

# HRT

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## HAM RADIO TODAY

APRIL 1993 £1.70

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Yupiteru  
MVT-7100

Yaesu FT-530



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# HRT

## HAM RADIO TODAY

VOLUME II NO.4 APR 1993

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Howes DXR10 Receiver kit Reviewed



CQ WW SSB contesting from Guernsey.



Yupiteru MVT-7100 Reviewed

# CQ de G8IYA

*Amateur radio means different things to different people*



Our hobby of amateur radio is unique. Many of us know it holds no international frontiers, it doesn't discriminate between race, nor status. Our 'CQ' on 20m could be replied to by a chap down the road, or on the other side of the world, by a King, a Lord, an amateur on an otherwise deserted island in the middle of an ocean, or someone who you knew as a school friend.

Tuning around the bands, we hear all sorts of conversations. Some technical, some about last night's DX, some about what's happening at the club next week.

## Sit Back and Look

This no doubt sounds familiar, but it sometimes helps us to sit back and take a look at ourselves. Our hobby means different things to different people. Some like to experiment, either by designing and building new equipment and aerials, others instead like to experiment with the effects of HF or VHF propagation. There's lots we amateurs have 'taught' the professionals in the past, like how 'short waves' could sustain worldwide communication after these were given to amateurs to 'play with', as they weren't considered useful for 'real' communication needs. Others prefer to practice their operating skills and improve their on-air proficiency, entering contests, chasing awards and so on. Others like to combine a number of interests, improving their station 'all round', some even going to what could be described

as the current 'ultimate' combination of operating skill, proficiency, and station equipment by using techniques such as moonbounce communication.

After we've received our licence, we're relatively free to do what we want. No-one should 'force' one thing or another down our throats, although some certainly do try! Yes, we do have discussions on what is the 'best' mode, the 'best' form of operating technique, the 'best' way of equipping your station. In HRT, we try to cater for as many tastes as possible, by featuring regular columns and articles on a range of interests. And yes, we do try to actively promote discussion. We try to keep you active!

## Unsung Heros

Some amateurs go a little further and use their hobby interest to benefit others. Repeater groups provide facilities for all amateurs to use. Packet 'Node' and 'Bulletin Board' system operators put their station on air purely to help others. The 'ambassadors' of amateur radio, be they individuals or groups, run Novice and RAE courses to introduce new blood to the hobby. Satellite organisations around the world design, build, pay for and launch amateur radio satellites for use by any amateur. Emergency groups such as Raynet put their communication facilities at the disposal of other organised groups devoted to the safety of human life. Others with personal skills promote our hobby to the general public, in-

creasing our 'status' within the community.

A few weeks ago as I write this, I was pleased to go along to attend the inauguration of Peter Chadwick G3RZP as the new RSGB President. He said some very interesting things in his speech (see this month's Radio Today), many of which I had been harbouring thoughts of for some time. It looks like I wasn't the only one. He rounded off his speech with a toast to the volunteers who do so much for amateur radio, often 'in the background', the 'unsung heros' of our hobby. Hear Hear.

## HRT Amateur of The Year

It was in acknowledgement of the volunteer efforts of radio amateurs that, a couple of years ago, I decided that HRT would host an 'amateur of the year' award. There are many people out there who do so much for others in our hobby, voluntarily, often without any praise or even a 'thank you'. Sometimes they just get moaned at. This month is your last chance to nominate the person who you feel should receive this year's award and prize. If you don't have a nomination form, just drop me an SAE, the address is at the rear of every issue, and I'll send you one. The winner will be announced at the HRT stand at this year's London Show, and the London Radio Hamstore have kindly offered a prize of the winner's choice of a 2m handheld, 70cm handheld, or a wideband receiver. If the winner can attend the show, we'll be very pleased to award the prize there and then, otherwise we'll make sure they receive their prize immediately after the show.

## Code Free Licence?

With the possibility of a 'code free' HF licence, we've received many, many letters for publication regarding the mandatory Class A CW test in the UK, these coming not only from the UK but from around the world.

As I said in the January 92 issue, the Radiocommunications Agency are the people to write your letters to regarding the CW test (Radiocommunications Agency, Amateur Radio Division, Waterloo Bridge House, Waterloo Road, London, SE1 8UA), and in last month's issue I publicized the fact that the RSGB also want your views on a 'code free' licence, the closing date for the RSGB's study being in the early part of this month (address in 'Club News'). Now, where was that photocopier 'start' button...

# LETTERS

## Letter of the month

Dear HRT,

I think it deserves mentioning, the excellent greetings and hospitality that were extended to me on amateur radio during my visits to the south coast area of England in 1991 and 1992. Prior to that time, I had never done any international travel and amateur radio became one of the highlights of my vacation.

I contacted both the ARRL and RSGB for reciprocal information and also info on frequencies and other operating parameters for the UK repeaters.

Amateur radio provided me with a wealth of information that would never be found in tourist pamphlets and travel books. A few days after my arrival I was introduced to a ham in Hove and visited his QTH for several hours one afternoon. I was also invited to attend a meeting of the Brighton and District Amateur Radio Club where I enjoyed an excellent presentation about the Greenwich Observatory. It was also nice to meet many of those that I spoke to on the Brighton repeater. This was beginning to exceed my expectations of what to expect from bringing my 2m HT along with me on my vacation! It was unfortunate that my two week visit seemed to come to a close all too soon.

I made a return visit in 1992 and

this time in addition to visiting the Brighton Club again, I was invited and transported to a meeting of the Worthing and District Amateur Radio Club which I enjoyed very much. At both of the clubs I visited, I gave them each a copy of the ARRL Repeater Directory so if any of their members ever plan a visit to the USA, they can find repeater frequencies in the areas they will be visiting. I hope they would have an equally exciting time by bringing amateur radio, as I did while visiting in England.

I am now planning to visit again in the later part of 1993. I would like to thank all of you who have made my first international travel experience such an enjoyable and memorable one.

Bob Schappert, KA2BCD

### Editorial comment:

**It's good to know that the great 'American hospitality' we hear about is reciprocated! Thanks for your letter Bob, and thanks also go to the UK amateurs who made you welcome. For our part, for our 'Letter of the Month' we've airmailed you a copy of the latest UK Callbook and Information Directory, which has plenty of details of amateur radio in the UK including repeaters, clubs, and reciprocal licensing information, we hope you'll find it useful.**

all UK hams a very good health, good luck and happiness for the next year.

Mihai, YO9FSR

### Editorial comment:

**Mihai also sent us a nice photo of himself in his shack, and a very interesting copy of 'CQ-YO', their national amateur journal, which is filled with information. Thank you Mihai, it's nice to hear from amateurs such as yourself in this international hobby of ours. We also knew Mihai was having difficulty in getting some crystal filters which we're trying to help him with, but if any amateurs do have surplus gear they may like to donate to their club station, I'm sure we at HRT wouldn't be offending them by volunteering a 'transportation service' - give us a ring if you'd like to help out!**

Dear HRT,

This letter is prompted by a comment from G3XTT on the letters page of December 92 HRT. He states that HRT has strongly endorsed the introduction of a Novice Licence, which is doing much to 'bring new blood into the hobby'. Why?

Who are these people to whom spreading the gospel and making converts is so important? Not the average amateur surely, to whom the influx of new blood merely represents a reduction in band space. Has the granting of inducements over the years to encourage this new blood resulted in a general improvement in, or even the maintenance of, established standards? See the Editor's comment, page 5, Dec 92 HRT; "Many of us know what's now come of 2m, she says, tongue in cheek". Will amateur radio die without this constant gossipping and unremitting pressure for easier access?

Anyone who is seriously interested in amateur radio will find his own way to it, and will discover a friendly readiness to help him achieve his goal. But the hobby is now big business, and equipment dealers (and periodical publishers!) need constant market expansion in order to survive. At three

Dear HRT,

I am in the fourth year of study at a mechanic engineering faculty 'manufacturing department' from the Polytechnic University of Bucharest. I am a Novice radio amateur and I hope after I shall graduate the faculty I shall obtain a superior class licence for radio amateur. I have had yet little time for this hobby because I have a lot of study at my faculty.

I operate the radio club station YO9KBU/YO9KIF from my town Tirgoviste, especially in the holidays. I am very sorry that I have not made any QSO with UK, the transceiver of the clubs is an old one and it doesn't work

so good. Though my brother is the President of the radio club and though he is a very enterprising man, he could not make too much. The interest of the people for this hobby (sport) is diminishing continuously. He could not obtain the necessary financial support from the local sponsors for development of this hobby. We hope that in the next year the things will run more better than this year, we wish you the same.

I am more eager than you can imagine, and I shall wait some news from all the hams from Tirgoviste. Through my letter I want to wish you and your family, your colleagues from HRT, and

## £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

DRAWN BY G6MEN



thousand quid a throw for the latest HF rig, repeat orders are hard to come by. Magazine publishers need increasing circulation in order to pull the dealers' advertising, hence the desperate pressure for new blood.

Amateur radio can and will survive without this constant propaganda and easier entry blandishments. It will die only when the day dawns on which a cheque book is the only necessary passport into the hobby.

Jim Pearson, G3KOG

**Editorial comment;**  
It seems significant that we seem to be the only magazine pushing ex-PMR conversions to get new licensees on the 2m and 70cm bands at a price they can afford! But we don't seem to have upset the 'big rig' advertisers, do we? Our hobby needs newcomers to replace those who leave the hobby, without it, we'll dwindle. We'll go on trying to help newcomers, because some of us know how hard it was when we were in that position, even to the extent of being ignored and even mocked as 'beginners' at certain amateur radio clubs.

Dear HRT,

I would like to take this opportunity to wish you all a 'happy new year' and thank you for the free advertising you offer us. It is good for retired people like myself. So once again thank you all, I wish you all the success with your mag.

Mr. W. Taylor.

**Editorial comment;**  
We try, we try!

Dear HRT,

If you put more of the following in your publication I, and I'm sure many others will, subscribe to your magazine. I would like to see regular features

on HF aerials such as practical yagi or quad projects.

'HF Happenings' is great, but how about a close look at the set-up used at G0KPW in Suffolk for the CQWW Phone Contest, six mono band yagis must be quite a sight. Even the switching system would be of interest especially if high power linears and multiple receivers were being used.

With 70,000 operators within the UK, there is surely plenty of 'aerial farms' to write features on. With standardised transceivers from Kenwood or Yaesu being the norm on HF Worldwide, the main technical interest would logically seem to be beam aerial performance. I look forward to future editions.

P. Evans

**Editorial comment;**  
Right now we have an article by Steve G4JVG (now P29DX) on the Chiltern DX Club's GU6UW setup for the CQWW, including photos of the big yagis, multiple receivers and so on! And Don G3XTT did a complete feature on last year's G0KPW system in the Feb 92 issue, with plenty of photos. Regarding aerials, we've featured reviews of several HF beams in the past, e.g. in the last year the KLM KT-34A (Jun 92), HF aerial projects such as G3TNO's multiband HF aerial and G2BZQ's shielded anti-noise 40 aerial (both in the Sep 92 issue), and other features such as G3XTT's Aerial design by PC (Mar 92). HF propagation prediction software was featured in the May 92 issue. Back issues are available for those who don't subscribe!

Dear HRT,

I draw cartoons, mainly on the subject of amateur radio (you may have noticed!). The main characters in these cartoons are usually white and male. I hope this does not reflect any prejudice on my part, I intend it to be a reflection

of the sociology of amateur radio.

If one considers hams in this country (the UK), one will find that the vast majority are white, male, middle class, and science or technology educated. Women, who make up half our population, are poorly represented. It is impossible to see someone's skin colour over the air, and perhaps this is a good thing in many ways, but on the other hand it does nothing to dispel our assumptions about the person on the other end of the QSO. One prominent UK ham of African descent goes as far as having a drawing of a Zulu warrior on his QSL card, as if to make plain his minority status in the hobby. If any radio club runs a policy of being open for regular radio operation by economically disadvantaged people from poorer areas (to whom even the QRP boast of 'on the air for less than £100' is meaningless) I would be very glad to hear it, however I'll be surprised if the practice is widespread.

Novice licensing in the UK seems, I am glad to say, to be introducing more young people to our hobby, and many of them are girls. But we have a long way to go before amateur radio is truly the leveller which we like to boast it is. Friends and colleagues, what will be your response to this?

Paul Thompson, G6MEN.

**Editorial comment;**  
We recently published a 'plea' from a prospective amateur who'd been turned away by his appearance of a skinhead, and we're pleased to report that help has been found from an amateur in his area who's assisting him in getting his licence. But it happens, the HRT Editor found discrimination several years ago as a teenager, a prospective amateur visiting a local club after moving to a new area. Being ignored by the (generally old) amateurs there didn't give me a good impression of what amateurs did.

# Icom IC-W21E Review

*Chris Lorek goes 'poserphoning' with Icom's very latest  
2m/70cm dual band handheld*



More than one person's said to me 'that looks like one of those smart new handheld cellphones' when I've been using the IC-W21E. It does look smart, and as well as 2m and 70cm it also receives a lot more besides, more of this later! It's also very easy to use, within minutes of switching it on I was happily chatting away on the local repeater.

## Handheld

The set was nicely 'palm sized', and as well as having a combined speaker/mic at the top, a separate mic contained within the nicad battery of the set can be used, for constant transmission. This is handy for cross-band full duplex operation for example, without the feedback you'd normally get without an earphone plugged in, the IC-W21E being used indeed just like a cellphone!

Overall, the set is designed to be 'simple to use', without all the multiplicity of buttons which you could accidentally press and find you were either talking to someone you weren't a second ago, or in fact not talking to anyone at all when you should have been! There's very little to 'go wrong' in terms of 'pressing the wrong buttons', and with 32 memory channels on each band you can indeed just program these up and use them alone for everyday use. I did. If you'd like to see what else is around on the bands, then you can also program a couple more dedicated memory channels with 'lower' and 'upper' scan limits, for the set to search between and pause for a few seconds, whenever it finds a signal.

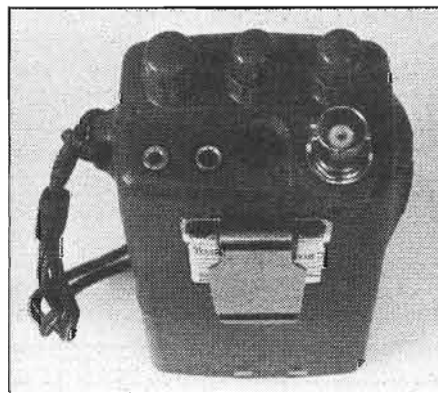
## Power

The set comes with a 7.2V 900mAh BP-131 nicad and a plug-in wall charger, with this the set gives you around 2W output on transmit. You can switch in lower power levels if you want to save your batteries, or even an extra-low 10mW 'EL' level for very local chats, or remote use of your 'main' station while you're at home.

For mobile or base station use, plugging in an external 12V DC supply increases the maximum transmit power up to around 5W, although this supply doesn't charge the batteries - you need to disconnect the nicad and slide a charging adapter onto it for use with the supplied wall charger.

## Facilities

As well as 2m and 70cm coverage, the receiver section can be programmed to tune over 108-179MHz, 311-460MHz,



and 800-945MHz. AM is automatically selected for you below 136MHz for airband reception which is quite handy (although it's illegal in the UK to listen to airband at present - a stupid law if you ask me). Not surprisingly, the specifications aren't guaranteed outside the amateur bands, but with more amateurs wishing to check other frequencies, this 'extended receive' facility could be useful.



Almost 'hidden away' in the instructions that come with the set are details of a 'multi-function' mode (which the manual gives only the 'essentials' of, hinting that a lot more facilities apart from the 'basic' ones featured are possible). CTCSS encode/decode can be programmed for example, to be used with an optional 'add on' CTCSS unit. An increasing number of 2m and 70cm repeaters in the UK are having CTCSS access facilities, often especially to aid handportable users, so this option could be very useful.

### In Use

I found the set was nice to hold, and very easy to operate, although I must confess to having a 'craving' to program it the way I would have preferred. 'Memory Scan' for example is initiated by a press of the 'S' button when in memory mode, this scans *all* the memory channels, including those with frequencies stored in 'extended coverage'. I would have preferred to have selected the channels 'in' and 'out' of the scan, and once I'd programmed them in, they couldn't be deleted. No doubt this can be altered in one of the 'multi-function' commands that aren't in the manual, but for 2m or 70cm scanning I just used the 'programmed scan' mode which was reasonably useful.

The receiver was nicely sensitive both on 2m and 70cm, and my transmitted audio was described as 'clear and punchy', although the receive audio from the small speaker holes was a bit 'boxy' and distorted a lot when I turned it up in noisy surroundings. I found the large display was easy to read, and once I'd learned the positions of the controls, I found the raised buttons were easy to use by touch alone, in the dark for example.

Connecting a rooftop aerial at home showed the set to be capable of reasonable performance, although I sometimes suffered on 2m receive from my semi-local fire station transmitter system operating just outside 2m.

### Lab Tests

The accompanying laboratory measurements show the set has ad-



equate performance for a handheld, the transmit deviation is a bit high (explaining the 'punchy' reports!) and the receiver 'S-meter' is rather limited, but otherwise I can't complain—I'm a rather fussy so-and-so technically. There was plenty of transmit power available with an external 12V DC supply, useful for mobile and base use as long as you keep your transmissions short to stop the case getting too hot!

### Conclusions

The set was easy to hold, easy to use, and all round quite a reasonable performer. Few amateurs should have problems in using it even 'from scratch', especially in today's age where 'bells and whistles' seem to come with everything. It may, however, be limiting to those who want paging, DTMF selective calling and the like, but then it's designed for a 'different' user to this.



The smart styling of the transceiver will I'm sure find appeal with many users. The HRT Editor Sheila G8IYA certainly liked the look of it for example – indeed it's her jeans (yes, she was inside them at the time) you'll see on this month's front cover 'modelling' the set!

The IC-W21E is currently priced at £425 including nicad and wall charger, with the CTCSS unit at £57 (but check the latest prices with your dealer). My thanks go to Icom (UK) for the kind loan of the review set.

## LABORATORY RESULTS:

All measurements taken using fully charged BP-131 nicad, high power TX, otherwise stated.

## RECEIVER

### Adjacent Channel Selectivity;

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

	145MHz	435MHz
+12.5kHz;	34.1dB	29.6dB
- 12.5kHz;	29.9dB	31.9dB
+ 25kHz;	65.8dB	63.2dB
- 25kHz;	60.3dB	63.2dB

### S-Meter Linearity

	145MHz	435MHz
S1	sq open	sq open
S3	0.32µV pd (-11.0dB)	0.57µV pd (-7.5dB)
S5	0.57µV pd (-6.0dB)	0.75µV pd (-5.0dB)
S7	0.81µV pd (-3.1dB)	1.02µV pd (-2.3dB)
S9	1.14µV pd (0dB ref)	1.34µV pd (0dB ref)
S9++	1.71µV pd (+3.5dB)	1.74µV pd (+2.3dB)

### Sensitivity;

Input level required to give 12dB SINAD;

145MHz	435MHz
0.15µV pd	0.15µV pd

### Current Consumption

Standby, squelch closed;	98mA
Receive, mid volume;	143mA
Receive, max volume;	173mA

### Maximum Audio Output;

Measured at 1kHz on the onset of clipping, 8 ohm load;

145MHz	435MHz
212mW RMS	209mW RMS

### Image Rejection;

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

145MHz	435MHz
92.9dB	65.2dB

### Squelch Sensitivity;

	145MHz	435MHz
Threshold;	0.14µV pd (11dB SINAD)	0.10µV pd (6dB SINAD)
Maximum;	0.29µV pd (25dB SINAD)	0.27µV pd (24dB SINAD)

### Intermodulation Rejection;

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

	145MHz	435MHz
25/50kHz spacing;	58.0dB	58.8dB
50/100kHz spacing;	55.3dB	59.5dB

### Blocking;

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

	145MHz	435MHz
+100kHz;	77.2dB	75.4dB
+1MHz;	88.8dB	88.5dB
+10MHz;	96.9dB	95.6dB

## TRANSMITTER

### TX Power and Current Consumption;

Freq.	Power	7.2V Supply	12.0V Supply
145MHz	High	2.25W/1.08A	5.86W/1.48A
	Low 3	2.25W/1.07A	3.59W/1.15A
	Low 2	1.45W/800mA	1.47W/790mA
	Low 1	380mW/485mA	390mW/495mA
	E Low	20mW/160mA	20mW/160mA
435MHz	High	1.71W/1.16A	5.45W/1.82A
	Low 3	1.71W/1.16A	4.08W/1.44A
	Low 2	1.58W/1.08A	1.81W/1.03A
	Low 1	430mW/625mA	660mW/655mA
	E Low	10mW/160mA	10mW/160mA

### Harmonics;

	145MHz	435MHz
2nd Harmonic;	-73dBc	-81dBc
3rd Harmonic;	<-90dBc	-77dBc
4th Harmonic;	<-90dBc	<-90dBc
5th Harmonic;	<-90dBc	-
6th Harmonic;	<-90dBc	-
7th Harmonic;	-78dBc	-

### Peak Deviation;

145MHz	435MHz
5.16kHz	6.17kHz

### Toneburst Deviation;

145MHz	435MHz
3.15kHz	3.41kHz

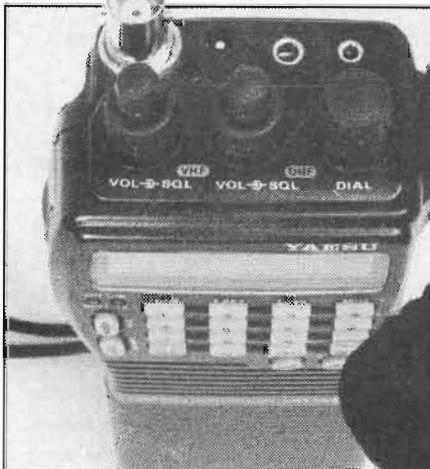
### Frequency Accuracy;

145MHz	435MHz
-162Hz	-480Hz



# Yaesu FT-530 Review

*Chris Lorek G4HCL goes fully flexible with a new do-everything handheld*



They described it as a 'very flexible' handheld, one that could do as little or as much as you wanted. I think they were right! I managed to have a quick 'play' with the FT-530 at the Leicester exhibition, complete with the optional extension mic with it's buttons and backlit LCD, and I awaited the day I'd be 'let loose' on one to try out for a review.

## Flexibility

The day came, and I wasn't disappointed. Indeed, this very evening the 'talk' on my local repeater is between two new FT-530 owners, chatting about all the various things it can do! To give you an idea, as well as the usual dual band things such as 2m and 70cm operation, you can use it as an automatic cross band repeater, it has CTCSS built in for repeater access use as well as quiet monitoring, all the DTMF 'bells and whistles' that I can think of, such as

paging, selective calling, plus a few more, a very wide extended receive coverage (and transmit if you really

want) including switchable AM/FM receive anywhere across the range, timers that can switch the set on, off, wake you up, remind you of appointments or skeds, I could go on and on.

## Basics

OK, so having been 'overwhelmed' with all this, let's get back to Earth. To keep things simple, you can use the set as a 'simple' rig, either using the tuning knob, which automatically switches in the correct 2m repeater shift when you're in that part of the band, or the 40 memories channels on each band (which also store all the 'bells and whistles' you've programmed). So, tune to the frequency you need, press the button, and let the radio do the rest.

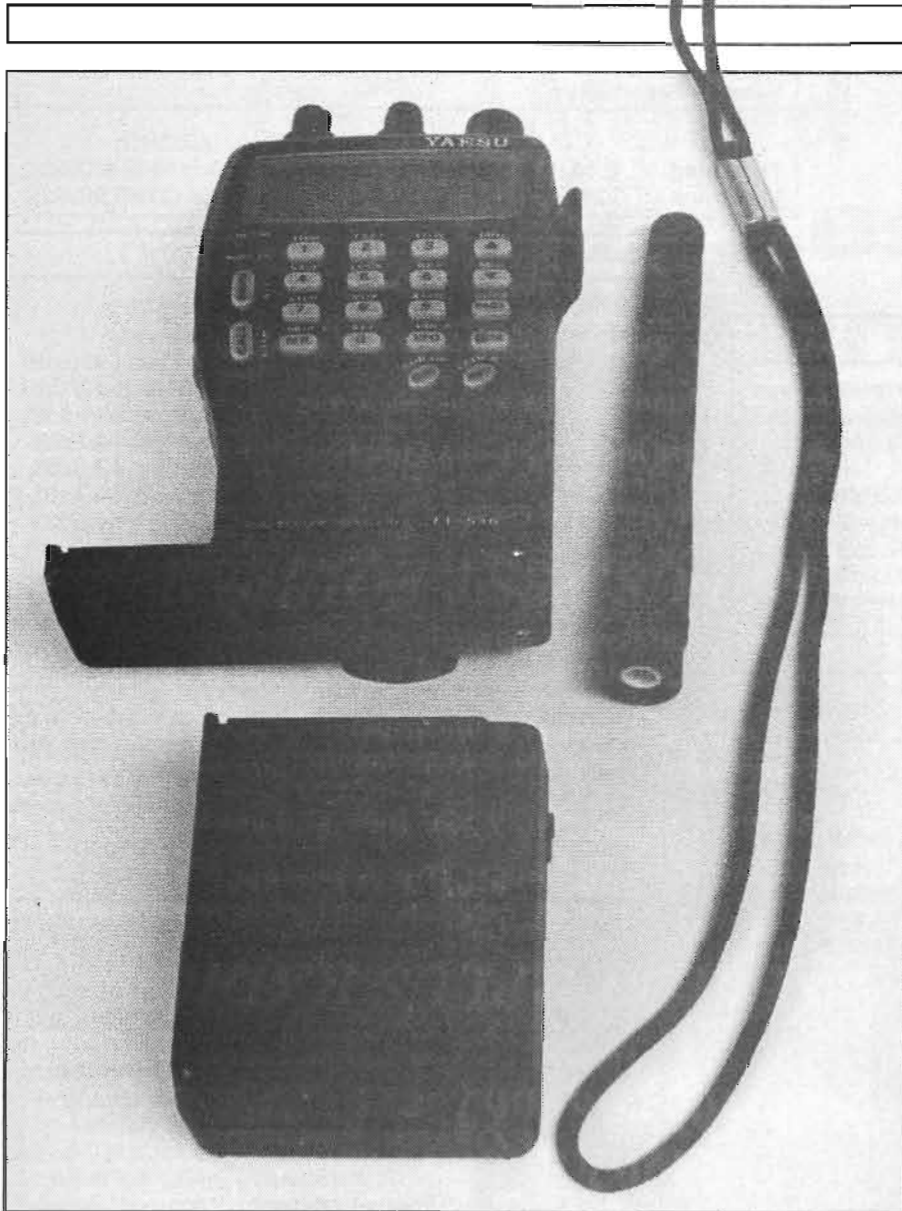
It covers the normal 2m and 70cm bands 'as standard', and can also receive over 110-180, 300-500, and 800-950MHz, which opens up a few possibilities. It gives around 2W out on transmit with the supplied 7.2V 700mAh nicad, and around 5W out if you plug in an external 12V supply which also charges the supplied nicad.

## Power Saving

Three TX low power levels can be switched in, down to around half a watt output, and plenty methods of 'battery save' features can be switched in on receive including an 'automatic' cycle which looks at the channel activity and varies the on/off save ratio to suit what you're listening to. On transmit, it can even look at the S-meter, and if it's full scale it'll automatically select low power transmit for you if you like, it can also automatically unkey the transmitter while you're not talking to make those nicads last that bit longer.

## Buttons Galore

So I was let loose on it, and after trying the 'basics' out I decided to have a 'play'. This, I must confess, is where I got unstuck. Yes, I *should* have had the manual to hand, fortunately a small credit-card sized booklet comes with the set giving details of most of the functions. But this didn't stop me getting the set into modes I somehow just couldn't get out of, and on more than one occasion I did a



with my base aerial system using my 70cm portable from the lounge, this of course being quite legal in the UK (read your licence).

### Laboratory Tests

These showed quite a reasonable performance, the receiver 'images' could have been a bit better, but otherwise the strong signal handling performance wasn't too bad. On transmit the harmonics were very well suppressed, and the transmit deviation accurately set – no 'overdeviation bleeps' on repeaters with this one.

### Conclusions

This is the most versatile handportable I've come across as yet, it's no wonder the guys I heard on my local repeater were 'raving' about it. I certainly found it so, but maybe a little 'too much'. The 'keyboard lock' function was very useful, I could just use the rotary knob and the 80 memories when out and about, after programming these up with all the things I could think of, making operation very simple as a result. I'm saving up, I'm saving up.....

*The FT-530 is currently priced at around £435 including nicad and wall charger, and my thanks go to South Midlands Communications Ltd. for the loan of the review set.*

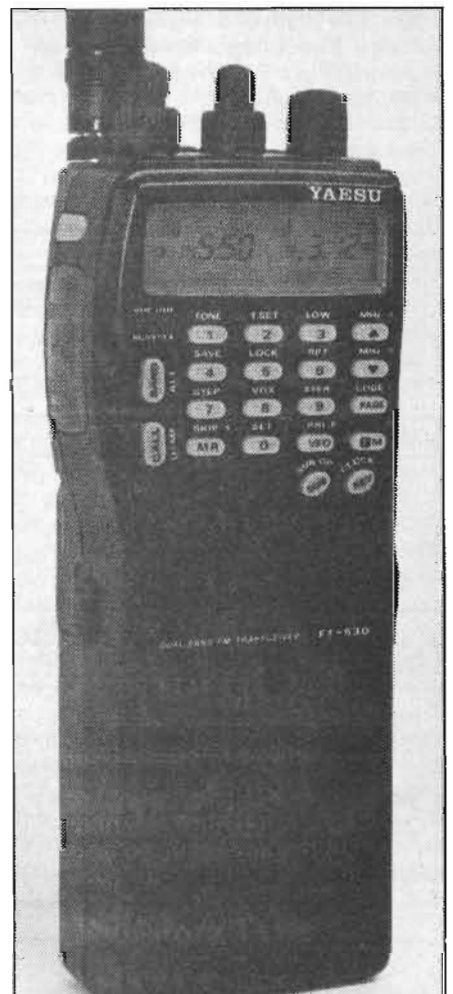
'reset' on the rig, possibly more out of frustration than anything else! Eventually, I settled down to having a good read of the book, programming the memories and using just these for 'normal' monitoring and communication, and using the two 'VFOs' on each band for channel hopping and general tuning around.

### In Use

To be quite honest, I didn't like the 'styling' of the set, although that's just a personal thought – the buttons and controls must go somewhere I suppose. The separate volume and squelch controls for each band were easy to use, and separate 'busy' LEDs for each band told me exactly what was happening when a signal came through. The automatic 'band select' made sure I replied on the right band as well, especially while I was walking along in the dark! The keypad and display backlight illumination were superb, al-

though I occasionally found operating the small buttons with gloved hands a bit difficult, sometimes pressing the 'band' button accidentally as I operated the set. The 1750Hz toneburst button for repeater access was sensibly placed just above the PTT, rather than repeater access being a 'two handed affair' as with some sets, and the built-in CTCSS was a nice touch, especially with more and more UK repeaters having CTCSS access facility which helps weak portable users no end.

I found the VHF receiver very sensitive indeed, the UHF side slightly less so, and the small set top helical gave quite a reasonable performance. Operating from home with my rooftop aerial showed a few 'blocking' problems on VHF, this probably being down to the sensitive receiver, where strong local signals brought the odd 'mixing' problem to light. I did however find the set very useful in cross band 'repeater' mode, so I could operate on high power 2m (feeding my external 100W linear)



## LABORATORY RESULTS:

All measurements taken using fully charged BP-131 nicad, high power TX, otherwise stated.

### Squelch Sensitivity;

	145MHz	435MHz
Threshold;	0.10 $\mu$ V pd (8dB SINAD)	0.16 $\mu$ V pd (10dB SINAD)
Maximum;	0.24 $\mu$ V pd (22dB SINAD)	0.29 $\mu$ V pd (22dB SINAD)

## RECEIVER

### Blocking;

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

	145MHz	435MHz
+100kHz;	85.2dB	80.4dB
+1MHz;	95.1dB	87.0dB
+10MHz;	96.9dB	90.9dB

### Adjacent Channel Selectivity;

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

	145MHz	435MHz
+12.5kHz;	40.6dB	36.3dB
-12.5kHz;	26.6dB	15.3dB
+25kHz;	71.3dB	68.4dB
-25kHz;	66.3dB	66.9dB

### Image Rejection;

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

145MHz	435MHz
53.8dB	41.7dB

### Current Consumption

Standby, squelch closed;	96mA
Receive, mid volume;	142mA
Receive, max volume;	219mA

### Maximum Audio Output;

Measured at 1kHz on the onset of clipping, 8 ohm load;

145MHz	435MHz
220mW RMS	234mW RMS

### Sensitivity;

Input level required to give 12dB SINAD;

145MHz	435MHz
0.13 $\mu$ V pd	0.18 $\mu$ V pd

### S-Meter Linearity

	145MHz	435MHz
S1	sq open	sq open
S2	0.29 $\mu$ V pd (-15.0dB)	0.46 $\mu$ V pd (-13.2dB)
S3	0.33 $\mu$ V pd (-14.3dB)	0.53 $\mu$ V pd (-12.1dB)
S4	0.40 $\mu$ V pd (-12.8dB)	0.57 $\mu$ V pd (-11.3dB)
S5	0.51 $\mu$ V pd (-10.6dB)	-.71 $\mu$ V pd (-9.5dB)
S6	0.67 $\mu$ V pd (-8.3dB)	0.93 $\mu$ V pd (-7.1dB)
S7	0.87 $\mu$ V pd (-6.0dB)	1.27 $\mu$ V pd (-4.4dB)
S8	1.22 $\mu$ V pd (-3.1dB)	1.58 $\mu$ V pd (-2.5dB)
S9	1.72 $\mu$ V pd (0dB ref)	2.11 $\mu$ V pd (0dB ref)
S9+	3.29 $\mu$ V pd (+6.0dB)	2.97 $\mu$ V pd (+3.0dB)
S9++	4.95 $\mu$ V pd (+9.1dB)	4.54 $\mu$ V pd (+6.7dB)

### Intermodulation Rejection;

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

	145MHz	435MHz
25/50kHz spacing;	59.0dB	60.0dB
50/100kHz spacing;	58.2dB	59.8dB

## TRANSMITTER

### TX Power and Current Consumption;

Freq.	Power	7.2V Supply	12.0V Supply
145MHz	High	2.23W/970mA	5.30W/1.32A
	Low 3	2.23W/970mA	3.42W/1.07A
	Low 2	1.71W/790mA	1.71W/780mA
	Low 1	600mW/540mA	600mW/540mA
435MHz	High	1.51W/1.09A	4.59W/1.70A
	Low 3	1.51W/1.05A	3.21W/1.17A
	Low 2	1.48W/1.04A	1.47W/950mA
	Low 1	580mW/610mA	580mW/590mA

### Harmonics;

	145MHz	435MHz
2nd Harmonic;	-69dBc	<-90dBc
3rd Harmonic;	-85dBc	<-90dBc
4th Harmonic;	<-90dBc	<-90dBc
5th Harmonic;	<-90dBc	-
6th Harmonic;	<-90dBc	-
7th Harmonic;	<-90dBc	-

### Frequency Accuracy;

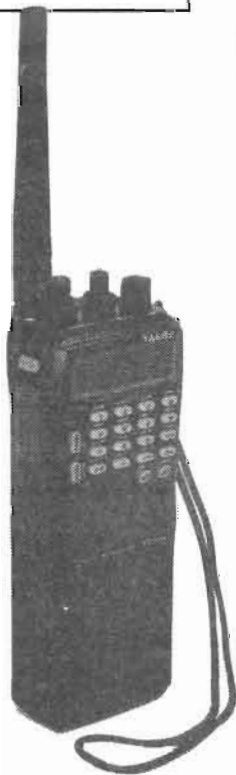
145MHz	435MHz
-216Hz	-610Hz

### Toneburst Deviation;

145MHz	435MHz
2.77kHz	3.02kHz

### Peak Deviation;

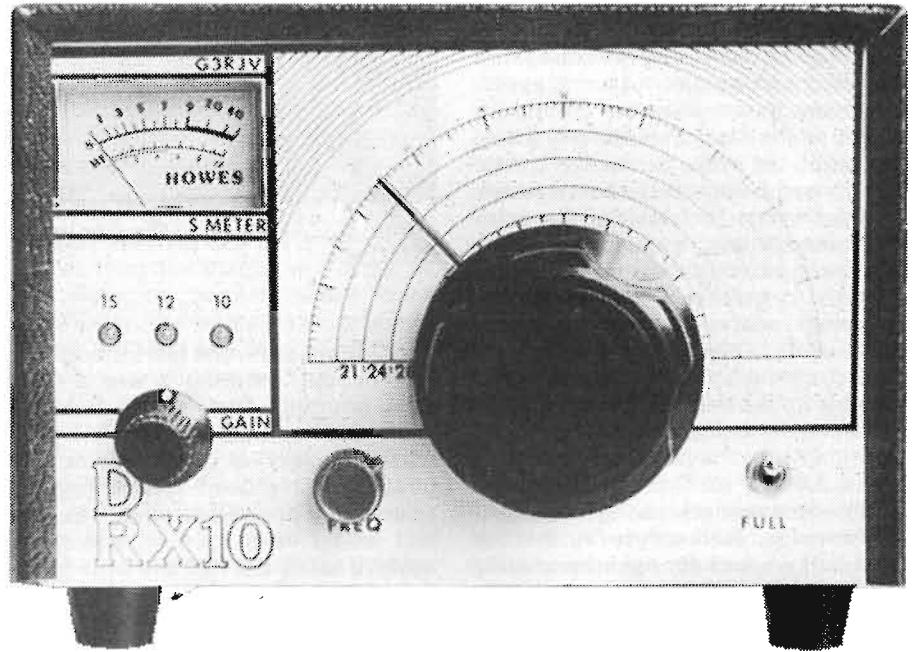
145MHz	435MHz
4.94kHz	4/62kHz



# DXR10 Review

When conditions are right, the upper HF amateur bands can offer exciting listening. Many radio amateurs have shared in the pleasure of working around the world on the 10m band (28 to 29.7MHz), and the 15m band (21 to 21.45MHz) is a popular DX band and is often full of interesting signals on both CW and SSB. Now added to these is the new 12m band (24.89 to 24.99MHz), highly rated for DX by those who have used it. Generally very few items of home built equipment are built for these bands because of the techniques involved in getting a stable and reliable receiver operational on them. Good stability, high sensitivity and strong signal handling capability are all required for a successful receiver on these bands.

Recently the firm of C. M. Howes Communications have added to their range of amateur radio kits a receiver called the DXR10. This kit enables the average constructor to build a direct conversion receiver which covers the whole



## *Rev. G. C. Dobbs G3RJV looks at the Howes DXR10 Receiver kit for 10, 12 and 15 metres.*

of the 15m and 12m bands, and the most used bottom end of the 10m band. It can receive CW and SSB signals, the two commonest types of traditional amateur radio communication on HF.

The DXR10 receiver has bandpass input filtering, thus the receiver requires no alignment or RF peaking adjustment. Other features include a high level double balanced mixer, an active filter, a stable three band VFO, and around 1W of audio output power to drive an external speaker or headphones.

### **Building the DXR10**

The constructor is provided with the printed circuit board and all the board mounted components. The controls, the case and the hardware are not provided but instead are left for the constructor to obtain. Not a bad idea, since these items can be the most expensive in any project and can often be found cheaply at radio rallies and in deep junk boxes. It also

adds individuality to the project, as one problem with kits can be that whoever builds it, it can turn out the same as all the other examples of the same kit! This decision allows some scope for personalising the receiver, my example of the kit can be seen in the accompanying photograph.

The instructions provided with the kit are simple but very clear, and it should be possible for anyone with a good soldering technique to build the kit without any problems. There is a concise section on how to identify the provided components, sometimes not easy for beginners, for example when faced with various capacitor markings. One component must be hand wound, a broad-band transformer, and the instructions are well laid out to enable anyone to wind the transformer even if it is their first attempt at inductor winding.

The band change switch is situated on the printed circuit board as close as possible to the capacitors being

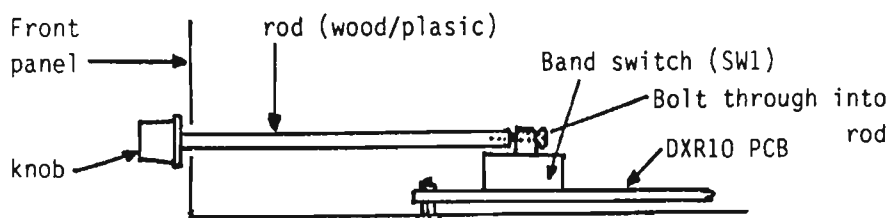
switched. This does mean that some method has to be adopted to enable the switch to be operated. The simplest method would be to lift up the lid of the case and operate the switch on the board, but this is somewhat crude and a remote slide switching method is suggested. Rather than use a rod attached to the switch by a bolt as suggested in the instructions, I simply fashioned a piece of stiff wire of around 18 SWG to push and pull the switch SW1. I drilled a hole in the 'toggle' of SW1 and made a hook in the wire to fit through the hole. The other end of the wire went through the front panel of the receiver where I terminated it with a small knob. The resulting band switch action was by pushing and pulling the knob, with LEDs indicating which band had been selected.

My example of the DXR10 shown in the photo also includes another Howes kit, the DCS2 relative signal strength meter. This is an audio driven module which provides a meter reading of the audio strength of signals, having been designed for use with their range of direct conversion receivers.

### **Case and Hardware**

I built the DXR10 in a case measuring 100mm high by 150mm wide by 150mm deep, this gave adequate room to mount both the DXR10 and DCS2 printed circuit boards. The generous height allowed a large tuning scale to be used on the front panel and a 75mm diameter loudspeaker to be mounted inside the rear

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panel. The main tuning control does need a reduction drive for ease of tuning. I used a 6:1 in-line epicyclic drive with a pointer attached to the barrel to indicate the tuned frequency on a semi-circular scale, this gave a pleasant 'classic look'.

### How did it perform?

Feeding the receiver through an aerial tuner connected to my doublet aerial positioned around 18m above ground level showed it to appear to be very sensitive, and when the 10m band

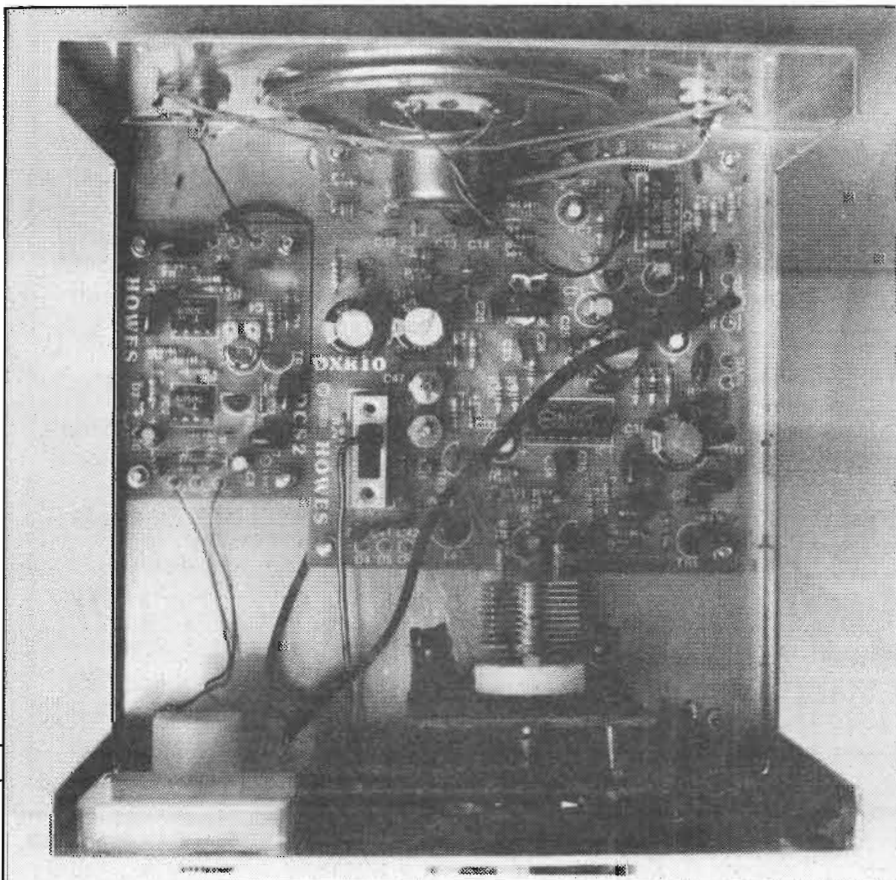
was open it brought in an amazing range of DX stations. I then put the receiver on my desk in a bay window and ran a length of wire about 3m up in the air, and I was still able to monitor a large range of stations on the 15m and 10m bands.

Naturally these three 'higher bands' are dependent upon signal propagation conditions and there are times when the receiver may appear to be dead, but so do most receivers at these times. When these bands are open, they can often provide the most interesting listening of all the HF amateur bands.

I wondered about the wisdom of the receiver designer using a single band-pass filter to cover all three amateur bands, but in practice, with the exception of signals from a local transmitter operating just below 10m, I had no out of band breakthrough on the receiver. I also had doubts about the switched VFO used, but again this seemed to work out very well and the receiver was stable enough to resolve and hold SSB signals on the 15m and 10m bands.

### Conclusion

I found the DXR10 receiver kit easy to build, and the results were such that in my opinion it represented good value for money even if it was only used as a casual monitor receiver. I liked it.



# Packet Radio

## -Roundup-



*Chris Lorek G4HCL tests the G7JJF packet program, and gets invited to an interesting lecture*

It was a few months ago since I first came across the G7JJF suite of packet terminal driver programs, and even now I haven't tested all the features! I've already had enquiries from as far away as Greece from a station who knew I was testing this, as well as plenty of enquiry messages from UK amateurs, so here goes;

There are versions of the G7JJF program for a 'normal' TNC, for use 'above' a BPQ node running on your computer, or with the Baycom system. All give roughly similar features although each add some individual 'niceties', like multiple 'virtual TNC' port switching on BPQ, and WEFAX, SSTV and RTTY receive on the TNC version when used with suitable Kantronics TNCs.

The 'basic' features, if you call them basic, beside the 'usual' communications screen as seen here are; a 500 line scroll-back buffer with 'search' facilities, a very comprehensive personal mail system, connect directory, pop-up menu-driven ASCII, YAPP, YModem and XModem file transfers, a file directory browser with a file viewer, file and notepad editor, built-in 7PLUS encoding and decoding of files, an easy to use 'script' language for automatic (and even automatically timed) BBS access, message listing and the like, right down to a QTH locator directory and conversion and distance calculation 'pop up' facility!

Best of all, it's shareware, meaning that you can try most of the features out, if you like it and wish to carry on using it, then registration costs you only a minimum donation of £10 which adds all the facilities.

### The Software

The main screen is split into two main windows, for transmit and receive text, with the current time and the length of time 'connected' shown at the top (or

```
TNC Driver Program (C) Jon Welch (G7JJF) Ver 1.41 09/03/92 00:20:00
Connected To BBSXJZ
7134 B$ 3091 ALL GBR G3KEV 09-Jan LESS FREQUENCIES NOT MORE
7135 B$ 1220 50MHZ GBR GBFAK 09-Jan MWVINFO 7 JAN...UK 6N GROUP***
7140 B$ 3555 USENET GBR G6IXS 10-Jan Usenet Broadcast links ...
7141 B$ 1544 FDB GBR G8XAM 10-Jan Protocole Problem solved!!
7142 B$ 6816 SPACE GBR G8VHD 10-Jan FAQ3-2
7143 B$ 4442 SPACE GBR G8VHD 10-Jan FAQ-7
7144 B$ 1451 SAIIV GBR G7JYU 10-Jan GP SAI IX info pse
7145 B$ 1755 CDROM GBR G81SXX 10-Jan Photo CD Help.
7147 PW 3862 G4USC G87LMB G4HCL 10-Jan Reply from Steven
G87XJZ BBS >

Registered to Chris Lorek G4HCL DP Spool: >OFF) Printer: >OFF)

c bbsxjz
11 10
```

### The main communications screen

the 'help' key when not connected). Below this is a window which shows the callsign you're connected to, which is picked up from the 'Connected to' text from your TNC. Another window contains status information, which displays the registered user of the software, the music symbol if the connect bell is on, a 'P' if the PMS is enabled (it'll flash if you have mail waiting), the uploading/downloading files status

together with a bytes to go/bytes downloaded counter and the printer dump on/off status.

### Personal Message System

This has many of the facilities of a 'full blown' BBS, including 'Normal User', 'Expert User' and 'Sysop' command strings, automatic forwarding in

Pop-up 'help' is available

```
16:48:53 TNC Driver Program (C) Jon Welch (G7JJF) Ver 1.41 09/03/92 00:02:00
Connected To BBSXJZ
7134 B$
7135 B$
7140 B$
7141 B$
7142 B$
7143 B$
7144 B$
7145 B$
7147 PW
G87XJZ BBS

Alt Help Screen
Alt A - Toggle Local Echo
Alt B - Toggle Connect Bell
Alt C - Connect Directory
Alt D - Directory Browser
Alt E - Edit File
Alt F - FAX Menu
Alt G - Perform Script
Alt H - This Help Screen
Alt I - Info Screen
Alt J - Monitor Connects
Alt K - Exit Kiss Mode
Alt L - Locator Calculations
Alt M - Monitor Data
Alt N - Note Pad
Alt O - Enter PMS locally
Alt P - Toggle Printer
Alt Q - TNC I/P From File
Alt R - Toggle RTTY Mode
Alt S - Change Setup
Alt T - Send Date/Time
Alt U - Encode/Decode File
Alt V - Slow Scan TV Menu
Alt W - Toggle Connect Bar
Alt X - Exit Program
Alt Y - File Transfers
Alt Z - Toggle Full Screen

Register
e: >OFF)

c bbsxjz
11 10

F1: Capture F2: ASCII Send F3: Pause F4: Bin Recv F5: Bin Send F9: Shell
```



### Typical WEFAX display

and out, and the like. You can configure it to do as little or as much as you like, including 'DOS Gateway' functions allow computer access. The PMS also supports REQDIR and REQFIL requests from users, with optional automatic encoding of binary REQFIL requests into UUcode or 7PLUS code format, the 7PLUS source code having been integrated into the software. A configurable 'help' file can help users through all the commands!

### WEFAX, RTTY, and SSTV

These (receive only) modes will work on TNC's that support the MAXUSERS, DAYTWEAK and WEFAX commands, such as some Kantronics TNCs. The WEFAX mode can capture, review, and print either WEFAX weather pictures or FAX pictures, and you can invert or reverse the picture as needed, and automatic alignment synchronises the picture before reception starts. The RTTY mode can receive RTTY data at any baud rate between 10 and 2000 with optional tone inversion, verbose mode or true data mode. The SSTV mode can be used for capturing, reviewing and printing 8 second, 16 second and 32 second frame SSTV pictures. These modes certainly 'open up' the facilities of an otherwise 'normal' TNC!

### User Friendly

Pop-up menus make the program very 'user friendly', I had no difficulty in getting going with it, including using the built-in file editor for messages and even for automatic 'script files'. These are very useful once you've got the

'hang' of them, e.g. for creating automatic procedures for virtually anything you'd do at the keyboard, such as logging onto a BBS, spooling all your messages to a disc file then disconnecting, automatically forwarding mail from your program, or just connecting to a packetcluster over a multi-hop path.

I certainly enjoyed using the program, and I now routinely use my registered version of this in preference to others for BBS use. The £10 registration seems very good value, and I'd recommend the program highly.

I received my evaluation copy from the Riverside Computers shareware library (Riverside House, Manvers Road, West Bridgeford, Nottingham, NG26DJ, Tel. 0602 452242). The disk comes packed with files plus complete documentation, including registration information. Alternatively if you'd like to know more about the software, you can contact Jon G7JJF @ GB7EQT.#23. GBR.EU

### Packet Guides

Hardly a week goes by without my being asked 'where can I get information on such-and such an aspect of packet radio. I recently received the latest (5th Edition) Practical Guide to Packet Operation in the UK, and it seems to grow more comprehensive each time! Almost half of the A4 spiral bound volume is filled with 'help files', typical of those you'd find on your local BBS and DX Cluster, making it a handy 'look-up' reference while you're on-air. It isn't just limited to that of course, up-to-date lists and maps of packet nodes, BBSs and DX clusters are shown for the UK and Eire, and world BBS listings are given including the vast number in the USA. Information chapters cover an introduction to packet radio, basic TNC commands and their settings, a beginner's 'trouble-shooting' guide, and a very useful chapter on Packet Satellite operation, altogether a good reference for the 'old hand' as well as newcomers to the mode. The next issue will contain details of 9600 baud modifications (maybe you have something in this line to offer for the next issue?). The book is priced at £7.95 plus £2.00 p/p, and my thanks to Siskin Electronics (2, South St, Hythe, Southampton, SO4 6EB, Tel. 0703 207587) for the provision of the review copy.

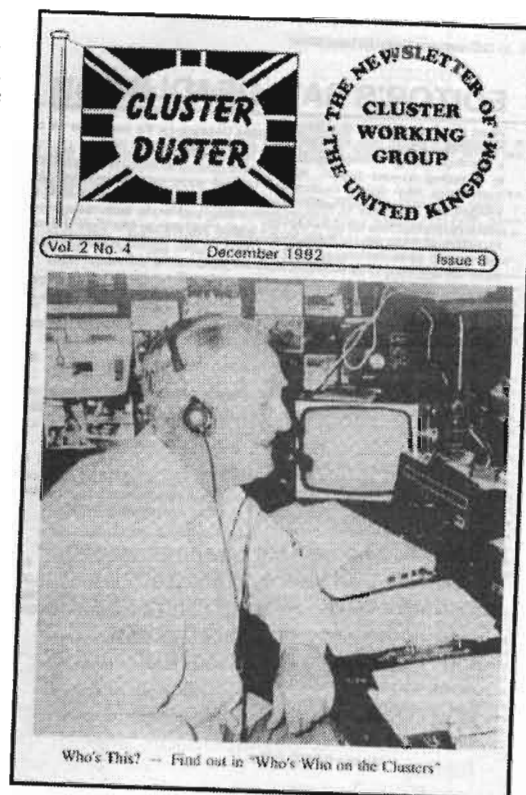
### CTRL-Z, End of Message

The latest issue of the UK Cluster Working Group's quarterly 'Cluster Duster' popped through my letter box a couple of weeks ago, again filled with news on the clusters as well as very

readable articles. The annual subs for receiving this by post are just £4, payable to the UKCWG, c/o Maurice King G3XKD, 15 Glebe Road, Prestbury, Cheltenham, Glos, GL52 3DG.

I've also just received another bumper load of amateur software from Riverside (thanks Nigel), including a vast amount of NOS (Network Operating System) information and programs, I'm still ploughing through it all! You can get a catalogue from the company if you're interested, see last month's *Radio Today* for details.

As I write this, I've been invited to attend a lecture next week, entitled 'Packet Radio on the Battlefield', organised by an international military/commercial liaison communications organisation. It should be interesting! I'll be able to tell you about it in next month column. Please keep me in touch with what you're doing, all packet messages I receive get a reply, or you can contact me by post at P. O. Box 73, Eastleigh, Hants, SO5 5WG. Until next month, 73 from G4HCL @ GB7XJZ



### SSTV reception facilities



HAM RADIO TODAY APRIL 1993

# SCANNERS

## From the Editor's Desk

We had a good response to our competition, featured in the Jan 93 issue of *Scanners*, with six prizes each of a personally signed copy of Kevin Fox's book the *Aviation Enthusiasts Handbook*. The lucky winners were;

Mr. M Graves of Crawley, Sussex; Paul Herrman of New York, USA; Cliff Barrimore of Isleworth, Middlesex; David Mitchell of Preston, Lancashire, Werner Henry of St. Joseph in the Commonwealth of Dominica, and Ms. B. Platter of Chichester, West Sussex. Congratulations to the winners and readers alike for your correct answers (we did get some incorrect entries). Our commiserations if you didn't manage to win, but remember you can always purchase a copy!

## New Products

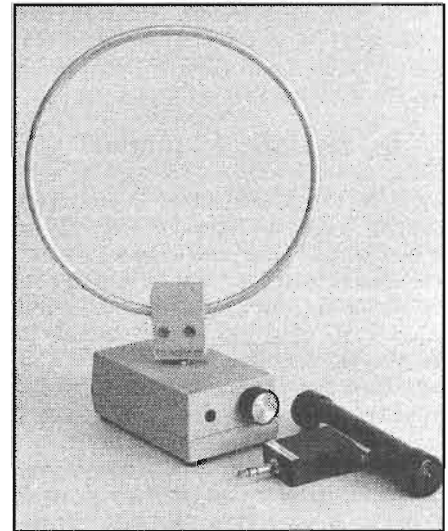
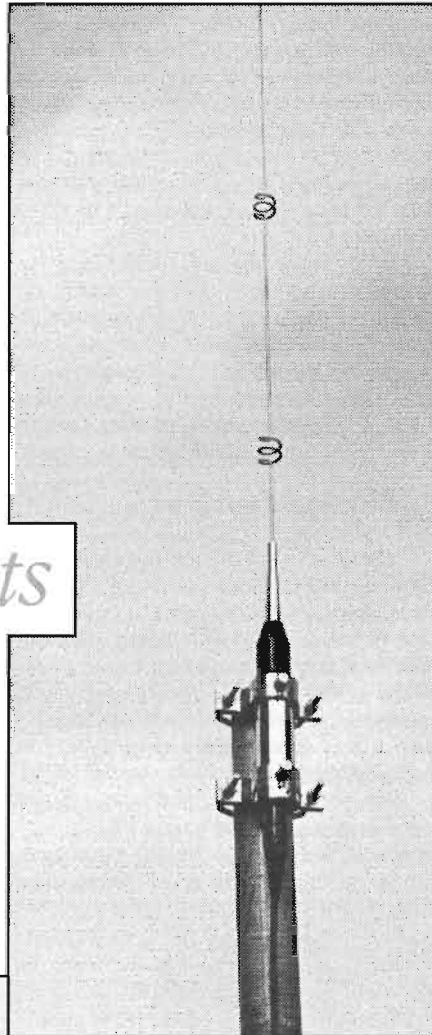
### WA7000 30kHz-2GHz Aerial System

The WA7000 has replaced the earlier WA5000 from AOR, this having already proved to be very popular from the feedback we've received following our June 92 *Scanners* review. The new WA7000 is a slimline base aerial, and is likewise designed for a wide range of VLF-SHF listening requirements. A MOS power FET amplifier is housed in the outdoor aerial base, for use over the 30kHz-

30MHz HF range with a gain of 6dB being provided, the preamp being switched out for use above 30MHz.

An indoor interface unit is used together with the supplied plug-in wall power unit for the preamplifier, and together with a short patch lead for your receiver, a 15m length of terminated RG-58U coax is supplied to con-

nect the interface unit to the aerial base. Outdoor mounting hardware allows the aerial to be fitted to a 25mm-60mm diameter pole. The WA7000 system is priced at £129.

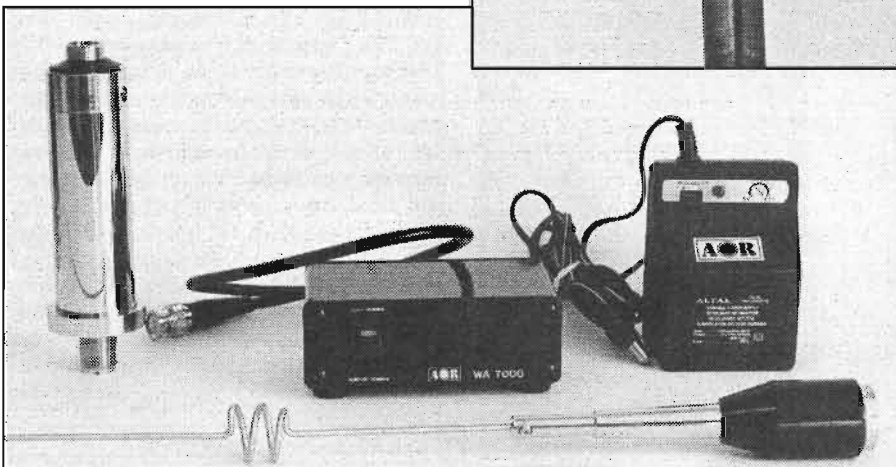


LA320 Active Loop Aerial

With more and more scanner receivers having LF and HF coverage, a number of scanner users have joined dedicated LF and HF listeners in finding the need for compact aerials for these bands. A 'long wire' can prove useful if space allows, although the 'feed-in' lead from this can often pick up local electrical noise. The LA-320 system, while having the advantage of being a compact indoor aerial, adds the feature of directivity, where the aerial element may be rotated to 'null out' interfering signals to improve reception. These signals may be either from local sources such as neighbourhood computers, or from greater distances such as unwanted radio stations on the same or nearby frequencies.

The LA320 is supplied with a base unit (powered from an internally fitted 9V battery), coaxial patch lead, and aerial elements for 1.6-5MHz and 5-15MHz, and is priced at £99. For keen broadcast band DX listeners, optional elements are also available for 0.54-1.6MHz (Medium Wave) and 0.2-0.54MHz (Long Wave) at £29.40 each.

We've already planned 'mini-reviews' of both of these aerial systems. In the meantime, you can get further details from the UK distributors, AOR (UK) Ltd., Room 2, Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbys. DE4 4BG. Tel. 0629 825926.





# Yupiteru MVT-7100

## Review

*Chris Lorek marvels at an incredible super-wideband all mode scanner*

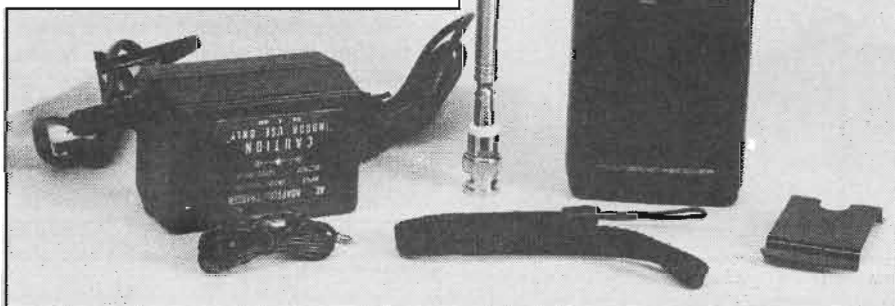
After seeing a Japanese leaflet on the Yupiteru MVT-7100 (written in Japanese as well), brought back for me from Tokyo by a colleague because he 'knew I'd be interested', I was marvelling at its features, and wondering 'How would it perform?'. I didn't have long to wait, as just a couple of days later I received a fax asking if I'd like to try this wonderful new scanner called the MVT-7100! Needless to say, I didn't waste time before replying!

### DC to Light, all mode!

Well, almost. The scanner covers an incredible frequency range of 500kHz to 1650MHz (it'll actually tune down to 100kHz), with receive modes of USB, LSB, AM, FM, and WFM. Yes, that's right, upper and lower sideband as well! So after you've listened to the crew on board Concorde taking off, you can follow them across the Atlantic on HF SSB. Or listen into radio amateurs from across the world on 14MHz. Or tune into HF and VHF maritime signals while you're having that cruise you've always promised yourself. If you've an amateur licence, add a home made CW or SSB low power transmitter and wire aerial, and you'd have a portable go-anywhere battery-powered station for world-wide communication!

### Monitoring, Monitoring

Almost any radio frequencies you'd want to tune into, you'd probably be able to do so with this rig. To help you keep track, it has 1000 memory channels, arranged in the 'usual' ten banks of 100 channels each. But with all that frequency spectrum to cover, you'll probably find yourself putting the set into 'search' mode to seek out new active channels. With this in mind, the set has ten search 'banks', and to save problems from all those strange signals and the many unwanted 'dead carriers' we seem to come across on the bands, no less than 500 'pass frequencies' can be programmed. These are then skipped over in 'search' mode so the receiver doesn't lock onto these, which for 'background scanning' can otherwise be very, very annoying. The set comes factory-programmed with ten 'search banks', although you can easily alter these to whatever you want.



### Tuning Around

To cope with the needs of the various modes, you can tune AM and FM in 1kHz, 5kHz, 6.25kHz, 9kHz, 10kHz, 12.5kHz, 20kHz, 25kHz, 50kHz and 100kHz steps, with these together with 50Hz and 100Hz steps on LSB and USB, WFM (Wide FM) tuning in 50kHz or 100kHz steps. Together with the up/down buttons on the keypad, you can also tune up and down using the small click-step rotary tuning knob on the top panel alongside the volume and squelch controls.

There are plenty of scan modes of course. Any number of the ten 100-channel memory banks can be placed in or out of scan mode, and within these you can select each channel in or out of the scan. A further 'Program Scan' is available where up to 100 channels, from ten banks holding ten channels each, can be scanned for activity. A 'priority channel' check is available, and to complete the picture a 'mode scan' is also available, where the set scans all channels programmed with whatever reception mode you've chosen, i.e., AM, WFM or whatever.

In all cases, the scan halts when the receiver squelch raises, and you can choose whether the set pauses for five seconds on each channel and then continues, or halts until two seconds after the squelch closes before resuming. To make sure you don't miss signals due to delays in the other party answering, this two second pause can be extended to four seconds.

### Physical Features

The set is quite light, weighing in at 320g, and nicely pocket sized at 64mm (W) x 155mm (H) x 38mm (D). It's powered from four AA sized nicads, supplied with the set, these can easily be changed if needed by a spare set for 'all day' portable use. A 'battery save' circuit automatically cycles the receiver on/off quickly when it's in standby on a given quiet frequency, to make your nicads last that bit longer. To keep your nicads topped up, a plug-in mains charger is provided, and a 12V DC lead terminated in a car 'cigarette lighter' plug comes with the set, this also charges the nicads when



used.

To save you dropping the set when you're carrying it around, a belt clip and a wrist strap are provided, together with a black earphone for private listening. The aerial supplied is a telescopic whip terminated in a BNC connector, this can be extended or shortened as needed to suit the frequency range you're receiving at the time, i.e., almost retracted for UHF or fully extended for VHF. Finally, a well-written 75 page manual in 'real' (not American) English comes with the set, giving operating details together with typical programming examples.

### On The Air

As it was a 'fully featured' scanner, albeit a handheld which arguably may not be intended to be coupled up to 'monster' aerials, knowing the typical use it'd be put to by readers I decided to go straight in at the 'deep end'. So I connected it to my rooftop VHF/UHF aerials, and via a coax switch to my 76m long trapped HF dipole system, and I honestly expected the set to 'curl up' with all the 'monster' signals in my locality, but I was most pleasantly surprised. Even on the 7MHz amateur band this evening (about 50kHz away from rock-crushing AM broadcast band signals) with the internal attenuator switched in I was happily listening to the relatively (much) weaker amateur SSB signals. Likewise on the 2m amateur band on FM, whereas I often get problems from a nearby fire station transmitter system and a multi-frequency packet radio

system only a few hundred metres away, I was happily listening to weak, distant repeater signals. The set was extremely sensitive, as good as the 'best' 2m amateur handhelds I'd used. I was impressed.

The set scanned at about 30 channels a second, likewise for frequency steps in 'search' mode, and I certainly had great fun with the set's wide, continuous coverage. The search

banks were initially programmed to Japanese-used bands, however I quickly reprogrammed most of these to bands more appropriate in the UK, then started 'searching away'. The 'pass' frequency facility was very useful here, where I could choose to ignore the large number of frequencies I was 'aware' of, (these I'd programmed into memory channels), letting the set searching away to find new channels. Each time it did, I simply programmed it into memory, likewise into a further 'pass' memory,

then off to hunt out more 'new' frequencies. Very, very handy!

Out and about, I found the supplied telescopic aerial a bit of a hindrance although it certainly gave good performance. However I'm sure I'd have broken it in time, so instead I plugged in a VHF/UHF helical aerial which I rather more happy with. The LCD I found hard to see when viewed from above, I had to tilt the set backwards to read the display, although this I didn't find too much of a problem. There was a reasonable amount of undistorted audio available from the set's internal speaker, even for outdoor listening, and plugging in the earphone didn't bring about the loud 'pops' that I find with some sets each time the squelch opens and closes, which was a refreshing change!

## LABORATORY RESULTS:

### Sensitivity;

Input signal level in  $\mu V$  pd required to give 12dB SINAD;

Freq.	SSB	AM	FM	WFM
500kHz	5.13	3.94	2.33	-
1MHz	1.45	1.27	0.76	-
2MHz	0.75	0.58	0.35	-
4MHz	0.38	0.40	0.23	-
6MHz	0.27	0.32	0.17	-
10MHz	0.23	0.26	0.16	-
20MHz	0.16	0.22	0.13	-
30MHz	0.14	0.22	0.12	0.36
50MHz	0.14	0.22	0.13	0.39
100MHz	0.13	0.21	0.12	0.38
145MHz	0.18	0.25	0.16	0.48
250MHz	0.21	0.29	0.17	0.73
435MHz	0.26	0.35	0.22	0.67
700MHz	0.38	0.46	0.21	0.77
935MHz	0.33	0.37	0.21	0.55
1300MHz	-	-	0.47	1.73
1500MHz	-	-	0.52	2.08
1650MHz	-	-	1.31	4.71

### Initial Search Banks

Band	Limits	Step	Mode
1	76-107.75MHz	50kHz	WFM
2	108-142MHz	50kHz	AM
3	144-146MHz	20kHz	FM
4	146.01-154.65MHz	10kHz	FM
5	156-162.05MHz	12.5kHz	FM
6	175.75-221.75MHz	50kHz	WFM
7	430-440MHz	20kHz	FM
8	450.0125-451.5	12.5kHz	FM
9	850.0125-859.9875MHz	6.25kHz	FM
1	0903.0375-904.9875MHz	12.5MHz	FM

### Intermodulation Rejection;

Measured on 145MHz FM as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;

25/50kHz spacing; 65.3dB  
50/100kHz spacing; 65.3dB

## Lab Tests

Technical boffins will be able to deduce from the lab results that the set was indeed quite a reasonable performer, and as found on air, very sensitive indeed whilst having a good strong-signal handling performance. In these days where nearly every street seems to have a radio transmitter of some description, it's no good whatsoever in having a super-sensitive receiver when the first nearby transmitter totally 'blocks' it from receiving anything!

## Conclusions

For a handheld, the set is a very good performer indeed. Its extremely wide coverage combined with all-mode selection and superb SSB tuning steps is a 'first'. I'm sure it's going to be one of the most desired handheld scanners on the market today. I just wish I could afford one!

The MVT-7100 is priced at around the £399 mark, and my thanks go to authorised UK Yupiteru dealers Nevada Communications Ltd., (189 London Rd., North End, Portsmouth, PO2 9AE, Tel. 0705 662145) for the loan of the review set.

### S-Meter Linearity

1	0.25 $\mu V$ pd	(-35.7dB)
2	0.33 $\mu V$ pd	(-33.4dB)
3	0.42 $\mu V$ pd	(-31.3dB)
4	0.54 $\mu V$ pd	(-29.0dB)
5	0.78 $\mu V$ pd	(-25.9dB)
6	1.31 $\mu V$ pd	(-21.4dB)
7	2.27 $\mu V$ pd	(-16.6dB)
8	5.08 $\mu V$ pd	(-9.6dB)
9	15.3 $\mu V$ pd	(0dB Ref)

### Blocking;

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

+100kHz; 55.5dB  
+1MHz; 85.5dB  
+10MHz; 93.8dB

### Adjacent Channel Selectivity;

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

+12.5kHz; 40.7dB  
-12.5kHz; 27.4dB  
+25kHz; 50.1dB  
-25kHz; 46.7dB

### Maximum Audio Output

Measured at 1kHz audio at the onset of clipping, 8 ohm resistive load;

199mW RMS

### Image Rejection

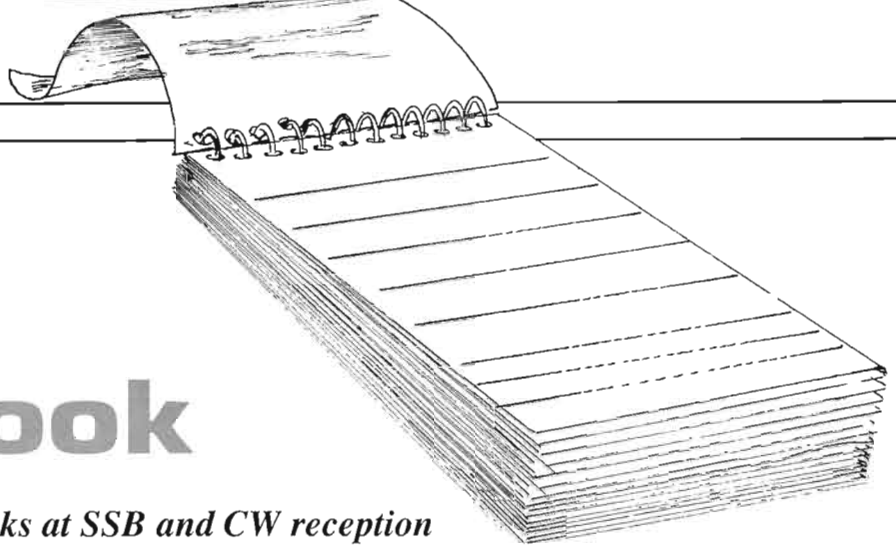
Difference in level between unwanted (+910kHz) and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;

78.7dB

### Current Consumption

Scanning, no signal; 94mA  
Receive, mid volume; 127mA  
Receive, max volume; 152mA

# From My Notebook



## *Geoff Arnold G3GSR looks at SSB and CW reception using different methods of detection*

In the September and October issues of *HRT* last year, I looked at the basic principles of TRF and superhet receiver circuits. When you want to listen to CW (Morse code), or a 'suppressed carrier' transmission such as voice SSB, it is necessary to have an oscillator in the receiver to produce a heterodyne (beat) note from the Morse code signals, or to re-insert the missing carrier in the SSB signal.

In a communications-style receiver, this special oscillator is usually provided. Its general name is a 'beat frequency oscillator', abbreviated to *BFO*, and you will find a switch on the receiver front panel to control it. That switch may be labelled *BFO ON/OFF* or something similar, or perhaps *AM/CW* in which case it brings the BFO in when set to 'CW'. When provided specifically for use in SSB reception, its alternative name is 'carrier insertion oscillator', abbreviated *CIO*. It will be brought into operation when a switch is set to a position marked SSB, USB or LSB.

Without the beating oscillator, received CW signals will usually produce only a 'thumping' noise in the headphones or loudspeaker. If there is another station radiating a constant carrier on a frequency that's right alongside the CW signal (within a kilohertz or so), the second station may provide a substitute for the BFO. That's the same effect that provides steady heterodyne 'whistles' between stations on the broadcast bands.

Similarly, if a receiver produces any significant internal spurious signals, these may beat with the incoming CW signal, making it clearly audible. With that sort of receiver, you are likely to be constantly plagued with 'birdies' - rising and falling whistles - as you tune through the bands!

### **Morse on 'Straight' Receivers**

In so-called 'straight' receivers - TRFs and Direct Conversion or 'Homodyne' types - the BFO function is

provided as an incidental to the normal circuit operation. In a TRF, it comes about when you advance the 'reaction' (positive-feedback) control on the detector stage past the threshold of self-oscillation - the point that gives maximum sensitivity and sensitivity - so that the stage oscillates constantly at a radio frequency very close to that of the incoming signal. The actual frequency of that oscillation is determined by the tuning of the circuits of the detector stage.

For Morse signal reception, the tuning of the detector stage (and therefore the frequency of oscillation) is set some 700 to 1000 hertz away from the incoming signal, and will produce an audio beat-note of a frequency equivalent to that difference.

In a Direct Conversion (DC) receiver (which is effectively a superhet with a zero-frequency IF) the oscillator runs continuously, converting the incoming modulated RF signal directly to audio frequencies. For Morse signal reception, the oscillator is detuned slightly up or down, as in the TRF, to provide a suitable audio frequency beat note with the incoming keyed carrier.

If the frequency of the oscillator in a TRF or DC receiver is exactly the same as that of the incoming signal, the two are at 'zero beat', a state which is actually very difficult to achieve in practice. Usually the best that can be had is a 'beat' every few seconds, and even that will change as the oscillator drifts slightly. This makes it very difficult to use the DC receiver (or a TRF adjusted so that it is in oscillation) for reception of a double-sideband AM broadcast station.

You will notice that in describing both these types of receiver, I've talked about 'detuning' the oscillator to provide the audio beat frequency. Detuning any tuned circuit will always result in some loss of performance compared to the ideal when adjusted 'on the nose'. In most circumstances, the amount of detuning required will not significantly reduce the strength of the incoming

signal, although a 'Q' figure of several thousand is achievable in a skilfully adjusted regenerative detector in a TRF receiver.

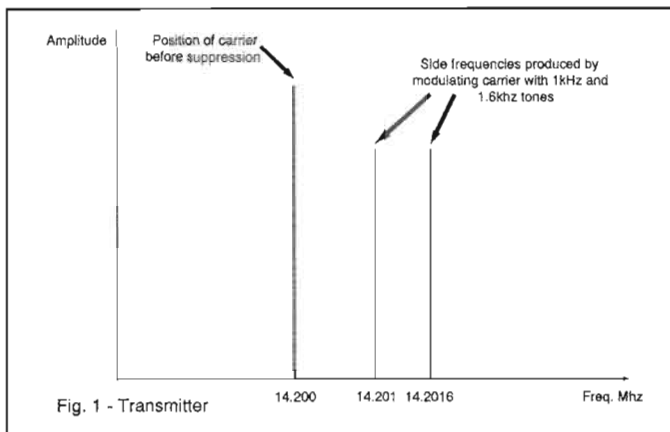
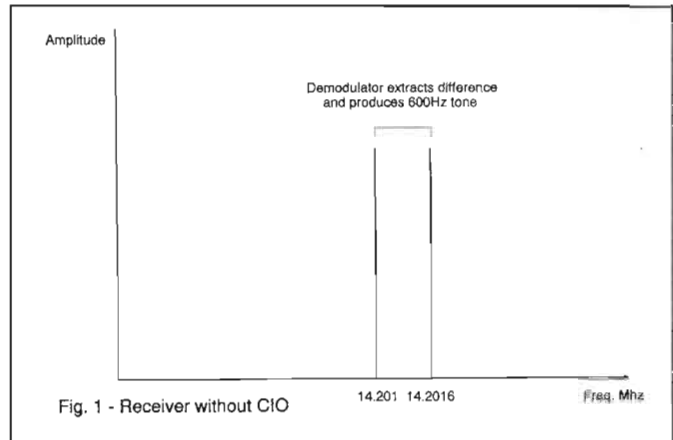
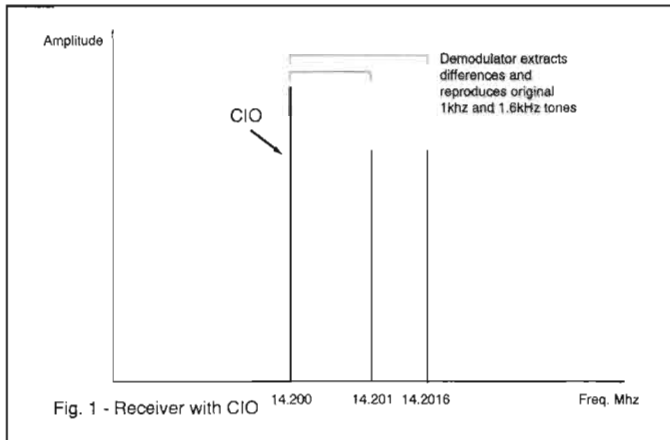
Where the detuning does have a severe effect is in the reception of frequencies in the lower LF or VLF bands. There, the frequency difference needed to produce an acceptable audio beat-note between the incoming signal and the receiver oscillator becomes a very large percentage of the signal frequency. Remember that the bandwidth in kilohertz of a low frequency circuit is very much less than that of a higher frequency circuit with the same 'Q'. In one type of 3-valve TRF communications receiver made by Marconi Marine and fitted in merchant ships in the 1930s and 40s, a separate heterodyne oscillator stage was provided solely for use when receiving daily time-signals from the Rugby Radio VLF station, callsign GBR, on 16kHz! Without the extra valve and its associated components, obtaining the usual 1kHz beat-note at that frequency would have required the detector stage to be detuned by 6.25 per cent (1 part in 16), and sensitivity to GBR would have been pretty low as a result.

If you would like to learn more about simple TRFs, you could find a series of articles describing the design and construction of a 1-V-1 (3-valve) short-wave receiver, currently running in *Radio Bygones* magazine, of interest (for further details see the advertisement in this issue - Ed).

### **SSB on Straight Receivers**

When we want to receive suppressed-carrier transmissions, the receiver has to reinstate the carrier, in order to provide the missing 'reference frequency' which the detector or demodulator will use to enable it to recover the audio modulation from the incoming signal.

If that reference carrier frequency was not there, the demodulator would



try to produce outputs equal to difference frequencies between all the various sideband components. This is the 'monkey chatter' which you hear when you tune to an SSB signal on a simple AM short-wave broadcast receiver.

If you have difficulty visualising what happens, consider the simple case where an amateur transmitter operating on a carrier frequency of 14.2MHz is modulated by two simultaneous audio tones, one of 1kHz and one of 1.6kHz (Figure 1). The side-frequencies produced at the transmitter output will be on 14.201 and 14.2016MHz (upper sideband). In a properly tuned SSB receiver, these will beat or mix with a CIO running at 14.2MHz (the same as the carrier oscillator in the transmitter), and the difference frequencies of 1kHz and 1.6kHz will be recovered as audio tones. If the CIO signal is not present, the demodulator will instead take the difference between the two side-frequencies and produce an output at 600Hz. Not at all what was intended!

Just like the CW receiver, the SSB receiver has to be adjusted so that CIO signal is offset to one side of the transmitted intelligence. When operating on lower sideband (LSB) the oscillator must be higher in frequency than the sideband. It is the international convention to use LSB for transmissions below 10MHz, although as an exception to this rule the Aeronautical and Mari-

TRF with a self-oscillating regenerative detector, sideband-cutting is likely to reduce the output of higher audio frequencies.

The solution would be to have a separate oscillator to re-insert the carrier in the receiver, but it would have to be tuneable over the entire frequency coverage of the receiver. This, of course, is where the superhet scores, because the CIO operates at one fixed frequency, related to the intermediate frequency.

### The BFO in a Superhet

In traditional (non-synthesized) superhets, the BFO provided for CW reception is sometimes fixed in frequency, being adjusted during receiver alignment to between 700 and 1000Hz above or below the IF. Alternatively, it may be adjustable by means of a front-panel control, in which case the operator can not only adjust the pitch of the received Morse signals to suit his own personal preference, but also can put his BFO on the opposite side of the received signal to escape a strong interfering signal (as can the operator of a TRF or DC receiver). The adjustment range provided is typically plus and minus 3kHz, sometimes more.

Again, a little further explanation may help you to understand this. If you have a simple communications receiver with an IF of 455kHz, and an incoming

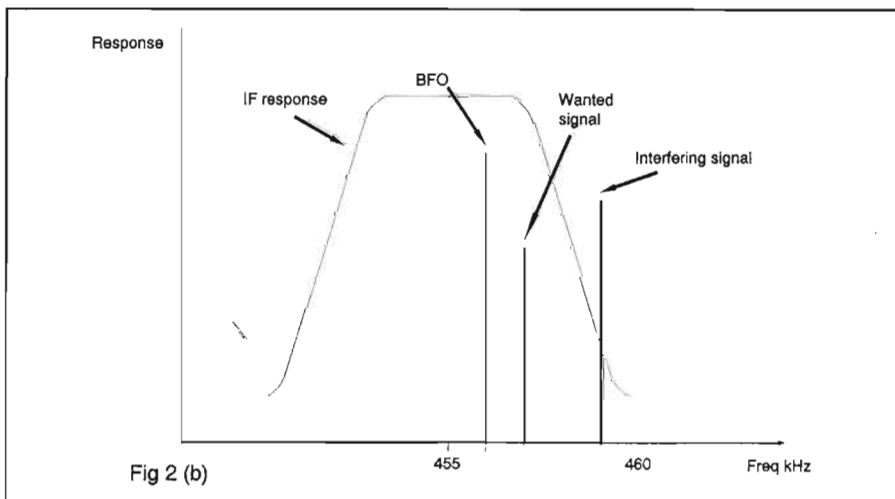
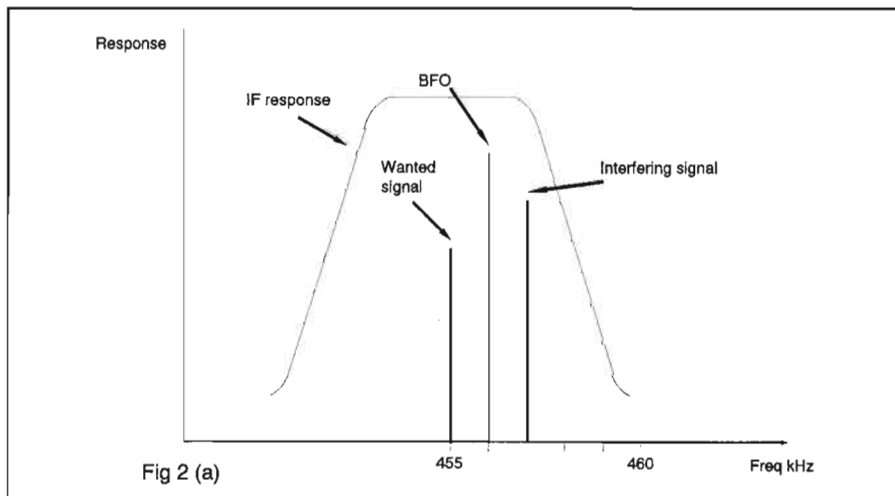
time Mobile services use upper sideband (USB) on all frequencies. When operating on USB the oscillator is lower in frequency than the sideband (the international convention for transmissions above 10MHz). For the Direct Conversion receiver this is no problem, but in a

CW signal tuned so that it falls in the middle of the IF passband (i.e., exactly on 455kHz), then a 1kHz beat-note can be produced by having the BFO running at either 454 or 456kHz. Say that you have turned the BFO-Tune control to +1kHz (which I'm assuming means it's on 456kHz) and are happily listening to a station in the clear in a quiet band. Then up pops another strong station on a frequency 2kHz above your wanted station, producing an IF signal at 457kHz, and a beat-note the same as that of your wanted station (Figure 2(a)).

You may be able to read through the interference by simply changing the BFO frequency slightly. Taking it down by 300Hz will change the pitch of the wanted signals to 700Hz and that of the interfering signals to 1300Hz. If the interfering signal is very strong it may still make reception difficult, and you could try instead moving the BFO to 454kHz. The beat-note of your wanted station is 1kHz again, but that of the interfering station is now 3kHz, making life very much easier!

You could also try changing the receiver's main tuning control slightly, so that the wanted signal is no longer sitting in the middle of the IF passband, but is instead moved off to one side, although still well within the peak of the passband. Retuning the receiver to shift the wanted signal up to, say, 457kHz will shift the interfering signal to 459kHz, where it should be beginning to drop off the peak of the IF response, so reducing its strength (Figure 2(b)). Doing this will have the added advantage that the interfering signal should start to have less effect on the receiver's AGC circuits, so that it no longer tends to reduce the IF gain, or perhaps to chop the wanted signal up. The beat-note can be returned to 1kHz by retuning the BFO to 456kHz once more.

Now, you may be thinking "It's all very well for him reeling off all these frequencies, but how do we know when the received signal is in the centre of the IF passband, or what frequency the BFO is set to." Well, assuming that the



receiver has been properly aligned, a signal will be in the centre of the passband when it is at its strongest. For a CW signal, where the pitch of the beat-note is changing as you tune it in, that's not easy to tell by ear, but the secret is to tune for maximum on the S-meter. The S-meter is measuring the IF signal strength, rather than the AF, so that it ignores the effect of the changing audio beat-note. If your receiver doesn't have an S-meter, you will simply have to try to judge strength as best you can by ear.

Providing the receiver has been properly aligned, when the received signal is in the centre of the IF passband, the audio beat-note will be at zero when the BFO pitch control has been set to its centre (zero) position.

### SSB on a Superhet

For a simple, inexpensive superhet, the circuit arrangements for SSB reception may be exactly the same as those for CW, by no means an ideal state of affairs. It will use the same components to provide its IF selectivity, and may even use the same envelope detector, rather than a product detector which gives superior performance, though at greater cost.

If that is the case, you'll simply have to make the best of it, until the day you decide you want to lash out on something more sophisticated. The

experience you gain in receiver handling will be well worth while, however.

In receiving SSB signals, instead of setting the BFO or CIO to a frequency which is offset from the carrier frequency of the transmitter, you must set it as exactly as possible to the carrier frequency. Ideally, the receiver is tuned so that the signals contained in the received sideband lie within the IF passband, and the BFO or CIO lies just outside that passband, above it in the case of LSB reception, and below it for USB reception.

Obviously it is possible to adjust a receiver with an operator-variable BFO or CIO for this state of affairs. If you look at the scale around the BFO pitch control on a receiver being used for SSB, you are almost sure to find pencil marks labelled 'USB' and 'LSB' will have been put there by the operator. Once the correct setting for the BFO or CIO has been found by experience, you simply adjust the receiver main tuning for clearest speech whilst listening to an SSB signal. What you are doing then is simultaneously fitting the received signal into your IF passband and at the correct offset from the re-inserted carrier.

In more sophisticated receivers, the adjustment of the CIO will have been taken out of the operator's hands, being pre-set correctly relative to the IF passband, and probably crystal controlled. The IF passband will be defined

by one or more ceramic, crystal or mechanical filters, rather than the traditional LC tuned circuits contained in IF transformers. In these days of inexpensive ceramic filters even the cheaper receivers use them.

In any superhet receiver, the alignment process begins with setting the IF stages to the correct frequency, with the correct bandwidth. Not always the easiest of tasks if the circuit designer resorted to stagger-tuned LC circuits to get a wide, flat-topped response! Working from that reference point, the tracking of the RF amplifier, frequency changer/mixer and local oscillator tuning can be set, followed finally by the setting of the BFO/CIO for a communications-type receiver.

If block IF filters are used, their response in terms of centre-frequency, bandwidth and shape, is pre-determined within given tolerances by the filter manufacturer, and what can be a very tricky job is safely taken care of once and for all (providing a considerable saving in labour costs for the receiver manufacturer). The crystal for the CIO will have a trimmer fitted, so that it can be adjusted to exactly the right frequency, relative to the IF filter response.

### Assigned Frequency

In a properly adjusted double-sideband signal, whether AM or FM, the carrier sits neatly in the centre of the transmitted bandwidth. It provides a reference point which can be accurately measured by means of a frequency meter and used as a 'label' to define where the signal lies in the RF spectrum. If you remove the carrier of an AM signal, and one of the sidebands too, not only has that handy reference point disappeared but the transmitted bandwidth - the chunk of the spectrum occupied by the signal - has, in a manner of speaking, shifted sideways.

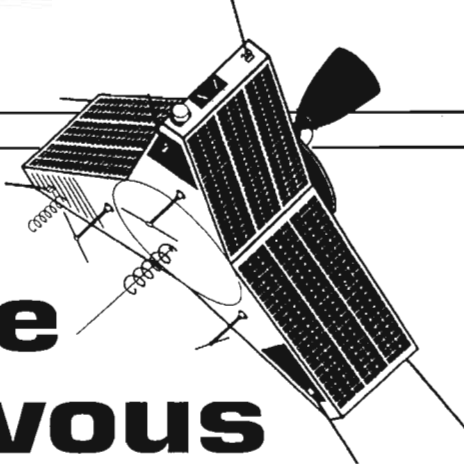
Defining a radio channel by its carrier frequency is all very well, but if the carrier isn't transmitted, and neither is one of the sidebands, it can be a rather misleading way of telling you where to find it, and how much spectrum space it's occupying. For this reason, official frequency allocation tables often quote something called *Assigned Frequencies*, either as well as, or instead of, Carrier Frequencies.

To find out what Assigned Frequencies are, how they are worked out, and how the idea can be useful in understanding the arrangement of CW and SSB receivers (and transmitters), you'll have to read this column next month. See you then!

*Geoff continues this subject in next month's 'From My Notebook'.*

# Satellite Rendezvous

AMSAT-UK news collated by Richard Limebear  
G3RWL



As I write this at the end of 1992, it seems appropriate to look back on the events of the year;

In January, a strike of ground controllers affected commanding of RS14/Oscar 21 and Nasa's change in check-summing of 2-line orbital elements struck home. In February, 9600bps users moved from UO-14 to UO-22 and the French authorities grabbed chunks of the 2m satellite band for use by winter olympics teams. In March, the new CIS (ex soviet) space agency was formed, and the Queen visited the new facility at the UoS. In April, AO-13's perigee height started rising again and PY2BJO got the Brazilian equivalent of a knighthood for work with amateur radio, education, and the space shuttle. In May, DOVE's voice was first heard but software and hardware problems persist. In June, AO-21's fm transponder operation started and the ARSENE satellite got bounced off its planned ride with HISPASAT. In July, we had the Amsat-UK Colloquium and AGM which approved the setting up of the Phase-3D fund with a target of a million pounds. In August, Kitsat-A was launched and became KO-23. In September, not much happened. In October, NASA signed an agreement for exchanges of visits between MIR and the space shuttle etc. In November, Kitsat entered its first eclipses, and Doug Loughmiller KO5I joined the UoS as ground station manager.

## Oscar 21

On December 3rd last year, a new AO-21 FM transponder schedule change went into effect, with a foreign language voice message being broadcast to wish Matjaz (YT3MV) a speedy recovery from a car accident he was involved in last summer. Matjaz is well known in AMSAT technical circles for his expertise in RF transponder design. Matjaz helped with the design and construction of the S-Band transmitters now flying on AO-16 and DOVE. He is also assisting in the Phase-3D program.

The current AO-21 schedule is now

6 minutes of FM transponder operation, 3 minutes of voice, and 1 minute of telemetry. DB2OS points out that the FM transponder mode is done entirely through Digital Signal Processing and many users may note that the relayed voice quality will sound a bit better because of the software update on December 3rd when the voice 'sampling frequency' was increased to 16kHz. Further improvements include a 1 MByte RAMDISK for voice message files.

A final addition in the software was a 1200 Baud AFSK telemetry mode. This means that if you have a standard terrestrial packet TNC in your shack, you can download the telemetry from AO-21 by 'pumping' the 1 minute of telemetry into the audio input of your TNC.

As a reminder, the frequencies for the FM transponder are Uplink frequency 435.016MHz and downlink frequency 145.987MHz FM.

## Oscar 13

In the course of a year, the Sun makes a complete orbit of the Earth and of OSCAR-13 too, and attitude schedules show a familiar bi-annual rhythm. In recent years the orientation of the Sun's orbit with respect to the satellite's orbit has been relatively benign, with poor presentations being short lived. Through 1993-1994 however, OSCAR-13's orbits are the least favourably in-

clined possible with respect to the orientation of the Sun's orbit, and some unfamiliar strategies are needed to compensate. These are reflected in the schedules presented here.

The AO-13 command team wish to stress that these schedules are provisional. That is, while they do represent the best expectations at the time of writing (late 1992), as always there may have to be minor changes to deal with unexpected situations.

Up to date information about AO-13 operations is always available on the beacons, 145.812MHz or 435.658MHz in CW, RTTY and 400 bps PSK. The command stations always welcome and constructive feedback, they can be reached via packet radio as follows -DB2OS @ DK0MAV and G3RUH @ GB7DDX.

## UoSats

UoS have apologized to users of UoSAT-2 who have been looking for updated UoSAT bulletins as announced. Recent non-nominal spacecraft operations, including the recent crash of UoSAT-22, precluded spacecraft controllers from preparing and disseminating regular UoSAT bulletins. Plans have been put together to allow for a more orderly process of compiling bulletin material (including an offer from G3RWL of AMSAT-UK - Ed) to make regular contributions to the bulletin releases. They plan to begin anew in the new year with a change in format and schedule -so keep monitoring!

The DCE aboard UO-11 crashed during the week of December 6th. UoSAT controllers expected to have the DCE reloaded within a few days. The only noticeable effect to the ground observer of this fault is that the DCE is currently sending a series of 'Ns' on the DCE downlink. All other data streams are operating normally.

## UO-22

After the recent series of OBC re-

### Oscar 13 Provisional Attitude Schedule, 1993-1994

Date	[Mon]	Alon/Alat	Modes	SA to SA	
1993	Jan 04	140/0	B	-45 -34	
1993	Jan 18	150/0	B	-45 -27	] Up to 96 minute eclipses
1993	Feb 08	150/0	BJLS	-27 -3	
1993	Mar 08	180/0	BJLS	-32 +33	] Jan 28 - Mar 10
1993	May 10	210/0	BJLS	+11 +33	)
		via 180/15 to			
1993	May 31	120/0	B	+41 +34	)
1993	Jun 14	130/0	B	+43 +35	) Eclipses at
1993	Jun 28	140/0	B	+45 +36	) perigee Apr 09
1993	Jul 12	150/0	B	+45 +30	) - Sep 12. Max
1993	Aug 02	150/0	BJLS	+30 +5	) 24 minutes
1993	Aug 30	180/0	BJLS	+28 -26	)
1993	Oct 18	210/0	BJLS	-7 -29	)
		via 180/15 to			
1993	Nov 08	120/0	B	-43 -34	< 81% Moon Eclipse Nov 13
1993	Dec 06	130/0	B	-44 -36	] Up to 140 minute eclipses
1993	Dec 20	40/0	B	-45 -36	] MA 102-156 Dec 05 - Dec 22

loads and crashes, UO-22 is back in a stable state supporting 9600 baud store-and-forward communications world-wide. No further reloads are planned until after the start of the new year.

UoSAT-22 controllers tried an upload of new housekeeping software to UoSAT-22 but shortly after the upload was completed the OBC crashed. This was not completely unexpected as an attempted upload last August rendered a similar result. At that time, however, the UoSAT-22 spacecraft was being used to support health and welfare traffic from the Hawaiian Islands which had just been struck by a hurricane so spacecraft controllers reloaded the existing operating system to restore communications as quickly as possible.

This time the controllers wanted to fully understand the source of the fault so when the OBC-186 crashed they began the lengthy process of downloading a memory dump from the spacecraft, a possible source for the fault was identified and corrected software was then uploaded to the spacecraft early on the 8th of December. The spacecraft operated for about 6 hours before the OBC-186 crashed once again. The whole process of dumping the memory was repeated as before to attempt to understand the cause for the second OBC-186 crash. After further analysis additional revisions to the software were implemented. The whole scenario was repeated during the 9th of December. Further investigation has not revealed the source of the fault. As a result, UoS decided to reload the previous operating system which had supported UoSAT-22 operations for the past 70+ days prior to the reload of the new software. Further, the decision has been made to not attempt any additional reloads of the spacecraft operating system until after the start of the new year allowing UoSAT-22 to be available through the holiday period when use of the spacecraft is expected to be heavy.

UoSAT controllers apologize for any inconvenience the disruption of service may have caused UoSAT-22's many users world-wide.

## Other Satellites

**ARSENE;** Apparently the launch is scheduled for 20-April-93. Telemetry formats will be published soon.

**ITAMSAT;** Recently the flight model of this satellite went to France for the mechanical fit-check. The spacecraft was successfully mated with its launcher plate to the Ariane Small Auxiliary Payload platform where a number of mechanical and electrical tests were performed to verify the compatibility of the satellite and the launch vehicle. No problems were found and



the next critical steps will be the vibration, thermal vacuum and pyrotechnic tests to be performed next spring. The launch is scheduled for 1st September this year with the launch campaign starting in Kourou in the first days of August.

**FO-20;** They seem to be keeping to the JA mode on every Wednesday UTC. At all other times the Mode JD BBS is in operation. Mode JA Uplink passband is 145.900-146.000MHz and the downlink passband is 435.900-435.800MHz; Mode JA is an inverting transponder. The Mode JA beacon can be heard on 435.795MHz.

## SAREX Missions this year

Here's a brief line-up of the SAREX missions planned with amateur radio on board;

**STS-55 25/02/93** SAREX configuration C; 2m voice and packet and German SAFEX Amateur Radio station operating 70cm voice using a dual band (2m/70cm) whip on the exterior of the Spacelab module, duration unknown, 28.5 degree inclination, two hams on board (to be confirmed) - N5RAW and N5SCW.

**STS-56 23/03/93** SAREX configuration D; Voice, packet, SSTV and ATV uplink. Nine days, 57 degree inclination, four hams on board - KB5AWP, KB5UAH, KB5UAC, and KB5TZZ.

**STS-57 29/04/93** SAREX configuration C. Seven days, 28.5 degree inclination, 1 ham on board: N5WQW.

The DARC host their first AMSAT-DL Symposium this month in Detmold

## German AMSAT Symposium

The first AMSAT-Symposium in Germany will take place in Detmold on the 6th March this year, soon after this issue appears. Lectures and demonstrations are planned on PACSAT subjects and HF subjects related to AMSAT activity. Detmold is in the north west of Germany near Bielefeld. The organiser is the Detmold branch of the DARC, for details contact DD8QG via DB0BQ.DEU.EU on packet, or by post (if you're quick) to his callbook address.

The AMSAT-UK Colloquium will this year take place over the 'long weekend' of Thursday 29th July to Sunday 2nd August. Contact AMSAT-UK for a booking form nearer the time.

## Tracking software

Many amateurs are still using 'old' tracking software which requires a sidereal time offset and it is necessary for one to update it at the beginning of each year. The numbers for 1992 were 0.27477847 and the numbers for 1993 are 0.27685328.

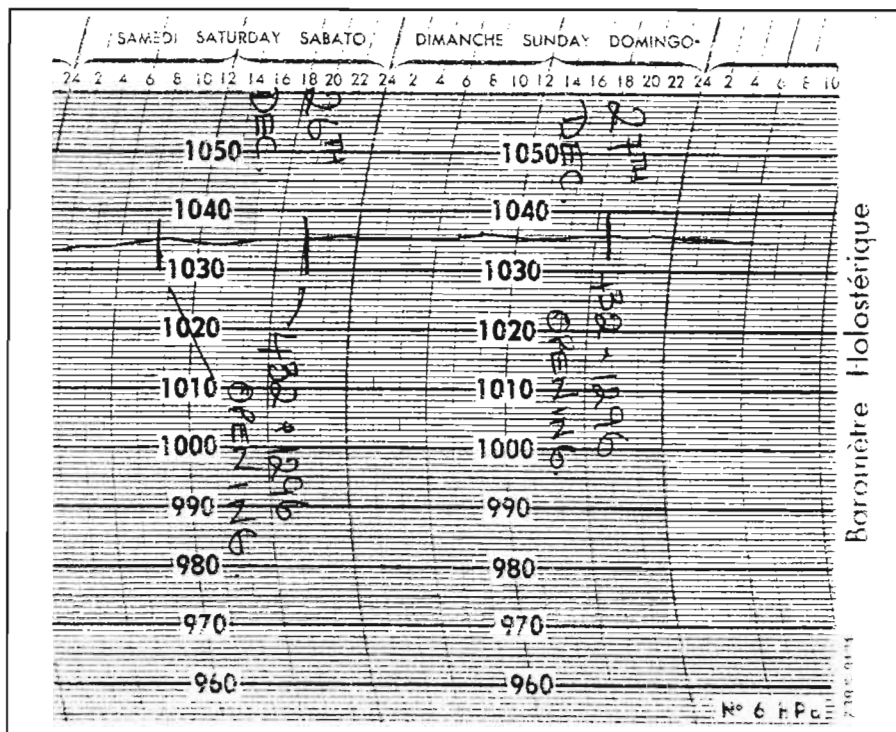
*If you're interested in satellite, or indeed are just fascinated by the information here, then why not join AMSAT-UK? SWL are welcome as well as licensed amateurs, and you can details by sending a large SAE to: AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ.*

### KEPLERS

OSAT	OSCAR-10	Uosat 2	AO-13	PACSAT	DO-17	WO-18	LO-19
OSPC	02357.2049400	00358 14301917	92349.95371474	92357.09600260	92356.12237951	92356.24897549	92357.36201910
INDL	28.9814	67.8307	57.5436	98.6336	98.6325	98.6322	98.6346
RAAN	49.4022	26.1879	344.4116	77.8827	77.1792	76.3511	76.3517
ECEN	06011488	0.0011812	0.7278706	0.0011917	0.6011620	0.6011987	0.0011948
ARGP	47.0647	197.6195	202.5109	349.2468	352.4649	395.0839	347.8812
EA	390.8856	162.3914	6.9354	10.821	7.6360	5.0224	12.266
RM	20587793.7	14.68796381	2.68724118	14.29776739	14.29907469	14.28892953	14.29880253
DECY	-RE-4W	7.81E-06	-4.48E-06	2.15E-06	2.27E-06	2.21E-06	3.16E-06
REVN	4385	47087	289	15213	15200	15188	15219
OSAR	FO-20	INFORMTR-1	UO-22	KO-23	RS-1611	RS-1215	MR
EPOC	9238.70249823	9238.795961235	9235206277415	92359.01281502	92397.65013987	92364.05717728	92357.04187541
INDL	9510E14	1829430	984937	66.0802	87.921	87.9226	51.6223
RAAN	234.9517	186.2304	84.9689	393.0470	8.9441	98.2340	231.9037
ECEN	140641491	0.0000000	0.0007784	0.0013285	0.0013284	3.0007978	0.0001245
ARGP	1443802	161.7969	117.6961	22.6174	86.4074	183.2401	150.0787
EA	219.5171	30915192	242.5003	13.13003	2738580	106.85799	210.0310
RM	12.83214648	13.74042011	1436748.030	12.6274003	13.7230548	13.74009832	15.57220982
DECY	-E-08	1.0E-06	2.70E-06	-1E-08	9.7E-07	5.7E-07	2.1211E-04
REVN	13265	8123	7451	1716	27898	3387	39166

# VHF/UHF Message

Geoff Brown GJ4ICD gets professional 'inside information' about forthcoming 70cm and 23cm conditions



It does now seem that as the cycle declines, 50MHz propagation is very much like it was in 1986, with very few openings occurring. Only stations in the 30 to 40 degrees areas seem to be getting in on the act, for instance look at Mal's (Z23JO) report to G2AHU for the month of October 92; 1/10/92; 4U1ITU, EH3IH, SV1AHP, EH3ACW.

3/10/92; 9H5EE, 9H1PA, 4X1IF.  
6/10/92; EH6ET, SV1AMP (all stations within that magic Mediterranean belt)

The 11th was the best day with stations being worked in DL, PA, and the UK, but this opening only lasted for 14 minutes! (just like those weak openings in 1986). The 14th brought ZC4 and 9H, 20th brought only 9H, 22nd was ZB0T and 9H, the 25th S57CC and so on with propagation not being extended any further north than 40 degrees for the rest of the month.

However, Costas SV1DH reports the following heard during the same month from 38 degrees north of the Equator; V51/beacon every day (!), plus ZS6, ZD8, 7Q7, FR5, Z23, A22, TR8, TU, 9J, PY, 5B, 4X1, F, 9H, I, HB9, DL, PA0, OE, ON, EA3, OK, LX, S5, YO, SP, and EA6, I presume some of the later to be via Sporadic 'E'.

**Barometric pressure over the Dec 26-27th period, coinciding with the 432MHz and 1296MHz openings**

## News from Australia

Eric VK5LP sent in his 50MHz happenings from down under, Steve VK6PA worked 9H1BT, 9H5ET and 9H1PA during early November, Steve VK3OT also had a short opening to PE1JKW on the 11th, other openings worth a mention were VK4BRG to K6MYC/KH6 via TEP, and VK4ZJB worked T30JH.

Joe VK7JG reports that VK7RNT the 50MHz beacon that has been operational for the past 12 years will be closed down for the time being, after serving its purpose during the cycle peak.

Eric VK5LP reports that 'A special mention should be made of the contact between Rex VK8RH and S21ZE in Bangladesh on 50MHz, the Bangladesh operation was mounted by two Japanese stations'. It will be very interesting to see the level of sporadic 'E' in Australia during the next few months so we can compare openings with the northern hemisphere.

## Beacon News

Some news of interest regarding beacons next. K1NFE on 50.061MHz is now off the air, and I also presume that the 9L1US beacon in Sierra Leone on 50.091MHz is also non-operational as nobody has heard it for over a year. 4N3SIX on 50.015MHz has changed its call, to fall in line with the new DXCC ruling, to S55ZRS. TU2VHF has recently been heard on 50.094MHz from EJ76AM, this is the same locator as TU2OJ. It is not known if it is a dedicated 24hr beacon, or an intermittent keyer, thanks to the UK Six Metre Group for this information.

JX7DFA on 50.079MHz is now on air from Jan Mayen Island in the Arctic Circle. Stations are active from Jan Mayen Island with 100W on 6m, so keep a look out during the forthcoming 'ES' season. So far they have worked as far south as Denmark. Z21SIX is now near completion, the frequency is 50.060MHz and should be shipped out very soon. Add these beacons to your listings from the December HRT; FX3UHB, IN78VC, 432.934MHz; DB0YI, JO42, 1296.933MHz; GB3BSL, IO81, 432.933MHz. Another new beacon has just come on the air, this is CN6VHF located in IM64 (Rabat, Morocco). This beacon was supplied by Joel N6AMG/CN2JP (see below), and is manned by CN8ST. It's on 50.093MHz, running 8W to a vertical.

The UK Six Metre Group recently met Hal Lund ZS6WB when he came over to London. Hal returned the ZS8MI beacon for reprogramming, and once this is complete it will be forwarded to Malawi (7Q7). If you need a 50MHz beacon for your country then please feel free to contact me, the beacons are free but must be maintained and licensed correctly.

## Very Sad News

Many 50MHz operators who regularly worked into South Africa a few years ago will have at some time worked Jack ZS6LN. The sad news was that in early December Jack passed away after a very short illness. Jack had been active on 50MHz since 1949 and was well known and respected all over the world, I am sure you are all with me in passing our deepest sympathy to his family.





J. S. de VILLIERS

SM5BSZ

Ken G5KW sent a little note to say his health had not been too good recently. Ken has just recovered from a mild stroke, we all wish him well and a speedy recovery. During late December it was learned that Joel N6AMG (or known to many as CN2JP) had passed away. Joel was awaiting a bone marrow transplant that never materialised, he gave many people their first Moroccan contact.

### 50MHz Reports

Many reports were received about activity on December 15th, extensive sporadic 'E' was widespread in the southern half of the UK for most of the morning from around 0800z. Funny really isn't it, sporadic 'E' again just after a major MS shower again! Nev, G3RFS reported LA9ZV at S9++, and down here in GJ the 48.250MHz signal from Norway and 49.750MHz Russian video was also very strong for most of the morning.

Chris GM3WOJ reports that the new OH9 beacon is proving quite useful, Chris has monitored this beacon several times during December via Aurora.

On the 17th, Neil G0JHC reported a good aurora in progress peaking around 1800z, beam headings were anywhere from 330 degrees to 10 degrees. Stations reported active were SM3JGG, OZ4VV, GM4OBD (I087), and GM3WOJ with his usual very strong signal, Neil's best DX was OH3MF on CW. December 27th was an interesting evening, down here in Jersey the Buxton beacon on 50.000MHz could be heard at S9+++ and many stations were contacted on six.

EA8/DJ3OS is QRV again from the Canaries, he reported a large 'ES' opening to Italy and Malta on the 29th.

### 144MHz Reports

On the 17th widespread aurora was reported, ON's were working DL's!, G6RAF reported the GB3LER beacon just after 1900z, G4SWX worked SM5DIC in JO89, G0OFE in Bournemouth reported GM4JJJ and G4PIQ

### ZS6LN who passed away in December, active on 6m from 1949

worked SM5BSZ beam headings were again around 330deg to 20deg.

### The Higher Bands

This winter has been poor on the UHF/SHF bands, those lovely anticyclones we used to get that stayed with us for days just don't seem to materialise these days, but here's a funny story that really *did* produce the DX.

I received a phone call from a Michael Pallot (pronounced Pallo) who jointly owns a guest house (a very large one and very tasty too!) called 'The Grois Puits' in Jersey. "Geoff, we are having some problems with three of the satellite TV systems you sold us" he said. "This *would* have to happen just one week before Christmas" I thought. Anyway the problem had to be investigated, but why three systems were faulty was beyond me. Michael did ask "Is it the weather conditions?", I quickly replied "No way". Now Mr. Pallot is one of the Senior Meteorological Officers in Jersey, and so he does understand that high pressure brings tropospheric or co-channel interference on television, after all he's the one who has to announce it on the local radio or TV channel!

On arrival at his house, I found that the satellite modulated output was on channel 39, smack bang on top of a French channel!. I tuned around and said "Ah, tropo problems, we have a little high pressure brewing". Well at that time, the pressure was about 1024m/b, Michael quickly turned around and said "You wait until Christmas week, it's going to be nearly 1050m/b". I said "Great, fantastic, wow, tropo, DX, etc."! Michael was not amused at the thought of his satellite systems being obliterated by other continental channels, so with screwdriver in hand the systems were moved to a clear channel in the spectrum, and then into the bar for a pint or three.

For the next few days I became very, very, busy but still kept an eye on the weather charts and my HF weather

fax system. Boxing Day arrived (the real one, the 26th) and the pressure was around 1036 down here and showing signs of starting to fall. The humidity was also very high, and these two factors coupled should produce some tropo somewhere, so off I went to the station to see what was going on.

I searched 432MHz for beacons, and yes, the band was open to Germany and Switzerland. I then checked 1296MHz and found some rock crushing signals also from DL and HB9. So the tip for Christmas week was a good one, thanks Michael!

A few reports came in, but the main DX seemed to be HB9AMH/P (JN37) on both 432MHz and 1296MHz into the southern half of the UK. Brian G6YXT was heard working DLs on 432MHz, as was Richard G8FUO who later QSYed up to 1296MHz, the German stations were also coming into South Wales on both bands. The activity really wasn't very high due to the holidays (everybody was sleeping the Turkey off!), your's truly had a 30dB over S9 pipeline into Germany and worked JO31, JO32, JO41, JO42, and JO52 on both 432MHz and 1296MHz.

### Snippets

During a QSO on 23cm with DF2JQ, Tom told me that he will be active again on 50MHz as V50AT (ex ZS3AT) during the first part of 1993. Tom was very active on 6m from Namibia, in fact he was contacted nearly every day and provided many Gs with their one and only contact from V51 (ZS3). Tom will this time be operating more /P than anything else, and will be mainly operating from JH70 grid square.

Dave, G3SDL hopes to be active on 50MHz from EA6 during the summer months. Dave has so far been able to verbally agree a permit, but he wants the magic piece of paper!

### Late News

The January Quadrantids shower seemed good from this latitude. The shower was at its best on the 3rd at around 1200 noon, when the following were worked/heard on 50MHz; OK2PZW (new country from 1/1/93) IK0OKY, SM6CMU, G4IFX, IK2GSO, S59AM, I4CIL, EH6FB, EH3EHQ, CT4KQ, DK9YE, FC1JG, OK2BTW, OE5OLL, OK1MAC, S59UN, and S57AC, all with very long bursts and very strong signals.

Next month it's time to get ready for the Sporadic 'E' season, so that's it for another cold month. Please let me have any news or views by the 5th of the month to; GJ4ICD, TV Shop, Belmont Rd, St. Helier, Jersey, or Phone/(Fax after 6.00pm) 0534-77067.