

# HRT

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**SCANNERS**

## HAM RADIO TODAY

JUNE 1993 £1.70

### ICOM IC-737 HF TRANSCEIVER REVIEWED



Award  
Presentation to  
**G4JKS HRT**  
'Amateur Of The Year'

**Pan-European  
Amateur Radio**

**BEST VALUE**  
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NOVICE • PACKET • REVIEWS • PROJECTS • SATELLITES

# HRT

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VOLUME II NO.6 JUNE 1993

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HRT 'Amateur of the Year'  
Hilary G4JKS



# CQ de G8IYA

## Editorial

*Is wideband coverage a good or a bad thing?*



**Congratulations to Hilary G4JKS, HRT 'Amateur of the Year'**

This month, I'm very pleased to be able to add my congratulations to Hilary G4JKS, who was awarded the title by HRT at the London Show of this year's 'Amateur of the Year'. Hilary does a vast amount of voluntary work in promoting amateur radio to newcomers, as well as safeguarding its interests in the fields of EMC and the like.

### Wideband coverage on your radio?

Whilst at the London Show, I was very pleased to find that several readers came up to the HRT stand, saying 'I like your Editorials, I don't always agree with them, but I like reading them!'. Well, I do try to keep 'rattling the cage', and one thing on looking around the trade stands was the large number of 'wideband' coverage equipment for sale. If you wanted a set that was capable of transmitting on your local taxi firm frequency, or your local police channel, you could buy one. Just a short while ago, such 'wideband coverage' on a 2m or 70cm amateur transceiver, even on receive-only, was a definite 'no-no'. At that time, some dealers 'flouted' the law and openly advertised their (illegal) radios as 'coverage 108-174MHz on receive' or whatever, because it was, understandably, a good 'selling point'. It was also commonly known, or you could at least get the information on, how to 'expand' a variety of sets to receive or even transmit on those 'other' frequencies.

Now, things have changed, and wideband sets are openly advertised and sold, the RA currently taking the view that the operation of, rather than ability to, operate on unauthorised frequencies is their duty to restrict. But is this a 'bubble' waiting to 'burst'? How long will it be before criminals start buying such rigs? What about businesses finding these are a cheap source of 'non-type approved' radios they can (illegally) add for use on 'their' system? A more worrying matter could be for, say, maritime safety use, where some (possibly misguided) boat owners could be tempted to use 'opened-up' amateur HF rigs as their prime means of emergency communication should the worst happen. Or even 'opened-up' 2m rigs on the VHF marine band. These are *lives* we're talking about. Amateur rigs, besides not being made to stringent specifications in terms of transmitter harmonics and so on, never mind their performance on frequencies they were never designed for in the first place, often aren't built to withstand operating in Force 9 gales with salt water getting into the controls and so on. 'Mayday, Mayday', why doesn't my (amateur) radio work? Why didn't I buy a *proper* radio? Help!

I understand this used to be a *big* problem over in Australia, where people would often use such rigs to (try to) summon such services as the flying doctor. Indeed I remember reading about such an incident, the radio in question just not being 'up to' the conditions experienced in the outback - the engineer called to repair the set certainly had a few things to say about the dealer who sold it to the owner who (possibly unsuspectingly) relied upon it for life-saving duty.

But things have now changed in 'Oz', they've stamped down on such 'opened up' rigs, and they've stamped down *hard*. Anyone operating a radiocommunications device which is not authorised by a spectrum or apparatus licence, and this includes 'expanded' amateur gear, is liable to imprisonment for up to two years. There's *no* provision for a fine. This also comes into effect even if you have such a rig *in your possession*, it's mandatory *imprisonment*. If it's 'under your control', for example in your house, or in your wife's car, then again it's *you* who gets

slung inside. Incidentally, if you're over there and you get caught, the onus of proof rests with *you* in having to prove that you don't have the gear in your possession for the purpose of operating, not the other way around! Now, I wonder what could happen if the same starts over here?

### A lot of gear out there for our use

There's a lot of other amateur's gear out there for us to use. I'm talking here about packet and repeater stations, amateurs who put their gear on air and allow us to use it for our hobby. As I'm putting this 'final part' of the magazine together, this weekend sees the CQ WPX (Worldwide prefix) contest on HF. A huge number of amateurs are taking part, and several hundred of these are 'logged in' to the European PacketCluster system. No less than 67 PacketCluster 'nodes' are currently connected to the one I'm linked to, some with up to 20 or 30 amateurs connected to each of them, all sharing information on which stations are active and where. Now leave aside the question of contest operation, or DXing, or packet, and think of the amount of equipment involved in *keeping* these cluster 'nodes' on air for our use, and possibly more importantly all the VHF/UHF interlink nodes between them to allow them to be all linked up. That's a lot of gear, some of it expensive 23cm point-point links. Another related example is ARSENE, the French packet satellite (paid for by amateurs) which is scheduled to be launched soon, this will give a coverage area similar to that of a geostationary satellite (indeed it's being launched along with Astra 1C), and the possibility for future such links is incredible! Again, this has cost time, effort, and money, and it's there for us to use.

But that's if it doesn't 'choke itself to death'. An often-said phrase when referring to some of our amateur bands, especially VHF and UHF, is 'use it or lose it'. Well many allocated VHF/UHF packet channels are simply full to bursting, and other amateurs are naturally complaining when packet operators start using 'their' 2m frequencies to communicate! It's good to see that additional 70cm channels have recently been released for unattended use by the RA for this, hopefully this will help 'spread the load' somewhat, and allow us to continue to justify our use of the bands. As long as we give something back, like advances in technology, which of course digital radio certainly is. Amateur radio certainly isn't declining in this field, but let's not 'hold it back' without good reason.

# LETTERS

## Letter of the month

Dear HRT,

I read the letter from G3KOC in the April Issue of HRT and feel that a reply from a novice is called for.

Having only had a licence since November 1992 I am still a very new hand at the game, on the other hand since I am retired I am what could be called a Senior Novice, and so take exception to his general tone. I doubt that amateur radio will ever die but I think that he must admit that it is at times a little difficult to find out about the 'way in', in fact unless I hadn't had the good fortune to meet a G4, I would never have been able to find out how to take any exams etc.

If inducements have been offered I am not aware of it, but surely if there has not been a vast influx into the hobby, then obviously the inducements have not been that effective. Regarding the influx reducing the band space, a million apologies, I didn't realise that I was creating a problem, most amateurs I have spoken to have been only too pleased to have the 70cm bands filled. I believe the saying is 'use it' or 'lose

it', and from what I have been told, many were concerned that there could be a reduction of band space, as it was not being used to its full capacity.

I would like to take these final lines to thank all the contacts I have made who have given me both support and encouragement, and know that the sentiments of G3KOC are not the majority view.  
Rowly Greer, 2E1BFF

**Editorial comment;**  
**We would first like to apologize to G3KOC for wrongly putting his callsign to the original letter, which was in fact sent by G3KOC (a hand written 'C' can look much like a 'G'), sorry! In reply, many amateurs have their own views on the way they see the hobby, some disagree with what others do, but often we find there's 'room for everyone' to do what they wish, for example by the careful observance of bandplans, and no-one says you must reply to a 'CQ' call from someone you don't wish to communicate with!**

Dear HRT

The good Paul G6MEN (April 93) has set me off again. Regarding clubs, relevant definitions are (OED 1971);

An association or society of persons of like sympathies, of a common vocation, or otherwise mutually acceptable, meeting periodically (under certain regulations) at some house of entertainment, for social intercourse and cooperation'.

An association formed to combine the operations of persons interested in the promotion or prosecution of some object, the purpose is often indicated in the title'.

These clearly relevant to radio, imply that helping people may well be an object, but also imply that bringing in people of unduly divergent aims or values will wreck the whole conception of a club. On that principle I have not inflicted myself on the local club, having

regard to a likely divergence from some members which reminds me that I was able to get a driving competition licence without having to pass an examination in steam ploughing!

Alex Dick ('Sandy') GM0IRZ

**Editorial comment;**  
**Some clubs are good, some aren't, some even attract a certain 'breed' of amateurs (see last month's cartoon) and others turn away a certain breed of amateurs. Yes, many club members are divergent, but there's often someone out there who 'thinks alike' just waiting for someone else like them to come along. After all, our hobby is based upon communication between often completely different types of people.**

Dear HRT,

I have decided to start a group for radio amateurs and shortwave listeners who use Atari computers. I

have had to search various locations for soft/hardware for use with my ST, and I also hope to be able to assist users of the XL, XE etc. The Atari computers are capable of doing most, if not all things other computers can do, and hopefully this group will get them some more attention.

I would like to know if any of your readers would be interested in joining and/or helping with the group, if so could they please send an SAE to me at; 38 Brockhurst Road, Chesham, Bucks HP5 3JE.  
Graham Rayner, G7KCT

**Editorial comment;**  
**Over to our readers!**

Dear HRT,

I was interested in G8IYA's article on the Packet TNC Kit in your March edition, and her comments on setting up the audio levels to and from her rig. I wonder just how she 'fine tuned' these?

Having been active on packet radio for the last five years or so, most stations seem to have great difficulty in setting the level of the transmitted audio, judging by the quality of the signals I receive. I guess they just poke the audio into the microphone socket and hope that the microphone amplifier and limiter do the rest. I calibrated an oscilloscope in terms of deviation, connected it to my receiver, and found deviation levels varied between 2 and 8kHz. Even some nodes and mailboxes had very wide signals, these I would have expected to have been set up properly.

There seems to be some confusion as to just what the optimum deviation should be, perhaps you could give us some guidance on this problem. I am sure an article on how to 'fine tune' the transmitted audio, with the minimum amount of test equipment, would be appreciated by all packet operators.  
Barrie Procter, G8AWN

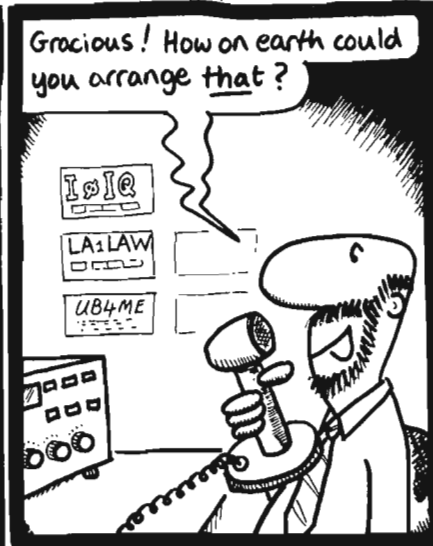
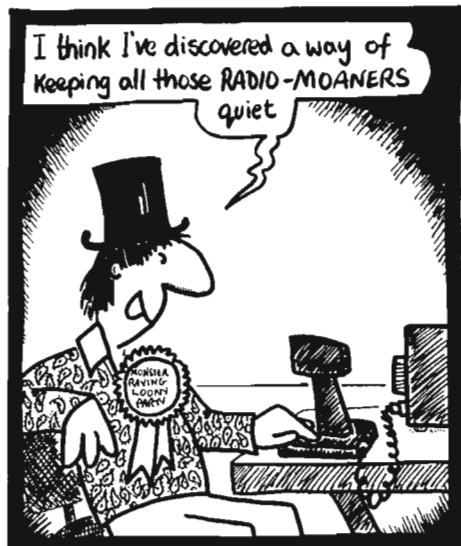
**Editorial comment;**  
**I agree, we think alike, and indeed we published a short feature on setting your packet deviation correctly from a TNC in the June**

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

# "TONE" BURST

By GOMEN



1991 issue of HRT (pages 44 and 45) including diagrams of output waveforms. I've sent you a photocopy of this Barrie, and hope it proves useful. Here, a figure of 3kHz deviation was recommended, this should suit the majority of receivers including ex-PMR rigs intended for 12.5kHz channel spacing. Like yourself, we find that many amateurs do indeed just 'plug it in and hope it works', but a little 'fine tuning' can often make a lot of difference!

Dear HRT,

I am now in the third year of subscription to your magazine. During this time I have always found your magazine to contain interesting articles, sometimes more, sometimes less, but as you often point out, our's is a very diverse hobby and you need to appeal to the widest possible audience. Overall I have to say that I am very happy with the format of HRT. I have a small suggestion, however, that I feel would further improve your reviews.

In these days of miniaturization, particularly of handheld equipment, I feel it would be of use to take photographs of any equipment under review with a ruler or similar standard size 'scale' device included. In this way it would be much easier to judge the size of the latest piece of equipment. I know you often include shots of someone holding handheld equipment, but hands do vary in size and there is never any indication of who was holding the rig for the photo call. As I said just a small point which you may like to consider, otherwise just keep up the good work.  
Andrew Jenner, G7KNA

**Editorial comment:**

We do try to include details within the review text of the exact dimensions of the sets we test, but I take the point that these often don't equate to a 'feeling' of how large the

set really is. When Chris G4HCL was buying his first 2m FM handheld many years ago (in the days of 'tuning high to low for any possible calls!') he made a cardboard cutout of the rig's size to see how it would look in his hand, and this is why we try to include a 'hand held' photo of such rigs in the magazine whenever possible. Adding a ruler or such often tends to make equipment photos rather 'scientific', but what do other readers think? We'd be pleased to oblige if readers want it!

Dear HRT,

It is the simple things in life that give the most pleasure to the greater number of people. The same can, I hope, be said for amateur radio in general. For those who enjoy complex and technical matters, again, amateur radio can and does provide the challenges those interested parties seek.

In amateur radio, on a world wide basis, the greater number of people would appear, when they operate DX, to speak a little to excellent English, so why is it that there are some who say that we here in Great Britain should learn to use a second language, either French, German, Italian or Spanish, more often than we do at present? Personally speaking, if a UK amateur can speak or is in the process of learning to speak in another language, then it is an obvious advantage to him or her to practice what he or she is in the process of learning or to keep up with what he or she has already learnt. However, learning a second language, for many people, can and is often or not as hard if not harder to learn, than it is for people to learn Morse code.

If we keep it simple, the basics of amateur radio, both in the language sector and the technical sector and then lead people through the hobby, a step at a time, never pushing

someone or for that matter one's self, too far too fast, then the enjoyment factor is greater for longer, and the longer someone enjoys the hobby then the longer they will remain within it. To want to make things either harder or more complex, in what is after all a hobby, is nothing short of suicidal. By now, given that many amateurs really believe that they are intellectually superior to the average punter, it should have become somewhat obvious, that amateur radio in general and in particular, does not appeal to the majority of people and that includes the greater number of shortwave listeners and CB radio users.

The fear of invasion and strangulation of the bands cannot and will not happen and that should be obvious to anyone who operates from 10m up to 70cm. As for the remainder of the HF bands the only two major problems that need to be sorted out are; (a) The IQ Zeros who use CW to deliberately jam voice and other calls, and (b) the frequency occupation by RTTY signals that are constant frequency blocking signals and not actual contacts, as one sees upon 80m.

J. D. Bolton, G4XPP

**Editorial comment:**

The current 'International Language' of amateur radio is indisputably English, and even CW abbreviations appear to be based upon this (e.g. CUAGN OM etc.). If we change to a number of languages, things could certainly get rather messy, but as an 'addition' for, say, travel or just conversational practice of another language, international communication via amateur radio can be an invaluable help. They've had to learn at least some English to be able to have a QSO, and I've found it's often nice to greet a QSO partner with a friendly 'hello' or 'goodbye' in their language if I'm able to.

# IC-737 HF Transceiver Review

**Chris Lorek G4HCL**  
*tests Icom's latest HF DX transceiver*

The very day that I had been reading a few details in a 'sneak preview' of the IC-737 in the Australian magazine 'Amateur Radio Action' (they managed to get one before we'd even heard of it in the UK - envy, envy!), did Icom (UK) phone me. "Would you like to take a look at our very latest HF Rig Chris? We've just had one come in". "Yes", I replied, "I'd love to try the IC-737 out on air, it seems to be quite an upmarket rig, offering.....". Well fortunately, it was the IC-737 they meant, and yes, it lived up to more than my expectations. Which surprised me, because I'd have thought for the features it would have sold for rather more than the current price of £1495, like a claimed superb dynamic range, auto ATU, even a supplied fist mic (you often pay extra for these with HF rigs nowadays). So let's see what it's made of...

## Features

On unpacking the box, I was a little surprised with the size and relative light weight, measuring 330mm (W) x 111mm (H) x 285mm (D) and weighing a light 8kg. The reason for this is that the set operates from an external 13.8V DC source, hence the light weight and lighter-than-usual price! Of course many amateurs, myself included, already have a high current DC supply so it's senseless to pay 'over the odds' for something you already may have. It's also very handy to be able to 'stick the rig in the car' for a spot of portable or even



mobile operation when out and about for the day, an optional mobile bracket being available for the (relatively large) rig.

It comes with a built-in automatic ATU as standard, which as well as being useful for home location use can also be handy in 'fine tuning' that portable dipole slug between a couple of trees, or for a slightly off-frequency mobile whip when you need to QSY a few kHz away from the QRM on the move. The ATU memorizes the last frequency for each band to save time when band-hopping, and even works on 160m. Two aerial sockets are fitted, and you can set the rig to automatically select either depending on the band you're using.

As you'd probably expect, the rig covers all the usual WARC HF amateur bands, together with a general coverage receiver covering 500kHz-29.995MHz (it actually tunes down to 30kHz). It gives you 100W out on SSB, CW and FM, and 40W on AM (if you really must), with a variable power reduction control down to 10W output. SSB, AM and FM receive filters come fitted as standard, and 250Hz or 500Hz CW filters for the second

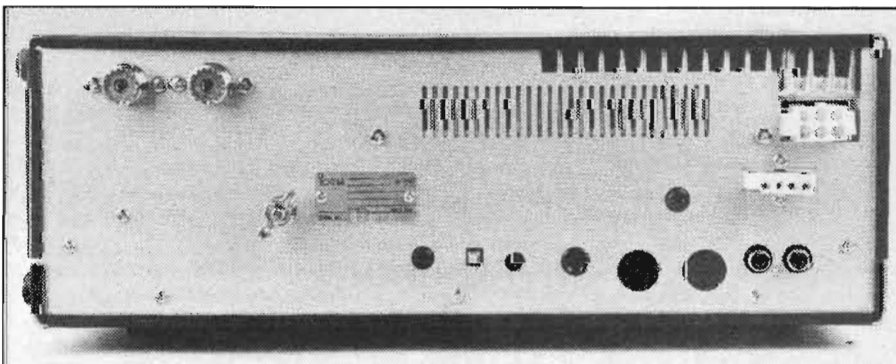
and/or third IFs are available as options.

For interference rejection (because as we all know our bands sometimes *do* get crowded!), the set offers passband tuning which can be adjusted to 'bring in' one side of the selectivity curve, to reduce the QRM from that adjacent station for example. The set also offers a tunable audio notch filter, although this doesn't reduce the strength of interfering carriers and the like it can help in giving your ears the occasional rest from annoying heterodynes.

CW reception uses the fitted SSB filters, but if you add both optional CW filters you can get the advantage of passband tuning here as well. Full break-in together with an internal electronic keyer are fitted, and QRO freaks can add the full break-in IC-4KL linear (at a price!) for greater QRM-busting potential (I have to stick with my homebrew 3-500Z amp). SSB users can get some help in punching through the QRM without a linear with the built-in speech compressor, and a switchable internal preamp or 20dB attenuator can be used when the need arises. An all-mode squelch completes the lineup, this being handy for example for when you're listening out on a quiet band such as the FM section of 10m.

## Tuning

A nicely large flywheel-weighted knob lets you tune around, and a direct-entry keypad lets you tap in whatever frequency you'd like to QSY to. Computer users can add an optional interface to control the set from an RS-232 port with suitable software (there's plenty around nowadays). 101 memories in total are provided, and the keypad doubles as a 'band change' pad. Each



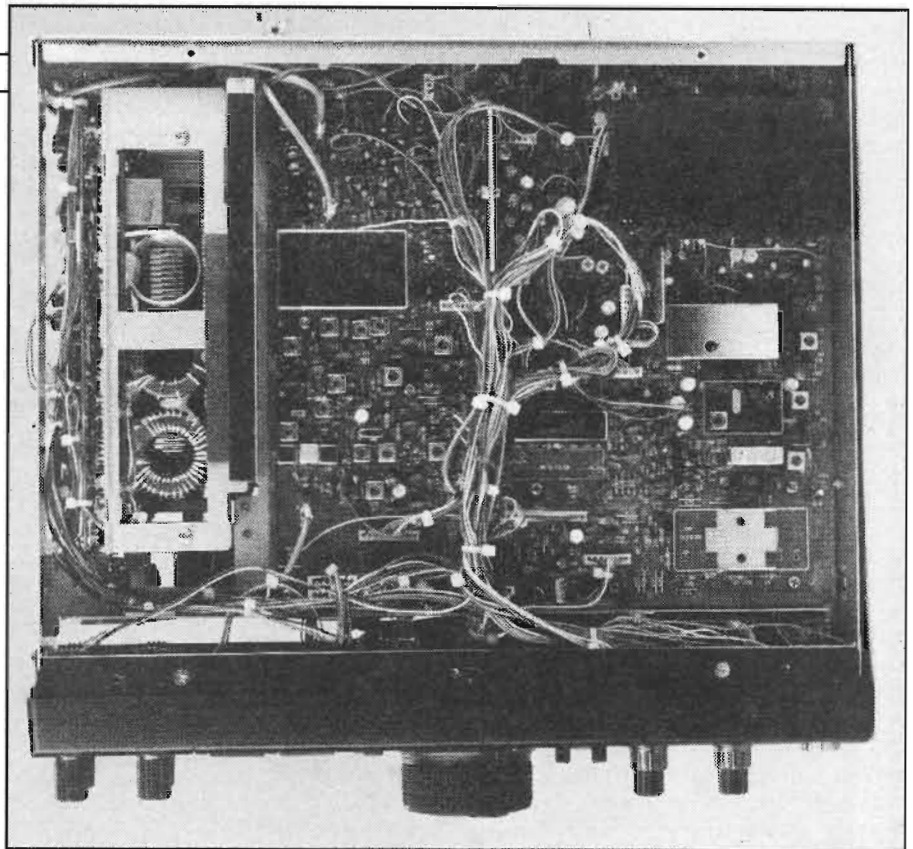
band 'memory' can contain two frequency/mode settings, for example repeated presses of the '3.5' button can switch you alternately between the SSB and CW sections of 80m if you wish. As well as this, five 'memo pad' temporary frequencies can be stored by a press of the 'MP-W' button, repeated presses of the 'MP-R' button then cycle through these, great for when first tuning around a band or simply for quickly switching between frequencies.

## On the Air

My first impressions of the set after connecting up and switching on, were that it was very easy to use, and that tuning around and between the bands used sensibly placed buttons, again very easy to operate. The tuning knob had a smooth 'feel' to it, although I found the small 'tension' adjustment for this didn't seem to do very much. The five 'memory pad' frequencies were extremely handy, and I later found that I could extend these to ten channels using the rig's 'set' mode. Split frequency DXing was likewise a delight to operate using the rig, a small separate frequency display showing the 'split' frequency in use, and a further XFC 'transmit frequency check button' allowed me to check whenever there was a gap in the 'pileup'. The RIT (and XIT, transmit frequency shift) range was limited to only 1.25kHz, and although this could be extended to +/-2.5kHz this was still too restricted for the common 'listening 5 up' approach, hence I found I was using 'split' mode rather more often than usual!

For switching between bands, I found the twin aerial sockets quite handy - I normally use a manual coaxial switch between my 40m/80m trap dipole and my 20m-10m aerial, although for 'true' DXers with a variety of aerials a further 9-way automatic remote coax switch is also available as an option from Icom. The auto-ATU was quick in operation, probably because it had 'memorized' the right setting for each band as I switched around. The slight 'whirr' on changing bands showed it was tuning to the last-known setting of each band in turn so further adjustment was just a quick automatic 'fine tune'.

As for any negative points, well I tried searching for the RF gain control, but found there wasn't one! The frequency display was, in my view at least, rather overpowering compared to the rest of the front panel of the set, it was too bright with no user 'dim' function (although I'm told this can be internally adjusted with an 'engineering' preset) and the frequency display was simply just too big compared with the rest of the fascia (see this month's front cover).



But what about the important aspect, that of hearing things through the QRM? I found that on tuning around, strong stations that I knew to be 'clean' signals came and went cleanly also, without the slight 'splitching' I sometimes find - showing the set's receiver was similarly 'clean'. I was impressed with the very 'tight' bandwidth of the rig, and together with the passband tuning this helped me out on many occasions. I thought it a pity that the notch control was just an audio notch rather than a true 'IF' notch, as this would have been far more useful.

On air, the set performed well on all modes (apart from a rather overgenerous S-meter on FM which seemed to read S9 plus or nothing) and I had many pleasant hours on-air with the rig. The supplied mic worked fine on-air, although my own Icom SM-10 microphone really showed off the good TX quality. I used the rear panel accessory socket for data modes using AFSK on SSB, remembering to unplug or 'switch off' the mic when using this to save 'two lots' of audio being transmitted as the set didn't have facility for switch to a 'data' mode.

## Technicalities

A DDS (Direct Digital Synthesizer) is used within the set for frequency control, tuning the rig in selectable 10Hz or 20Hz increments across the tuning range. This also gives quite a degree of flexibility, and you can indeed select virtually any 'quick tuning' step you'd like for use with the up/down buttons, the fast DDS switching time also no

doubt helping give fast CW QSK break-in and fast TX/RX changeover for AMTOR and the like.

Inside, a number of large PCBs are arranged around a metal chassis, an internally mounted fan keeping the PA cool. The automatic ATU is housed in a separate sub-assembly within the transceiver case, this having a claimed matching range of 16.7-150Ω unbalanced and an insertion loss of less than 1dB.

The receiver uses a triple conversion superhet, a high first IF of 69MHz being used for 'roofing' selectivity followed by further IFs of 9MHz and 455kHz which are used on all modes. Filter bandwidths of 2.1kHz (CW/SSB), 6.0kHz (AM) and 12kHz (FM) are provided, plus optional 250Hz and 500Hz filters for CW. With the optional 500Hz bandwidth installed, Icom claim a 3rd order IMD range of 105dB with the preamp off and 3dB S+N/N.

## Lab Results

The thing that impressed me was the excellent filter 'skirt' responses of the set, I kept increasing the signal generator level and the set kept rejecting this as I slowly tuned away, without the 'bubbles' and 'clicks' I'd have expected - very good! The strong signal performance with signals further removed was also very good indeed, although coming within 10 or 20kHz showed that the roofing filter was having a good effect on these. I measured over 103dB IMD range on SSB with 100kHz/200kHz spacing, which impressed me somewhat.

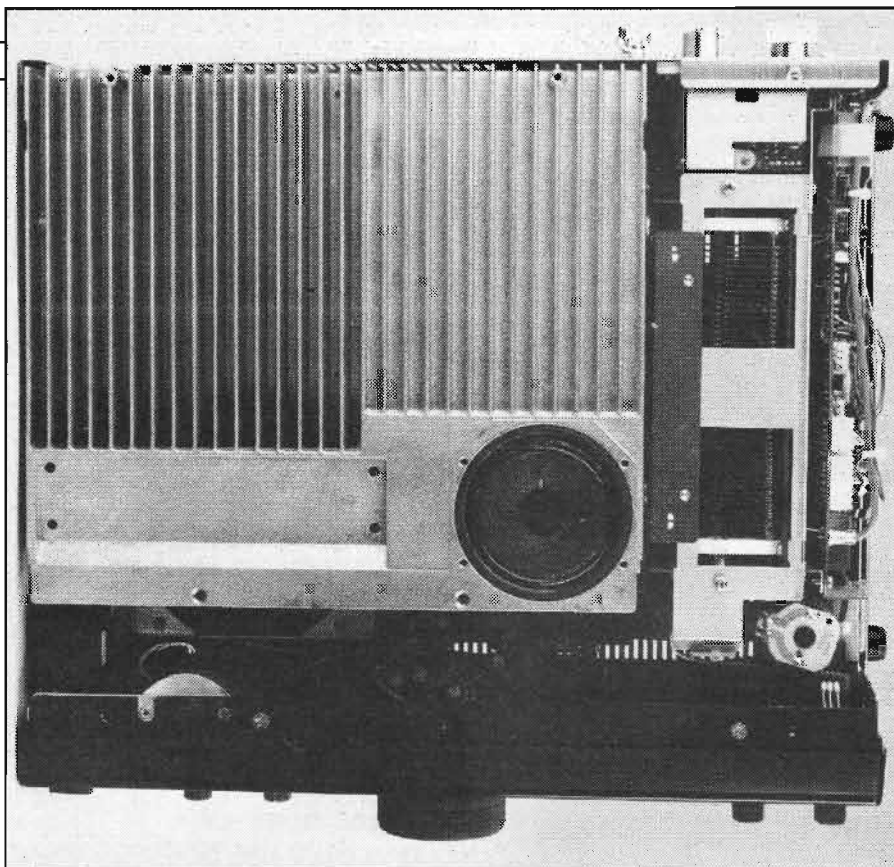
On transmit, the PA linearity was quite reasonable for a solid state PA, and switching in the built-in processor acted as a useful 'overdrive' prevention actually cleaning the transmitted signal up over that of a 'shout into the mic' type overdrive.

### Conclusions

Quite a reasonable performer for a set in this price range, although don't forget you'll need a 20A 13.8V DC supply to power it. The IC-737 has quite a few operating 'convenience' features such as the quick-recall 'memo-pad' frequencies and easy split frequency operation, the built-in ATU also being handy, although it lacked one or two 'niceties' I'd have liked, such as an RF gain control and IF notch. But overall I was very pleased with how it coped both on the bands as well as in the lab, I couldn't fault it here at all.

*My thanks go to Icom (UK) for the loan of the review transceiver*

### LABORATORY RESULTS:



#### RECEIVER:

*All measurements carried out in standard SSB mode, with attenuator and preamp off, unless stated.*

Sensitivity;			
Input level in $\mu\text{V}$ pd required to give 12dB SINAD;			
Freq. MHz	SSB/CW	AM	FM
1.8	0.33	0.87	0.56
3.5	0.32	0.79	0.52
7.0	0.23	0.64	0.39
10.1	0.25	0.63	0.42
14.0	0.26	0.75	0.47
18.1	0.22	0.60	0.41
21.0	0.22	0.61	0.41
24.9	0.26	0.73	0.47
28.5	0.30	0.80	0.53
29.5	0.30	0.81	0.54

S-Meter Linearity		
Measured at 14.25MHz;		
Indication	Sig. Level	Rel. Level
S1	4.72 $\mu\text{V}$ pd	-20.7dB
S2	5.83 $\mu\text{V}$ pd	-18.9dB
S3	7.52 $\mu\text{V}$ pd	-16.7dB
S4	9.00 $\mu\text{V}$ pd	-15.1dB
S5	12.0 $\mu\text{V}$ pd	-12.6dB
S6	15.7 $\mu\text{V}$ pd	-10.3dB
S7	21.4 $\mu\text{V}$ pd	-7.6dB
S8	31.3 $\mu\text{V}$ pd	-4.3dB
S9	51.0 $\mu\text{V}$ pd	0dB ref
S9+20dB	454 $\mu\text{V}$ pd	+19.0dB
S9+40dB	3.96mV pd	+37.8dB
S9+60dB	49.6mV pd	+59.7dB

Image Rejection;	
Increase in level of signal at the first IF image frequency, over level of on-channel signal, giving identical 12dB SINAD signal;	
Freq. MHz	Image Rej.
1.8	100.5dB
3.5	101.4dB
7.0	105.8dB
10.1	101.0dB
14.0	98.1dB
18.1	100.4dB
21.0	107.2dB
24.9	>125dB
28.5	>125dB
29.5	>125dB

Selectivity;			
	SSB/CW	AM	FM
-3dB	1.97kHz	6.23kHz	9.17kHz
-6dB	2.20kHz	7.97kHz	13.28kHz
-20dB	2.65kHz	9.66kHz	18.54kHz
-40dB	2.98kHz	11.75kHz	21.10kHz
-60dB	3.17kHz	14.19kHz	22.59kHz
-80dB	4.25kHz	15.99kHz	22.67kHz

Blocking;		
Measured on 21.4MHz as increase over 12dB SINAD level of interfering signal, unmodulated carrier, causing 6dB degradation in 12dB SINAD on-channel signal;		
	Preamp Off	Preamp On
+/-50kHz;	106.7dB	105.8dB
+/-100kHz;	108.2dB	108.6dB
+/-200kHz;	109.7dB	109.4dB



**3rd Order Intermodulation Rejection;**

Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, measured at 21.4MHz;

	Preamp Off	Preamp On
10/20kHz spacing;	75.5dB	72.6dB
20/40kHz spacing;	89.7dB	87.3dB
50/100kHz spacing;	101.7dB	98.3dB
100/200kHz spacing;	103.3dB	99.4dB

**S-Meter S9 Level;**

Freq. MHz	Sig. Level
1.8	55.8µV pd
3.5	53.7µV pd
7.0	45.6µV pd
10.1	48.7µV pd
14.0	52.8µV pd
18.1	44.5µV pd
21.0	45.3µV pd
24.9	46.4µV pd
28.5	50.6µV pd
29.5	51.9µV pd

**Preamp/Attenuator**

Tested at 14.25MHz;

Preamp Gain;	19.5dB
Attenuator;	19.9dB

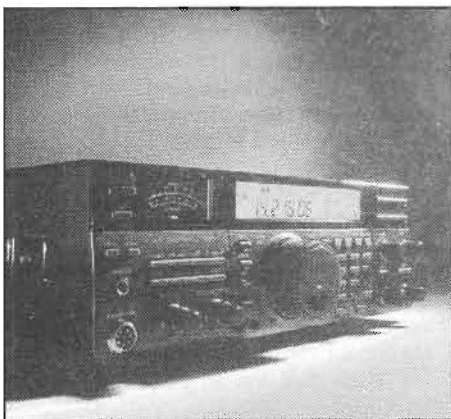
**TRANSMITTER;****TX Power/Current Consumption;**

Powered from stabilised 13.8V DC DC lead

Freq MHz;	Power/Current;
1.8	107W (16.4A)
3.5	105W (16.1A)
7.0	99.6W (16.2A)
10.1	98.3W (16.1A)
14.0	98.2W (16.7A)
18.1	98.1W (17.9A)
21.0	98.2W (16.4A)
24.9	99.4W (16.3A)
28.5	99.6W (16.3A)
29.5	99.5W (16.2A)

**Harmonics;**

Freq. MHz	2nd	3rd	4th	5th	6th
1.8	-60dBc	-55dBc	<-80dBc	<-80Bc	<-80Bc
3.5	<-80dBc	-51dBc	<-80dBc	-55dBc	<-80dBc
7.0	<-80dBc	-59dBc	<-80dBc	-64dBc	<-80dBc
10.1	-54dBc	-50dBc	<-80dBc	-57dBc	<-80dBc
14.0	-56dBc	<-80dBc	<-80dBc	-58dBc	<-80dBc
18.1	-57dBc	-51dBc	<-80dBc	<-80dBc	<-80dBc
21.0	-68dBc	-56dBc	<-80dBc	<-80dBc	<-80dBc
24.9	-60dBc	-56dBc	<-80dBc	<-80dBc	<-80dBc
28.5	<-80dBc	-59dBc	<-80dBc	<-80dBc	<-80dBc
29.5	<-80dBc	-60dBc	<-80dBc	<-80dBc	<-80dBc

**SSB IMD Performance;**

Measured on 14.25MHz with a two-tone AF signal, results given as dB below PEP level;

Order	3rd Order	5th Order	7th Order	9th Order	11th
ALC Onset	-31dB/ -32dB	-41dB/ -44dB	-50dB/ -50dB	-51dB/ -54dB	-59dB/ -58dB
Mid ALC	-17dB/ -18dB	-19dB/ -32dB	-34dB/ -35dB	-39dB/ -40dB	-45dB/ -46dB
Proc On	-24dB/	-30dB/	-34dB/	-40dB/	-46dB/
Mid ALC	-23dB	-30dB	-37dB	-46dB	-50dB

# Next Month In HRT

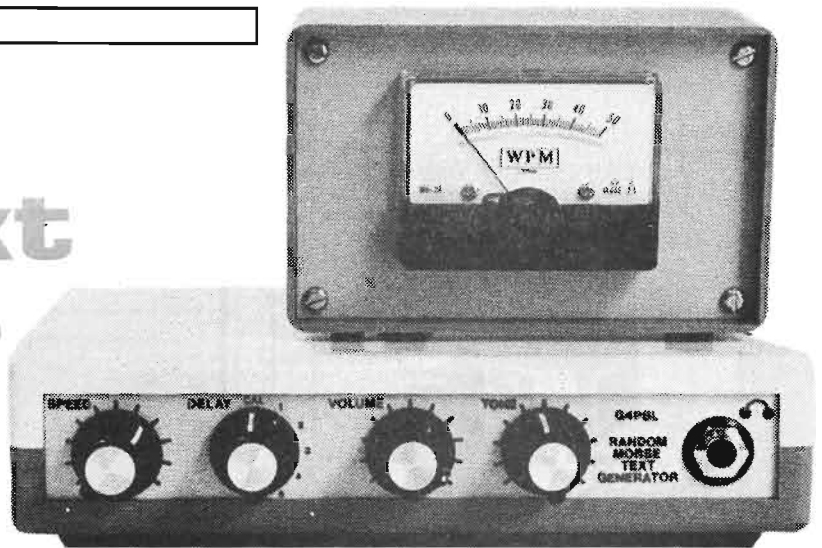
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Planned articles subject to editorial space being available.

# Random Morse Text Generator Speed Meter



*Terry Grice G4PSL, constructs an add-on speedmeter for the Random Morse Text Generator*

If you've built, or are thinking of building, the Random Morse Text Generator (RMTG) published in the October and September 1991 issues of HRT, here's a matching speedmeter for your project! If you missed these issues then photocopies are available from the ASP Photocopy Service at the Hemel Hempstead office (see panel at end of 'Free Readers Ads' for details). This generator is very useful for Morse training for the Class A test, and this project shows the exact speed in one WPM increments.

## Block diagram

Refer to the block diagram shown in Fig.1. The circuit is based on the LM2917 tachometer IC which is a type of D/A (digital to analogue) converter. The ongoing 0V to 5V digital waveform present on the A0 address line of the RMTG EPROM is used to drive the tachometer input. The output voltage obtained is in direct proportion to the input frequency, so halving the input frequency will half the output voltage, and doubling it will double the output voltage. The output voltage sources a current through a 50µA moving coil meter, and as this device operates in a linear manner, coil current is repre-

sentative of input frequency.

The LM2917 obtains its supply voltage from the RMTG power source which can be either 9V DC or 12V DC for respective battery and external PSU operation. The tachometer IC has a built-in 7.56V Zener diode for regulation, but after a period of use the RMTG battery voltage will drop below this level so a 5V DC regulator followed by a 5V to 12V DC to DC converter have been included. The circuit diagram is given in Fig. 2.

## Circuit description

Power derived from the RMTG power source is connected to the PCB via SK1/PL1. C1 and C2 decouple the input of REG1 which provides a stable 5V dc output. For regular battery operation an LM2950 micropower regulator is recommended which has a quiescent current drain of 75µA and a drop-out voltage of only 50mV. The more common 7805 regulator may be used with the above values increasing to 3.5mA and 2V respectively. C3 is essential to regulator stability when using the LM2950 option. IC1 is a 5V to 12V DC to DC converter which provides the 12V dc supply for IC2. R1 is a bias resistor for the tachometers internal

7.56V Zener shunt regulator.

The regulator unipolar square wave oscillation found on pin 10 of RMTG Eprom IC3 is connected via SK1/PL1 to C4 which, in conjunction with R4, produces a bipolar differentiated signal on input pin 2 of IC2, this being necessary for correct D to A conversion. The output voltage for a given input signal frequency is controlled by R3 and C5 in the equation;  $V_0 = 7.56 \times Fin \times R3 \times C5 \text{ volts}$

The values of R3 and C5 have been calculated to provide a 1V DC output for an input period, t, of 100ms, this being equivalent to 12 WPM and a 4V DC output for period, t, equal to 25ms at 48 WPM. C6 controls the output response time and RV1 is a multi-turn preset potentiometer which is used to calibrate ammeter M1. Adjustment is explained under calibration.

## Construction

The full-sized PCB artwork is given in Fig. 3 and the PCB layout in Fig. 6. All PCB holes are 0.8mm except for those required for pin connections, and those for RV1 which need to be 1.0mm diameter. PCB assembly is straightforward but check the orientation of components IC2, C1, C3, C6, and REG1.

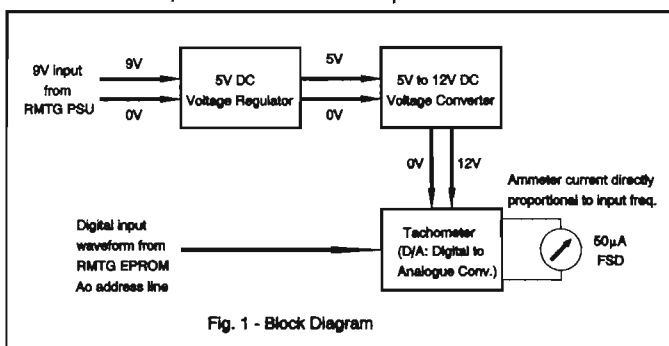


Fig. 1 - Block Diagram

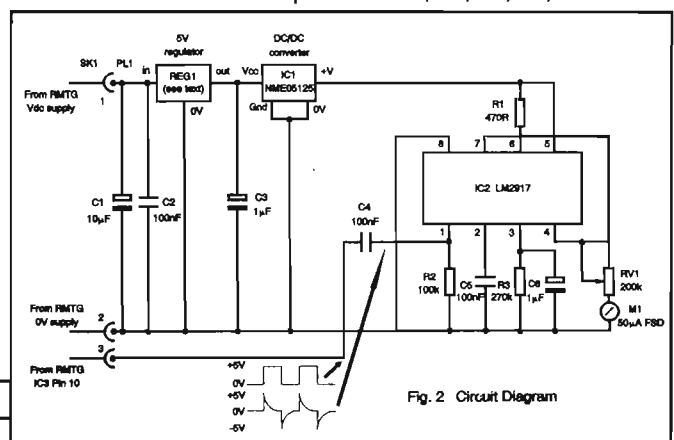
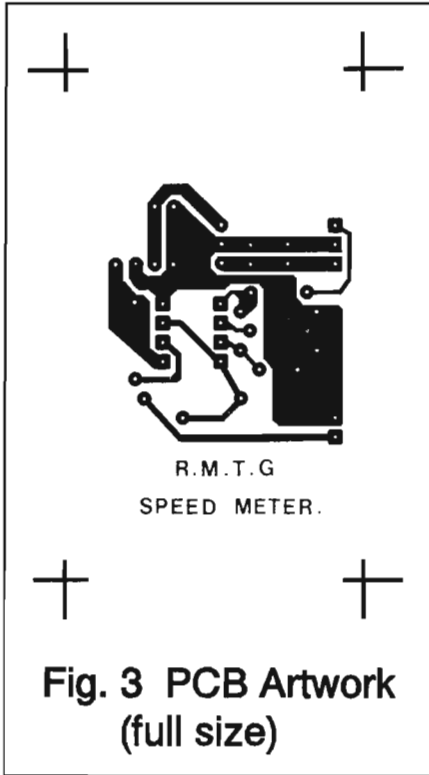
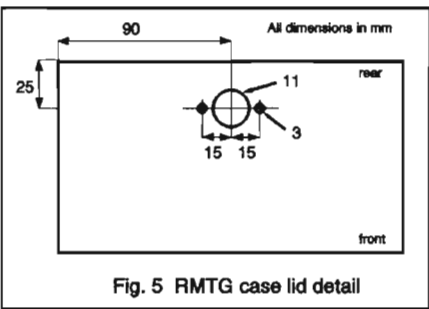


Fig. 2 Circuit Diagram

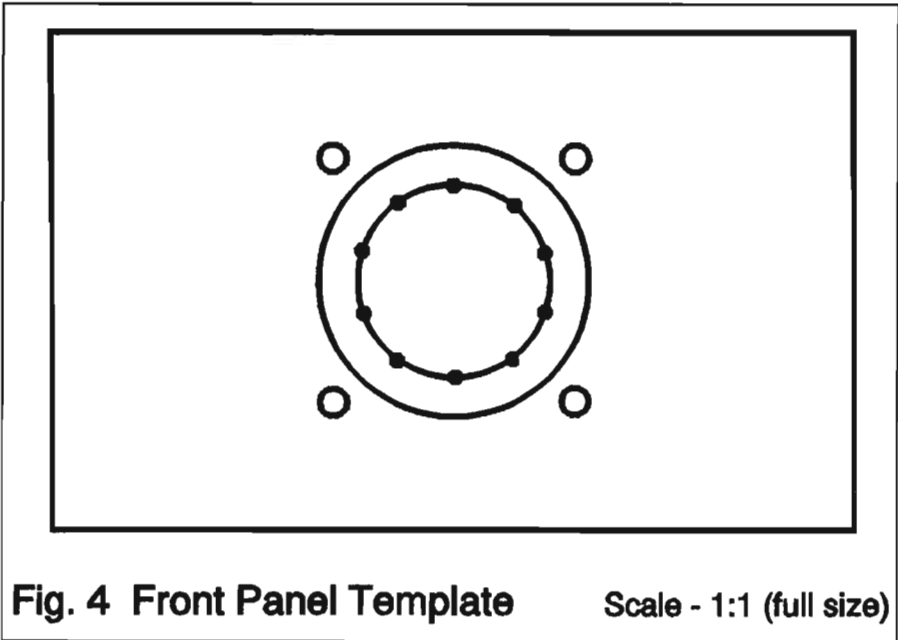


**Fig. 3 PCB Artwork (full size)**

Note that the four pins protruding from IC1, the DC/DC converter, are offset and it is the side that they are nearer to, that faces inboard towards IC2. Check the completed PCB for solder bridges and dry joints. A 12mm length of cable is sufficient for the link between the speedmeter and the RMTG, 3-core 7/0.2 being suitable.



**Fig. 5 RMTG case lid detail**



**Fig. 4 Front Panel Template Scale - 1:1 (full size)**

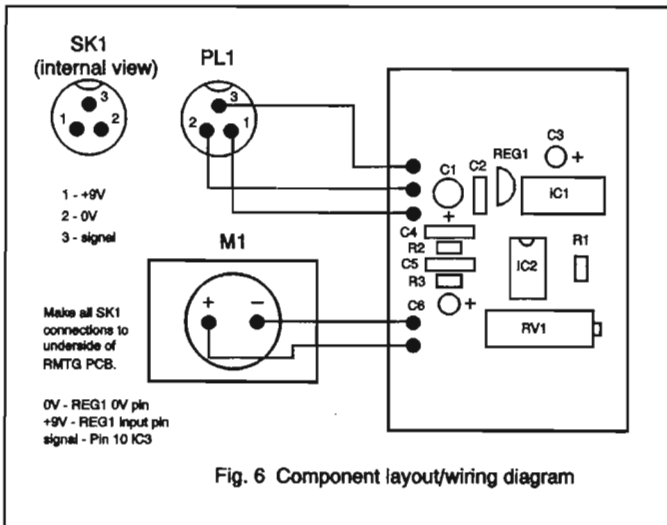
Fig. 4 is shown full scale and can be used as a template for drilling the case lid to support the ammeter. Attach this to the lid and spot through the ten holes on the inner circle. Drill each hole 4mm diameter and join the holes with an Abrafile or an old pair of stout cutters so that the centre is removed. File to the shape of the outer circle using a half-round file. The four meter fixing holes need to be 3mm diameter, use these to fit the meter to the front panel. The lid of the RMTG should be drilled as shown in Fig. 5, ensure that these holes are placed along the rear of the lid as this only fits in one direction. Drilling is completed by placing a hole in the middle of the back surface of the speedmeter box with the diameter being dependant on cable and grommet used. Refer again to Fig. 6 to carry out overall assembly.

### Calibration

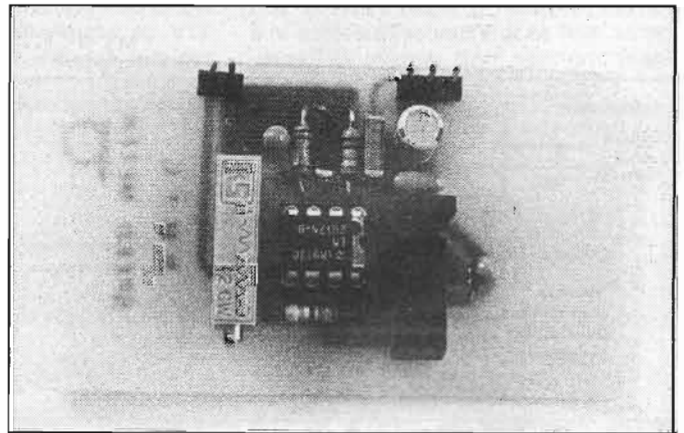
Calibration can be carried out with or without an oscilloscope, if you have one available then connections can be

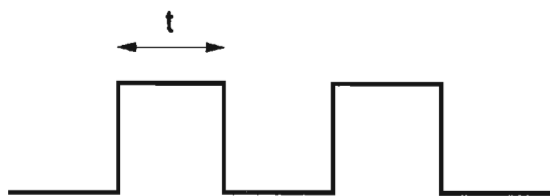
made to SK1 on the RMTG lid. Fig. 7 shows period timing,  $t$ , for the speed settings. The Maplin meter used in this design has an accuracy of 2% at FSD, but it may be preferable to calibrate the meter at a mid-range setting of 24 WPM, in which case the speed control should be adjusted to display a 50ms signal period on the oscilloscope. Taking care not to readjust the speed control, remove the oscilloscope lead from SK1 and connect the speedmeter, having first checked that the meter is set to zero. Adjust the multi-turn potentiometer RV1 until the meter reads  $24\mu\text{A}$ , i.e., 24 WPM.

To calibrate the meter without the use of an oscilloscope proceed as follows; take a spare 20 pin IC holder and common pins 10 through to 19, this is achieved by linking the pins with tinned copper wire soldered to the top side of the holder. Remove IC2, the 74HC573, from the RMTG PCB and replace with the assembled IC holder, observing the polarity. Switch on the generator and confirm that the output alternates between the Morse characters K and CT



**Fig. 6 Component layout/wiring diagram**





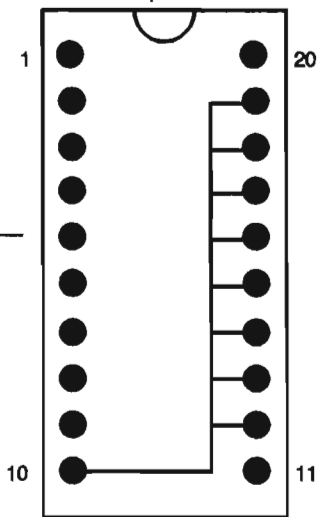
RMTG EPROM address line Ao

t = 100mS = 12WPM  
 t = 50mS = 24WPM  
 t = 25mS = 48WPM

FIG. 7 Calibration Waveform

continuously. Adjust the speed control until the Morse letter K is produced nineteen times in a one minute period - ignore the interleaving CT. This corresponds to a speed of 24 WPM so adjust RV1 until the meter reads 24µA. Switch off and return IC2 to the RMTG PCB. This completes the calibration procedure and the speedmeter is now ready for use.

Finally it should be noted that the meter will display true 'dot rate' at all times, that is, the speed at which individual words are being sent regardless of the interword timing set by the delay



20 pin IC socket - top view

Fig. 8 Calibration socket

**Parts List;**

**Resistors**, all 1/4W 5% carbon film;

- R1 470R
- R2 100k
- R3 270k
- RV1 200k multi-turn preset

**Capacitors;**

- C1 10µF/16V electrolytic
- C2 100nF ceramic
- C3, C6 1µF/35V tantalum
- C4, C5 100nF polyester

**Semiconductors;**

- IC1 NME0512S DC to DC converter
- IC2 LM2917 tachometer
- REG1 7805 or LM2905 voltage regulator

**Miscellaneous;**

- M1 50µA meter
- SK1 min. DIN socket.
- PL1 min. DIN plug
- Case

control. This is consistent with setting the RMTG to a desired speed with some applied delay, and reducing the delay setting until reception at the standard interword spacing is achieved.

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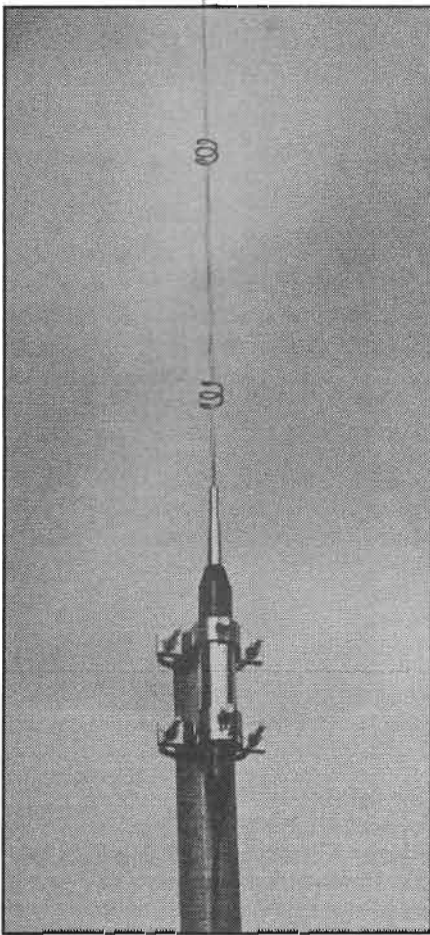
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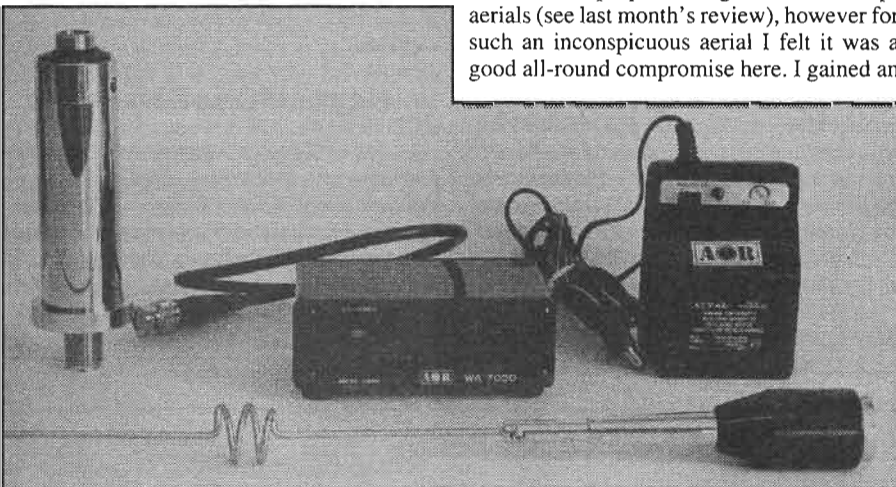
WA 7000 Aerial INTERNATIONAL

## AOR's super-wideband base receiver aerial, reviewed by Chris Lorek



The unobtrusive WA7000

### An indoor unit with a plug-in wall adapter powers the aerial preamp



In the June 92 issue of Scanners you'll have seen the WA5000 from AOR, and I'm told that the new WA7000 has now replaced this. Covering a staggering 30kHz-2,000MHz, it's a slimline base aerial, almost resembling a mobile multiband 'whip', and I'm sure it would also serve this type of purpose well for wideband receive use on the move. Within the metallic base of the aerial is a MOS power FET amplifier, this coming into use over the LF/HF range of 30kHz-30MHz with a gain of 6dB provided. For VHF/UHF use, this preamp is effectively bypassed, so preventing any problems of receiver overload.

The aerial is supplied with virtually everything you'd need for installation and use, including 15m of coax cable terminated with coax connectors at each end, and a short 'stub' pole which can be used to mount the aerial onto any 25-60mm diameter mast. The aerial preamp is powered through the coax cable from an indoor unit, this is a small unit fitted with a switch marked simply '0.1-30MHz' and 'above 30MHz'. A patch cable is supplied to connect your receiver to the unit, which in turn is powered from a supplied plug-in wall adapter providing 12V DC.

In use, the system worked well, with good signals received on VHF/UHF but without the problems I often experience on VHF due to amplified 'wideband' outdoor aerials. I live in a rather RF-congested area with many strong local signals present together with the weaker signals from the nearby international airport and international shipping port. The combination of these often give my receivers a 'hard time', although it proves very handy for on-air test purposes!

I found on the lower HF frequencies, medium wave for example, that I could (naturally) obtain better reception with either a long wire or the purpose-designed AOR 'loop' aerials (see last month's review), however for such an inconspicuous aerial I felt it was a good all-round compromise here. I gained an

*From the  
Editor's  
Desk*

### £3,000 fine for 'scanner' dealer.

In last month's issue, you'll have read that Mr. Martin Fisher of Development Products was found guilty of ripping the public off, by claiming the radios he was selling were 'scanning' receivers, which of course they weren't. Regular readers will of course know this from our 'expose' of this in the July 91 issue, but not everyone reads *Scanners*. We've now received a further update from the Trading Standards Office of Kent County Council (who we helped by providing evidence), and you'll possibly be glad to hear that Martin Fisher has been fined £3,000 following the action in Medway Magistrates Court.

The 'hue and cry' by some of the press seems to have died down now regarding the illegal use of scanners, especially for 'phone tapping', although we still get the odd newspaper or two contacting our office, trying to seek 'sensationalism'. A few calls were made in the reverse direction however, in telling various papers the facts to correct their often totally wrong (imagined?) stories, and hopefully by now some may have learned their lesson in getting their facts straight! I really am surprised that the Radiocommunications Agency haven't 'cracked down' on some of these, one or two even printed the details of the conversations they (illegally) listened into! Maybe *that's* why it's gone quiet? (!).

impression of 'all-round quality' with the aerial system, and for those who'd like an unobtrusive base aerial the WA7000 should provide exactly this.

The WA7000 system is priced at £129, and my thanks go to AOR UK Ltd. (Room 2, Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbys. DE4 4BG, Tel. 0629 825926) for the loan of this for review.

# Phoenix 2m Beam Review

*Chris Lorek G4HCL tests a beam that's made to last all weathers*

I'd seen the adverts for Phoenix aerials, with their claims of high construction quality and the like, but it was only when I actually saw them at a local rally did I appreciate how well made they really were. Within a week, a review sample on loan arrived at my door!

I'd chosen the Phoenix 7 element 2m beam, with the optional 7 element 'extension' to make it into a 14 element long yagi. This arrangement can be a very handy feature, where as your interest grows (or indeed your partner and/or neighbours become more used to the resultant 'aerial farm') you haven't wasted your money on a small beam, just add an extension!

The beam I received wasn't a lightweight affair, and looking down the tubes showed why - no less than 10 gauge wall thickness aluminium was used for the boom with 16 gauge wall thickness elements. All these were made from round, seamless aluminium, which of course gives less wind resistance than square section. The stainless steel bolts, nuts, and spring washers supplied make sure the lot should stay together as well!

## Putting It Together

I assembled the 7 element first, which used a single boom, 2.79m long, and came with a certificate to the effect that it had been assembled and tested prior to packing. The accompanying instructions were excellent, and it took me around 20 minutes, significantly less than I'd planned, to fully assemble the beam. I found that on a couple of the elements, the supplied bolts were just that bit too short to allow the accompanying spring washers to be used, but on querying this with Phoenix I was told these had been packed in error, the aerial having been factory tested with 'quick release' bolts, and I'm sure that replacements would have been sent had I requested them.

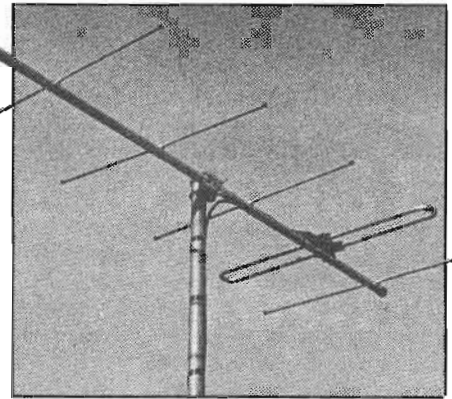
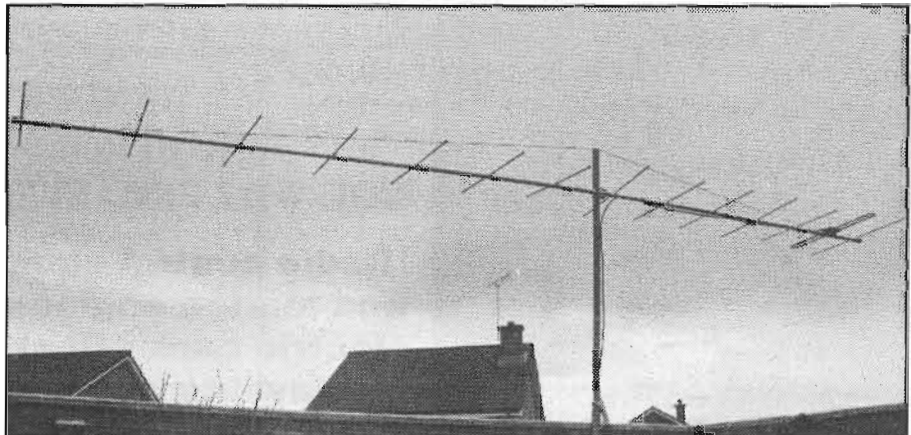
The driven element was a complete weatherproof assembly, right down to the moulded-in coax terminated in an N type plug with an accompanying shroud, indeed this element comes with a five year warranty. On looking at the completed aerial, my thoughts were, simply, 'this aerial was designed to last.'

Continuing with the 7 element extension, this came as two further booms each 2.05m long together with a pair of solid aluminium centre jointing sections, and of course seven additional elements and fixing hardware, all built to the same excellent quality as the original beam. A white boom support guy and a pair of boom clips were also provided to prevent the completed assembly 'drooping', although the guy support hook mentioned in the packing list seemed to have gone astray - I used a simple mast clamp instead. Phoenix advised me this was a packing list error, now rectified. Assembling the extension and fitting it to the original beam took me around 30 minutes, the end result being a very solid, 6.89m long beam, that looked like it should cope with whatever the weather could throw at it.

## In Use

So up it went, not just at my house, but also at around 30m above ground level at the exposed site of my local packet node aerial system. And last it did - including the late Jan/early Feb gales where many amateurs lost their beams. Following the review period, when I came to remove the aerial (it was destined for the special event station at Great Ormond St. Hospital) upon inspection I found that although the galvanised boom clamp had started to rust slightly at the edges, the beam itself was in excellent shape.

**The Phoenix 2m beam, with optional 7 element 'extension' fitted, to make a 14 element long yagi.**



**The Phoenix 7 element 2m beam**

As for technical performance, well gain measurement is riddled with all sorts of anomalies, but a quick test using the beam pointed at a reference aerial around 300m away gave around 14-15dB gain over a 2m dipole in the same position, with a horizontal plane -3dB beamwidth of around 35 to 40 degrees. Remember, however, these were for a given installation, and local effects could cause inaccuracies.

## Conclusion

The 2m beam I tested was certainly well made, I really felt it was built to professional, rather than amateur, usage standards. It should certainly last in use, and the performance is what I'd have expected from such a boom length. The Phoenix range isn't cheap, the 7 ele is currently priced at £79.95 with the 7 ele extension at £59.95 (or £129.95 for the two ordered as a 14 ele from the start), plus delivery, but you get what you pay for. I've had problems in the past with elements from other aerials actually falling off, to say nothing of getting bent from heavy birds using them as perches, you won't have that problem with this one!

*My thanks go to Phoenix S.M.D. (0963 34992) for the loan of the review beam.*

# The MTR1 Morse Tutor Kit Reviewed

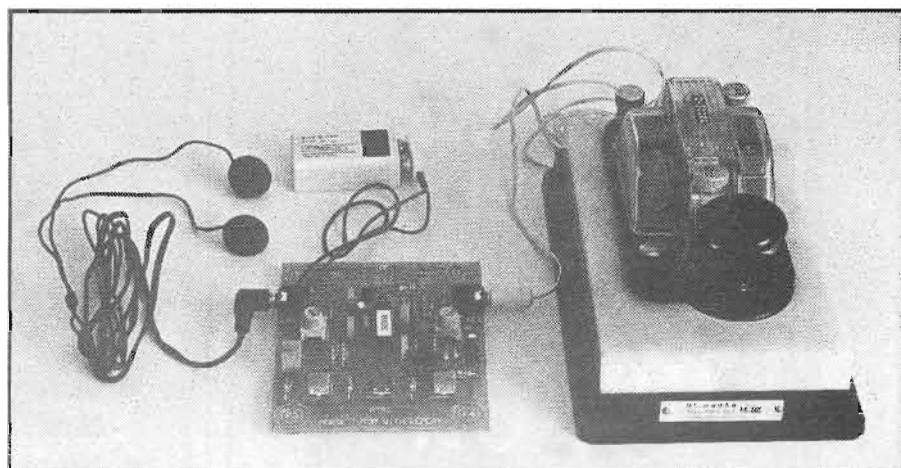
*Steven Lorek reviews the MTR1 Morse tutor kit with replay facilities, from a beginner's point of view*

I'll be 12 years old this year and I'm interested in computers and electronics. I have, however, only used a soldering iron three times recently at school in Design and Technology. I had learned about LEDs, resistors and other simple electronic aspects so I was very excited when my parents asked me if I would like to build a Morse kit with integrated circuits, and I quickly got down to working with a lot of things I'd never even seen before.

## What does it do?

The Morse tutor generates random characters, and you can switch it to send either ten groups of five pseudo-random letters, ten groups of five pseudo-random numerals, or ten groups of mixed letters and numerals.

There are three buttons on the board, two blue and one red. The speed can be varied between 5WPM and 36WPM in 1WPM steps, and is controlled by pressing and holding down the middle button and then pressing either the left or right buttons. The delay be-



tween characters can also be varied, and the pitch of the tone can be adjusted to suit your liking. The last used function (i.e., groups of letters, numbers and so on) as well as the speed are remembered after the battery has been disconnected and reconnected.

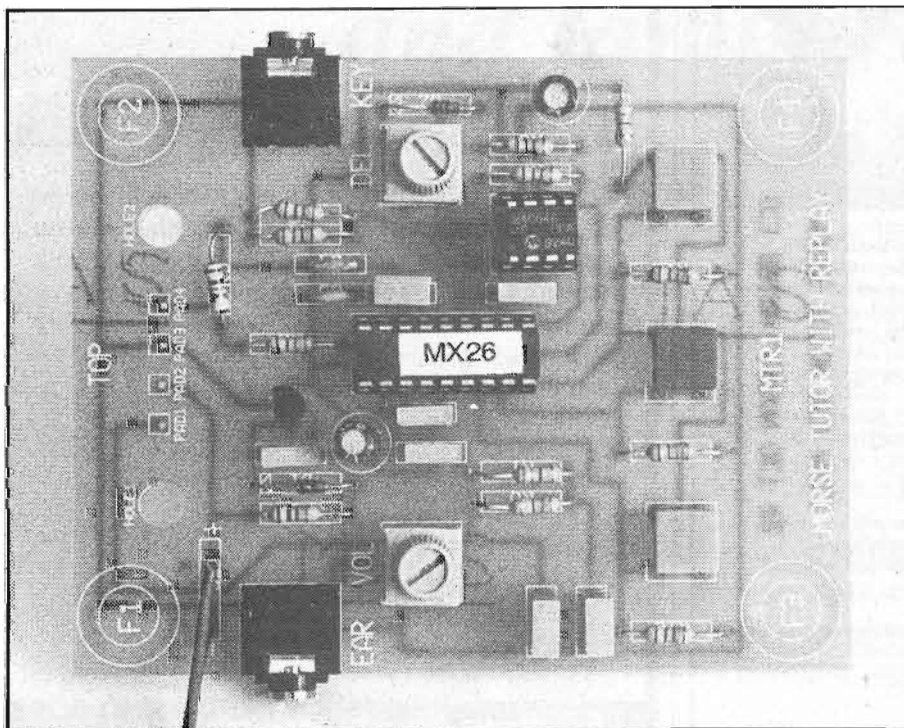
As well as being used as a tutor, it can also be used as a practice oscillator for sending if you attach a 'straight'

Morse key, and it even lets you record your Morse for replay. It has a memory for up to around 250 dots or dashes, which is about one and a half minute's worth of 12WPM Morse.

The kit needs a PP3 battery or a power supply of up to 14V to operate plus a pair of medium or low impedance headphones with a 3.5mm plug and a Morse key. The tutor comes as a PCB with stick-on rubber feet, although I'm sure that you could build it into a case if you wanted.

## Construction

When I opened the packet I was a bit scared that I would not be able to assemble it correctly and would get confused easily, but to my surprise it was very straightforward. The components were sorted into packs of items of similar value and each pack has a label stating the name of what is inside the packet, where on the printed circuit board the components go and one letter from A to Y. As the instructions suggest the components are to be assembled in alphabetical order. It is a very easy kit to assemble and the easy-to-understand 10 page step by step instruction leaflet makes sure you never get stuck, each part has a box that you 'tick' when you've done that step. The leaflet tells you what each component looks like, which are orientation sensitive and which way round to solder them on the PCB if they are, the value of



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**KAM V6.1** - an internal card expansion card for the Kam offering up to 128K ram plus hardware PacTor, real time clock and more. This board should be available by the time you read this ad (now where have you heard that before?).

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each component, and it also suggests the best ways to solder the different components. The instruction leaflet includes the expected assembly instructions, operating instructions, a troubleshooting section and a clear diagram of where everything goes. It also recommended the use of a component bending tool, which is supplied, for the resistors and diodes, but I found that it was easier to use my hands.

### Did it Work?

As I was so anxious to get it working I found that after inspecting the completed circuit I had not fully soldered three joints and had blown up the eight pin chip by putting it in the wrong way round. However, the instruction manual *did* say which way round to attach it,

and to check it after, so I am to blame for this mistake (I didn't ask my parents to check it before I connected the battery because I couldn't wait to try it). After replacing the chip and resoldering the joints it was working well, and I immediately heard the V signal that told you that the kit was on. With the Morse key attached it worked well and the signal was very clear in the headphones I used with it. It was easy to change the speed and so on using the buttons, but it was a bit difficult for my parents to help me because there wasn't enough volume to use a speaker with.

### Add-On Display and Dictionary

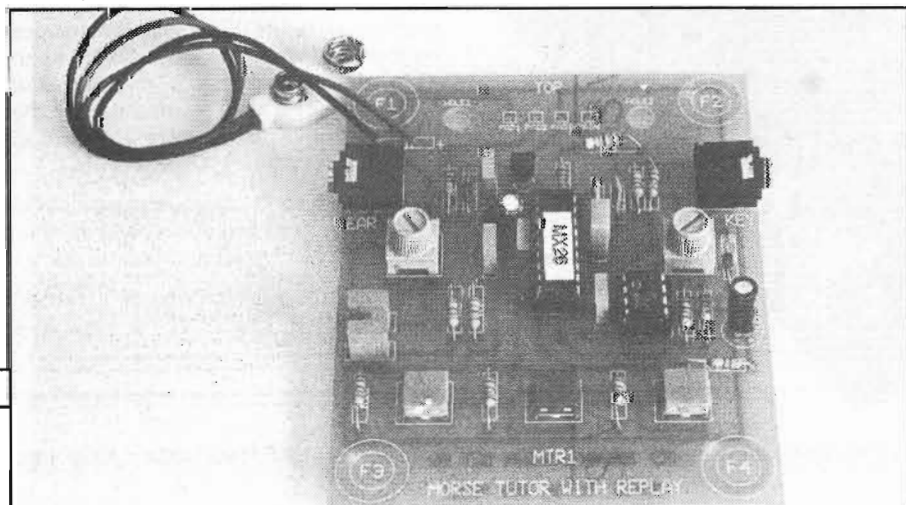
On the board are four expansion holes so future add-on kits can be at-

tached. The MDD1 kit adds a single digit alphanumeric display, which lets you replay one letter at a time on the display rather than in Morse, this will make checking a considerable amount easier for novices. It also adds a 5000 word dictionary, and 150 test passages similar to the new style 'procedural' Morse test. I'm currently building this, and you'll see how I got on in a future issue.

### Conclusions

It took me approximately one hour to complete the construction. The assembly instructions are very comprehensive, but if you still have problems assembling it they offer a 'get you going' service. If, when you have completed the kit it does not work you can send it back with a cheque for £10 and they will return it to you working.

I think the MTR1 is ideal for helping beginners looking for a Class A licence, as well as giving novices practice in soldering and identifying components, and I'm looking forward to using the MDD1 with it. The MTR1 is priced at £29.95 inclusive, and many thanks to Brian Jordan (42 Ben Nevis Road, Birkenhead, L42 6QY, Phone/Fax 051 643 8506) for the supply of the review kit.





# Packet Radio

## —Roundup—

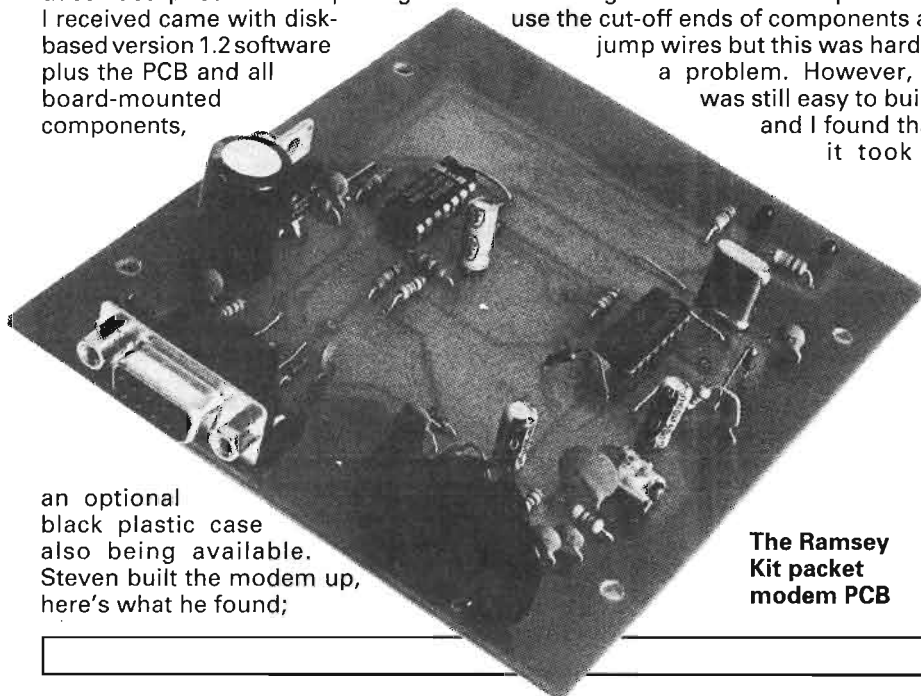


*Chris Lorek G4HCL gets a budding novice packet operator to build the Ramsey packet modem*

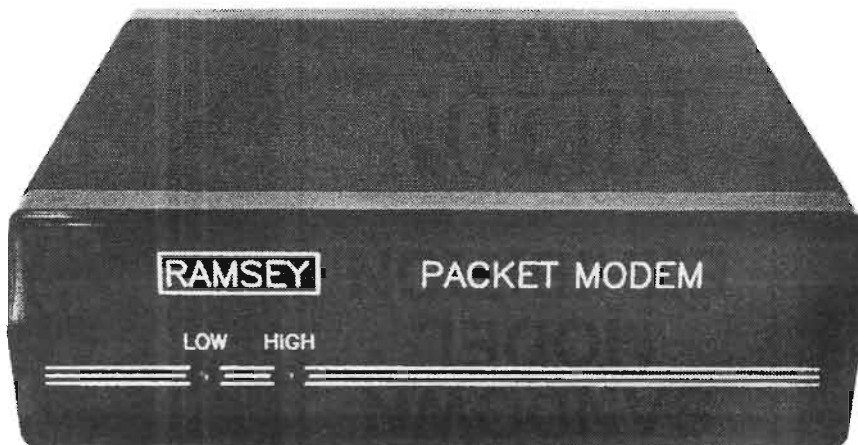
My 11 year old son, Steven, has already been active on packet using my shack computer to type packet messages on to other amateurs. It's perfectly legal (read your licence) and it's a great way in encouraging youngsters in my opinion. Enthused with this, he's currently studying for his novice exam to get on the air himself without me watching over him! When I received a Ramsey packet modem kit to try out, a low-cost 'starter' into the mode, he asked if he could build it, so off he went.

### Ramsey Packet Modem Kit

This is a US-made kit, and uses Baycom software running on an IBM PC clone computer to control an external modem which forms the kit hardware itself. See the write-up in the March 1992 issue of HRT for a description of the superb Baycom system. The UK Ramsey Kit distributors tell me this is one of their best-selling kits, which doesn't surprise me! The packaged kit I received came with disk-based version 1.2 software plus the PCB and all board-mounted components,



an optional black plastic case also being available. Steven built the modem up, here's what he found;



### An optional case adds the finishing touch

"The Ramsey Packet Radio Kit is quite a simple kit to construct. It comes with a 25-page comprehensive instruction booklet, a circuit diagram and a PC disk. Identifying components was quite difficult as there was no identification list, and what there was took a while to understand. This delayed construction slightly, but as soon as I understood it there was no problem. I found that I was slowly wasting a lot of solder because it was running all over the track, but luckily not joining separate components together. You were expected to use the cut-off ends of components as jump wires but this was hardly a problem. However, it was still easy to build and I found that it took 1

hour and 25 minutes to end the construction process. When I ran the program I found I had to pay more money to use it, because it was shareware and didn't come from the kit makers".

The kit is priced at £59.95 plus £2.00 p/p, the optional case at £12.95, with payment for use of the necessary software at DM20 (around £8.00), the total thus being either £69.95 (uncased) or £82.90 (cased) which of course does provide a cost-effective way of getting onto packet. The superb software from the Baycom team in Germany is very easy to use, and the relatively low fee asked for the supplied version is well worth the money. Note that the software, which is essential for the completed kit to operate, is described by Ramsey on the kit packaging as (quote) "FREE BAYCOM TNC software disk included" but within the construction manual as (quote) "Ramsey Electronics neither endorses nor represents itself as a supplier of this user-supported software". The kit is available from the UK Ramsey Kit distributors, Waters and Stanton Electronics (0708 444765).

### Anglo-Scottish Data Group

This group, which was only formed in September 1992, have produced a

**The Ramsey Kit packet modem PCB**

very good system in such a short time. They live in a thinly populated area with lots of large hills, which is certainly challenging! They currently operate packet systems on 4m, 2m, 70cm and planned 23cm, and are adding a much-needed 70cm BBS forwarding link between the GB7BG node in Moota (linked to the GB7BMR BBS), and IOMBBS on the Isle of Mam. The group already have 32 members, with an annual membership fee of £10, and they provide a well-written A4-sized 'Guide' for their members which is produced at no cost to the group. Meetings are held once a quarter with most members travelling many miles (devotion!) to these. You can get further information from Alan G00OY@GB7BMR, to whom my thanks go for the excellent details on the group - thanks for sending these on together with your user guide Alan.

### XR Chipset TNC Modifications

Tony G4CJZ@GB7IMB recently got in touch regarding details of a DCD modification for the XR chipset in TNCs such as the TNC2 and clones. Many packet users, myself included, have heard about such a mod but don't have the details, but after seeking information from other such TNC users Tony has collated the following; change R73 to 180k and fit a 180k in parallel with a 0.001µF across pins 6 and 3 of the XR221. The original R73 was a 470k and the XR221 is U20 on the TNC2 PCB. Tony tells me that he's performed the mod and that it works very well. Another useful mod he received, not related to the DCD mod, was to improve the performance of the bit rate capability to the screen, which is limited at data rates to the screen of over 9600 baud. On the original TNC2 this is performed by an LM324, replacing this with a TL074 or TL084 cures the problem. Thanks, Tony, for sharing this information with readers.

### KAM Plus Controller

I've just received a fax from Kantronics telling me about their new multimode *KAM Plus* with built-in PacTOR, 128K bytes of RAM which can be expanded to 512K, EPROM space up to 1Mb, new user/expert command sets, an enhanced mailbox command set, extended RTTY and AMTOR character sets, enhanced CW with Farnsworth, weighting, and even on-line 'help'

messages for each command. The other news is that existing KAM owners like myself can simply add a plug-in PCB to upgrade to a KAM Plus. I'm now anxiously waiting for the postman to bring me a small package.....! You'll see a review in these pages soon.

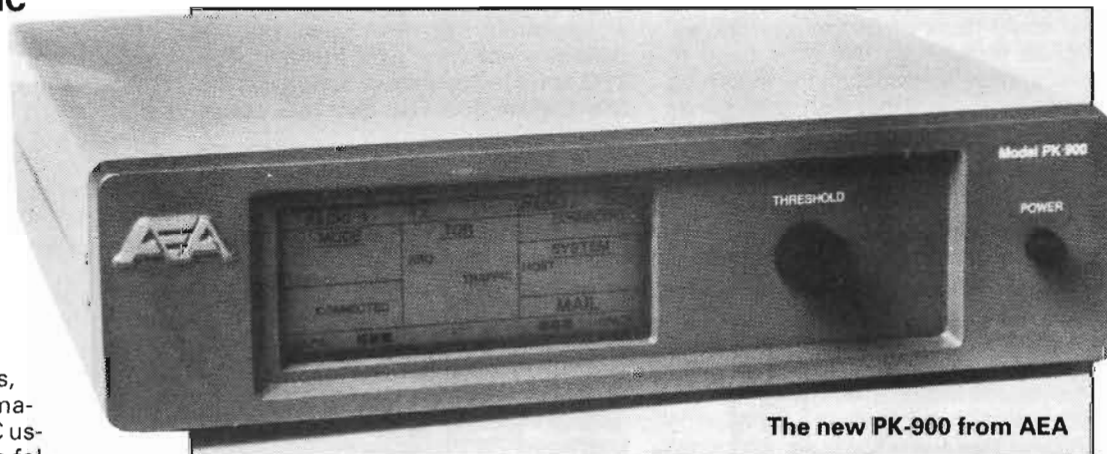
### New PK-900

AEA have also launched a new multimode controller, the PK-900, this having all the 'normal' digital modes together with an AMTOR/Packet maildrop. It uses a large, backlit LCD for status and mode information, including a 20 segment tuning indicator. Options include PacTOR firmware and a 9600 baud modem, and it's expected to sell for just under the £500 mark. I already have a review sample arranged, you'll see this in HRT soon.

tiny side, the new AR210 at 100 x 60 x 22mm might fit the bill! It's based on TAPR TNC-2 upper compatible firmware with an extended character set (not TheNet or NET/ROM compatible though unfortunately), and may if you wish be powered from an internal Nicad battery for true portability. It looks very similar to earlier mini-TNCs from this source, although new connectors are fitted and upgraded software including a mail indicator and real time clock are included, together with 3rd party mail on/off and CWID to comply with UK licence requirements. You can get more details from AOR UK (Tel. 0629 825926).

### CTRL-Z, End of Message

Peter GU1DKD tells us that packet operators on the Channel Islands have now formed the *CIPAC* group, with plans for mainland trunk linking and



The new PK-900 from AEA

### PK-232 PacTOR Upgrades

For AEA PK-232 owners, there's news of two PacTOR upgrades available. The first comes from G4BMK and fits between the RS-232 port and the radio port, this has the advantage of allowing non-mailbox PK-232 owners the use of PacTOR, as well as slow-scan with additional software. I'm told this PacTOR add-on is officially licensed (from SCC who are the developers of PacTOR), and it's available at £79.95 from Siskin (Tel. 0703 207155).

The latest PacTOR add-on alternative is produced by AEA themselves, and comes as two plug-in EPROMs plus what I'm told is a 'substantial amount' (!) of documentation. This one will operate only on PK-232s already fitted with a mailbox, and is priced at £69.95 from AEA dealers (i.e. ICS, Tel. 0903 731101).

### AOR AR210 Mini TNC

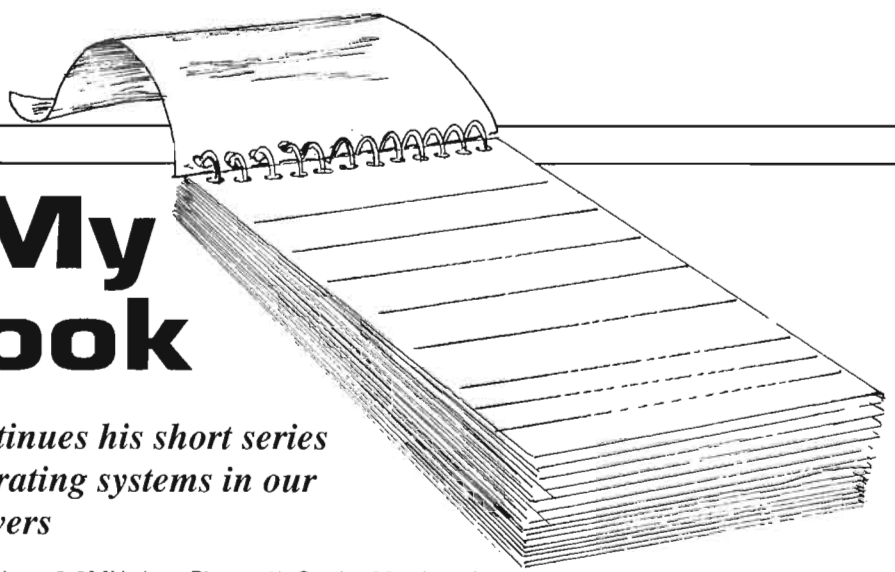
If you like your packet TNC on the

inter-island links and user access frequencies. More details from their Chairman Keith GU6EFB or BBS SysOp Chris GU4YMV.

With the growing interest in PacTOR for HF use, I'm reminded from tuning around the HF amateur bands that there's also a growing number of *Clover* users, including no less than 13 Clover mailboxes operating on a 24hr/day basis (K4CJX, KB1PJ, KE5HE, KK4CQ, KP4GE, N5TC, N6IYA, W0RLI, W4NPX, WX5O, WA2MFY, WA1URA and ZS5S). Terminal units for these are rather more expensive than those for PacTOR, and are currently only available from one manufacturer, so it'll be interesting to see how this potentially very useful mode develops.

Please do keep your packet messages coming, and my thanks to all those who've been in touch, *all* messages I receive get a speedy reply. You can contact me either via the BBS network, or on the DX PacketCluster network in the UK, or via post to P. O. Box 73, Eastleigh, SO5 5WG. Until next month, 73 from Chris G4HCL @ GB7XJZ.

# From My Notebook



*Geoff Arnold G3GSR continues his short series about the frequency-generating systems in our transceivers*

This month, we come to the final instalment of this short series about the arrangement of frequency-generating systems in SSB and SSB/CW receivers and transceivers.

In explaining the receive conversion and heterodyne system last month, I used a single-sideband, suppressed-carrier signal at the intermediate frequency of 9MHz, which I explained that we could think of as the internal 'assigned frequency'. We now need to look at how we translate the incoming signal from one of the HF amateur bands

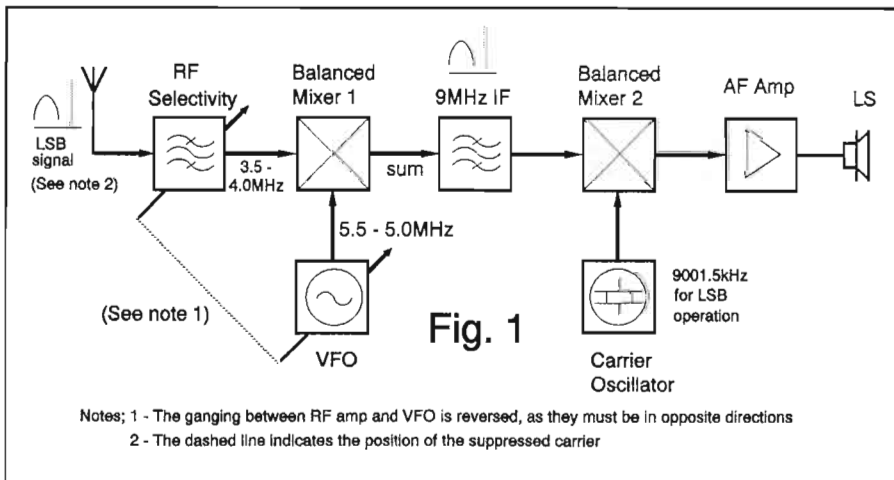
9.0MHz (see Figure 1). On the 20m band, the VFO frequency is subtracted from the signal frequency, so tuning the VFO from its lowest frequency to its highest would cover the signal-frequency range 14MHz up to 14.5MHz - the IF filter selects the **difference** of the signal and VFO frequencies ( $14.0 - 5.0 = 9.0\text{MHz}$ , and  $14.5 - 5.0 = 9.0\text{MHz}$ ).

As I mentioned once before, this arrangement has been used, but it's definitely not very 'user-friendly'. The VFO tunes in opposite directions on the two bands, and requires two scales

reading in opposite directions on the associated dial. In any case, although 80m and 20m are as good as any if you are only to have access to two bands, most users soon feel the urge to expand their horizons.

Say that we want to add coverage of the 40m band, 7.00 to 7.10MHz. There's no point in going to the expense of providing another tuneable VFO, operating over a different frequency range, to mix with the incoming signal and convert it to the 9MHz IF. We've already got a perfectly good VFO tuning from 5.5 to 5.0MHz (it's usually arranged to tune that way round from dial minimum to dial maximum, for reasons which should become apparent later), so we might as well make use of it on all bands, if we can.

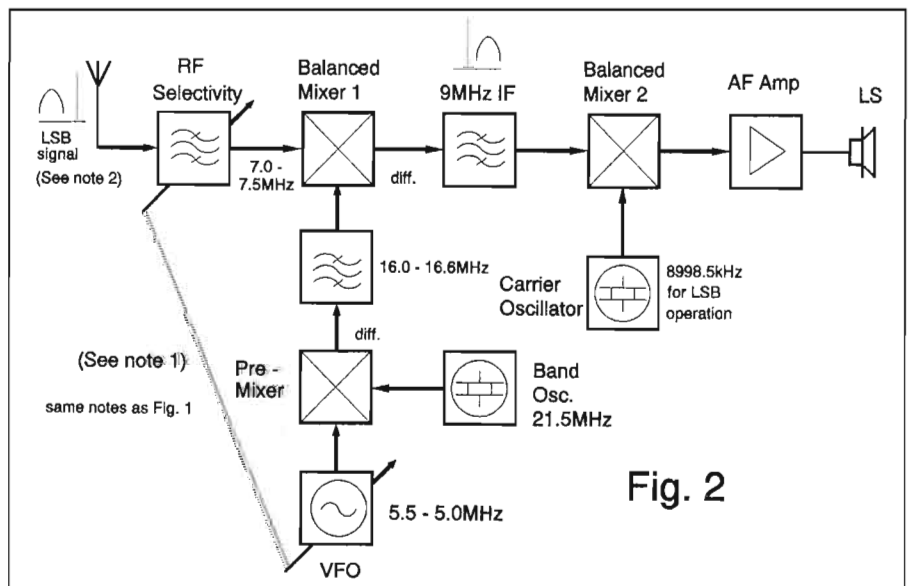
To do this, an additional mixing system and oscillator are needed. This oscillator is in practice often a set of crystal oscillators, or 'band oscillators', selected by the receiver's band-switch. By choosing suitable crystal frequencies, we can cover any band that we want to. In fact, with a large bank of crystals, it would be possible to provide continuous coverage up to 30MHz apart from the usual gap around the intermediate frequency which is a natural



to the intermediate frequency.

Faithful readers of my column may recall that last autumn, I described a simple design of superhet receiver in which a variable frequency oscillator (VFO) tuneable from 5 to 5.5MHz is mixed with the incoming signals in the 3.5-3.8MHz (80m) or 14.0-14.35MHz (20m) band to provide conversion to a 9MHz intermediate frequency. Of course, the VFO has a wider range than is needed for either of these bands in the UK allocations, but to avoid complications, I shall talk about the complete VFO swing in each example.

In this receiver, tuning the VFO from its lowest frequency to its highest when operating on the 80m band would cover the signal-frequency range 4MHz down to 3.5MHz - the IF filter selects the **sum** of the VFO and signal frequencies:  $5.0 + 4.0 = 9.0\text{MHz}$ , and  $5.5 + 3.5 =$



drawback of the superhet receiver system.

To provide that 40m band coverage, we actually need a local oscillator signal tuneable from 16 to 16.5MHz (remember I'm still talking about the complete half-megahertz swing of the VFO). If we mix the output of a 21.5MHz crystal oscillator with the VFO (in a stage usually called a 'pre-mixer') and select the **difference** signal by a tuned circuit or band-pass filter at the output, we shall have just that coverage. Figure 2 shows the circuit arrangement. To prove that's true, subtract the VFO frequency from the crystal oscillator frequency for each end of the VFO swing:  $21.5 - 5.5 = 16.0\text{MHz}$  and  $21.5 - 5.0 = 16.5\text{MHz}$ . Moving on to the output of the receiver's 'first mixer' (the traditional name for the stage that converts the received signals to the intermediate frequency), the difference frequency is  $16.0 - 7.0\text{MHz} = 9.0\text{MHz}$ , and at the other end of the VFO swing,  $16.5 - 7.5\text{MHz} = 9.0\text{MHz}$ .

Have you noticed something? With this system, when the VFO is at the top of its range (5.5MHz) the received frequency is at its lowest, and with the VFO at the bottom of its range (5.0MHz) the received frequency is at its highest, just the same as it was for the 'single-mix' system of 80m.

What happens on other bands if we use this 'double-mixing' system? Well, I won't go through all the calculations for each band, but I can assure you that exactly the same relationship applies. The crystal frequencies for the band oscillators are as shown in the table.

## Reversed Sidebands

How are the various frequencies related? Using a single-mix system on 3.5MHz and double-mix one on all other bands, the local oscillator frequency applied to the first mixer is always higher than the signal frequency.

On the 80m band the local oscillator frequency (VFO direct) is lower than the intermediate frequency, and the IF output from the first mixer is equal to signal frequency **plus** VFO frequency. On all other bands the local oscillator frequency (band oscillator minus VFO) is higher than the intermediate frequency, and the IF output from the first mixer is local oscillator frequency **minus** signal frequency.

This difference means that, although we've managed to find a way of making the VFO **dial** always change frequency in the same direction, regardless of band, the sideband spectrum of the incoming signal will be inverted on 80m compared with all the

other bands. In fact, on 80m, where the **sum** of the two input frequencies to the first mixer is selected by the IF filter, the sideband spectrum stays the same way up. On all other bands, where the **difference** is selected, the sideband spectrum is inverted in the mixing process.

This means that in my simplified explanation last month, although what I said about needing an 8998.5kHz carrier insertion oscillator for USB and a 9001.5kHz CIO for LSB was correct for the 80m band, you have to swap the CIO crystal frequencies over for all other bands. This is easily done automatically by means of a couple of wafers on the receiver band-switch, and can be safely forgotten about in normal operating. However, sideband reversal is something to bear in mind if you do any fault-finding or alignment work on a set of this type. You could otherwise end up looking for a fault in the wrong CIO, even tweak the trimmer on the wrong crystal, depending on which band you've switched the set to.

## Transmit Arrangements

The organisation of the oscillators and mixers for transmission are basically similar, although signal flow through the mixers and IF filter is reversed compared with the receiver (see Figs. 1 and 2 in last month's *Notebook*).

## Assumptions

I've already mentioned that, to keep the calculations as uncluttered as possible, I've quoted the full half-megahertz swing of the VFO each time, even though only a part of that swing is used on each band except 10m. Any other approach makes explanation of the simple, single-mix 80m and 20m circuit very much more difficult to grasp, as the segments of the half-megahertz VFO swing used on the two bands are at opposite ends of the dial. Work it out for

yourself.

Another simplification I made was to quote audio modulation bands going right down to zero hertz - in other words, DC. This isn't so, of course. Speech communication circuits generally have a response which 'rolls off' rapidly below a frequency of 300Hz or thereabouts. Life would be very difficult if this were not so, as it would be much harder to filter out the unwanted opposite sideband in an SSB transmitter if the wanted and unwanted sidebands met at zero hertz!

## More Complex Sets

The arrangements and frequencies which I've used to illustrate this short series about frequency-generating systems are based on those used in the Shimizu SS-105S transceiver, a very nice little 10W solid-state rig which was imported and sold in semi-kit form some years back by Lowe Electronics. Its age is given away by the lack of provision for any of the WARC bands! However, I think that the LC-tuned VFO plus crystal band-oscillator set-up makes it easier to understand the principles I've tried to explain.

A more modern rig would use a synthesiser system to generate all the frequencies required in the mixing, modulating and demodulating processes, and some of those processes would be implemented in a quite different way.

I hope that my explanations may encourage and help you to read the technical description given in the handbook of your modern 'all bells and whistles' rig. It's an advantage to understand more of what goes on inside it, even if you don't feel able to tackle any repair work yourself, should the need ever arise. You should at least be better placed to understand, by a process of deduction, where the fault may lie.

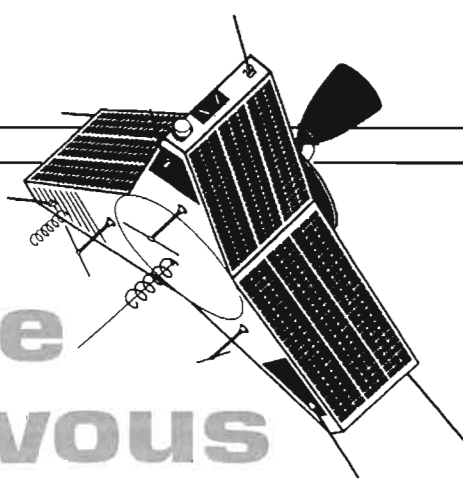
### Band Oscillator Frequencies

(5.5-5.0MHz VFO; 9.0MHz IF)

Band (m)	Band (MHz)*	Band Oscillator (MHz)	Band Oscillator minus VFO (MHz)
80	3.5-3.8	None	5.5-5.0 (direct)
40	7.0-7.1	21.5	16.0-16.5
20	14.0-14.35	28.5	23.0-23.5
15	21.0-21.45	35.5	30.0-30.5
10	28.0-28.5	42.5	37.0-37.5
	28.5-29.0	43.0	37.5-38.0
	29.0-29.5	43.5	38.0-38.5
	29.5-29.7	44.0	38.5-39.0

\* On each band, the total coverage is the half-megahertz segment which includes the amateur band quoted.

# Satellite Rendezvous



French authorities have allocated the callsign *FX0ARS* to the satellite, but the AX25 frames will be labelled *ARSENE-1*, *ARSENE-2* or *ARSENE-3* depending on which TNC is in use. The French group have decided that the name of the satellite *ARSENE* should be kept when it is in use but did not disagree that other AMSAT organisations could give it an OSCAR number.

**Richard Limebear G3RWL with this month's collation of AMSAT-UK news**

The AMSAT-UK team manned the group stand at the VHF Convention at Sandown Park and also at the London Amateur Radio Show at Picketts Lock the following weekend, and thanks to all who came and said 'hello'. Are we going to see you at the Colloquium? Anyway, onto the satellite news;

## Oscar 13

A brief warning about AO-13 Kepler set dated 93027.8; the numbers in this said the satellite's perigee had dropped by 100 km over about ten days. Subsequent element sets resulted in a more normal perigee. Congratulations to G4JJ for spotting it!

## Oscar 10

It's currently available for Mode B operation when it is view. Please *do not* attempt to use it if you hear the beacon or the transponder signals FMing.

## MIR Update

The 13th MIR crew reminded us that the Mir Space Station has now been in orbit for seven years. The Cosmonauts report all systems on MIR are functioning well. Amateur radio on board MIR started in November 1988 with a Yaesu FT290R transceiver on 2m FM with 2.5W output to a specially installed ground plane aerial. Since February 1991 they've had new equipment; an Icom IC228A/H with 5/25W output, a PacComm HandiPacket packet controller and a laptop computer.

From 1st January this year the cosmonauts got a new callsign series R#MIR but the old series U#MIR are still valid. From 01/01/93 the new QSL Manager for the cosmonauts is RV3DR so all QSLs should be sent to: RV3DR-Serge Samburov, Space QSL Manager, Chief of Cosmonaut Amateur Radio Department NPO "Energia", P. O. Box 73, Kaliningrad-10, Moscow Area, 141070, Russia.

## Oscar 21 double-hop tests

AO-21 changed mode to the RM-2 transponder on 9th February to provide for G4CUO's Double Hop trans-satellite tests and contacts were made by several people using the 70cm uplink to AO-21, a link on 2m to RS 10, and downlinking on 10m. The experiment was successful with 6 stations linked in the 3min 11sec window available whilst the two satellites were passing each other over North Africa. Much data was gathered and is being evaluated by G4CUO to be published later.

## KitSat

Users of UO-22 and KO-23 have been polled recently about whether BBS forwarding should transfer from UO-22 to KO-23 (n.b. it was never suggested that both satellites should be used). A consensus appears to be to keep BBS forwarding on 22 and leave 23 for 'normal' operations.

## UoSats

UO-22 has been down once or twice, UoS loaded new software recently and software crashes are to be expected. They've found some of the bugs in the software but debugging is still going on. UoSAT controllers apologize for any inconvenience the disruption of service may cause many users world-wide.

## Webersat

WeberSat (WO-18) has been reloaded with new software! The satellite is now broadcasting pictures, light spectrometer data, and whole orbit data.

## ARSENE News

As this is being prepared, Arsene was still set to launch on 20th April. The

## Weather Sat News

For readers of last month's weather satellite feature, here's news of the status, at the time of writing, of the various orbiting satellites.

NOAA-9: APT 137.62MHz, On  
NOAA-10: APT 137.50MHz, On again  
NOAA-11: APT 137.62MHz, On  
NOAA-12: APT 137.50MHz, On  
Meteor 3-3: APT 137.85MHz, On  
Meteor 3-4: APT 137.30MHz, On

Meteor 3-3 is currently giving good vis-images during morning ascending passes, and infra-red during evening descending passes. Meteor 3-4 is giving good vis-images during noon descending passes. The NOAA-10/NOAA-12 VHF 'conflict' has ended, and APT NOAA-10 is active again.

## Space Shuttle Flights

The STS-55 space shuttle launch first slipped to the 6th March and has now been deferred indefinitely but this flight, being low inclination, will not be visible from Britain. The following STS-56 flight will be visible to us; both flights carry the SAREX amateur radio experiment. The STS-56 mission was planned to liftoff at 05:50 UTC on March 23rd but this may also have changed. All five crew members are currently licensed but the main voice callsign for this mission will be KB5AWP.

STS-56 will carry SAREX configuration D which consists of 2m FM voice, packet, SSTV and 70cm ATV (receive only). The downlink frequency used for two-way voice communications with the Shuttle astronauts is 145.55 MHz World-wide, and the uplink frequencies for Europe are 144.70, 144.75 and 144.80 MHz.

## Phase-3D

As you read in these pages, the European Space Agency informed AMSAT that it would not be able to provide the satellite/rocket interface which Phase-3D had been designed for over the past two years. This design involved a conical section tapering from approximately 1920mm to approximately 1200mm in diameter. This conical section was supposed to be the central structural core of the satellite.

What ESA offered instead was a cylindrical section 2624mm in diameter and 750mm high, coupled with a 830mm high conical section, which tapers to 1200mm. This led to an exhaustive series of design studies, including thermal considerations which pointed to a completely new design concept for Phase-3D, one employing a much smaller spacecraft carried inside the adapter section and separating from it following its detachment from the Ariane launch vehicle, rather than using it as a central structural core. ESA have now agreed to this.

This new design concept offers several advantages compared to the previous one and they are;

1) AMSAT is responsible for the design of only the cylinder and its bolt circles and this is considerably simpler

than the conical structure that we had to design under the old concept.

2) ESA will be responsible for the conical portion of the adapter section and the separation hardware between the cylindrical portion and the Ariane-5 vehicle.

3) A new 2300mm diameter by 700mm high Phase 3D spacecraft will reside inside the adapter section. This makes for a significantly lighter satellite than under the previous concept in which the old conical adapter section formed a part of the spacecraft's structure. This means that much less propellant will be required to get into the final orbit. With the new design approach, P3D is estimated to weigh only about 430kg including propellant as opposed to nearly 600kg previously. It should be emphasised that this smaller

spacecraft will be just as capable as the old one, in so far as providing amateur communications and supporting various other experiments. It is currently estimated, however, that the solar arrays will produce somewhat less power, about 730W compared with 870W for the old configuration.

4) The aerials, and most importantly the rocket nozzle, and in fact any other structural elements can protrude up to 400mm into the conical section. This provides much more design latitude than under the previous approach.

## AMSAT-UK News

AMSAT-UK will host its 8th annual colloquium over July 29 - August 1. As in past years, booking forms will be available from 15th May from the Hon. Sec. Ron G3AAJ (details below). A stamped and self addressed large envelope will assist the Hon. Sec, overseas enquiries please add two IRCs. The *Proceedings* will be on sale at the colloquium. AMSAT-UK are pleased to announce that the prices for this year's colloquium will be the same as last year's event (as there's been no VAT increase). So mark your calendar *now* and plan to attend Colloquium '93, this year's event promises to be one of the best ever!

AMSAT-UK have now sent £32,000 to Amsat-DL for the new rocket/P3D interface; this assures us that P3D will be ready in time for the planned mission. Ron G3AAJ has a new consignment of the *Satellite Experimenter's Handbook*; that's the excellent book by Marty Davidoff K2UBC which many of us have on our shelves, contact him if you'd like to purchase a copy.

For further information about the group, contact AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. A big SAE gets you membership info, SWLs as well as licenced amateurs are welcome.

The latest keplers are available from myself for an SAE, by modem or AX25 packet radio (HF/VHF) if anyone wants it; my packet mailbox is GB7HSN. When asking for keplers please say which satellites; *all* means about 140 satellites. (*all amateur sats* is adequate if that's what you want); requests on packet will get 2-line elements unless AMSAT format is specified.

### AO-13 Transponder Schedules

#### Until May 10

Mode-B : MA 0 to MA 120  
 Mode-S : MA 120 to MA 130 - S transponder; B trsp. is off  
 Mode-LS : MA 130 to MA 135 - S beacon + L transponder  
 Mode-JL : MA 135 to MA 150 Alon/Alat 180/0  
 Mode-B : MA 150 to MA 256  
 Omnis : MA 230 to MA 40

Please don't uplink to B, MA 120-130, it interferes with mode S.

#### May 10 - May 31

Mode-B : MA 0 to MA 180  
 Mode-S : MA 180 to MA 190 - S transponder; B trsp. is off  
 Mode-LS : MA 190 to MA 195 - S beacon + L transponder  
 Mode-JL : MA 195 to MA 210 Alon/Alat 210/0  
 Mode-B : MA 210 to MA 256  
 Omnis : MA 250 to MA 60

Please don't uplink to B, MA 180-190, it interferes with mode S.

#### May 31 - Aug 02

Mode-B : MA 0 to MA 256 Attitude changes; May 31 - 120/0  
 Mode-S : Jun 14 - 130/0  
 Mode-LS : Jun 28 - 140/0  
 Mode-JL : Jul 12 - 150/0  
 Mode-B :  
 Omnis : MA 170 to MA 10

Note that these schedules are provisional, continuous up-to-date information about AO-13 operations is always available on the beacons, 145.812 MHz, 435.658 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK.

KEPLERS								
SAT:	OSCAR 10	UoSat 2	AO-13	PACSAT	DO-17	WO-18	LO-19	FO-20
EPOC:	93034.09502976	93046.09611398	93055.95355222	93046.100581	8193043.72242124	93035.22338149	93046.07867758	93044.30466127
INCL:	27.0236	97.8238	57.6503	98.6313	98.6309	98.6311	98.6319	98.0694
RAAN:	41.6607	77.8331	330.9930	132.4918	130.3095	121.9214	131.8348	283.7488
ECCN:	0.6012183	0.0012964	0.7259697	0.0011058	0.0011191	0.0011597	0.0012282	0.0840928
ARGP:	54.7431	31.5913	309.1516	180.0793	188.0644	215.3259	180.8862	7.5828
MA:	347.8844	328.6069	6.4351	180.0392	172.0363	144.7153	179.2508	384.3333
MM:	2.05880407	14.68858390	2.09721489	14.29795854	14.29927437	14.29908715	14.30000328	14.30017688
DECY:	2.7E-07	5.49E-06	-3E-08	1.95E-06	1.92E-06	2.33E-06	1.93E-06	1.7E-07
REVN:	4453	47879	450	15999	15966	15845	16621	16191
SAT:	AO-21	UO-22	KO-23	RS-10/11	RS-12/13	Mir	FRJJA	
EPOC:	93055.29064387	93040.24894820	93041.54059394	93056.82168910	93043.01588136	93057.07385540	93047.10624205	
INCL:	82.9441	98.4864	66.0811	82.9285	82.9213	51.6201	61.8988	
RAAN:	136.3834	118.3602	229.3542	320.9321	14.9359	57.4068	81.8340	
ECCN:	0.0035336	0.0007834	0.0011044	0.0010388	0.0030957	0.0002465	0.078888	
ARGP:	338.8372	324.9777	218.6354	269.8053	33.2578	66.6448	272.0674	
MA:	21.1295	35.0893	141.3875	90.1897	327.0513	294.0830	79.7445	
MM:	13.74509808	14.36774641	12.86276954	13.72309216	13.74014278	15.59228666	13.21676743	
DECY:	1.01E-06	2.25E-06	-1E-08	9.7E-07	8.5E-07	2.0223E-04	2.67E-06	
REVN:	10393	8229	2355	28457	10133	40180	1755	

# VHF/UHF Message

*Geoff Brown GJ4ICD tells of superb VHF/UHF conditions after high pressure hit the south!*



**FR5EL, active on 6m**

Just as we came to the deadline last month, a magnificent amount of tropo transpired on 144/432/1296MHz, it seemed that the higher frequencies were far better than lower ones.

On the 3rd, southern stations reported lots of strong German beacons on 432MHz and 1296MHz, Brian G6YXT was heard having QSOs into HB9 on 432MHz but little was heard at your's truly (going over my head!). On the 4th, things really got going, John G3XDY in Suffolk worked FC1MOZ/P in JN27 on 1296MHz for his 101 square on the band, EA1WD/P was also reported on 1296MHz from the rare square IN53.

By midnight on the 4th I too realised that things were going to get better as our TV link with the UK mainland became unwatchable due to co-channel interference from the continent. Early on the 5th it was time to have a good look around, beacons in Germany and near the Czechoslovakian border were very strong on 1296 and 432MHz, later that day contacts were made with OK1FFD (JO60) and OK1IBL on 1296MHz, these were the first contacts ever between OK and GJ on this band.

The high pressure system held on for over a week with good conditions appearing from time to time in different areas of the UK, but 432 and 1296MHz seemed to be the best bands. Ela

G6HKM reported that things were not as good from her area, however Ela did work a selection of HB9s and DLs on both 432 and 1296MHz.

## Down on 50MHz

Early February saw a few 'ES' openings, one of the best was on the 3rd with over four hours of long distance DX. OH3XA was reported in GD, G, GW, GJ and down to the South of France, showing the opening to be quite widespread, others reported were ES5QA (KO38) and several SM0s around JO99. Ela G6HKM bagged SP5CCC/KO02 and ES5QA/KO38 but that was about it for the month.

The UK Six Metre Group set up EME (Earth-Moon-Earth) tests with W6JKV and K6QXY during the month and the results were very interesting, as it seemed that only the southern half of England, from the Midlands, down had any results to speak of. Neil G0JHC in Preston, Lancs reported nothing heard, but Martin G3UKV near Telford did identify signals. Ken G8VR in Kent states he heard good signals and was only using a three element yagi on a 2m long boom (he must have some good ground gain). Richard G4CVI had his four aerials active for the tests and actually completed the contact, also Richard G4AHN identified signals. Well done to all who participated and further tests will continue later in the year.

Later in the month on the 19th, T.E.P. returned to the South, at 1245z 7Q7 and Z21 were heard down here in GJ, and Hal, ZS6WB also reported another opening later in the day at around 1700-1800z. Other news from Hal was that he had just dispatched a 50MHz radio to C9RJJ in Mozambique, all we want now is more propagation. Also, 5R8DG on Mozambique should be active by the time you read this.

F2 propagation was also recorded in the morning of the 21st with CIS FM military stations active around 40MHz, and weak multi path video on 49.749MHz coming from eastern CIS, the best DX that day was at 0825z when DK5UG worked into VK4.



**The Radio Amateurs Association of Crete**

At last, Andorra will come on 50MHz. C31HK has expressed a serious interest in 50MHz but at present (March) has no equipment. A permit has been granted after 5 years of negotiations with the PTT, this came about because previous operators caused so many problems operating outside their licence conditions (i.e., 50MHz has never been permitted from Andorra but C30DAW was used on 50MHz!). C31HK states that now only residents can operate on the VHF/UHF bands, so no more expeditions can take place due to the thoughtlessness of past operators. Angelo I2ADN is going to contact C31HK to see if it is possible for a get-together on 50MHz, more later.

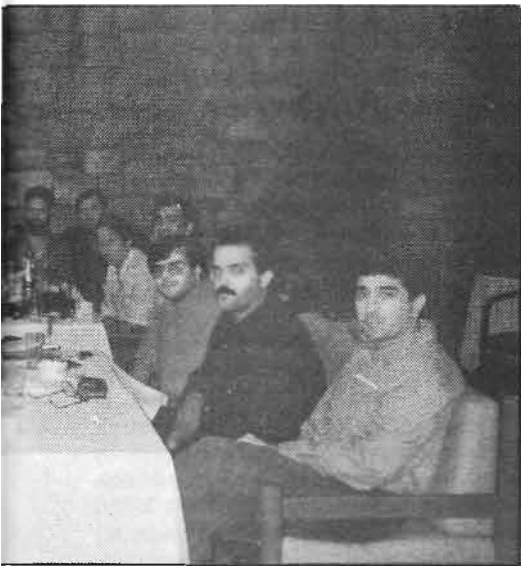
## Beacon News

Here are a few more additions to the beacon list (in the December 92 issue of HRT) which have been received by readers. Firstly, a change of frequency to the Zimbabwe 50MHz beacon, the frequency will now be 50.052MHz, as the proposed 50.060 has been ruled out due to GB3RMK using this slot.

The following beacons have been reported and confirmed during the big opening of February; DB0JK (JO30) 1296.936MHz; DB0KI (JO50) 432.840MHz; DB0KI (JO50) 1296.840MHz; DF0ANN (JN59PL) 432.965MHz; DB0JB (JN48FX) 1296.918MHz; and FX4UHB (JN06KN) 432.888MHz.

## The VHF/UHF Monitor

You may remember in the March edition of HRT that I spoke of a unique piece of equipment from Uniohm called a signal analyzer for use for monitoring



Sporadic 'E' and checking your harmonics. Several readers telephoned to ask 'Where can I get one please?'. Well sources in Jersey seemed to have dried up a little since the short review, but, I am trying to contact fellow UKSMG members in Italy (where they were made) to see if it is possible to obtain any surplus units from the factory there. I have all your phone numbers and should I receive any news will contact you immediately, so thanks for the interest and the response.

## Going to Greece?

Chris, G6XPJ wrote in with news of activity while on holiday in Crete. He advises that if you are going on holiday there, don't bother to take 432MHz as it

is dead, however 2m is worth taking as there's an abundance of repeaters and stations active (if you can speak Greek!). Chris points out that the coverage of the repeaters is very extensive indeed.

There is also a club which meet on Wednesdays at around 2030 local time (although Chris doesn't say whether it's for a radio or plate smashing session), and anybody interested in joining in should contact; ERK, P. O. Box 1390, 7110, Iraklion, Crete, Greece. As the photo shows, 'all the plates have gone!'.

## Other News

The RA have just announced that there will be no cuts in the 432MHz band which is good news, and later in the year the restrictions imposed on the north of England regarding 432MHz may well be lifted, thanks to the RSGB for their negotiating powers!

Charlie G3WDG, well known for his 10GHz activities, has completed two QSOs on the band via the moon. The initial QSO was with WA7CJO and is surely a British Isles first, the other station contacted was SM4DHN.

JA1VOK reports good openings on 50MHz from Japan to New Zealand in the early part of February, it seems to

me that the British Isles should be moved about 20 degrees further south so we can get in on the act!

The UKSMG holds its annual 50MHz Summer Contest on Saturday 5th June, from 0000z to 2400z, and last year it was a terrific success with massive sporadic 'E' even through the night. This contest is open to non members as well as members so why not have a bash, and you never know, you may well win a trophy. You can obtain full details from G1IOV on receipt of an SASE. Interestingly enough, last year's fixed station winner in the UK section was GD7HEJ who worked 24 countries, 76 QTH squares and 214 stations. In the UK open section G1FYC worked 25 countries, 65 squares and 135 stations, and the European winner was 9H1BT who worked 31 Countries, 120 squares and a massive 622 stations.

The new amateur schedule states that Novice licensees can now have full access to 50MHz, but at the time of writing nothing apparently has appeared in the London Gazette.

Thanks to the UKSMG for the QSL list, Neil G0JHC, and others mentioned for their news. News or views can be sent to; Geoff Brown, GJ4ICD, TVShop, Belmont Rd., St. Helier, Jersey. C.I. or phone/fax 0534 77067 anytime.

## QSL Listing

- 3X0HNU - Via F6FNU, A. Baldeck, PO Box 14, F-91291 Arpajon, Cedex, France
- 4X1MH - Dr Alex Vilensky, PO Box 6342, Haifa, Israel
- 9A3AQ - PO Box 673, 41001 Zagreb, Rep of Croatia
- 9H1FP - Franklin Polidano, Olida, Sawmill St, Msida MSD05, Malta
- A22MN - Via WA8JOC, 5875 Cedaridge Dr, Cincinnati, OH 45247 USA
- EH1EH - F. Cameno, C/ Virgen de la Rosa No. 1, Abalos - La Rioja, Spain
- EH2ADJ - J. Sanchez, Apartado 1716, San Sebastian, E-20080 Spain
- EH2LU - J. Daglio, C/ Manuel Iribarren 2-5 D, Pamplona, E-31008 Spain
- EH3BTZ - E. Fraile, "Algeciras", Frederic Corominas 58, 08629 Torrelles, Barcelona, Spain.
- EH3EDU - M. Molist, Apartado 68, Sant Just Desvern (Barcelona), 08960, Spain.
- EH3IH - R. Galvez, Mare de Deu de Nuria 9, Barcelona, 08017 Spain
- EH3MD - J. Nebot, C/ Bartomeu Pl #19 30 3a, Barcelona, 08014 Spain
- EH4CGN - J. Martin, PO Box 57014, Madrid, E-28080 Spain
- EH3KU - F Lizama, PO Box 69, 8025 Barcelona, Spain. (not good in 92 CB)
- HB9BQU - Hans Kamper, Hohle, CH-4937 Ursenbach, Switzerland.
- JX3EX - Via LA5NM.
- JX7DFA - PO Box 105, 6520 Reijpsvik, Norway.
- OJ0/OH0AF - SSB via OH1EH, CW via OH1NOA.
- SM3NRY - Thomas Gillgren, Linneagatan 19 D, 85251 Sundsvall, Sweden
- SP2SWR - P. Beifus, UL, Matejki 64734, Torun, 87-100 Poland
- SP2YAP - Students Radio Club, UL, Gagarina 33, Torun, 87-100 Poland
- SP3CUG - R. Grabowski, UL, Niemiecka 18/10, Leszno, 64-100 Poland
- SP4TKK - K. Krassowski, PO Box 21, Olsztyn 1, 10-950 Poland
- SP5CCC - T. Ciepiewski PO Box 19, Warszawa 131, 03-996 Poland
- SP6HDZ - E. Suchowiejko PO Box 111, Luban Slaski, 59-800 Poland
- S79ELY - Via JA1ELY: Tosh Kusano, Box 8, Kamata, Tokyo, Japan
- S79IDY - See S79ELY.
- VQ9QM - Dale Strieter, 928 Trinidad St, Cocoa Beach, FL 32931, USA
- Y50CO - PO Box 21988, Windhoek, Namibia
- YO4BZC - Via IK8DYD.
- ZA1BK - Operation on 8th September 1992 via JA1HGY
- ZD8SA - PO Box 2, Ascension Island



# QRP CORNER

*Dick Pascoe G0BPS bagful of mail from QRP operators*

Lots of news this month, quite a bagful. Firstly, a long letter from Les 2E0ADM, who's been having a go at 10m SSB and doing very well. Les is a very young 74 (judging by his writing) and is thoroughly enjoying the hobby. He states "I am amazed at what 3 watts of SSB can do, OK mainly on 10m, now all my gear is on 3W!". Les uses a 2m/70cm multimode and a TS670 multi-bander for 21 to 50MHz at 10W that can be wound down to 700mW PEP coupled to a half size G5RV with the high end at 9m.

Les tells me that he only operates a maximum of 30 minutes a day but still managed to bag a good collection of callsigns and countries. He is presently building a 160m DSB CW radio but prefers SSB so the CW will not get much use. I am surprised at this, as he gave one CQ call on QRP CW which was answered by A22MQ, and he complains he disappeared in the QRM!

I must also say that Les is a bit of a cheat, he has held the call G1LHW for the past 9 years but obviously the Morse test has kept him off HF until now. He obviously found the 5 WPM test a doddle and has great fun on HF with what must be a great callsign. I might even go for a novice call myself, it could generate more DX replies with what appears to be a 'rare' callsign.

The next letter comes from J. D. Burrow G0NYD, a very new member of the G-QRP Club (7563). He tells me that after reading my column of March 1992 about contest operating he had some wonderful contacts. Readers may remember that I suggested that newer licensees interested in low power operating should try joining a few contests. Do listen first to get the pattern of the contest. Find out what information is required, sometimes it is just RST plus a number ie 59067, at other times it may be the region number plus the RST ie 5914 (for UK).

Mr. Burrow says he read the column just two days after getting his licence, he switched on his receiver and heard 'such a racket' that he almost switched it off again. After listening for a while he found that he was listening to the ARRL International 10m Contest. What a chance of getting some new countries! 'Get in there' I cry, they are desperate for your points. The QSLs may be impossible but you may work DXCC in a few hours if you try hard.

This operator, a newcomer, had a ball. Only days after being licensed with only 5 watts he gained a claimed 9,432 points! Some of these were some stupendous DX; ZF2, HK3, 9J2, S57 and 4U1UN in New York. The rig was a Kenwood TS850 with a Jaybeam TB2 aerial. He always monitors the output power to ensure that it is always below the 5 watt level.

Most of the major contests have a section for the QRP operator so you can even send in an entry, but unless you work hard at it, it may be preferable just to 'give away a few points' as most of us do.

After reading the above comments I was amazed about the dedication of these two amateurs. Yet, when I first got my licence I tried DX on 2m and was pleased to get into DL land with just 2.5W with my FT290R, but the excitement soon paled when it became a matter of course. With my new QTH of course things will change on the VHF/UHF front.

## New Books

One of my own personal joys is getting a new book, I love the feel of all books, new or old and I spend hours reading, so given the opportunity to look over some new arrivals to the UK recently I jumped at the chance.

Regular readers will know of the importance I put on a good aerial system in any station, even more so for the QRP man, so the majority of the books on my shelf are on aeriels and aerial techniques. It is always a shame to me that by far the majority of good amateur books come from the USA. Yes, I know that it is much larger than the UK, but we have some fantastic brains over here that are ignored in the amateur field.

In the USA there are dozens of books of interest to the Ham operator and we must offer thanks to Poole Logic for importing so many of them. Ring Poole Logic for details of the following...

## The ARRL Antenna Handbook

This is a wonderful collection of information about aeriels, a huge book of almost 5cm thick that will provide hours of interest to the aerial enthusiast. It is full of information gathered

from the four corners of everywhere, and is essential reading for all amateurs.

The next is the ARRL Antenna Compendium Volume 3, which gives in-depth details of slopers, double cross verticals, and CCD aeriels. This book is a good companion to the handbook, also very well worth reading.

The next book came direct from the states. Named as 'Your QRP Operating Companion' by Brad Wells KR7L shows an HW9, a morse key and a shower of exotic QSLs on the front cover. I am always wary of books of this type, "Grab an HW9 and work the world!" This is not always possible, loads of patience and a good aerial will assist, but not good words....

Having said that, I did read the book and found it of great interest. Most of the contents will already be known by the ardent operator, but brushing up on your skills and reading a few forgotten tips will always help. Brads book, the companion does help, it does give some good guides for the newcomer to the hobby.

M Maxwell W2DU is a technical Adviser to the ARRL in the speciality field of aeriels and transmission lines. So when he offers a book called 'Reflections, Transmission Lines and Antennas' I tend to grab it. In hard back the book costs £12.90 and is also essential reading for any aerial enthusiast.

## Dayton

As I sit and write this my tickets for the annual pilgrimage to the Dayton Hamvention were confirmed. I shall be travelling to this huge rally with another club member Paul G1PJJ and meeting up with other club members on arrival. The hospitality shown by the ARCI members is fantastic. They book a block of 50 rooms at a hotel, unfortunately our usual one has closed so we have moved south a touch. These rooms sell out to club members very quickly of course. The camaraderie amongst the low power boys is fantastic. With many of the very big names in the field gathering to share their interest. More details on this year's show later.

That's it for now, news and views to me via HRT Editorial, or GB7ZAA (note the change), or to Seaview House, Crete Road East, Folkestone CT18 7EG.