HRT

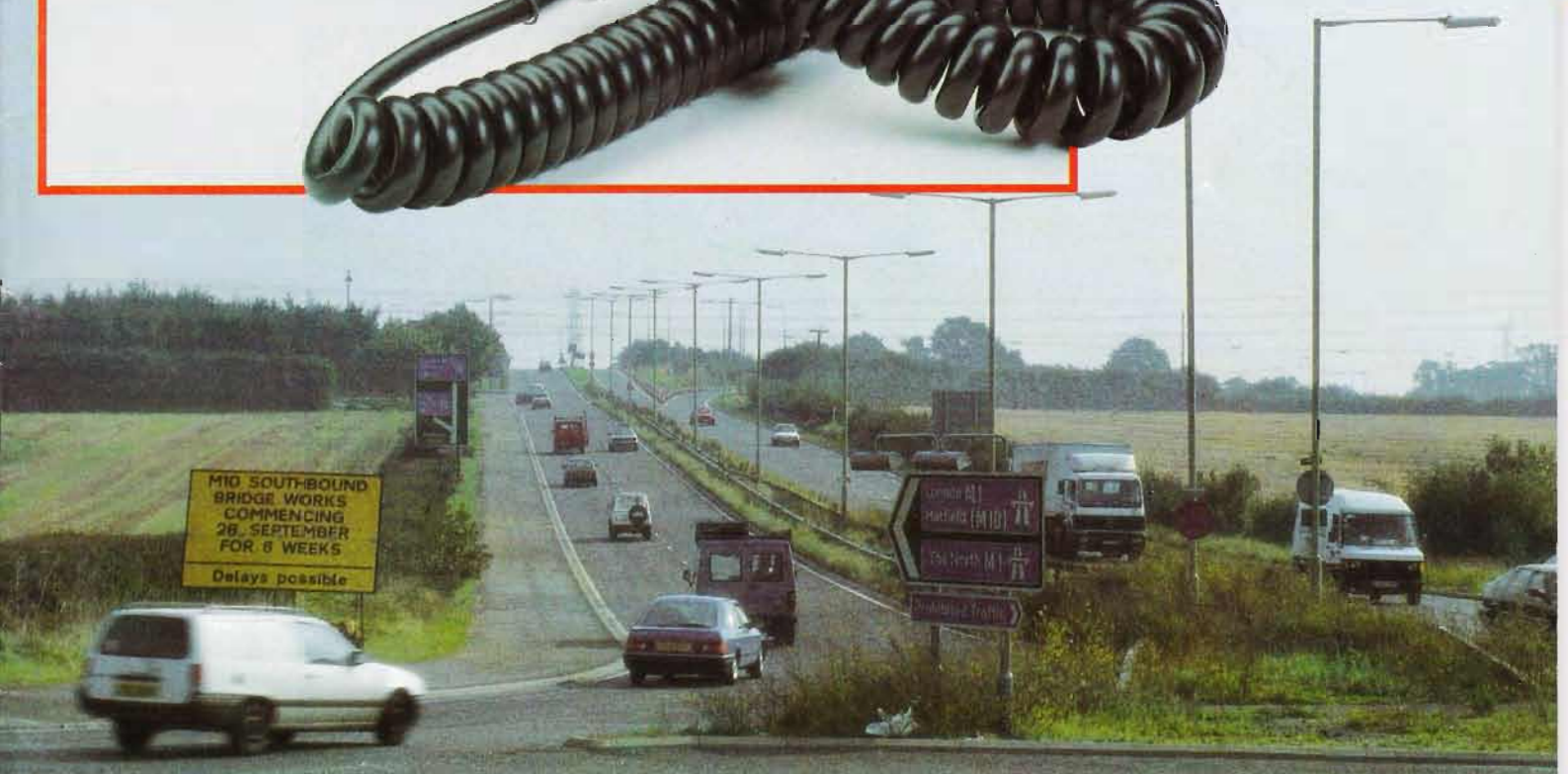
Incorporating SCANNERS

HAM RADIO TODAY

DECEMBER 1992 £1.70

Packet Radio in Russia

Radiocommunications Agency's 'Young Amateur of the Year' presentation to G7JCJ



ICOM IC-3230H Reviewed

12
9 770269 826031
Argus SPECIALIST PUBLICATION
BEST VALUE

NOVICE • PACKET • REVIEWS • PROJECTS • SATELLITES

HRT CONTENTS

HAM RADIO TODAY VOLUME 10 NO12 DEC 1992

REGULAR COLUMNS

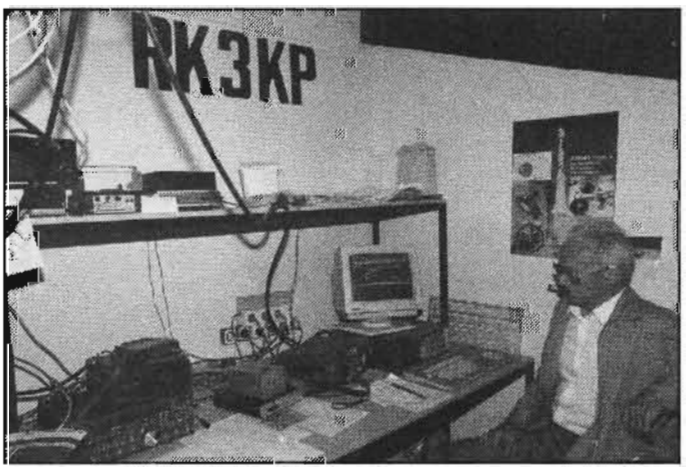
REVIEWS

FEATURES

PROJECT

NEWS AND VIEWS

Icom IC-3230H Reviewed

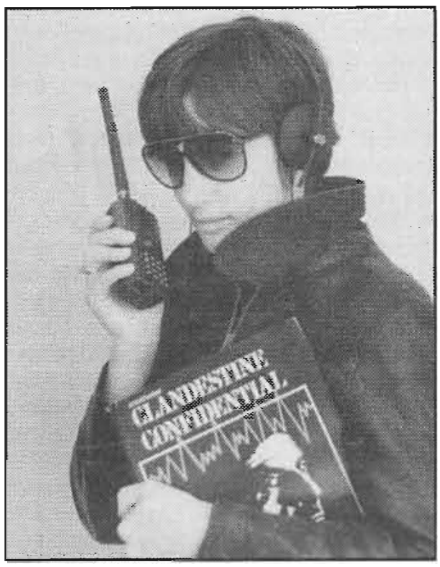


Packet Radio in Russia.

Alinco DJ-X1D reviewed.

CQ de G8IYA

Is our hobby changing for the better, do we just let someone else change it for us?



It seems that, as I write this, you can't open a newspaper or watch the TV without some talk of naughty 'scanners' coming up. Could scanner owners, or owners of the now-legal 'expanded receive coverage' amateur transceivers, all be perverts, snooping in listening to other people's conversations. I do that all the time. Like on 80m, 20m, and 2m. There's probably often a lot more interesting listening on some 2m channels than on boring telephone conversations.

Novice Licences

On the amateur bands, there's been much talk of possible changes to the Novice licence. Many amateurs have suggested that Novice licensees be given greater privileges in terms of band allocations, for example the addition of 2m to the Novice licence. Other amateurs appear dead against this, citing the possibility of adding occupancy to an already overcrowded band, and a possible reduction in operating standards. Whatever happens, from my experience in listening to Novices on air, their operating standards have been absolutely impeccable. It's probably because they're 'taught to operate' from the start, rather than 'pass a written exam only and you get your licence'.

The possibility of adding 2m could simply be a case of 'history repeating itself', as Class B amateurs were, in the early days, restricted to frequencies of 430MHz and above until the 'powers that be' added 2m to the Class B allocation. Many of us know what's now come of 2m, she says, tongue in cheek! We could of course go back to the 'old days' (the 'dark ages'?) where there weren't many amateurs around in the first place. But again, history appears to be showing that in technically advanced countries, those where youngsters especially have a good knowledge of electronics and the like, the number of radio amateurs is high in relation to the general population. This can have its disadvantages though. In Japan, the VHF/UHF bands are so crowded in city areas that it's very hard to get a channel to communicate on, virtually all of them have at least a few QSOs taking place. 2m repeaters aren't allowed because there's simply no room for them. But how often do you hear poor operating standards from a JA, on HF for example? Is this the way we're going over here?

In chatting to the RA, they've told us they should have their Novice licence review completed by around the beginning of December. We'll of course be there at the meeting to report back to you. I for one await the RA's decisions with anticipation.

Class A test isn't more difficult, just 'different'

Following the recent details of changes to the Morse test required for a Class A licence, many Class B amateurs are also getting rather, let's say, 'excited' about this. From last month's 'Radio Today' in HRT, you'll see that a 'QSO' style of test will soon be required, adding procedural signals and the like to the test. I consulted with my (Class A) Consultant Technical Editor and asked him to investigate this. Here's what he's come up with;

The RA tell me that these (quote) *"proposed"* changes "will prepare candidates better for the sort of operating procedures they can expect on air". I agree, they will. However the message I'm also getting is that the test will require a knowledge of a greater amount of Morse code vocabulary than it has done over the past years. In view of the RA's statement of their wish to "simplify licensing where possible" and to "reduce the number of unnecessary obstacles", this does seem to be doing rather the opposite. The RA stated for publication that the *proposed* test isn't more difficult, just different.

The other message I've been getting is that amateurs in general (not just a 'closed shop' of Morse examiners or whatever) weren't consulted about these *proposed* changes. The RA told me they've had no communication whatsoever from amateurs saying they disagree with this new format, and I'm sure their conclusion is that all amateurs think it's a good thing. So it looks like amateurs who make it to a Class A *will* be better CW operators. But I ask myself, why are today's most dynamic young amateurs (for example, the winner and runner-up of this year's 'Young Amateur of the Year Award') primarily interested in packet radio?

Goodbye, Waterloo Bridge House

So that's it (Editor back now!), only time will tell. As always, the RA tell us they want to hear *your* views on amateur licensing. You can contact them at the Amateur Licence Dept., Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London, SE1 8UA, Tel. 071 215 2217 (or 071 215 5000 switchboard).

They'll soon be moving to the London Docklands although they wouldn't reveal to us whether they'd be moving to the top floor of Canary Wharf or not! (see this month's cartoon). No doubt all their phone lines and mail will be automatically re- routed, however, on a human note I wonder if the staff there really *want* to move? (Civil Servants at London's Department of Transport recently demonstrated against their possible move there). Waterloo Bridge House certainly has it's 'character' as many Londoners will know, but times do change, and we sometimes also need to change ourselves in order to adapt. Maybe we should make ourselves 'open' to change, to see whether it's a change for the better. In terms of Novice licensing. In terms of the Class A test requirements. In terms of the advancement of our hobby. But if we sit around, leaving the 'changes for the better' to others, we won't get very far, or if we do we may disagree with the changes others make. It's no good moaning about any changes a national body introduce on our behalf, for example, if you get a chance to do something about it and don't. Like voting. Like disagreeing with the RSGB unless you've tried to 'change things from within' by becoming a member. We all have a chance to shape the future of our hobby, which the RA are giving us in an apparently 'open' manner unknown of before. The moral is, make your voice known, while they're listening.

LETTERS

Letter of the month

Dear HRT,

Further to your comments regarding advertising of courses in the October issue of the magazine, indicating that you felt that courses outside the clubs were being run on a profit making basis. Having recently retired from a life spent in further education it would appear that your comments, while sound in principle, are somewhat wide of the mark - in real life.

It is admitted that the aim of colleges is for courses to be as profitable as possible. As a result of recent national changes in the financing of further education, this need to be profitable has increased as they are now, in effect, self financing instead of being supported by the local authority.

In practice however the fee required to ensure real profitability for courses such as the RAE would render them completely unrealistic on the individual. The real cost of a course per week is in the order of £1000 to £1500 when all overheads of administration, cleaning, use of equipment etc., is added up. A lot of money per student! In addition there is the cost to the college of concessionary fees for the unemployed and the senior citizens etc. In short these courses are run at a real loss by each and every college though as 'vocational' i.e., a course leading to an exam, they attract a subsidy from central government resulting in a lower fee than a non-vocational or recreational course. It should be noted that for many years the actual fee income from RAE courses has been but a fraction of that to be expected from the numbers in the class due to the high proportion of concessory students.

This pressure of finance could well lead to the demise of courses such as the RAE in colleges of further education. As such courses supply the bulk of new entrants into amateur radio, such a prospect should be viewed with concern, not only by our national society, but also by the RA who seem to be taking a very much more active interest in amateur radio of late.

I hope this information will indicate the problems on the 'other side of the coin'.
R. Wilson G4NZU.

Editorial Comment;

I take your point, and I totally agree with you that if a course is being run on a self-financing basis, then as far as I can see it isn't being run for profit. This is good, and I'm very happy to freely publicize such courses within the editorial section of the magazine. All they need to do is tell me this in their reply to my letter(s). But to date, *not one* non-amateur-run organisation seeking free publicity has done this. That's a 'real life' example. *Surely* they can't *all* be running to make money? Or maybe it's only the ones that are that want publicity! In any case, all groups are perfectly welcome to (also?) publicize their course in the classified ads section of HRT, I know of none we've refused!

However for local information for prospective amateurs, I list the contact details, each month, of all active radio clubs and similar organisations who send me information. Any self-respecting club secretary will know where their local RAE or Novice course is held, they may even run one themselves, thus giving a local contact point for prospective amateurs as well as providing an introduction to a local club that wants to promote our hobby.

Dear HRT,

I wonder if anyone else has had the same experience with their call-sign as I have? In April this year I passed the Morse test, I then had to wait two months for the 'A' licence. It finally turned up on the 20th June, it was G0RSR, I immediately went on the HF bands and in just under a fortnight I worked 33 DXCC countries. In the meantime I purchased some QSL cards, a brass plaque, and a badge all with the G0RSR call-sign on them, none of which were cheap. I was reasonably happy until 11th September when I received a letter, and another validation certificate from the Accounts Director of Subscription Services Ltd. The letter informed me that they had issued the G0RSR call to me in error, it was reserved for a radio club and my correct call is G0SFV, if I was inconvenienced by this I had to write to the Director. In my reply I have said that I am very annoyed and why did they wait for nearly two months to inform me? I then went on to list all the things I had purchased with the G0RSR callsign on, and their prices. I hope to be reimbursed for the items, as they have admitted that it was their fault, I think it is the least they could do. Also what of the QSLs that I have sent via the bureau? who will they be sent to? At the moment I am possibly in the unique position of having two valid A licences, as G0RSR hasn't been formally revoked. What do you think of all that?
Dave Burton G0SFV.

Editorial comment;

Some years ago, when licensing was handled by a different body, my friend Vince passed his Morse and applied for a Class 'A' with a request to be issued, if possible, with a specific callsign featuring his three initials. The callsign which came back indicated that he'd just missed this by a few letters. Many months later, the callsign he'd initially requested was published in the RSGB callbook as being his, and his (wrongly) issued callsign being that of another person, who was also using it. This was the first he'd heard of it, and needless to say, he had mixed feelings! No doubt there are many other such examples, you're not the only one Dave, and human errors do sometimes happen. At least the Accounts Director of SSL personally wrote to you to let you know, and gave you a contact person (himself) to complain to if you had been inconvenienced.

Dear HRT,

Having read HF Happenings (Sept 92), Don Field G3XTT's discussion regarding the introduction of incentive

£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.

licensing into the UK leaves me, personally, on the brink of despair... nearly. He apparently believes, that emulating the American licensing structure will somehow miraculously transform amateur radio as we know it.

Presumably he occasionally speaks with American hams? I refer here to a meaningful QSO, rather than a manic exchange of reports etc. If so, he may find out that multitudes of these people treat incentive licensing with the contempt it so richly deserves. Unless Don's QSOs are restricted to those state-side hams, who, for reasons best known to themselves, blindly support a system endorsed and stage-managed by the ARRL.

The advent of incentive licensing in 1963, (USA) brought about a virtual annihilation of American electronic manufacturing companies - far too numerous to mention here, but more importantly, its inception stopped amateur radio growth stone dead in its tracks. American amateur radio activity has never recovered, and probably never will. Thanks to those people who controlled their national organisation during the 60s - unless they dump this divisive licensing system and embrace common-sense.

You know, whenever radio amateur writers put forward proposals that subtly promote the creation of what is nothing more or less than class-division, I become highly suspicious of their ultimate motives. Hey, where's the silent majority? I'll tell you, remaining silent as usual, unless you know better?

Ray Howes G4OWY.

Dear HRT,

I'd like to reinforce what Ray Howes has said about incentive licensing in the US being a catastrophe. I was not in the US at the time, but there seems to have been a combination of two reasons;

1) Existing hams were not 'grandfathered' into a higher licence class like they should have been.

2) Although to begin with there were different power limits for different licences as well as different sub-bands, they kept only the sub-bands and gave everybody permission to use high power, which I regard as a serious blinder. They should have done the opposite.

Partitioning ham bands by licence class is something we should strive hard to avoid, and high power carries more responsibility to produce a clear signal. If incentive licensing is going to happen in the UK, we must learn by American mistakes and come up with a better system. We need to 'grandfather' existing licensees (including the B licence if we are talking about a 'post Morse test world'). We also need to see that, with the exception of Novices, each subsequent licence should give more power and possibly more bands, but not little bits of a band as they do in the US.

I have a UK class B licence and an American 'Extra' licence (the highest grade they have). To get the last little bits of the 'phone' on each HF band I had to learn 20 wpm Morse, which is an even bigger waste of time than having to learn Morse to operate 'HF phone' in the first place.

Alun Palmer B.Sc, AMIEE, G8VUK/N3KIP

Editorial comment;

Don's reply is;

It's nice to know someone reads HF Happenings! I happen, for reasons of my own, to support some form of incentive licensing, but I don't recall saying anything in the column about how "emulating the American structure will miraculously transform amateur radio as we know it". Rather, I was speaking in the context of a mandatory 12wpm CW requirement and wondering aloud whether amateurs might actually be more interested in CW if they took it out of interest rather than compulsion. Neither do I endorse a slavish emulation of the US scene. In fact I don't know what form a UK incentive licensing scheme would take, though we seem to be moving towards one in gradual steps with the introduction of the Novice licence which HRT has endorsed strongly and which, on the evidence so far, is doing much to bring new blood into the hobby.

Just to take the US system for a moment though. Yes, I speak regularly with US amateurs, both on the air (several half-hour plus QSOs this last weekend!) and on my regular trips to the US (as a reader of my column you will know I attended a US Hamvention and a local Hamfest in the last year), and hold a US Extra Class licence (NK1G).

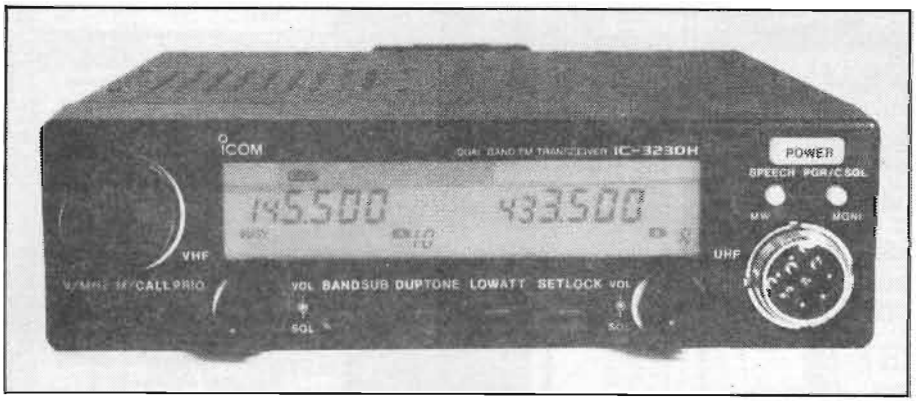
You cite no evidence that the onset of incentive licensing brought about a "virtual annihilation of American electronic manufacturing companies" - maybe the rise of the Japanese production machine had more than a little to do with that, just as with the demise of the motorcycle industry over here?

Anyway, thank you for enlivening my day, and keep on reading 'HF Happenings'.

Don Field, G3XTT/NK1G (also MA (Cantab), C.Eng, MIEE - Ed)

Icom IC-3230H Review

G4HCL goes on the road with Icom's latest tiny dual bander



OK, so what's new about the IC-3230H then? Nothing really. Except of course the fact that Icom's new 45W/35W dual band mobile comes in a box only half the size of a typical car radio/cassette!

Yes, it's tiny, but it packs a big punch of power. Opening the covers and looking inside is literally a magnifying-glass job with the sheer miniaturization involved. All this is well and good, but what does it do for us amateurs? The most significant fact is that, as a mobile rig, you can mount it virtually anywhere, including 'up high' on your dash so that you don't need to keep looking down while you're driving to operate it. This 'eye travel distance' is the most dangerous part of mobile operation, pro fessionally proved to be far worse than for example using a hand mic and the like.

What do you get?

In its compact 140mm (W) x 40mm (H) x 165mm (D) case, you get a FM mobile giving switchable 5W/10W/45W on 2m and 5W/10W/35W on 70cm, and you can even run it as a cross-band repeater if you like (more of this later). The set 'as standard' covers the usual amateur bands, but in countries where its allowed you can open up the receiver to cover typically 136-174MHz and 400-479MHz by keeping a few buttons pressed whilst switching the set on. To keep the depth required for mounting down to a minimum, a flying lead terminated in an SO-239 socket is used for the common 2m/70cm aerial feed, and a further flying lead is used for the DC input supply. A tiny fan on the equally tiny rear heatsink comes into operation when you start transmitting, again keeping the size down whilst giving the necessary cooling.

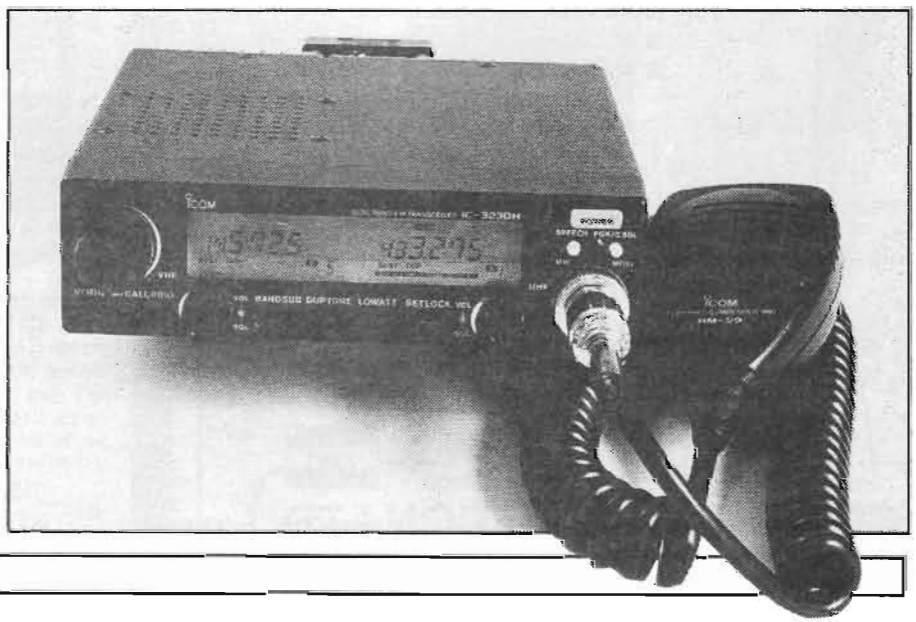
Memories

On each band the set has 15 'standard' memory channels, plus a further two for upper and lower band scan frequencies, plus a further quick-access 'call' channel. A number of either tiny, small, or not-so-small but recessed, buttons on the front panel control the set's functions, together with up/down buttons on the mic with a sliding 'lock' switch. European models add a 1750Hz tone button on the back of the mic for repeater access, and by plugging in an optional module you can add CTCSS encode/decode facilities for alternative UK repeater access or for quiet 'club channel' monitoring.

Remote Control

A further plug-in option gives you DTMF facilities, including selective calling using the common multi-digit system now 'standard' on the amateur bands including a 'paging' facility to let you know you've been called in your absence. When used with a DTMF-equipped 2m or 70cm handheld or an optional DTMF mic, you can also control the rig's functions off-air and/or remotely, for example changing channel, altering the transmit power and so on.

With an internal diode cut, the set can be placed in and out of cross-band repeater mode from the front panel. This means, for example, you can program the set up on your 2m club 'chat' channel with the 70cm side fed via a 2m/70cm diplexer into a dummy load, so you can hear it just around your house on a 70cm handheld. Transmitting back on 70cm using 'Extra Low' power (typically 10mW or less ERP) as fitted to some portables to give short range, and you can have all the advantages of your shack 2m rig and rooftop aerial from your armchair in the living room. This of course is quite



legal to do under UK licensing regulations.

On the Air

So I unpacked the set and plugged it in. It took me a short while to get the hang of programming the memories using the tiny buttons, although the operation was straightforward enough. In my shack, a handy thing I found with the IC-3230H is that I could switch in a receiver attenuator when needed, and I could also program the set to automatically switch this in when I switched to the 5W power level. At home, when scanning round on most sets I sometimes find that I can hear more than one repeater (one local, one distant but still fully readable) on few channels, especially on 70cm. This has the annoying (to me at least) effect of halting the squelch, and I know that if I try to key it up I'll also bring up the local repeater if I transmit on high power, low power not accessing the distant repeater. The auto-attenuator function on the IC-3230H nicely overcomes this.

Tested with my rooftop colinear with the attenuator out, even with a very local government VHF transmitter system operating adjacent to 2m (which often causes some rigs I test a number of problems) as well as a line-of sight 2m/70cm packet node/DX Cluster system, I found no breakthrough or intermodulation problems with this rig, just crisp clear audio. Some sets, especially scanners, go rather 'deaf' each time the packet system keys up, as well as producing a buzzing noise every 100kHz mixed with repeater audio on VHF! No problems here due to strong signals.

On the Road

I started by using the memories for repeater channels plus the S20/SU20 calling channels (I'd really have liked more standard memory channels than 15 on each band), and the 'VFO' mode with the mic up/down buttons for simplex chats. If the scan stopped on the calling channel, a press of the tiny 'MW' button next to the power switch wrote that memory channel information into the VFO, from which I could easily tune using the up/down mic buttons.

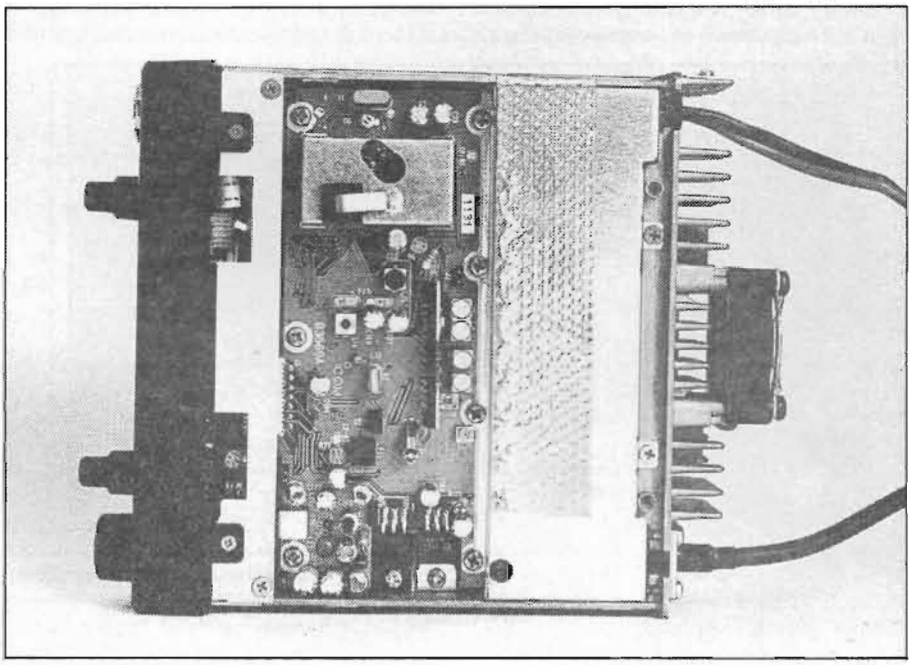
The small speaker on the top of the set was quite useful,but only at slow speeds - travelling on a motorway brought to light the benefit of plugging my external speaker in. Plugging two external speakers in was even better - the rig had the facility of separating the audio from each band into different speakers, which I found handy in making sure I replied on the right band!

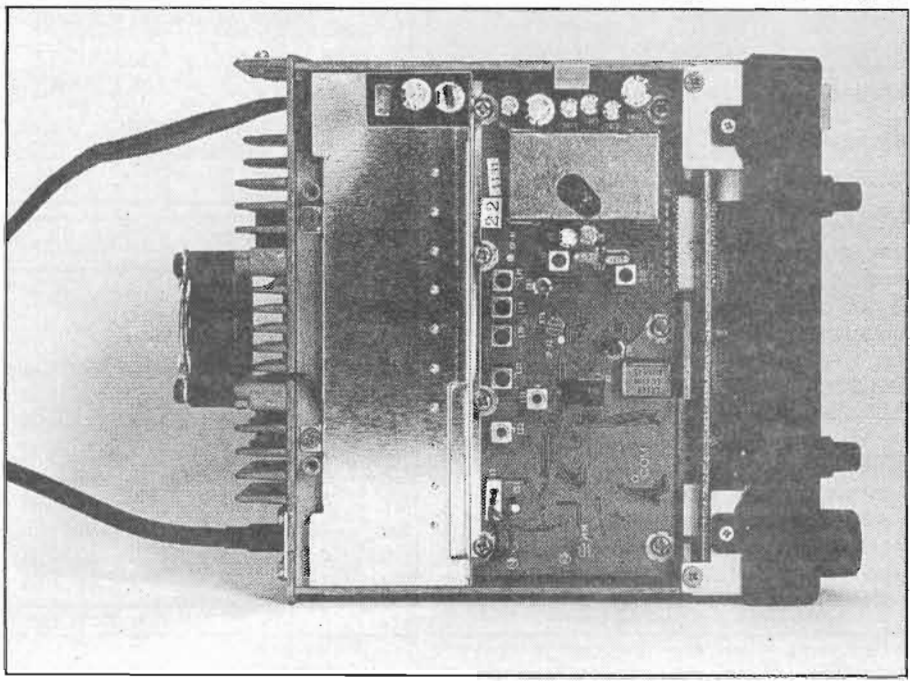
Band changing was a different matter though, a quick squint at the display to see on which side the 'band' icon was shown, followed by a press of the recessed 'band' button until it came up on the right side of the display, each time I wanted to change bands, eventually got the better of me. Icom had fortunately made provision for the 'up' button on the mic to be programmed as any of the front panel facilities - you can guess which I chose. This changed the 'down' button to a 'scan initiate' button, so changing channel was then normally a 'twist the main knob' affair. OK, I suppose I can't have everything, but another button on the mic for a programmed function would have been very useful.

The rig did perform very well though, the mic was very easy to hold and use and gave fairly reasonable audio - although this was described as rather 'bassy' by some amateurs, yet 'fine' by others - and especially with external speakers the receiver audio was well tailored.

Insides

The set's case is based on a die cast chassis, the rear heatsink being an integral part of this with the internal transmitter power amplifier modules bolted straight onto it. The transmitter circuitry on each band is well screened, even to the extent of additional copper tape on 70cm, to reduce undesirable emissions and to help in providing a good 'ground path' - essential in a small box. On the 70cm receiver side, a small additional internal coax socket is fitted, next to an 'alternative' front end section which suggests the set also has the facility for 900MHz reception for certain uses. Indeed two 'blanked off' holes for



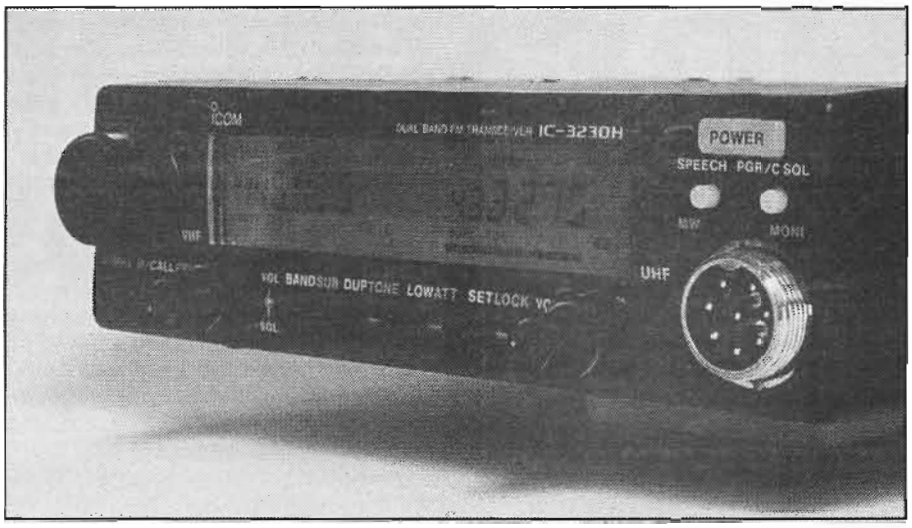


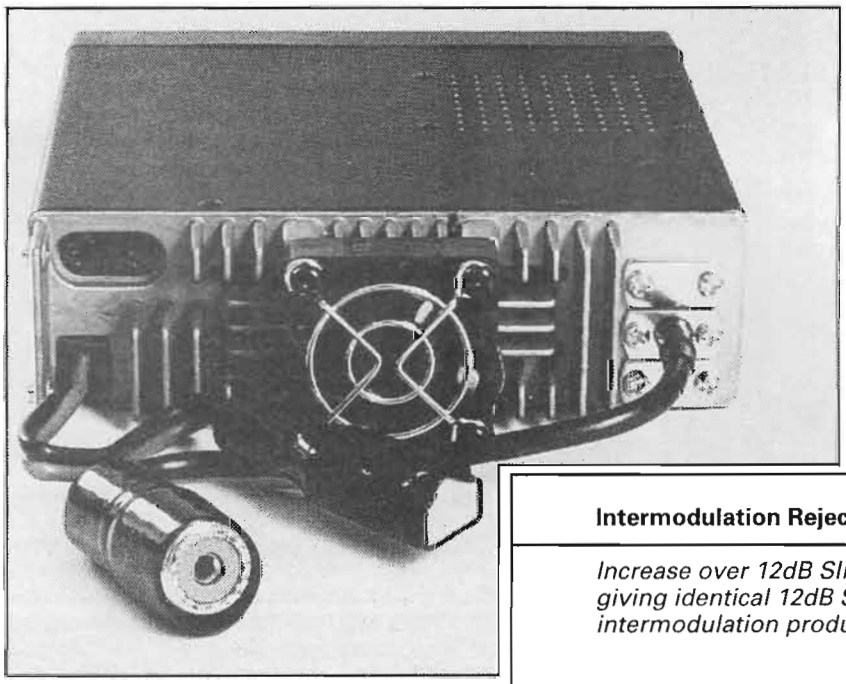
aerial leads on the rear panel suggest that separate 2m/70cm aerials may be a possible option for some markets.

Laboratory Tests

The receiver's strong signal handling performance was good, very good in fact, confirming the impeccable results I found on-air. On transmit, I just couldn't detect many of the harmonic levels, they were so well suppressed, and the power levels and TX frequency deviation were accurately set.

To check on the odd 'bassy' transmit report I quickly measured the deviation at low audio frequencies - this rose to a rather high level when 'pushed' (6.02kHz at 200Hz, 7.30kHz at 150Hz with a 20dB higher input level than normal, typifying a loud 'haalo' into the microphone), which may possibly cause the odd overdeviation 'pip' on one or two repeaters, although I found no problems on air.





Conclusions

The set's small size, in common with many such rigs nowadays, is a very good feature for mobile operation, and on air the set performed quite well. Small size does of course have its disadvantages, such as the tiny buttons for the control functions of the rig, although the microphone mounted buttons can be used to advantage here.

In use, even at high power level the small rear mounted fan kept the heatsink reasonably cool and was nicely quiet in operation, no large and heavy heatsinks here to add to the set's bulk. A potent and very clean transmitter, and the set's receiver coped with strong signals very well indeed, this I'm sure will be important as our radio spectrum becomes more and more crowded. In all a very reasonable performer, and if you add the optional CTCSS and DTMF units you can turn the set into one with most of the 'bells and whistles' found on today's top of the range set.

My thanks go to Icom (UK) for the loan of the review transceiver. As this is being written, the selling price of the set is likely to change, so readers should contact their dealer for the latest on this.

LABORATORY RESULTS:

All measurements taken using 13.2V DC, high power TX level, unless stated otherwise.

RECEIVER;

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;	73.3dB	63.4dB
50/100kHz spacing;	72.9dB	63.9dB

S-Meter Linearity

	145MHz		*435MHz*	
	Sig. Level	Rel. Level	Sig. Level	Rel. Level
S1	0.89uV pd	-11.4dB	0.81uV pd	-7.5dB
S3	0.97uV pd	-10.6dB	0.89uV pd	-6.7dB
S5	1.68uV pd	-5.9dB	1.29uV pd	-3.5dB
S7	2.28uV pd	-3.2dB	1.54uV pd	-1.9dB
S9	3.29uV pd	0dB ref	1.93uV pd	0dB ref
S9+	4.35uV pd	+2.4dB	2.37uV pd	+1.8dB
S9++	6.00uV pd	+5.2dB	3.57uV pd	+5.4dB

Sensitivity;

Input level required to give 12dB SINAD;

144MHz;	0.13uV pd
145MHz;	0.13uV pd
146MHz;	0.13uV pd
430MHz;	0.15uV pd
435MHz;	0.15uV pd
440MHz;	0.15uV pd

Maximum Audio Output;

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

145MHz	*435MHz*
2.90W RMS	2.96W 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*
73.1dB	92.2dB

Squelch Sensitivity;

	145MHz	*435MHz*
Threshold;	0.09uV pd (6.5dB SINAD)	0.11uV pd (6dB SINAD
Maximum;	0.18uV pd (19dB SINAD)	0.22uV pd (20dB SINAD)

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;	90.3dB	87.3dB
+1MHz;	97.8dB	95.9dB
+10MHz;	98.2dB	97.4dB

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;	28.8dB	43.8dB
-12.5kHz;	35.7dB	12.7dB
+25kHz;	74.2dB	73.2dB
-25kHz;	77.0dB	70.8dB

TRANSMITTER

TX Power and Current Consumption;

Freq.	*Power*	*10.8V Supply*	*13.2V Supply*	*15.6V Supply*
144MHz	High	34.7W/8.25A	46.7W/9.00A	46.9W/8.70A
	Low 2	11.3W/3.40A	11.4W/4.55A	11.4W/4.55A
	Low 1	5.30W/4.50A	5.40W/3.40A	5.30W/3.45A
145MHz	High	33.9W/8.05A	46.7W/8.95A	46.9W/8.65A
	Low 2	11.3W/4.50A	11.4W/4.55A	11.5W/4.55A
	Low 1	5.40W/3.35A	5.40W/3.35A	5.30W/3.40A
146MHz	High	33.1W/7.90A	46.9W/9.10A	47.2W/8.70A
	Low 2	11.4W/4.50A	11.5W/4.50A	11.5W/4.55A
	Low 1	5.40W/3.40A	5.40W/3.40A	5.40W/3.45A
430MHz	High	20.2W/7.15A	33.4W/8.90A	33.4W/8.40A
	Low 2	10.9W/5.00A	11.0W/4.95A	11.0W/4.90A
	Low 1	5.45W/3.75A	5.50W/3.75A	5.45W/3.70A
435MHz	High	20.3W/7.15A	31.4W/8.45A	31.4W/8.00A
	Low 2	10.3W/4.90A	10.5W/4.80A	10.4W/4.70A
	Low	5.15W/3.70A	5.20W/3.75A	5.15W/3.65A
440MHz	High	20.2W/7.25A	30.1W/8.40A	30.1W/7.95A
	Low 2	9.70W/4.90A	9.75W/4.80A	9.75W/4.75A
	Low 1	4.69W/3.70A	4.77W/3.70A	4.77W/3.60A

Harmonics;

	145MHz	*435MHz*
2nd Harmonic;	-82dBc	<-90dBc
3rd Harmonic;	-85dBc	<-90dBc
4th Harmonic;	<-90dBc	<-90dBc
5th Harmonic;	<-90dBc	-
6th Harmonic;	<-90dBc	-
7th Harmonic;	<-90dBc	

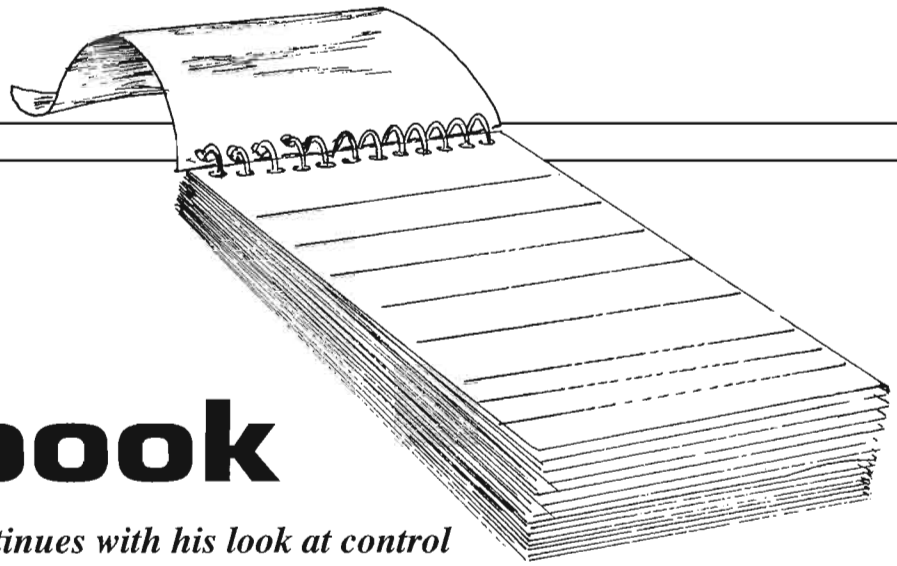
Toneburst Deviation;

145MHz	*435MHz*
4.52kHz	4.80kHz

Peak Deviation;

Measured at 1kHz (see text)

145MHz	*435MHz*
4.97kHz	5.07kHz



From My Notebook

Geoff Arnold G3GSR continues with his look at control circuits for your station

There are two important requirements of any control circuit (or any other circuit come to that). First that it is safe – designed in such a way that neither the user nor the equipment are likely to suffer damage in the course of its use. Secondly that it is reliable – in other words when you turn a knob or operate a switch instructing it to do so something, then and only then will it do it.

Reliability

Looking at the reliability element first, if you are going to get reliable operation from any switching or control circuit, the insulation between conductors, or between a live conductor and circuit ground or 0V, must be adequate to withstand the voltage that will be applied across it. Excessive leakage across the insulation can upset circuit conditions so that the relay or other sensing device is unsure what state the circuit is in.

Just to recap the example I gave last month, in Fig. 1 relay RLA will be energised, opening or closing whatever contact sets it carries, if sufficient current flows from the +V line to 0V through its coil. Normally we would expect that current to flow via the 2-pole plug and socket and the remote switch S1. If the plug and socket is not of a suitable design for the voltage and circuit impedances involved, the leakage between its poles may be enough to energise the relay, even when S1 contacts are open.

At the same time, it is essential that the circuit resistance of the plug and socket, the switch and the wiring joining them all together is low enough to allow enough current to ensure reliable operation of the relay when S1 is closed. The value of the voltage on the +V line is important here. If it is below the nominal working voltage rating of the relay coil, there is less leeway to take care of excessive circuit resistance.

So, switches, relay contacts and plugs and sockets must all have good insulation but a low contact resistance.

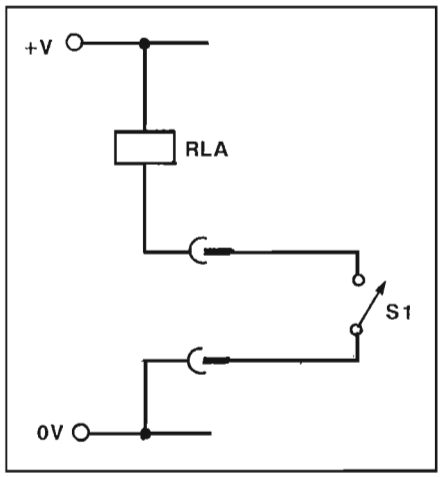


Fig. 1

The heavier the current being carried by the circuit, the more efficient (low resistance) the contacts must be, otherwise they will overheat due to the passing current.

There is another problem to be watched out for, however, which is contact corrosion. The contact faces of switches, relays and connectors carrying substantial currents are to some extent self-cleaning, the power being sufficient to break through slight to moderate oxidisation. Contacts carrying very small currents, such as in microphone lines or receiver aerial circuits, must be made of or coated with materials which do not oxidise, for the power is not sufficient to break through even a thin isolating layer.

Safe Working Voltage

It is also an essential of any assembly of contacts, whether in a switch, a relay or a connector, to have adequate clearances for the voltages applied, so that there can be no flash-over between two contacts of the same pair when open (which would give a premature 'switch-on' of the circuit they control), or between contacts of one pair and an adjacent pair or some earthed metalwork (causing unpredictable faults and probable damage). Take care with the working voltages of relays and small toggle switches for mains switching, many are not rated for such use.

When selecting a resistor type for use in any circuit, the most important factors are of course the correct ohmic value and an adequate wattage rating. Tolerance – how close the actual value of a particular resistor comes to the value marked on it, the stability of resistance value with changing temperature, the noise levels and self-inductance can also be critical. One factor which can easily be overlooked when doing a straightforward wattage calculation on the basis of current-flow through a resistor or the voltage across it, is that any resistor has a maximum working voltage which depends on the physical size and construction. Sometimes, the voltage which will exist across a resistor will dictate the use of one of a larger rating than the wattage calculation might suggest.

Meter Switching

In a power control system, it is often useful to have metering of the voltages and currents powering various circuits. It is rather expensive to have a separate meter devoted to each function, and usually unnecessary unless simultaneous monitoring of two quantities is vital. Instead, a single meter with a circuit selector switch is generally used – similar arrangements are fitted to many transceivers. The switch used must always be a type where one contact is broken before the next one is made as it is moved from one position to the next (called a break-before-make type). If not, unrelated circuits may be momentarily bridged together as the switch is turned, with potentially disastrous results.

For current measurements, shunt or sampling resistors are permanently incorporated into each circuit to be monitored, and the meter connected across the relevant one by means of the selector switch (Fig. 2). For voltage measurements, we would normally connect a multiplier resistor in series

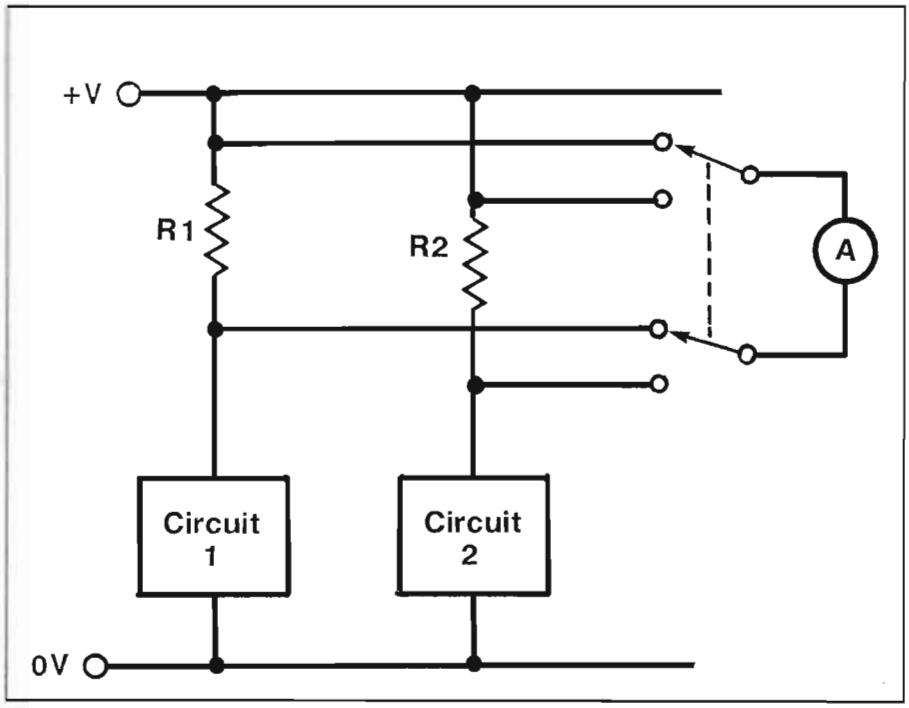


Fig. 2

with the meter, to drop the circuit voltage to a value within the working range of the basic meter movement (see *From My Notebook,* HRT June 1991 for further explanation). With switched selection to meter several different voltages, the circuit would be as shown in Fig. 3. However, in practice a slightly more complicated arrangement may be required for safe operation.

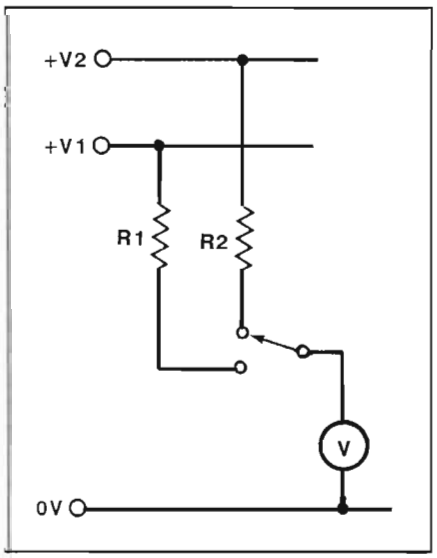


Fig. 3

Consider what happens to the voltage at the bottom end of the unconnected multiplier resistor (R1 in Fig. 3). Without the current drawn by the meter to hold it down, it will rise to the full value of the supply rail, in this case +V1. If +V1 happens to be a high-voltage rail feeding a transmitter PA stage, it could well exceed the safe working voltage of the meter selector switch, causing a flashover between contacts on the switch. The solution is to add a resistor to each multiplier circuit, turning it into a potential divider, as shown in Fig. 4. The voltages at the various selector switch contacts will then never exceed the few hundred millivolts required for operation of the meter movement.

You might think that the resistors

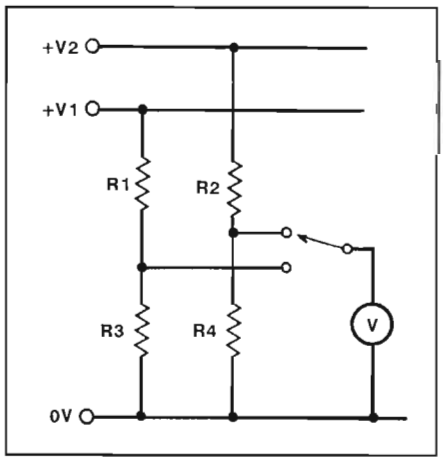


Fig. 4

R3 and R4 could safely be very small in physical size, since they have only minimal voltage across them, and will be called upon to dissipate almost no power. In fact, they must be chosen with great care, since if one should go open circuit, disastrous consequences may follow. I once saw the prototype of a 1.5kW HF transmitter in which the bottom-end resistor on the power amplifier supply metering had gone open-circuit, applying some 3kV to a small rotary wafer switch. The switch was not a pretty sight!

Connector Polarity

When installing connectors to take power into and out of a unit, a choice has to be made as to which side the plug (the one with pins) and which side the socket (the one with socket shells) should be fitted. In general, the rule-of-thumb is that the socket should be on the 'feed' or 'live' side, so that there are no exposed live contacts open to short circuit by touching metalwork, or that might give the user an electric shock where high voltages are concerned. The need to protect the equipment and the user against accidental contact with supplies is still as relevant as ever, especially with mains or similar high-power supplies.

Sometimes it may be convenient to take power in and out of a unit on the same connector. You can get self-assembly modular connectors in which pins and socket shells can be mixed on both sides, so that the 'feed' connections in and out are always on socket shells, and thus protected against accidental contact. A conventional plug and socket arrangement can often be used, however, as in Fig. 5 which shows a simple 12V to 9V stabiliser. The 12V feed **into** the unit on poles 1 and 2 is safely connected to the socket side of the connector. The 9V feed **out** of the unit is on the pins of poles 3 and 4, but this is quite safe because if the socket is removed, exposing the pins, the feed into the unit has been removed and pins 3 and 4 will be dead. You have, of course, included a proper bleed resistor across the 9V output to rapidly discharge any reservoir capacitor, haven't you!

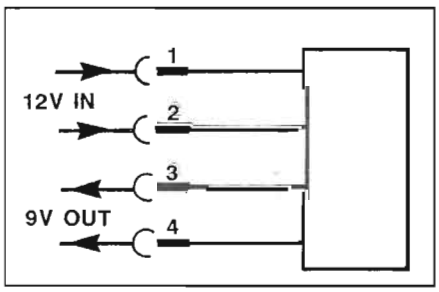


Fig. 5

Station Power

It is common practice in amateur radio stations nowadays to have one beefy, stabilised 12 volt DC power supply feeding most or all of the station ancillary equipment requiring that voltage. No problem in this, so long as the supply unit is adequately regulated, protected against over-current and over-voltage, and properly decoupled from the effects of stray transmitter RF getting into the voltage regulator circuit, causing it to go haywire. You can't expect to run a 100W SSB transmitter from the same supply, of course, because unless you're very lucky the wildly-varying load presented by the transmitter will cause voltage variations on the supply which will upset

other equipment, unless these all happen to include their own regulators.

Having this sort of supply, which you switch on as soon as you enter the shack, is useful in that it's almost as good as a 'maintained' battery supply which you can use to feed all the 'start-up' circuits in your station control system. The design of a station control system is much easier if you can count on a supply suitable for driving lamps and relays always being present.

Audio

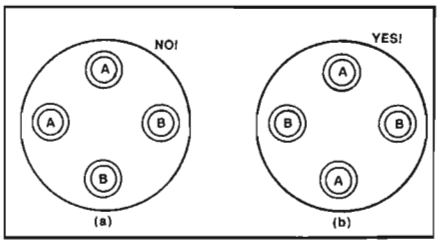
Before leaving the subject of station control systems, a few words about receiver audio output distribution. You may want to have loudspeakers, headphones and possibly a tape recorder, depending on your interests.

If you have several receivers, you may want to switch one loudspeaker between them, or alternatively provide a bank of separate 'speakers so that a simultaneous watch can be kept on several channels. If you also want to be able to record the output from one of the receivers, it is essential to minimise 'cross-talk' or break-through between channels. Such cross-talk can happen very easily if the wiring carrying the various loudspeaker outputs from the receivers runs closely parallel, and is virtually inevitable if the 'earthy' sides of all the outputs are commoned up, with switching in the 'live' side only.

The professional way around this problem would be 'balanced' outputs, in which neither side is earthed. As a second-best, run each output in twisted twin flex, known in the audio profession as a 'twisted pair', and switch both sides of the circuits at any selector switching. Running two or more audio circuits in a multi-core cable can be a disaster for cross-talk unless you use the correct type of cable. Ideally, it should consist of a number of twisted pairs, but unless you can pick up a scrap length somewhere, it's likely to be prohibitively expensive.

For just two audio circuits, you can use a standard 4-core cable, providing you connect it up the right way. Looking at the end of the cable, the arrangement of Fig. 6(a) with circuit 'A' using one adjacent pair, and circuit 'B' using the other adjacent pair, is likely to cause horrendous cross-talk between 'A' and 'B'. Swapping over two wires, as in Fig. 6(b), will virtually cure the cross-talk.

Fig. 6



Some communications receivers also include 'Line' or 'Record' outputs, usually at a lower audio level – milliwatts rather than watts – and a higher impedance – 600 ohms or more – than the loudspeaker output. These have the advantage that they do not mute or otherwise interfere with the loudspeaker output when in use.

Audio outputs at an impedance of 600 ohms have the advantage that they can be distributed over long lengths of cable with less loss than low-impedance loudspeaker outputs. The reasons are exactly the same as those which I discussed for power supply distribution in my February 1992 'Notebook'. It's all down to the resistance of the conductors in the cable.

Safety and Reliability

To sum up, for a long and happy life of your control system (and yourself), check the manufacturers' ratings before using any components. Always keep an eye open for parts of the circuit where component failures could do a particularly large amount of damage, and consider using a beefier component than simple voltage or dissipation calculations would otherwise suggest.

BBC to PC Monitor Interface for Packet

Peter Cole DAIPE describes a weekend project to interface a PC monitor with your BBC Computer

When a local department store started to sell off brand new monochrome PC monitors at a give-away price, it didn't take me long to decide that my BBC 'B' micro, used for RTTY and Packet Radio operation, would benefit from a higher quality display. Unfortunately the two systems are not compatible so before the monitor could be put to use there was a problem to solve, how to get it to work with the 'Beeb'.

Now like most things in life it's easy when you know how. However, at the time I knew little about either computer video or monitor circuitry, and my attempts to design a simple interface were complete failures! Numerous books and magazines were searched for information but without success, and the monitor was about to join other unfinished projects under the workshop bench when I heard about LM1881 video sync separator chip. I couldn't find any data on this either, so a plea for help was sent out over the packet radio network and this resulted in a set of data sheets arriving by post a few days later. A quick study of these showed that the LM1881 would indeed be ideal for the purpose.

Interfacing problems

The main reason for the lack of compatibility of older home computers, and the modern PC system, is due to the different standards for sync and video signals. Also there may be some differences in the scanning frequencies, but normally these can be taken care of by resetting the monitor preset controls.

From Fig. 1a it can be seen that the BBC machine has two display outputs; 1) a composite monochrome signal on SKT2 in which video and sync are combined. 2) separate red, green and blue video signals, a combined hor/vert sync line and a +5V line on SKT3.

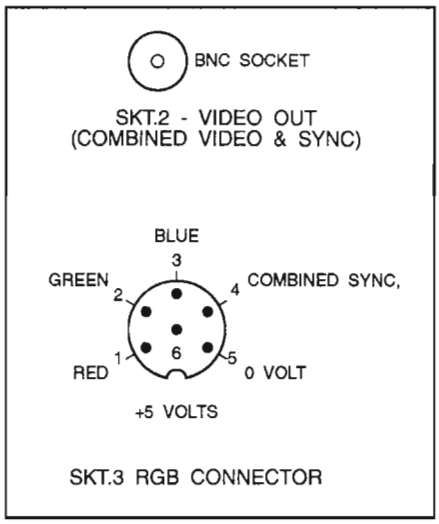


Fig. 1a BBC computer video and sync outputs.

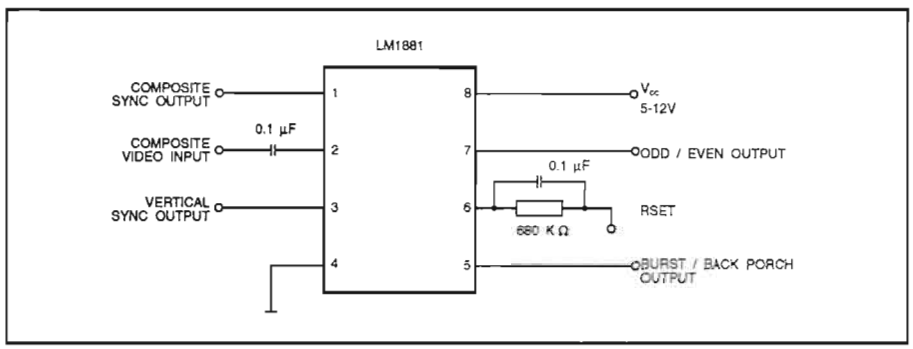


Fig. 2a IC1 LM1881 pin-outs.

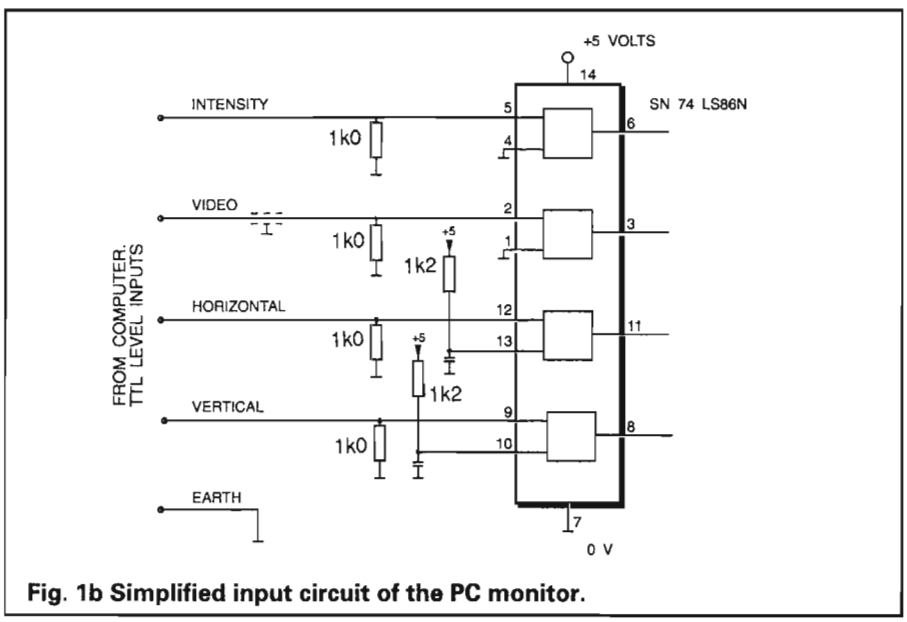


Fig. 1b Simplified input circuit of the PC monitor.

Fig. 1b is a simplified diagram of the input circuit of the PC monitor showing that separate TTL level input lines are used for intensity, horizontal sync, vertical sync, and video. Screen brightness is controlled by the intensity line, which may be connected to earth or to +5V as preferred. A suitable video signal is obtained easily by simply parallelling the RGB lines. Having dealt with these the only remaining difficulty is to produce sync signals in the correct format and it is for this task that the LM1881 is needed.

The LM1881, shown in Fig. 2, is an 8-pin DIL package containing circuits designed to separate the sync signals from composite video signals of similar format to the NTSC standard. It operates from a single positive supply of 5-12V at about 12mA, and apart from supply decoupling it needs only a DC input blocking capacitor and a CR tim-

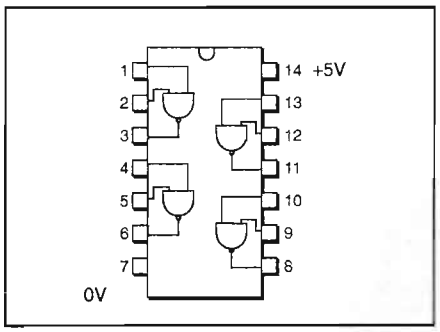
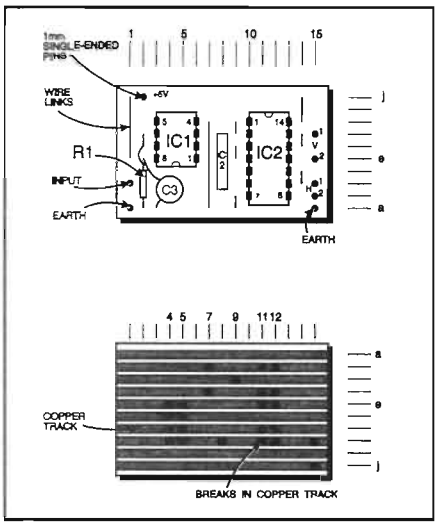


Fig. 2b IC2 7400 pin-outs.



Construction of the interface.

ing network to produce a working circuit.

When correctly driven, the outputs from the IC are combined horizontal/vertical sync on pin 1 (which provides the horizontal timing), and vertical sync on pin 3. In addition there are pulses for more specialised uses on pins 5 and 7.

The practical circuit

Although designed to separate the sync signals from a composite video waveform, it was found in this particular application the LM1881 worked just as well when driven with the combined sync from pin 4 of SKT3. This is very convenient, as it means that all of the connections to the BBC micro can be made via a single cable to SKT3.

The circuit shown in Fig. 3 consists of an LM1881 feeding a 7400 type quad input NAND gate used as buffer and inverter stages. Composite sync from the computer is fed to pin 2 of the LM1881 via a 0.1uF coupling capacitor, and horizontal and vertical sync signals are produced on pins 1 and 3 respectively.

Outputs from pins 1 and 3 are then fed to the 7400 which is wired as two sets of two-stage inverters. Here the first gate of each set is used as a buffer stage and the second may be used if needed to change the polarity of the sync pulse output.

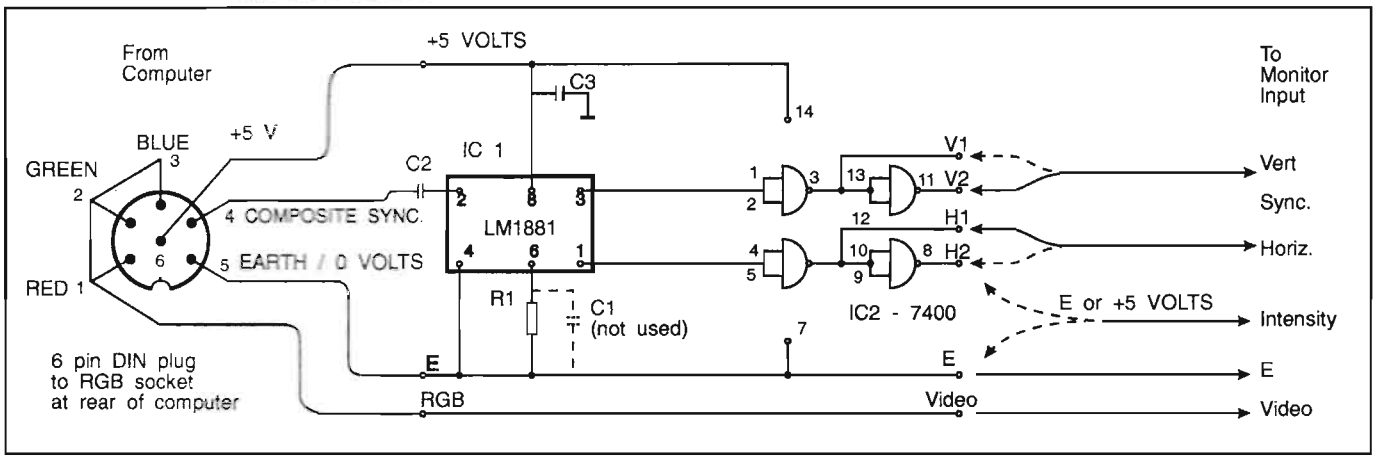


Fig. 3 Circuit of the interface. The timing capacitor C1 had no effect on the operation of the circuit so it was not used.

Construction

There is nothing critical about the construction or layout of the circuit, and the prototype was built on a small piece of 0.1in matrix stripboard. After testing, this was fitted inside a 35mm film canister, to form a compact in-line unit.

Testing

Before applying power, carry out visual checks and resistance measurements to make sure that there are no short circuits which might damage the computer. Then with vertical sync from pin V2 and horizontal sync from pin H1 (these connections gave the correct sync polarity for my computer/monitor set-up), switch on and adjust the monitor controls to obtain a stable display. Both line and frame locks should be absolutely solid, if they are not, invert the sync pulse(s) by changing the appropriate sync line(s) to the other output terminal.

Use with other computers

Whilst this circuit will produce timing pulses from any standard format composite video signal, it should be noted that home computers do not always have RGB video outputs. In this case the composite signal video will need further processing to make it suitable to drive a TTL input. Whilst this should not be difficult to do, a circuit is not offered here as it will need to be designed to suit the computer being used.

Despite the increasing popularity and greater power of PCs, 8-bit home computers are ideal for many tasks in an amateur radio station, and they are certain to be around for a very long time yet. Using an interface such as the one described here will allow these older machines to benefit from the higher quality display of a PC monitor, increasing numbers of which are likely to appear as surplus or clearance lines as systems are updated. The improvement over the commonly used B&W portable TV is nothing short of amazing.

Components list (for Fig. 3)		
Resistor		
R1	680k	0.25W carbon
Capacitors		
C1		not used
C2	100n	polyester
C3	10n	ceramic disc
Integrated circuits		
IC1	LM1881	
IC2	7400	
Other items		
8 pin IC holder for LM1881.		
14 pin IC holder for 7400.		
0.1in matrix stripboard, 10 holes wide by 15 holes long.		
Single-ended 1mm dia. PCB pins.		
5 core screened cable.		
Plugs to suit computer and monitor.		
Suitable housing e.g., an empty 35mm film canister.		

Alinco DJ-X1D Review

The DJ-X1 is dead, long live the DJ-X1D! Chris Lorek looks at the improvements

The Alinco DJ-X1 scanner was first revealed at the Leicester show last year, and we anxiously awaited a review sample of this. But *hold on* was the word from Mr. Toyoaki Kamatsu of Alinco and UK distributors Waters and Stanton Electronics, as an 'improved' model would eventually be launched in the UK. It was, and here it is, the DJ-X1D, a set with almost (but see later!) identical features and with an improved RF performance, more appropriate to European needs of sensitivity and strong signal handling.

Where's the Frequency Bands?

The first thing I noticed was that the set, on unpacking, could only operate on European amateur bands. OK, it did cover the whole 28-30, 50-54, 144-146, 430-440 and 1240-1300MHz bands, but what about the entire 100kHz-1300MHz range? I should have read the insert that came with the instruction book, as Alinco have done something *very* clever. Many amateurs know that scanners are a 'sensitive' subject in some countries, as a result importing them into these countries is rather difficult! By entering a special keypad code into the DJ-X1D (which I'm not telling you in case you're living in such a country - can't have you breaking the law, can I?), the receiver instantly becomes 'opened up'. Press the side-mounted 'function' bar when you switch the set on, and it's reset to amateur-only frequencies again, 'dumping' the memories.

Apart from getting inside to see the internal circuit changes, this is the only outside difference between this set and its predecessor, even the model number is the same. A real-life case of Japanese manufacturers designing 'especially for market needs'.

Features

The set gives specified coverage over 2MHz to 905MHz, although the actual display range (and in the case of the set tested, the actual receive range albeit with reduced performance) was 100kHz to 1300MHz. It has 100 memory channels available, arranged in three banks of 40, 40, and 20 channels each, plus a quick one-touch 'Call' channel which you can quickly access.

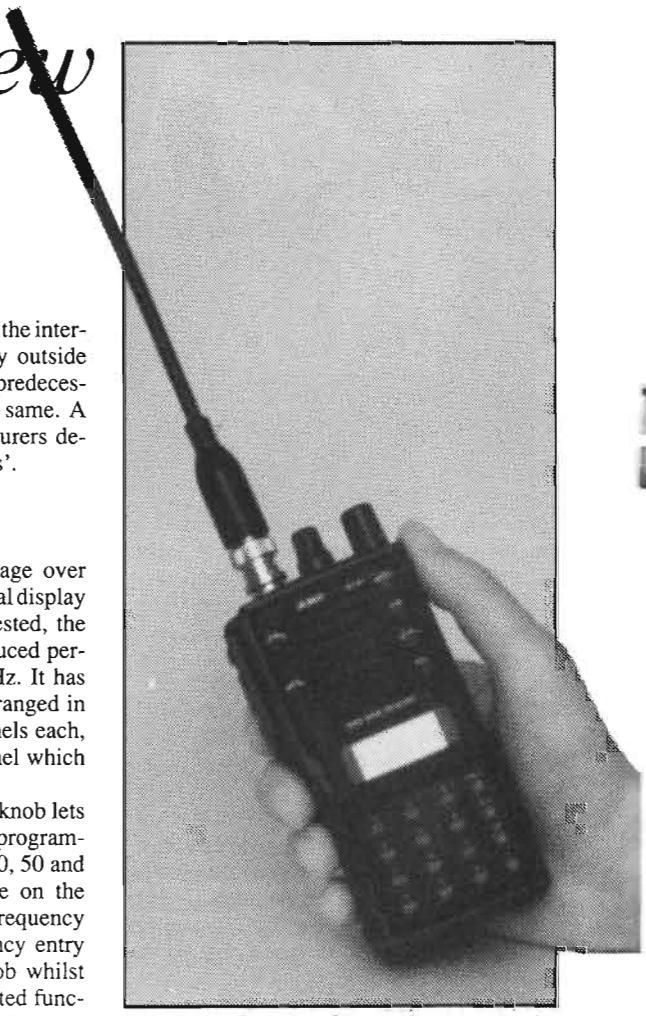
A top panel 'click step' tuning knob lets you switch around channels, with programmable steps of 5, 10, 12.5, 20, 25, 30, 50 and 100kHz, with 9kHz also selectable on the Medium Wave range. For quick frequency shifts, as well as the direct frequency entry keypad you can use the rotary knob whilst pressing one of the three side-mounted function buttons to step in 100kHz, 1MHz and 10MHz steps - very handy.

You can automatically scan through channels at either 10, 15, or 20 channels per second, and as well as memory channel scanning and 'mode selective' scanning (i.e. AM, NFM or WFM) you can program up to five frequency ranges for the set to scan over, with either a 'timed' or 'halt' stop when the set's squelch raises.

Bits and Pieces

The scanner comes with two set-top aerials, a 'tubby' helical whip for use up to 150MHz and a straight whip for use above 100MHz, giving the best of both worlds for such a wide-coverage set as well as the ability to connect an external aerial via. the BNC connector. An empty battery case which fits six AA batteries comes supplied, this clips onto the back of the set, and special nicads packs, chargers and the like are available as options as well as external DC cables which you can plug into the side of the set to give your batteries a rest when needed.

Also on the side of the scanner are two jack sockets, a 3.5mm external speaker socket which you can also use with an earphone, and a 2.5mm 'line' socket for tape recorder use. A handy metal belt clip comes with the scanner, which screws to the rear of the assembled set (onto the battery pack in fact), also a hand strap



to save you dropping the set when carrying it, and an optional soft carry case is also available.

The DJ-X1D has a useful battery 'economizer' similar to many portable transceivers, to allow your batteries to last longer when listening to a single low-activity channel. A switchable auto-power-off can also place the set into a 'power down' mode after a given period of no received signals.

Using the Set

The DJ-X1D uses tiny rubberized keys for the keypad, and although these don't have a positive 'click' an internal beeper lets you know when you've pressed the button correctly. Even though the keypad was small, I found it surprisingly quite easy to use, and the 'backlight' extended to the translucent keypad buttons as well as the LCD, which was great for nighttime use. Although the knobs aren't tiny, the combined volume/squelch knob was rather close to the aerial socket for my fingers, and I often found I was turning up the squelch level as well as the volume when I used this.

Listening to the Airwaves

Living in a fairly 'RF congested' area, I did find the set was rather limited in coping with nearby strong signals, even using the small whip I couldn't hear 2m repeaters due to

loud bursts of packet radio from a local bulletin board station. However, I did find that when I listened to the 'reasonably weak' VHF orbiting satellite transmissions around 137MHz I had no problems, likewise on airband, and I found the set was very sensitive indeed on air. Unfortunately, connecting the set to an outdoor aerial wasn't very useful, as it often just 'gave up' with the many signals about on crowded bands. It looks like Alinco must have improved the front end circuits due to the good 'out of band' rejection, but possibly not the filter circuits later on.

I took the set on my travels one weekend, over a couple of hundred miles of countryside roads. Here I found that 'out of town' I had no problems whatsoever, the scanner picking up even the weakest of signals which certainly impressed me. The set's internal speaker was very good, certainly not giving the 'tinny' type of response I'd first expected, and I could happily turn the volume up quite high while travelling along in the car without distortion setting in.

On shortwave, tuning around on AM let me receive plenty of the strong broadcast stations on air, but the 'crowded band' syndrome is quite bad on HF as many listeners know, and not surprisingly I found it a bit difficult to try and 'DX' with the set.

Towards the end of the review, the UK distributors informed me of an 'upgrade' they could make, of an additional filter inside the set. I had the chance to quickly test this on air, and what a difference! Signals even on crowded VHF/UHF bands came and went very cleanly indeed as I tuned, and I found the sensitivity was virtually the same - an overall excellent performance.

Lab Tests

Testing the scanner on my signal generators showed it certainly was sensitive, and as found on air the 'out of band' strong signal handling was very good indeed - i.e., a good front end and first mixer design by the manufacturers. I found I couldn't measure the (very good) 'far out' intermodulation (on-channel interference caused by multiple strong signals on different frequencies), it was quite simply limited by the (also very good) blocking. However, 'close in' the performance degraded quite a bit, probably because the circuits 'further on' were getting rather overloaded. I must say this was a laboratory case, and some users won't have any problems whatsoever. But if you live in an 'RF crowded area' I'd recommend you take the option of the added filter upgrade, which I found improved the performance significantly.

Conclusions

The DJ-X1D is lovely and small, and covers a very wide frequency range indeed. I found it easy to use, the set fitting in my hand comfortably, and it gave a good amount of audio which was pleasing on the ear. The out-of band rejection of strong signals I found very good indeed for such a tiny size, which no doubt explains the latest DJ-X1D version. The current selling price of £249 as standard, excluding batteries, makes it a very good buy in my opinion. However, if you live in a city location you'll probably find the set suffers from close-in strong signals within the same band, especially if you use an outdoor aerial. In this case, I'd suggest the 'upgraded' DJ-X1D with the added filter fitted by the UK distributors, although the manufacturers could indeed eventually offer this as standard.

My thanks go to Waters and Stanton Electronics for the loan of the review scanner.

LABORATORY RESULTS:

Sensitivity:

Input signal level in uV pd required to give 12dB SINAD;

Freq.	AM	NFM	WFM
500kHz	2.65	1.90	-
1MHz	2.40	0.56	-
2MHz	1.02	0.94	-
4MHz	0.44	0.30	-
6MHz	0.39	0.22	-
10MHz	0.37	0.20	-
20MHz	0.30	0.18	-
30MHz	0.21	0.15	0.25
50MHz	0.17	0.12	0.20
100MHz	0.15	0.12	0.21
145MHz	0.16	0.13	0.22
250MHz	0.21	0.18	0.33
435MHz	0.18	0.12	0.24
700MHz	0.28	0.20	0.31
1300MHz	-	1.66	3.10

Image Rejection

Difference in level between unwanted and wanted signal levels, each giving 12dB SINAD on-channel 145MHz NFM signals;

1st Image; 89.6dB (+192.075MHz)
2nd Image; 25.1dB (+21.4MHz)

Adjacent Channel Selectivity:

Measured on 145MHz NFM 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; 14.2dB
-12.5kHz; 23.6dB
+25kHz; 34.0dB
-25kHz; 30.8dB

S-Meter Linearity

S1 0.15uV pd (-22.4dB)
S3 0.23uV pd (-18.6dB)
S5 0.37uV pd (-14.6dB)
S7 0.73uV pd (-8.7dB)
S9 2.00uV pd (0dB Ref)
Full 6.49uV pd (+10.2dB)

Intermodulation Rejection:

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

25/50kHz spacing; 24.0dB
50/100kHz spacing; 27.9dB

Blocking:

Measured on 145MHz NFM 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; 40.9dB
+1MHz; 80.6dB
+10MHz; 87.1dB

Maximum Audio Output

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

88.5mW RMS

Current Consumption

Scanning, no signal; 82mA
Receive, mid volume; 123mA
Receive, max volume; 158mA

QRP CORNER

Dick Pascoe GOBPS says 'Remember lemon power, now there's rhubarb power!'

You may remember my comments about the lemon-powered transmitter in a recent column. Well I'm pleased to say that at least one amateur was positive enough to have a go. No negative vibes here! (just a few puns).

Rhubarb Power

John G3DOP tells us that after reading 'QRP Corner' he decided to start some experiments with real fruit power, and also with vegetable power. His first effort was to try a lemon with a pair of nails, resulting in a similar 0.8V to my results, John also tried the humble potato, again getting a similar voltage. As 0.8V is rather impractical, his first impulse was to try more than one lemon in series. But lemons are expensive and the cook of the house took exception to the kitchen-stored foodstuffs vanishing. Experiments proved that a better supply was required.

It was here that John came up with an idea that we had missed. Rhubarb is a great vegetable (fruit?), it also has a high acid content. John acquired a bunch from his garden, and with two nails about 50mm apart this length of rhubarb resulted in a voltage of 1.5V. This sounded quite good, so a further piece was added. Unfortunately this did not give a useful increase, so two more were added in series, giving a total of 2.0V. A repeat of the exercise raised the voltage to 2.5V, which should be enough to drive a small simple transmitter.

John knocked up a one transistor transmitter as I've described in a past issue, and connected this to the rhubarb power supply. Disaster, the voltage dropped to just 1V on load. Tests proved that the transmitter was working well from a 1.4V battery on 14MHz, so the problem was the RPSU (Rhubarb Power Supply Unit). The project has been shelved until the rhubarb patch provides some more ripe fruit for further experimentation. In the meantime how many others have tried true fruit power?

John continues operating, but in a much more formal way. Using a 'flea power' of 200mW on 7, 14 and 21MHz, John has logged 52 countries, and he really looks forward to working some other stations using the 'juice of the fruit'. Look out for him on 7.030MHz and 14.060MHz, you may be surprised at his rig.

Phone Problems

Keith, G0FDJ had a lot of problems operating on HF when first licensed. His elderly FT101ZD (circa 1980) produced a clean signal but the telephone wires surrounding his G5RV aerial coupled with the overhead power lines only 10m away made QSOs very difficult. Neighbours complained about ghostly ringing of telephone bells at weird hours, of course only when Keith was operating. A friend suggested 'going QRP' to reduce the breakthrough problem, and now Keith comments "Glad I did, it has saved my ham life".

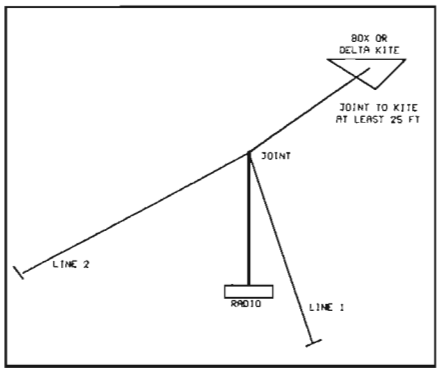
Many other operators are much like Keith, with various difficulties making higher power operating difficult. I also came into low power operating through a similar way. My neighbour had an old TV which also picked up my every word/Morse digit, I fitted a filter which stopped it, but she later removed the filter because it didn't look nice! Yes, I know it wasn't my fault now, but neighbours are neighbours who we have to live with!

However Keith tells me that he sometimes calls CQ for over hour without success, "but when I do, boy what a thrill". He likes to 'fish alone' and hates nets. I believe calling CQ with low power is not the answer, unless you are using a very good aerial system such as a beam. A wire aerial will give out a signal, but weakly. The easiest way to maintain a fair QSO rate is to 'tail end', this is where you first listen for any two stations having a chat. Try to determine who 'has' the frequency, and after they sign, call that station. In this instance it may be beneficial not add the suffix /QRP, but if you are on one of the usual QRP frequencies then do add the suffix.

Many operators hear a weak signal and immediately think it may be DX, and automatically answer. If the suffix /QRP is added they may not think the effort worthwhile in answering, and just pretend they cannot hear you. Of course this may be true if they have a lot of interference at their end! Perseverance in this will make for many more contacts than just calling CQ on a clear spot.

Sky Hooks in Use

My recent holiday in the South West was spent in trying to keep dry in the pouring rain (likewise! – Ed) and to find somewhere to raise an aerial for some operating.



A kit 'Sky hook' secured with two lines

We have our annual holiday with our caravan, and often visit Cornwall as it is my ancestral home. One disadvantage of most of the sites we use is the lack of trees to hold a wire aerial. In these cases, I usually try to use a good sized kite which can raise a good length of wire to a fair height. Using this it is not difficult to raise a quarter wave on 20m fed against ground, the top end held by a kite.

One of the difficulties with using a kite is the stability, and in keeping the kite over the operating position. There are many commercial kites on the market now, and many will be eminently suitable for raising an aerial. Do not try a stunt kite, these are designed for rapid movement whereas we need stability.

Two people make life much easier when attempting to raise such an aerial. A steady wind speed from one direction also helps, if the wind is 'variable' then do not attempt this method. Look at the diagram, it is essential to get the kite into clear air, out of turbulence, before the wire is added. Then both the wire and the second line can be added. If two lines are used to fly the kite, then rather than provide stunt capabilities the second line can add good stability.

The main line is taken off to the side and up to windward of the proposed operating position. The second line is tensioned to bring the kite over this position, so that the wire hangs vertically over the operating position. The kite will move around the sky above the joint, but below it should remain steadier. The location of the lines can then be adjusted to position the vertical wire over the bench.

Of course, with larger kites a greater length of wire can be raised. A quarter wave length on top band (160m) has been used, with spare operators sitting on the car used as the anchor for one line! Beware there are rules about flying kites near airfields, and there are height restrictions.

That's it for this month, happy winter flying. News and views to me at 3 Limes Road, Folkestone CT19 4AU or via HRT Editorial, or on packet via GB7SEK.

Packet Radio

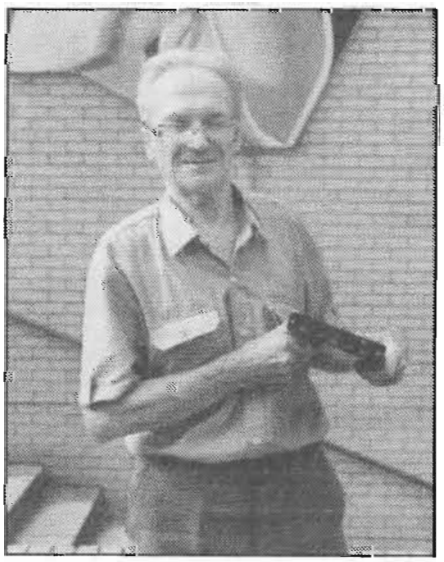
Roundup

HRT's Packet SysOp G4HCL brings back packet bargains from the BARTG rally, and from further afield

This month, I must start by wishing Martin G7JCJ the most heartiest of congratulations in being awarded the title of the Radiocommunications Agency 'Young Amateur of the Year'. You may have seen Martin mentioned in this column in the past as one of the dynamic members of *SUNPAC*, the Southern Users Network Packet Group, putting together their many information packs, network listing books and the like. Martin also runs the Dorset GB7JCJ DX PacketCluster, together with a BPQ network node from his home. You'll see photos of the presentation in the 'Radio Today' section of this month's HRT.

Packet Radio in Russia

Another item you'll see elsewhere in this issue is a feature on the activities of the Moscow Packet Network, specially written for HRT by Leo UA3CR. Since last month's issue, where I featured the Moscow-built TNC2-Compas, Leo has been in touch with me by fax to tell us that Compas Ltd have just agreed a joint project with NPO Energia, entitled 'Packet Radio Communication between Mission Centre and Space Station MIR'. Leo tells us that the TNC2-Compas is used as the 'heart' of the project, and the Mission Centre is now equipped with the TNC2-Compas for professional communication with MIR. Landline links using this system are also used between Moscow and across Russia, also as far as Kamchatka in the Far East, with contacts with MIR via ground communications centres.



Leo UA3CR proudly displays the Moscow built TNC2-Compas TNC used for MIR space station communication

Plenty of bargains to be had at the BARTG rally, as the large number of visitors shows

Below; the BARTG 'waved the flag' for both old hands and newcomers to data communications on the air

On his return to the UK from Moscow, Martin PA3BHF brought back a 'bare' Compas PCB which he sent onto me, these being available at a bargain price as well as ready-built TNCs. It certainly looks excellent quality, and the laser- printed parts layouts and component lists should make construction quite easy – I think I may even be tempted to have a go!

BARTG Rally

This annual event, run by the British Amateur Radio Teledata Group, has just taken place as I write this. As usual it was a superb rally for the data-minded amateur, especially to get those 'bits and pieces' for your station projects. HRT contributor Dick G0BPS saw yours truly literally staggering out with a large box of gear, (thanks for the help in storage Dick), indeed the eventual pile wouldn't even fit in the HRT Editor's car boot! Liquid refreshment quickly followed by a kind offer from Ron G3AAJ at the AMSAT-UK stand, he must have seen my red face (thanks Ron – I'll reciprocate at Leicester!). Ex-PMR gear for packet use was also in evidence on a number of stands, and even my youngsters got a few surplus bits and pieces for their computer system. This is one rally I won't be missing next year.

BARTG AGM

A reminder that this year's AGM is at a new venue, the Green Wine Bar and Restaurant, The Green, Mere Green Road, Four Oaks, Sutton Coldfield. It takes place on Saturday, November 14th at 2.00pm, and this move from London has been chosen to see if a central venue encourages more BARTG members to attend. As the venue is a restaurant, Secretary Ian G4EAN tells us that AGM attendees can have lunch before the meeting at a very reasonable price, and that the group will also have an amateur radio and computer bookstall there. If you'll be attending, Ian asks that you let him know so that he can make arrangements (such as having enough cups of coffee on hand for you and catering arrangements if you're eating). You can contact him on packet with a message to G4EAN @ GB7BAD, or by phone on 0602 262360.

Low Cost DPK-2 TNC

Amdat of Bristol have released details of their new low- cost (£99.50) TNC. The DPK-2 made by the US firm of DRSI (well known for their plug-in PC packet TNCs) is an all-CMOS unit for low power consumption. It draws only 45mA at 12V DC, and provides all the usual 'bells and whistles' such as a personal message system, KISS operation, and a standard modem disconnect header, in a box measuring 32mm x 127mm x 160mm. Look out for a 'mini-review' of this in next month's HRT 'Christmas Review Special'. In the meantime, you can get further information from Terry of Amdat on 0272 699352.

CTRL-Z, End of Message

Roger G0AOZ has been in touch to say he's just got going on 2m packet with a BSX TNC, and that he's now interested in HF working. He used to run HF and VHF RTTY some time ago using a Spectrum computer, but now asks if he could modify his old home built Spectrum terminal unit and interface to work with an IBM PC. If you have any information to help Roger get going on HF RTTY, AMTOR or PACTOR using the interface (which operates with the G4IDE RTTY-9 software tape), or if you know of any alternative low cost kits/circuits available, you can contact Roger with a message to G0AOZ @ GB7SDN.#49.GBR.EU.

That's all there's room for this month, see you in the next issue of HRT's Packet Radio Roundup. 73 from Chris G4HCL @ GB7XJZ, or by post at HRT Editorial, P. O. Box 73, Eastleigh, Hants. SO5 5WG.

VHF-UHF Message

Geoff Brown GJ4ICD reveals the latest VHF/UHF DX Snippets, and tells of a new coax for VHFers

This month, as promised, I've put together a European beacon list. This list contains over 120 beacons on 144MHz, 432Mhz, and 1296MHz. It has been painstakingly put together from many reports and enquiries to beacon keepers around Europe, so if you can update any of the following I would be very grateful if you would send me your additions or updates.

Some beacons seem to be a little off-frequency, especially on 1296MHz. So please allow for errors on this band, however, they may well help you to catch the DX.

News from Down Under

Eric VK5LP sent news of some VK distance records on 50MHz, and I was also very pleased to receive a certificate from the W.I.A. (Wireless Institute of Australia) for creating the VK5 Southern Australia distance record (unknown to myself) with VK5NC at a distance of 16,808.4km. But surprisingly my VK2FLR contact is a greater distance, and still stands for the furthest British Isles contact.

Eric states that several Australian state records have been broken during cycle 22. These included VK2FLR to Joel CU/N6AMG (of which incidentally we all send our 'get wells' as Joel has just gone through a bone marrow transplant), the distance was 19,424.1km, this was a VK2 State record and also the National short path record, also VK7IK to PA0LSB at 17,053km on 8/2/92.

I would appreciate feedback on the 'ES' season in Australia to compare our winter period with their summer period, any offers?

In early September I received a bunch of QSL cards from VK5BC in QF05, these were for contacts he'd had in February 1992 and are as follows; 8/2/92, 1052/GJ4ICD/559, 1059/G3WOS/339, 1059/G4AHN/449, 1106/G3NSM/439, 1134/G3KOX/339, and 1136/G3VYF/339. Now, why should he have worked GJ first after the signals have travelled over 16000km? Very strange.

VHF/UHF/SHF Profile

As way of a change this month, I arranged with the Editor to do a small feature about somebody who really does try hard on many of the VHF and above bands. I have followed the activity of this Class B licensee now for around two years and I've become very impressed the more I see, especially as it happens to be a lady operator!

Yes the lady in question is Ela, G6HKM who resides in Essex. Even though Ela is only active on SSB, she has shown many of the men in amateur radio what it really is about. Her present standing as of August for 50MHz countries was a staggering 97, which is the highest score that I have heard of for a Class B licensee. Her 50MHz Maidenhead square score is also impressive, and must be in the European 'top ten'.

Ela is also active on 144MHz, 432MHz and 1296MHz, and continues to penetrate the DX on these bands.

Pictured here, Ela G6HKM who has 97 countries on 50MHz

Snippets

Richard G4CVI and Paul G4CCZ went to 9M (Malaysia) during late July/early August as scouts for the Camel

Trophy, and this time they may be providing communications for up to seven weeks in 1993. Paul hopes to be QRV on 50MHz with the call 9M2PS.

Graham, GW7NGP burnt the midnight oil during the Perseid meteor shower in August. On 50MHz he worked 19 countries, which isn't bad considering that he's only just licensed!

At long last, the RSGB are producing an update to the VHF/UHF manual. The entire book is being re-written by well known VHF DXers, and it is rumoured that the new manual should be available for the Leicester show in late October.

Just as I approached the deadline for this column, 4N4VO (Bosnia) was reported on 50MHz, adding a new country to many amateurs' logs. I wonder how long he'll be operational? Once things are sorted out in YU there should be 4 countries (Croatia 9A, Slovenia S5?, Serbia, and Bosnia 4N4) the loss will be Yugoslavia YU.

Hal, ZS6WB has sent a 50MHz radio to C9 (Mozambique) which should be an easy picking for the south coast of England, and speaking of Africa, reports from Malta indicate that T.E.P. has returned as 9H stations have been working ZS6's.

A new beacon should now be operating from Luxembourg signing LX0SIX, the frequency is 50.023MHz and it's running 5W to a dipole. News of another new beacon, this time in Norway, LA9UHF in JP40CP on 432.845MHz, and it's running 700 watts ERP!

More beacon news is that FE6BPB has been heard on 144.860MHz, it signs *FE6BPB TEST BALISE VVV VVV.* Before you all start writing to me, 'balise' is French for 'beacon', rumours have it that its QTH is around the Calais area.

Chris SP4TKK, informs me that the 50MHz Polish group are about to print a 50 page book on 6m. Chris has promised me a copy for my contributions, but, the only problem is that it will be printed in Polish. Any offers to translate it? (I'll lend you a big dictionary – Ed).

The Australian 50MHz Countries list has just been updated and is as follows; VK4ZJB/94, VK4BRG/87, VK3OT/81, VK2QF/83, and VK4ALM/67, I wish we could have a shot at some of the Pacific stations they must have worked.

FC1OMZ/TL is active from the Central African Republic, the locator is JJ94.

9J2HN is QRV again, Hanz has been working into ZS6 just recently.

Harry Schools, KA3B is showing interest in activating FP (St Pierre and Miqelon Is) during June 93 for three weeks during the ES season.

The 3V licensing authorities have been written to for a permit in June next year, operating frequencies requested were 28.885MHz spot, and 50.110MHz spot. I have my doubts that I will receive a reply never mind a permit, but I can only try.

Nevada UK have just received a new form of Japanese double screened coax especially for the VHFer. Its loss compared with URM67 is quite fantastic, those interested may like to contact Mike Devereux, G3SED at Nevada UK Portsmouth for a sample. At 432MHz and 1296MHz you will be surprised, and it bends OK, unlike Wholes!

Well that's it for another month, news and views please to; Geoff Brown, GJ4ICD, TV Shop, Belmont Rd, St Helier, Jersey. C.I. or Fax/Phone 053477067 anytime.

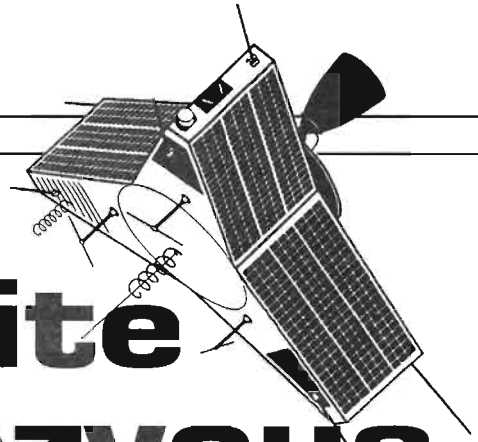
EUROPEAN BEACON LIST

DB0ABG	144.900	JN59WI
DB0GD	144.990	JO40WM
DB0JT	144.927	JN67JT
DK0OE	144.915	JO30DU
DL0PR	144.910	JO44JH
DL0SG	144.975	JN68EQ
DL0UB	144.850	JO62OL
DL0UH	144.940	JO41RD
EA1VHF	144.867	IN53UG
EA6VHF	144.918	JM08PW
EI2WRB	144.920	IO62IJ
EA3VHF	144.892	JN11LS
FX3THF	144.905	IN88GS
GB3ANG	144.975	IO86MN
GB3MCB	144.915	IO70OJ
GB3LER	144.965	IP90JD
GB3VHF	144.925	JO01DH
HB9HB	144.865	JN37NE
I0A	144.825	JN61ES
I5OA	144.810	JN40SX
IT9A	144.805	JM67LX
IT9G	144.840	JM68QE
IX1A	144.845	JN35OQ
I1G	144.830	JN35SH
I2G	144.975	JN45ST
I2M	144.870	JN55AD
I4A	144.815	JN54LG
I5A	144.850	JN53FR
I7A	144.820	JN71UR
I8A	144.890	JM78WD
LA1VHF	144.860	JO49GT
LA2VHF	144.870	JP53EG
LA3VHF	144.880	JO38PB
LA5VHF	144.855	JP77KI
LA6VHF	144.865	KP59AL
LA7VHF	144.892	JP99LO
LX0VHF	144.905	JN39CP
LZ2F	145.980	KN33WM
OH6VHF	144.900	KP02TG
ON4VHF	144.985	JO20FP
OX3VHF	144.902	GP60QQ
OY6VHF	144.885	IP62NA
OZ7IGY	144.930	JO55VO
PI7CIS	144.935	JO22DC
PI7ZWL	144.870	JO32BM
SK1VHF	144.950	JO97BG
SK2VHF	144.875	JP94TF
SK4MPI	144.960	JP70NJ
SK7VHF	144.920	JO65SN
TF8VHF	144.939	HP84PA
YU2KHP	144.957	KN05OS
Y41B	144.985	JO53QP
3A2B	144.900	JN33RR
9H1VHF	144.830	JM75FU

DB0ABG	432.825	JN59WI
DB0IH	432.950	JN39ML
DB0JZ	432.805	JO31SN
DB0KI	432.841	JO50SF
DB0QO	432.542	JO42BA
DB0VJ	432.995	JN67LQ
DB0YI	432.900	JO42
DF0AAD	432.990	JO54IF
DL0RW?	432.8??	JN69ES
DL0UB	432.86?	JO62QL
EI2WRB	432.870?	IO62IJ
FX1UHF	432.830	JN18BR
FX3UHB	432.887.6	JN06
FX3UHF	432.950?	IN97PF
FX4UHF	432.886	IN94UW
GB3ANG	432.980	IO86MN
GB3MLY	432.910	IO93EO
GB3WHA	432.810	JO01BA
HB9F	432.984	JN36XN
IT9B	432.805	JM67LX
IV3B	432.880	JN65WR
I0B	432.825	JN61ES
I1H	432.830	JN35SH
I2B	432.860	JN45NT
I2H	432.870	JN55DN
I2U	432.975	JN45ST
I5B	432.850	JN53JR
I8B	432.890	JM70WO
LA1UHF	432.860	JO59IX
LA3UHF	432.880	JO38RA
LA4UHF	432.980	JO29PJ
LA5UHF	432.855	JP76CW
LA6UHF	432.865	KP59AL
LA8UHF	432.820	JO59CB
LA9UHF	432.845	JP40GT
OH6UHF	432.840	KP13GM
OH7UHF	432.973	KP32GR
OK0EA	432.938	JO70UP
OY6UHF	432.885	IP62OA
OZ1UHF	432.955	JO57FJ
OZ2ALS	432.982	JO44WX
OZ4UHF	432895	JO75JE
OZ7IGY	432.930	JO55VO
SK1UHF	432.950	JO97BJ
SK2UHF	432.875	JP94WG
SK4UHF	432.960	JO79KH
SK5UHF	432.975	JP80TB
SK6UHF	432.925	JO67BF
SK7UHF	432.920	JO77BQ
SK7UHH	432.936	JO86FQ
UA9C	432.579	LO96WW
Y41N	432.030	JO60JW

DB0OS	1296.947	JO40WM
FX3HPF	1296.880	JN09BP
FX3UHX	1296.875.5	IN78??
FX4UHX	1296.945	IN94UW
FX4UHY	1296.885	JN06
GB3IOW	1296.906	IO90
GB3MCB	1296.866	IO70OJ
GB3MHL	1296.833	JO02
GB3MLY	1296.930	IO93EO
LA1UHG	1296.860	JO59CB
LA3UHG	1296.877.8	JO38RA
ON5UHF	1296.876	JO10
OZ7IGY	1296.930	JO55VO
PI7QHN	1296.923	JO22GI

Here's the latest beacon list, if you have any updates please let me know.



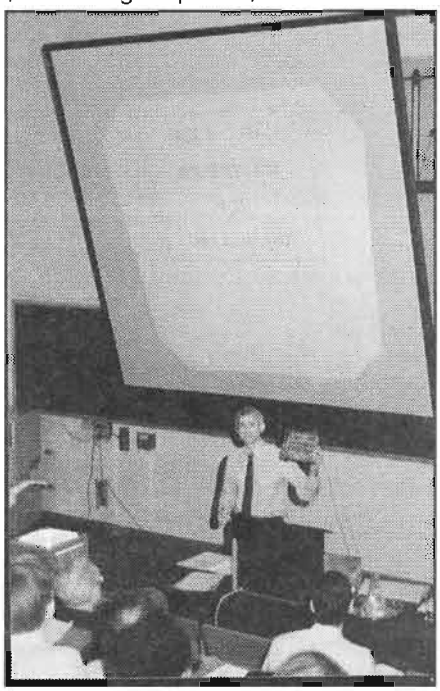
Satellite Rendezvous

Richard Limebear G3RWL provides a roundup of events at the AMSAT-UK Colloquium

AMSAT-UK's Annual Colloquium was held at the University of Surrey from 29th July to 2nd August. 134 people came from 24 countries in five continents to join in with the proceedings. Special thanks go to the University and its' staff who took time out from complex KitSat preparations to assist and meet with everyone.

The first day of the Colloquium was devoted to IARU matters and space politics and included discussions about gateway operation (both single-user and BBS forwarding), third-party traffic (Pac-Pals etc) and frequency planning for the future. It seems almost inevitable that some frequencies (especially in the 2400MHz band) will be lost.

So to give *all* satellite users equal possibilities, 'connected mode' communications to the satellites will cease fairly soon. All communications (including upload) will be in 'unconnected mode'. In view of the current heavy use of the 145MHz satellite band, users are invited to prepare their satellite stations for the use of microwave satellite allocations.



G3RUH describes his new Phase 3 400 bps data demodulator, and shows attendees the earlier version as a comparison

In the talks about ground hardware we learned that G3RUH has produced an updated version of his 400 bps (AO-13) demodulator (plus 1200 now); this one needs *no adjustment* before it works. It's now available direct from G3RUH (not from Amsat-UK), and 50% of the proceeds from this project will be given to the Amsat-UK Phase 3D fund. Phase 3D will use the same TLM format and modulation as AO-13 so any investment in these boards will not be wasted. Jim will not sell kits, only printed circuit boards and fully populated boards.

Joe G3ZCZ talked about using simulation and modelling in the Oscar program and described some of the hardware and software simulation and modelling techniques in use today and some of those needed. He described a software simulator he has developed for the PC. It simulates the *DOVE*, *FUJI* and *ARSENE* telemetry formats and can do it in a local manner or even on-the-air via a TNC. This simulator is designed for people who write their own decode and display software. Copies are available for the asking, Disk, SASE etc. from G3ZCZ.

We heard the following information about currently operational satellites:

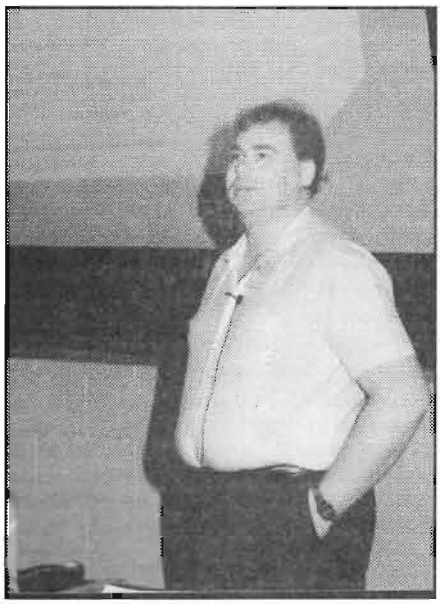
UO-11; it keeps on going. UoS regard it as nominal, they invite suggestions from users for any experiments within its capabilities.

AO-13; OE1VKW reported that the orbital decay is proceeding as expected. Victor showed how the orbit is expected to decay and said that as the perigee gets closer the earth, the satellite will tend to heat up during perigee passes and cool down during the rest of the orbit. This will be interesting to monitor and plot.

DOVE; could *still* complete its mission despite the major technical problems involved in commanding it.

WO-18; The camera is on the +Y axis, not the +X as previously thought; this is the reason for so many sky pictures in the early days. The pictures are getting better and some colour is now emerging; a new version of the picture decoding software is expected in a few months.

AO-21/RS-14; The Rudak equipment here must be regarded as basically a flying test-bed for techniques to be used on Phase-3D; nothing else



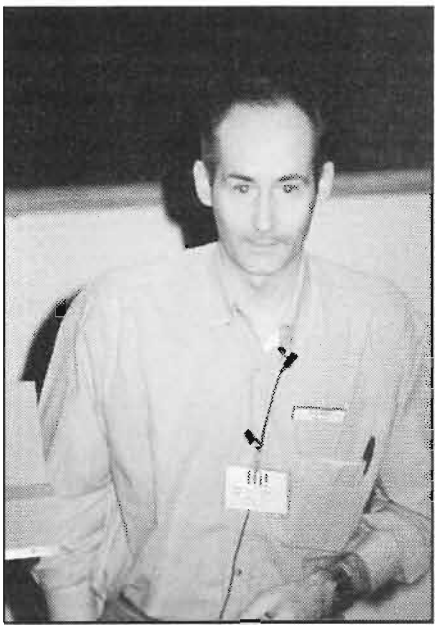
DB2OS gives an update on RUDAK

(quote from Amsat-DL). There are still techniques and experiments to be performed however such as: 4800/9600bps RSM; other modulation (MSK, QPSK, and other suggestions are invited); voice and other sounds; voice mail; spoken telemetry/bulletins (within a few weeks) of 30-40 seconds initially, longer when they use data compression; other DSP/modem experiments such as SSTV and FAX. Future BBS operations are unlikely.

UO-22; will be loaded with even newer software very soon (they wouldn't say what it will do).

Future Satellites

Arsene; Its all finished, in its box, waiting to fly. To recap on last year's information it will be 3-axis stabilised with sun and earth sensors, attitude control is by gas jets after ground command (about twice per year). VHF/UHF aerials are monopoles, with dipoles for 2.4GHz. Digipeater uplinks 435.050/100/150MHz, downlink 145.975MHz 2W and 15W. Transponder uplink (16kHz wide) 435.110MHz, downlink 2446.540MHz (0.8W, estimate 2.5m dish required). Expect the doppler shift (2m/70cm) in final orbit to be about 3Hz per



F6BVP describes the forthcoming ARSENE project

minute. Orbit period 17H30 with perigee 20,000km and apogee 36,000km. This should produce a slow drift from west to east with 12 hours/day average access. Launch on Ariane V58 with the Astra 1C satellite in less than one year.

Phase-3D; The launch of this was confirmed as the second Ariane-5 test flight but it may move to the first; it's still with the 'cluster' spacecraft, and the eventual orbit is unchanged (apogee 47714, perigee 4000km, inclination 63.4).

Earlier plans had suggested the use of pattern-agile aerials, this will not now occur, instead the spacecraft will employ 3-axis stabilisation by means of momentum wheels even though this will create thermal stabilisation problems. The shape is triangular with the points cut off. Non-radio payloads are *SCOPE*, a Japanese camera system, and an atomic clock. Regrettably, due to lack of resources, the hoped-for Mars probe will *not* be included.

P3D will use the current (AO-13) 400 bps telemetry transmission scheme; other data formats will be provided by RUDAK equipment. The transponder format is still matrix-based, meaning that many different transponder configurations can be achieved as the different needs are perceived. *LEILA* (an 'alligator-killer') will be fitted to the transponding equipment, and the RUDAK unit will employ an RTX-2000 processor and new hardware. It will have as many receive channels as possible (10-20) and encompass low-speed (1200 bps PSK) through to high-speed (64K rsm) capabilities using several protocols (DAMA, FTL0 etc).

DJ4ZC mentioned that there was hope for putting a 10GHz wideband high power transponder on the spacecraft. This transponder may be usable by converting surplus TVRO equipment.

SedSat; This equipment, made in Alabama, will replace the weight on the end of a space tether experiment flying on NASA's SEDS-2 mission (on a Delta rocket) between the end of 1993 and mid-1994. Planned life is five years. Orbit details - inclination 39 deg, altitude 680/792km; it will be deployed upwards 46km from the Delta's upper stage. Equipment carried will be Mode A and Mode J; digital images (initially of the tether), as well as telemetry will be transmitted on 70cm. Initial plans speak of a mode A transponder with a 300 bps BBS at the LF end and a digitalker at the HF end of the downlink passband; also FM uplinks will be downlinked as SSB (!). At the end of the tether experiment (i.e., after about six months) SedSat will be released from the tether to fly autonomously for the rest of its lifetime. But since the tether experiment on the space shuttle failed recently this mission could be delayed.

TechSat; This is a MicroSat-class package being constructed in Israel. It's prime mission is to explore low cost 3-axis stabilization techniques. It carries the following experiments: packet store and forwarding; GPS receiver; radiation measurements; DSP; and is intended to be compatible with existing digital communications software. It will have three uplinks (on 2m and 23cm) and a 70cm downlink. The power budget is designed to work with omnidirectional ground-station antennas. Launch is planned on Ariane into a sun-synchronous 700km orbit.

ITAmsat; As reported last year, this unit is mechanically identical to a MicroSat and will be compatible with existing digital communications software. Amsat-I have already produced a functional prototype; all of the flight hardware will be made in Italy (except for the solar panels), the launch will be on the Ariane SPOT-3 mission. It will support 1200 (Fuji) and 9600 bps (UO-22) digital modulation, uplinks are on 145.875/900/925/950MHz and the two downlinks will be on 435.760/810MHz.

RS-15; Little information is available about this mission except that it will be Mode A only and will fly in 1993 to 2000km, 60 degree inclination orbit.

KitSat-B; Similar to KitSat-A, but hopefully will include a GPS receiver and maybe a 38 kilobit downlink. To be launched on the SPOT-3 mission.

HutSat; This is a three-year Finnish project to test the technology and produce an engineering model leading to a later Ariane launch (in 1997/98). The aims are to use new GaAs technology and to give occupancy of presently unused frequencies. It will carry a digital transponder, BBS and DSP experiments and will use 435/1260/2400MHz links (no 2m).

Spot-3 Mission; This flight is currently expected in mid-to late-1993. It carries the replacement for Spot-2 so if Spot-2 continues to function well the flight is likely to be delayed. Conversely, if Spot-2 meets problems the launch will be earlier, we should expect a similar orbit to the current MicroSats. As well as Spot-3 it will have an ASAP carrying KitSat-B, ITAmsat, and two Portuguese amateur radio satellites (from a university but no other information available as it has not yet been finalised). 98 degree sun synchronous orbit.

Next year why don't ***you*** join us for this memorable weekend? Colloquium 1993 will be held at the University of Surrey over the last weekend in July.

KEPLERS

SAT:	OSCAR 10	UoSat 2	AO-13	PACSAT	DO-17	WO-18	LO-19
EPOC:	92227.67653450	92237.55603125	92239.80873106	92236.72664479	92233.52455972	92233.77079303	92237.70945207
INCL:	26.7268	97.8467	57.1832	98.6422	98.6427	98.6427	98.6424
RAAN:	68.9017	270.6227	5.2305	318.6280	315.5842	315.8721	319.9022
ECCN:	0.6028962	0.0010859	0.7292519	0.0011845	0.0012125	0.0012585	0.0012730
ARGP:	8.6060	224.6285	294.6349	342.9772	351.7631	351.2357	339.6017
MA:	358.5849	135.4048	8.6889	17.1011	8.3350	8.8603	20.4655
MM:	2.05882051	14.68640916	2.09720804	14.29729314	14.29855797	14.29846508	14.29931543
DECY:	-3.7E-07	3.61E-06	-1.34E-06	8.7E-07	9.8E-07	8.6E-07	8.9E-07
REVN:	4098	45317	3218	13493	13448	13452	13509

SAT:	FO-20	AO-21	UO-22	KO-23	RS-10/11	RS-12/13	Mir
EPOC:	92231.73786198	92238.86720641	92233.18690085	92228.01182115	92240.68925693	92235.77505534	92240.58254429
INCL:	99.0714	82.9423	98.5060	66.0834	82.9250	82.9277	51.6226
RAAN:	138.6430	271.3611	307.6613	245.2331	95.5529	143.4041	250.4273
ECCN:	0.0541439	0.0036632	0.0008152	0.0015902	0.0013183	0.0028637	0.0004059
ARGP:	51.4046	123.1789	110.5898	263.8032	54.6377	153.4480	94.1539
MA:	313.4279	237.2842	249.6165	96.1188	305.5944	206.8148	265.9934
MM:	12.83212927	13.74491867	14.36686494	12.86273610	13.72292947	13.73998782	15.53666341
DECY:	-4E-08	7.8E-07	1.39E-06	8.22E-06	1.75E-06	4.2E-07	2.4742E-04
REVN:	11852	7887	5744	53	25959	7754	37338

KitSat Images

The commissioning process is going extremely well as this is being written, they have deployed the gravity gradient boom, taken some fairly good images, and produced speech (in Korean) from the DSP experiment. The BBS is not yet open for traffic but there is no reason for folks not to download the pictures if they want to.

The first earth images were of the Antarctic and the tip of Patagonia on August 19th. The image was excellent, displaying cloud formations with spectacular lighting effects because of the low sun angle and since that first picture, many more have been taken. KO-23 has two cameras, the high resolution (narrow angle) one and the low resolution (wide angle) one. It is important to be aware of this because the name of the image files follow this convention: files that are named KAINxxxx are the narrow angle pictures and those that are named KAIWxxxx are for the wide angle shots.

Although the file-create dates are different for the two files, the two images are taken near-simultaneously. The wide-angle file create time is the correct image snapping time. To use the older versions DISPLAY4 on these images, you must rename them so that the file name begins with 'IM' otherwise DISPLAY4 assumes that they are old UO-22 'CCD' series images and they will not be correctly formatted.

For those who would like to decode the telemetry, you can obtain a copy of the DTLM.EXE program from AMSAT-UK.

RUDAK FM Repeater

RUDAK has been operational with the 'software' FM repeater (DSP) for some time now, uplink 435.016MHz, downlink 145.987MHz *(strong signals even on my small dual-band colinear - Tech Ed).*

The latest schedule for AO-21's transponder is; 6 minutes FM DSP-Repeater, 3 minutes *digital voice* in FM, and 1 minute 400 Bit/s PSK Telemetry. The RUDAK speech synthesizer experiment has been speaking a Russian language message; *"RUDAK-2 radio satellite 14 operating normally. Hello to those on the ground and the cosmonauts in the space station MIR".* Those who copy the digital speech message and would like to receive a QSL card, please write down the message in your language (or in Russian) and send your QSL card to RK3KP.

STS-47 QSLs

If you heard or worked the 2m Shuttle Amateur Radio Experiment (SAREX) on STS-47 in mid-September, the QSL information for this is via; N5QWL, 806 Shorewood Drive, Seabrook, Texas 77586 USA. Include a self-addressed stamped envelope (SASE). Non-US stations should include a self addressed envelope with $0.50 of US postage affixed or appropriate IRCs. Include the callsign worked, date, UTC, mode, and frequency. For packet contacts, include the QSO number issued by the robot. SWL QSLs; Include the callsign heard, date, UTC, mode, and frequency.

Amsat-UK News

The Annual General Meeting of Amsat-UK was held during the Colloquium; the committee was all re-elected (apart from G4ULS who retired with G0FCL replacing him). The meeting approved the setting up of Amsat-UK's Phase 3D fund which already has several thousand pounds pledged; the target is *One Million Pounds.*

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