequency of 432MHz and an output of 146MHz. Amateurs in the Washington area built a second one and a third repeater was developed by radio amateurs in Melbourne. Many unique features were incorporated into these two satellites. A telemetry system provided data on solar current, battery voltage and temperature, power output, the temperature inside and outside the spacecraft and so on. A message storage unit called a *Codestore* was installed into which messages in Morse code and teletype could be placed for subsequent retransmission.

This provided a source of space motivated students to copy signals and decode them into meaningful messages.

Oscar 6 was launched on the 15th October 1972 on a launch vehicle carrying the NOAA Meteorological satellite. It was placed in a circular orbit of 910 miles altitude, which gave it an orbital period of 115.0 minutes — that is the time it took to go round the world. It had an uplink frequency in the 2m band and a downlink frequency in the 10m band. It performed excellently and exceeded its designed lifetime by 5 years, signals from it still being heard in June 1977.

## International Co-Operational

Oscar 7 was built by amateurs in Australia, Canada, Germany and the USA

and was the result of a four year project by AMSAT. According to the Project Manager, Jan King, W3GEY of the Goddard Space Flight Centre, a satellite performing the functions of Oscar 7 would have cost around two million dollars if built commercially, whereas it was built for a cash investment of around 60,000 dollars. This funding came from individuals and organisations sympathetic to the project. Space-Qualified components and test gear worth thousands of dollars were donated by a number of aerospace companies, surplus satellite hardware such as solar panels and nickel cadmium rechargeable batteries left over from other space projects were also used. Oscar 7 continued in service until 1981, when it went out of action after nearly seven years of excellent service.

Oscar 8 was the next to be built by groups of radio amateurs in USA, Canada, West Germany and Japan, each group

taking on one or more components for the satellite. Extensive use was made of parts left over from Oscar 7. Its objective was to provide a low orbiting satellite for instructional use in schools and technical colleges, but it also had two transponders for amateur radio communication. One had an uplink of 145.90MHz and a downlink of 29.40MHz, and the other an uplink of 145MHz and a downlink of 435.1MHz. It also had a telemetry beacon on 29.402MHz and another on 435.095MHz. It was launched on the 5th March 1978 from the Western Test Range USA, and continued in service until mid 1985.

### Elliptic Orbits

After Oscar 8, a much more sophisticated series of satellites was planned. Instead of being used in a circular orbit,

they were designed for an elliptical one, going right out into space and back again towards the earth. The furthest distance from earth was to be 35500km and its nearest point to earth was 3955km, the time to complete such an orbit was about eleven hours. Nine years of planning and a further four years for construction went into this satellite, which was launched from the European Space Agency launch site at Kourou, French Guiana, by an Ariane rocket. Most unfortunately, the first stage of this rocket failed and this satellite, which would have become Oscar 9, plunged into the Atlantic Ocean.

### All Was Not Lost

To many of those involved in the building of this satellite, it seemed that this would be the end of amateur radio

satellites. It had cost more than all the previous satellites in both time and money. It seemed just too big an effort to replace it. However, ways and means were found to produce a replacement. Team effort from Canada, Hungary, Japan, West Germany and the USA, produced another just in time for another launch opportunity on 16th June 1985 when Oscar 10 was successfully launched.

### Russian Technology

In July 1977, the Russians filed a notice with the International Frequency Registration Board of the International Telecommunications Union (ITU) intimating that they would be launching a number of satellites in the 'Amateur Satellite Service'. It is interesting to note the phrase 'Amateur Satellite Service' was used in this application.

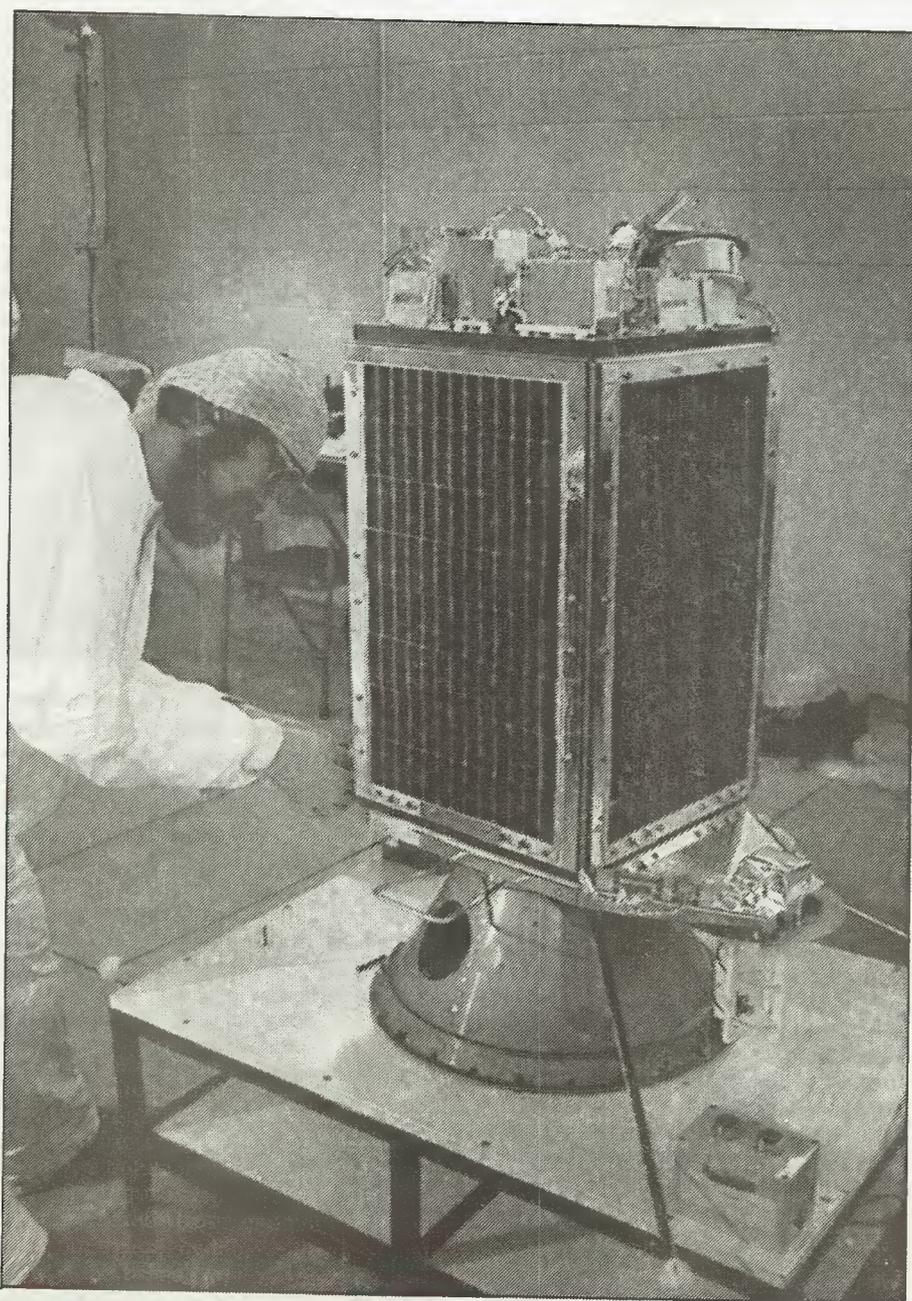
In 1971 the World Administrative Radio Conference for Space Communication, held under the sponsorship of the ITU, created a new radio communication service, especially for the use of the amateur radio satellite systems which they realised were being successfully developed. They allocated specific frequencies for this service. But to return to the Russian interest in amateur radio satellites, on October 26th 1978, a Russian rocket launched two amateur radio satellites, designated RS1 and RS2. They each had a transponder aboard operating in the 2m and 10m bands. Telemetry and a Codestore were provided and power was from solar panels. They were operational for several months after which they ceased to operate due to battery failure.

In December 1981 the Russians launched a whole cluster of six satellites, designated RS3 to RS8, all together. Since then a compound one has been launched, designated RS10/11. In May 1982 they launched a very simplified satellite called ISKRA, which was built by aeronautical students as an educational exercise and launched through the airlock of the Salyut 7 Space Station.

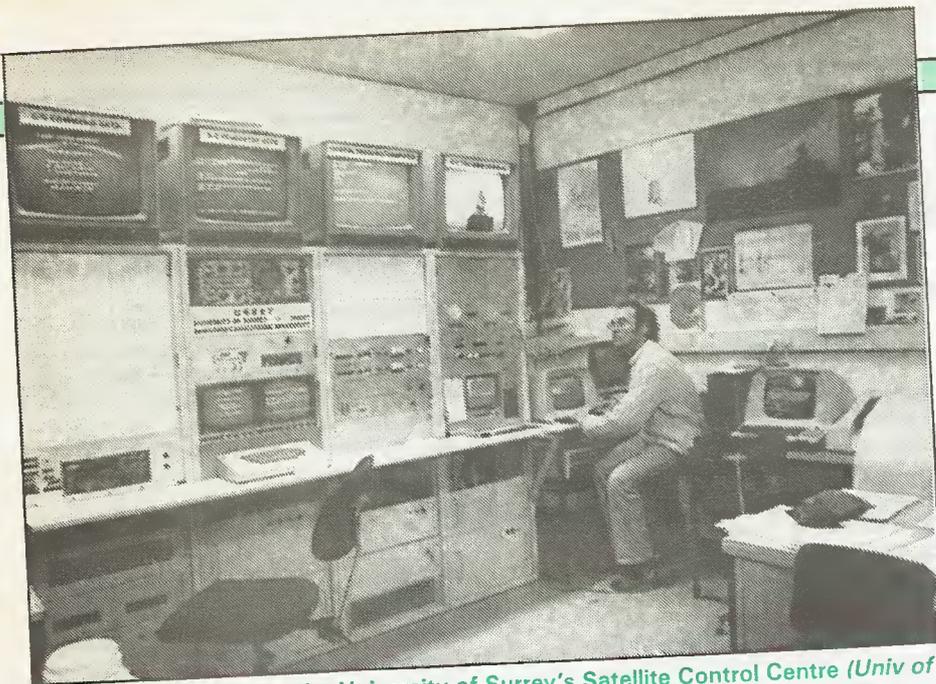
### University of Surrey

So far we have considered satellites designed primarily for amateur radio communication purposes. Whilst these were being designed and launched another project was progressing at the University of Surrey — the UoSAT Project.

One feature of the satellites which we have so far described is that they have to be 'controlled', that is, radio signals have to be sent up to them which control their operation. The more sophisticated of the latter satellites send down signals which indicate the voltage of the batteries, the charging rate of these from the solar panels, various temperatures of units in the satellites, parameters of how



UoSAT 2 ready for flight (Univ. of Surrey)



Dr. Martin Sweeting at the University of Surrey's Satellite Control Centre (Univ of Surrey)

they are working and a great deal of similar information.

This data is received by a ground station and depending on the information received, control signals are sent back to the satellite which can turn on or off the appropriate units in the satellite to adjust things so that the satellite works properly. In this way the satellite can be operated at its maximum efficiency without overloading components or running down the batteries etc. This aspect of the satellite control is provided by a number of ground radio stations located around the world at suitable sites to give access to the satellite throughout its orbit.

One of these control stations was operated by the radio amateurs at the University who established a satellite tracking station which operated in a reliable and satisfactory manner. With the experience they had gained from this, they realised that they might be able to build a satellite themselves on quite a small budget, to prove the feasibility from the cost, engineering, reliability aspects of such a project being technically possible.

By 1978 enthusiasm had reached a stage where it became apparent that it would be feasible to build a low-cost satellite which could be used for educational and scientific purposes to stimulate interest in space science in schools, technical colleges and universities through actual participation in receiving data transmitted from such spacecraft.

### British UoSATS

A satellite was designed, built and launched in thirty months! Facilities were provided on it for the measurement of ionospheric data for research purposes, a CCD camera, particle counters for measuring solar and auroral activity, a magnetometer similar to that used on the

Voyager spacecraft mission to Jupiter and Saturn, and an electronic voice synthesiser which could actually speak details of the telemetry with a vocabulary of about 150 words in English. It was launched from the Western Test Range in California on the 6th October 1981. The American National Aeronautics and Space Administration (NASA) agreed to launch it 'in view of its potential contributions to space science, education and to the investigation of radio propagation phenomena'.

UoSAT 1 proved so successful that a second satellite similar to it was then planned and launched on the 1st March 1984. Many thousands of radio amateurs, schools and university groups around the world have taken part in the technical challenge of receiving decoding and analysing the data transmitted by these small spacecraft.

It soon became apparent after the launch of UoSAT 1 that a much wider field of interested parties was rapidly building up whose interest was in using these satellites as 'educational tools' as they could be used in the classroom as aids in teaching physics, mathematics and similar science subjects. To be able to predict in the classroom when a particular satellite would be 'coming over' and then receive its radio signal so all could hear its passes overhead from audio signals coming out of a radio receiver loudspeaker, was quite an exciting event for even the most scientifically disinterested pupils. When these radio signals could be converted into meaningful information the interest was even greater. Interest in these satellites thus grew quickly in the educational establishment.

### Microsats

This idea of building satellites much smaller than the professional ones of the time, was taken a stage further by the

announcement of the 'Microsat Program'. At the AMSAT-UK Colloquium held at the University of Surrey in July 1988, Bob McGwier N4HY presented a paper on the AMSAT-NA Microsat Program. He said that at the 1987 AMSAT-NA Annual Meeting in Detroit Michigan, the idea of a new type of small satellite was put forward to the Board of AMSAT-NA and to some of the technical volunteers present, by Jan King, Chairman of AMSAT.

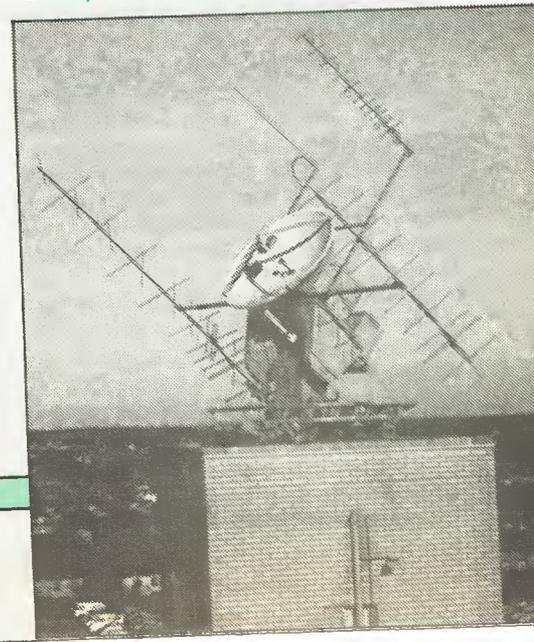
Since then much had happened both in the design and application of the ideas which had been developing for small satellites, and had 'grown beyond their wildest dreams'. Ariospace had been approached with the idea of launching several small satellites on the upcoming launch of the commercial satellite 'SPOT 2'. The outcome of the ensuing discussion resulted in the design and construction of four microsats which had been successfully launched in 1989. We shall have more to say about these later on.

### Now and the Future

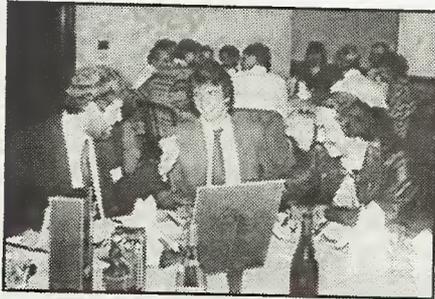
The Japanese now also have two amateur satellites in orbit, Fuji-Oscar 20 with its orbiting BBS being used by many packet radio operators around the world. Oscar 13 operating in an elliptic orbit provides much DX right now for amateurs of the world. At the recent AMSAT-UK Colloquium at the University of Surrey, details of France's ARSENE satellite were released as featured in HRT. Also at the Colloquium numerous satellite organisations were represented, they also put forward their plans for future satellites. So it looks as though there will be enough activity in the amateur radio satellite scene to produce plenty of interest for a long time to come.

So we see that the amateur radio satellite scene is full of interest and excitement and is a truly worthwhile activity to get involved in. **Our next article will deal with the question of just what is required to become involved in this latest aspect of amateur radio.**

**The aerial system for controlling amateur satellites at the University of Surrey (Univ of Surrey)**



# HF Convention



**DXers from around the world at the DX Dinner, including Dimar UA3AGW and Lawrence GM4DMA.**

For HF operators, and HF DXers in particular, the most exciting happening in the last few weeks was undoubtedly the RSGB HF convention, this year held at the Penguin Hotel at Daventry in Northamptonshire. The convention was once again a great success, and enjoyed by all who attended. Unfortunately, I hear from the organising committee that overall attendance was down on last year which is a shame, as this year's event was bigger and better than any previous HF convention.

The convention opened on the Saturday (29th September) with a series of guided tours around the BBC HF transmitting station, conveniently located just up the hill from the hotel. The tours were conducted by Neil Burrows, himself a class B licensee, who answered all the technical questions which were thrown at him. It was fascinating to see the huge old Marconi 100kW transmitters and to even walk inside one (switched off, of course), and several new 300kW Marconi trans-

in the direction of the target area.

## DX Dinner

Later on the Saturday, a 'DX dinner' was attended by over 100 people, following which were a number of excellent slide shows. The first by Lawrence Howell GM4DMA, detailed the radio back-up provided to Sir Ranulph Fiennes' attempt to walk to the North Pole. In such conditions, radio obviously provides a potentially life-saving necessity.

The second slide show was by Jim Smith VK9NS on his expedition to the desolate Pacific island of Banaba, whose great mineral wealth (guano) was its undoing — the island has been excavated to such an extent that it is now virtually a skeleton of rock.

Finally, Paul Granger F6EXV (a regular attendee of the HF Conventions) gave a presentation on his recent operation from Aden in Yemen 708AA, which was mentioned in a recent column in 'Ham Radio Today'. The merry making



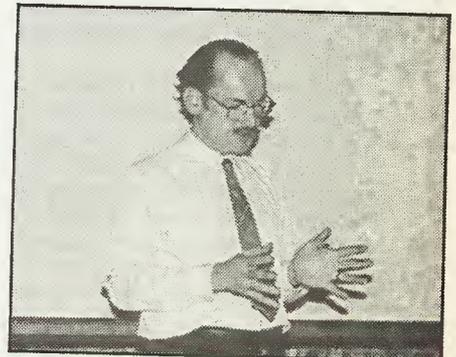
**Ian G4LJF and Don G3XTT fill the hall to capacity with their lecture.**

including logging programs, contest logging, propagation predictions, aerial design programs, and of course the DX Packet-Cluster. Ian Shepherd G4LJF is credited with introducing this system into the UK and he and Don Field G3XTT were there to demonstrate not only the DX Packet-Cluster (complete with a working cluster station) but also the other software packages. There must have been several tens of thousands of pounds worth of computers on show at the convention. Following this, Norman G4LQF addressed the QRP side of operating in his lecture 'QRP from a newcomer's angle' on behalf of the G-QRP club, followed after lunch by David G3PGQ showing us how not to burn out our beam traps with his talk on 'High Power HF Antennas'. The lecture planned to follow this on Digital Signal Processing by Dr. Saul G8EUX unfortunately couldn't run as Dr. Saul was ill, this was sadly missed.

## Expedition Talks

The ever-popular DXpedition lectures however attracted big crowds. First, Mats Persson SM7PKK gave an informative and hugely entertaining account of his travels around the Pacific with his rig, linear amplifier and aerial all packed into a rucksack. He has operated from such rare spots as American and Western Samoa, Fiji, Niue and Rotuma, mainly on CW. But he also took time out to make no less than 4500 QSO's in less than 48 hours in last year's CQ world wide SSB contest, as KH8/SM7PKK from American Samoa.

Next up was Einar Enderud LA1EE, who was one of the leaders of the expedition to what was once the rarest amateur radio country in the world, Bouvet Island. Einar and a multi-national



**Norman G4LQF tells us about HF QRP.**

team operated 3Y5X from one of the most inhospitable places on this planet's surface, and one which is almost impossible to reach without a helicopter. Einar's account of the expedition gave some idea of the tremendous amount of planning

## DXers of the World united at this year's HF Convention. Steve Telenius-Lowe G4JVG reports.

mitters complemented the line up.

Unfortunately, the weather was so abysmal that most visitors did not get a chance to see the aerial field at close quarters, although the last group did take advantage of a break in the torrential rain to see some of the arrays. Most of these consist of stacks of horizontal half-wave dipoles, with a reflector screen behind. There are sufficient arrays to cover most of the important directions, plus they are electrically slewed by up to 20 degrees. The arrays give up to 16 or 18dBd gain, depending on the frequency, and this with up to 300kW going into them, gives an ERP of several Megawatts

went on until well into the night (some claim to have been swapping yarns until 4am, although I eventually got to bed at 1.30!) *Tech Ed's note — true, I was one of the 4am guys!*

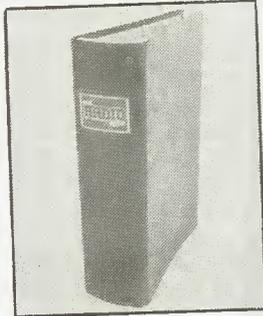
## Sunday Morning

The next morning the convention officially opened with two lecture streams as well as an open hall of stands belonging to various clubs and societies, the RSGB book stall and so on. One of the most popular lectures, with the hall filled to capacity with standing room only, was on the various forms of computer software now available for radio amateurs,

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required to put on such a difficult place.

After lunch, Jim Smith VK9NS not content with operating from a place as rare as Norfolk Island, gave a lecture on his recent expedition to the Kingdom of Bhutan, where he operated as A51JS for three weeks, making 15,000 QSO's in the process. Jim's lecture was highly informative and gave an insight into the culture of this remote country. His slides also showed a lot more of the beautiful Himalayan scenery than radio operating. Jim explained that this was an expensive operation, as he was obliged to live as a 'common tourist' (as the Bhutanese put it!) which meant hotel bills of 200 — 250 dollars per day. Nevertheless, Jim donated an Icom rig and a Butternut aerial to the Bhutanese authorities, and it is to be hoped that one or two local Bhutanese operators will soon be able to make use of them.

Much of Bhutan's communications to the outside World — via India — is by HF CW communication (in fact they use an old Yaesu rig operating just outside the amateur bands and a Cushcraft A4 tri-bander for much of it). Jim therefore believes that amateur radio could really 'take off' in a big way in Bhutan, since there are already many trained CW operators.

The last of the lectures was a return by Mats SM7PKK, who gave a slide show

on this spring's DXpedition to Conway Reef, 3D2AM. This expedition was also a multi-national affair, with Martti Laine OH2BH and Peter OH1RY also among the operators. Having worked the expedition with ease (they had an excellent signal, especially on 20m long path in the mornings) it was fascinating to see the operating conditions, in tents with daytime temperatures of 35 — 40 degrees C and biting bugs all night long.



Ian G4LJF receives his award for introducing the DX PacketCluster.

## Not Just Radio

Several people commented to me that the DXpedition lectures, and also the tours of the BBC site, were interesting to non radio enthusiasts as well as to the hardened DXer, and it was gratifying to

see many wives and partners at the convention, enjoying the social side of things. For my part I met Ham Radio Today's Consultant Technical Editor Chris Lorek G4HCL for the first time, although it was a fairly rushed meeting due to my occupation with the Chiltern DX club (CDXC) stand. (We kept missing each other at the bar the night before — Tech Ed).

## Presentations

This year, CDXC awarded their prestigious Awards of Merit to Mats Persson SM7PKK for his outstanding operations from the Pacific for the last three years, and also to Ian Shepherd G4LJF for his work in introducing the DX PacketCluster system to the UK. This year, for the first time, CDXC also presented awards for the leading British single operator in the SSB and CW legs of the CQ World Wide DX Contests. These plaques were awarded to Steve Cole GW4BLE for the SSB leg and to Al Slater G3FXB for the CW leg. Similar plaques will be awarded every year to the top-scoring UK station in both of these contests, and having seen them I can say they are well worth winning, so why not put in a serious entry in next years contest? You never know, it may be you being invited to next year's convention to receive an award! The HRT staff and HF contributors will again be there, see you then?

# HF HAPPENINGS



**QTH of Steve Cole GW4BLE at Newport, Gwent. That's a KLM KT-34XA 6 element tribander at 20m!**

CDXC is open to all DXers or SWLs normally resident in the UK (or those who visit the UK Frequently or have some other close connection with Britain) providing you have worked (or heard, for SWLs) a minimum of 100 DXCC countries. For a prospectus including a membership application form as well as more details about the club, write to the secretary Roger Brown G3LQP, 32 Albert Road, Sutton, Surrey. SM1 4RX, enclosing a large stamped addressed envelope. (Ed's note — the large number of CDXC badges worn at this year's HF Convention needed to be seen to be believed!)

## DXpeditions

As I write this, there are rumours of a major Pacific DXpedition in the near future, possibly as early as November 1990 and possibly involving Martti OH2BH, Peter AH3C, Mats SM7PKK and maybe others. I have no further details as this goes to press, but I do hope to bring you a write-up on one of Pete and Martti's

earlier expeditions soon. The Conway Reef expedition mentioned in this month's HF Convention report was transported to the island by the 'Yasme' yacht. This boat has given its

It has been interesting to note that stations in the Eastern part of Germany, which was formerly the German

from the QTH of G3OZF near Aylesbury, the first time there have been two CDXC groups competing in the multi-single category of this contest.

For those interested, membership of

## Steve Telenius-Lowe G4JVG Reports on the latest DX

Democratic Republic, are still using their Y prefix callsigns. I spoke to one station there on the last day of the GDR being a separate country, and he explained to me that they were allowed to continue using the Y callsigns even after reunification, at least until December 1990. No-one knew what was going to happen in 1991, such as whether they would keep the Y callsigns, or if the old DM callsigns would come back, or even if they would all be issued callsigns in the former West German DA-DL series. What is sure is that both East and West Germany cease to exist for DXCC purposes, and a new country of 'Germany' is therefore created.

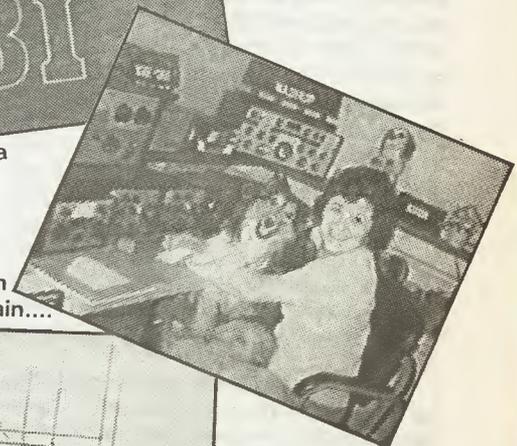
### Chiltern DX Club

This article is being written shortly before this year's CQ World Wide phone contest, which takes place on 27th and 28th of October. In previous years, the Chiltern DX Club has participated fairly seriously in this contest by sending a multi operator group to Jersey and taking part in the multi operator single transmitter category. Last year the CDXC group made 6834 QSO's during the contest, more than any other group in Europe in the same category, yet only came third in Europe. This year the group is going instead to Guernsey and will be operating as GU6UW in an attempt to get first place in Europe. There will be some competition from a second CDXC group operating

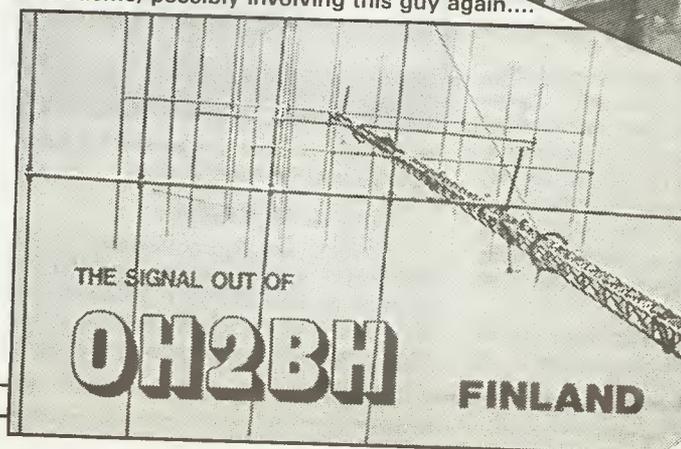


**QSL of the Month, the CTØBI Berlenga Island DXpedition**

There are rumours of a major expedition in the Pacific, possibly involving this guy again....



**Mary Ann WA3HUP is QSL manager for many DX stations (see Table 1)**



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name to the Yasme foundation, which handles the QSLing for quite a few expeditions, including 3D2AM and all the operations by Lloyd and Iris Colvin. These veteran expeditioners normally try to air several rare countries every year, and always ask for their QSLs 'via Yasme'. If you send your QSL via the bureau, you will probably not get a reply. You have to QSL direct to the address given later, enclosing a self-addressed envelope and a couple of IRCs for a reply. Lloyd and Iris's most recent operation was from Malawi in Africa, from where they made 7000 QSOs in just under two weeks on the air as 7Q7KQ.

### QSL Managers

During 1990 there have been at least three expeditions to the Portuguese island of Berlenga; CTOB in May, CTOBI in August, and CR1BI in September. All were easy to work and CTOBI at least has issued some splendid full-colour QSLs. For those DXers who do not keep up to date though a DX PacketCluster station or a DX News Sheet, it can be sometimes difficult to find out correct QSL information for some DX stations. DXpeditions are usually on and off the air within a week or two, so by the time this is read many operations will be history. However, many DX stations use QSL managers and the list in Table 1 is of DX

stations who are at present very active. All are good QSLers, although some only reply to cards sent direct with return

postage.

Good DX and good QSLing, see you next month.

### QSL information for currently or recently active DX stations

AH3C (Johnston Island, Pacific)	— via. K9UIY, Vic Shields, 524 E Empire street, Freeport. IL 61032. USA
CR1BI (Berlenga Island)	— via. CT1CQK, Luis Filipe Matos Teixeira, P.O. Box 146, 2710 Sintra, Portugal.
GU6UW/GP6UW (Guernsey)	— via. G3XTT, Don Field, 105 Shiplake Bottom, Peppard Common, Henley on Thames. RG9 5HJ. England
VP2EE, VP2EHF, VP2EBN	— via. KA3DBN, John Rouse, 2703 Bartlett Lane, Bowie, MD 20715, USA
VP2EXX (Anguilla, Caribbean)	— via. KC8JH, Gregg Lee, 15290 Hannon Trace Road, Crown City, OH 45623, USA
ZK3EKY/5W1KY (Tokelau, W.Samoa)	— via. WA3HUP, May Ann Crider, R. D. 2, Box 5A, York Haven, PA 17370, USA (Mary Ann is also QSL manager for many other DX stations)
7Q7KQ (and all 'Yasme' expeditions)	— via. Yasme Foundation, P. O. Box 2025, Castro Valley, CA 94546, USA

# VHF/UHF Mes

By the time you read this the DX F2 season should be well under way with new countries and DX QSOs in the log. However newcomers to the VHF bands earlier this year must have wondered if the stories of exotic DX they had been told about were true in view of the very poor propagation we have been experiencing lately. Compared with last year, to date it has been very disappointing.

By the middle of October we had openings to VK, VE, W and Central America on 6m and DX QSOs on 4m and 2m. This year, apart from two or three short openings to South America there is little to report, even the autumn equinox TEP (Trans Equatorial Propagation) season to South Africa was less productive than in former years.

had a bit of success lately. I worked from the Brendon Hills in Somerset to North of Cardiff and North East of Newport in Gwent. On another day I worked from Dartmoor to the Prescelly Mountains in West Wales, my power was 20mW and the aerial a 46cm diameter paraboloid. All this reminds me of the old 5m days, there were no wavemeters etc. around then and the first job was to 'find the band'. I used Lecher lines stretched between two horse chestnut trees at the North Camp end of Aldershot at the side of the playing fields. Ah, those were the days and 3 cm is bringing it all back to some extent. Instead of using Cosmos green and red spot valves I am using Gun Diodes not much bigger than a large pinhead and taking 1/10th the power. Best DX has been about

enquire about receiving our pictures.

Looking at the magazines in the newsagents it was noticed that some reported on ATV matters but very few answered the questions we were asked. This prompted Roy G60KB and myself to introduce you to Amateur Television. Neither of us are technical wizards but we are keen to see others gain enjoyment from this mode. Within our future columns we will explain the steps from a receive only system to transmission. We will describe the equipment required and give details of the frequencies used together with sources of further information.

In the next VHF/UHF Message, we will commence with the reception of ATV transmissions covering receiver and antenna requirements, in the meantime remember the popular HRT 23cm ATV system described a few years ago, showing you how to get operational at low cost.

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## Ken Ellis G5KW details activity from 50MHz to 10GHz this month, including amateur TV

---

### Starting On 10GHz

This month Bill James G6XM, who was one of the pioneers of 2m, 4m, 5m and 6m, starting nearly 60 years ago, tells us how to get started on the band. In a recent letter he writes; "I have gone off 6m recently, although I listen and call a lot I seldom get replies. My signals are getting out to the north, this I know because when I 'earwig' to the odd QSO coming from up north I often hear reference to "I've only heard old Bill 6XM tonight!". Why they don't call me is a mystery. For about a year now I've been building 3cm (10GHz) gear and I've been out operating portable on Dartmoor and Exmoor. Most of the 'expeditions' have been a complete failure, mainly because getting on parts of the band not being used. There seems to be a north/south divide, the north using the high end of 3cm, i.e. 10.35GHz to about 10.45GHz and the south using the low end about 10.00GHz to 10.25GHz. So with 500MHz to operate in it's not too easy to find the other fellow.

I am now using crystal control on about 10.370GHz with a self excited receiver tuning 10.0-10.5GHz and have

150km so not bad for 20mW."

Bill G6XM would like to hear from anyone in the south west interested in co-operating in 10GHz tests. He can operate portable from the heights of Cornwall and Devon, and you can arrange skeds by phoning him on 0837 52923.

### Amateur Television

*Brian G8ZYX writes;* Whilst operating the Battle of Britain Special Event Station at Hawkinge during the period September 8-16th, a bystander asked me what channel we were watching. When I informed the interested gentleman that it was Amateur Television, he was amazed that amateurs could produce near broadcast quality pictures in full colour, he immediately became hooked.

Having been involved with ATV at several Special Event stations I have been surprised by the number of amateurs who would like to become involved in ATV but assume that it is a costly and highly technical mode. I have also discovered that the scanner enthusiasts soon find the ATV talk-back channel on their receivers, and some of them become interested in what they hear. It's not long before they're tuning their TV set or contacting us to

---

## 6m Report from Ted Collins G4UPS

**Liberia;** Richard EL2B is now back home in the UK after being evacuated from Monrovia, and I gather that EL2FO has also left the country. Judging from the news reporting the chaotic state of that country, I think it will be a long time before we hear EL again on six.

**ZS8MI;** JA1VOK reports in the August edition of his 'World News Pages' that between 23 April and 1 May ZS8MI Peter (ZS6FT) worked 477 JA stations on 6m. A tribute to the discipline of the JA operators is evident in the fact that on 23 April in just 80 minutes he worked 113 JAs and on 26 April in 100 minutes he worked 201 JAs.

**Madeira Island;** Kari informs me that his father OH2SK will be active on 6m from Madeira as CT3DJ from mid October 1990 to mid April 1991. QSL information is via OH2SK or via the bureau.

**Luxembourg;** Jack LX1JX is now the VHF manager for Luxembourg, and informs us in a letter dated 20 August that there are now 6 LX stations active on six. These are LX1DB Willi (JN39CO), LX1DK Josy (JN9AL), LX1DT Henri (JN39AO), LX1JX Jack (JN3OAB), LX1PD Jules (JN39BN), and LX1SI Marc (JN39CQ). The LX stations have been very busy on 6m, with 47 countries worked in all continents. Jack reports up to the time of writing that he has worked 40 countries with 700 QSOs on the band. We will soon

# Message

have a LX beacon on the band, LXOSIX, the frequency is likely to be 50.023MHz with the beacon located in JN39AV at 150m ASL.

**India;** There have been rumours for quite a long time about a VU station being active on 6m, now we have the facts. Dasan VU2AID received a permit on 6 June 1990, this is due to expire at the end of October 1990 but I understand that Dasan is trying to get it extended. The frequency spectrum allotted to him is from 50.070 to 50.130. He has already worked into Japan, and Dasan's XYL Grace VU2AIU is also active on 6m.

**One for the Price of Two;** With German reunification from 3rd of October this year it is interesting to note that when two separate entities unite to form a new country, whilst we lose the two separate countries for DXCC the newly formed country is then counted separately for DXCC. What a pity that Y2 stations did not receive 6m permits, we would have made three different DXCC countries from them.

**Malawi;** Another station is active on 6m from Malawi, 7Q7JA, a JA operator named Yoshi Kawaku, he will be in Malawi for about one year. His QSL details are; Private Bag 28, Manu, Blantyre Malawi. Yoshi requests that all those who require a QSL card direct send their cards to him direct and all other cards for contacts on the HF/LF bands be sent to his QSL manager who is JH8BKL.

**Republic of Guinea;** I have been informed that 3X1SG has applied for a 6m permit, his locator is IK5MT, QSL via ON6BV. On September 19 he worked G3JVL/EA8 and was heard by Geoff GJ4ICD working 9H stations. A further report was that his callsign has been used by the well known pirate, again heard within the Italian sector of the band. It has been reported that 3X1SG QSL cards are not valid for DXCC on any band. I hear that Dave 9L1US will be going on vacation soon to Guinea and will be QRV on 6m.

**Turks and Caicos DXpedition;** Joe Pater WB8GEX and five other amateurs operated from VP5 during the period November 28 — December 5 on all bands including 6m. QSL via. WB8GEX, 1894 Old Oxford Road, Hamilton, OH 45013 USA.

**TA Expedition;** Nick G3KOX will be going to Turkey and hopes to be active from the first week in December. He already has a permit for 6m. When bookings are confirmed the details will be given on 3.718MHz and 28.885MHz.

**V51SW;** V51SW now has a QSL manager who is G1IOV, Mr. G. D. Ibell, The Corner House, Church Road, Mortimer Westend, Berks. RG7 2HY.

**Azores Expedition;** The expedition to CU2 by Nev G3RFS and Nick G3KOX in July this year resulted in more than 1000 QSOs on 6m, about 600 were made with UK stations. They also had 120 QSOs with W/VE stations, and a grand total of 35 countries in four continents. QSL cards started going out at the end of September. A splendid effort and many of us were given a new country because of this expedition, thanks Nev and Nick for your hard work.

**Swaziland;** A new station was worked on 6m recently, 3DAOBK. QSL information Franz Taschl, PO Box 122 Eveni, Swaziland. As far as I know GJ4ICD was the only UK station to work him.

**Nicaragua;** Jose YN3CC, now has a new callsign of YN1CC, but QSL information is the same; Jose Cespedes PO Box 2971, Managua Nicaragua.

## Geoff GJ4ICD Reports

During the last few weeks conditions on the bands have picked up, the OH beacon on 10m is very strong most of the day, and it seems that openings to ZS etc. on 6m are occurring about ten days earlier than last year, although later than 1988. Some remarkable DX has been worked around the world, for instance Z23JO worked into JA on September 29. The same day, WS to VS was worked on the long path, lots of TEP such as W to LU/CE/CX and of course to here in Europe. 48.250MHz video was received by K1JHW on September 29.

**IT9 status for DXCC;** I have written to K5ZMS explaining the situation here in Europe and it is going to be taken up with the ARRL. On September 30, 6m was open for a long time to Scandinavia and Africa, at 1707z I had a QSO with V51SW, and tried some 144MHz tests from 1705-1725z on 144.090, this will be the frequency I will now always use for tests. Now on to other things.

**70cm;** I am back on 432MHz at last! My equipment is an FT736R plus 50W driver and a 3CX500 triode and the antenna is a 24 element long yagi, so I hope to push up the 432 MHz square total. I have received a 30dBW permit for 144 MHz and during the last few days have been trying tests with V51/ZS, but so far nothing has been heard. However I think it will happen soon, as V51E has already worked last week into 3A2 and Italy, the 3A2 being a modest set-up, all I can do is keep trying.

**ZS Opening;** Late afternoon on September 20 saw a large opening to ZS. At 1500z I first heard ZS6AXT on the key at S9+, the opening had just started I

was told. There seemed to be a lack of activity, I called for 20 minutes but with no answers! Then came ZS6LN at S9+, and ZS6WB, ZR6AGN, and then the star of the afternoon, 3DAOBK was heard calling CQ at 1550z on 50.115MHz. Reports were exchanged (57) both ways from KG53. This was my 97th country, 426th square, 72nd GJ first, plus I think a British Isles first, what a surprise! Conditions continued with ZS6TVB, and all three ZS6 beacons were copied at good strength. At 1755z the band died with me. I had to go out so missed an opening to LU later. Great day.

**Another Great Day;** A word NOW about the strange dual propagation mode on September 21. At 1400z, the ZS beacons were received here at S5, this was at the usual beam heading of 145 degrees. But then finding that the 9L1 beacon was audible on this heading I moved the aerial to 200 degrees which brought the beacon up to S9+. After listening around for a while, many ZS stations were heard at a high signal level, so I moved the aerial back and forth between 140 degrees and 210 degrees to experiment. There was a null midway, but no difference in signal strength.

This was clearly a scatter region in the Atlantic Ocean. The 9L1 beacon was heard from 1400z to 1800z, the ZS6 beacons were heard from 1400z-1725z, V51VHF and V51E beacons were heard from 1600z to close down at 1810z. It is very unusual to have a strong ZS opening and, at the same time an opening to 9L1 for most of the afternoon. I was hoping for the 3X1SG to turn up but nothing was heard of him that day. So it looks like things are getting better. After all, we do not seem to have had these strong openings last year, well not in my log anyway. The forthcoming season looks promising, but who will know?

**Another New Country;** From early afternoon on October 5, the south African beacons V51VHF and V51E, followed by FR5SIX, ZB8VHF and 9L1US all came in at good strength. ZD8VHF was still there when I switched off late evening, during that afternoon I worked by Meteor Scatter my 98th country on 6m, DL6BCT, — only 2 to go!

## Next Month

For next month's VHF/UHF Message, as well as all the usual DX details, Smithy G8KG has promised a review of propagation conditions during 1990, and the second part of 'amateur television' by Roy G6OKB and Brian G8ZYZ will be included. Your comments on the new form this column is taking, reports, and items of VHF/UHF interest will be appreciated. Just drop me a line, either c/o of the editorial address, or direct to Ken Ellis G5KW, 18, Joyes Road, Folkestone. Kent.

# Satellite Rende

With the ever increasing interest in the Packet Microsats, this month Richard G3RWL provides information on what the near future holds.

## Answers About Future PACSAT BBS Operations

**Q:** 'Which PACSAT will commence BBS operations first?'

**A:** 'UO-14 is now about 80% functional with the BBS software. AO-16 will be brought to that level, then LO-19.'

**Q:** 'Will the TLM or Whole Orbit Data (WOD) format, frequency or any other parameters change?'

**A:** 'This is more of a spacecraft control than an application question.

don't see much of this type of activity. They would not want to see digipeating supplant the intended use of store-and-forward data, but if there is a big demand it would probably be addressed.'

**Q:** 'How will the 'user' ground software be distributed and tested?'

**A:** 'Nothing has been finalised. The first approach is to make a minimum implementation of the user ground-based software available, including C language source code, as shareware. They want to get something out soon, and, since the writers are IBM PC-based, availability of code will hopefully encourage others to write for MAC, Amiga, C-64, Unix, and

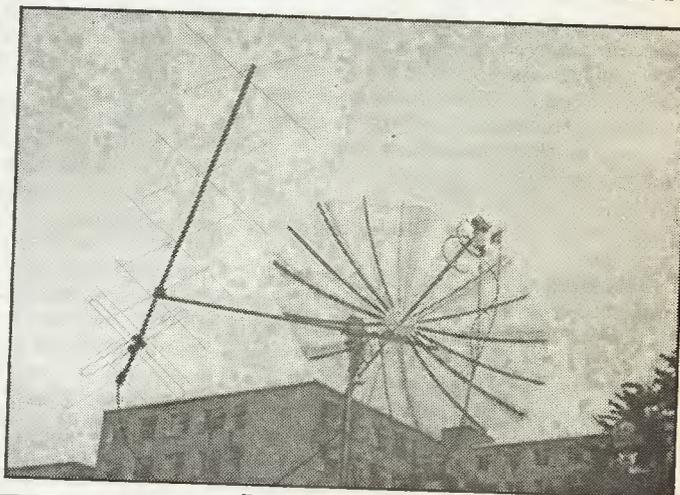
**Maarten (Max) Meerman PA3BHF at the UoSat Control Station.**

Direct connect BBS file transfer is done in frames sent to the user's address. The broadcaster controls the repetition rate for simultaneous broadcast files, based on the number of user's requesting a file, or the file's priority. The method for prioritising broadcast vs. direct connect (FTLO) is To Be Determined.'

**Q:** 'How will people know the BBS is running and available? Will they be able to tell by looking with an ASCII terminal program, with TLMDC or similar or will they have to have the ground software to tell?'

**A:** 'Much ado will be made. Also, you'll see frames sent to QST-1 with a PID of BBS.'

**Q:** 'Will the user ground software be



**Freddie ON6UG's AO-13 aerial system.** available before the BBS in the bird is turned on?'

**A:** 'Available, yes. Widely distributed? No. They have to have it running on the air to give it a good test, but don't want to subject it to simultaneous connects on the first day. Once a week's worth of testing by users has been done successfully, the shareware will be distributed, placed on CompuServe and elsewhere.'

**Q:** 'Will you be testing BBS and ground software together for a time prior to making ground available? How will people know that is happening?'

**A:** 'Yes, they will. This is happening now on UO-14. People will learn the same way as always, via official AMSAT Nets and publications.'

## Oscar 13

As stations who monitor the telemetry will have noticed, the battery voltage has been dropping to a rather low level during the Mode L-S-B operations between MA 195 and 205. To maintain

## AMSAT-UK this month provide a Question/Answer session on the PACSATs

There is nothing in the new code that will require a change. WOD will probably end up as files, and be downloaded or broadcastable. This means that it won't come down in frames sent to WOD, but the internal record format will be the same. There may be code compression on the WOD, but they may be running out of code space. If it is compressed, the ground station software will know how to decompress it. There would be no frequency changes.'

**Q:** 'Will people still be able to just digipeat through the PACSATs?'

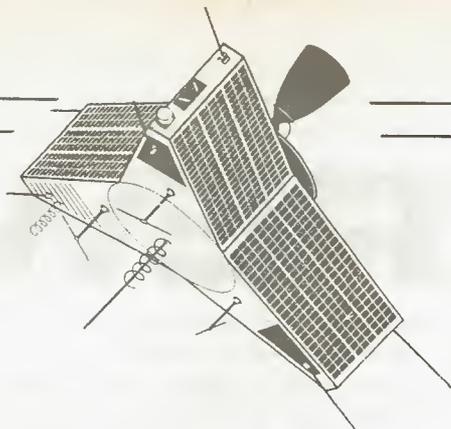
**A:** 'This has not yet been decided. Digipeating is a good way to check out your station. There isn't much demand for it in the long run, the Microsats are available now for digipeating, but you

others but they don't want to leave the impression that all AMSAT offerings are shareware. The minimum implementation will not be automated, and will not be pretty (colours, windows, pull-down menus, etc.) but will be more portable. The second approach is for Amsat-NA and Amsat-UK make available an 'all-singing-all-dancing' Pacsat ground station program. This will be automated, easily interfaced to terrestrial BBSs, and will have a fancy menu driven format. No source.'

**Q:** 'How will WOD dumps and BBS output be interleaved on the downlink?'

**A:** 'The broadcast protocol provides for demuxing broadcast files. This is probably how WOD will be done. These frames are sent to the address QST-1,

# VOUS



the voltage at an optimal level, Mode-S has been discontinued until the new transponder schedule on 17 Oct after the next attitude change has been commenced on 15 Oct.

Amsat Oscar-13 is experiencing eclipses around perigee until 09 Oct, so reorientation to a new attitude of LON 180 LAT 0 degrees cannot start until after then. The next reorientation will start on 15 Oct with a new transponder schedule starting on 17 Oct.

## Oscar 13 Schedule 17 Oct to 26 Dec.

Mode-B : MA 000 — 095  
 Mode-JL: MA 095 — 125  
 Mode-LS: MA 125 — 130  
 Mode-S : MA 130 — 135  
 Mode-BS: MA 135 — 140  
 Mode-B : MA 140 — 256  
 Omnis : MA 220 — 040

The next move to LON 210 deg LAT 0 deg will occur on 24 December.

## Fuji Oscar-20

JAMSAT reports that, since emerging from an eclipse period in late August, command stations have been having difficulty controlling the temperature on board. Battery temperature had risen to over 40 deg when Mode-JA and JD have been in simultaneous operation. Even after turning off both transponders recently, the indicated temperature was still at 35 deg. C. If the batteries are left at these elevated temperatures for any prolonged period of time, it significantly reduces the battery life. (As a point of reference, the Microsat Battery temperatures typically hover around 0 to 5 deg. C.)

Unfortunately, because FO-20 will experience eclipse-free orbits until next

May, the natural cooling off of the satellite during eclipse won't happen. Therefore, the reduction of transponder operation availability is one way to reduce the internal temperature build up. The command team will be monitoring satellite performance and operations during these times and may turn off the transponder if they determine that the satellite is in danger.

## MIR Activity

Austrian Amateurs are building a project called AREM (Amateur Radio Experiments on MIR) scheduled for January 1991. This augments current Russian Mir space station operations on 2m with an automatic beacon transmitter which will broadcast information in packet radio and in synthesised voice. (See this month's 'Radio Today').

A laptop computer will be connected to both a TNC and a voice synthesiser, which in turn feed the 144MHz transceiver. The TNC will use 1200 bps AFSK with the usual AX.25, so that all earthlings can receive the transmissions with their normal equipment.

The voice synthesiser will use delta modulation. Messages with greetings and general information will be transmitted in English, Russian, and German. Data transmissions will alternate with voice. The cosmonauts can, if time permits, switch off the beacon and grab the microphone for a QSO. Phase two (scheduled for November 1991) envisages an uplink and the use of simple BBS software.

## Hayden K2BZT

Amsat-NA regret to report the death on September 24 of Hayden Evans, K2BZT. Hayden, an early and active operator on AMSAT-OSCAR 6 and subsequent satellites, was the originator of the Satellite DXCC award.

## Amsat-UK News

A number of BBS sysops have called into Amsat Headquarters inquiring as to whether *Instant Track* was now being offered as shareware or is in the public domain. It seems that there are people who are uploading the software into BBSs from which anyone who dials in can download a 'free' copy. In many cases the copyright information is still intact when running the program.

None of the tracking software which Amsat offers is in fact shareware or in the public domain. The distribution of software is one of the major contributors to the funding of the construction, launch and operation of Amsat's satellites. These pirated versions of the software represent a serious threat to future spacecraft development. If any of you see any software which is being distributed by BBSs that does not look like freeware, please inform the sysop immediately. With many thousands of files on most BBS systems, it is not unusual for sysops not to look at all of them.

## New Oscar Guide

I've just finished the new 'Guide to Oscar Operating' and passed it on to Ron Broadbent of Amsat-UK, its planned to be published in time for Christmas. (*Ed's note — why not get your partner to put one in your stocking?*)

For further information about Amsat-UK contact: AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. Big SAE gets membership info. SWLs are of course most welcome.

### Keplers:

SAT:	OSCAR 10	UoSAT 2	A0-13	U0-14	LO-19	FO20	RS-10/11
EPOC:	90260.931877818	90268.04142506	90263.62168524	90266.22484339	90267.43158664	90261.57386249	90267.77847824
INCL:	26.0092	97.9423	56.8713	98.6921	98.6984	99.0356	82.9217
RAAN:	184.3937	317.2989	134.9262	342.0182	343.4593	290.4267	254.9370
ECCN:	0.5954699	0.0011803	0.7029521	0.0010529	0.0011784	0.0540429	0.0011340
ARGP:	176.6918	293.7999	236.1311	229.3009	222.9453	196.9758	195.4973
MA:	190.5773	66.1969	37.1395	130.7273	137.0809	161.2629	164.5823
MM:	2.05881694	14.657096130	2.09702232	14.28724065	14.29038750	12.83160374	13.72110926
DECY:	-5.8E-07	2.098E-05	-1.21E-06	6.91E-06	6.55E-06	1.1E-07	1.7E-07
REVN:	2664	35059	1740	3486	3504	2872	16310

SAT:	U0-15	PACSAT	DO-17	WO-18	Mir	Salyut 7	BADR-1
EPOC:	90265.07635239	90265.36721578	90266.410397	90266.11300440	90267.82606835	90267.72900166	90267.83173221
INCL:	98.6969	98.6987	98.6978	98.6989	51.6115	51.5988	28.4881
RAAN:	340.8409	341.3263	342.3824	342.1183	187.8282	157.1276	196.0972
ECCN:	0.0009497	0.0010630	0.0010896	0.0011375	0.0026528	0.0001840	0.0418544
ARGP:	231.0845	229.8888	225.7236	227.5911	82.5778	172.6105	169.4149
MA:	128.9521	130.1393	134.3066	132.4315	277.8169	187.5586	191.4885
MM:	14.28435847	14.28824015	14.28878142	14.28965575	15.59246468	15.73630878	15.27043635
DECY:	3.86E-06	6.24E-06	7.25E-06	6.05E-06	2.6386E-04	7.594E-04	3.6594E-03
REVN:	3469	3474	3489	3485	26367	48047	1069

# METREWAVE

A brand new amateur licence, some brand new VHF/UHF allocations to go with it and an unexpected shot in the arm for 'six', this would be headline stuff at any time. In 1990 it came to pass. In mid-year the details of the new Novice licence were made known. In a metrewave context they did not permit operation in either the 2m band or the 4m band but they offered the new Novice operator generous allocations in both the 70cm and 6m bands and, a real spur to experimentation, sizable slices of 23cm and of 3cm (1240-1325 and 10,000 to 10,500 respectively).

No exclusive Novice frequency areas are envisaged, the Novice operators will share their allocations with the existing populations that already thrive in them. This will be of great benefit to the newcomers by demonstrating to them how things should be done, in other words the 'how' of operating. This learning process will quite obviously turn very much on the way the present users of the bands play their part in promoting it. One cynic was

the SU simplex channels and all the repeater ones. Clearly, FM is to be the norm here. The band enjoys a reasonable level of activity except in the remoter parts of the land, to give Novices every opportunity to learn 'how it is done' and to share and enjoy the doing. At 6 metres the activity state has been so poor that the newly licensed Novice may feel little incentive to 'have a go' there, but see later for a description of that shot-in-the-arm which may transform the situation. Plenty of room, then, for the Novice to move around in within all four of the VHF, UHF and microwave allocations using easy to build low power transceivers, and the 'made it myself' ethic is an important part of the Novice licence concept.

## Rejuvenating 'Six'

The other headline-event of 1990 in addition to the Novice was the sudden and unexpected announcement that vertical aerials and mobile operation would be allowed in the 50-52MHz band

They have done so in no uncertain terms to 'Four' since the band was opened to all in June, 1987. If 'Six' follows the example set by 'Four' it will provide signals, and someone to talk to throughout the day, either at home or away. Maybe in a year's time when the round-up for 1991 goes through this typewriter it will express disbelief, noting the burgeoning mobile and vertically polarised activity which will have developed, that 'Six' could be the desert it was during the Eighties for most of the time. It might be added that the granting of mobility and verticality on 'six' occurred largely because many members of the metrewave fraternity pounded away at authority over a long period of time with such logical and irrefutable arguments that the concession became a 'must'.

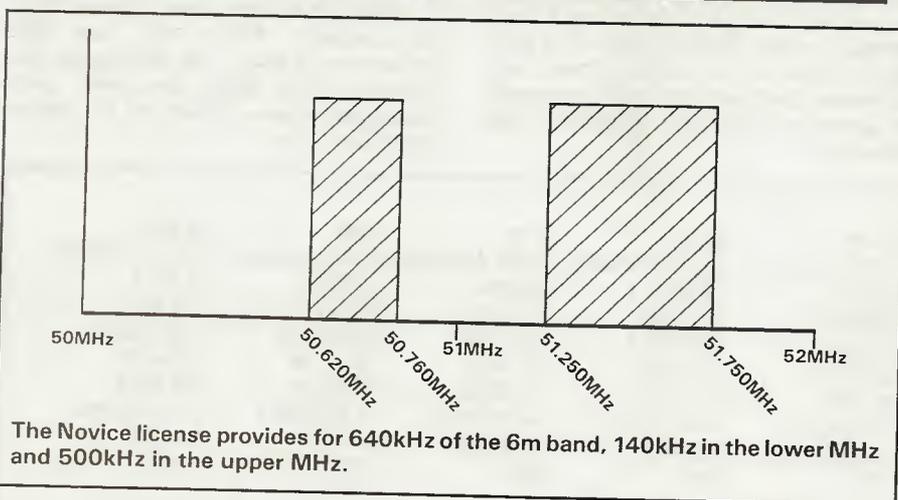
## What Rig For 6m Mobile?

This question will face the fraternity as they prepare for the new FM era on the band. Several answers to the question suggest themselves. First, the least expensive route to 6m FM is with the help of an ex-PMR mobile transceiver re-crystalled for the band, and of course retrimmed. The definitive articles on this subject were those by G4OUB in HRT May 1989, and G8AMG in HRT Nov 1990 which could truly be described as 'Six FM made easy'. Access to professional test and measuring gear isn't always necessary, but if needed the local supplier's tech-workshop will doubtless be able to oblige.

Secondly, a rather more expensive route is to pick up one of the 6m transceivers which have been appearing in quantity on dealers' shelves thanks to their former users' disenchantment with the band as being the place 'where nobody wants to talk to you'. It may be expected that prices of such equipments will rise as the demand for 51MHz FM gear accelerates during 1991. Nevertheless, some good bargains may be on offer.

Thirdly, there is the route of 'buying new'. To date few if any FM only transceivers for 'six' have appeared on the market, compelling the purchaser to buy an all-mode rig which he doesn't want unless he is a DX chaser. Another question 'What aerial?'. To date, polarisation in the horizontal mode has been mandatory and a variety of commercial aerials have been available. One of these turned in the vertical plane will amply fulfil the FMers needs and of course provide the great advantage of firing his signal in the

## In his customary twelve-months summary, Jack Hum G5UM takes a retrospective look at 1990's metrewave highlights



heard to observe that the reason the Novices would not be allowed on to 'Two' was that they wouldn't learn much from what they heard there!

A look then, at the Novice areas of 'Seventy' and of 'Six'. At 70cm there is a generous spread of 2MHz, embracing all

'later in the year'. This article may well have gone to press before 'later in the year' arrives, but let us not be grudging, for verticality and mobility on 'six' will turn out to be just what is needed to give the band that above mentioned shot in the arm.



wanted direction, and gaining many extra S-points.

For the operator who intends to chase the DX at the bottom end of 'six' but wishes to enjoy relaxed FM conversations in the rest of it, two aeriols will be needed, one horizontal and the other vertical, as has happened on 4m, 2m and 70cm.

### Repeaters On 'Six'?

Now for a slightly tendentious thought (cat straight among the pigeons). Who would like to have repeaters on 'Six'? When the subject is discussed over the air the arguments put forward are virtually self-cancelling. "Enough repeaters already on 'Two' and 'seventy' " and then, diametrically opposed. "Repeaters are a logical extension of mobile operation and will throw your signal a lot farther".

It is known that the authority views repeaters on 'six' with no enthusiasm. From what they overhear on 'two' can they be blamed? Yet there is a logical, if not practical, case for them. They may appear like a chimera at the present time, but so were verticality and mobile until mid 1990. A repeater service could avoid the Novice segment by placing inputs low, say, 50.750 to 50.950MHz and outputs high at 51.750 to 51.950MHz. All this postulates a 6m band much changed from the way it has been used to date. As one of its occupants remarked to your scribe, "Some of the DX chasing done on 'six' could equally well be done, and more efficiently, on 'twenty' " which was only half an argument.

For when the DX emerges sporadically on 50MHz, the urge seizes hundreds to go after it just as they do when the higher frequency bands exhibit anoma-

lous propagation. Thus it always has been and always will be, as deep down in the radio ham's psyche lurks the desire to project his/her signal as far as possible. In some of the 'super lifts' of the hot summer of 1990 it was quite an event for large numbers of operators to talk to Norwegians or Spaniards through their local repeaters. Many QSL cards were exchanged as a result, which was a bit of a waste of time and pasteboard when in fact it was the distant repeater that did the communicating and not the home operator. If a QSL were to be sent it should, in logic, go to the repeater even though there may often be no answer to it, repeaters can listen and talk but they can't write.

### Least Possible Power

To work the DX it has become axiomatic that you need lots of power. 'Cheque book ham radio' as it has been called. Once, QRP was the norm and QRO the exception. Today less so, to pile it on to get through at all costs ignores the fact that true amateur communicating skill is best exhibited, when the leastest is used to work the farthest, and mostest. During 1990 the misuse of power at 50MHz became so blatant that it prompted the suggestion that the miscreants should be named in the public print, misguidedly ignoring the fact that there is a law of libel in the land.

Said one G4 — — — to your G5UM: "You can detect the moment a chap switches his linear on. He cannot break the pile-up to work that rare DX, then suddenly his ground-wave signal doubles in amplitude". Said another G4 — — — "If they get their countries and squares by illicit means they are simply cheating themselves". Just a final thought about the use and misuse of power; Who will monitor the new Novice signals when they come on air to ensure that the restricted power levels stipulated are being observed? Maybe it won't be necessary. Maybe the Novice licensees, or many of them, imbued with the idealism of youth will take care to achieve

the most effective results for the least power.

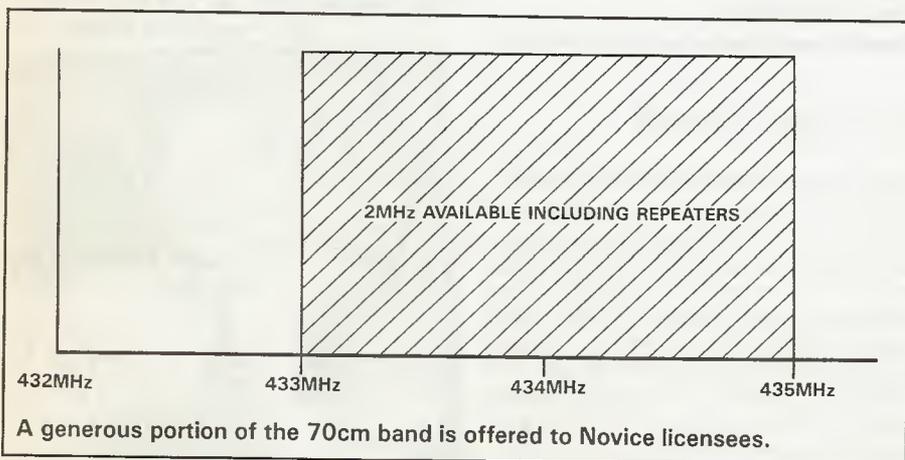
### Electronic Graffiti

Just one more piece of abuse needs to be mentioned, the abuse of repeaters. Both power abuse and repeater abuse represent different facets of today's society, which are "Me first and blow the rest" plus "Lets destroy it for the fun of it" — the football hooligan mentality. Plastering a repeater with inanities and profanities is to commit electronic graffiti. Like visual graffiti it seems inescapable. Eradication is possible only if a cautious and cost-conscious Radio Interference Service is prepared to hunt, identify and prosecute. A few instances were reported early in the year where miscreants received not very consign punishment. There could be many more, especially with the help of the large numbers of radio amateurs who themselves have been doing the hunting, often with equipment of ingenious sophistication. The state of mind that perpetrates any kind of graffiti is difficult for the normal person to fathom. There is no sensible reason for it. Ye who like not radio repeaters, do not destroy, just pass quietly on the other side. Leave to their enjoyment those who do like them, and wish to continue to use them in peace.

### Sins Of Omission

When one looks back over a closing year and tries to sum it up, one finds the task to be insuperable. So much is happening all the time on the metrowave front that many more pages than these would be needed to do justice to it all. No mention of microwaves, surely one area where ham experimenting is seen at its best, its most radical and it's most aesthetically profitable. No mention of the delights of CW, whose tactile pleasure resembles vehicle driving and the recognition of the rights and feelings of others. No mention of contests and their tests of stamina, human and electronic, allied to will power in the art of wrinkling them out. No mention of the awards which are available in profusion to the metrowave enthusiast in recognition of operating skill combined with single-minded tenacity plus the added bonus of certificates to cover up those damp patches on the radio room wall! No mention of all the hopefuls trying to master the Morse code ". . . to get me on the HF bands", understandable if you have never been there yet prompting the underlying thought, is their journey really necessary (to adapt a catch phrase much in use fifty years ago)?

The journeyings which may be undertaken in the metrowave spectrum are in plenitude enough to keep one person fully engaged for an entire ham radio life, And you don't even need to pass the Morse to traverse them!



# Leicester Show Report



New VHF/UHF products from Yaesu

The annual Leicester Amateur Radio Show is visited by thousands of amateurs each year, and the 1990 event was no exception. As usual the show was again held in the two large halls of the Granby Halls complex in Leicester, this being well sign posted from many routes into the city. For those who did get lost or couldn't find a car park, the talk-in station did a most efficient job in guiding amateurs in the right direction. This was often

of components to multi-thousand pound transceivers. Surplus equipment was also much in evidence, with many happy amateurs coming away clutching bargains for their new construction or conversion project.

## New Products

The show again lived up to its reputation of being the annual event where manufacturers choose to launch

mobile, and as with last year SMC again stole the show with five new products from Yaesu, the FT-990 HF transceiver, the FT-5200 2m/70cm and FT-6200 70cm/23cm dual band remote mount mobiles, and the tiny FT-26 2m and FT-76 70cm portables.

Personnel from Yaesu, Alinco, and Radio Tek flew into the UK especially to be on hand at their respective launches, again confirming the important status of this event. Mike Hayden of Waters and Stanton this time escaped a custard pie from Sheila the HRT editor (see our picture in the HRT London Show report), but guess which magazine had a van load of review goodies to take away to test for our readers?

## The HRT Stand

The large HRT and Scanners International stand greeted visitors just as they came through the main entrance, the 'new look' December issue being launched there. Editorial and advertising staff together with HRT contributors were on hand to answer questions, and our photographer Manny captured several unsuspecting 'shots'. Ken G5KW who also manned the stand throughout the



Seiji Yokoi (Yaesu) and Graham Taylor (SMC) reveal the FT-990



Mike Hayden of Waters and Stanton this time escaped a custard pie

## This year's show, again a great success

needed, as the large Cattle Market car park some walk from the venue was quickly filled to capacity, and the even more distant football ground car park needed to be used after an hour or so of the first cars arriving.

Once through the entrance, the visitor was greeted with a full day's worth viewing of amateur radio stalls displaying all manner of goodies, ranging from bags

their new amateur radio products. This year, Icom UK launched their W2 dual band portable, Lowe Electronics their new TH-77E dual band portable, Lee Electronics their Standard C5600 dual band mobile with remote display microphone, Raycom their Radio Tek 2000 40m/15m/10m HF mobile, Waters and Stanton their Alinco DJ-560 dual band portable and the DR-112 low cost 2m





**Beryl of Lowe Electronics models the Kenwood TH-77E portable**

show gave an impressive display of QSL cards, and many old friends arrived including HRT contributor Jack G5UM and his wife Grace who we were honoured to welcome at our stand.

Our regular *Scanners International* contributors of Peter Rouse, Alan Gardner, Kevin Fox and Jonathan Clough were also there in convivial surroundings, the regular sound of the corks popping later in our small hospitality area causing much mirth (there is absolutely no truth in the rumour the corks were all aimed to land at one stand across the hall!). Kaye and Donna from our advertising department came away with a record interest shown

**The Standard remote microphone mobile**



from both readers and traders, and even Terry the Managing Director of our magazine group was pleased at the large number of hands he shook throughout the event.

**The Less Popular Side**

As with many events where large numbers of people gather, the less attractive elements of our society also make an appearance. This year, it was reported that at least eight cars were broken into at the Cattle Market car park, the Leicester Show committee being quick to respond by placing extra staff on vigilant duty there. Unfortunately, the main hotel used by exhibitors was also frequented with one unsuccessful break-in on the Thursday night, and on the Friday night with the theft and vandalism of the HRT editorial vehicle complete with the loss of much equipment. So if the HRT editorial staff seemed a bit grumpy on the Saturday afternoon at the stand, please accept our apologies!

**See You Next Year**

The Leicester Show was again a great success, a credit to the organisers who are formed solely from amateur radio groups in the Leicester area, with any show profits going to further the cause of amateur radio. Keep up the good work lads, we'll see you all there again next year.

# QRP CORNER

Several items of interest have appeared over the past month. The news first this time. Colin G3VTT (229) tells us that the OK boys have started a new QRP club, it has just published its first magazine OK-QRP. The UK QRP club has had ties with Czech operators for several years now, and the club has organised several week-ends of activity between UK operators and our Czech friends. It is nice to see them getting ahead. You can get more information from Peter OK1CZ, U1, Batterie I. PRAHA, Czechoslovakia. (Peter is member number 426). It is understood that membership may be available for 15 IRC's, but check first.

I know this is the January edition of the magazine, I know it is also appearing in December, so here are details of the G-QRP club winter sports. This event is not a contest, just a way of generating some interest in QRP activity between the Christmas pudding and the new year hangover. The rules are printed in detail in SPRAT, the club magazine of the G-QRP club, but briefly they are; *Operate QRP on*

## Dick Pascoe G0BPS of the G-QRP Club shows us how to improve our ERP

any of the bands between 26th December and 1st January. Work as many other QRP stations as possible. If you intend to operate on 80m in the morning please avoid the normal QRP frequency of 3.560 between 0600 and 0800. Leave this for the DX boys. Us lesser mortals will QSY to 3.570 for this two hour period. Don't forget, 3.560 (3.570), 7.060, 14.060, 18.080, 21.060, for CW QRP contacts. More information and completed log sheets to Gus G8PG (04) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on QRO do not count, and the whole QSO must be QRP!

Rumour has it that 40m has been very busy lately, so why not try 50MHz. It can prove to be a wonderful band, full of exotic DX when it's open, try 50.060MHz. Many other VHF addicts also stick to QRP on VHF too, why not give that a go?

## Great Yarmouth

Over 60 QRP operators attended the 'QRP beside the Seaside' organised in Great Yarmouth by Dave G30EP (484), set in the relatively new Garnham Centre

of the United Reformed Church. The event was very well presented, it is understood that it even made a profit, with £15 being sent to the RAIBC.

The author managed to get there and envy some of the gear. A wide range of homebrew equipment was on display from keyers to a 2m FM rig, via several HF rigs and much test equipment.

## Expeditions

Since writing last month's column, the author has had a lot of fun, operating QRP from some 'rare' countries. Visits to HBO (Liechtenstein) and LX (Luxembourg) brought a fair bit in response to CQ calls, more on this later. Another avid QRP operator also held his own DXpedition, Tony G4TPB (1647). He went to a remote part of Wales on the Llyn Peninsula near Pwllheli, and using homebrew equipment he managed to work, amongst others, Dave FY/DJ0PJ (4436). Well done Tony, apart from the rarity of French Guiana popping up and a QSO resulting, it was QRP both ways. The aerial that

rig from Japan will not necessarily outperform a jaded KW valued at about £100 if both are fed into a G5RV aerial. If only those with wire aerials would sell their £500 amplifier or the £3000 rig, and buy a second hand tower and a beam. The aerial gets the RF out, not the rig (*he's on his hobby horse again* — Ed).

Talking about aerials, the cost of commercial aerials today is sometimes horrendous; so, as per the ideals of QRPers world wide, why not make one? As normal, any beam aerial is a compromise, maximum forward gain does not equal a good 'front to back ratio' so a compromise has to be made. One way to ascertain how any aerial works is to use a field strength meter.

## Field Strength Meter

Using one of these, you could check how well any aerial is radiating in any given direction, check that front to back ratio, or even test between different designs of aerials. This design comes over from the states where it has proved quite popular, and it uses only a few components.

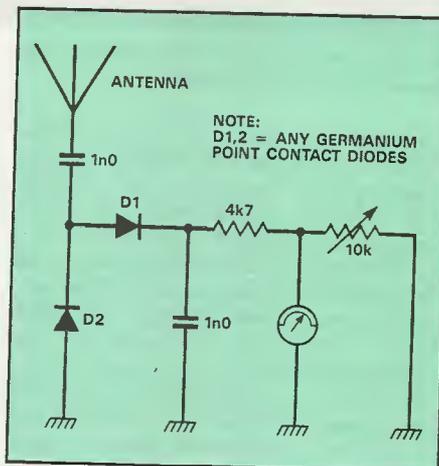
Looking at the circuit in Fig. 1 it will be seen that only a few components are used. This keeps in with the QRP standard KISS principle (keep it simple, not what you're thinking!).

In use, RF is coupled to the unit and into D1 and D2, these are used as a voltage doubler. This developed voltage is then 'seen' across the resistors R1 and R2, the latter is the sensitivity control. As RF is sensed by the unit, the voltage generated is fed to the meter via R1 thus actuating the meter.

The most expensive part of the unit is the meter, but these can be found at most rallies for under £1, and indeed only cost £7 new. It should be remembered that most values of meter can be used, it is not critical, 50uA to 1mA will normally be OK. A PCB is not essential, just mount the components 'ugly style', it will still work OK.

Testing is quite simple. Just connect a short piece of wire to the mount, fire up the rig, and rotate the sensitivity control as you increase the signal to the aerial. Do start with the unit on low sensitivity, to save the needle being hammered hard over. This FSM is not intended to be an accurate RF measuring device, but it will give a relative indication of field strengths around an aerial.

That's it for this month, ideas and reports to me please via the HRT editorial address. 73's for now BCNU.



Dave was using is of note, he was using a loop aerial with sides of just one metre long, this on 20m too. It shows what can be done using low power and simple aerials.

On the point of simple aerials, Peter, PE1MHO (2543) has been using a home brew delta loop aerial on 50MHz, he has over 40 countries so far, and all QRP! Peter operated from some rare spots in Scotland during his holidays with his UK call, GM7ECO. He tells me he is still waiting for a QSL to confirm GJ.

## Aerials

The QRP fraternity has for years tried to convince the amateur world that the latest all singing, all dancing £3000 plus

# A Ghostly Message

Toby entered the 'Wig and Pen' and made his way through to the saloon bar. Custom in the form of Christmas Eve revellers was already building up, but he saw Harry and Tom in their usual corner, already well into their respective pints. Toby ordered a half of bitter and took it over to join them. This was a weekly gathering place for the group, all were members of the Hilldale Radio Society and attended the monthly meetings, but they found the intervening time too long without radio talk and used the 'Wig and Pen' venue to catch up on DX and other topics.

## All Alone

"On your own for Christmas I hear?" Tom grinned at Toby as he pulled up a chair. "Good chance to get on the air eh?" Toby smiled. He'd told a few friends that Marjorie had left with the kids to spend Christmas with her mother who had been ill. Due to work commitments he'd been unable to go with her which meant he would be on his own over the Christmas

say?" "Nothing that made much sense," answered Toby. "The QTH was given as Eton but it was a YL on the key, or so they said. The Morse was terrible and each time the transmission ended suddenly as if it had been interrupted." Toby remained silent for a moment, thinking about his experience.

## No Chance

"You're imagining things," decided Tom, sarcastically. "You've been spending too much time on the air just because Marjorie's away. I've noticed your lights still on these last three nights when I came off shift, you're overdoing it." "Don't talk wet," snapped Toby and then wished he hadn't. He looked at his companions through strained eyes. He was tired and he knew he had been spending all his available time on the air but it hadn't affected his senses.

"Well relax a bit," smiled Tom after a few moments, relieving the tension. "Give it a miss tonight anyway, after all it's

but Harry broke in. "OK, I'll listen for you tonight. Let me know what frequency you intend using." They stayed on for one more round but it wasn't a convivial occasion. Toby remained silent and in spite of his friends' attempted to make light of the matter, a feeling of gloom settled over the small corner. This was in sharp contrast with the rest of the inhabitants of the 'Wig and Pen' who were bent on letting themselves go on this special night of the year.

## On The Air

Later that evening, Toby switched off the rig and went downstairs to make himself a final cup of tea. He was tired and felt like nothing on Earth. The mysterious G2SB had once again appeared before he'd even touched the key, stronger than ever but still with the eerie flutter that had accompanied the earlier signal. In faltering Morse a brief exchange had taken place. Toby's thoughts were interrupted by the sound of the telephone. It was Harry.

"Well, what did you think?" asked Toby quietly. "I think you're pulling my leg mate," laughed Harry and then added, "didn't hear anything." Toby frowned, "what do you mean, I was talking for about 10 minutes." "Oh yes, you were. I could hear you loud and clear but I couldn't hear the other station. So I repeat, are you trying to pull our leg?"

Toby was confused. This didn't make sense. Harry was less than a quarter of a mile away and should have heard everything that had been sent. "Listen Harry," he blurted out, "I swear I had a contact tonight with that station just like the other times earlier today, there was a message about Cyril, does that mean anything to you?"

## Realisation

There was a moment's silence from the telephone. Then Harry said quietly, "Cyril was Gladys's husband." Toby was speechless. His mind went blank and then it was as if a multitude of stations were calling him in Morse, all at once. He screwed up his eyes as if trying to shut them out. He was brought back to reality by the sound of his name and realised it was coming from the telephone.

"Toby, Toby," "Yes I'm here," he replied wearily. Harry's authoritative tone demanded attention. "Now listen, stay there I'll be right over."

Toby was seated in darkness, when fifteen minutes later he heard a car pull up outside the house and saw the headlights

## Our annual Christmas chiller, by G3OXC

period. He'd spent most of his spare time until now on the air.

"You look rough," remarked Harry. "How many new ones have you worked?" "You could say I've been rather active," Toby smiled as he leaned forward to take the first sip of his beer. "And I worked an old member of the club who wished to be remembered to you both. G2SB, does it ring a bell?"

"Gladys Brown!" said Tom with surprise. "Can't be, she passed away about ten years ago. You sure of the callsign?" "Yes," said Toby. "Could be someone pirating the call," observed Harry. "Well whoever it was they seemed to know you old timers," laughed Toby. It was a joke between them that Toby was a mere youngster in the group. He suddenly became serious and continued; "To tell the truth I've worked this station three times today on different bands and there's been something weird about each contact. Each time I had just switched on and was about to call 'CQ' when G2SB called me first, on my frequency. Very slow Morse but a strong signal."

"Well that's unusual for a start," remarked Tom. "Gladys was a phone lady, never used the key much, what did they

Christmas Eve. Same again?" he looked at the other two and receiving nods, made his way to the bar for replenishments. Toby remained silent. He screwed up his eyes and dropped his head forward into his hands. Harry looked at him for a few moments and then spoke quietly.

"Can you remember anything else, what was actually said?" "There wasn't much time to say much. The Morse was very slow and not very good, whoever it was kept making mistakes and repeating words. The first time, your two calls were mentioned and the next time she asked my address. It was just like someone being away for a long time and wanting to refresh their memory. What puzzled me was the fluttering all the time."

"It must have been a pirate," Tom had arrived back and caught the end of the conversation as he was setting the drinks down on the table. "Or someone we know playing a joke. Must admit it's not my idea of a joke though." Toby thought for a moment. "There's one way we could check this out. Will you listen for me? Tonight at exactly ten o'clock. You monitor us both and then tell me if you don't think there's something weird". He looked at them expectantly. Tom started to decline,

go out. He had left the door open and was slouched in a chair when Harry entered. "You OK?" asked his visitor. Toby looked terrible. This whole business was obviously affecting him badly. Toby looked up at him. "You're trying to tell me you heard all my signals but nothing of the other station?" he said weakly. "That's about it," replied Harry. "There was just silence when you passed it over."

### On With the Rig

Toby stood up unsteadily and beckoned Harry to follow him up the stairs and into the small third bedroom which served as the shack. He sat down at the rig and switched on. There were no intelligible signals. He switched the equipment to tune and check the SWR. He was ready to transmit.

They waited expectantly but nothing happened. Toby remarked that previously the mystery station had been so strong that he had been obliged to turn down the audio gain. But this time there was no such signal. After a few more minutes Toby gave a short call. "G2SB G2SB G2SB de..." and paused, but there was no response. He turned a confused face to his companion. "You do believe me don't you Harry?"

Harry looked at him for a moment and then spoke, "have you any record of what was received tonight?" he asked. Toby reached forward and searched amongst the scraps of paper on the desk. He singled out the sheet on which he had copied the last transmission. They gazed at it together.

"See," said Toby catching his breath, "this shows it was a woman, I copied 'YL TSOHG'. Admittedly Tsohg is a strange name, it sounds Japanese, but there are many names like that now. And here," he pointed to a string of characters, "the name Chester is mentioned. This is strange because the first time the location was given as Eton."

### Let's Find Out

Harry was concentrating on the rest of the scrawl. Toby had said the Morse was poor and the fact that he had copied down the numerous repeats did not make the result very clear. Eventually they were able to form a short intelligible sentence from the notes. 'Help Cyril at Chester.' Harry gazed at the writing for a moment and then raised his head to look directly at Toby. "Wait a minute," he said, his eyes brightening. "Cyril and Gladys used to live in 48 Chester Road on the other side of town." He stood up and made his way to the shack door. "Come on," he shouted over his shoulder as he ran down the stairs, "we can find out."

As the car turned into Chester Road, Harry and Toby remained silent, neither had spoken during the journey. Harry now wondered if they were on a wild goose chase, or had there really been some semblance of intelligence in the cryptic message. Again the whole episode could have been contrived by some prankster, or could it?

Harry slowed down as he approached the end of the road, and the car came to rest outside No. 48. A light was just showing behind a curtain in the front room. They left the car and moved quickly up the pathway to the front door. Harry rang the bell. A few moments later was opened cautiously and a young woman looked out. "Yes?" she asked. "Cyril Brown, does he live here?" asked Harry. "No" said the woman. Harry's face fell. He looked at her, biting his lip. "You don't know the name at all?"

"What's the problem?" the door opened wider and a man moved the woman aside. Harry tried again, half-heartedly. "Cyril Brown, does that name mean anything to you?". The man looked at them for a moment, thinking, and then his eyes brightened. "Yes," he said "thought it was familiar. We bought the house from him years ago, we never met but I remember the name when we were

signing the papers at the solicitors." Harry's face fell. "You've never met him, and he's not here now?" "Definitely not mate, sorry." They made their apologies and left.

### On the Way Back

Harry was deep in thought but Toby was now becoming agitated and kept muttering to himself as they returned to the car. Harry started the engine and moved off. Knowing the area, he made a sharp left turn into a deserted lane which would eventually lead them back onto the main road.

It was pitch black, Harry drove very carefully because of the many potholes on the old track. Leaning forward and staring through the windscreen, it was fortunate that he was alert enough to see a small figure, laying against the fence at the side of the lane. It was Cyril, lying there distressed and in a state of extreme exhaustion.

On the broadcast radio that Christmas morning came the news that the county police had called off their search for an elderly widower who had not returned to his retired people's home. He had been found in a very ill state on a deserted lane, apparently trying to return to the house he had shared for 40 years with his departed wife. Doctors at the hospital who had successfully worked through the night to save hi said that if he had not been found that night he would have certainly died of hypothermia. It was reported that the first words that came from his tired lips when he awoke were "Thanks, Gladys".

On New Year's Eve, Toby was in his shack clearing his desk, when he came across the first message he had copied from G2SB. He looked at it for a few moments and then it dawned on him. By reversing the letters spelling out the QTH and name received as 'ETON YL TSOHG' he realised in fact the message read, a 'GHOSTLY NOTE.'

## Coming Next Month

### Reviews

Alinco, low cost 2m mobile

Kenwood TH-77E

Dual Band Portable

Dealer Profile — Anchor Surplus

Starting on Satellites

Part 2

Plus all the regular

'Big Names' in

Amateur Radio.

# Club

# News

## *The latest get-togethers*

**Bromley and District Amateur Radio Society** meets on the third Tuesday of each month, 7.30pm for 8.00pm, at the Victory Social Club, Kechill Gardens, Hayes, Kent. Their forthcoming events include; Dec. 18th. Christmas Party.  
Jan. 15th. AGM.

**South Bristol Amateur Radio Club** meets every Wednesday at the Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Bristol, Avon. BS14 0LN. Events for December and January include;

Dec. 5th Judging for Terry Dunsford Trophy.  
Dec. 12th HF contest evening.  
Dec. 19th Christmas party.  
Dec. 26th 2 metre activity evening.  
Jan. 2nd Photographic equipment evening.  
Jan. 9th HF activity evening.  
Jan. 16th 1991 Bristol rally planning.

Events and dates often change, so for more information Tel. Whitchurch 832222 on a Wednesday evening.

**Chichester and Dist Amateur Radio Club** meet at St. Pancras Hall, St. Pancras, Chichester, first and third Tuesday each month at 7.30pm. Dates to remember;

Dec. 4th Club meeting  
Dec. 18th Christmas social evening with presentation of the Marcuse Trophy.

For further details, Tel. Chichester 573541.

**Dover Amateur Radio Club** meet at Dover YMCA Godwynehurst, Leyburne Road, Dover, Kent CT16 1SN every Wednesday at 8.00pm. Dates for December and January are;

Dec. 5th Natter night.  
Dec. 12th Visit by RSGB RLO (to be confirmed).  
Dec. 19th Christmas social.  
Dec. 26th No meeting.  
Jan. 2nd No meeting.  
Jan. 9th Novice training course discussion evening.  
Jan. 16th Natter night.  
Jan. 23rd 50MHz — A Valuable resource, a talk by Ken Willis G8VR.  
Jan. 30th Natter night and security marking evening, G8ZYZ.

**Dragon Amateur Radio Club**, North Wales, GW4TTA. Their contact man is Tony Rees, Tel. 0248 600963. They meet at the Four Crosses, Pentraeth Rd, Menai Bridge. 7.30pm, on 1st and 3rd Mondays.

Dec. 3rd Club talk  
Dec. 17th Christmas party (ticket only)

**Halifax & District Amateur Radio Society** meet at The Running Man, Pellon Lane, Halifax at 7.30pm every 3rd Tuesday.

Dec. 18th Christmas social with free pie and peas.  
Details from David Moss on Halifax 202306

**Horndean and Dist Amateur Radio Club** meet at the Horndean Community School at 7.30pm, Barton Cross, Horndean, Hants.

Dec. 6th Weather and propagation by Ron Lobeck TVS.  
Jan. 3rd High Tech test equipment by Hewlett Packard.  
Further details from S. W. Swain Tel. 0705 472846

**West Kent Amateur Radio Society** meet at the school annex, Albion Rd, Tunbridge Wells, Kent. Further details from R. J. Taylor, G3OHV, 'Eagles Rest' 9 Jefferies Way, Crowborough, E. Sussex TN6 2UH. Dates for your diary include;

Dec. 3rd Xmas social held in conjunction with the Seven Oaks Radio Club at Seven Oaks.  
Jan. 18th TBA

**Keighley Amateur Radio Society** meet at the Ingrow Cricket Club.

Their programme for December is;

Dec. 6th Natter night.

Dec. 13th Natter night.

Dec. 20th Christmas buffet.

Further details available from Kathy, on Bradford 496222

**Midland Amateur Radio Society** meet on Tuesdays at 7.30pm. at Unit 16, 60 Regent Place, off Caroline Street, Birmingham, B1 3NJ.

Dates for December are;

Dec. 4th Christmas party.

Details from Paul O'Connor G1ZCY Tel. 021 443 5157.

**Northern Heights Amateur Radio and Electronics Society** meet on the first and third Wednesdays each month at the Bradshaw Tavern, Nr. Queensbury, Bedfordshire, at 8.15pm. Events include;

Dec. 5th Alignment evening with Alan Robinson G3TQA.

Dec. 19th Social evening.

Jan. 2nd Video evening.

For details contact Stan Catton G0IYR on 0274 673116

**Nottingham Amateur Radio Club** meet every Thursday evening at the Sherwood Community Centre, Mansfield Rd, Woodthorpe at 7.30pm. Their events include;

Dec. 6th Forum.

Dec. 13th EI2VPX — talk by G1WBZ.

Dec. 20th Christmas social.

Dec. 27th No meeting.

Further details from Geoff G8OHC, Tel 0602 754666

**Reading and District Amateur Radio Club** meet at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading, Berks. Meetings start at 8.00pm. Club events are;

Dec. 13th AGM with cheese and wine.

Dec. 27th Christmas informal drinks party.

Further details can be obtained from the club secretary Mike Anthony, G4THN, Tel. 0734 774042

**Stourbridge & District Amateur Radio Society** meet on the first and third Monday of each month at the Robin Wood's Community Centre, Scotts Road, Stourbridge.

Programme of events;

Dec. 3rd On air and natter night.

Dec. 17th Club talk.

Jan. 7th On air and natter night.

Jan. 21st Sounds of yesteryear, by J.P. Stroud.

Their secretary is Dennis Body G0HTJ.

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

Dec. 10th Chaired discussion.

Dec. 24th No meeting.

Jan. 14th Projects evening (bring your project along).

Jan. 28th New year social, Gay Dog, Lower Quinton.

Details from A. Beasley G0CXJ. Tel. 060 882 495.

**Welwyn — Hatfield Amateur Radio Club** meet at two venues.

Events at the Lemsford Village Hall, Bocket Road, Welwyn Garden City include;

Dec. 3rd AGM.

Events at Knightsfield Scout HQ, Knightsfield W.G.C.;

Dec. 17th Christmas social event.

Details from Roger Curtis. Tel. 0707 324958

**Wimbledon and District Amateur Radio Society** meet on the second and last Friday of each month at 7.30pm, in St Andrews Church Hall, Herbert Road, London. SW19

Dec. 14th Christmas social

Further details from Nick on 081 330 2703

**Yeovil Amateur Radio Society** meets every Thursday 7.30pm at the Recreation centre, Chilton Grove, Yeovil. Dates for your diary are;

Dec. 6th Low pass filters by G3MYM.

Dec. 13th The VK/G propagation phenomenon by G3MYM.

Dec. 20th Mince pies and on the air.

Dec. 23rd Natter night and committee meeting.

Further details from the Chairman, Adrian G4JBH. Tel. 0935 28341.



# Free Readers Ads!

## FOR SALE

**Redifon R50M** receiver (valve set) in perfect working order, complete with many spares, £50, buyer to collect. Tel. (Cloughton, Scarborough) 0723 364282 daytime.

**Trio TR2200G** 2m handheld transceiver with batteries, charger, and 10W, 12V power amplifier, ideal portable or mobile, £90. SR9 2m receiver, tuneable and complete with 10 crystallised channels £50. All in very good condition. Tel. (Guernsey, C.I.) 0481 47278

**HF 225** with Synchronous AM, £300 ono. VIC 20 with 16k expansion, Technical Software's RX-4, Morse tutor, Morse text, RAE maths, locator, TIF-1 interface, offers. Please call in or write to Mr. S. Brown, 33 Market Street, Millom, Cumbria.

**Sommerkamp FT250** little used, very good condition, full 10m £200. FRG7 with digital readout, FM demodulator and SSB filter fitted, £140. Contact Tony Jaques G3PTD, 88 Sandy Lane, Stretford, Manchester M32 9BX. Tel. 061 865 9398.

**Oscilloscope**, Hameg 203-6, 20MHz dual trace with probes, 250. Realistic PRO2005 scanner with discone, £250. Bencher iambic key, £55. Codemaster CW teacher and RTTY decoder £40. Himound HK 702 straight key, £30. Tel. (Lambton, Washington) 091 415 1550

**FT 757GX**, handbook, desk microphone used mainly QRP, £575. Also FT102, fitted FM, AM boards, CW, microphone, handbook, used only as receiver for three years, £475. Two 88 element Jaybeam Multibeams for 70cms, offers. Contact P.J. Thomas of Brecon, Powys. Tel. 0874 3815

**Philips D2999** synthesised receiver, 0.15 to 30MHz, AM/SSB plus FM broadcast. 7 Watts audio, similar size and configuration to Trio R2000, excellent condition, £125. Delivery may be possible. Contact M. Farmer of Bury St. Edmunds Tel. 0284 704152 evenings.

**JupiterII** scanner, just 3 months old. Original box, immaculate condition, cost £300 new but will accept £250. (Stevenage). Tel. 0438 720910 for details, ask for Bob.

**AOR2002** all mode scanner. 25-550MHz, 800-1300MHz, £320 ovno or part exchange for Icom IC-R100 or Yaesu

FRG9600MkII with cash difference. (Northwich, Cheshire) Tel. Brian on 0606 46366

**Caravan Mini Thompson Glen**, in need of slight service, not been on road for two years, very good condition otherwise, £250 ono. Will consider part exchange for a slimline Telescopic tilt over mast WHY. Tel. R. Pearson, Fareham, Hants 0705 321857

**Ex-MoD Receiver 2-16MHz AM**, SSB, CW filter model No. R210 converted to mains and L.S. output, £50 ono. Tel Philip Lock of Aldershot on 0252 624955 daytime, or 0252 332035 evenings.

**FT707, FC707, and FP700** £600. FRG7, £99. Hy-Gain 5 10m multimode £75. Tiny-2, latest Tfirmware, £99. Tel. GODVD, 0922 476279 weekends only.

**Bearcat 202FB** base scanner, mains and car use, good audio. Boxed, good condition, £100 ono. Sony ICF7600A portable receiver, FM/MW plus 7 SW bands, good condition, £40. (Streatham, S. London) Tel. 081 769 4389

**PRO2004** Scanner in very good condition, with wide band discone, coax, brackets, rawbolts etc. All you need to start up! £25-1300MHz coverage, only £250 ovno. (Southport) Tel. 0704 20356 after 6.00pm please.

**Eddystone 770R** VHF receiver, excellent condition, £150. Thomson TV black and white 12 inch tube, ideal DX/TV, VHF/UHF, pos/neg, 240V AC/12V DC, 5.5MHz & 6.5MHz sound, £50. Sanyo receiver 8700RP, fast/slow tuning, analog, AC/DC, wide/narrow, sw 1-4 all OBF's + FM/MW, very sensitive, suit young SWL £15. Up-converter by Labgear DX/TV, offers. Contact Mike Evans, 120 Loughton Way, Buckhurst Hill, Essex IG9 6AR.

**Icom IC R71E** general coverage receiver, fully loaded. Would like to swap for HF transceiver 720A or similar. Also have 10m Belcom LS102 transceiver, all mode, will swap for 2m transceiver, or HF ATU, no rubbish please, Tel. G. Sutton (Gwynedd) on 0248 602206 anytime.

**Selina 215** 8 band Russian receiver, battery and mains, as new, £25. LR2 vert 2m aerial Jaybeam, never been used, £40. Sony ICF2001D synthesised receiver, Air/AM/FM 150kHz-30MHz, 76-108MHz, 116-156MHz, 32 programable memories, battery and mains £250. Tel. Brian (Calne, Wiltshire) on 0249 816334 after 6pm and weekends, all items collection only.

**AVO Model 8 MK.V**, Pan-climatic, NATO Spec, unused condition, £85. Yaesu FT200, re-valved, re-aligned, mint condition, £295. AR88LF, re-valved, professionally re-aligned, £125. Advance audio generator type J1, re-aligned, £10.95. Yaesu FC301 ATU, £95. Airmec mod meter, £20. Contact J. Pearson, G3KOC, QTHR. Tel. Humberside (0469) 30453.

**Drake R7** receiver, superior dynamic range, selectivity, sensitivity, very good condition and working order, 2.4kHz crystal filter and AM wide, £850. Drake crystal filters for R7/R7a, 500Hz, 1.8kHz, 4.0kHz, £55. Drake Aux 7 board for R7, £50. Contact Keith (Hounslow, Middx) on 081 570 5603

**Icom IC2SE** handheld 2m portable, as new used only once. Fully boxed, includes case, quarter wave whip and four inch stubby, £250. Contact R. Berry (Milton Keynes) on 0908 690039

**Sony Air-7** VHF scanner fully synthesised 144-174MHz, 108-136MHz, 76-88 MHz, complete with 240V-6V power adaptor, boxed with guarantee and receipt, £175. Contact Dev Gale (London) on 071 474 3413 after 6pm.

**FT201**, works well, £220. TET 2 element minibeam, 180 countries worked in 2 years, £65, try before you buy. Contact Ron (St. Helens, Merseyside) on 0744 57471

**Nems Clarke** special purpose receiver type 1306, 30-260MHz, £150 ono. Contact Dave (Keevil, Wilts) on 0380 870801 evenings.

**Trio TS711E** 2m base station with built in power supply, 25 Watts, PTT switching for linear, boxed and in mint condition with manual and mike, £550. 2m Microwave Modules linear amp, 10 Watts in 100 Watts out, £110. 70cms Microwave Modules linear amp 10 Watts in 50 Watts out, £95. Contact A. Trusler (Shoreham-by-Sea, W. Sussex) on 0273 462696 after 6pm.

**Yaesu FT208R** 2m hand held transceiver, memory channels, keyboard control, includes speaker mic, charger and manual, good condition, £150. Tel. Gravesend (0474) 569225

**HRO-MX** Superb, condensers replaced, nine coils, buyer collects (Saturdays, Sundays) £100, cash only. Contact Mr. Walker, 35/37 Brighouse and Denholme Rd, Opposite Raggalds Inn, Queensbury, Bradford BD13 1NA.

**R107** 1.2-17MHz VGC, £65. Wavemeters Class D, MkII £20, MkIII £25. 100/1000kHz Xtals for class D wavemeter £5 each. Petrol generator 6V 6A boxed VGC, £50. Gyro-unit 8112 new £20. Command RX BC453B 190-550KHz £35. Tel. J. Stables on 091 410 3706

**IC 735**, FL63A filter fitted, VGC, £650. Tel. Peter Haughey on 0908 642398 (Bletchley).

**American and DX callbooks**, £12 each plus postage, or £25 the pair postage paid. Contact M.J. Faulkner, G3IZJ, 35 Abbey Way, Farnborough, Hants GU14 7DD Tel. 0252 548561

**Microwave Modules MM2001** RTTY microprocessor, plugs between any receiver and television. All baud rates covered, cost £140 sell for £75. Contact Dave G4EZF, Tel. 0457 62799 (Cl.eshire).

**2 ele Altron Mini Beam**, good condition, £80 ono. Tel. J.W. Crosby on 061 748 2915 (Manchester).

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**Kenwood TS430** FM, AM Wide, SSB Narrow filters fitted, £575. PK88 TNC complete with Commodore C64 computer and ICS software, £125. GOCRIP, Tel Crawley (0293) 782910

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**Homebrew QRP 20m TX/RX**, not working, uncased and half finished but could appeal to devotee. Will exchange for FT-1000 or similar, must be in excellent condition. (Will collect nationwide). First taker gets free matching DIY wire aerial and Morse key. Faxed offers please to 0703 263429.

**RN Electronics** 6m/2m transverter and 6m HB9CV aerial, £140. Datong D70 Morse tutor, £45. Sony ICF-7600D general coverage HF receiver, £90. Wanted - optoelectronics handheld frequency counter. Graham G6SUG, 42 David Close, Harlington, Middx. or phone 0494 424227 during office hours.

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**Yaesu FT707** HF TX/RX, 100 Watts plus FV700DM unit, mint condition, sell or exchange. Wanted dual band UHF/VHF equipment which has extended RX coverage, i.e. Trio 75E HH, Trio 4100E mobile. Contact A. Drake from Newcastle, G1EBD on 0782 612868 after 7.00pm Mon - Fri, anytime at weekends.

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**Coil units** for Eddystone receiver model 358, any range. Also wanted for Wordplex word processor model 80-4 either on discs, or in manual form, programmes for same. Contact Peter Howlett 122 Victoria Ave, Princes Ave, Hull HU5 3DT. Tel. 0482 441255

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### TS-140S

£862

The TS-140S was in effect designed by our customers, who demanded Kenwood performance and facilities at modest cost. The TS-140S has all mode, all band HF coverage, and of course a high performance general coverage receiver. 100W output and a first class receiver combine to make the TS-140S a really satisfying rig to own. It's also available in the form of the TS-680S which has all the bands and modes of operation of the TS-140S but with the 6 metre band as well.

## For all that's good in Amateur Radio – including choice!

Although our head office and service department are located in far-off Derbyshire, don't think that you are not being looked after locally. In London, our manager, Fred Butchart, will be delighted to see you at Eastcote (the shop is actually part of the Eastcote Tube Station entrance).

In addition to the permanent display of the entire Kenwood range, Fred also has a constantly changing selection of good previously owned transceivers and receivers, together with all the other items from our

comprehensive product list.

Whatever your particular interests, be it Amateur Radio, Packet Radio, Short Wave Listening, Aircraft Band Listening or just general radio communications, Fred will be happy to see you, advise you and then, hopefully, supply you with equipment that REALLY suits your requirements.

Call in soon at London's Amateur Radio Centre and let Fred assist you in your hobby.

**LOWE ELECTRONICS LONDON**

223-225 Field End Road, Eastcote, Middx HA5 1QZ. Telephone: 081-429 3256

A high-performance HF rig . . . with a great receiver and full-power transmitter. Light in weight and low in price.

This is Yaesu's FT-747GX.

Whether you're a beginner or a veteran, it's a great way to start. And a great way to go.

**DX ready.** The 747 packs a full 100-watt RF punch on 160 to 10 meters, with continuous receive from 100 kHz to 30MHz.

And its control panel is refreshingly simple. So you can hop around the band fast to nail those DX stations.

While other guys are warming up their amplifiers, you can be working the DX!

**Multimode versatility.** The FT-747GX is ready to go on LSB, USB, CW, and AM. With provision for the FM-747 FM unit.

You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan

plus auto-resume memory scan via the microphone up/down buttons.

**Great receiver.** Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW and AM filters. A one-touch noise blanker. All-mode squelch. RTT. And a 20-dB attenuator for local QSOs.

**Lightweight construction.** Housed in a metallized high-impact plastic case, the FT-747GX weighs in at about 7½ pounds! With the loud-speaker mounted on the front panel for maximum audio transfer. And internal heatsinking for the transmitter, rated at full power for FM, packet, RTTY, SSTV, and AMTOR when used with a heavy-duty power supply.

**Available options.** FC-1000 or FC-757AT Automatic Antenna Tuners. FL-7000 500-watt Automatic, Solid-State Linear Amplifier. TCXO-747

Temperature-Compensated Crystal Oscillator. FAS 1 4R Remote Antenna Selector. FRB-757 Amplifier Relay Box. FP-700 Standard Power Supply. FP-757HD Heavy-Duty Power Supply. MMB-38 Mobile Mounting Bracket. MH-1B8 & MD-1B8 Microphones. New heavy duty metal case MMB42A.

**Discover the price / performance leader.** Check out Yaesu's low-cost FT-747GX at your Yaesu dealer today. Because now, Yaesu puts priceless DX into your price range.

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