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HRT HAM RADIO TODAY

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VOLUME 9 NO 4 APRIL 1991

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Printed in Great Britain by
Acorn Web Offset, Bradford

Subscriptions and back issues:
Ham Radio Today Subscription Dept, Select Subscriptions Ltd, 5 River Park Estate, Berkhamsted, Herts HP4 1HL
Tel: (0442) 876661/4
Subscription rates:
UK £19.20, Europe £24.00
Middle East £24.35, USA $48.00
Far East £26.70, Rest of World £25.75
Airmail rates available on request.
USA Subscription Agent:
Wise Owl Worldwide Publications,
4314 West 238th Street,
Torrance CA90505
Tel: (213) 375 6258

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NEWS AND VIEWS

CQ de G8IYA

G8IYA/M stirs up the repeater activity

If you operate mobile or portable on 2m or 70cm, more likely than not you'll have used the services of your local repeater. Amateurs travelling in parts of the country away from their normal 'treading ground' often find that a call through the repeater covering their area of travel results in a friendly reply from another station, maybe to provide a report of road conditions, the best route to a given destination using 'local knowledge', or indeed just to keep one company on a car journey.

I've often been driving late at night along a motorway, either from visiting friends or from a distant business trip (amateur radio events often finish at night, and sometimes in the early hours of the morning — witness the RSGB Presidential election in Cardiff, a long drive from Eastleigh!). Whilst travelling along a sometimes deserted motorway, often alone in the car, it's great to have a chat on the air, and it certainly stops me tempting to fall asleep at the wheel!

What would 'mobile' life on 2m and 70cm be like without the repeaters? Some could say 'a lot more peaceful', others could wonder whether they'd still get the best use out of their mobile rigs. Remember no-one forces you to use a repeater on FM, but those who do use them may do well to cast a thought towards the hard-working chaps who keep the repeaters on the air for us to use. It's often a thankless job, I know too well as I often used to accompany our Consultant Technical Editor on his maintenance and repair trips up to GB3PI, sometimes in the middle of the night, to ensure the repeater never stayed off-air for longer than a few hours at any time.

So why do they do all this work in keeping the 'boxes' going? Maybe it's for the inner reward of knowing they're helping other amateurs enjoy their hobby to the fullest, and you'll often find the people who do all the work get the least recognition, whilst others who do all the talking get the most attention! The important thing to note is that *someone* out there keeps the repeaters on air for you to use. It isn't the RSGB, although some amateurs quite wrongly think it is, instead it's normally a group of local amateurs who have 'clubbed together' to provide a facility for the use of all other amateurs. The moral of course is that if you use your local repeater facilities often, consider supporting your local group.

Because if no-one does, you may find one day 'your' local repeater isn't there any more.

A Lively Bunch

Many amateurs have contacted us to say how much they appreciate the good 'balance' of articles in HRT, together with the fact that we seem to be a 'lively' bunch of people who don't sit around acting complacent! We like stirring other amateurs into activity also! You'll probably know that HRT is put together by over a dozen people, all being full-time staff of the company of ASP who've been publishing technical magazines continuously since 1898 (yes, the last century). But without our contributors there would of course be no magazine! In this respect we're proud to have such distinguished and very experienced contributors as G5KW, G5UM, G2UK and G3GSR in our pages, and from reading their articles you'll see that they're anything but 'old and dull'! Their considerable experience backs up the 'younger' brigade of newer amateurs who also contribute to HRT.

To accompany this month's editorial photo, Jack G5UM wrote to tell us "The G5 plus 2 callsign holders are a dwindling band, see the callbook. All are prewar, except for a small number of re-allocations to relatives of the original holders. It was therefore quite an event when two G5s were present at the HRT stand at last autumn's Leicester Show. On the right is Ken Ellis G5KW, contributor of the HRT 'VHF/UHF Message' dealing with VHF propagation. On the left is Jack Hum G5UM, who has been 'Metrewave' contributor since 1982. Between them is your Editor G8IYA *(who hasn't been licensed for anywhere near as long! — Ed).* There is some significance in the stand behind the HRT one. It belongs to the Leicestershire Repeater Group, whose life president is G5UM. Invaluable assistance to mobiles homing in on Leicester was given by LRG members via the two repeaters GB3LE and GB3LF, complementing the intensive operations of the show talk-in stations in the exhibition hall."

Ken G5KW will again be present on the HRT stand throughout the London Show this month, so do come and say hello, I'm sure he'll be pleased to have a chat about VHF matters and the like. The rest of the HRT editorial and sales 'team' will of course also be there to answer your questions, take your subscription orders, or indeed just to have a chat as well!

LETTERS

Letter of the Month

Dear HRT
Almost too much is written on the for/anti Morse debate in so far as it applies to our licensing. Much comment however stems from simply looking at what exists and trying to modify this for the future, some comment even comes as anti-establishment. But for a change why not view the scene from what was and brought it all about in the first place.

A large proportion of early radio working (when the spark ruled) was devoted to maritime communication. Morse was for a long time the only method of communicating by radio and even after voice began to be used it was still realised that CW equipment was still a simple and effective method of communication over distance. Even if the worst should occur any self respecting radio officer ought to be able to cobble up some form of sender if all else failed. I believe spark transmitters were still held in reserve long after their acceptance for normal communication had ceased. CW was after all the ultimate fall back for sending messages of distress.

So here we come to the essence of the HF Morse requirement, the ability either to be able to accept distress calls or to avoid band areas already being used for that purpose. The only way this could be attained was for all operators working the radio spectrum were there would be a chance of a distress call to have capability to RX and TX Morse at a reasonable proficiency. Generally it has become accepted practice worldwide that this area of the radio spectrum is below 30MHz. Naturally these requirements affect the radio amateur who wishes to work HF and in our case reflect the difference between the class A and class B licence.

So far so good and there are up to the present very sound reasons for the Morse requirement below 30MHz. However in the next couple of years the distress requirements are being removed from maritime use to be taken over by satellite network. Once this has occurred, the keystone supporting the essential of Morse for HF will have been removed and it will take increasingly stronger and devious argument from authority and officialdom to try to justify the continued retention of the clause for licence identification.

However where the amateur is concerned, CW working still has an effective role to play because of its specific characteristics. In the longer term it will no doubt be the amateur who will continue using Morse code long after official and commercial users have left it behind. But it will then be used simply for its capabilities and not due to any official requirements. Simply removing the code requirement would in effect produce a single licence class. But one must also consider if this might not be a retrograde step and if some other differentiation of licensing classes would be more appropriate to take us forward to the turn of the century. Personally I feel some form of graduated licensing would be an advantage, the question being the parameters to base it upon. Questions of EMC are at this time growing more in importance and the general approach indicated by the forthcoming novice class taken into account. Let us leave Class A as it is, as a full facility licence and the Novice with heavily restricted power and band segment, and restructure Class B in the middle.

It might also seem at first light to be a little against the grain with constructional abilities, but it may also be wise to consider restricting in some way the forms of self construction permitted within the lower two classes. However this would only need to affect RF PA stages and perhaps driver stages. Only these are in reality the areas where unwanted transmissions are created and it still leaves the majority of the equipment within the shack open to the individuals delight and experimentation.

To support this form of licensing, the present form of RAE exam could be retained which as now would lead to a class B. To graduate from B to A could then be made either simply by period of licence held which should indicate the assimilation of further experience, or perhaps could be short cut by taking a further exam going into slightly deeper technical items than presently contained in part 2 as at present.

As with any change in licensing structure, there will be a reasonable lead time. We already do know of dates in the future when changes outside our licensing structure will be taking place. Consideration must also be taken between national radio authorities. The time is not too soon to be considering today what these next steps should be, but they will have to be based on realistic attitudes rather than it being a re-hash or a temporary patch to the current requirements. Our representatives at the forthcoming International Conference should go with a well planned proposition in this field based upon future needs and a clear of prejudice from past requirements.
David Turtle G1OLZ

Editorial comment
I didn't think segments of amateur bands were used for international HF distress frequencies (500kHz and 2182kHz). We don't even need a receiver covering those frequencies in our amateur station. So why the need to make sure amateurs can identify when there's a Morse message being transmitted on a frequency totally outside the amateur bands? As for incentive licensing, what do other readers think?

£10 for the Letter of the Month

Do you have something constructive to say on the state of amateur radio today? Perhaps you'd like to put your viewpoint to the readers, get some discussion going, or give an answer to one of the issues raised? We'll pay £10 for the best letter we publish each month. So write in with your views, to HRT, P.O. Box 73, Eastleigh, SO5 5WG.

Dear HRT,
With reference to the article in the February HRT by G8IYA and a letter from G7GEG about compulsory Morse tests. They seem to be against the actual test and not Morse, I too think this way. If the 'for the test' amateurs tune into the CW-only sections of the amateur bands, they will find it very boring. On the average day there could be only 20 CW stations on the band, 20 out of 1000s, so it looks as if A licensees that use CW are very few.

If we must have a test it should be to be able to use the CW parts of the bands. If we keep going back, we will kill off our hobby, let's look forward. If a B licensee cannot use telephony on HF, why not section off the bands for RTTY, DATA, FAX, etc. for all amateurs. My two lads have left school where they were told about communicating in the modern world with computers, not Morse.

Let's have a vote on whether we are to be a progressive hobby or not. For the good of **all** amateurs a vote for **all**, not just the members of the RSGB. Let's see democracy at work. Like G7GEG I'd best get back to the Morse practise, because I want to, not that I'm forced to.
K. T. Brown G7EXO

Editorial comment
The CW parts of the bands, at least as far as UK licensing goes, are only a voluntary agreement, whereas in some other countries such as the USA they are indeed mandatory. But yes, why not have a packet test to operate packet (you can very easily cause a lot of QRM to other users by setting your 'beacon' command incorrectly and the like), an AMTOR test to operate AMTOR (your transmitter could be keying all the time without any data being exchanged), how about a TV test to operate fast-scan ATV (trying to run 'normal' AM double sideband TV on 70cm can soon wipe out emergency service users on UHF). Where does it stop?

Dear HRT,
I was very pleased to read your Editorial in HRT of late, and I feel the same way about all you said in it. I too feel that the Morse test should be dropped straight away as a way of stopping new blood from coming into radio.

The need also of a exam as it is, just to talk on VHF/UHF, is very unfair, as I have just sat the test and I feel it is stupid. The exam I sat (Dec 3rd 1990) had more in common with an exam to apply for a job building radios and amplifiers etc. than speaking on radio. Why on earth should anyone wanting to use a TX to chat to friends need to know how every radio component should work, I will never know.

I have been building TX and RX sets for the last 20 years and I still don't know every part of all components today.

I feel that 'yes' a small test on radio operating and law etc., and causing problems like TVI should be taken, but why kill off people's radio interests by making them learn silly things never needed by 99% of folk?

OK, if Ham Radio is dying out like I know it is, please keep the test as it is and help it to die faster, but if you want it to live on, then someone better get wise fast and get realistic.

I for one am fed up with being put off transmitting by this stupid test, and we can't all be teachers and BT staff to get through. Has anyone noticed how quiet the bands are? Keep the test and all we will listen to soon is static noises.
David Webb.

Editorial comment
Maybe that's why amateurs lobbied for a Novice licence, where newcomers to the hobby now don't need to know about the intricacies of superheterodyne receivers and crystal multipliers. Guess what, we're off to meet the Radiocommunications Agency at their invitation this week, to discuss the very future of amateur radio.

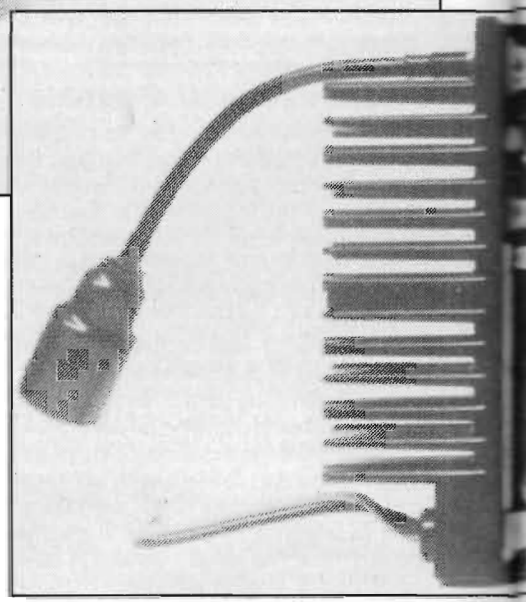
Dear HRT
Eighteen months ago I received a packet of QSL cards from the Inwards QSL bureau in our state (Victoria/VK3). Since then I have not received any more cards. Repeated enquiries as to the fate of my cards brought no response. However, after much pressure the secretary of the Victorian division of the Wireless Institute of Victoria (Mr. Barry Wilton) finally admitted to me that a QSL Bureau for incoming cards no longer operates in this state. He has also informed me that all incoming cards are now destroyed. The reason he gave me was that due to the poor state of the Australian economy, the WIA can no longer afford to offer such 'luxuries'.

Could you please inform your readers not to send any more cards via. the Bureau to VK3 calls.

I personally am very sad that I can no longer receive cards via the Bureau as I particularly enjoyed answering cards from SWLs.
Terry Robinson VK3DWZ.

Editorial comment
Thanks for the information Terry, I've added this also as a message on the UK DX PacketCluster network, but hopefully non- cluster users will also take note. If an alternative QSL arrangement comes into operation, do let us know.

Alinco DR-112 Review



Low cost 2m mobiling, tested by G4HCL

In today's age of super-whizzo, do-everything transceivers, an amateur's search for a new rig can be often a rather confusing one! Features such as DTMF selective calling to say nothing of DCS and AQS, several different scanning modes of an even greater number of different channels, each with their own CTCSS and DTMF codes programmed in, can sometimes be just that little bit *too* sophisticated for some amateurs' needs!

Regular HRT readers will know that Alinco have the reputation of often providing 'down to earth' rigs, not necessarily the most up to date in technology and the amount of facilities provided, but often at a lower price than many of those from the 'big three' amateur radio manufacturers. The UK Alinco importers of Waters and Stanton Electronics recently provided HRT with the very first review sample of the latest offering, the DR-112, a 25W 'no nonsense' mobile with a very realistic price tag of £239.

Offerings

Well, what can I say about the rig? It covers the 2m band in all the usual channel steps which you can select to suit your preferences, the transmitter offering a 25W output power across the band. This is lower than the more usual 40/45W to be found on mobiles nowadays, however it should be quite enough for chatting through repeaters and the like, all UK repeaters also having a 25W maximum ERP, and a sensitive receiver specified as 0.16uV for 12dB SINAD, is provided to make sure you can hear the stations who can hear you!

The set measures a compact 140mm (W) x 40mm (H) x 170mm (D) to allow it to be positioned in the various nooks and crannies to be found in a typical car dashboard, or indeed due to it's low height on top of the dash to allow minimum eye travel distance between the rig's display and the road ahead. The set comes supplied with a quick-release mobile mounting bracket so you can get the rig in and out easily, and terminated leads from the rear panel are used for the power lead and aerial connections, to again provide you with a degree of flexibility in mounting the set. A small easily-read user instruction booklet comes with the transceiver, this provides good operating details but no internal adjustment or servicing information.

Controls

A row of buttons along the set's facia control functions such as the usual 1750Hz repeater access toneburst, reverse repeater checking, repeater shift and the like. For nighttime use, as well as the backlit main display, the function keys are illuminated by the use of a 'light pipe' above the key logos together with small slits of light

shining through the key mouldings. You can use the main click-step tuning knob to go up and down the channels, and the supplied mobile fist microphone has up/down buttons operating in parallel with this to give you another method of control. A small 'Lock' switch is fitted on the front of the microphone, to use in case you're one of those types who accidentally change channel and end up talking to completely different people to those you thought you were in contact with!

The usual rotary volume and squelch controls are there of course, next to these being push buttons for high/low transmit power (the set giving around 5W in the 'low' position) and the main power on/off switch. Although not fitted in the review sample, the supplied user instructions detail a CTCSS encode and decode facility, this allowing the set to be used with the various repeaters around the country fitted with CTCSS user facilities, or indeed for net use and the like on a simplex frequency for 'quiet' monitoring.

Memories

The transceiver comes with 14 memory channels to let you store your favourite frequencies in, these being numbered 0-9 and A, B, C and D. Each memory channel lets you store the usual frequency, repeater shift, and CTCSS frequency and status (when fitted), with memory channels A-D used also for other specific purposes. Channels A and B are used to store a pair of frequency limits for the set's 'Programmed Scan' mode, where upon command the set searches between the two frequencies in your pre-programmed channel steps, pausing on each channel where the receiver squelch raises. Memory channel D can be used to store a frequency for use as the transmit frequency for 'odd split' modes, where the set receives on the tuned frequency and transmits on the one you've stored in channel 'D'. Memory channel C is used as a quick-access 'Call' channel memory on some market variants of the set, although not on the European version.

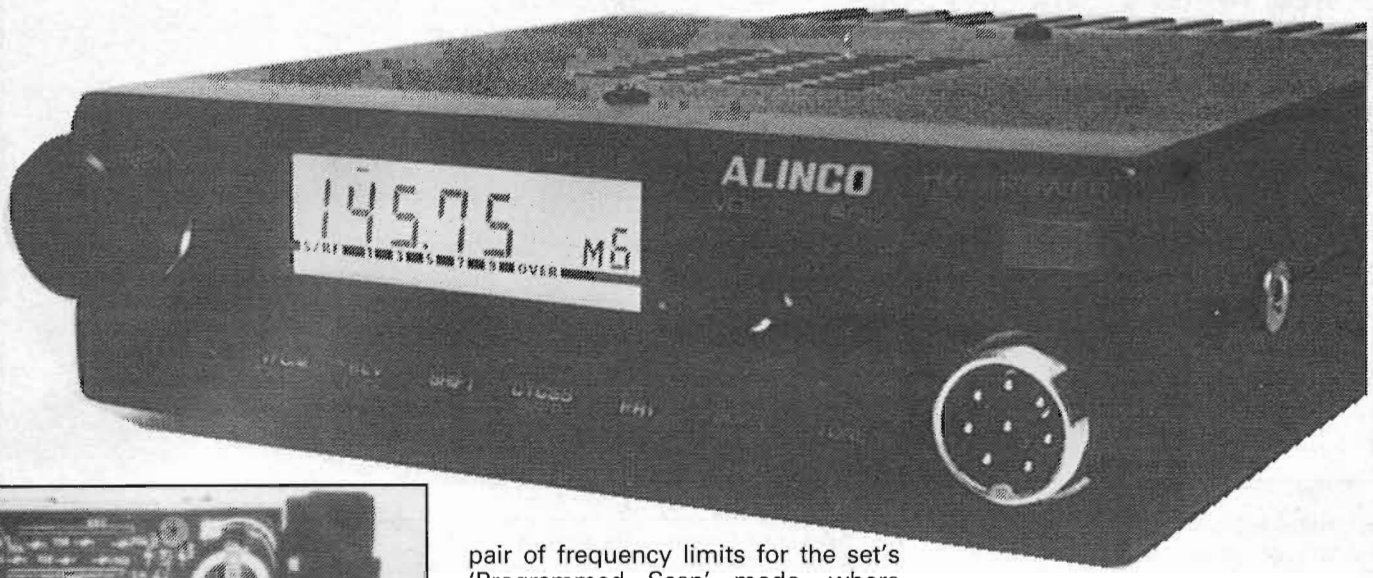
As well as the programmed frequency scan mode, you can of course scan just the memory channels, with an individual 'lockout' of any of the memory channels you don't want the set to halt on (a busy repeater channel for example), or perform a scan of the entire band with the transceiver in 'VFO' mode. A press of a front panel button starts the set off in scan mode, in each case the receiver halting on a 'busy' receive frequency, and continuing following a brief pause when the channel becomes clear. Pressing the 'Scan' key again, or the microphone PTT, halts the scan mode so you can settle down for a QSO.

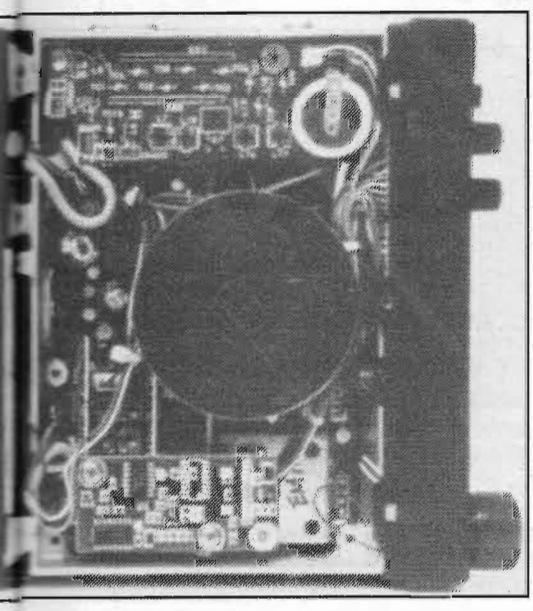
In Use

Because I'm a great believer in keeping the rig safe to use whilst on the road, I mounted it on the top centre of the car dashboard, i.e. in between the driver and passenger so either of us could use it. Keeping the rig's display high up, i.e. near the windscreen, then allowed us to use the set's controls with the minimum of distraction, none of this fumbling around with unseen controls while driving along (the latter having been proved to be far more dangerous than simply talking into a fist microphone or whatever whilst driving).

The set has it's own speaker on the top of the case, and I found the audio level from this was more than ample whilst operating on the move, so no need to spend more cash on an external speaker. On receive, the set was very sensitive indeed, although I found the squelch rather 'clicky' when receiving a weak signal that was fading in and out of the squelch. This often became so annoying that I had to open the squelch completely when in QSO to calm my nerves somewhat. That aside, reports on my transmitted modulation were surprisingly good, although I did note my local repeater was occasionally suppressing my transmit audio, suggesting the set was deviating a bit too much. The 25W transmit power level was fine for my purposes, I could always get into repeaters that I could hear at moderate strength, as well as allowing me to have reasonable distance QSOs with other stations travelling parallel to me but several miles distant along a motorway.

Whilst travelling at night, I found the set very easy to use, probably due to the 'no nonsense' controls, however I would really have liked an LCD backlight dimmer button as the set's display seemed rather bright with it on the dashboard-top position. The moulded microphone case fitted very nicely in





my hand, the up/down tuning controls on this of course being quite useful. These buttons were recessed into the microphone case to prevent me from causing the set to whizz off in frequency without me knowing about it, but I would have liked the 'Scan' mode to have been initiated in the usual way by keeping one of these pressed for about a second or so. Instead, I just had to keep hitting the front panel button.

Laboratory Results

As found on air the receiver was quite sensitive, in fact exactly at the level the specification said it should be when measured on 145.0MHz! The adjacent channel rejection of 12.5kHz spaced signals was very good, in fact far better than I would have thought,

LABORATORY RESULTS:
RECEIVER

Sensitivity;	
Input level required to give 12dB SINAD;	
144MHz;	0.165uV pd
145MHz;	0.160uV pd
146MHz;	0.160uV pd

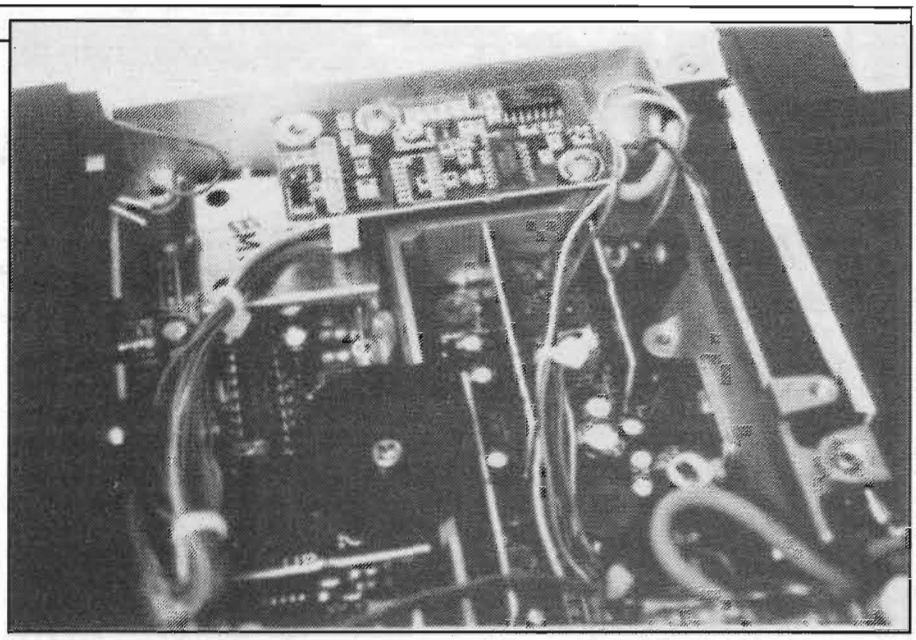
Squelch Sensitivity;	
Threshold;	<0.06uV pd
Maximum;	0.260uV pd

Adjacent Channel Selectivity;	
Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal;	
+12.5kHz;	50.5dB
-12.5kHz;	54.0dB
+25kHz;	66.0dB
-25kHz;	67.5dB

Blocking;	
Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;	
+100kHz;	79.5dB
+1MHz;	95.5dB
+10MHz;	97.5dB

Intermodulation Rejection;	
Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;	
25/50kHz spacing;	69.0dB
50/100kHz spacing;	69.0dB

Maximum Audio Output;	
Measured at 1kHz on the onset of clipping;	
3 ohm load;	1.62W RMS
8 ohm load;	1.01W RMS
15ohm load;	675mW RMS



and the rejection of the more usual 25kHz spaced signals was up to that of the best rigs on the market. Neither could I complain about the general strong signal handling, the measured results of these all being quite reasonable. On transmit the harmonics were often unmeasurably low, I was most impressed! However the transmit deviation was 'over the top', and the user manual doesn't give you any idea on how to correct this incorrect factory setting. This level could cause the rig to produce the dreaded 'over-deviation pips' on some repeaters.

Conclusions

The rig's main feature is it's very realistic price, with this in mind it's sure to be a popular choice with users who don't need extra-high transmit power combined with all the 'bells and whistles' such as selective calling, CTCSS and the like. For those who instead want a down-to-earth set that will get them plenty of contacts, it's bound to appeal. The technical performance was up to that of many other current sets so no 'cutbacks' have been made here, however the incorrect deviation alignment could cause a few problems in some areas without it being corrected by a quick internal adjustment.

Our thanks go to Waters and Stanton Electronics for the loan of the review transceiver. We're told future sets will have correctly set deviation.

Image Rejection;
Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;
67.5dB (-21.4MHz)

S-Meter Linearity;		
Indication	**Sig.Level**	**Rel.Level**
S1	0.73uV	pd-8.9dB
S3	0.97uV	pd-6.3dB
S5	1.19uV	pd-4.6dB
S7	1.47uV	pd-2.8dB
S9	2.01uV	pd0dB ref.
S9+	2.45uV	pd+1.7dB
S9++	3.22uV	pd+4.1dB

TRANSMITTER

TX Power and Current Consumption;				
Freq MHz	**Power**	**10.8V Supply**	**13.8V Supply**	**15.6V Supply**
144	High	18.9W/4.60A	22.2W/4.80A	22.5W/4.95A
Low	4.29W/ 4.55A	4.29W/2.70A	4.31W/2.70A	
145	High	18.5W/4.50A	21.9W/4.70A	22.2W/4.85A
Low	4.26W/ 2.50A	4.29W/2.65A	4.29W/2.65A	
146	High	17.8W/4.40A	21.6W/4.60A	22.1W/4.75A
Low	4.23W/ 2.45A	4.26W/2.65A	4.26W/2.65A	

Harmonics;	
2nd	Harmonic;-78dBc
3rd	Harmonic;-81dBc
4th	Harmonic;<-90dBc
5th	Harmonic;<-90dBc
6th	Harmonic;<-90dBc
7th	Harmonic;<-90dBc

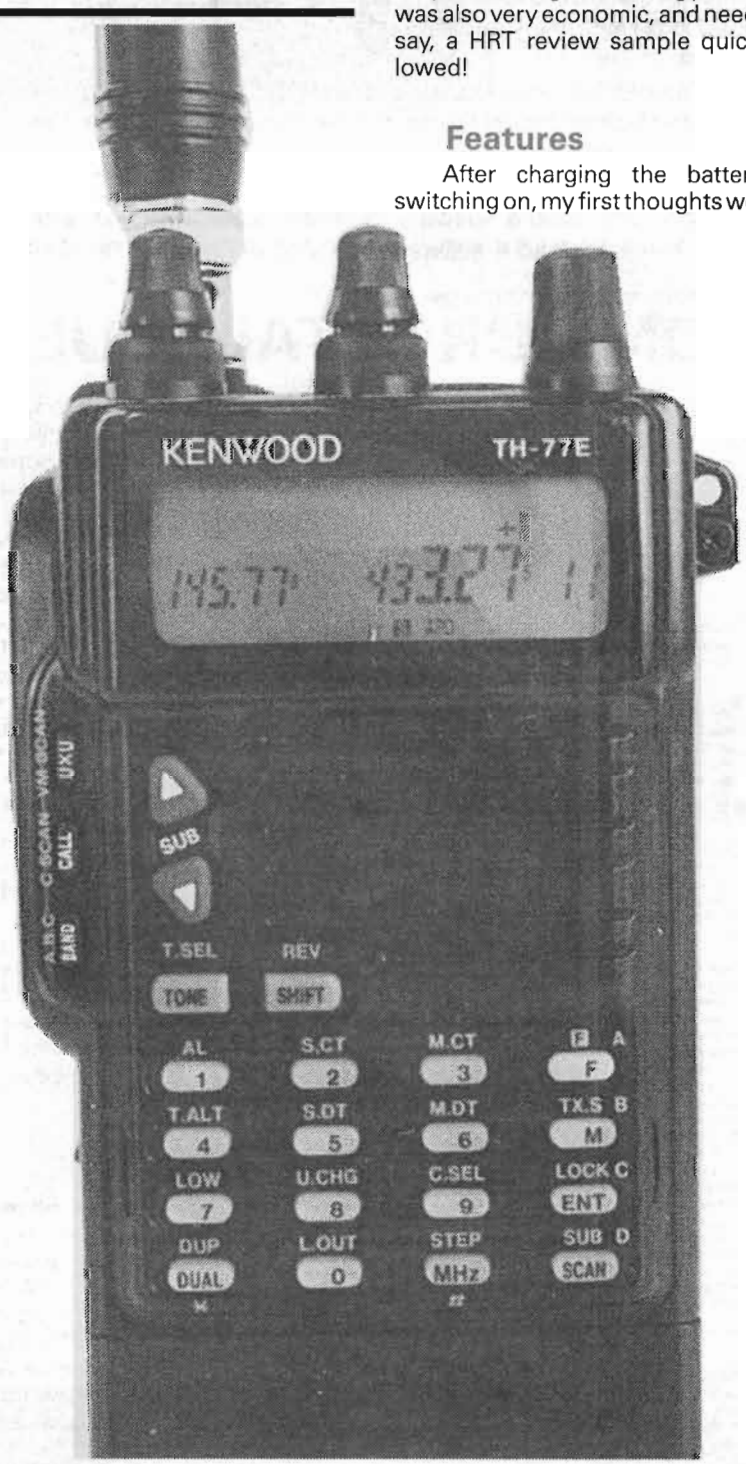
Peak Deviation;
6.06kHz

Toneburst Deviation;
3.58kHz

Kenwood TH-77E Review

Kenwood's latest dual band portable, tested by Chris Lorek

Revealed for the first time at this year's Leicester Show was Kenwood's new dual band portable, the TH-77E. Being smaller, lighter, and packed with more features than its predecessor it looked very interesting! The selling price at £389 was also very economic, and needless to say, a HRT review sample quickly followed!



Features

After charging the battery and switching on, my first thoughts were that it would take me some time to understand how to use all of the set's many and varied features, there were simply so many! Microprocessors with everything, so again I resigned myself again to doing what I have become used to with today's modern amateur rigs, that of having a good sit down and a thorough read through the thick instruction manual!

Operating Modes

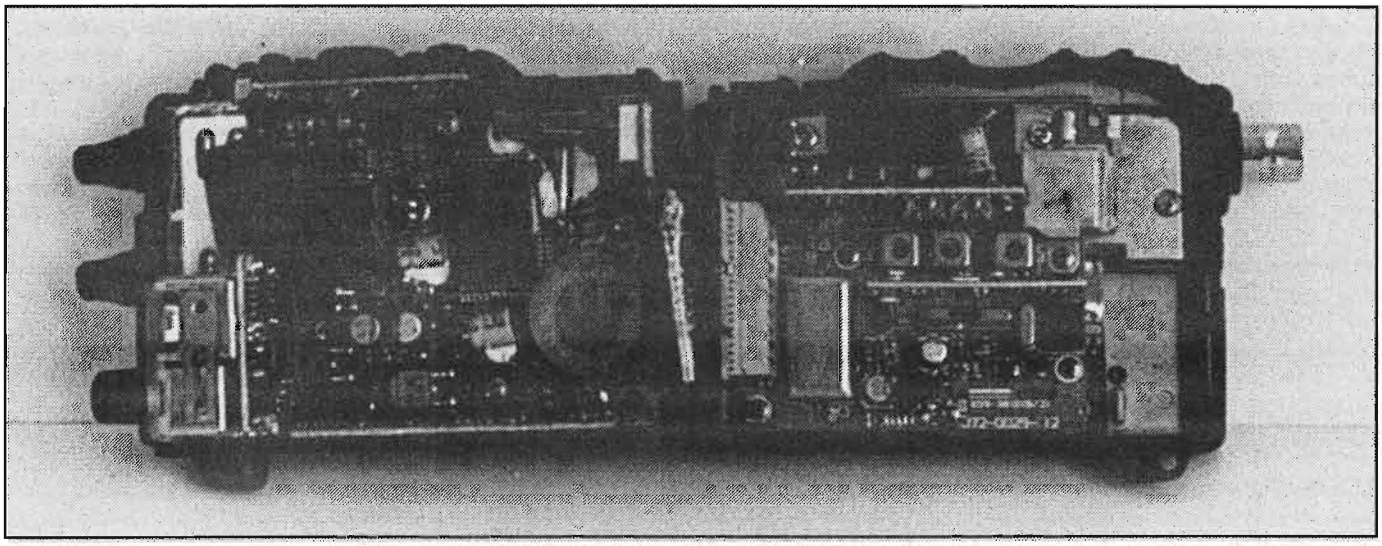
As well as the manual giving me the usual details of how the set can operate over the 144-146MHz and 430-440MHz frequency range in my selected channel steps (I chose 25kHz on 70cm and 12.5kHz on 2m), it also gave a good step-by-step explaination of the many other features such as the 40 memory channels plus a quick-access 'Call' channel, the varied scanning, DTMF selective calling, and paging functions and suchlike, but let's take these one by one.

First of all, let's have a look at the basics. The set can operate from a DC supply voltage of 7.2V — 16V, and comes supplied with a 7.2V 600mAh nicad battery pack as standard. With this, the transmitter is specified at providing around 2.0W on 2m and 1.5W on 70cm, and by powering it from an external 13.8V DC voltage supply over 5W output is achieved. You can increase the maximum power also by adding the option of a larger 12V nicad, a range of 7.2V optional nicads in varying mAh capacities also being available. The set can be switched to High, Mid and Low power levels on transmit, low power being around 0.5W, but not the 'Extra Low' mode as found on other Kenwood portables.

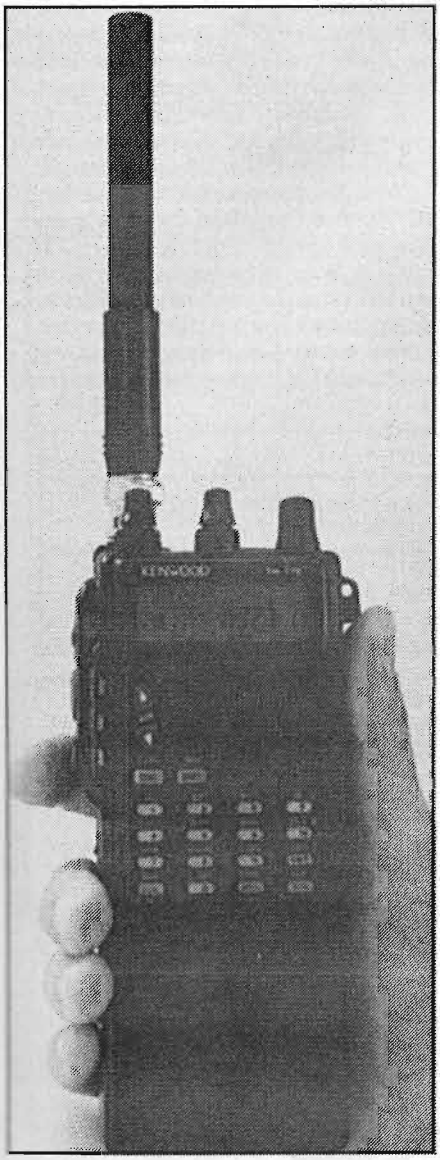
Twin Receivers

The set has two receivers, one normally used of course for 2m and the other for 70cm, each with their own volume and squelch knobs fitted on the top panel of the set. A novel feature of the set is that of a 'twin UHF' receive facility, where the VHF receiver section can instead be placed in service as a second-frequency 70cm receiver, capable of receiving strong local signals on the band.

The set operates in the usual fashion with 'Main' and 'Sub' bands, the transmitter operating on either band depend-



ing on your pre-programming, and an 'Automatic Band Exchange' may be switched in which automatically changes band for you if a signal is received on the Sub band. A click-step tuning knob on the top panel lets you tune across the Main band in your selected tuning steps, and panel mounted Up/Down buttons are used for the Sub band, a press of the tiny 'Band' button at the side switching between Main and Sub bands.



Frequencies and Memories

The 40 memory channels may be used to store a combination of 2m or 70cm frequencies to give you a degree of flexibility depending on your particular needs. The front panel keypad can be used for direct frequency entry or memory channel recall, and in memory mode simply entering the required memory channel number recalls the required details in the appropriate Main or Sub band for you. As well as this, the keypad may be used in 'Second Function' mode by a prior press of the 'F' button for a multiplicity of other functions, the type I often had to read the manual to comprehend, more of these later!

Scanning

The 'Scan' button on the keypad, as its name suggests, is used to initiate a scan of either the memory channels or the VFO, and depending on the use of the 'F' button a scan of either the Main or Sub band scan is initiated. On each band, you can scan the memory channels, the entire band, any 1MHz range of the band, or alternately scan the VFO and last memory or call channel used, or indeed initiate a scan of the VFO, Call Channel, and Memory Channel. If you're the type who always wants you make sure nothing is missed, by suitable button-pushing operations you can even have two bands scanning at the same time in any of the above modes, the mind boggles!

The scan stops when a signal appears, and may be set to resume either 5 seconds after stopping regardless of whether the signal is there or not, or after a couple of seconds with no signal being present on the channel for more casual listening.

Selective Calling

Here's where the set's operation starts getting interesting! Many of us have found that selective calling can often be useful, where your set's speaker remains silent until a pre-set sequence of tones are received, the speaker then instantly bursting into life. A common 'standard' using a sequence of three DTMF (Dual Tone Medium frequency, or 'Touch Tone') digits are commonly used as a selective calling code, the TH-77E conforming to this. So when someone wishes to alert you while you have your receiver 'silenced', all they need do is tap in the three relevant digits on their set's DTMF keypad, following this with the usual verbal call. To simplify matters for operation between common units, the TH-77E may also store pre-set tone sequencies in its memory channels for automatic transmission. A built-in delay of 250mS is provided before transmission of the sequence to allow the receiver squelch at the other end to raise, and when a repeater shift has been programmed the set even extends this built-in delay to allow for the repeater 'rise time', very clever!

Paging

As well as this, a 'Paging' mode may also be programmed where the set may be used to alert you to calls received in your absence, here the DTMF ID sequence of the station who called you is displayed on the set's LCD. When either system is used with the 'Tone Alert' facility which may also be programmed, the set bleeps away at you when the receiver squelch raises.

Some repeaters in the UK now allow or indeed require the use of CTCSS (Continuous Tone Controlled Squelch System), and many amateur special interest groups are finding this can also be useful for call-out net frequencies and the like. Although the TH-77E does not have this facility fitted as standard, it may be added as an internal option with tone frequencies selected using the rotary knob, and the tone encode/decode mode as needed stored into memory channels as required.

Options

The set comes supplied with a carrying strap and belt clip, a nicad charger, battery, helical aerial and a user instruction book together with block and full circuit diagrams. A plastic clip-on cover is even suppied to fit over the keypad, for use whenever required. As well as the various extra battery packs and the CTCSS unit already mentioned, a variety of other add-on options are of course available ranging from soft carrying cases, a headset with VOX/PTT, and various types of speaker/microphone. One such speaker/microphone which could be quite useful is the SMC33, this has three buttons on the top which may be programmed for use with the set to simulate any three of the keypad functions, thus allowing a degree of 'remote use'.

LABORATORY RESULTS:

RECEIVER;

Sensitivity;

Input level required to give 12dB SINAD;

144MHz;	0.150uV pd
145MHz;	0.150uV pd
146MHz;	0.155uV pd
430MHz;	0.175uV pd
435MHz;	0.185uV pd
440MHz;	0.185uV pd

Squelch Sensitivity;

	145MHz	*435MHz*
Threshold;	<0.06uV pd (<2dB SINAD)	0.07uV pd (2dB SINAD)
Maximum;	0.13uV pd (10dB SINAD)	0.18uV pd (12dB SINAD)

Adjacent Channel Selectivity;

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

	145MHz	*435MHz*
+12.5kHz;	15.0dB	18.0dB
- 12.5kHz;	23.0dB	17.5dB
+25kHz;	68.0dB	58.5dB
- 25kHz;	71.0dB	56.5dB

Blocking;

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

	145MHz	*435MHz*
+100kHz;	80.5dB	79.0dB
+1MHz;	86.5dB	84.0dB
+10MHz;	91.0dB	87.0dB

On The Air

With any handportable, if it doesn't 'feel' right in operation the user won't get on with it! While holding the TH-77E, I found it fitted very comfortably in my hand with the rounded edges ofthe set helping here. The rotary volume and squelch knobs were easy to use, but operation of the tiny keypad and some of

Intermodulation Rejection;

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

	145MHz	*435MHz*
25/50kHz spacing;	58.5dB	62.0dB
50/100kHz spacing;	58.5dB	61.5dB

Image Rejection;

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

145MHz	*435MHz*
68.5dB	71.5dB

Maximum Audio Output;

Measured at 1kHz on the onset of clipping;

3 ohm load;	121mW RMS
8 ohm load;	148mW RMS
15ohm load;	102mW RMS

S-Meter Linearity;

	145MHz		*435MHz*	
Indication	Sig.Level	Rel.Level	Sig.Level	Rel.Level
2	0.13uV pd	0dB ref.	0.30uV pd	0dB ref.
4	0.20uV pd	+5.5dB	0.53uV pd	+4.9dB
6	0.57uV pd	+9.1dB	1.05uV pd	+10.8dB
8	1.04uV pd	+14.3dB	2.17uV pd	+17.1dB
10	2.06uV pd	+20.2dB	6.61uV pd	+26.9dB

Current Consumption;

No RX, Economiser Mode;	25mA
No RX, Normal;	112mA
Receive, Mid Volume;	145mA
Receive, Max Volume;	198mA

the other controls was rather a different matter though! Even though I don't have large fingers, I normally had to use either the side of my finger or use the end of a fingernail to operate the keys, otherwise I found myself pressing more than one at a time. Maybe this is why Kenwood supply a plastic clip-on keypad cover! As is usual when I test sets such as this, I found myself resigned to programming up the various memories and the like, then simply using the set in memory recall mode with the rotary channel knob and 'Band' switch only being used for frequency change, this indeed giving me quite an amount of flexibility after the intial programming operations.

I found the receiver sensitivity fairly good, this coupled with the set's small size made it quite a handy companion to carry around in my inside pocket so I could keep up with the goings-on over my semi-local 2m and 70cm repeaters (none of these provide a strong signal where I live, hence good sensitivity is important in my case). I also live within a few hundred metres of a 2m packet BBS, and also a further DX PacketCluster with nodes operating on 2m and 70cm, but throughout use around the house I rarely found any 'blocking' problems from these, unlike one or two other portables I have tested here. I did however find a moderately strong 12.5kHz spaced signal I receive in the middle of the 70cm repeater section, presumably orginating from the UK primary band user (the MoD), sometimes halted the receiver scan using 25kHz steps when I connected in my outdoor colinear. This I had to overcome simply by turning the squelch up to maximum.

Whilst walking out and about, I found the transmitted audio quite good although output power on 70cm didn't quite get to the repeaters I could hear fully quieting, if I were to have kept the set I think I'd have been tempted to invest in the larger 12V battery to give me a few more Watts of power to match the set's receive performance. I did find that the tiny speaker on the front panel went into distortion at fairly low levels of received audio, it was OK for indoor use but when operating outdoors or inside a moving car I really had to keep the volume level down and hold the set up to my ear. However by plugging in the SMC33 speaker/microphone I found a significant improvement, this also allowed me to program one of the buttons as the 1750Hz toneburst to save me having to use two hands to access a repeater, as I needed to do when using the front panel buttons on the set. A press on the LCD backlight button gave a very easily read display at night, this also illuminating the primary digits (although not the second functions) on the keypad.

Laboratory Tests

The accompanying tables show that, as I usually find with Kenwood VHF/UHF equipment, the set operated very well and I did indeed find that the 70cm harmonics were so well supressed as to be below measurable thresholds! The transmit power on 2m as measured with a fully charged nicad was well in excess of the specified 2W nominal, that on 70cm again ample at just under the 2W mark. The receiver adjacent channel rejection of 12.5kHz spaced signals both on 2m and 70cm wasn't all that high, explaining the on-air results, but then one must consider its intended use as a portable rather than that of a base or mobile set.

Conclusions

I found the set to be extremely versatile with its many features, even being a self confessed 'techno-freak' I still found difficulty in operating them all, both from the view of pressing the buttons and indeed remembering what functions all the buttons enabled! After suitable pre-programming, I found operation of the set by memory channel selection alone was quite feasible for many uses, so I mustn't complain. I found the set very handy to carry around with it's light weight and small size, and the technical performance in general was up to Kenwood's usual high standards which pleased me. I would however advise the use of an earphone or external speaker if considering using the set out of doors, due to the small speaker fitted in the set.

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

TRANSMITTER;

TX Power and Current Consumption;

Measured with fully charged Nicad

Freq MHz	Setting	Power/Current
144MHz	High	2.93W/975mA
	Mid	2.31W/935mA
	Low	0.49W/525mA
145MHz	High	2.95W/970mA
	Mid	2.31W/935mA
	Low	0.51W/525mA
146MHz	High	3.01W/980mA
	Mid	2.33W/935mA
	Low	0.51W/525mA
430MHz	High	2.04W/980mA
	Mid	1.90W/975mA
	Low	0.39W/512mA
435MHz	High	1.94W/975mA
	Mid	1.84W/970mA
	Low	0.41W/515mA
440MHz	High	1.83W/945mA
	Mid	1.77W/940mA
	Low	0.43W/510mA

Harmonics;

	145MHz	*435MHz*
2nd Harmonic;	-71dBc	<-90dBc
3rd Harmonic;	-84dBc	<-90dBc
4th Harmonic;	<-90dBc	<-90dBc
5th Harmonic;	<-90dBc	—
6th Harmonic;	-85dBc	—
7th Harmonic;	<-90dBc	—

Peak Deviation;

145MHz	*435MHz*
4.53kHz	4.42kHz

Toneburst Deviation;

145MHz	*435MHz*
3.05kHz	2.97kHz

Frequency Accuracy;

145MHz	*435MHz*
-40Hz	-110Hz

Pye VHF Olympic Conversion

The Pye M202 **Olympic**

There have recently been a number of Pye Olympics released onto the surplus market, both VHF and UHF versions. This month we'll look at the VHF FM model, and we plan to detail the UHF conversion in next month's issue of HRT — watch out for it!

Chris Lorek G4HCL details the VHF Pye Olympic, with 'P' Band modifications by Ron Fenn G8CXR

The M202 Olympic Range

The Olympic range is a series of dash-mounted mobiles, operating on VHF FM and AM and on UHF FM. Being a *range* they often look identical from the outside, so take a look at the side-mounted label — the equipment type 'M202' signifies a VHF FM model (the M201 is VHF AM, the M212 is UHF FM).

The M202 gives in the order of 17-18W RF output, with a reasonably sensitive receiver. The 'A' and 'B' band models can be tuned up for the 2m band, and the 'E' band model for 4m, without any component modifications being required. Some of the details given here for the A, B and E band sets are based on information from the companion Argus Books 'Surplus 2-Way Radio Conversion Handbook', now available from the HRT Head Office. One version however which isn't detailed in the book *does* need modification, this being the commonly-called 'P' band version which consists of a 'D' band receiver and an 'E' band transmitter, the required modification details being given here. As with 'P' band Westminsters, a large number of these sets have recently become available.

The receiver is normally very fairly sensitive so you won't have to add a pre-amp, and on transmit a 'block' PA module is used for easy tune-up and reliable power output. As a result, no PA alignment is required, and even if you find an unrepairable fault on the receive side you can always remove the PA unit and use it separately as an add-on PA for your handportable. If you have one of the 'E' band PF2 portables detailed in HRT, you might even find the low cost 'M' band rig buying for the add-on PA alone!

Identification

You'll see from the accompanying photograph what the set looks like. On the left hand side of the facia is a 'facility' slot to allow fitting of selective calling tone circuitry and the like. If your Olympic has a blank panel here, or indeed just an empty hole, don't worry, it will still work without it. If instead it has a sub-facia with an array of indicators and/or push buttons, then the module may easily be unplugged and the set instead linked internally for normal operation.

The M202 comes in the following ranges;

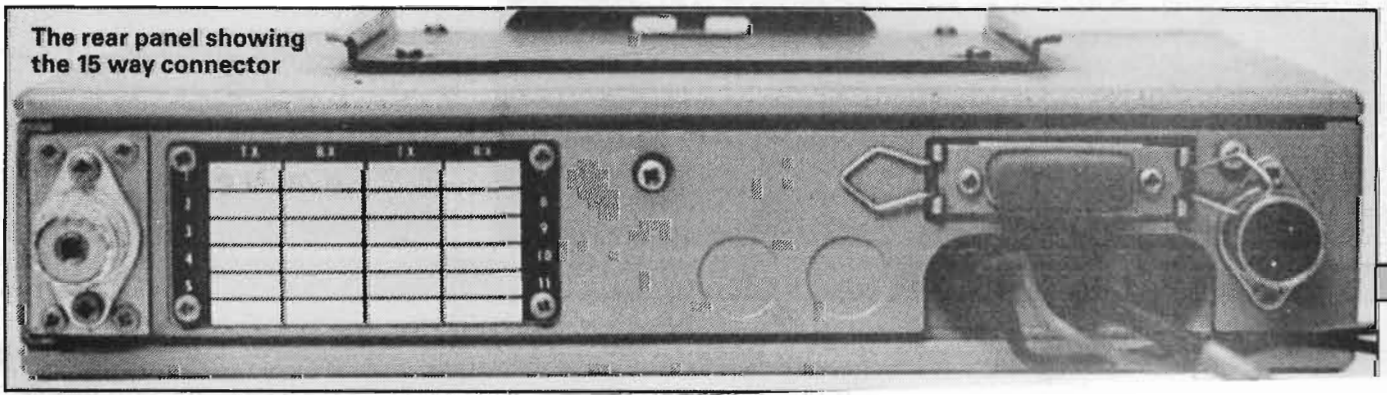
A Band; 148-174MHz
B Band; 132-156MHz
D Band; 88-108MHz
E Band; 68-88MHz

You may also find a 'D' band receiver combined with an 'E' band transmitter, usually termed a 'P' band set (from it's commonly manufactured use for the early VHF UK 'Public Utilities' band no longer used — hence their appearance on the market!). You'll see the manufactured equipment type and the band range engraved onto the side-mounted metal label, this will be followed by the channel spacing of either S (12.5kHz), R (20kHz) or V (25kHz). You may also see the code 1, 6, or B signifying that the set is a single, 6, or 12 channel version. Make sure the frequency range will cover your needs, and likewise the channel spacing. The 'A' band equipments will normally operate satisfactorily on 2m, the fairly rare 'B' band sets being ideal for this of course. The 'E' band sets are perfect for 4m, and we'll show you how to modify the 'P' band set onto 4m also.

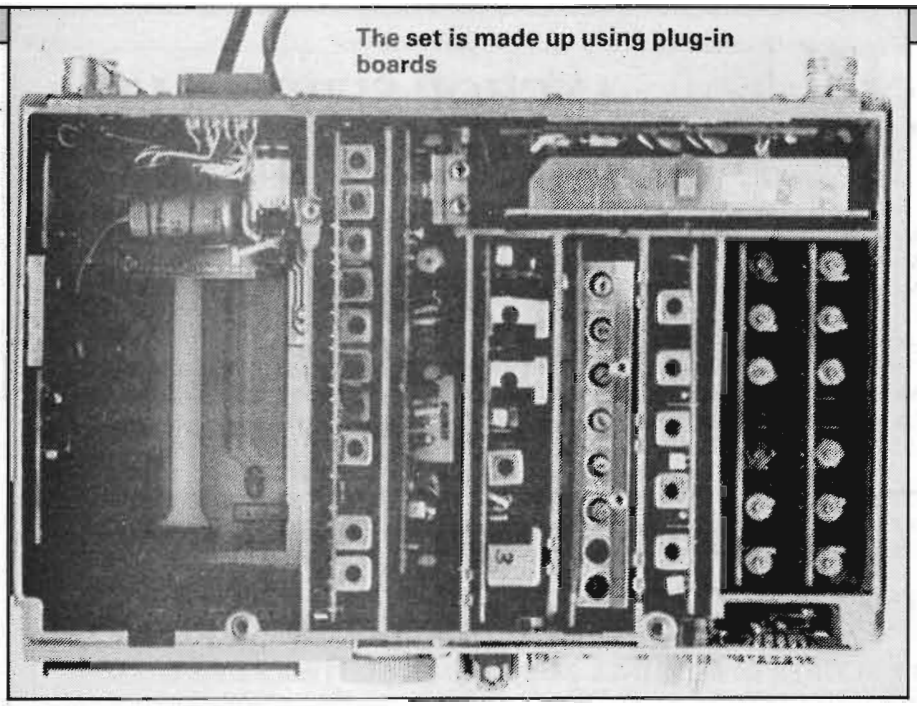
If you're after an FM rig don't be tempted to purchase an M201 type hoping it's a simple matter to convert it to FM, it isn't. Also if you find an M212, this is fine for 70cm, so look for details in HRT next month!

Internals

The sets are made using several plug-in 'daughter' boards assembled onto a main 'mother' board, with a die cast chassis used providing screening between them. You may also find additional tin-plate screens push-fitted on



The rear panel showing the 15 way connector



The set is made up using plug-in boards

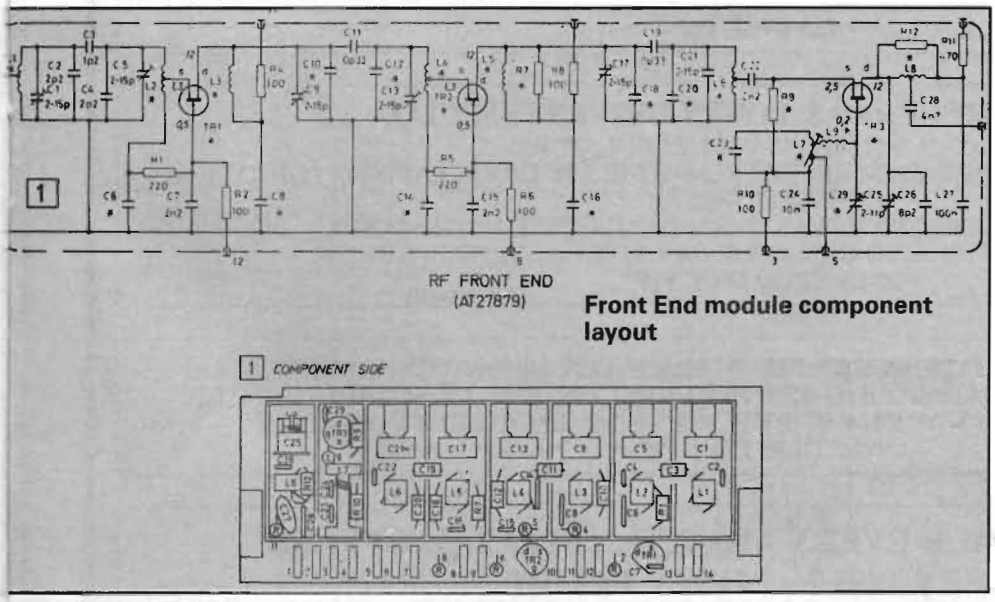
the top of the chassis between the circuit boards and the top lid. A useful check before purchase would be a quick look inside to ensure the crystal oscillator boards are fitted, and that no other PCBs are apparently missing.

Preliminaries

To remove the top lid, first push the front panel On/Off switch upwards to the 'On' position. Then push the end of a small pointed object into the tiny hole at the right of the black front panel plastic facia, at the same time hinge the facia panel forwards. You'll now see the exposed 'control' board screwed to the front of the set, you don't need to remove this but undo the two large screws at the front of the top lid, this can then be removed to expose the internal circuitry.

Be careful if you unplug the daughter boards, because some of these, e.g. the RX audio board, are screwed to the chassis and others, e.g. the TX driver, have short coax links plugged in at the top. To prevent damaging the motherboard pins, pull the PCBs out vertically rather than trying to lever them out at an angle. If your set has a selective calling unit in the facility unit space, you can unplug this by inserting the end of a small screwdriver into the hole on the bottom front of the unit's facia, this unlocks the PCB, then carefully pull the assembly out from the front of the transceiver.

If there's no board whatsoever here, check that pins 8 and 12 are linked on the 15 way PCB socket at the rear of the facility area, pin 1 is at the extreme left with pin 15 on the extreme right with the set controls towards you. This link is sometimes added in manufacture with a PCB having just a link track present, or sometimes with a wire link between the two PCB pins just behind this socket. This is the receiver low-level audio link, and it must be in place for the receiver to function normally. If it isn't there, for instance if a plug-in tone board was originally fitted, then add the appropriate link, for example at the bottom of the PCB with a short length of insulated wire.



Front End module component layout

Connections

The microphone connector is the usual Pye-type 270 deg DIN socket with pin 1 as mic live, pin 2 ground/screen, pin 3 as PTT (+10V needed for TX), pin 4 carrying earphone audio and pin 5 the +10V output. For receive you'll need to connect an external speaker of 3-8 ohms impedance, the insulated lead with blue and brown insulated wires is the speaker output, don't confuse this with the adjacent DC power connections! On some sets you may find a thinner white insulated wire, this is used to control On/Off switching via. an internal relay from the car's accessory supply, to switch the set on this lead must be connected to the supply positive. You may also find a 15-way D-type socket fitted on the rear panel, this being linked to the internal facility socket to allow external units to be connected.

Crystals

The crystal formulae required for all bands in the M202 is;

$$\text{TX Xtal} = \frac{\text{TX Freq}}{12}$$

$$\text{RX Xtal} = \frac{\text{RX Freq} + 10.7\text{MHz}}{12}$$

The crystals are HC25/u type, the commercial specification of these is T54JO for all types. You may find some suppliers can offer ex-stock crystals on popular amateur channels, and of course several suppliers can make crystals to your specifications for the M202. When ordering, it would be worth letting the supplier know the commercial specification of T54JO even if you specify the usually cheaper 'amateur specification' version crystals, to let them know the required loading etc.

Alignment

Plug in your crystals, and if you've added a number of channels, switch to the one nearest the centre of the frequency range of your fitted crystals. Turn the volume control to around mid-travel, connect your 13.8V DC power supply, and switch the set on by pressing upwards on the orange On/Off switch.

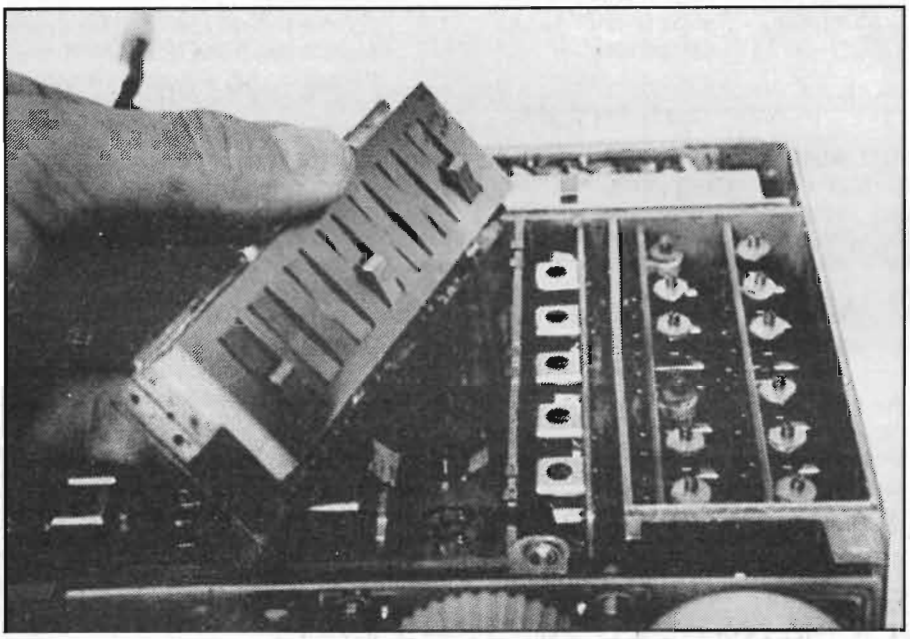
Rotate the squelch control and check that you can hear the usual squelch noise, if not then re-check your internal facility connector linking.

If you've purchased a set with the incorrect channel spacing, you can often change the 10.7MHz crystal filter or indeed the whole IF PCB if you can find a source of 'spares'. The individual filters are identified by;

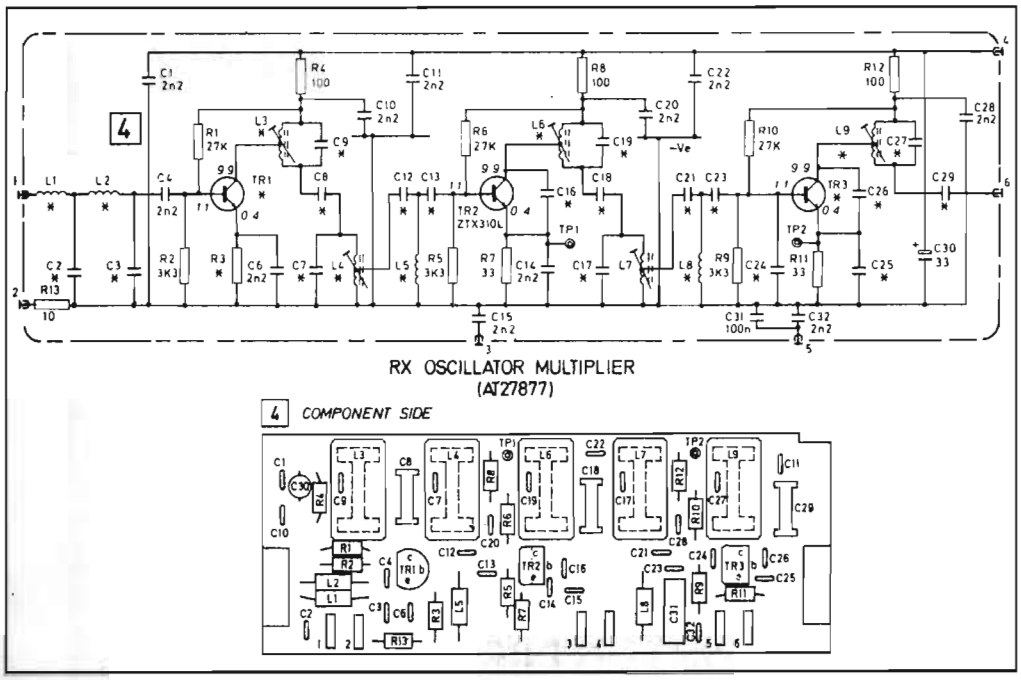
FC99001 12.5kHz spacing
FC99002 25kHz spacing
FC99003 20kHz spacing (normally OK for 25kHz amateur use). Replacement filters can be purchased from the usual crystal suppliers.

For the alignment stages, veteran HRT converters will know they'll need a non-metallic trimming tool to adjust the ferrite cores with, a filed-down knitting needle or even a match stick will suffice, together with a simple multimeter. For the front- end alignment, some form of off-air signal is needed, either another amateur who can vary his power for you or even the signal from a local repeater or whatever combined with aerial variations at your end to provide a reducing level of signal as you tune the set up. For the transmitter, if you have some form of RF power meter it's useful but not essential. If you have a 'P' band set, before continuing you'll need to perform the required modifications detailed later, but for other bands read on.

Remove the Front End PCB



Receiver Multiplier component layout



RX OSCILLATOR MULTIPLIER
(AT27877)

RX Alignment

We'll start with the oscillator/multiplier stages, so set your multimeter to a low DC voltage range (1V-2.5V), and connect the negative lead from this to your DC supply negative. Initially adjust the ferrite cores on the Oscillator-Multiplier PCB (board 4) so the cores protrude about 3mm from the tops of their formers. Connect your multimeter positive lead to TP1 on the Osc- Mult board, and tune the cores of L3 and L4 downwards with your non-metallic trimming tool for maximum multimeter reading. As you tune downwards you'll get two voltage peaks, adjust for the second peak.

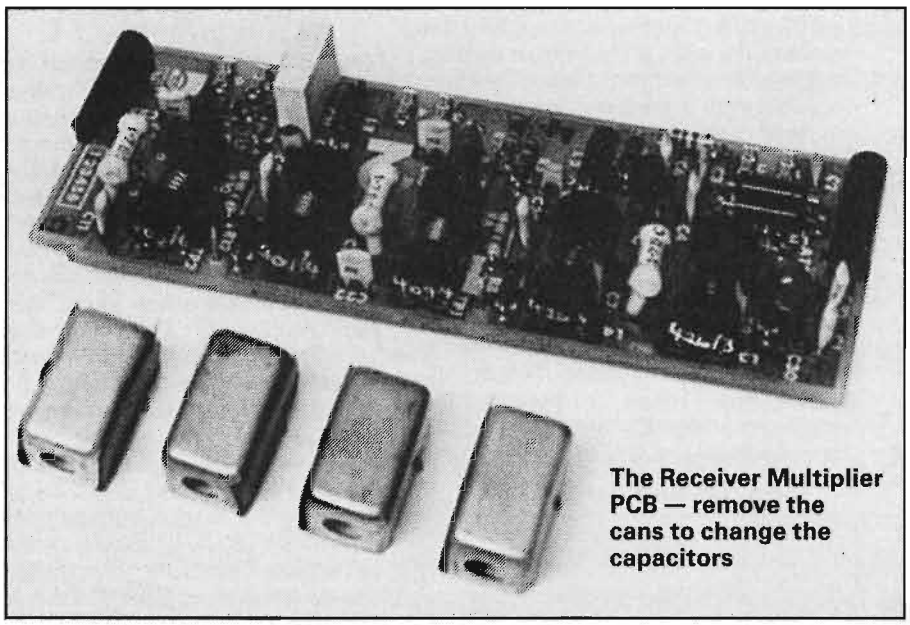
Now transfer your multimeter positive lead to TP2, and adjust L6 and L7 again for the second voltage peak. Retune L3, L4, L6 and L7 slightly as required to achieve absolute maximum, you should get around 0.5V, that's it so you can now disconnect your meter. For the off-air alignment, first set the former of L9 so that it's flush with the top of the former before proceeding onto the front end.

Connect an aerial, or indeed a signal generator if you have one, and while receiving an on-channel signal adjust the appropriate crystal trimmer to bring the receiver onto frequency, i.e. tune for best quieting and least audio distortion on a modulated signal. Now on the front end board, adjust C9 and C17 for best quieting, then C1, C5, C13 and C21 again for best quieting, reducing the received signal level as you progress. Now go back and tune C1, C5, C9, C13, C17 C21 and L7 in that order, again for best quieting of a weak signal, then slightly re-tune L9 on the Osc-Mult board as required for best sensitivity. Now re- check the crystal trimmer for spot-on reception, then adjust C25 on the front end board for best quieting. That completes the front end alignment.

The other receiver stages should already be aligned if the set came out of working use, however if you've replaced the crystal filter it may be worthwhile to give T1 next to the filter a slight re-tune if required, adjusting this for maximum current (around 5uA DC) on the adjacent TP1 on that board when receiving a signal on the correct frequency.

'P' Band Modifications

You'll need to unplug the receiver Front End PCB and the receiver Multiplier PCB, and change a number of capacitor values as detailed in Tables 1 and 2. First unplug the Front End PCB, then remove the metal top plate from this. Referring to the layout diagram, change the required capacitors, using small metallised ceramic plate capacitors as



The Receiver Multiplier PCB — remove the cans to change the capacitors

replacements, these are available from several component suppliers. Be careful when replacing these to keep the leads short, and check to make sure you haven't bridged any PCB tracks with solder before re- inserting the board. Now unplug the receiver Multiplier PCB, then carefully unsolder and remove the small metal screening cans from this, you'll find they are secured by small tags soldered through holes in the PCB. Change the capacitors, again using small metallised ceramic plate capacitors keeping the leads as short as possible. Check your solder connections, re-fit the screening cans and plug the PCB back into the set.

Continue with the tune-up as previously described, the receiver now acting as an 'E' band set. Note that the value of C10 on the front end may occasionally need increasing, up to the value of 18pF in some cases, as tests on a number of sets (we at HRT don't just convert *one* set before we write about it!) have shown that the internal capacitance of the front-end transistor TR1 may sometimes vary. So if you have difficulties achieving a tuning resonance on tuning capacitor C9, try increasing C10 slightly. On transmit, the unit is of course designed for 68- 88MHz in any case so no modifications are required, on transmit you should be able to get around 8.75V on TP1, 10.5V on TP2, 10.25V on TP3 and 10.6V on TP4.

TX Alignment

Connect a 50 ohm load to the aerial connector with an RF power meter in line, and with your multimeter switched to the 10V DC range connect its negative lead to the DC supply negative, and the positive lead to TP1 on the TX multiplier board (board 8, just to the right of the facility housing). With the transmitter PTT keyed, tune L1 and L2 with your non-metallic trimming tool for minimum multimeter reading, then tune L3 for maximum, you should get around 8V at this stage. Transfer your multimeter positive lead to TP2 on this board and tune L4, then L3 both for minimum, then L5 for maximum, you should get around 9V. Transfer to TP3, and tune L6 and then L5 both for minimum, then L7 for maximum, you should get around 8V. Now step your multimeter up one range, to indicate up to around 15V, and transfer the multimeter positive lead to TP4. Tune L8 and then L7 both for minimum, then tune L9 for maximum.

You should by now be seeing some RF power from the transmitter, so tune L9 and L10 for maximum. If you don't have an RF power meter, you can place your meter on the 10A DC range in series with the positive DC supply lead to the transceiver, and tune these coils for maximum DC current drawn. Now adjust your crystal trimmers to achieve the correct transmit frequency, followed by adjustment of RV1 on the AF PCB for the correct peak deviation. The mic gain is pre-set and isn't variable so this completes the entire alignment.

Packet Connections

All connections for receive audio and transmit audio/PTT are available on the microphone socket, which does rather simplify interconnection with a TNC for packet! If you wish to use a DC squelch output for your TNC or indeed to drive a 'squelch open' LED, pin 2 on the internal facility socket is a 'busy' lamp control, and may be used via a resistor to control the base of an NPN switching transistor for squelch detection, this point being 0.5V squelched, 1.5V unsquelched. Pins 8 and 12 are of course linked and carry the receive audio.

If you wish to use the facility unit space to house a toneburst, you'll find that socket pin 3 is connected to the microphone audio input, pin 1 being ground, pin 7 carries switched 10V on TX, pin 9 carries 12.5V and pin 11 carries constant regulated 10V.

Next month, HRT plans to provide details on the UHF M212 Olympic for 70cm use, these sets also recently being available very cheaply on the amateur market (even G4HCL has one sitting in his shack!), together with a few fault-finding hints and a variable power output modification common to either version. Ron G8CXR wishes to thank C.A.R.E. (North West) Ltd. for their help in provision of crystals, as otherwise the 'P' band modification project would not have got off the ground. Ron is also working on a 6m modification to the M202 for a forthcoming issue of HRT - watch this space!

Table 1 — Front End Modifications

Capacitor(s)	Old Value	New Value
C6, 8, 14, 16	330pF	1n0
C2, 4, 10, 12, 20	2p2/2p7	10p
C18	2p2/2p7	12p
C23	15pF	22pF
C29	10p	18p

Remove R3 and R7, both 15k.

Table 2 — Receive Multiplier Modifications

Capacitor(s)	Old Value	New Value
C7, 9	120p	150p
C17	47p	68p
C19	47p	82p
C27	18p	33p

From My N

Geoff Arnold G3GSR reveals the secrets of diode and transistor codes

When burrowing in your 'junk-box', or trying to find your way through a piece of equipment that you're trying to repair, especially without the benefit of a service sheet or any other data, you'll not get far without being able to recognise the components. With a little experience, telling the difference between the various sorts of components isn't too difficult, though even the most dyed-in-the-wool dabbler can sometimes be misled. Some small resistors and capacitors, the sort that are tubular in shape, with several bands of coloured paint to indicate the value, tolerance and so on, look awfully alike. Recognising and understanding the codes on these 'passive' components, as they're called, and on integrated circuits, is something I plan to come back to in a future 'Notebook', but this month I want to talk about the information you can glean from the type numbers marked on diodes and transistors — the 'active' components.

Identification

The need to identify the type or value of radio and electronic components has been around since the earliest days. At first, they were mostly large enough to accommodate printed details, although the familiar colour-code was soon developed for marking resistors with their value, and capacitors followed suit as they became smaller.

Valves were marked with all sorts of information, not just the type number but also maker's name and trade mark, licence numbers, patent numbers and so on. The early type numbers were sometimes abbreviations that actually 'meant' something obvious - 'DE' for Dull Emitter, for example — but others were far more obscure. Later, various manufacturers devised codes of their own (known as 'house-codes') and eventually some national and international codes were developed. (For those interested in valve type-codes, see Geoff's *Radio Bygones* magazine, Feb/Mar 1991 issue).

When transistors came on the scene, the same muddle of a variety of international and national codes, plus 'house-codes' began all over again, much to the disgust of people involved in the provision of spares and in servicing and repair, but no doubt to the delight of those who made a living compiling equivalents lists! Then came integrated circuits. Yes! You guessed it - another profusion of codes — will they never learn?

JEDEC

So far as diodes and transistors are concerned, probably the most commonly used code on a world-wide basis is that devised in the USA by *JEDEC* (Joint Electron Device Engineering Council). Unfortunately, it's one of those codes that tells you virtually nothing about the characteristics of the device.

It consists of a single figure, followed by the letter 'N', followed by a group of two or more figures. You will recognise it instantly from the examples 1N914 and 2N3055. The first figure indicates the number of semiconductor junctions in the device, or as it's sometimes put, the number of useful leads brought out, minus one. Therefore '1' = a diode; '2' = a junction or field effect transistor; '3' = a dual-gate FET; higher numbers = multiple devices such as opto-isolators. The final group of figures is simply a serial number, issued at the time of registration of the design. Sometimes there is a final suffix letter (A, B, etc.) indicating a later or modified variant of the design.

Texas Instruments House Code

This is a variant of the JEDEC Code, which tells you just a tiny bit more about the device. Instead of the letter 'N', the Texas code uses the letter 'G' for germanium devices and the letter 'S' for silicon devices.

Early Mullard House Code

When Mullard first began to produce diodes and transistors in Europe, they devised a type number house-code which was apparently based on the existing Pro-Electron code for receiving valves. It consisted of the letter 'O', followed by one or two further letters (see Table 1), followed by a serial number of two or three figures. Germanium diodes have 2-figure serial numbers; silicon diodes, including voltage regulator diodes, have 3-figure serial numbers. For transistors, serial numbers up to 199 indicate germanium devices; serial numbers of 200 and over indicate silicon devices.

The OA47, OAZ210 and OC28 are typical examples of this code.

Pro-Electron

Following on from the Pro-Electron code for valves, mentioned above, we come to the Pro-Electron code for diodes and transistors. There's also one for integrated circuits, but more of that another time. Pro-Electron is a European standards organisation based in Brussels, which issues serial numbers against specifications submitted by manufacturers for new devices. Once the device is registered, other manufacturers may decide to make a similar one, under the same type number, so giving useful 'multi-sourcing' back-up for equipment designers and maintainers.

The Pro-Electron codes, whether for valves, diodes and transistors, or ICs, are probably the most useful ones around, because they tell you quite a lot about the device. The basic code for diodes and transistors (see Table 2a) consists of; (a) a letter indicating the material from which the device is made; (b) a second letter indicating the construction or type of device, and (c) a serial number. Devices intended for consumer or domestic use have a 3-figure serial number, those for industrial or professional use have a serial number containing one letter (Z, Y, X, etc.) followed by two figures. A single suffix letter (A, B, C, etc.) is added after the serial number of some devices to indicate selections either of different current-gain groups or of different collector voltage ratings. A few examples may help here.

A BC109 is a small AF silicon transis-

otebook

tor intended for consumer applications, and is usually coded into gain groups with suffix letters A, B or C. A BFY50 is a small RF silicon transistor intended for professional applications.

Rectifying diodes, thyristors and voltage regulator diodes use the same basic code as described above, but have a further group of letters and figures, known as a range number, tacked on the end. For rectifying diodes and thyristors, there is a group of figures indicating the PIV or VRRM rating.

For voltage regulator diodes, the range number consists of a letter indicating the voltage tolerance (see Table 2b), followed by a group of figures indicating the working (stabilising) voltage, with a letter V in place of the decimal point.

Finally, for the larger, stud-mounting devices, there may be a final letter R. If there is no final R, the device has its cathode connected to the stud. If there is an R, the device has its anode connected to the stud. Again, the following examples may help you to recognise this sort of code.

A BZX85-C5V1 is a silicon voltage regulator diode for professional applications, with a working voltage of 5.1 volts and a tolerance of 5%. A BZX85-C27V would be a similar device with a working voltage of 27 volts.

A BTY79-400R is a silicon power thyristor with a stud anode and a VRRM of 400V.

JIS

Transistors manufactured in Japan are registered with the Electronic Industries Association of Japan (EIAJ) and coded according to a Japanese Industrial Standard. The first symbol (see Table 3) is a figure indicating the type of device. The second symbol is always the letter S, standing for semiconductor. The third symbol (Table 3) is a letter indicating the polarity and intended application of the device, except for diodes and photo-transistors, where a figure is used. The fourth symbol is a serial number in a series beginning at 11, and the fifth symbol (if present) is a revision letter, beginning at A.

Heart-ache

To round off, a few general comments about transistor and diode coding and data. First, a practice which has caused a lot of heart-ache over the years, particularly in hobbyists. It apparently started back in those dark days before integrated circuits, when computers used row upon row of transistors in little black cylindrical blobs of plastic with a flat on one side, known as TO-92 packages. The computer manufacturers went along to the transistor manufacturers and said something along the lines of "Look, it would make life a lot easier for us when laying out our PCBs, and save us lots of money, if instead of the lead-outs on such and such a transistor being arranged as emitter- base-collector (EBC) they came out as BCE", or perhaps cbe, or even that they could be arranged in a triangle instead of a straight line (or vice versa).

The transistor manufacturers naturally said yes (after all, money talks!) and duly produced the required devices. Unfortunately, in most cases, rather than give them completely new type numbers, they simply added a suffix letter to the type number of the original device. So, for example, though a BC182 has lead-outs arranged EBC in a triangle, and is a drop-in replacement for a BC107, a BC182L is a device with identical electrical characteristics but having its lead-outs arranged ECB in a straight line. As if that wasn't confusing enough, there is also a BC182LTO5, which had its leads preformed to match those of a TO-5 package. They all have the same size body!

This sort of thing is all very well, but it causes problems First, there isn't a lot of room for type numbers, manufacturer's marks, etc., on the flat side of a plastic transistor which measures at most about 4 x 5mm. You need good light, plus good eyesight or a magnifying glass (or both) to pick up the 'L' suffix if there is one. Secondly, though they were manufactured for a particular industrial user, some of these 'specials' soon found their way to the outside world.

Unfortunately, the fact that these variations even existed wasn't widely known, especially in the hobbyist market. I've known component shops where they kept BC182 and BC182L all mixed up in the same bin, and what the customers actually received was very much pot-luck. I wonder how many home-construction projects are gathering dust in a corner of the shack because some of the transistors have been wired in the wrong way round, simply because they have a different lead-out configuration to what the PCB designer used!

The second comment also stems from the very limited space available for any identifying markings. The solution adopted by some manufacturers is to abbreviate the type number. For example, Japanese transistors sometimes have the prefix 2S omitted. Some devices from Texas Instruments having type numbers beginning with TI omit those letters, for example a TIC106D will be marked C106D. For diodes, where the problem is even worse, colour coding (after the fashion of resistors) is sometimes adopted as well. So, for example, the markings on a 1N4148 are bands of yellow, brown, yellow and grey, with the first yellow band being broader than the rest and positioned at the cathode end of the device.

Information Sources

Finally, where do you get your information about diode and transistor characteristics, and about their lead-out arrangements? For people in industry, this isn't usually a problem, as the semiconductor manufacturers are happy to supply copies of their catalogues and application notes in anticipation of lucrative sales. For the home constructor, it's rather different. Sometimes you can wangle some manufacturer's data, but usually you're going to have to pay for commercially compiled data books, mail-order catalogues, copies of data sheets, etc.

If you're a home-construction addict, you need reliable reference material. Mail-order catalogues are a good source nowadays, and they often come with discount vouchers which help to offset the cost when you make a purchase of components. What I would say, though, with all due respect to the compilers, is *don't* rely on just *one* catalogue or data book. Having been a producer of such material myself, I know how difficult it is to put together a list of data which is 100% correct. I also know how frustrating it is for the user to find that he or she's been misled by an error. The solution is to have at least two data books or catalogues, so that you can cross-check information given.

Even the semiconductor manufacturers make mistakes in their data books. A few years back, one of the big multinationals produced a new edition of an IC data book in which for some reason the pin-out diagrams of several established chips had been re-drawn. On one of them, I seem to recall that it was an electronic organ chip, the draughtsman had transposed the labels on the supply

SCANNERS INTERNATIONAL

From the Editor's desk

Phew, it's been a busy week! In the last 7 days, the editorial phone has been ringing virtually non-stop, hoards of professionals have been visiting us armed with tape recorders and cameras, and the message of exciting listening has been given a tremendous boost to the public. The reason?.....the public have found out about shortwave broadcasting stations!

On Friday morning, BBC TV came to see us complete with film crew and sound recordist, and our consultant editor was screened for several minutes that very evening during 'prime time' viewing, just tuning around the short wave bands and talking about the broadcasting stations that could be heard. That afternoon, ITV phoned us twice asking to send their TV crew round, at the same time the local IBA interviewer was interviewing the consultant editor. That very lunchtime BBC radio also did a piece from the soundtrack of the BBC TV interview! Both local and national papers have caught on, with pieces and photographs published.

Why?

So what's special about us? Nothing! You, dear reader can also tune in to news from around the world, transmitted by numerous HF broadcast stations, all giving their own version of what they see, or what they want you to see, the news to be! None of this 'censorship' stuff, you get it fist hand. You'd like to hear the views of the Israeli government, just tune into Radio Israel! How about what Radio Baghdad has to say...just try listening on 13.660MHz in the evening! Mind you, there have also been reports of a certain lady by the name of 'Betty Baghdad', telling some American people temporarily stationed in Saudi Arabia that their loved ones back home are currently attracting the romantic attentions of Hollywood films stars such as Clint Eastwood, Tom Cruise, and Roger Rabbit. I wonder if 'Betty' knows that Roger Rabbit, despite being a successful film star, is a cartoon character!

Secret Stations

Not surprisingly, several 'clandestine' stations have also sprung up, sometimes operating using battery power from covert locations such as woodland, one station is reputedly operating from a cave. One clandestine station however is documented as using a 500kW (yes, half a megawatt) transmitter to send it's propaganda around the world, so receiving some of these stations these should be quite easy. Jamming of signals is also prolific, this occurring where one faction disagrees with what the other is broadcasting, and starts actions to disrupt this. Common jamming techniques include a wavering 'carrier' rapidly swishing from side to side, beating with the broadcaster, others include the commonly termed 'bubble machine', due to the resulting bubble-type noise. Certain others aren't quite so sophisticated, one such reported action is that of Morse code transmissions on top of a broadcasting station, telling listeners in no uncertain terms what they think of the country's leader and what they should send over to the capital of the country in question!

We'll leave it up to you, dear reader, to decide what you want to listen to and what to believe when you hear it! In this month's 'Frequency Finder', a collected source of information is presented, this coming from several sources combined with many late nights of compilation, listening in, and verification (together with the odd BBC/IBA/newspaper personnel listening in with us). It's no secret that there is also a possibly controversial book around, giving details of various non-broadcasters operating on land, sea, and in the air. But we can't encourage you to listen to these other stations, can we?

Tuning Hints and Tips

Many handheld scanners now have HF AM coverage, and a large number of HRT readers may indeed have a table-top HF receiver connected to an outdoor aerial. HF propagation is of course variable, but the starting point is to use a decent aerial out in the clear. No, not the telescopic whip plugged into the top of the set when at home, as this will also pick up plenty of electrical noise from your TV, computer, and the like. Try and get at least a short length of wire outdoors, and connect this instead to the aerial socket. Remember also that a good 'ground' is also important, not the house electrical wiring Earth', but instead an earth rod, or even better earth radials, outdoors in the garden or back yard. Your's truly uses an outdoor radial earth 'mat' consisting of over 2km of copper wire buried under the (relatively small) back garden turf. An attenuator can be used if your receiver starts overloading due to excessively strong signals from other stations. Some receivers have a switchable attenuator built in, with others a handy tip is to use either three resistors in a 'pi' formation (with values given in several data books), or even one of the low-cost 20dB in line TV attenuators used with a suitable adaptor.

If you don't have facilities for an outdoor 'long wire' aerial and earth, then one of the small 'amplified aerials' can be used, but again remember to place this away from local interference sources, otherwise it will just amplify the noise as well as the wanted station and you'll be no better off! Put it on your balcony railing, hang it outside your window, or in the loft providing you don't already have this full of other noise-inducing wiring!

Happy listening, and if you'd like to share the information you hear from these broadcasters, we'd be very happy to hear from you, write in and tell us!

Competition Winners

Lots of entries came in for our free draw for handheld scanner accessories. The day came, and here are the successful winners;

1st prize; JIM handheld scanner Power Supply/charger/stand;

Mr. D. Fielding from Exmouth, Devon.

2nd prize; JIM ni-cad battery charging system;

Mr. A. Holloway, from Sedgley, West Midlands.

3rd and 4th Prizes; Carrera handheld scanner stands

W. Gostling from Diss, Norfolk

M. J. Knott from Mitcham, Surrey.

We've got more free competitions lined up for you in the future, so watch this space! Also if you'll be visiting the London Show this month, do come and say hello at our stand (South Hall, stand J), fill in a free raffle ticket, and you could win over £150's worth of aerials. Exclusive to the HRT/Scanners stand, you see we do try to look after our readers!

Frequency Finder

This month, we're concentrating on Short Wave broadcasting stations in the Middle East, to let our readers 'tune in' to possibly different news broadcasts by different countries! Remember, HF propagation, i.e. the capability of receiving signals from the broadcaster in a given location at a given time, often depends upon the state of the ionosphere at the time, i.e. it's variable! With this in mind, broadcasting stations normally time their transmissions to co-incide with good propagation paths to the intended reception area using a given transmission frequency. As always, these frequencies and times may vary, the most reliable source being information of this given by the station itself. The following is based upon material gathered from a number of sources including the stations themselves, together with monitoring reports. You may note that transmission times from some stations vary, indeed Radio Baghdad at the time of writing is transmitting various 'special' programmes to English-speaking countries. Times in GMT (UTC) of English, French and German transmissions, where available, have been given, and a selection of 'non-official' stations are provided at the end, it's your guess as to the language they may be using!

Radio Afghanistan
English service; 19.00-19.30
7.310MHz 9.665MHz
French service; 19.30-20.00
7.200MHz 9.635MHz
German service; 18.30-19.00
7.310MHz 9.665MHz

The Voice of the Islamic Republic of Iran;
English service; 19.30-20.30 GMT
French service; 06.30-07.30, 18.45-19.30
German service; 18.00-18.45
6.030MHz 6.080MHz
9.022MHz

Radio Baghdad
English Service variable times 18.00-23.00
French service variable times 19.00-20.00
German Service variable times 20.00-21.00
7.295MHz 9.770MHz
13.660MHz 15.230MHz

Kol Israel, Jerusalem
English service 00.00-00.30, 01.00-01.25, 02.00-02.25. 05.00-05.15, 11.00-11.30, 18.00-18.15, 20.00-20.30, 22.30-23.00
French service 05.15-05.30, 11.30-12.00, 18.15-18.30, 20.30-20.55, 22.00-22.30.
7.460MHz 9.435MHz
9.855MHz 11.585MHz
12.077MHz

Radio Jordan
English service 05.00-22.00
9.560MHz
05.00-14.15
13.655MHz

Radio Kuwait
English service 05.00-08.00;
15.345MHz
18.00-21.00;
11.665MHz

Radio Lebanon
English services;
06.00-10.00
6.215MHz 6.280MHz
09.00, 13.15, 18.15
6.550MHz
French service; 19.45-20.00
6.215MHz 6.280MHz
08.00, 13.00, 16.15
6.550MHz

Radio Oman
Frequencies/Hours of operation;
6.085MHz 02.00-04.00, 18.00-22.00
7.270MHz 16.00-18.00
9.735MHz 04.00-06.00
11.745MHz 06.00-16.00
11.890MHz 03.00-16.00
17.735MHz 08.00-17.00
17.770MHz 02.00-08.00

Broadcasting Service of the Kingdom of Saudi Arabia
English service; 16.00-21.00
9.705MHz 9.720MHz

Syrian Republic Arab Broadcasting Service
English service; 20.05-21.05
French service; 19.05-20.05
German service; 18.35-19.05
12.085MHz 15.095MHz

Voice of Turkey
English Service; 20.00-21.00
9.825MHz
22.00-23.00
7.250MHz
9.685MHz
French service; 21.00-22.00
9.825MHz
German service; 19.00-20.00
9.825MHz

Voice of the United Arab Emirates
English service 11.00-13.00
French service 13.00-16.00
Frequencies used;
5.955MHz 5.960MHz
6.195MHz 7.125MHz
7.225MHz 7.280MHz
9.595MHz 9.630MHz
9.655MHz 9.695MHz
11.815MHz 11.865MHz
11.940MHz 15.115MHz
15.135MHz 15.395MHz
15.405MHz 17.705MHz
17.820MHz 21.700MHz
21.735MHz

United Arab Emirates Radio
English service; 10.30-11.30, 13.30-14.00, 16.00-17.00
11.730MHz 15.320MHz
15.435MHz 17.865MHz

A selection of 'alternative' stations;
'Voice of the Crusader' (Iraq - Jamming)
20.00-21.00
6.100MHz
15.30-16.00, 18.30-21.30
6.145MHz
16.00-17.00, 20.00-21.00
6.175MHz
06.30-09.30
9.595MHz

'Voice of Iraqi People' (Middle East)
12.00-12.45, 13.30-14.30
6.957MHz 6.995MHz

Lebanon - Voice of Hope
English; 06.00-10.00
6.280MHz 6.215MHz

Lebanon - Voice of Lebanon
English service; 09.00-09.15, 13.15-13.30, 18.15-18.30
French service 08.00-08.15, 13.00-13.15, 16.15-16.30
6.550MHz

'Iran Freedom Flag' (Middle East)
03.00-05.00
9.045MHz
16.30-18.30
11.615MHz
06.45-07.45, 14.00-14.45, 16.30-18.30
15.100MHz
03.30-05.30
15.560MHz

'Voice of Iranian Revolution' (Jamming)
09.00-10.00, 14.00-15.00
6.435MHz

'Voice of Unity' (Egypt - Jamming)
01.30-02.30, 12.00-13.00, 15.15-16.15
12.230MHz 15.685MHz
17.540MHz

'Radio Iran' (Middle East)
18.30-19.30
7.075MHz
02.30-03.30, 18.30-19.30
9.400MHz
02.30-03.30
15.560MHz

'Al-Quids Radio' (Syria)
07.00-12.00, 14.00-17.00
7.460MHz

'Iran Baluchistan' (Baghdad)
05.00-06.00, 16.00-17.00
9.545MHz

Continued from page 36

Contest Logging

Contest logging programs are a special case. For day to day station logging rapid data entry is relatively unimportant, but you do want to be able to enter details of name, QTH, etc. In a contest you want to get the essential data in as quickly as possible with the minimum number of keystrokes. From your station log you want to be able to retrieve QSOs by various criteria. In a contest you are more concerned with getting immediate feedback on QSO rates, your running score, etc. In fact this is one of the great benefits, the psychological boost which comes from being able to see how well you are doing as you go along is tremendous. The other great benefits are immediate dupe-checking without getting submerged in paper dupe sheets and, of course, a print out of perfect log sheets immediately the contest has ended!

DXpedition logging is different again. You don't need to enter name and QTH, and neither do you need to keep track of scoring or QSO rates. The important thing is to be able to get the basic QSO data into the program as easily as possible, either at the time or after the event. Again, there are some programs which specialise in doing this, while some of the regular station logging programs offer a rapid entry mode for this purpose or for those out of the way contests which you wouldn't expect to be supported by the main contesting programs.

Differing Needs

Because of these different requirements very few programs are good at contest, DXpedition and station logging, so you may end up using different logging programs at different times, which takes us back to what I said before about being able to exchange log data between programs. If you plan to maintain your station log only on computer and give up paper log keeping altogether then you must make sure that you maintain the data required by the licensing authority, including transmitter power in the UK. Some of the programs we looked at had a field for power, others didn't although there was usually a spare 'remarks' field which could be used for this purpose. In fact my ideal log program would have two or three unallocated fields so that I could customise the program to my own requirements — to track progress towards the RSGB Commonwealth or Islands on the Air awards for example.

Gripes

Finally, I have a particular complaint about many logging programs in that they do not cater for some of the very long callsigns which crop up from time to time. One of the longest I have come across is PA0GAM/OH0/OJ0 who was operating from Market Reef. That's 14 characters in all, and many programs are limited to 12, 11 or even 10 characters. The extreme example I have come across is a Public Domain logging program from KD2MT which is limited to calls of 6 characters maximum.

Just a word of warning before I close. When installing and running a new piece of software, do ensure that you read the manual. The temptation is to get started as quickly as possible and a good program should have lots of on-screen help. The danger, though, is twofold. First, you may end up corrupting data or programs already on your PC. Secondly, you may never get round to discovering some of the interesting features buried in the program and may not have it configured to best advantage for your PC.

Next month, some reviews of specific logging programs.

Aries-2 program

```
ID(Sta): IK1ABC      Name: Enrico    City: Genoa              State: Italy
Date: 03-10-88       Begin: 20:56    End QSO:                 Freq: 14.085.2
Type (mode): FSK     My RST:         His RST:                 Power:    QSL: R
Remarks: Enjoys Sailing and fishing on his 30' boat 'TOMAR'
Data: 2) 10-31-87 / 17:27 to 17:48 / USB / 21.215.0 / RST 55 / His 57
Status:  [T/R]  [CLS]   RTTY   45 Baud   Normal     [CLD] [Sr/F] [Qu/eX]
---------------------------- Log of NY2I ----------------------------------
CQ CQ CQ DE IK1ABC IK1ABC
KKK

IK1ABC DE NY2I NY2I

NY2I DE IK1ABC. TNX FER CALL OM UR RST 579 -- HW CPY? BK

IK1ABC DE NY2I
FB ENRICO UR RST ALSO 579 FROM GENOA -- I SEE FROM MY LOG THAT WE HAVE
WORKED TWICE BEFORE, THE LAST TIME ON 15 METER SSB -- HAVE YOU BEEN OUT
SAILING ON THE TOMAR LATELY? BY THE WAY I SEE THAT I HAVE RECD UR QSL
CARD. TNX -- HW IS THE PRINT?
IK1ABC DE NY2I NY2I KN

--------------------------------------------------------------------------

SAILING ON THE TOMAR LATELY? BY THE WAY I SEE THAT I HAVE RECD UR QSL
CARD. TNX -- HW IS THE PRINT?
IK1ABC DE NY2I NY2I KN
1Tr/Rcv 2Text 1 3Text 2 4CallEx 5MsgBfr 6TimeOn 7TmeOff 8Clear 9 Log  10 Optns
```

Packet Radio Roundup

G4HCL with the latest in new packet hardware, software, and even firmware

Knowing that HRT 'packeteer' readers are always keen to know about the latest packet developments, this month I'm going to take a look at some new offerings in the packet field, in terms of hardware, software and firmware.

Baycom, a PC based Digicom

Regular Packet Radio Roundup readers will know the 'Digicom' program for the Commodore series of computers has been available for some time now. For the uninitiated, this program allows your computer to 'emulate' a TNC, complete with personal mailbox and the like, by just plugging a simple modem rather than a complete TNC to the computer's rear accessory port. 'Digiprom', the plug-in PROM based version of this, was exclusively reviewed in the Sept 1990 issue of HRT. With the popularity of IBM PC 'Clones', the two Digicom personalities of Johannes DG3RBU and Florian DL8MBT have now put together a PC version with the name of 'Baycom', and as would be expected it is claimed to be just as good as the original Commodore version!

The program provides up to nine user ports, and adds a Baycom-to-Baycom binary file transfer facility. It provides a three-way split screen display mode, this being transmit text, received text, and a monitor section, the program supporting MDA, MGA, CGA, MCGA, EGA and VGA display drivers, VGA using a 43 line mode. Again, only a simple modem is used to interface between the computer and your TNC, and existing users of Digicom using the AM7910 IC version of modem with ILQ74 style opto-isolators fitted will find they only need to add a 1N4148 diode and replace one resistor to convert their existing modem circuit for Baycom use.

Baycom uses the computer's DTR, CTS, RTS and Ground lines from either COM port 1 or 2 on your PC, and fits onto a 3.5 or 5.25 inch disk. For information on obtaining a copy, you can contact Jim Mahoney G6FCL, 89 Tyefields, Pitsea, Basildon, Essex, SS13 1JA enclosing an SAE. It has been reported that Baycom is 'Public Domain' for amateur use, others report of a donation to the Baycom team being required before being supplied with a copy, however the UK distributor should be able to provide the latest information on this on receipt of an SAE.

New Kantronics Upgrades

Yes, it's EPROM time again! One of the benefits of the many stand-alone packet TNCs is that you can easily 'upgrade' the facilities available from your packet station by simply changing an IC, as opposed to that with radio hardware such as transceivers where if you want more facilities, it's usually trade-in time. To take an example, I've had my KAM all-mode TNC for many years now, having placed this in use from the date they first became available. As the years rolled along, by simply replacing its EPROM-based firmware I've added modes of operation such as FAX reception, a 'node' for the use of other stations, a personal mailbox, and several other facilities.

Kantronics have now released their version 3.04 EPROM firmware for the KAM, KPC2, KPC4, and the Data Engine (v1.04 for the latter). The differences from the earlier version of 3.00 to 3.04 are fairly minor, mainly consisting of improvements to the real-time clock and a few 'bug' fixes to the *KISS* mode and the CW identification. In fact, Richard Hillier of Lowe Electronics tells me he believes the software is now 'bug free'. The good news is that if you have the previous EPROM version, you can obtain a completely free upgrade by sending the old EPROM back to your Kantronics dealer, together with a sturdy SAE with sufficient return postage (i.e. a couple of first class stamps). My thanks to Lowe Electronics and Siskin Electronics for the above information.

Posting EPROMS

A point mentioned in *Packet Radio Roundup* some time ago concerns returning EPROMS through the post. Bits of silver foil and black sponge are a waste of time! With the aid of post office mail sorting rollers, the legs of the enclosed EPROM cut a neat perforation in the envelope, often pushing it straight out into a little black tray at the sorting office! Postmen and women don't appreciate having their fingers stabbed either, the blood also stains the envelopes. Ideally, the black plastic tube most dealers supply EPROMs in is a much better bet, or if all else fails, a piece of thick expanded polystyrene and a Jiffy bag (not just an ordinary envelope) will sometimes suffice. Thanks to Phil Bridges G6DLJ for this info.

Plug-in 9600 Baud

James G3RUH called me to say he is now in possession of one of the first manufactured plug-in 9600 baud modems for the Tereleader TNC-24 all-mode terminal unit. The modem comprises a very small surface mounted assembly with components mounted on both sides, the unit simply plugging into the rear of the TNC-24. With the terminal unit already having a built-in PSK modem for satellite packet as well as the usual VHF and HF packet modems (plus of course all the other CW/RTTY/Amtor etc. modes), it looks like this arrangement could provide a very nice 'do everything' terminal unit at low cost. Yours truly is looking forward to getting his hands on a review sample to link up to the FT-736R sitting here, to have a go at the various orbiting BBSs!

On the subject of satellite packet modems, AMSAT-UK are now stocking the PacComm PSK-1 satellite modem, details from Ron Broadbent (see 'Satellite Rendezvous for contact details). Note that the profits AMSAT make from the sales of this all go straight into AMSAT-UK funds, to further progress on the amateur satellite front.

Hardware

Not to be outdone, a jumper board is now available for the Kantronics Data Engine to allow external modems such as the PSK-1 to be fitted to the unit, whereas previously only 1200 baud and 9600 baud modems could be used, details from Lowe Electronics.

Siskin Electronics tell us there is now a 'real-time' clock module available for the PK-88 and PK-232 TNCs. This plug-in board simply fits underneath the existing RAM chip in the TNC, hence you won't need to get your soldering iron out, you'll also never need to set your 'DA' clock again.

Tiny-2 Modifications

In another radio publication, a rather out-of-date modification was recently detailed for the Tiny-2 TNC, to cure 'deafness'. It seems that owners of Tiny-2s took this to mean that **all** Tiny-2s needed this modification! The correct information, 'straight from the horse's mouth', is that a small percentage of early model Tiny-2s, these having a ser-

ial number of 2000 or less of which around 250 were imported to the UK (current serial numbers reach over 6000), suddenly went totally deaf for no apparent reason. This condition took anything between 5 days and 6 months to appear, with the only cure being to switch the TNC off and start again.

This problem was tracked down to a lack of signal to the TCM3105 modem IC and a simple modification was produced which involved a transistor and a couple of resistors soldered to a DIL socket. Anyone who has one of these early TNCs will do no harm in adding the mod, which was well publicised on the packet network from as far back as June 1988. However we're told that owners who don't trust their soldering capabilities may return their Tiny-2 to the UK distributors (Siskin) who have offered to add the modification for the cost of the return postage only (£5). But do remember this mod applies only to units sold over two and a half years ago.

BBS and Cluster News

The number of DX Clusters in the UK is continuing to grow, these providing a networked 'focus' for latest news such as up-to- the-minute propagation reports and activity news. A typical usage for the keen VHF/UHF operator is that of Sporadic-E and Tropospheric openings, to allow amateurs again to continue their pioneering advancements in radio which sometime even prove the 'experts' wrong (see this month's 'VHF/UHF Message')! Remembering that a Sporadic-E opening on 2m can often last only a few tens of minutes, this shows the great power of putting packet radio to an extremely useful purpose, and must only quell criticisms of the packet network being used to propagate inane messages throughout the BBS system! Improvements are being made every day to the packet node network to provide better and faster links, and this again can only help further the cause of packet as a very useful communications mode to progress the pioneering aspects of amateur radio.

Link Improvements

Indeed it appears that the numbers of BBSs in the UK are decreasing, as users find node linking is improving by leaps and bounds to handle extra network 'traffic'. Two years ago in my area there were three operational BBSs, all on 2m, 'sharing' the often congested user load. Right now there is now just one multi-user BBS, with direct node links on 4m, 2m, 70cm and 23cm for local users. But maybe there is another reason for the decreasing numbers of BBSs, as their sysops remember how much financial outlay can be 'tied up' in running one of these. It's reported that GB7UWS in London and the RSGB's GB7HQQ have recently closed for these reasons. The moral here again is that if you regularly use the packet network, either a BBS, Cluster, or the Node system, consider asking your local packet group whether they need any help. Remember, without a connected network, packet would still be in it's infancy!

Looking to the Future

The good news is, that following a meeting with the Radiocommunications Agency I attended today at their invitation, they are looking to expand the number of frequencies allowable for unattended packet radio operation. So it looks like the RA not blind to the rapidly evolving future of packet in amateur radio, and that they wish to promote this rather than curb our activities as some 'scaremongers' may like to think!

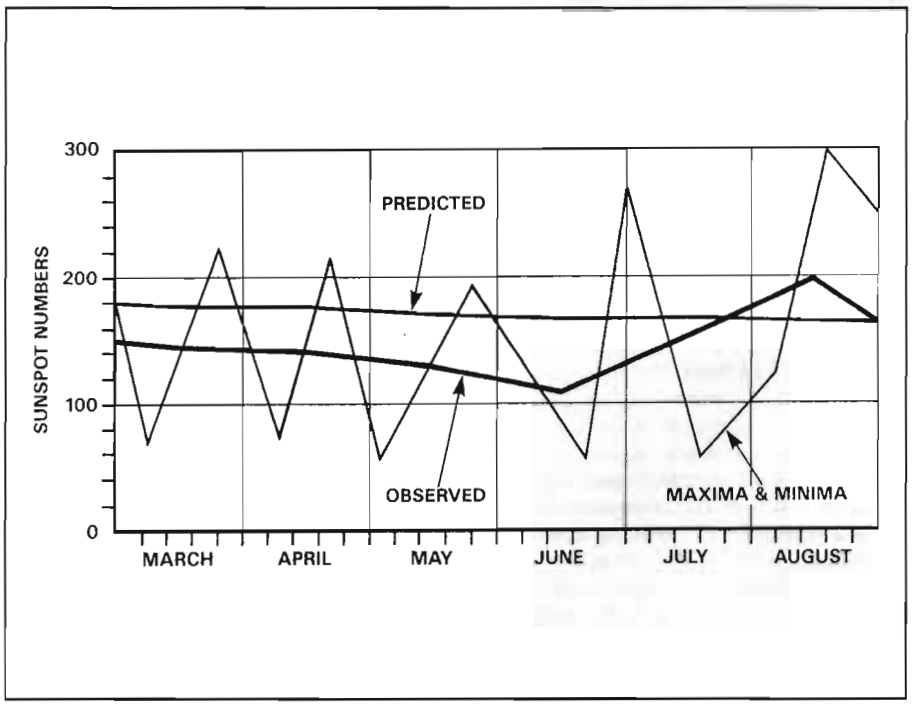
CTRL-Z, End of Message

That's it for another month, please do keep sending your comments for inclusion in the 'Roundup', every message sent to G4HCL @ GB7XJZ is guaranteed a prompt reply! You can also contact me by post directly at the editorial address, or indeed sometimes 'live' during the evenings on the UK Cluster network. Until next month, 73 de Chris G4HCL @ GB7XJZ

VHF/UHF Message

Ken Ellis G5KW discusses the possibilities of 50MHz WAC, and proves the propagation experts wrong!

Making WAC on any band is intriguing but fairly commonplace on the HF bands. Since it became apparent that 50MHz was the crossover of HF and VHF, and DX was possible at certain times of the year when the MUF (Maximum Usable Frequency) went above 50MHz, it is something we in the UK have dreamed about for many years. In QST for January 1948, the late Dennis Heightman G6DH, one of the most successful and experienced 6m DX operators at that time wrote; "It is interesting to speculate on the possibility of working all continents on 50MHz. As far as European stations are concerned the writer considers that, with the exception of Australia, this would have been possible with the conditions present on a few days during the period January - March 1948 (the peak of cycle 18), Australia to Europe would present the biggest problem. A suitable path passes nearer the high MUF equatorial zones than that from VK2 etc. This path should be most favourable during February — March and October - November periods".



WAC Crossband Peak of Cycle 21

By the middle of November 1980, the flat peak of cycle was providing some real DX conditions on 6m and we were wondering if the 1947/48 predictions of G6DH would be realised. At about 0955z on 26th November, Gordon Pheasant G4BY alerted the 6m gang that he was receiving the Australian beacon VK6RTT on 50MHz. It was heard by several of us for a few minutes, before it faded out at my QTH at that time on the Isles of Scilly at 1010z. After it had faded we had an excellent day with worldwide DX QSOs, crossband and two-way. During the evening, double hop contacts across America and crossband contacts with W6ABN (California) and other west coast stations were made. Simultaneously, east coast stations were S9+ and the band was open until a late hour.

First Crossband QSO UK-VK

The following day it happened. G4BPY reported "On 27/10/80 my first reception was VK6RTU in Perth from 1858-0909z peaking 549. At 1000z I had a crossband QSO with VK6OX in Western Australia, to make the first historic six metre UK WAC". As soon as Gordon signed, Brian Bower G3COJ took over to make the second QSO. While I was awaiting my turn in desperation as VK6OX started to fade out, it took me from 0950 — 0955z to complete the QSO as Andy was having difficulty copying my report.

We were the only three to make it, and no other two-way or crossband QSOs took place until 20th March 1989, when the all time first two-way QSO took place between UK-VK.

Two-way WAC UK-VK on 50MHz

The openings to VK during 11-12 October 1989 provided several UK stations with their first two-way 50MHz QSO with Australia and completed their 50MHz WAC. The VK opening began at 0920z on the 11th. G4CCZ, G2ADR, G4FXW, and G3ENZ were the lucky stations working VK8GF, VK8ZLX and VK8KTM, G5KW worked VK3OT at 0932z. During the 12th opening 0820-1000z, many Gs had QSOs with VK2, VK4 and VK, and about 8 UK stations are known to have qualified for 50MHz WAC.

The 50MHz Reporting Club

Ray Cracknell G2AHU of the RSGB propagation studies committee writes; "The reporting period was marked by an unexpected downturn in solar activity and in spite of a strong burst in the second part of August, predictions for the maximum of cycle 22 had to be progressively revised earlier than January/February 1990. The maximum is calculated from the 12 month running average of monthly means and it transpires that the maximum will turn out to have been in July 1989 with a smoothed monthly mean of 159 which could compare with 164 for the maximum of cycle 21 in December 1979 giving a period of nine and a half years between maxima, and six and three quarter from maximum to minimum and only two and three quarter years for variations in conditions, for long range DX contacts on 50MHz are not directly correlated with figures for the daily solar flux.

There is no doubt that the overall results do vary directed with the smoothed monthly variations in solar flux, provided seasonal variations and ionospheric disturbances are discounted. In order that comparisons can be made with previous cycles for which reliable records go back to 1700, we continue to use the figures prepared monthly by the sunspot Index Data Centre in Bruxelles, from data from around 37 stations rather than figures for solar flux. There seems to be considerable similarity between solar activity in the period covered in report No.6 (March - August 1989) and the current reporting period, and the average of the monthly

means of sunspot numbers for the six month periods was 148 in 1989 and 144 in 1990, with similar peaks and lows.

Comparisons of geomagnetic activity would be more complex in effect due to the exceptionally intense storm of 12/13 March 1989 and the longer lasting but less intense stormy conditions accompanying the August 1990 peak in solar activity. Nevertheless, it seems that neither can be held responsible entirely for the differences in results that are apparent in the analysis of results during the current period.

Something Missing?

Following my report in this column last month on 50MHz propagation, I have now collected information from the USA and Japan for the month of October. Believe me it is very interesting indeed! You may recall that on certain days when the 'A' and 'K' figures were very high and aurora was prevalent, openings were logged from Europe to VK and JA. Now I can give more information on these disturbed events. As I said before, many amateurs were misled because of high 'A' and 'K' figures, for instance the most disturbed days of high geomagnetic activity were the 4th, 10th, 11th, 12th, 15th, 20th, 24th and 31st. The 'K' index for those days was 4, 4, 4, 4, 5, 4, 4 respectively. Many professional propagation experts predict that when these 'high K' figures exist, no propagation on 50MHz can be supported. Thanks to the information supplied from JA and the USA for the month of October this is now proved **wrong**! It should be remembered that even during massive auroral events over the last few years, that occasionally the trans-equatorial path has been open, but not to the extent of the reports from around the World for October.

The Darkest Hours

Results from the recent CN2JP DXpedition show similar results happening in Japan. Both are about 35 deg. latitude and exhibit the same 'dark hours' of 50MHz propagation, sometimes via. the long path. This was also noted by Mike Walters G3JVL on his many visits to EA8, during daylight hours apart from 'Es' there was no 50MHz propagation, but as darkness fell then 50MHz opened up to PY/LU. Other interesting points of note are the 17th November when JR6WPT at 0905 (0000z) worked PY2DJC and 9H1BT via. the *long path* (the European being in darkness) and once again 9H1 is around the 35 deg. latitude mark. I also believe places like Cyprus and Gibraltar are in this 'stream' and, if they had more dedicated people listening, would benefit from these openings.

So there you have it, interesting **facts**, not fiction, and more of these openings should be collated between the USA, JA and Europe.

Monthly Review

Geoff GJ4ICD writes; December proved to be a poor month, propagation was very much down compared with 1989. As we go into the 'mid' quiet period, other propagation modes will have to be used to keep us interested. So that's it, no new squares on 50MHz, still at 433 for the moment an 99 DXCC countries with 95 confirmed. Let's hope we see some interesting DX in February and March and hope for some Tropo for 144 and 432MHz, as since I got back on those bands things have been dead. 73 de GJ4ICD, see you at Sandown Park.

Comment by Ray G2AHU;

GJ4ICD thinks he has 'put his foot in it' by saying that the A index and K index do not have any bearing on long distance (12000-16500km) DX on 50MHz. If he means a simplistic interpretation of variations between 0 and 5 in the K index, he is quite correct. Before the arrival of a magnetic storm we often get enhancement of the MUF, and even quite severe storms have little effect on the F region in the tropics (witness how many times we have had the V51E beacon coming bounding in amongst auroral signals). There are many factors affecting the 'quality' of propagation. Remember, before the days of satellite communications the usual excuse for communication failure used to be 'sunspot activity', and remember what little benefit the very high sunspot count and solar flux in August brought us ... Well, very good aurora anyway.

Steve Damon G8PYP writes

Many congratulations on your new column in HRT, it's something I've always felt that the magazine needs. I will forward monthly (or so) reports for you to use in HRT as any information which helps to generate interest in VHF/UHF bands has to be a good thing. 2m and 70cm have been very quiet lately with the only DX heard on 2m being via. meteor scatter. I only had two 2m MS skeds arranged for the *Geminids* meteor shower (SP6BTI - 11/12/90 and FC1ODA — 12/12/90), both via SSB and we failed to complete either. I heard IK1MTZ on SSB on the 12th and 14th, although he was called no complete SSB MS QSO was completed. 6m, by way of compensation, has offered a few new squares but conditions are nowhere as good as the same period last year.

Ken Willis of the UK 6m Group Reports

The UK 6m group committee meeting at Telford was most successful and lasted three hours. We drafted changes to the constitution which will be published in the next 'Six News' together with ballot forms so that members can vote on these proposals. I think that what is proposed is a great improvement on the existing constitution, but it will be up to the membership to decide.

Ted Collins writes; I have enrolled 300 new members for the group in the seven months that I have been secretary. Apart from that I have, by making a personal appeal to lapsed members, succeeded in persuading quite a number to rejoin. When I took over we had 109 paid up members, 200 members had left the group, we now have 450. The AGM of the group will be held as usual at the RSGB VHF Convention at Sandown Park.

Martyn G3UKV writes from Minorca;

Listening on 50MHz from Spain and its islands is quite an eye-opener for those of us used to brief, selective openings associated with more northerly latitudes. At times the band is dead, but every evening the ZD8, 9L1 and V51 beacons build up to very acceptable levels, often S9. South Africa, especially ZS6, is also more or less a daily occurrence, and when Spain gets the go ahead I shall have a 6m transmitter with me! I found the article in HRT most interesting, and as always with your articles, most comprehensive with little 'waffle'.

South Africa

Jack de Villiers ZS6LN, located near the border with Zimbabwe, says Cycle 22 has thus far confirmed the strictly seasonal openings to specific areas at specific dates, thus for instance the openings during the months of April to Hawaii during Cycle 22. This makes me hope that the same will hold true for the openings to USA which are due from the second half of October *(it did, on 23rd he worked VE1, K1, W9;K0 as well as G, DL, SM, F, EA, CU).* Thus far Cycle 22 has followed the same pattern as 21 to Hawaii, Japan, England, Belgium, Sweden and Austria.

That's it for another month, please keep your reports coming to me at 18, Joyles Rd, Folkestone, Kent CT19 6NX.

Late news: GJ4ICD has just worked his 100th country on 6m!

QRP CORNER

Crystal filters for CW QRP working are the subject of this month's 'QRP Corner' by Dick Pascoe G0BPS

At the time of writing, we've just completed the QRP 'Winter Sports' on-air activity. Band conditions were quite reasonable, and it was very cheering to hear so many G-QRP group members out operating on the bands. 20m was rather good for netting a few new countries, and rumour had it that even George G3RJV ventured onto 20m as well. Until recently, most QRP activity was centred around the 80m frequency of 3.560MHZ, but it seems that as HF conditions improve, those with an interest in QRP operating have also moved up to 40m, operating around 7.030MHz.

Filters

Trying to squeeze so many stations on, or about, the same frequency always causes problems. One day I was quite happily working one avid QRPer Bob G4JFN, bang on 7.030MHz, and only when I switched my receiver's narrow filter out that I realised how much activity there was on that frequency. This made me consider the number of stations that sometimes must try to work each other on the commonly used QRP frequencies. Most CW filters are of about 500 — 600Hz bandwidth, this is perfectly satisfactory for most applications but when trying to work in a very busy part of the band the capture area of these filters is too high.

Much narrower filters *are* available, the only problem is to find one that is narrow enough for the job but not so narrow that it 'rings'. I use a 250Hz wide filter, and I believe this is as narrow as you may wish to go. With this filter in use I once had a QSO in between two other QRO stations that were nearly zero beat with each other.

Crystal Filters

Let's take a closer look at what a crystal filter is. There are many types of filter, but they are usually made up of several crystals in a 'ladder' formation. The more crystals that are used, the better is the shape factor that is usually achieved. Normally the number of crystals used in the filter is defined by the letter in the code on the top of the unit. IQD, one of the many UK crystal suppliers,

Fig. 1.
Typical filter selectivity curves

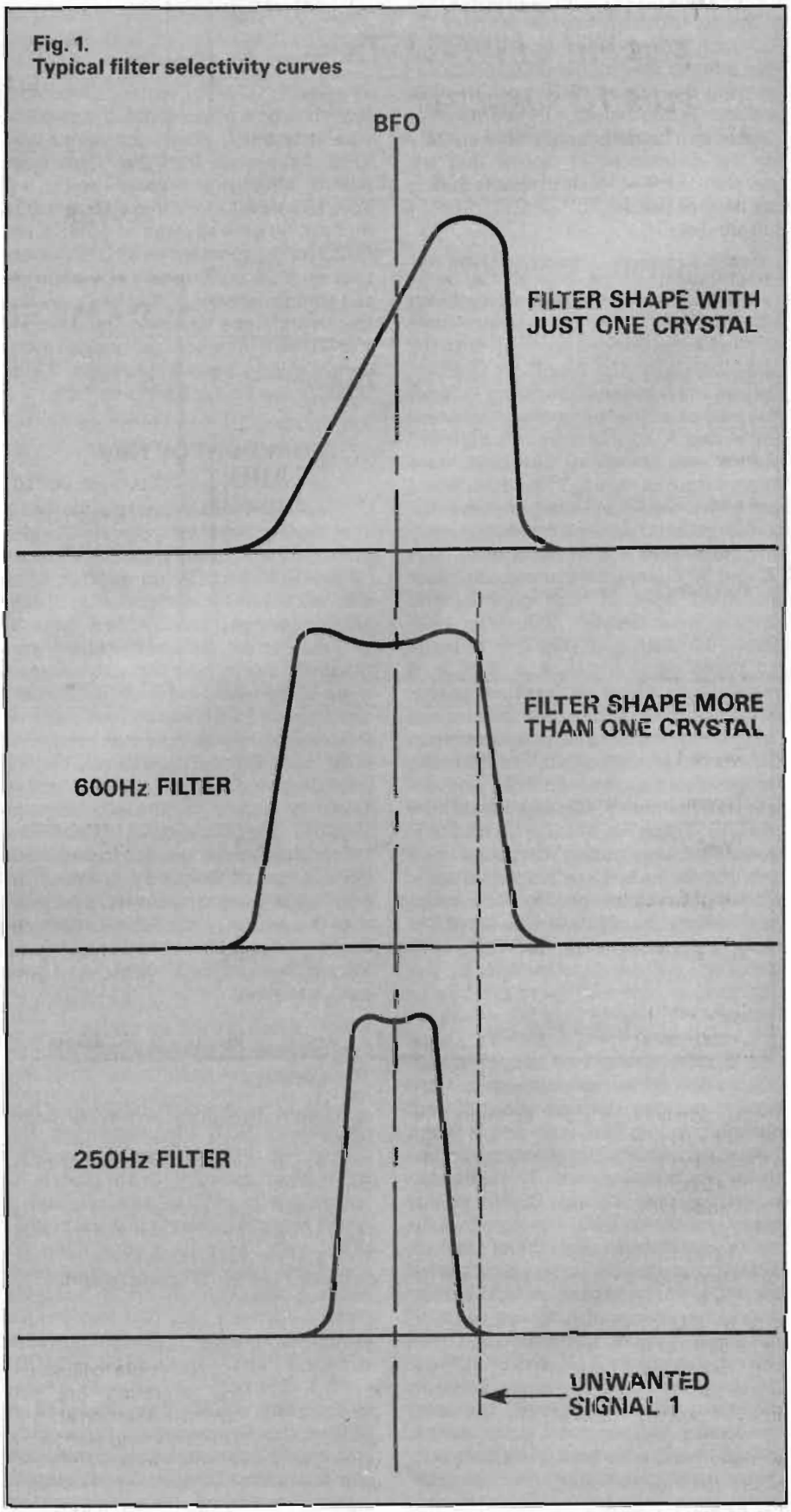


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Table 1

Typical parameters for amateur crystal filters

Type	CW	SSB	AM	FM
No of Crystals	5	8	8	8
Bandwidth	500Hz	2.5KHz	5KHz	12KHz
Stop band Attenuation	>90dB	>100db	>100db	>100db

uses a code such as 90E0.5B, where the '90' is the frequency, here 9MHz, the 'E' is the 5th letter of the alphabet thus indicating a 5 pole filter, and the 0.5 indicates the bandwidth, in this case 0.5kHz (500Hz).

The bandwidth required for various communication modes differs as well. A filter for the reception of FM may be as wide as 12kHz, whereas for AM reception a 5kHz or 6kHz filter may be found. SSB bandwidths are usually in the region of 2.5kHz and the 'standard' CW filter is normally about 600Hz.

Table 1 gives typical specifications of these filters, showing their bandwidth, their usual number of crystals, and the stop band attenuation provided. It is normal to count the bandwidth at the 6dB point.

Fig. 1 shows the expected shape of a simple filter using a single crystal which some constructors may consider using, it can be seen that the shape of this filter is not good. Also shown is that of a 600Hz and a 250Hz filter for comparison.

Selectivity

So let's take an example to illustrate this. If we are operating on, say 7.030MHz, we may have a station at 20dB over S9 on 7.031MHz and the station we want to receive is operating on 7.030MHz with a received strength of S5. With a 'standard' 600Hz filter, both stations may be heard, with the stronger one masking the weaker one. A good CW operator may still be able to copy the weaker signals but, by switching in the narrow filter the strong station will significantly reduce in level, leaving the weaker station in the clear.

Good quality filters of this type can cost £35 or even more, but are a very good buy for the avid CW operator. More information on filters may be found in many radio handbooks, for example the RSGB's 'Radio Communication Handbook', and a forthcoming HRT article will also be covering this in more detail.

Come and Meet Us

Many readers may be visiting the Picketts Lock radio exhibition. The G-QRP club will be in attendance, located in the north hall, so look out for us, and do say hello. Rumour has it that the HRT stand may also tempt yours truly away for a few hours, so if you don't find me at the G-QRP stand you know where to look!

That's it for this month, comments to me please via the HRT Editorial address or at 3, Limes Road, Folkestone CT19 4AU.

IQD may be found at IQD Ltd., North Street, Crewkerne, Somerset.