CONVERSION PROJECT: P-BAND EUROPA TO 4mFM

EXCLUSIVE: YAESU FT-990 REVIEWED!

CHRISTMAS REVIEW SPECIAL
Stocking fillers for your station
SAVE MONEY - SAVE £24!!

RAYCOM PACKAGE DEAL £699.00

YOU SAVE £85.20!!

FT290R  II ........................................ £429.00
TOKYO HX240 .................................... £249.00
1/2 Size G5RV .................................. £14.95
12 Amp PSU ..................................... £59.95
Nicads & Wall Charger ...................... £31.30
Total regular price ............................ £784.20

RAYCOM PACKAGE DEAL £699.00

HP100E/AR1000

FAIRMATE HP100E

Since its launch a few months ago, this has become the UK's most popular scanning receiver. The HP100E covers 25 to 550MHz and 800 to 1300MHz with selectable channel steps of 5, 10, 120, or 250kHz. You can also program channel steps in any multiple of 5 or 120kHz up to 100kHz. With 100 memory channels arranged in 10 banks of 10, the scanning functions are really versatile.

Three modes are available - AM, WFM and NFM. This means that you can also listen to your local FM radio station as well as Heathrow approach or your local VHF repeater.

If that's not enough, Raycom have an exclusive British made shortwave converter. The converter and a small mod are all that's needed to add 200kHz to 30MHz coverage to your HP100E (or your AR1000). 10 memories, channel review, including FREE charger worth £4.95

HP100E/AR1000 .................................. £249.00
SW Converter ................................... £59.00
Modifications ................................... £15.00
Total regular price ............................ £323.00

SAVE MONEY - SAVE £24!!
RAYCOM PACKAGE DEAL £299.00

CHARGE IT!

Why not take advantage of the RAYCOM Credit Card and spread the payment for that scanner you've always wanted. Example: Yaesu FRG9600

9600 standard 60-950MHz .......... £469.00
9600 Std pack 60-950MHz ........... £545.00
9600 MkII pack 60-950MHz ......... £595.00
9600 Standard 60-905MHz .......... £499.00

AOR AR-3000

There are many scanning receivers to choose from today but several features make the AR3000 stand out from the others. Frequency steps are programmable in 50Hz steps from 50Hz to 100kHz (so you get 9kHz steps on MW). It has 400 memory channels in four banks of 100 so you can store all your favourite frequencies and scan through these at 20 channels per second. It can also perform a limited scan in each of the four banks and an accessory socket can control a tape recorder remotely, and a built in clock/timer helps. For computer buffs, full control over all functions is available via a built in RS232C interface. Details of operating protocols are in the manual and best of all, it's In stock now!!

AOR AR3000 .................................. £740.00

The TOKYO HX240 HF Transverter when coupled to an all-mode 2m rig will give you 50 watts on 80 to 10m. RAYCOM have put together this unique unit with the new YAESU FT290R II Inc. DC and COAX leads!!

FT290R II ........................................ £429.00
TOKYO HX240 .................................... £249.00
1/2 Size G5RV .................................. £14.95
12 Amp PSU ..................................... £59.95
Nicads & Wall Charger ...................... £31.30
Total regular price ............................ £784.20

RAYCOM PACKAGE DEAL £699.00

OTHER HIGH QUALITY SCANNERS FROM RAYCOM

BEARCAT UBC50/55XL 66-88/136-174/406-512MHz ........ £99.95
BEARCAT BC 70XL 66-88/136-174/406-512MHz ........ £149.99
BEARCAT UBC 100XLT 66-88/117-136/406-512MHz ..... £199.99
JUPITER MVT 5000 Hand-held only £249.00
JUPITER MVT 6000 mobile £299.99
NEW JUPITER MVT 6000 mobile SPECIAL OFFER £319.00

MANY OTHER TYPES & MODELS STOCKED - SAE FOR DETAILS & USED LIST

THE UK SCANNER EXPERTS

LATEST NEWS FROM ICOM! WE HAVE THE SCANNER!!!

Demand for the new IC-R1 handheld and the IC-R100 base/mobile scanning receiver is extremely high, with the result that supplies have been sporadic. We are the only dealer in the UK to have consistent supplies of the IC-R1/R100. RAYCOM's buying power wins!!

IC-R1  500KHz to 1300 MHz ..................... £399.00
IC-R100 500KHz to 1800 MHz ..................... £499.00

Ring our hotline now to order your R1 or R100!
Buy it now! e.g. R1 £40 deposit, payments £15/month (APR 36%)

BEARCAT UBC50/55XL 66-88/136-174/406-512MHz ........ £99.95
BEARCAT BC 70XL 66-88/136-174/406-512MHz ........ £149.99
BEARCAT UBC 100XLT 66-88/117-136/406-512MHz ..... £199.99
JUPITER MVT 5000 Hand-held only £249.00
JUPITER MVT 6000 mobile £299.99
NEW JUPITER MVT 6000 mobile SPECIAL OFFER £319.00

MANY OTHER TYPES & MODELS STOCKED - SAE FOR DETAILS & USED LIST

OTHER HIGH QUALITY SCANNERS FROM RAYCOM

BEARCAT UBC 50/55XL 66-88/136-174/406-512MHz ........ £99.95
BEARCAT BC 70XL 66-88/136-174/406-512MHz ........ £149.99
BEARCAT UBC 100XLT 66-88/117-136/406-512MHz ..... £199.99
JUPITER MVT 5000 Hand-held only £249.00
JUPITER MVT 6000 mobile £299.99
NEW JUPITER MVT 6000 mobile SPECIAL OFFER £319.00

MANY OTHER TYPES & MODELS STOCKED - SAE FOR DETAILS & USED LIST
<table>
<thead>
<tr>
<th>REGULAR COLUMNS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PACKET RADIO ROUNDUP</td>
<td>31</td>
</tr>
<tr>
<td>G4HCL tells of DSP, the future of packet radio.</td>
<td></td>
</tr>
<tr>
<td>HF HAPPENINGS</td>
<td>40</td>
</tr>
<tr>
<td>Steve G4JVG with QSL manager and DXpedition news.</td>
<td></td>
</tr>
<tr>
<td>VHF/UHF MESSAGE</td>
<td>42</td>
</tr>
<tr>
<td>Ken Ellis G3YGT's column.</td>
<td></td>
</tr>
<tr>
<td>SATELLITE RENDEZVOUS</td>
<td>44</td>
</tr>
<tr>
<td>Amsat-UK questions and answers from G3RWL.</td>
<td></td>
</tr>
<tr>
<td>QRP CORNER</td>
<td>50</td>
</tr>
<tr>
<td>GOBPS tells us of Winter Sports using Low Power.</td>
<td></td>
</tr>
<tr>
<td>READER ADS</td>
<td>55</td>
</tr>
<tr>
<td>Want a rig? Have a read.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FEATURES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENTERS FILE</td>
<td>32</td>
</tr>
<tr>
<td>Ian Poole G3YWX with handy hints for the shack.</td>
<td></td>
</tr>
<tr>
<td>STARTING ON SATELLITES</td>
<td>34</td>
</tr>
<tr>
<td>Arthur Gee G2UK says satellites can be easy.</td>
<td></td>
</tr>
<tr>
<td>HF CONVENTION REPORT</td>
<td>38</td>
</tr>
<tr>
<td>DXers of the World unite at Daventry.</td>
<td></td>
</tr>
<tr>
<td>METREWAVE</td>
<td>46</td>
</tr>
<tr>
<td>Jack Hum with his traditional year end roundup.</td>
<td></td>
</tr>
<tr>
<td>LEICESTER SHOW REPORT</td>
<td>48</td>
</tr>
<tr>
<td>The big event of the year, we tell you what went on.</td>
<td></td>
</tr>
<tr>
<td>A GHOSTLY MESSAGE</td>
<td>51</td>
</tr>
<tr>
<td>Our traditional Christmas chiller.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROJECTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P-BAND EUROPA CONVERSION TO 4m</td>
<td>26</td>
</tr>
<tr>
<td>4m FM for a few pounds — G4HCL shows you how.</td>
<td></td>
</tr>
<tr>
<td>AUDIO PROCESSOR</td>
<td>30</td>
</tr>
<tr>
<td>A useful receiver audio filter and notch system.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NEWS AND VIEWS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LETTERS</td>
<td>6</td>
</tr>
<tr>
<td>To CW or not to CW, that is the question.</td>
<td></td>
</tr>
<tr>
<td>EDITORIAL</td>
<td>6</td>
</tr>
<tr>
<td>Clean up the airwaves — designed to get you talking.</td>
<td></td>
</tr>
<tr>
<td>RADIO TODAY</td>
<td>8</td>
</tr>
<tr>
<td>Youngsters into Amateur radio.</td>
<td></td>
</tr>
<tr>
<td>COMING NEXT MONTH</td>
<td>52</td>
</tr>
<tr>
<td>A bumper crop of goodies.</td>
<td></td>
</tr>
<tr>
<td>CLUB NEWS</td>
<td>53</td>
</tr>
<tr>
<td>Meet your local arrangers.</td>
<td></td>
</tr>
<tr>
<td>RALLIES</td>
<td>54</td>
</tr>
<tr>
<td>And where to meet the not so locals.</td>
<td></td>
</tr>
<tr>
<td>SUBSCRIPTIONS</td>
<td>33</td>
</tr>
<tr>
<td>ADVERTISERS INDEX</td>
<td>41</td>
</tr>
</tbody>
</table>

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.
RADIO HAMS

Need to know the time in Perth Australis, Gorky Russia, or even Stanley Falklands? ZONALTIME will tell you, along with another 174 locations worldwide. Its quick and easy to use. Built by craftsmen on a beautiful oak finished plinth. Zonaltime has two clocks one local time and one world time. Each clock is set in a diamond turned and polished solid brass bezel. Zonaltime is suitable for any room, office or home. Zonaltime is easy to read/plinth size measures approx 15½" x 12¾". Made in UK, with a full 12 month guarantee. Ideal for own use, gift or presentation. Price £95.00 (S.S.P £145.00) inc postage packing and vat

PACKET RADIO FROM THE SPECIALISTS!

Siskin Electronics have a policy of supplying the best range of packet radio equipment available for the radio enthusiast. We have examined the products of many manufacturers and are pleased to be able to offer what must be the widest range of equipment available from just one UK supplier. All prices include VAT and were valid when going to press.

AEA
PK-232/PK-88 Real Time Clock £ 29.95
AMT3 AMTOR/RTTY £179.55
PK-332-MAILBOX £99.95
PK-48 VHF/HP TNC + new MBX £129.00

PACCOMM
Real Time Clock fits BSX etc. serial £ 29.95
STATE MACHINE DCC (3105). £ 19.95
HANDIPACKET (47TNC) £ 199.00
PSK-1 MCROSSAT MODEM £189.00
PC-320 dual port PC card £189.00
TINY-2 with PMS version 3.0 £129.00
TNC-320 dual port HP/VHF £179.00
9600 baud modem £ 95.00

KANTRONICS
"Smart Watch" Real Time Clock £ 29.95
DATA ENGINE (56,000 baud) £327.95
KPC21HP/VHF with Wefax £165.00
KX84 VHF/HP dual port £242.00
KAM all modes with Wefax £285.00
Data Engine 5600 baud modem £95.00

LATEST UPDATE RELEASE DATES
Packetronic V1.16DX (PMS V10)
Kantronics Version 3.02
If it's in stock (and it usually is) we will despatch it same day.

NOTE: Prices do not include carriage

THE AIRBAND CENTRE

We are very pleased to announce the opening of our new specialist air band radio centre right near Heathrow Airport.

We have been selling airband radios for over 25 years, and specialise in giving you all the advice and support that you need as well as selling you a radio. We are the UK distributors for the famous AOR range of scanning receivers as well as the more specialised airband only radios such as Signal and WIN. Our VHF receivers cover both civil and military bands, and we have HF units to listen to the long distance transatlantic traffic and Middle Eastern military control frequencies. We also stock comprehensive frequency listings to help you find the right channels to listen to.

LOWE ELECTRONICS LTD
6 CHERWELL CLOSE, LANGLEY, SLOUGH, BERKS SL3 8XB. Tel: 0753 45255

please mention HRT when replying to advertisements

HAM RADIO TODAY JANUARY 1991
It's been great to hear from you all about how you 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.

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 1/HF 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 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.

Clean Up the Airwaves
HRT recently listened to Steven Spivey, who is the Head of the Radio-communications 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.

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 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.

We're Getting There
Listening around both on the airwaves and on the VDU from the amateur 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 HRT Consultant Technical Editor
Spivey, who is the Head of the Radio-communications Division of the DTI,艾特 者 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.

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 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.

We're Getting There
Listening around both on the airwaves and on the VDU from the amateur 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 HRT Consultant Technical Editor
Spivey, who is the Head of the Radio-communications Division of the DTI,艾特 者 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.
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, if 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 join and enlarged, so it may be wondered why it did not, given that it now justifies its position merely by being among the majority? On earlier occasions I have been told by the DTT predecessors of the agency in effect that amateurs wanted the Morse test because the RSGB representing them said so; this is doubles 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 banned 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, scraps 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 embarrass 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 “Erone Burst, since his colleague R. F. Byrne would hardly be allowed to touch it!”

Sandy, GM0IRZ.

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?”

Explanations follow....

“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.

If you have a story to tell, please write to me at HRT, P.O. Box 73, Eastleigh, S05 5GW.
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 £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, GIV18AOB

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, 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 the addition of 'small print hidden charges' and we personally often refuse 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 it's 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 who's 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.
Mir Space Station on 2m Helps Schools  
Just received from the 'Compassive' 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 responsible 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 synthesized 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 transmitter. 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 uses delta modulation. The advantage of this modulation is that the digitised speech uses relatively few bytes, and can be transmitted 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) envisions an uplink and the use of simple BBS software.

Interested parties requiring further information can contact Wolf Hoeller OE7FTJ, Amraserstrasse 19, A-6026 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 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!

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

Please mention HRT when replying to advertisements
R. F. Byrne’s Unpublished Masterpieces
by Paul Thompson G6MEN
R. F. Byrne is a chap who’s 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 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.

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.

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

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 Ioncap propagation prediction packages, MN, Yagi-Optisiser, 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 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!
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 handheld 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 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 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 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 thorough 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 bleeps 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.

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.

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

Not everyone wants a 2m or 70cm handheld 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....
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 receive 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.

#### Receiver

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Input level required to give 12dB SINAD:</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz</td>
<td>0.13μV pd</td>
</tr>
<tr>
<td>435MHz</td>
<td>0.17μV pd</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjacent Channel Selectivity</th>
<th>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;</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz</td>
<td>435MHz</td>
</tr>
<tr>
<td>+ 12.5kHz;</td>
<td>37.0dB</td>
</tr>
<tr>
<td>- 12.5kHz;</td>
<td>25.0dB</td>
</tr>
<tr>
<td>+ 25kHz;</td>
<td>75.0dB</td>
</tr>
<tr>
<td>- 25kHz;</td>
<td>73.0dB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blocking;</th>
<th>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;</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz</td>
<td>435MHz</td>
</tr>
<tr>
<td>+ 100kHz;</td>
<td>84.0dB</td>
</tr>
<tr>
<td>+ 1kHz;</td>
<td>91.5dB</td>
</tr>
<tr>
<td>+ 10MHz;</td>
<td>94.5dB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermodulation Rejection;</th>
<th>Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz</td>
<td>435MHz</td>
</tr>
<tr>
<td>25/50kHz spacing;</td>
<td>61.5dB</td>
</tr>
<tr>
<td>50/100kHz spacing;</td>
<td>62.0dB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Image Rejection;</th>
<th>Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz</td>
<td>435MHz</td>
</tr>
<tr>
<td>- 61.0dB</td>
<td>- 62.5dB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Audio Output;</th>
<th>Measured at 1kHz on the onset of clipping;</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz</td>
<td>435MHz</td>
</tr>
<tr>
<td>3ohm load;</td>
<td>340mW RMS</td>
</tr>
<tr>
<td>8ohm load;</td>
<td>315mW RMS</td>
</tr>
<tr>
<td>15ohm load;</td>
<td>225mW RMS</td>
</tr>
</tbody>
</table>
twin-band mobile and base transceivers could use this for remote control of some day use around a given site, indeed one memories. The extra-low power level of after suitable pre-programming of the little sets, generally being easy to use with suitable CTCSS/DTMF control on external aerial and providing 'walkthrough' set transceiving on, say, 2m using an placed in 'talkthrough' mode, the remote power into a dummy load or similar to restrict radiation. A quick switch back to high power on the portable, and you've achieved a reasonable distortion levels. Ideal to drive a pair of headphones or a speaker in your own radio.

Start 1991 with a New Years resolution. Build something this winter from KANGA PRODUCTS wide range of kits.

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.

KANGA PRODUCTS

QUALITY KITS FOR THE RADIO AMATEUR

BUDDING AMATEUR AND THE LISTENER

ONER TRANSCIEVER

The ONER transceiver is a full HF Transceiver comprising the Transmitter, Receiver, V.F.O., Q.S.K. and the Low Pass Filter. Each unit is on an approx. one square inch PCB. One builder has already worked "ZL" using the ONER! Try the "smallest HF rig in the world" for just (State band required when ordering) £29.95

DIRECTIONAL POWER METER

The Kanga DIRECTIONAL WATTMETER is a 'simple' method of reading both the forward and reverse power in a transmission line. Designed by David GM4ZNX for the G-QRP club, our version will handle up to 200 Watts with an accuracy of better than 10%. It is supplied complete with both meters and the 'head' for £22.95

THE SUDDEN RECEIVER

Designed by the Rev George Dobbs for the G-QRP club, the SUDDEN single band receiver is a superb direct conversion receiver, Supplied with all 'on board' components, including the variable capacitor. Available for 160m to 20m inc. State band required when ordering £17.95

DUMMY LOAD

We GUARANTEE our DUMMY LOAD will handle up to 100 Watts in free air. For a greater power handling just add dry sand or oil. Complete with a power reading facility too and all for £12.95

IAMBC KEYER

The Kanga IAMBC KEYER is on a PCB of about 2.5" square. It has dot, dash memories and will key up to 50 volts @ 500mA the power consumption is so low that we don't even use a switch. Complete with an 'on board' speed control too £16.95

L.C.K. TRANSCIEVER

This is a complex C.W. transceiver for either 160m or 80m only. It has a beautiful superhet reciever coupled to a nice transmitter giving up to 3 watts output. The transmitter alone is just £32.95

THE SUDDEN RECEIVER

Designed by the Rev George Dobbs for the G-QRP club, our version will handle up to 200 Watts in free air. For a greater power handling just add dry sand or oil. Complete with a power reading facility too and all for £12.95

KANGA PRODUCTS: 3 LIMES ROAD, FOLKESTONE, KENT CT19 4AU
Telephone: 0303 276171 or 0860 363915

Please add £1 to cover Post & Packing
Send a A5 SAE (17p) for a free full catalogue

KANGA PRODUCTS

Telephone: 0303 276171 or 0860 363915

Current Consumption:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>145MHz</th>
<th>435MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby, Economiser on</td>
<td>12mA av.</td>
<td>14mA av.</td>
</tr>
<tr>
<td>Receive, Mid Volume</td>
<td>98mA</td>
<td>96mA</td>
</tr>
<tr>
<td>Receive, Max Volume</td>
<td>164mA</td>
<td>173mA</td>
</tr>
</tbody>
</table>

Transmitter

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Power</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>145MHz High</td>
<td>1.18W/770mA</td>
<td>12.0V Supply</td>
</tr>
<tr>
<td>Low</td>
<td>440mW/470mA</td>
<td>12.0V Supply</td>
</tr>
<tr>
<td>E Low</td>
<td>25mW/102mA</td>
<td>13.8V Supply</td>
</tr>
<tr>
<td>435MHz High</td>
<td>1.58W/120mA</td>
<td>13.8V Supply</td>
</tr>
<tr>
<td>Low</td>
<td>480mW/656mA</td>
<td>13.8V Supply</td>
</tr>
<tr>
<td>E Low</td>
<td>22mW/119mA</td>
<td>13.8V Supply</td>
</tr>
</tbody>
</table>

Harmonics:

<table>
<thead>
<tr>
<th>Harmonics</th>
<th>Frequency</th>
<th>145MHz</th>
<th>435MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Harmonic</td>
<td>&lt; 85dBc</td>
<td>- 76dBc</td>
<td></td>
</tr>
<tr>
<td>3rd Harmonic</td>
<td>&lt; 85dBc</td>
<td>- 85dBc</td>
<td></td>
</tr>
<tr>
<td>4th Harmonic</td>
<td>&lt; 85dBc</td>
<td>- 85dBc</td>
<td></td>
</tr>
<tr>
<td>5th Harmonic</td>
<td>&lt; 85dBc</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6th Harmonic</td>
<td>&lt; 85dBc</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7th Harmonic</td>
<td>&lt; 85dBc</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
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 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 power sensor detects a transceiver drive level of 3W, 10W or 25W), 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 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 switch adds a delay of around a second to the TX/RX switching time to prevent

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

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 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
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**

<table>
<thead>
<tr>
<th>Power Output</th>
<th>High</th>
<th>185W (24.1A DC)</th>
<th>Low</th>
<th>80W (12.9A DC)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

**RX Preamp gain:** 16.9dB

**TX IMDs:**

<table>
<thead>
<tr>
<th>Low Power</th>
<th>High Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Power</td>
<td>High Power</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd order</th>
<th>-19/-18dB</th>
<th>-18/-17dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th order</td>
<td>-30/-25dB</td>
<td>-25/-22dB</td>
</tr>
<tr>
<td>7th order</td>
<td>-33/-36dB</td>
<td>-31/-31dB</td>
</tr>
<tr>
<td>9th order</td>
<td>-52/-36dB</td>
<td>-46/-51dB</td>
</tr>
<tr>
<td>11th order</td>
<td>-42/-46dB</td>
<td>-45/-44dB</td>
</tr>
<tr>
<td>13th order</td>
<td>-47/-53dB</td>
<td>-43/-44dB</td>
</tr>
</tbody>
</table>

**Harmonics:**

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

**TX IMDs;**

<table>
<thead>
<tr>
<th>Low Power</th>
<th>High Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd order</td>
<td>-22/-25dB</td>
</tr>
<tr>
<td>5th order</td>
<td>-32/-33dB</td>
</tr>
<tr>
<td>7th order</td>
<td>-50/-51dB</td>
</tr>
<tr>
<td>9th order</td>
<td>-53/-53dB</td>
</tr>
<tr>
<td>11th order</td>
<td>-53/-53dB</td>
</tr>
<tr>
<td>13th order</td>
<td>-53/-53dB</td>
</tr>
<tr>
<td>15th order</td>
<td>-53/-53dB</td>
</tr>
</tbody>
</table>

**Harmonics:**

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

**HL-166V, 6m**

<table>
<thead>
<tr>
<th>Power Output</th>
<th>High</th>
<th>161W (20.5A DC)</th>
<th>Low</th>
<th>58W (12.2A DC)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>RX Preamp Gain</th>
<th>15.1dB</th>
</tr>
</thead>
</table>

**Harmonics:**

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

**TX IMDs;**

<table>
<thead>
<tr>
<th>Low Power</th>
<th>High Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd order</td>
<td>-23/-26dB</td>
</tr>
<tr>
<td>5th order</td>
<td>-40/-33dB</td>
</tr>
<tr>
<td>7th order</td>
<td>-42/-39dB</td>
</tr>
<tr>
<td>9th order</td>
<td>-41/-46dB</td>
</tr>
<tr>
<td>11th order</td>
<td>-48/-48dB</td>
</tr>
<tr>
<td>13th order</td>
<td>-55/-54dB</td>
</tr>
</tbody>
</table>

**Harmonics:**

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

**HL-130U, 70cm**

<table>
<thead>
<tr>
<th>Power Output</th>
<th>High</th>
<th>110W (12.9A DC)</th>
<th>Low</th>
<th>80W (12.9A DC)</th>
</tr>
</thead>
</table>

**RX Preamp Gain:** 18.2dB

**Harmonics;**

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

**TX IMDs;**

<table>
<thead>
<tr>
<th>Low Power</th>
<th>High Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd order</td>
<td>-23/-25dB</td>
</tr>
<tr>
<td>5th order</td>
<td>-40/-33dB</td>
</tr>
<tr>
<td>7th order</td>
<td>-42/-39dB</td>
</tr>
<tr>
<td>9th order</td>
<td>-41/-46dB</td>
</tr>
<tr>
<td>11th order</td>
<td>-48/-48dB</td>
</tr>
<tr>
<td>13th order</td>
<td>-55/-54dB</td>
</tr>
</tbody>
</table>

**Harmonics:**

<table>
<thead>
<tr>
<th>Harmonics;</th>
<th>2nd; -70dBc</th>
<th>3rd; -84dBc</th>
<th>4th; &lt;-85dBc</th>
<th>5th; &lt;-85dBc</th>
<th>6th; &lt;-85dBc</th>
<th>7th; &lt;-85dBc</th>
</tr>
</thead>
</table>

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.
WOULD LIKE TO WISH ALL OUR CUSTOMERS OLD AND NEW A VERY HAPPY CHRISTMAS AND PROSPEROUS NEW YEAR

CHRISTMAS OPENING HOURS

HQ SHOWROOM
DEC 21/22 — 9.00am-1.00pm. DEC 24 — 9.00am-1.00pm. DEC 25/26 — CLOSED.
DEC 27/28 — 9.00am-5.00pm. DEC 29 — 9.00am-1.00pm. DEC 31 — 9.00am-5.00pm.
JAN 1 — CLOSED. JAN 2 — Open as usual.
Closed lunchtime during holiday period, 1.00-2.00pm
Service Department CLOSED from 1.00pm DEC 21 to 9.00am JAN 2

The Best of The Best — the FT1000

BRIEF SPECIFICATIONS
★ General Coverage Receiver 100kHz-30MHz
★ Ham bands TX 160-10m
★ Modes CW, USB, LSB, AM, FM, RTTY and Packet
★ VFO steps 10Hz CW, SSB, RTTY, 100Hz, AM, FM, PTT
★ Auto antenna impedance range 16.7 to 150 ohms
★ Selectable receiver band widths 2.4kHz, 2kHz, 500Hz, 250Hz
★ Dual band receiver tuning and monitoring with balance control
★ Power output up to 200 watts P.E.P. 50W AM
★ Sensitivity preamp on SSB/CW 0.25 micro volts 10dB S/N
★ D.D.S. Direct Digital Synthesiser
★ Dual Selectable noise blankets with adjustable threshold
★ 99 memories

DX-PEDITION SPECIAL

Noisy, crowded frequencies are about as productive as motorways in rush hour. Now, you can jump the queues and head for the wide, open spaces with the FT650 from Yaesu. The FT650 packs substantial communications power in a streamlined, compact case. A flip out handle makes it the perfect portable, especially for those remote locations. The three frequency operation lets you win the battle of the bands on 6m, 10m, & 12m. The transceiver covers from 24 to 56MHz continuous on receive with a full 100W output. An optional power supply and desk mic are available for base station operation.

OPTIONS
FP-22 Internal 240V AC P.S.U.
DVS-2 Digital Message Storage Unit
XF455m CW Filter 600Hz

£995 inc VAT
COMMUNICATIONS LTD.

communications ltd. | YAESU

NTS. SO5 3BY TEL: 0703 255111 FAX: 0703 263507 TLX: 477351

TOKYO HY-POWER

SAGRA-600
- 2m Linear Amplifier
- 600W Output 25W Drive (Nominal)
- 2 x 4CX250B VALVES

NOW ONLY £799.00

HF LINEARS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Drive</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL1KGX</td>
<td>160-10m 2x4CX250B</td>
<td>1KW PEP RF INPUT</td>
<td>70-120W DRIVE</td>
</tr>
<tr>
<td>HL2K</td>
<td>160-10m 2x3-5007</td>
<td>2KW PEP RF INPUT</td>
<td>60-120W DRIVE</td>
</tr>
</tbody>
</table>

VHF LINEARS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Drive</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL6V</td>
<td>6m 10W in 50-60W out RX Preamplifier</td>
<td>£139.00</td>
<td></td>
</tr>
<tr>
<td>HL15V</td>
<td>6m 3/10W in 80-160W out RX Preamplifier</td>
<td>£249.00</td>
<td></td>
</tr>
<tr>
<td>HL37V</td>
<td>2m 3W in 32W out RX Preamplifier</td>
<td>£239.00</td>
<td></td>
</tr>
<tr>
<td>HL82V</td>
<td>2m 10W in 60W out RX Preamplifier</td>
<td>£289.00</td>
<td></td>
</tr>
<tr>
<td>HL110V</td>
<td>2m 2/10W in 100W out RX Preamplifier</td>
<td>£258.00</td>
<td></td>
</tr>
<tr>
<td>HL150V</td>
<td>2m 3-25W in 120W out RX Preamplifier</td>
<td>£299.00</td>
<td></td>
</tr>
<tr>
<td>HL130U</td>
<td>70cm 5/10W in 25/30W out RX Preamplifier</td>
<td>£299.00</td>
<td></td>
</tr>
<tr>
<td>HL60U</td>
<td>70cm 10/25W in 50W out RX Preamplifier</td>
<td>£299.00</td>
<td></td>
</tr>
</tbody>
</table>

NOW BACK IN STOCK THE POPULAR HT106

6m TRANSCIEVER

£299 inc VAT

G-5400B/G-5600B SATELLITE INTERFACE

The IF-100PC & IF-100C64 are two new computer interfaces that work with the Yaesu G-5400B and G-5600B azimuth/elevation rotators. This is possibly the most comprehensive, yet easy to use satellite antenna control interface. Supplied with comprehensive software for either PC’s or CBM 64/128 computers. The satellite tracking programme is valid for all present and future satellites up to the next century. Rotator control is automatic once the satellite to be tracked is chosen. Satellite data can be updated at anytime, very easily.

IF-100PC Interface, lead & software for IBMPC...£139.00
IF-100C64 Interface, lead & software for CBM64/128...£145.00

PRICES & AVAILABILITY SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

*FREE FINANCE ON SELECTED ITEMS
On many regular priced items SMC offers Free Finance (on invoice balances over £120) 20% down and the balance over a year You pay no more than the cash price!
Details of eligible items available on request
*Subject to status.

CARRIAGE CHARGES
Carriage is charged on all items. Small items, Plug, Sockets etc by post £1.75. Antennas, Cables and larger items by LYNX from £5.75. Transceivers etc, next day delivery from £8.35. Overnight delivery can be specified at extra cost for other items. Same day dispatch whenever possible.

YAESU DISTRIBUTOR WARRANTY
Importer warranty on Yaesu Musen products. Ably staffed and equipped Service Department. Daily contact with the Yaesu, Musen-factory. Tens of thousands of spares and test equipment.

HAM RADIO TODAY JANUARY 1991

please mention HRT when replying to advertisements
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 'CO' 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 CO 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

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 have much to offer 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.
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-
fier accepts an RF input power level of 0.5W to 7W, and with a recommended input power of 5W it is specified as providing 30W out on 2m and 20W on 70cm, with a ±1dB tolerance in each case. On receive a pair of switchable GaAsFET pre-amplifiers are provided, these have a specified noise figure of 1-3dB with 15dB nominal gain on 2m and a noise figure of 2-4dB with 10dB nominal gain on 70cm.

Although mechanical relays rather than PIN diodes are used for RF switching, the transmit/receive switching time is given as a fast 20mS, hence the unit should be fine for most packet uses as well. Inside, an SRF3961 transistor is used for the 2m amplifier, and an MRF664 transistor is used for the 70cm amplifier section.

A pair of BNC aerial connectors are fitted at the rear of the amplifier for the common 2m/70cm RF input and output lines, next to these is the DC input connector which takes the supplied fused DC lead. The unit measures 88 (W) x 50 (H) x 212 (D)mm, and weighs a light 740g.

Laboratory Results:

- **145MHz**: Input 2.00W, Output 23.9W
  - Pre-amp gain; 14.1dB
- **433MHz**: Input 2.00W, Output 14.2W
  - Input 5.00W, Output 22.7W
  - Pre-amp gain; 9.1dB

A transistor is used for the 70cm amplifier used for the 2m amplifier, and an MRF664 well. Inside, an SRF3961 transistor is fitted at the rear of the amplifier for the lines, next to these is the DC input connector which takes the supplied fused DC lead. The unit measures 88 (W) x 50 (H) x 212 (D)mm, and weighs a light 740g.

In Use

Coupling the unit up between my portable and the dual band aerial I use was, not surprisingly, very simple, I just needed to make up an extra BNC to BNC coax lead for this. I felt that the DC lead supplied with the amplifier was rather thin for the current drain of around 5A, this cable appearing like the type I wouldn’t normally run more than a couple of amps through. Hence I tried to keep this as short as possible so as not to loose too much DC voltage.

As would be expected, the transmit amplifier made a remarkable difference to my signal at the other end. Working into a distant repeater I could hear perfectly my signal at the other end. Working into a distant repeater I could hear perfectly. Working into a fixed installation at a repeater, the only thing I could criticise would be the BNC connectors which were fixed to the internal PCB rather than being bolted onto the case, as such an accidental ‘kick’ to one of these with the amplifier installed in a car say could possibly cause some damage.

Conclusions

The RF Concepts amplifier would in my mind prove very useful to the dual band 2m/70cm portable owner who’d like to run higher mobile or base station power but can’t justify the additional cost of a mobile, when indeed all the facilities needed are there in an existing handheld portable. The receive pre-amplifiers however I found were little use with a modern portable rig, although these could prove of benefit to older, less sensitive types. In all, a useful and compact unit, lightweight, which performed faultlessly throughout the review period.

Our thanks go to Lowe Electronics Ltd. who are the RF Concepts distributors in the UK, for the loan of the review amplifier.

## "YOU NEVER KNEW THERE WAS SO MUCH IN IT"

- **Available from larger newsagents or direct from Cirkit**
- **£10 worth of discount vouchers**
- **Low cost multimeters**
- **Many new products**

Please supply:
- [ ] Winter '90/91 Catalogue @ £1.60
- [ ] Winter '90/91 Catalogue and subscription to the next two Issues @ £5.00

I enclose Cheque/Postal Order for

Please debit my Access/Visa card for

NAME: ____________________________
ADDRESS: _________________________
POST CODE: ________________________

ACCESS OR VISA: [ ]

EXPIRY DATE: ______________________
SIGNATURE: _______________________

Please mention HRT when replying to advertisements

Cirkit Distribution Ltd
Park Lane, Broxbourne, Herts EN10 7NO
(0992) 444111

184 PAGES PACKED WITH COMPONENTS, KITS, TEST EQUIPMENT AND BOOKS...
- **Batteries**
- **Books**
- **Capacitors**
- **Component packs**
- **Computers**
- **Connectors**
- **Counters and timers**
- **Crystals**
- **Filters**
- **Hardware**
- **Inductors**
- **Kits and modules**
- **Meters**
- **PCBs & equipment**
- **Relays**
- **Resistors**
- **Rigs and receivers**
- **Semiconductors**
- **Speakers/sounders**
- **Soldering iron**
- **Tools**
- **Test equipment**
- **Transformers**

OUT NOW FREE!

25W SOLDERING IRON WORTH £5.98

WHEN YOU SUBSCRIBE TO THIS AND THE NEXT TWO ISSUES - FOR ONLY £5.00

SIMPLY FILL IN THE COUPON AND KEEP UP TO DATE!
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**

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 readjustment 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.

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

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 crystallized 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 trimer capacitor 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...
The audio amplifier IC

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 L12 for maximum reading, re-tuning 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.

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 (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 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 (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
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 L18 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 for maximum current indicated on your multimeter, you should now have an indication of RF power, so disconnect the multimeter and tune C105 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 12.8kHz 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

<table>
<thead>
<tr>
<th>Capacitor</th>
<th>Original Value</th>
<th>New Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C49 (L10)</td>
<td>39p</td>
<td>82p</td>
</tr>
<tr>
<td>C51 (L11)</td>
<td>39p</td>
<td>82p</td>
</tr>
<tr>
<td>C53 (L12)</td>
<td>27p</td>
<td>56p</td>
</tr>
<tr>
<td>C55 (L13)</td>
<td>27p</td>
<td>56p</td>
</tr>
<tr>
<td>C56 (L15)</td>
<td>8p2</td>
<td>22p</td>
</tr>
<tr>
<td>C66 (L17)</td>
<td>8p2</td>
<td>18p</td>
</tr>
</tbody>
</table>

Table 2 Microphone Connections

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mic Live</td>
</tr>
<tr>
<td>2</td>
<td>Mic Ground</td>
</tr>
<tr>
<td>3</td>
<td>+10V for TX</td>
</tr>
<tr>
<td>4</td>
<td>Not Used</td>
</tr>
<tr>
<td>5</td>
<td>+10V</td>
</tr>
</tbody>
</table>
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 'chequebook' 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 encountered was 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 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 plea 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 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 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

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!
STANDARD OUT —

BUYING A SCANNER

COMPUTERISE YOUR SCANNER —
PC MONITOR REVIEWED

FREQUENCY FINDER —
SEARCH THE SHORT WAVES

PLUS
Airband Action

WIN!
Great Scanners' Accessories up for Grabs

FREE WITH HAM RADIO TODAY
AND CITIZEN'S BAND MAGAZINES
At 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 Reese, Man Gardener, Kevin Fox, Jonathan Clough, and Chris Crowe chatted with many visitors and it was great to hear how much they liked the magazine.

The hobby of scanning is becoming more and more well known, with many high-street retailers selling key-boards, entry receivers for short wave and 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 contributor, Jonathan Clough detailed 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 Scanners International review figures of sensitivity, blocking and intermediate gain mean? Well starting this month, we have a step-by-step guide to selecting your scanner, how to choose one 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 hand-helds now also have the capability of tuning to High Frequency, or Short Wave signals, such as those from international broadcasters. Today, instead of just selecting a station and listening to the "Voice of America", there are stations on the same subject on "Radio Moscow", the difference had to be heard to be believed! Needless to say, each country put's its own viewpoint across, yet listening to the "BBC World Service" that is transmitted into a different part of the world meant seeing a factual report, allowing the listener to make his/her own mind up!

Scanning through each of these stations in turn was certainly a pleasurable exercise, and with today's never ending worldwide scene of political differences we thought you might like to join us in the listening fun! Hence this month's "Frequency Finder" will show you a selection of stations, each broadcasting in every wav one of these countries in the world. Scanning through each of these stations in turn was certainly a pleasurable exercise, and with today's never ending worldwide scene of political differences we thought you might like to join us in the listening fun! Hence this month's "Frequency Finder" will show you a selection of stations, each broadcasting in every country it is possible to tune into these stations.

When 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 stations. So please don't do it. If you otherwise you can be heard, 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, not hear. Well, good job that the USSR let you hear how much you liked the magazine.

**CONTENTS**

3 Starting Out in Scanning
6 PC Monitor Professional
10 UHF Airband
12 Avantek MSA Series Amplifiers
14 Free Competition
16 Frequency Finder
So 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, 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.

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 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!

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 another channel to continue their conversation, leaving the ‘calling’ channel free. In the case of aircraft communications, 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
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 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 annoying. If you want to listen to 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 have the best of both worlds, for example where some transmitters 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 TVFM 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 lots 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!
by Chris Lorek G4HCL

Many 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 it's 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 database 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...
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 whilst the software is being used, to remind you of which HF services operated at which parts of the band.

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 disk. To be fair, the supplied instructions informs you of this, but the process does require some degree of DOS (Disk Operating System) knowledge.

Following this alteration and subsequent installation, the software operated very well indeed. I used the ‘mouse’ bus’ mouse on my PC clone to great success, but the process does require some 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 Micro

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.
BEARCAT SCANNERS
Recently appointed as the UK distributors for this high quality product range — we offer the complete selection of mobile and base scanners with full service backup.

BEARCAT BC800 XLT
Base Scanner with 900MHz UNF Band
Fantastic Value at ........................................ £149
* 40 Channels of Memory
* 240V AC Mains
* Covers 29-54, 136-174, 118-136, 406-512, 840-912MHz

BEARCAT UBC 175 XLT

BEARCAT 760XLT
New Model with 900MHz Coverage
With 100 memory channels and coverage of the UHF band, the 760XLT is ideal at home or in the car. Pre-programming of preset bands is possible for fast access. Freq. Coverage 66-88, 136-174, 406-512 MHz) £235

UBC 145 XLT (16 CH. Memories)
A low cost base scanner suitable for marine and public service reception
Coverage 66-88, 135-174, 406-512 MHz ........ £115

BEARCAT HANDHELD SCANNERS
UBC 59XL (10 CH MEM.) .................................. £99.95
(66-88 MHz, 136-174 MHz, 406-512 MHz)
8C 55 XLT (10 CH MEM.) .................................. £99.95
(76-88 MHz, 136-174 MHz, 406-512 MHz)
UBC 100XL (10 CH MEM.) £179
(96-88 MHz, 118-174 MHz, 406-512 MHz)
UBC 100XLT (100 CH MEM.) £169
(66-88, 118-174, 406-512 MHz)
UBC 200XL (200 CH MEM.) £229
(66-88, 118-174, 406-512, 806-956 MHz)

SONY RADIOS
We are the main short wave stockist
Sony ICF SW1E Short Wave + VHF, world's smallest s/wave radio ... £149.95

COMMUNICATION RECEIVERS
Low HF225 (30kHz-30MHz) .......... £425
Kenwood R2000 (150kHz-30MHz) .... £595
Kenwood R5000 (100kHz-30MHz) .......... £875
ICOM R71E (100kHz-30MHz) .... £855
ICOM R9000 (100kHz-2GHz) .......... £3395

LOW NOISE PRE-AMPLIFIERS
MODEL M75
For base and handheld scanners.
* 25-2100 MHz
* Low noise GaAs FET
* Selectable filters for improved performance
* Variable Gain Control .................. £69.95
These new Pre-Amplifiers are a must for the scanner enthusiast and will allow reception of signals that were inaudible without them.

MODEL M100
Same spec as M75 but with full RF switching, may be used with transceivers on transmit up to 5 watt o/p power .... £79.95

MODEL M60
A new low cost pre-amp without filters or gain control.
Offers low noise GaAs FET at 20 dB fixed gain ...... £49.95

AOR SCANNERS
AR 3000 wideband scanner 100kHz to 2036MHz with no gaps! Now available .... £785

FAST MAIL ORDER SERVICE
WE SHIP WORLDWIDE
STRIJUBOR OF SCANNING RECEIVERS

BLACK JAGUAR MkIII
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.

BLACK JAGUAR ACCESSORIES
(SUITABLE FOR ALL MODELS, BDU00, CHALLENGER ETC.)
- Mobile Mount £6.95
- Base Mount £6.95
- BJ1 Car Supply (MkIII version only) £14.95
- BCA6 Mains Slow/Fast Charger £14.95
- BJ1 Car Supply (MkIII version only) £14.95
- BCA6 Mains Slow/Fast Charger £14.95
- BCA6 Mains Slow/Fast Charger £14.95
- BCA6 Mains Slow/Fast Charger £14.95

LOW LOSS JAPANESE COAX
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 BD (11.1mm) £1.40 per MTR
MODEL SD (8.1mm) £0.96 per MTR

YUPITERU
We are pleased to announce our appointment as UK distributors for this comprehensive range. Working directly 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

Other models now available:
- Yupiteru MVT 8000 handheld (100 mem) £249
- Yupiteru MVT 8000 handheld (100 mem) £299
- Yupiteru MVT 8000 handheld (100 mem) £299

ICOM
We are ICOM specialists and carry the complete range in stock including these NEW models:
- IC-R1 The new miniature wideband handheld scanner that covers 150kHz to 1.3GHz with 100 memory channels and many features — £399
- IC-R100 Mobile or base extra wideband scanning receiver covering 500kHz to 1.8GHz with 100 memory channels and all mode reception — £399

- 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 all mode reception — £325

- IC-R7000 ICOMS Most popular communications receiver. Covers 25 MHz to 2 GHz with 99 memories and all mode reception — £325

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

SCANNING ANTENNAS
Nevada WB 1300 discone (25-1300 MHz) Stainless steel top of the range 'N' type connector £39.95
- CTE Micro Scan (180-1300 MHz) 3.50
- CTE Sky Band (25-1300 MHz) £24.00
- Nevada Mobile Antenna (50-1300 MHz) £27.90
- Create Wideband Beam (105-1300 MHz) £27.90
- Magnetic Mount £24.00

ASA DIGITAL AIRBAND RADIO
This new low cost receiver is designed for aviation enthusiasts featuring a digital display for accurate reception and tuning. Coverage 805-1300MHz FM, 118-1300MHz AM, 162-165MHz weather, 500kHz-1.6MHz.

NEW NEVADA MS 1000 BASE/MOBILE SCANNER

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.

Books:
- Short Wave Confidential Freq List £8.95
- VHF/UHF Frequency Guide £8.95
- Marine Frequency Guide £4.95
- VHF/UHF Airband Guide £3.50
- Comprehensive Airband Guide £9.95
- Scanners II by P. Rouse £7.95
- Scanners 3rd Edition £2.95
- Flight Routings Guide 1990 £4.95
- Airband Pocket Frequency Guide £2.95

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 MD-R1, Uniden BC 60XL, Uniden BC 80XL, Uniden BC 70XL, Realistic PRO 58, Uniden 200 XLT, Uniden 100 XLT.

NEW VERSION £29.50
This 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 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, simply 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 quality on a base station, in particular when connected to an external serial.

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.

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.
**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 memory 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.

**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 AS3220. 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

Avantek 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 10pF 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 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...
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.
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!

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 8WG
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.
Inside every issue of CB & HRT Today

From your newsagent NOW!

JAVIATION
THE VHF/UHF AIRBAND SPECIALISTS
Telephone: 0274-732146

With equipment from AOR, Fairmate, Yupiter, Icom, Signal, Sony, Uniden Bearcat, Win, Revco, Black Jaguar, Tendy/Realistic and others we offer one of the widest ranges of receivers suitable to the scanner enthusiast.

For information or advice on airband listening please give us a call and have a chat or send a large S.A.E. for a catalogue.

Frequency lists, Our UHF & VHF airband lists are produced and amended regularly, enabling us to keep them as up to date as possible. Our VHF list includes LATCC transmitter sites/req 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
Robust leather carry cases £25.00

Secondhand: Our secondhand equipment changes all the time, if you are after a particular set please give us a call — we might have what you are after.

JAVIATION
CARLTON WORKS, CARLTON STREET, BRADFORD
WEST YORKSHIRE BD7 1DA
Telephone: 0274-732146 Facsimile: 0274-722627

YOUR ONE STOP FOR SCANNERS AND SCANNER ANT UP TO 2000MHz
Also CB radio sets, ham radio and antennae, CB and some ham radio service manuals (to order)
Please ask for a free list

SEAWARD MAIL ORDER
ST OLAFS ROAD
STRATTON
NR BUDE
CORNWALL EX23 9AF

IF AN ADVERT IS WRONG, WHO PUTS IT RIGHT?

We do. The Advertising Standards Authority ensures advertisements meet with the strict Code of Advertising Practice. So if you question an advertiser they have to answer to us.

To find out more about the ASA please write to Advertising Standards Authority, Department X, Brook House, Torrington Place, London WC1E 7HN.

This space is donated in the interests of high standards in advertisements.

SCANNERS INTERNATIONAL JANUARY 1991
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.
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. Well, it's not quite a thankless job anymore. Think of how 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 'modes' 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 of getting through the QRM. 

Although not claiming to signal 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 'modes' 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 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 G44SMC/G65SMC 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 call sign of the Cluster will be GB7SMC with access ports as follows: 50.650 1200 Baud (G44SMC) 70.325 1200 Baud (GB75SMC) 144.625 9600 Baud (G44SMC) 144.650 1200 Baud (GB75SMC) 144.675 1200 Baud (G44SMC) 143.675 1200 Baud (GB75SMC) 1200.000 9600 Baud (G44SMC)

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 GB7DLS Cluster near Handcross, West Sussex. The GB7DLS 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 @ GB7PM, or any of the cluster sysops.

CTRL-Z, End of Message

It's nice to know that we'll shortly be having an orbital packet station in operation on the MIR space station, I'm going to have to brush up on my Russian! A short round up 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 1200 baud/9600 baud 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.
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.

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 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. 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.

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 each other 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.
FREE ISSUES

A subscription to your favourite magazine is the best way of making sure you never miss an issue.

And from now until 28th February 1991 you can get extra copies ABSOLUTELY FREE, by taking advantage of our special Christmas subscription offer. With a monthly title for example, this means you get 14 issues for the usual price of 12.

Order your subscription today using the coupon below and you will receive the best in reading entertainment right into the 1990's. This offer is also open to subscribers wishing to extend/renew their current subscriptions.

Standard subscription rates ▶️ ▶️ ▶️

<table>
<thead>
<tr>
<th>Monthly titles (14 for the price of 12)</th>
<th>UK</th>
<th>Europe</th>
<th>Middle East</th>
<th>Far East</th>
<th>Rest of World</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; B Computing — for Archimedes Owners (includes disk)</td>
<td>£35.40</td>
<td>£45.70</td>
<td>£46.30</td>
<td>£49.30</td>
<td>£54.30</td>
</tr>
<tr>
<td>Aeromodeller</td>
<td>£23.40</td>
<td>£28.20</td>
<td>£28.40</td>
<td>£30.20</td>
<td>£28.70</td>
</tr>
<tr>
<td>Citizens' Band</td>
<td>£19.20</td>
<td>£23.40</td>
<td>£23.70</td>
<td>£25.70</td>
<td>£24.90</td>
</tr>
<tr>
<td>Clocks</td>
<td>£28.80</td>
<td>£35.20</td>
<td>£35.60</td>
<td>£36.65</td>
<td>£37.40</td>
</tr>
<tr>
<td>Collecting Scale Models</td>
<td>£19.20</td>
<td>£24.60</td>
<td>£24.90</td>
<td>£27.50</td>
<td>£26.50</td>
</tr>
<tr>
<td>Film Monthly</td>
<td>£19.20</td>
<td>£24.10</td>
<td>£24.40</td>
<td>£26.80</td>
<td>£25.85</td>
</tr>
<tr>
<td>Ham Radio Today</td>
<td>£18.00</td>
<td>£22.60</td>
<td>£22.90</td>
<td>£25.10</td>
<td>£24.25</td>
</tr>
<tr>
<td>Military Modelling</td>
<td>£19.20</td>
<td>£24.00</td>
<td>£24.35</td>
<td>£26.70</td>
<td>£26.75</td>
</tr>
<tr>
<td>Model Boats</td>
<td>£19.80</td>
<td>£26.20</td>
<td>£26.60</td>
<td>£29.65</td>
<td>£28.40</td>
</tr>
<tr>
<td>Model Railways</td>
<td>£19.20</td>
<td>£24.65</td>
<td>£25.00</td>
<td>£27.60</td>
<td>£26.60</td>
</tr>
<tr>
<td>Photography</td>
<td>£23.40</td>
<td>£30.50</td>
<td>£30.75</td>
<td>£33.45</td>
<td>£31.25</td>
</tr>
<tr>
<td>Popular Crafts</td>
<td>£19.20</td>
<td>£24.80</td>
<td>£25.20</td>
<td>£27.90</td>
<td>£26.80</td>
</tr>
<tr>
<td>Radio Control Model Cars</td>
<td>£19.20</td>
<td>£24.45</td>
<td>£24.30</td>
<td>£27.30</td>
<td>£26.30</td>
</tr>
<tr>
<td>RCM&amp;E</td>
<td>£18.00</td>
<td>£28.20</td>
<td>£28.90</td>
<td>£33.80</td>
<td>£31.90</td>
</tr>
<tr>
<td>Radio Modeller</td>
<td>£18.00</td>
<td>£24.10</td>
<td>£24.50</td>
<td>£27.45</td>
<td>£26.30</td>
</tr>
<tr>
<td>Scale Models International</td>
<td>£18.00</td>
<td>£22.60</td>
<td>£22.80</td>
<td>£24.55</td>
<td>£23.10</td>
</tr>
<tr>
<td>Skeleton Crew</td>
<td>£23.40</td>
<td>£28.90</td>
<td>£29.30</td>
<td>£34.90</td>
<td>£30.90</td>
</tr>
<tr>
<td>Steam Classic</td>
<td>£18.00</td>
<td>£24.60</td>
<td>£25.05</td>
<td>£28.25</td>
<td>£27.00</td>
</tr>
<tr>
<td>Video Today</td>
<td>£19.20</td>
<td>£24.75</td>
<td>£25.10</td>
<td>£27.80</td>
<td>£26.70</td>
</tr>
<tr>
<td>Which Video</td>
<td>£21.00</td>
<td>£27.20</td>
<td>£27.60</td>
<td>£30.60</td>
<td>£29.40</td>
</tr>
<tr>
<td>Woodworker</td>
<td>£19.20</td>
<td>£26.00</td>
<td>£26.45</td>
<td>£29.75</td>
<td>£28.43</td>
</tr>
</tbody>
</table>

Alternate monthly titles (8 for the price of 6)

| Radio Control Boat Modeller           | £9.60  | £12.35 | £12.50      | £13.90   | £13.30        |
| Radio Control Scale Aircraft          | £13.30 | £16.65 | £16.80      | £17.95   | £17.00        |
| Practical Wargamer                   | £14.70 | £18.40 | £14.90      | £16.10   | £16.10        |
| Model Engineers' Workshop             | £15.00 | £18.90 | £19.20      | £21.40   | £20.30        |

Fortnightly title (26 for the price of 24)

| Model Engineer                       | £33.60 | £44.80 | £45.55      | £51.00   | £48.80        |

Please commence my subscription to ................................................ with the ........................................ issue.

I enclose my cheque/money order for £ ........................................ made payable to ARGUS SPECIALIST PUBLICATIONS

or debit my Access/Barclaycard number ........................................ Card expiry date ........................................

Signature ........................................ Name ........................................

Address ........................................ Postcode ........................................

UK subscribers may pay for their subscription using Direct Debit — for further information telephone: 0442 876664 during office hours.

Please return this coupon with your remittance to:

Select Subscriptions Ltd. (HRF/5) 5 River Park Estate, Billet Lane, BERKHAMSTED, Herts. HP4 1HL, UNITED KINGDOM

HAM RADIO TODAY JANUARY 1991 please mention HRT when replying to advertisements
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 fulfill 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 'HI HI' 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 Vandenburg 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.
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 retransmitted 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 charged batteries which were then hoped to give the satellite a life of a year or so, which in fact was greatly exceeded. Subsystems 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 panel, 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, 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 146.90MHz 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 435.095 MHz. 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 SKRA, 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
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 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-UK 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 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'. Arianespace 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)**
DXers from around the world at the DX Dinner, including Dimar UA4AGW and Lawrence GM4DMC.

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 Braunton in Northamptonshire. The convention was so good it was 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 transmitters 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 can be electrically slewed by up to 20 degrees. The arrays give up to 15 or 18dBd gain, depending on the frequency, and this with up to 300kW going into them, gives an ERP of several Megawatts 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 GM4DMC, 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 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, 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 G4LOF addressed the QRP side of operating in his lecture ‘QRP from a newcomer’s angle’ on behalf of the G-QRP club. After lunch, David G3PGQ showed 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 GBEUX 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 team operated 3Y5X from one of the most inhospitable places on this planet’s surface, and one where it is almost impossible to reach without a helicopter. Einar’s account of the expedition gave some idea of the tremendous amount of planning...
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 his recent expedition to the Kingdom of Bhutan. 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.

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-band 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 plaques 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 G4BLE for the SSB leg and to Al Slater G3FXX 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 year’s 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!

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

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

Democratic Republic stations in the Eastern part of Germany, which was formerly the German 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 6254 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 G06UVW in an attempt to get first place in Europe. There will be some competition from a second CDXC group operating from the G30ZF 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 G3LOP, 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

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)

Please mention HRT when replying to advertisements
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.

**QSL Managers**

During 1990 there have been at least three expeditions to the Portuguese island of Berlenga; CT08 in May, CT0BI in August, and CR1BI in September. All were easy to work and CT0BI 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 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.

**QSL Information for currently or recently active DX stations**

<table>
<thead>
<tr>
<th>DX Station</th>
<th>Address/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH3C</td>
<td>Johnston Island, Pacific</td>
</tr>
<tr>
<td>CR1BI</td>
<td>Berlenga Island</td>
</tr>
<tr>
<td>GU6UW/GP6UW</td>
<td>Guernsey</td>
</tr>
<tr>
<td>VP2EE, VP2EHF, VP2EBN</td>
<td></td>
</tr>
<tr>
<td>VP2EXX</td>
<td>Anguilla, Caribbean</td>
</tr>
<tr>
<td>ZK3EKY/5WIKY</td>
<td>Tokelau, W.Samoa</td>
</tr>
<tr>
<td>7Q7KQ</td>
<td>and all 'Yasme' expeditions</td>
</tr>
</tbody>
</table>

All are good QSLers, although some only reply to cards sent direct with return postage. Good DX and good QSLing, see you next month.

**ADVERTISERS’ INDEX**

- Raycom Communications
- GRM Ltd
- Siskin
- Lowe Electronics
- Icom
- Kanga Products
- South Midlands Communications
- Cirkit Holdings
- KW Communications Ltd
- ERA Ltd
- SRW Communications Ltd
- Ham Radio Today Binders
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.

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 up north often I 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 10.37GHz with a self excited receiver tuning 10.0-10.5GHz and have 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 150km so not bad for 20mW!"

Bill G6XM would like to hear from anyone in the south west interested in cooperating in 10GHz tests. He can operate portable from the heights of Cornwall and Devon, and you can arrange skeds by phoning him on 0937 522923.

Amateur Television

Brian GB2YZ 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 enquire about receiving our pictures.

Looking at the magazines in the newsagents it was noticed that some prompted Roy G6OKB 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.

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.

Z88MI; JA1VOK reports in the August edition of his 'World News Pages' that between 23 April and 1 May ZS8MI Peter (ZS8FT) 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 (JN39AI), LX1DT Henri (JN39AQ), LX1JX Jack (JN30AB), LX1PD Jules (JN39BN), and LX1S1 Marc (JN39CO). 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
have a LX beacon on the band, LX0SIX, 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. Dusan VU2AID received a permit on 6 June 1990, this is due to expire at the end of October 1990 but I understand that Dusan is trying to get it extended. The frequency spectrum allotted to him is from 50.070 to 60.130. He has already worked into Japan, and Dusan’s XYL Grace VU2AU 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 locater is K5MT, 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 call sign 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 G3KXW 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 G110V, 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 800 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, 3DA0BK, 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 call sign 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 KZ7MS explaining the situation here in the UK 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 144,060, 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 wave. I have received a 30dBW permit for 144 MHz and during the last few days have been trying tests with V51ZS, 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.

UK 2S 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 ZS6L at S9+-, and ZS6WB, ZR6AGN, and then the star of the afternoon, 3DA0BK was heard calling CQ at 1505z on 50.115MHz. Reports were exchanged (57) both ways from KG53. This was my 97th country, 426th square wave, 72nd GJ first, plus I think a British Isles first, what a surpise 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 114 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, V51SW 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 want to have had these strong openings last year, well not doing it again. 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 FRS5IX, ZSBVHF and 9L1US all came in at good strength. ZSBVHF was still there when I switched off late evening, during that afternoon I worked by Metaor Scatter my 88th 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 G8KB has promised a review of propagation conditions during 1990, and the second part of 'amateur television' by Roy GS0KB and Brian G8ZY 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 GSKW, 18, Joyes Road, Folkestone, Kent.
With the ever increasing interest in the Packet Microsats, this month Richard G3RWJ 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.

- **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, 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:** 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 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 cropping to a rather low level during the Mode L-S-B operations between MA 195 and 205. To maintain...
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 — 136
Mode-BS: MA 136 — 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 usual AX.25 to the voice synthesiser, 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-NAT 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.
In his customary twelve-months summary, Jack Hum G5UM takes a retrospective look at 1990’s metrewave highlights

The Novice licence provides for 640kHz of the 6m band, 140kHz in the lower MHz and 500kHz in the upper MHz.

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 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 6metres 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-crystallised, for the band, and of course retrimmed. The definitive articles on this subject were those by G40UB 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 fulfill the FMers needs and of course provide the great advantage of firing his signal in the...
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 aerials will be needed, one horizontal and the other vertical, as has happened on 4m, 2m and 70cm.

Repeater 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 'six' could equally well be done, and more one of its occupants remarked to your scribe, "Some of the DX chasing done on higher frequency bands exhibit anoma-

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 aerials will be needed, one horizontal and the other vertical, as has happened on 4m, 2m and 70cm.

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 metrewave 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 its 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 metrewave enthusiast in recognition of operating skill combined with single-minded tenacity and the added bonus of certificates to cover up those damp patches on the radio life, and you don't even need to pass the Morse to traverse them!
Leicester Show Report

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 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 C6600 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

This year’s show, again a great success

HHT RADIO TODAY JANUARY 1991
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 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.
Several items of interest have appeared over the past month. The news first this time. Colin G3YTT (229) tells us that the OK boys have started a new QRP club, it has just published it's first magazine OK-QRP. The UK QRP club has had ties with Czech operators for several years now, and the club has organised several weekends 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 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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!

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 0800 and 0900. 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 (044) 37 Pickerill Rod, Greasby, Merseyside. L49 3ND. Contacts that originate on GRO do not count, and the whole QSO must be QRP!
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 on 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 be alone. "I'm glad you're coming," he replied. "We both wished to be remembered to you both. Toby ordered a half of bitter and took it over to join them. 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.

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 the special night of the year.

A Ghostly Message

Our annual Christmas chiller, by G30XC

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 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 tiring and each time the transmission ended suddenly as if it had been interrupted," Toby remained silent for a moment, thinking about his experience.

"It must have been a pirate," Tom had replied wearily. "They stay 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 falttering 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
go out. He had left the door open and was slouched in a chair when Harry entered. "You OK?" he asked his visitor. Toby looked terrible. He 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. "Do you believe me don't you Harry?"

Harry looked at him for a moment and then spoke, "You haven't 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 scribble. 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 glanced 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 it 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. "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 windshield, 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.'
Please mention HRT when replying to advertisements.
National and International
The Irish Radio Transmitters Society send out regular newsletters giving details of local activities. The contact man for this is Dave Moore EI4BZ, 12 Castle Ave, Carrigtwohill, Co Cork. Tel. (Eire) 021 883555
G-QRP Club publish a quartery magazine devoted to low power communication, and hold regular get-togethers. Their secretary is Rev. G. Dobbs, St. Aidan’s Vicarage, 498 Manchester Road, Rochdale. Lancs. OL11 3HE. Tel. 0706 31812.
To include your club in this feature, make sure you send your events details to the editorial office address, then we’ll make sure our readers know exactly what you’re up to each month. You might even get some new members! Remember these pages are prepared two months in advance of the magazine appearing on the shelves, so dates need to be sent well in advance, i.e. dates to be included in the issue published in February should reach us at the beginning of December.

Rallies

Winter gatherings for bargain hunters

December 9th
The Leeds and DARS Christmas rally takes place at the Civic Hall, Dawsons Corner, Pudsey, doors open at 10.45am. Further details Tel. 0532 585801
Verulam Christmas Rally is at Hatfield Polytechnic, doors open at 11am, finishes at 5pm. Further details from Steve on 0923 249456

January 20th.
Oldham ARC Rally, at the Queen Elizabeth Hall, Civic Centre, Oldham. Further details available from Kathy, G4ZEP on 061 624 7354

January 27th.
The Lancastrian Rally is on January 27th at Lancaster University. The organisers of the event are the CLARC and ULARS radio clubs. For further details contact Sue Griffin, G10HH, on 0524 64239 or Mike Sherlock, G4ZYN, on 0257 452287.

Welsh Mobile Rally is at the Barry Leisure Centre, off Holton Road, Barry. For further details, phone Ceri GWOJC on 0446 721304

March 9th and 10th
London Amateur Radio Show, Pickets Lock Centre, Pickets Lock Lane, Edmonton, London. HRT will be there! Organised by the London Amateur Radio Show committee, in conjunction with the Southgate ARC. Further details from the London Amateur Radio Show, 125 Mount Pleasant Lane, Bricket Wood, Herts AL2 3XD.

Wythall Radio Club will be holding their 6th annual radio rally at Wythall Park, Silver Street, Wythall, Worcestershire, on the A455 near junction 3 on M42, South West of Birmingham. Rally opens at 11.00am, with an admission of 50p. Further details from Chris Pettitt, G0EYO, on 021 430 7267.

Pontefract and DARS Components Fair, at the Carleton Community Centre, Carleton, Pontefract. For further details, Tel. 0977 615549

Centre of England Easter Amateur Radio Rally, is being held at the motorcycle museum, Brickenhill, near the NEC Birmingham. Further details from Frank Martin, G4UMF, on 0952 698173
Radifon R60M receiver (valve set) in perfect working order, complete with many spares, £50, buyer to collect. Tel. (Cloughton, Scarborough) 0723 364262 daytime.

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

FRG9600MKII with cash difference. (Northwich, Cheshire) Tel. Brian on 0806 46336

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. Tel. (Prentice, Fareham, Hampshire) 0705 321857

Ex-MoD Receiver 2-16MHz AM, CB, SW filter model No. R210 converted to mains and L.S. output, £50 ono. Tel. Philip Lock of Aldershot on 0252 324955 day-time, or 0252 332035 evenings. FT707, FC707, and FF700 £600. FRG7, £99. Hy-Gain 10m multimode £75, Tiny-2, latest Firmware, £95. GDQVOO, 0822 478279 weekends only.

Bearcat 202FB base scanner, mains and car use, good audio, excellent condition, £150. Sony ICF7600A portable receiver, FM/MW plus 7 SW bands, very good condition. (£40. (STreatham, S. London) Tel. 081 769 4389

Judge G3PTD, 88 Sandy Lane, Stretford, Manchester M32 9BX. Tel. 061 865 9398.

Kenwood TR2500 2m 100 Watts out, £110. 70cms. (Nuneaton) Contact R. Berry (Milton Keynes) on 0908 680039

Sony AF-7 VHF scanner fully synthesised 144-174MHz, 108-138MHz, 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 574471

Nams Clarke's special purpose receiver type 1300, 30-260MHz, £150 ono. Contact Dave (Keevil, Wiltts) on 0380 760511 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, £580. 2m Microwave Modules linear amp 10 Watts in 100 Watts out, £110. 70cms Microwave Modules linear amp 10 Watts in 50 Watts out, £96. (Manchester). Contact A. Trusler (Shoreham-by-Sea, Sussex) on 0273 426285 after 6pm.

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

HRO-MX Superb, condensors replaced, nine coils, buyer collects (Saturdays, Sundays) £100, cash. Contact Mr. Walker, 137 Brighetouse and Denis Rd, Opposite Reggadals Inn, Queensbury, Bradford BD13 1NA.

R107 1.2-17MHz VGC, £65. Wavemeters Class D, MkII £20, MkIII £25. 100/1000kHz Xtalks for class D wavemeter £5 each. Petrol generator 6A battery box VGC, £50. Gyro unit 8112, new £25. Command RX BC4538 190-50KHz £35. Tel. J. Stables on 091 410 3706

American and DX callbooks, £12 each plus postage, or £25 the pair post paid. Contact M. J. Faulkner, G3UJ, 35 Abbey Way, Farnborough, Hants GU14 7TD 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 G4EZL, Tel. 0457 627999

2 ele Altron Mini Beam, very good condition, £60 ono. Tel. J. W. Crosby on 061 748 2915

Laser finished 2mW Hi-Ne Laser, uses Maple Tube. £100. (Ascot, Berks). Contact Pete on 0344 23696 after 4pm.

Burdunte handheld converted to 70cms with nicads and aerial, £45 inc post. Atari 800XL computer, tape and disk drive, approx 200 games on disk, plus books, £200 ono. (Work) Contact Andy on 0904 414998 after 6pm.

Yaesu FRG9600 receiver HF plus 2m and 6m, all modes including FM, crystal calibrated, in good condition, complete with operating manual and original packing. £150 ono. Will consider part exchange transceiver HF or 70cms. ( Nuneston) Contact R. Harris on 0203 327847

Kenwood Trio TR8000 2m multimode mobile/fix, plus base plinth and matching power supply, all VGC, £380. (Huntingdon). Tel. 0440 891482

3 ele, 6 band, HF Gen Quad aerial, three months old, going AMTOR and Packet. Cost £825, offers £500-£600. Will exchange with advanced prog’s BBC B computer, for IBM compatible computer, eg. Amstrad 1512, Hard Drive, 64K upgrade, colour monitor. (Callington, Cornwall). Call evenings 0566 82420

Kenwood T8430 FM, AM Wide, SSB Narrate, £575. PK18 TNC complete with Commodore 64 computer and IC5 software, £125. GOCPR, Tel Crawley (0293) 782910

10MHz

Free Readers Ads!

Edystone 990R VHF receiver, transverter version of 770R but 27-240MHz, 4 bands, £25, plus usual facilities, video outputs, 240V AC with manual. Circa 1969, reasonable condition, £60. Buyer collects. Bunnym. 33 Chavert St, Romsey, Hants. 0511 8BF. Tel. 0794 517497

FT-290R 2m multimode, full front end, slim jim plus coax, 7 ele beam, Digicomp packet modem, all leads and program for C64, £375. (Romsey, H. Humberside). Tel. 0469 576153

RMS Stabilised power supply, 13.8V 6A, as new, £30. ITT Kotlar brand twin track oscilloscope, working order (needs attention), £10. Manual, £50 plus carriage. (Street, Somerset). Tel. 0458 47019

Belcom LS20XE 2m FM portable, nicads, charger plus 20W amplifier with built-in preamp, col relay, £125. Icom 2E, 2m FM mobile, dual VFO, £125. All above VGC. Eric Page GU3HKV, Seacroft, Sheffield, L. 041 526 6607.

SX-400 professional receiving scanner, continuous frequency coverage 26 - 520MHz programmable by external computer, many other features, excellent condition with user manual. Also Revco 2050T VHF/UHF aerial, £350. Tel. G. Taylor on Stevenage (0438) 616136

QRP equipment, Argonaut S05 HF SB transceiver, £250 ono. Heathkit HW6 CW receiver, £50. Cobra converted 10m SSB, £40. All in good working order. Gordon G4ABO (Stevenage) Tel. 0438 365254


Kenwood R820 RX, excellent condition, boxed, £400. (Tadley, Hants). Tel. Mr. Rogers, 073 812 4767

Primer, OKI Microline 192, brand new, unused, all accessories etc. £130. Sony Prestel terminal, 14in colour monitor, all accessories, brand new and £250. (Lancashire). Pat G0MKJ, Tel. 0205 420434

Two Gould MG-5-40B PSUs, 5V, 40A, co-phased, excellent power supply with fan. (Barrow in Furness). Offers to 02294 42144. Willing to deal with some spare parts. Icom 271E 2m base multimode, with mic, good condition, £350. 18Wm 2m linear with preamp, £100. Grundig Setljet 650 International, as new, £350. (Penbroke). Tel. 0646 668112

Sony IC2001 receiver, boxed, mains power unit, excellent condition, £80. (Steveson). Tel. 041 3616131

 Loads of gear, transceivers £250 to £2500, antennas, test gear, third gear, maximum clearance inc. key, SAE for list. G4JWY, White House, Eype, Nr. Woodbridge, IP12 1OW. Kenwood TK207, as new, £90. £30.01 HQI Mini Beam, AR40 rotator, offers. Bencher Chroms twin paddle key, as new, £50. Contact Tony G4KHT, in Hull on 0482 6676457

Yaesu FT707 HF TX/RX, 100 Watts plus FV7000M unit, mint condition, sell or exchange. Wanted dual band UHF/VHF equipment with which has ended TX coverage, i.e. Trip 75E HH, Trip 4100E mobile. Contact A. Drake from Newcastle, G1EBD on 0782 612888 after 7.00pm Mon - Fri, or at weekends. Standard HF-100E scanner and frequency guide, excellent condition, hardly used, box and all accessories, £150 ono. Tel. Mr. Laren on Merrith Tydfl, Mid Glam (0685) 72 3115 between 4pm and 10pm.

Stereo Radio, FM/AM, 15 Watts per channel, cassette recorder, CW, RTTY. £250.000. Tel. G8BSK on Southampton (0703) 52 2247.

Colour Genie Computer plus Cassette recorder, CW, RTTY, Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing Contest logbook, QRA Bearing
FOR SALE

Kenwood TS-520SE transceiver, CW filter fitted, used approx 30 hours on transmit. Absolutely unmarked, complete with mic and two new spare PA valves, £375. (Lancaster). Tel. Norman on 0524 36813

19 inch Rack Cabinets, 5ft and 6ft tall, £75 and £120, good condition. Also clear-out of junk, VDUs, power supplies, fans etc. (St. Albans, Herts). Details Tel. Phil on 0923 677133

Aerial Rotator complete with control box, £40. (Rochester, Kent). Tel. Medway 250047. Racal RA17 receiver (rack mounting), with manual. 500kHz to 30MHz in 30 MHz ranges. Good working order and very clean front panel. £150, buyer collects. (Peterborough) Tel. 0733 357637

Diamond Active Aerial 50kHz to 1500MHz, 20dB gain, as new. Aerials also available. Tel. 0674 790033

Vintage Philips 681A model 6 valve radio, 12 Waveband, double superhet (1956/57), working or not. Contact Mr. Fox on 021 558 3522

Drake 28 with Q balance, or 4C4. Must be working and in good condition. Contact Mr Walker, 35/37 Brighouse and Denholme Rd, Queensbury, Bradford, BD13 4RA

SONY World Zone radio, CRF320 or similar, for cash. Or WHY? (Hitchin). Tel. 0462 421427

29 handheld TX/RX, Trio Yaesu ARBBD, on RX, must be in fault free, excellent condition with RCA meter if possible, also trimming tool, manual and any spares, or cheap working one for spares if no RX, original manual not photocopy wanted. Contact Mr. Shepherd, 68 Westerland Ave, Canvey Island, Essex SS8 8JS

Coil units for Edystone 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

18ET MKII, MKIII and any accessories for same. Also any WWI onward sets, purchase or swap. Tel (Selby) 0757 708805

Unlace 100 or 200FM CB radio's. Audioline 341 or 340 FM CB radio's, must be in good order. Also FM CB handheld portable, 40 channel in good order. Write to Mr. L. Mannering, 3 Ajax House, Burnley, Lancashire. BB11 4TD

Icom IC202, no fancy price! must be working. Contact Mr. W. James, 56 Fern Meadow, Okehampton, Devon EX20 1PB Tel. 0837 52923

Help and advice please. Have discovered Edystone 730/4 and enjoying 'Real' radio. Advice on best similar type radio's required. Wish to copy 730/4 handbook. Is there a source of such radio's in UK? Contact W. Johnston, 29 Hengistbury Road, Southbourne, Bournemouth, BH4 4DQ Tel 0202 422273 after 6.30pm.

Manual 900E TONO, G. Farrer, 16 Duncan Rd, Gillingham, Kent ME7 4LE

Motorola extension aerial leads, two off, to fit MX 300 series handhelds. Also Bird Thru line element to cover 2 metre band, 50 or 100 Watt rating. Please contact Tom Valentine, GM1XHZ, 39 Graman View, Montrose, Angus. Tel. 0874 76503

HF Rig anything considered, also 2m handheld, VHF scanner, test gear. Sale. Vibroplex type bug key, £8. Tel. Thanet (0843) 294446

Back numbers HRT, April, May and June 1986. Price to Seon Smyth, 'De Porres' 67 East Princes St, Helensburgh G84 7DG Tel 0436 71181

April 1983 and Jan 1986 copies of HRT to complete collection, buy or borrow to photocopy. Any info on KW Vanguard, OPS manual etc. Any Info on R206 receiver. Contact Geoff on Bracknell (0344) 528011

Old Vega 205 portahand transistor, also any war-era mains radio, reasonable price. Contact M. Quirk, 24 Sunhill, Sunniside, Newcastle-on-Tyne

SEM Transmatch ATU, preferably with easy tune but not essential. Tel. Huddersfield (0484) 545546

WANTED

Crystals for Py Westminster to use on 2m. Contact Geoff Dodsley, 253 Park Road, Heage, Belper, Derbyshire DE5 2AB

Denco valve type coils, general purpose, ranges 2, 3, 4, and 5 Blue. Yellow, Red, B9G or octal. Complete sets or part sets, all letters answered. Price and details to Frank Burns, 72 Winchester Rd, Brislington, Bristol BS4 3NH

Larkspur Equipt CII TXaboxB47. SEM Transmatch ATU, preferably 2m handheld, VHF scanner, signal generator, test gear. (Broadstairs, Kent) Tel. 0843 294446

Motorola SX300 series handheld aerials, also Bird Thruline extension aerial leads to fit Motorola SX300 series handheld TX, also element for Bird Thru line Wattmeter. (2m range). Contact Tom Valentine, 38 Graman View, Montrose, Angus DD10 9SX Tel. 0764 76503.

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

18ET MKII, MKIII and any accessories for same. Also any WWI onward sets, purchase or swap. Tel (Selby) 0757 708805

Unlace 100 or 200FM CB radio's. Audioline 341 or 340 FM CB radio's, must be in good order. Also FM CB handheld portable, 40 channel in good order. Write to Mr. L. Mannering, 3 Ajax House, Burnley, Lancashire. BB11 4TD

Icom IC202, no fancy price! must be working. Contact Mr. W. James, 56 Fern Meadow, Okehampton, Devon EX20 1PB Tel. 0837 52923

Help and advice please. Have discovered Edystone 730/4 and enjoying 'Real' radio. Advice on best similar type radio's required. Wish to copy 730/4 handbook. Is there a source of such radio's in UK? Contact W. Johnston, 29 Hengistbury Road, Southbourne, Bournemouth, BH4 4DQ Tel 0202 422273 after 6.30pm.

Manual 900E TONO, G. Farrer, 16 Duncan Rd, Gillingham, Kent ME7 4LE

Motorola extension aerial leads, two off, to fit MX 300 series handhelds. Also Bird Thru line element to cover 2 metre band, 50 or 100 Watt rating. Please contact Tom Valentine, GM1XHZ, 39 Graman View, Montrose, Angus. Tel. 0874 76503

HF Rig anything considered, also 2m handheld, VHF scanner, test gear. Sale. Vibroplex type bug key, £8. Tel. Thanet (0843) 294446

Back numbers HRT, April, May and June 1986. Price to Seon Smyth, 'De Porres' 67 East Princes St, Helensburgh G84 7DG Tel 0436 71181

April 1983 and Jan 1986 copies of HRT to complete collection, buy or borrow to photocopy. Any info on KW Vanguard, OPS manual etc. Any Info on R206 receiver. Contact Geoff on Bracknell (0344) 528011

Old Vega 205 portahand transistor, also any war-era mains radio, reasonable price. Contact M. Quirk, 24 Sunhill, Sunniside, Newcastle-on-Tyne

SEM Transmatch ATU, preferably with easy tune but not essential. Tel. Huddersfield (0484) 545546

FOR MORE DETAILS

DONNA WELLS

CALL DONNA WELLS ON

0442 66551

FOR MORE DETAILS ON ADVERTISING
**BIRMINGHAM**

**HEWARD'S HOME STORES LTD.**
822/4 Kingstanding Rd. Birmingham B44 9RT. Tel: 021-384 2083
G4FJM with over 40 years in The Radio Trade
Ham Equipment recently wanted!
Open: Mon-Sat 9-6

**LANCASTHIRE**

**AMATEUR ELECTRONICS/LOGDINGS G3LVL,**
38 Gloucester Avenue, Northampton
YAESU, JAYBEAM, GEAR, ANTENNAS, BLACK STAR COUNTERS,
ETC. FT286 BI EXPERTS
VHF/ UHF WORK IN Original type approved
values & our own Double Balanced Mixer and
PAU L-A-C.E. Full Year range. Brixworth, Northampton
Tel: 0604 68600 (Day or Night)

**WEST SUSSEX**

**BREDHURST ELECTRONICS LTD**
24 Oldfield Way, West Sussex.
Tel: 0444 490786
Situated at the Southern end of M25. Easy access to M25
and South London, Open Mon-Fri 8am-5pm except Wed
9am-12:30pm. Sat 10am-4pm.

**BIRMINGHAM**

**B&C ELECTRONICS**
51 Sir Hiltons Rd
West Heath, Birmingham B31 3NH
Amateur Radio and Computer Sales
Elec antenna main dealer and commission
sale items always required
BRUM'S PREMIUM JUNK SHOP
Tel: (021) 4752426

**LEICESTERSHIRE**

**ELIOTT ELECTRONICS**
for the Radio Enthusiast
26-28 Braunstone Gate, Leicester.
TEL: 553293
Open: Mon-Sat 9.00am to 5.30pm

**DEVON**

**AGRIMOTORS**
Merton CB & Radio Centre
Merton Park, London SW19 ORP
nr Oakhampton EX20 3DZ. Tel: (08053) 200
Open 6 days 8am-12 and 2-5 (Lunch 1-3)
(Baudet by appointment)

**BIRMINGHAM**

**LOWE ELECTRONICS**
Darlington
Sole U.K. Distributor for KENWOOD
22317/25 Field End Road
Eastcote, Middlesex HA6 1QZ
Tel: 081 429 3256

**DURHAM**

**LOWE ELECTRONICS**
Darlington
Sole U.K. Distributor for KENWOOD
56 North Road, Darlington
County Durham DL1 2EQ
Tel: 0325 486121

**LONDON**

**LOWE ELECTRONICS**
LONDON
Sole U.K. Distributor for KENWOOD
22317/25 Field End Road
Eastcote, Middlesex HA6 1QZ
Tel: 081 429 3256

**MANCHESTER**

**ST COMMUNICATION SYSTEMS LTD.**
22317/25 Field End Road
Manchester M23 7LX
Tel: 061-745 7389

**DURHAM**

**BORDER COMMUNICATIONS LTD.**
Communications Centre
Units 9-10
Drum Industrial Estate
Chester-le-Street
Co. Durham DH1 1XZ
TEL: 091 4105989

**MANCHESTER**

**VANNER'S**
Scanner and G.B. Centre
Sales, Service and Repairs of Scanners, CBs, Phones,
Answer Machines, Radios etc.
Agents for Garret, Rayovac, Beartooth, Uniden, Panasonic.
Part Exchange. All items welcome

**NORTHAMPTON**

**LOWE ELECTRONICS**
Darlington
Sole U.K. Distributor for KENWOOD
56 North Road, Darlington
County Durham DL1 2EQ
Tel: 0325 486121

**DURHAM**

**LOWE ELECTRONICS**
Darlington
Sole U.K. Distributor for KENWOOD
56 North Road, Darlington
County Durham DL1 2EQ
Tel: 0325 486121

**LONDON**

**LOWE ELECTRONICS**
LONDON
Sole U.K. Distributor for KENWOOD
22317/25 Field End Road
Eastcote, Middlesex HA6 1QZ
Tel: 081 429 3256

**DURHAM**

**BORDER COMMUNICATIONS LTD.**
Communications Centre
Units 9-10
Drum Industrial Estate
Chester-le-Street
Co. Durham DH1 1XZ
TEL: 091 4105989

**NORTHAMPTON**

**LOWE ELECTRONICS**
Darlington
Sole U.K. Distributor for KENWOOD
56 North Road, Darlington
County Durham DL1 2EQ
Tel: 0325 486121

**SCOTLAND**

**JAYCEE ELECTRONICS LTD**
42 Woodside Way Glenrothes
Fife KY7 5DF
Tel: 0592 756982 (Day or Night)
Open: Tues-Fri 9-5; Sat 9-4; Sunday by appointment
Good range Kenwood & Yaesu etc, plus
Icom Quality Secondhand Equipment
The London Kenwood Centre

KENWOOD

R-5000 £875
Don't forget that Kenwood expertise is not limited to transceivers. The R-5000 has been voted "Best HF receiver of the year" by the demanding reviewers at World Radio and TV Handbook, and this is not surprising when you actually use one. All mode top performance from 100kHz to 30MHz (and 108-174MHz with the optional VHF converter), ultra flexible IF filtering, built-in power supply, stable and accurate readouts in all modes, and of course Kenwood quality.

TS-790E £1,495
Destined to be the new standard by which all VHF/UHF transceivers are judged, the TS-790E gives the dedicated operator everything he ever wanted in a multi mode, multi band home station. Covering 2 metres, 70 centimetres, and (optionally) 23 centimetres, on all modes, whether DX chasing, contest operating or chatting cross town, the TS-790E can handle it all and give you complete satisfaction. See a brochure soon.

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. RIT. And a 20-dB attenuator for local QSOs.

**Lightweight construction.** Housed in a metalized high-impact plastic case, the FT-747GX weighs in at about 7½ pounds! With the loudspeaker 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.


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.

South Midlands Communications Ltd
S.M. House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY
Tel: (0703) 255111
UK Sole Distributor

**Fill your logbook.**

Without emptying your pocket.