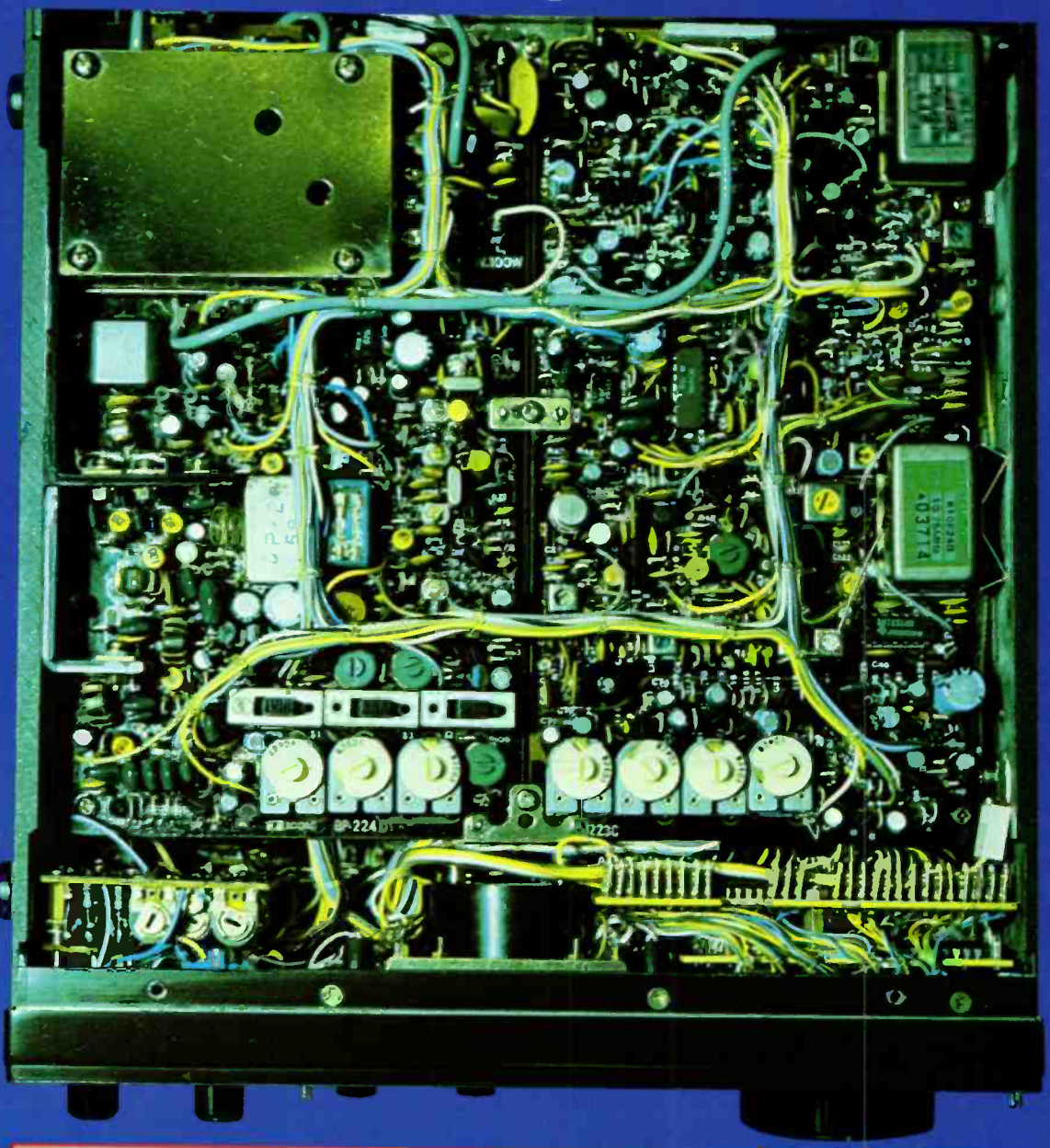
August 1983 90p

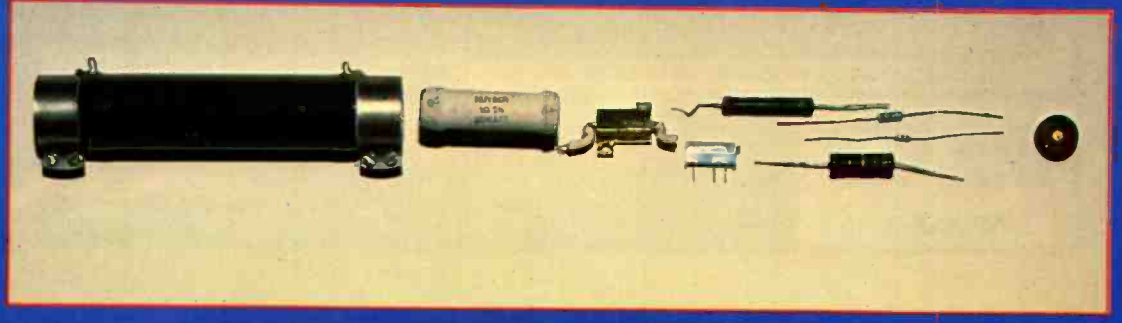
Amateur RADIO

For all two-way radio enthusiasts

Special DX issue: full prefix list

- Build a top band DSB transmitter
- Hi-fi amateur radio – now reality?
- Puma FM power amplifier tested
- Purpose-built radio desk
- Pass the RAE – resistors explained





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Input Modes	SSB, FM, AM, CW				
Input Requirements	10 Watts with standard attenuator — MMR15/10) (3 watts with alternative attenuator — MMR7/3)				
Output Power	10 Watts	10 Watts	10 Watts	10 Watts	2 Watts
Conversion Principle	SINGLE	DOUBLE	DOUBLE	DOUBLE	SINGLE
Receive Gain			15dB		
Recieve NF	2.0 dB max	2.0 dB max	3.0 dB max	3.0 dB max	1.2 dB max
Input & Output Impedance	50 ohm				
RF Connectors	SO239	SO239	SO239/BNC/N	SO239/BNC/N	SO239/BNC/N
Power Requirements	13.8V at 2.1A	13.8 V at 2.1A	13.8 V at 2.1A	13.8 V at 2.1A	13.8V at 0.5A

MMT432/144-R

MMT1296/144

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Input Requirements	5-500 mW (Continuously Variable)		
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Conversion Principle	SINGLE	SINGLE	SINGLE
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Receive NF	2.0 dB max	2.5 dB max	3.0 dB max
Input & Output Impedance	50 ohm		
RF Connectors	SO239	SO239	SO239/BNC/N
Power Requirements	13.8V at 2.1A	13.8V at 2.1A	13.8 V at 2.1A

MMT144/28

MMT432/28-S

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Front cover: An Icom HF transceiver, illustrating two points in this issue of Amateur Radio; *DXing made easier with such a rig, making the DX prefix list a must. Second, how many resistors can you count in the front cover picture? Not serious, of course, but it does serve to show how important resistors are. See Pass the RAE, on page 62. Picture by Tony Large Photographic.*

CURRENT · COMMENT

Introducing you to this month's issue

Pride of place in this month's offering from Bicester has to be our state-of-the-art bang-up-to-date country prefix list. Thanks to the generosity of Geoff Watts, the compiler, this has to be the most up-to-date guide to who uses what anywhere in the world and we're most grateful to him for the chance to publish it all. Every HF operator will want to keep this by the side of the wireless, especially for working out where those dratted Russians are.

What other gems are there this month? Angus McKenzie scoops everyone with his story on digital television; Technical Bod read this with delight when it came in, and it's nice to see something at the forefront of technology (or something) in the hallowed pages. Angus also has a look at a linear amplifier with a difference on page 56.

Actually, this seems to be a bit of an HF bands special issue this month – no, Brian, we didn't plan it that way, it just came out like that. As well as the prefix list, there's also a brilliant Top Band transmitter in the old style by the redoubtable G3BDQ, taking time off from his tinkering with wire antennas. Note, this uses VALVES. Ah, bliss, we must build one ourselves. There seems to be a lot of interest in valves still, and we're delighted to publish a circuit using one or two. We'll be publishing our HF amplifier design as soon as we've got it to be more than about 10% efficient on 28MHz . . . oh well, it'll come, it's just a matter of time. Mutter mutter.

Otherwise all the usual features are there for your pleasure and delight, and we're getting some more reviews together for future issues. If there's anything which you feel we ought to be looking at, please write and let us know so that we can get all the mechanism fired up to get it off the ground.

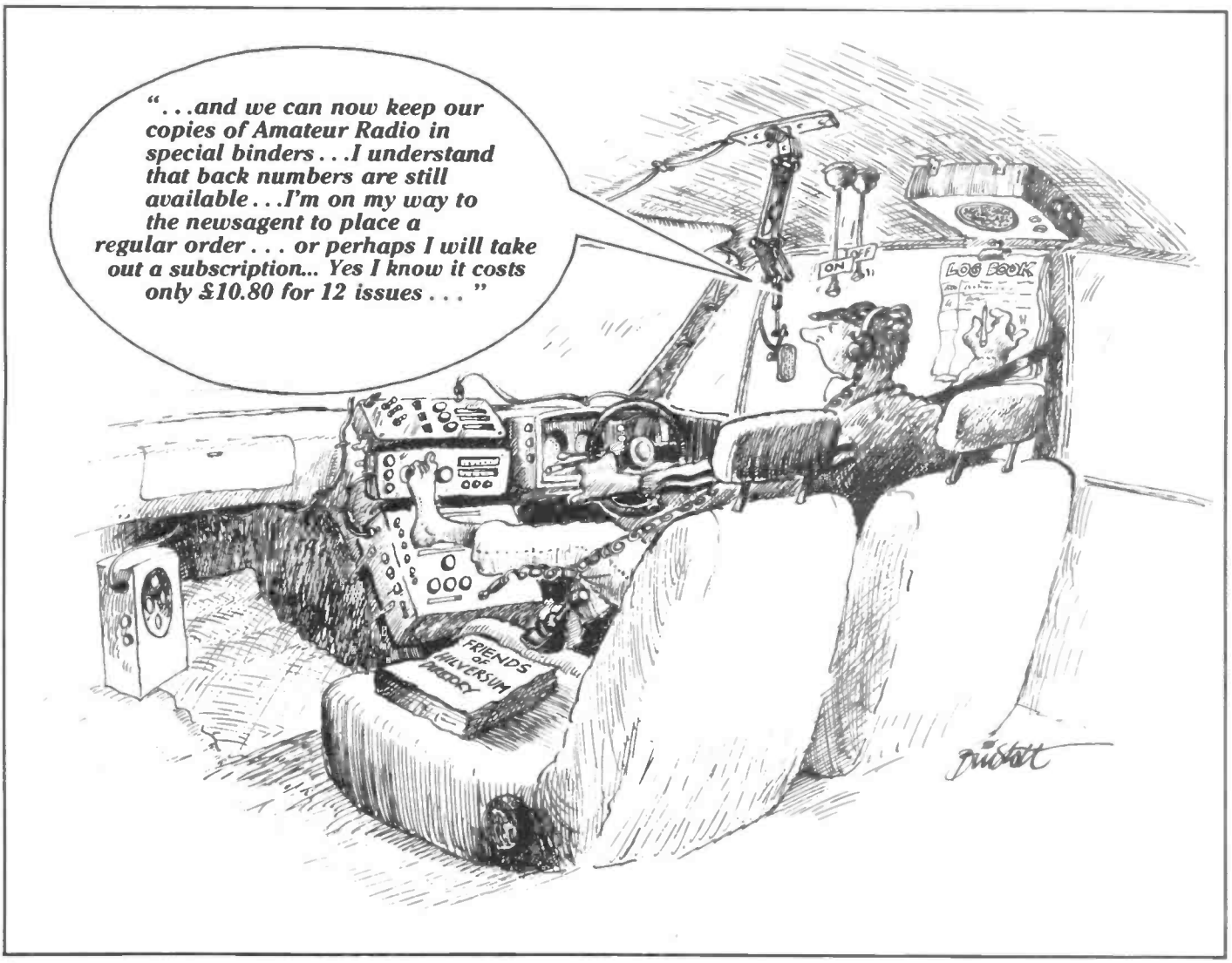
> "We have a funny feeling that a lot of capacitors had to be thrown away some years ago because they contained a nasty chemical called polychlorinated biphenyl . . ."

Most of last month's disasters have now been rectified, including the diodes in the rectifier stack (oh lord, he's still at it – any more of this and he's out on his ear – MD) of the big beast – we found some nice elctrolytics at the East Suffolk rally a while back and got it all going. Technical Bod still doesn't like electrolytics though, and we must admit we agree with the RSGB.

They were trying to get some oil-filled paper ones, apparently, for their headquarters station and it sounds to us as though they're on the right lines. We rather suspect that they won't find any, though – we have a funny feeling that a lot of capacitors of that sort had to be thrown away some years ago because they contained a nasty chemical called polychlorinated biphenyl (PCB to you and me) which turned out to be carcinogenic.

Ah well, never mind, life goes on. Hope you enjoy the mag this month; remember, it's lovely weather so why not take the rig out portable somewhere and give those of us in boring QTH squares somewhere exotic to work?

73 de Chris Drake



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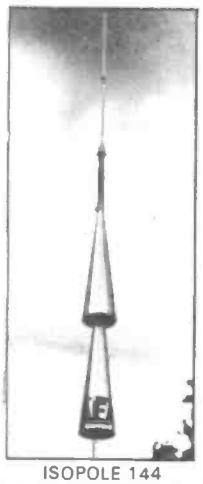
TR 9130 TRIO

The TR9130 is the new all mode VHF mobile or base station rig from Trio giving 25 watts output on 2 metres FM, USB, LSB and CW and now having a green LED display to make for easier mobile operation.

- 25 watts output on FM, SSB and CW.
- FM/USB/LSB/CW all mode operation.
- For added convenience in all modes of operation, the mode switch, in combination with the digital step (DS) switch, determines the size of the tuning step, and the number of digits displayed.
- Six memories. On FM, memories 1 through 5 for simplex or +600kHz offset, with the OFFSET switch. Memory 6 for non-standard offset. All six memories may be operated simplex, any mode.
- Memory scan. Scans memories in which data is stored. Stops on busy channels.
- Internal battery memory back-up. With Ni-Cad installed (not Trio supplied), memories will be retained approximately 24 hours, adequate for the typical move from base to mobile. A terminal is provided on the rear panel for connecting an external back-up supply.
- Automatic band scan. Scans within whole 1MHz segments (ie 144.0-144.999MHz), for improved scanning efficiency.
- Dual digital VFOs. Incorporates two built-in digital VFOs, selected through use of the A/B switch and individually tuned.
- Squelch circuit on all modes (FM/SSB/CW).
- Repeater reverse switch. For checking signals on the repeater input, on FM.
- CW semi break-in circuit with sidetone. Built-in, for convenience in CW operations.
- Digital display with green LEDs.
- Transmit offset switch for repeater shift
- High performance noise blanker.
- RIT (Receiver Incremental Tuning) circuit. Useful during SSB/CW operations.
- HI/LOW power switch. Select 25 or5 watts RF output on FM or CW.
- A four-pin accessory terminal is provided for use with a linear amplifier or other accessory
- Includes quick release mobile mounting bracket and up/down microphone.

TR9130 ALL MODE TRANSCEIVER £433 + car: £5.00



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L·E·T·T·E·R·S

Space amateur

I heard on national radio a few days ago about the astronaut/radio amateur who is intending to take a small, battery operated, amateur transceiver with him on his next journey into space aboard the NASA space shuttle, later this year.

Apart from my interest in listening to this experiment (maybe even getting the chance to take part in it if my ticket should happen to arrive in time) I am sure your other readers would like to know which frequencies would be in use and any other information that might be of interest in this experiment. So, could you please see if you can find out anything about this event?

R. Playford,
Hertford, Herts.

As far as we can gather, all that's been decided at the time of writing is that Dr. Owen Garriott, W5LFL, has been granted permission to take a 144MHz hand-held with him. They're currently trying to decide whether to designate certain repeaters as "gateway" units to work through, or whatever. In any case, we'll bring you the news as we hear it. – Ed.

The Etronic radio

Mrs. Meikle's enquiry about her Etronic radio (June issue) brought back memories more than somewhat. My father bought an Etronic table radio, probably the same model as that owned by Mrs. Meikle, and its robust nature was proven by my brother's knocking it to the floor almost as soon as Dad fixed it up. It still worked – wireless sets were made to bounce in the 1940s.

Etronic sets were made by the Hale Electric Company Ltd. of Talbot Road, West Ealing, W.13, and they obviously had high hopes, making a singularly handsome radiogram (78rpm) which a friend used as musical accompaniment to TV plays that bored him. Frankie Laine one end of the room and 12in BBC at the other. What is really interesting about this company was their ideas for projection TV which, as you know, is very much in vogue now.

'Giant Pictures' were promised – these being 16in by 12in – in a 1952 model that was widely advertised. 'The whole family can watch in comfort, in normal room lighting,' claimed the adverts. But when I tried to tune in a projection set at a well known holiday camp, a few years later, it was distinctly dim. It was not an Etronic set, but came from a famous international company. The truth was that projection television was as much of a damp squib as paraffin-lamp video.

It's probably too soon to class Mrs. Meikle's set as a modern antique – pre-war wirelesses, rather than the post-war variety, are most sought, though a small ad in the bulletin of the British Vintage Wireless Society might help. I would guess that it would fetch little more than £25 – a colleague tells me that the antique radio market has been temporarily overloaded. Don't tell me that we have wireless pirates, too.

I'd be inclined to hang onto such a handsome set. After all, valves are on the way back.

David Lazell,
29 West Leake Road,
East Leake,
Loughborough,
Leics.

The Editor of Vintage Wireless Bulletin, is Bob Hawes, 63 Manor Rd, London N.17 0JH. – Ed.

1923 crystal set

Your magazine is greatly appreciated every month. I built my first crystal set in 1923! And I'm still very keen. We Old Boys have seen some changes I can tell you.

By the way, I would like to get hold of a pair of 4000 (or higher) resistance headphones. Also, a battery eliminator for use with my old prewar valve set. If anyone has one, could they contact me, and quote me the price and condition?

Ben Brennan,
37 Birling Avenue,
Rainham, Gillingham, Kent,
ME8 7EY.

House party weekend

I shall be grateful if you are able to give publicity in *Amateur Radio* to the house party weekend at Theobalds Park College (GLC Enfield) on November 11th.

All aspects of radio and television will be discussed with practical demonstrations, including coherers and 30-line pictures. During the weekend we will speak with Villa Grifone, the house where Marconi lived, just outside Bologne, under my own callsign, G2FQS. Theobalds is 13 miles from Charing Cross, just off the A10, or take a college bus from Crews Hill Station. Booking is open now, by post or telephone, so don't leave your booking till the final few weeks!

Programme: Friday arrive after 4pm for dinner at 7pm. 8.15 Early days. Saturday breakfast at 8.30, 9.15 start of broadcasting, 10.30 coffee, 11 world wide radio, 1pm lunch, 2 Savoy Hill and 2LO, 3.30 tea, 4 research and debate, 6.30 dinner, 8 soiree and open discussion on radio and television. Sunday 8.30 breakfast, 9.15 Radio and Broadcasting House, 10.30 coffee, 11 TV and the Television Centre, 1pm course ends, with lunch.

The sessions will be enlivened by demonstration and illustration, using models and archive material. Antiquities will be on working display, a crystal set of 1922, a 1927 two valver, and fireworks in the form of a replica of Marconi's spark transmitter and receiver. Pictures will be shown on a 1929 Baird 30-line "televisor" and then up to date high power equipment will be used for shortwave broadcasting.. Price for the weekend is from £28. Phone Waltham Cross 37255.

What of the NRD?

I am considering the purchase of a very good communication receiver, and I have narrowed my choice down to either an Icom R70, or the JRC NRD515.

In your review of receiving equipment, you comment on the NRD 515 as being very nice, but not without its faults." Question: are these faults serious enough not to consider purchasing one?

I would appreciate some brief comments on this subject.

J. Santman,
Cobham, Surrey.

Personally (and that's how we deal with reviews anyway) we find the NRD a bit overpriced for what it will do. The performance in such things as signal handling and IF filtering isn't really that much better for the average SWL than the Icom R70 at a third of the price.

We used one professionally for some time after it was introduced, and it didn't strike us as being good value for money, to be brutally frank. But on the other hand, it's well put together, and nice if you have the spare loot. – Ed.

SWL info wanted

The magazine *Amateur Radio* is very good. Is it possible to help those who come from CB into SWL by having some pages for them? In these pages you could show different receivers, new and secondhand. Prices of components, ATUs, converters etc; how to go about getting a QSL card from the hams you have been listening to on your receiver, names and addresses etc.

Some of the listeners will be beginners in electronics, so small projects that will help them would be of use. I suppose I could go on and on. In this month's mag (June) there's not much for the beginner. It's more for those who have got their A or B licences.

Yes, there is a piece about radios and prices, but why not include something in each issue, that will be collected for reference? It would be the radio amateur's bible, especially for SWLers. Anyway thanks for a good magazine, and keep up the good work.

W.M. Rigby,
Morecambe, Lancs.

We'll work on it. – Ed.

L·E·T·T·E·R·S

Splattery SSB

Gentlemen (may I call you that?)
It's all very well going on and on about splattery SSB on 2 and 70 and claiming it's all due to us halfwits out here with more money than sense buying vast linears and then shouting into the mike with excitement as soon as we hear somebody a bit farther away than the next parish, but aren't you being just a little teeny bit lop-sided?

I mean, you can only attenuate spurii just so far and if a receiver is near enough it will hear them no matter what. I'm just a bit sensitive about this – I happen to have a good high QTH (note the "Hill"), a very nice 100 foot mast (planning permission and all), and I run high power on 2.
Consequently, every time I go on the air somebody accuses me of splattering over half the band, yet by dint of borrowing some very classy testgear from the firm and setting everything up just so, I know I'm not shoving out anything spurious that's less than 60dB down, 10kHz out, or 80dB down at 20kHz out. So why the complaints? Proximity, that's all.

Let's say 200 watts gets to the aerial (I can't afford LDF4-50 yet), and there's about 15dB gain there, hopefully. That's about +36dBW radiated in the main bandwidth. 10kHz out it will be—24dBW; 20kHz will be —44dBW. My aerial has an absolutely clear outlook in all directions and up to about 5 miles away I can assume free space attenuation, which at 144MHz is something like —93dB. So a listener at that range will get about —57dBW from me if he is dead on tune, —117dBW if he's 10kHz off, and —137dBW if he's as far away as 20kHz.

Let me assume his aerial has no gain, and that he loses another 3dB down his feeder (that damned RG58 again), so the figures become —60, —120, and —140dBW, into his receiver, which will certainly be a 50 ohm input impedance device. These then produce 7mV on tune (that'll melt his input transistor), 70uV at 10kHz off, and 7uV at 20kHz away.

On my IC-251, 7uV is an over-S9 signal, while 70uV is nearly end-stop stuff. See what I mean? And there's nothing wrong with either my transmitter or his receiver. The only way of stopping this is for me to go QR' or for him to move house.

And I get the problem in reverse, too, and not only from hams. Because it's such a nice spot, the jolly old British Telecoms have stuck up a paging transmitter on 151.75mHz, erp 350 watts, exactly 80 FEET away, which just about shuts down anything higher than 145MHz for me. Oh well, it wasn't really much use anyway, what with the Home Office QRO transmitter banging away on 146.025 a couple of miles distant. Now the BBC want to put up a telly relay all of 90 feet away – lucky I've never used 70 much.

Anyone want to buy excellent high QTH, OK for 160 metres?
Wally Blanchard, G3JKV, Tower Hill, Dorking, Surrey.
Point taken, but even so we weren't just talking about the strong signals – the case of "proximity" is true but even with stations who aren't putting monumental signals into the Rx we still get the feeling that lots of folk don't do themselves justice. But thanks for your masterly analysis, and we can lend you some nice bolt-croppers for a small fee . . .!

Dulling the edge of excellence?

Being an annual subscriber, I obviously feel that you are doing a great job. However, lest a surfeit of praise dulls the edge of excellence, may I be permitted a small moan?

For two reasons do I wish your writers would use words sparingly. Firstly, space saved could be used for informative news. Secondly, careless padding can give a dangerously wrong impression. A good example of this appears on page 23 of your June issue where two half-columns are used to state that "lid" is in, while "handle" is out!! Close reading of the padding that surrounds this simple truth strongly suggests that amateurs are a load of sarcastic snobs who take delight in the verbal thrashing of a fellow operator. Hopefully this impression was not intended, but resulted from too much filler.

Frances Woolley, G3LWY, ends her editorial notes in the April/May issue of Radial (RAIBC) with these words concerning promoted CBers. Quote: "If we are to continue to get pleasure from our hobby, whatever particular aspect of it appeals to us, the newcomers must be absorbed into the framework for everybody's benefit. It can be done, it MUST be done, and NOW." Unquote.

So please, may we attenuate the waffle and apply gain to the charity. In a house divided against itself a thermal runaway is a certainty. Am sorry to sound a sour note in a good cause.
Colin C. Stevenson, RAIBC, Shifnal, Shropshire.
Isn't "lid" out as well? Anyway, we love the hobby, and that's the main reason we started to publish the magazine, and naturally we are trying to maintain reasonable standards. Er, we've nudged Gresley, and made him stand in the corner during an Es opening last week. – Ed.

Useful valve article

Whoopee! At last an article on really useful pieces to use when home brewing, that don't turn up their noses or toesies when called upon to do a job of work.

I refer of course, to "Reintroducing Valves", page 61, June issue. Having now whetted the appetite, how about follow-up articles on simple CW (I know you're not keen on it) transmitters with their own PSUs?

The crafty idea of black box manufacturers supplying them as separates has gone on long enough. Any ideas where I can get a book on valve data and equivalents? Titles, suppliers of books etc? The valves themselves are well advertised in other mags, but why not yours?

No, I don't like the idea of novice licences. Why be content with only part of a licence, when with a little bit of effort, you can have the whole thing.

Hope I've passed the May RAE. I let my interest in radio lapse when I left the Royal Navy in 1956 as a radio operator.
Alan H.J. Field, Stroud, Glos.
P.S. Two things: KW/Ken-Tec Argosy costs £399 excluding VAT, I'm told. And, why didn't I write this (instead of capital letters – Ed)? Well, my scribble is almost as illegible as some of your "Pass the RAE" articles.
Thanks Mr. Field. Hope you pass your RAE too . . . However, we do like CW. Don't know what makes you think we don't. About 50 per cent of our contacts take place on the key, if you discount local FM etc. Regarding books on valves, try Newnes Radio Valve and Semiconductor Data Book, which if we remember rightly, is available from the RSGB. Aren't they all? CU on the wireless. – Ed.

Marconi 1018 info

I have recently acquired a Marconi type 1018 receiver. Unfortunately I have yet to see it operational. The problem is simply fixing up and connecting an adequate power supply to run it.

I was wondering if any of your staff, or readers could assist me with this problem. For those who think they know the receiver, it is an HF-type, and its range is 3-25MHz. All valves inside, and the PSU is connected through an inlet on the side of the metal casing.

I also have a low frequency version which tunes from 15kHz to 3MHz (also Marconi?). Would the connections be the same for this one?

Any information on the actual receiver (manuals, etc) would be greatly appreciated. I am willing to pay (but not too much) for any manuals that are associated with any of these RXs.
John Cole, 105 Ramsgate Road, Broadstairs, Kent.
We don't know. Can any readers help? – Ed.

L·E·T·T·E·R·S

About the RAE and Morse

I have been following the correspondence concerning the RAE in your (and other) publication since it started, and I finally found out what the fuss was all about this May. Following this, and considerable thought, my comments fall into two categories, general and specific.

In general then; access to the limited amount of spectrum available obviously has to be limited in some fashion, just listen on 27MHz if you need further convincing in that respect. The matter of getting further allocation (which is nothing to do with the RAE) is something I shan't mention. The use of a radio transmitter is not a right as some people would have us believe.

If you believe that, then think on the fact that the fourth harmonic of 27MHz is in the same frequency band used by aircraft instrument landing systems (ILS). Obviously, then, de-restriction could have catastrophic, even fatal results, as well as resulting in chaos. The chosen method for restricting access in this country is the RAE and the Morse test. The reason for the Morse test is obviously to provide further restrictions on access to the HF bands, since you can do so much more damage there.

If we did away with the RAE and Morse test, what would we replace them with? I believe the fairest system would be a series of grades of licence with both theory and practical tests to advance from grade to grade. The next problem, however, is who administers these tests? The Home Office can't (or won't), and the C&G has enough trouble running the present system which is computer marked.

To administer a more complex exam for the ever increasing number of people who want to sit it would be a vast (and expensive) undertaking. I also wonder if many of the people advocating a return to the older (and assumedly more difficult) exam are in fact just bemoaning the loss of exclusivity of their hobby caused by the upsurge of interest? It would seem that one of the more constructive moans concerns the general poor standard of operating on the air. What about, therefore, a revised (multiple choice) RAE (see below) coupled with a practical exam in operating procedures (or a third RAE paper devoted to the subject) all administered by the C&G???

Assuming that we are stuck with the present system, what of its content, difficulty etc? My experience of exams goes up to degree level, but never a multiple choice paper before. My first complaint is that the C&G don't allow you to take the paper away! This must surely hamper the candidate who fails and wishes to use the paper as a revision aid for the retake. Surely the C&G can't want the paper for the rough work? Mine was scribbled incomprehensibly some distance away from the question to which it referred; and anyway, the marking computer doesn't care.

The only reason I can think of is so that they can use the same questions again next time! (Yes, that damn holiday in Wales came up **again**). My second major complaint is that the examiners seem equally intent on testing your English comprehension as your radio theory. This must discriminate against the technically qualified candidate whose English is not good. (I have a physics Ph.D. friend who failed an English 'O' Level 5 times!). Thirdly the papers seemed to bear little relationship to real life. No valves, for instance, and in this paper an almost fanatical obsession with key clicks.

Another bugbear is the habit of the examiners of asking essentially the same question several times, but with different phrasings, or phrasing the answers in such a way as to confuse the candidate – for instance one of the questions concerning the frequency tolerance of a 144MHz signal had the edge frequencies of the signal different ways round in the alternative answers. What on earth is the point of such tricks? I also feel that the actual process of faultfinding is badly covered, eg the questions on keyclicks did not ask how you would go about making sure your equipment did not radiate them, other than on-air tests, presumably not a good idea.

One of the things I found interesting, although I am not sure of its significance, was the number of people at the May sitting who were taking the exam for the third or fourth time. Obviously some of these were due to poor preparation, it appeared that very few had attended classes of any kind, but not all of these can be due to that. As far as classes are concerned, it would appear that most of the correspondence courses are very expensive, I was quoted between £60 and £150 by several schools – a great deal of money for what I considered, in technical content, not a very difficult exam. I was also bombarded by literature offering me steadily cheaper 'special offers' by one school for some weeks following my initial enquiry.

As far as the Morse test goes, I am less qualified to comment, not yet having sat it (nor indeed started learning). However it would seem that the main requirement is for further barriers to access to the HF bands, and that if it is not possible from an administrative point to have a practical exam (I believe the best sort of test), then the Morse test at least provides a reasonable test of motivation, and despite all the talk of it having outlived its usefulness, I still believe that Morse has its place, especially considering the high levels of RM present on many bands today.

Hugh J.E. Davies, B.SC., RS51181,
St Albans,
Herts.

We don't think the RAE is all that good, to be sure, but it's difficult to know how *to get it right and to bring pressure on whoever does it to sort out the problems. A most interesting letter – anyone anything to add to it? – Ed.*

Transistors that pass away in a blink of an eye

What an excellent article on valves by Ken Williams (*Amateur Radio* June issue). Certainly my constructor's pendulum was swinging back towards building gear with valves after dabbling in transistors, mosfets, and ICs with reasonable success.

My return to valves was due to the reasons listed by Mr. Williams, and so relevant too! They will stand much abuse, and still allow you to use them after making your mistakes, an important point from a beginner's point of view. Transistors, as we all know, are not so forgiving, passing away in the silent blink of an eye.

As for the abuse that valves will stand, no doubt regular users could tell a tale or two, and my tale helps to illustrate their versatility. As a schoolboy ham, I modified an old ham TX to run a pair of 6146s in the PA, with EHT, and I mean EHT on the anodes, and about 750v on the screens, I forgot to connect the bias. On warm up, there was an almighty bang coupled with a blue flash from inside each valve. Not quite the northern lights, but just as spectacular. I switched off, righted my wrongs, mumbled a short prayer under my breath, and away they went for several years' faithful service.

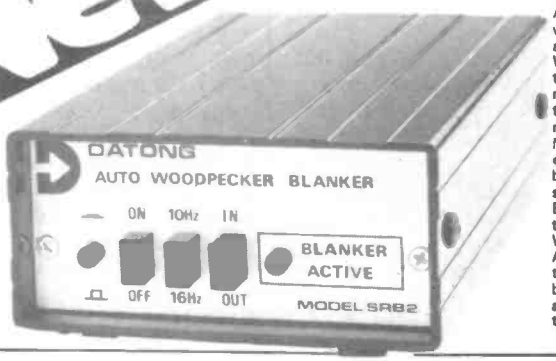
Mr. Williams' comments on octal based valves are very relevant as well. I required such a valve for a recently built 10MHz transverter to work as a driver for the PA. The junk box yielded a good old 6V6, something that will make the old timers smile.

I hope this article will encourage others to use valves. They are so easy, so faithful and ideal for all construction work. Lastly, when I next need a PA value, I have it ready and waiting in the junk box, the ubiquitous 807.

Bob Leask, G4CEO,
Bedford.

DATONG

NEW



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A built in r.f. activated transmit relay will handle the output for normal HF transceivers and three push button switches are fitted for: power on/off, selectable 10 or 16 Hz pulse rate, and before-and-after comparison. The unit uses the same case design as Model ANF (see this ad.), and a panel LED tells you when the unit is actually blanking. Price: £75.00 plus VAT (£86.25 total). Expected availability early July.

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Model ANF is a unique dual-mode audio filter designed to connect in series with a receivers loud speaker.

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Performance is independent of receiver volume setting thanks to a built-in compandor chip, and the notch depth is typically well over 40 dbs.

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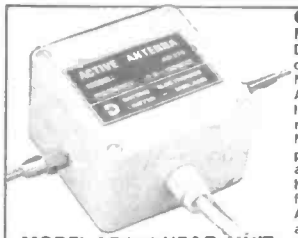
Prices: FL2 £78.00 with VAT £89.70, FL3 £112.50 with VAT £129.37, FL2/A £34.00 with VAT £39.67



COMPACT RECEIVING ANTENNAS
MODELS AD270/370

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Model AD370 mounted on a roof top or Model AD270 in a loft will give similar sensitivity to much larger conventional aerials yet are only 2½ and 3 metres long respectively.

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Although active antennas were introduced to the amateur market by Datong only a few years ago they have long been used by military and commercial receiving stations. The performance specifications achieved by the Datong AD270/370 are very close to those of "professional" active antennas selling for ten times the price – a point which is not lost on our many professional customers.

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Datong Active Antennas represent an advanced solution to a common problem and so far as we know have no serious competition in terms of performance at the price. (Reviewed in Rad. Com., June 1982).

AD270 £41.00 with VAT £47.15 AD370 £56.00 with VAT £64.40

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MODEL PC1

Once upon a time it was the norm to use a ten metre receiver to receive the two metre band. Now, large numbers of special purpose two metre SSB rigs are in use and conversion the other way becomes a very attractive possibility.

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Try this test. Listen on twenty metres after the band goes dead in the evening. With many general coverage receivers the band never dies. It remains populated with phantoms generated by the receiver from the many very strong signals on forty metres. This is the kind of effect that the higher quality receivers minimise, and that goes for PC1 plus a good two metre rig. Review: Rad. Com., April 1982.

PC-1 £119.50 with VAT £137.42

See us at A.R.R.A. Doncaster October 6, 7, 8th.

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STRAIGHT·AND·LEVEL

News and views from the world of the radio amateur, compiled by the staff of Amateur Radio.

What a lovely summer we're having – much too nice to sit slaving over a hot typewriter here in the Bichester Home of Fine and Socially Aware Journalism Working All The DX. Please, whatever you do, don't mention Sporadic E to us though – all we've worked is one IW9, who we worked last year, and not a tweet of anything else. Ah well, it shows the E layer is still there . . .

The antenna saga has been sorted out. Well, at least temporarily. A gentleman from Birmingham rang us to say that he had some 10ft tower sections left over from his old house, which he couldn't use in his new one, and would we like them? Oh yes, oh yes, oh yes, would we just; one of the motoring maniacs from next door was hastily despatched the following Saturday in the general direction of Brummagem and returned in triumph (or austin? oh gawd) bearing five nice tower sections which, we gather, were ex-USAF.

Funnily enough he'd obtained them some years ago from an electronic junkyard at a place called Barford St John – which isn't a million miles away from Bicester, actually, and Nigel Gresley drives past it every Monday evening on the way to his bowls club (ho, ho, tease, getting old then, old boy, nice sedentary game at your time of life, getting a bit past anything more active, eh? WHACK! He says that there are all sorts of mouth-watering log-periodics, discone antennas and heaven knows what on the site – it's a USAF radio site of some sort, apparently and there are some most unusual-looking things around.

Anyone know what's what at Barford, or is it one of those places you get beaten about the head if you so much as mention? It's funny, actually, how many interesting-looking wireless stations there are dotted about this fair country of ours and we must admit to the usual vulgar curiosity about what they all do. Any chance of borrowing one for a contest site??

Be that as it may, the tower sections were cleaned up and bolted together and we got a local welder to make up a structure with a top bearing for the rotator. Having done that, we had a quick re-read of Ken Williams' article last month and made with the gin-pole – after attaching the antennas, naturally. We managed to repair the 16-ele for 144MHz and bought a brand-new Tonna 21-ele at the East Suffolk Wireless Revival – there wasn't enough in the petty cash for anything on 1296 MHz but we're working on it.

So up it all went, nicely mounted and guyed, and it looks likely to resist the worst that Mother Nature can do to it. We also reinstated the 80 metre trap dipole after a very nice gentleman sent us an old (but perfectly serviceable) KW job to replace the one which splattered itself all over the front car park here, so at least we're back with that. The only mercy was that the 3-ele tribander, being on the chimney of the old boiler house, wasn't affected by the breezes of last month and it's still up there.

Anyway, we can now hear HB9HB most of the time and, surprisingly, FXOTHF in AI46 – at least, when our French cousins condescend to switch it on. It seems to spend half its life off the air, unless it's our wireless misbehaving.

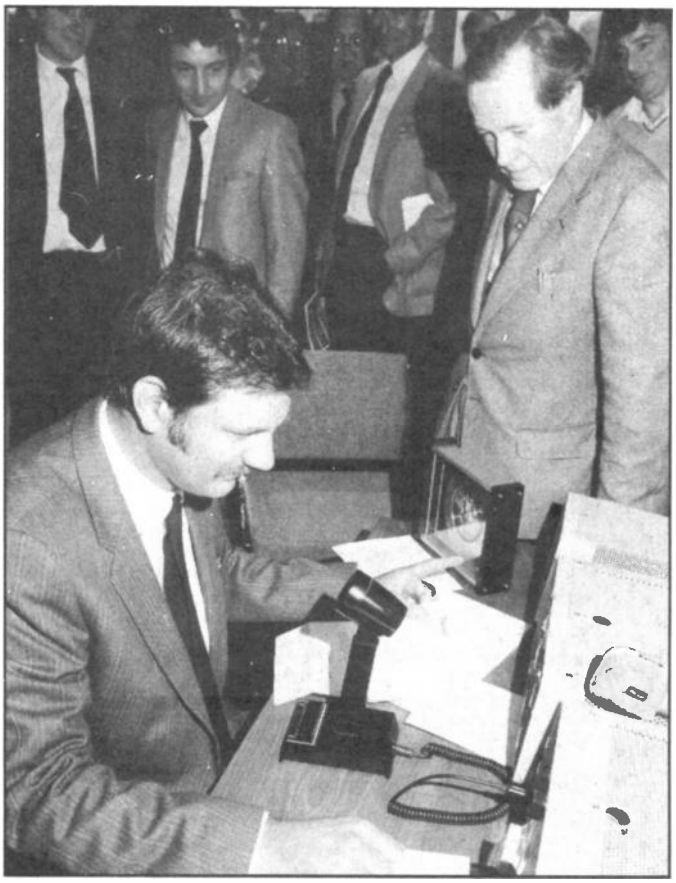
Catering for ALL readers!

Talking about misbehaving, did you spot last month's deliberate mistake? You can't say that this mag doesn't cater for all levels of readership, you know – some months the deliberate mistake is pretty subtle, requiring at least A-level maths or a degree in biology to spot, but last month's deliberate mistake was for the very beginner – it really was a nice simple howler, requiring only a very basic ability to read the English language. Yes, Brian, that's right, it was the mystery of the missing article, which was supposed to appear on page 23 and didn't. Well, what happened was (that's how we always start explaining these things to the MD; you know, those sessions where we get, erm, roasted) that the review of the IC-251E was a bit longer than we thought it was and we had to rearrange the magazine at rather short notice in order to fit everything in. Somewhere between the Bicester Wireless Station and the typesetters at Peterborough, there was what you might call a communications failure (oh, all right then, a cock-up) and the article by G3XSE kind of disappeared into hyperspace. Oh. Ah. Yes, well, it's definitely in this month's issue (he said, crossing every finger).

What will this month's deliberate mistake be? First to spot it gets a year's sub.

Talking of a year's sub, suggestions for the new name of this feature are coming in quite nicely now and we'll declare the result next month. Some of the suggestions have really made us hoot and the final result will be a close one.

We heard a brilliant story from someone on the air the other day. An amateur who was working mobile on 144MHz in the Isle of Man somewhere, complete with mag-mount antenna on the roof, pulled into the side of the kerb with a view to stopping at a shop and getting a paper and a packet of ciggies. No sooner had he stopped the car than a smartly-dressed chap jumped in the back and asked to be taken to the airport.



The callsign, 2MT used by Marconi's original Wireless Telegraph Company to introduce Britain's first public entertainment broadcasts way back in the 1920s, was re-launched by members of the newly-formed Marconi Radio Society last Saturday after a 60-year break in transmissions. Club member Cliff Deamer, watched by George Benbow, Chairman of the Marconi Radio Society and over 50 members, is pictured making contact with amateur radio enthusiasts around the world. The event, held at Marconi Space & Defence Systems' Stanmore headquarters, resulted in contacts with more than 150 amateur radio stations, including those behind the Iron Curtain and as far away as Brazil.

Below: E.G. Culverwell's mod to the Datong Morse Tutor which provides a completely separate on/off switch. See letter in last month's Amateur Radio.

The amateur, not surprisingly, was a little nonplussed and suggested to the said gent that perhaps he had the wrong car. The man said "Well, aren't you a radio cab? You've got the aerial on the roof!" It was then gently explained to him that no, it was not a radio cab; he rather sheepishly got out again. Oh dear – maybe we should all set up in the minicab trade part-time and make a bit of extra cash for the new linear or whatever . . .

Interesting that the Toady Party got in again – not from the political point of view but from the point of view of the **Telecommunications Bill.** According to the friendly folk at the Home Office Press Office (no, really, they're a good bunch of chaps) the thing had got as far as the Lords and apparently the idea is to get it underway again as quickly as possible.

It's unlikely to be in this session of Parliament, we'd imagine, because they go into recess again quite shortly, so maybe in September or whenever it is. Oh, there's a slight snag – according to a rumour which we heard floating about and subsequently confirmed, the Radio Regulatory Division at the Home Office has now been made part of the new Department of Trade and Industry, or whatever it is called, and we wonder what it's going to do.

Peeve of the month is the new **£12 licence fee.** It seems very odd that the first anyone heard about it was when licence reminders with the new fee appared up and down the country – no-one seems to have bothered to consult the RSGB or told them about it, which seems a bit weird to us, and we understand that the general idea is to finance computerisation of amateur licence records. Well, fine. it should be a damned sight better than the system they use now, which takes ages, but we find it a bit hard to take it from cold, as it were.

We wish someone had told *us* about it, and if the Home Office didn't tell the RSGB there's something a bit amiss somewhere. Or are we being paranoid again? We haven't had any furious letters about the licence fee, funnily enough, so maybe it isn't such a burning issue as we thought.

By the way, talking about letters, keep 'em coming – we need to know what you think of the hobby, us, and everything else. Don't spare the brickbats if you feel so minded; no-one's perfect and we certainly don't pretend to be.

We gather that there was a fairly splendiferous opening on VHF and UHF to Northern Germany and Denmark in late June – we didn't get in on it, being up to our ears in one of the other Goodhead magazines at the time, but various nice squares were worked, apparently. There's not been much to report on the HF bands, alas, so nothing dramatic unless we were on the wrong band at the time. We still get bothered by stray CB types in the bottom end of the 28MHz band and it doesn't seem to us that anyone's doing a thing about it. Yes, we *know* the existing legislation is inadequate, yes we *know* there's a shortage of manpower in the RI Department, but it still hurts.

Ah well, we can but hope that the new Bill finally makes it into law and gives someone somewhere some teeth. We're very proud of the amateur bands at Bicester, even though we do miss whole articles out of our magazine from time to time, and it's a shame to see intruders trespassing when they've no right.

Oh yes, here's a thing. Just as we were typing this, Technical Bod rushed in – apparently he and the lads in the lab were listening to the AMSAT net on 3.78MHz and the Phase 3B satellite has finally made it into orbit. Nice one, chaps, and we'll have to do a feature all about it.

LATER THAT WEEK – we can hear the telemetry beacon on 145.81MHz and things are looking good!

Enjoy your wireless and see you next time.

S·W·L

For the short wave listener

Fantastic! Super! Wonderful! Tremendous! We've actually had some letters for the column – things are really looking up, and thank you all for the nice things you wrote and the suggestions you put to us. We particularly enjoyed the one with "A Rare SWL Letter Please QSL" on it, from E.W. Franks of Paignton – he is obviously a fan of our pal Brian (you know, as in we say "no, Brian it isn't at all").

"... welcome notes on broadcast station DXing and frequency lists of aircraft and marine beacons."

He says "go on, give Brian a look-in. He is becoming our hero and asks all the questions we would like the answers to". Mr Franks suggests we give the SWL more than one page and put in reviews of interest to listeners.

Well, yes, that's possible and we've certainly put that idea in our Pending Suggestions file – you know, the one we take with us when the MD summons us for One Of His Sessions. Mr Franks would also welcome notes on broadcast station DX-ing and frequency lists of aircraft and marine beacons and so on; he also wondered about a list of what awards are available to listeners. That's a brilliant idea, although we don't quite know where to start – we promise to have a look at that and see what we can come up with.

"... a chap on his course who was always asking the most inane questions ..."

Many thanks for your letter, sir, and we will see what everyone else says. Oh, and we have said hi to Brian, as you ask! He doesn't really exist, but the habit of putting him in the text stems from when His Ineffable Majesty Nigel Gresley, B.Sc and avid consumer of real ale, was working on selective calling systems for one of the big electronics companies. He tells us that there used to be a chap in his course on them who was always asking the most inane questions; this guy had a Ph.D and a whole lot of other letters after his name but he wasn't on the same planet as everyone else and, according to Nigel, you would have thought he had an IQ of about 3½. However, he was a nice man and even got a G4 callsign some while ago, so he can't be too much of a Brian, if you see what we mean. His name, surprise, surprise, was Brian ...

Mr V. Wainwright from Dartford wanted to see articles on the use and benefit of components such as filters, linears, pre-amps, active antennas and whatnot. He bought the *World Radio and TV Handbook* and from what he says he's been burning the midnight oil searching for distant stations with what sounds like a remarkable degree of success (the *WRTVH* is truly superb, and quite indispensable for the broadcast-type SWL, it's true). Mr Wainwright is another one who asked for details of marine frequencies; he also asked what he could expect to receive on 50MHz with the appropriate converter?

50MHz: "We hear that some worked a VE1 station on multi-hop sporadic E on June 20th. There's an amateur allocation in regions 2 and 3."

Well, you'll hear some of the 40 Good Men and True who have permits to operate between 50 and 52MHz at the moment (and we hear that some of them worked a VE1 station on multi-hop sporadic E on 20 June – well done, chaps) and you'll also hear things like TV sound and vision, from various countries under good conditions. There is an amateur allocation at 50MHz in Regions 2 and 3 but whether you'd hear any is a moot point. He asks why signals are few and far between on 28MHz – well, the sun isn't doing its stuff as well as it was and there isn't enough ionisation about to make F-layer contacts possible very often. However, there should be some good openings to Europe on sporadic E at this time of year, so it shouldn't be all that quiet.

Mr Wainwright also hands H. Lexton Ltd a bouquet for fast delivery of his RX – he ordered it at 4.30pm and they delivered it at 7.00pm. Very good!

P.K. Sargent sent in a long list of things he'd heard on 28MHz – very good, sir, – and asks whether the RSGB run an SWL's club. Not to our knowledge, although you can be a member of the RSGB even if you don't have a transmitting licence.

"Any chance of a Private Member's Bill revoking Income Tax for SWLs?"

There were letters as well from Corporal Watson of 31 Squadron, RAF Bruggen, Den Marriott of Bexley Heath, Ian Wilkinson from Romford, Barry Wiggins of Rossington, near Doncaster and, believe it or not, a very well-known Member of Parliament who, when not doing his stuff in the House of Commons, says he "spends hours and hours with an old AR88 thoroughly enjoying himself and wishing I had a better antenna!" He asks us not to mention his name "so that the constituents don't think I'm a lazy good-for-nothing!" On the contrary, sir, glad to hear there's at least one human MP in Parliament – any chance of a Private Member's Bill revoking Income Tax for SWL's???

"Propagation has been really up and down just lately, and looks like staying that way for a while."

Everyone sent in very good suggestions, and we're sorry we haven't got the space this month to feature all your ideas. If this goes on the SWLs will take over the mag – seriously, if things do go well we'll see if we can elbow Gresley and the gang out of the way and make a bit more room for the likes of you and me.

Propagation has been really up-and-down just lately and looks like staying that way for a while. **28MHz** has produced some nice short-skip into Europe and Scandinavia via sporadic E at times but pretty well nothing long-distance, and **21MHz** has really been in the doldrums since we're really in summer conditions now. There have been some bad blackouts affecting frequencies up to 21MHz this month, and our spies tell us that things aren't likely to get better for some time yet.

14MHz continues to be overcrowded and noisy but there's usually some choice place workable if you stick at it more or less 24 hours a day! **7MHz** is noisy during the day and even worse at night – it's a great band but it's very hard going at this time of the year what with the static and noises off and what-have-you. We haven't heard anything good on 7MHz for a few weeks now, which is unusual for us, and the Yanks at midnightish have been very weak and watery even though we checked the antenna a couple of times.

"It's still worth parking the RX on the SSB calling frequency with the beam to the south-ish. You never know what you might hear."

Ah well, such is life. Just a quick final this month – don't forget that there's still a chance of sporadic E on **144MHz** even though we're coming into August and if you're sitting in the shack doing other things, it's still well worth parking the Rx on the SSB calling frequency, 144.300MHz, with the beam to the south-ish. You never know what you might hear, although the VHF types in the office tell us that there hasn't been a lot of action so far this year and everyone's feeling a bit peeved!

Happy listening. Oh, and we hope you enjoy the monster Prefix List in this issue. We think it's the most authoritative that's been published anywhere for a long time and it helps amateur band SWLs every bit as much as licenced chaps.

STOP PRESS·STOP PRESS·STOP

It's all off in ON-land

There have been rumours flying about concerning the loss of some VHF and UHF bands to our friends in Belgium. But as we went to press, we'd managed to establish that the new *limits* of the 70cm band are 434MHz to 438MHz. Also, only 30 watts output power is being allowed in that band – also on 2 metres.

This was to apply from July 15th 1983.

In addition, all bands between one and 10GHz are withdrawn completely, and the power limit on all bands above 10GHz is reduced to 100mW.

Yet another shock is that apparently, the PTT are proposing a new introductory licence. This would allow the use of 15 watts of FM *anywhere* within the 2 metre band. All one would need is minimal technical qualifications.

Is Syledis the real problem?

We at *Amateur Radio* believe this to be extremely ill-advised. A well-known amateur who prefers to remain anonymous due to his Home Office connections, told *Amateur Radio* that "this has got to be nothing short of disaster. Holland has 'spot' frequencies which is acceptable, but Belgium's adoption of the phrase 'anywhere' is just not on".

We gather from the Home Office that similar changes could well spread to other countries. Provisionally at least, this piece of legislation is confined to ON-land.

Amateur Radio magazine has not had this confirmed as yet, but we believe this legislation has been brought in due to a change in policy and of the activities of Syledis and certain military operations. Syledis, as we all know, is the controversial position-fixing system which is carving up 70cms on the south coast of Britain and elsewhere. It isn't working to its designed specification, we understand.

Back to Belgium then; this European country (of 11,775 square miles and a population of nearly 10 million people) has now lost the bottom four, and the top two megahertz in the 70cm band. Belgium is a country where amateurs are a **shared primary user** of all bands, along with radiolocation (radar etc).

The UBA (Belgium's version of the RSGB) have estimated that this new legislation has affected almost 50% of their radio amateurs. But of course, the legislation affects them all for another reason; the high power licence (Class C) that used to be available has been completely withdrawn. Belgium will now be out of line with the rest of Europe, and DXing is made much, much more difficult as all DX modes are allocated in the slot between 432MHz and 433MHz.

At the time of going to press, we know there are meetings going on in Belgium, and elsewhere, to discuss the possible ramifications and effects on the amateur radio scene. The RSGB want to confirm that the Belgium decision will not be reflected in Britain, either now or in the future. The implications are numerous and far-reaching.

We also hear comments from Belgium that amateurs might even consider taking this matter to the International Court of Justice, as it is unprecedented for a shared primary user to be deprived of amateur bands on such a large scale.

This is almost a fait accompli

This is almost a fait accompli as far as the withdrawal of the bands in Belgium is concerned – which is a great pity because it would have been right and proper for amateurs and organisations working on behalf of amateurs, to put their case to the relevant authorities. The ramifications include a satellite, as we know, and it would be a disaster if this were lost to amateurs. Well readers, it's now up to both of us to make our case heard. – Ed.

Just prior to the legislation being made, *Amateur Radio* received the following letter from G4KGC, Petra Suckling, RSGB committee member:

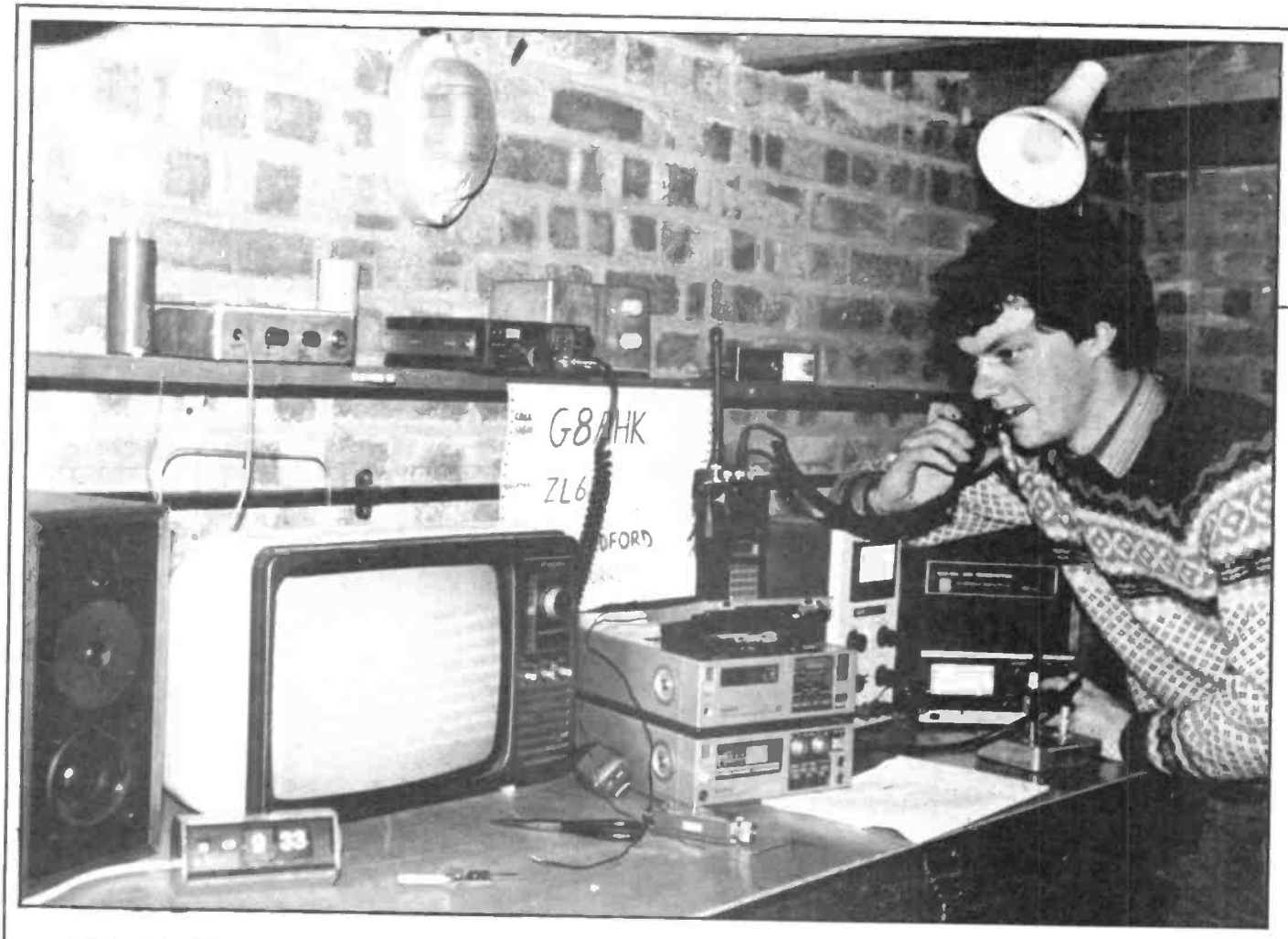
"There is some very bad news from Belgium! The Belgian authorities are about to withdraw the following amateur allocations in Belgium: the lower part of the 70cm band, so that operation will be permitted only above 434MHz (which will in effect isolate Belgium from the rest of the world on this band); all frequencies above 1000MHz.

"I have been asked by ON6UG of the UBA to pass on the following request:

"ON6AT has set up a special PO Box in order to collect as many QSL cards as possible with messages of sympathy. These will be used to demonstrate to the authorities that amateurs outside Belgium are strongly opposed to this severe loss of amateur frequencies. The Belgian amateurs are hoping for strong support, to help them in their struggle to retain/regain these frequencies."

QSL cards, please to: ON6AT/RTT, PO Box 71, 9218 Gent, Belgium.

STOP PRESS·STOP PRESS·STOP



Why not hi-fi audio on amateur radio?

Many years ago I transmitted my first stereo on 2m, using an extraordinary lash-up. Two microphones were fed through a control desk and into a limiter and thence through a Dolby B processor. The output from this modulated a stereo encoder whose composite output was used to drive a signal generator with output frequency on 145.5MHz in the days (14 years ago) when this part of the band was not used normally in London, only coming to life in an opening!

The signal generator output was amplified up to 3w drive for a QQV07/50 PA valve which could give out a healthy 90w for 150w DC input. My stereo test signals and speech were heard, and recorded in stereo by G8AMG when he used to live in South east London; he made a special converter from 2m to 100MHz so that he could use his normal stereo FM tuner. The path worked very well, but it was not long before I was goaded by my good BBC friends for transmitting some hum in the background. it was quite right that they should criticise this, for as FM radio critic for *Hi Fi News*, I often criticise them for the same reason!

I have always been interested in the highest possible quality of audio transmission, recording, and reproduction, and whilst there is no direct connection between this and the transmitting of information on amateur radio in the normal sense, there is no reason at all why amateur radio should not be the breeding ground for researching into higher and higher quality audio transmissions.
Angus McKenzie, G30SS

The system worked well, both with narrow and with wide deviation and whilst one station criticised me for spreading, others found the whole exercise of interest. The critic, however, was calling the kettle black, for his AM transmissions used to spread like hell every time his incredibly noisy parrot sqauwked about three feet from the mic, causing violent flat topping and over 50kHz band occupancy on the peak!

Some years later I repeated the whole exercise again on UHF, again proving that it can be done quite easily. Strangely, the RSGB took absolutely no interest in what was believed to be the first multiplex stereo transmissions on an amateur radio band, and yet when I wrote it up in detail in *Hi Fi News*, I received dozens of letters from amateurs all over the world who would have liked to have seen it written up in an amateur radio magazine.

I was preparing, two years ago, to carry out some prolonged tests on the 23cm amateur band of multiplex stereo in order to check the occurrence of multi path and other anomalous propagations, when it occurred to me that I should be able to do some interesting research into the transmission of digital signals in order to see if they would be ruled right out of court. Or alternatively could be worthwhile.

Analogue to digital conversion

It would be as well to describe in detail what PCM actually is and roughly how it works before detailing all the experiments that my friends and I have been making. Although there are many different standards for digital sampling, the most usual one is at just over 44kHz. The incoming

signal is sampled at this frequency to ascertain its level at the moment of sampling.

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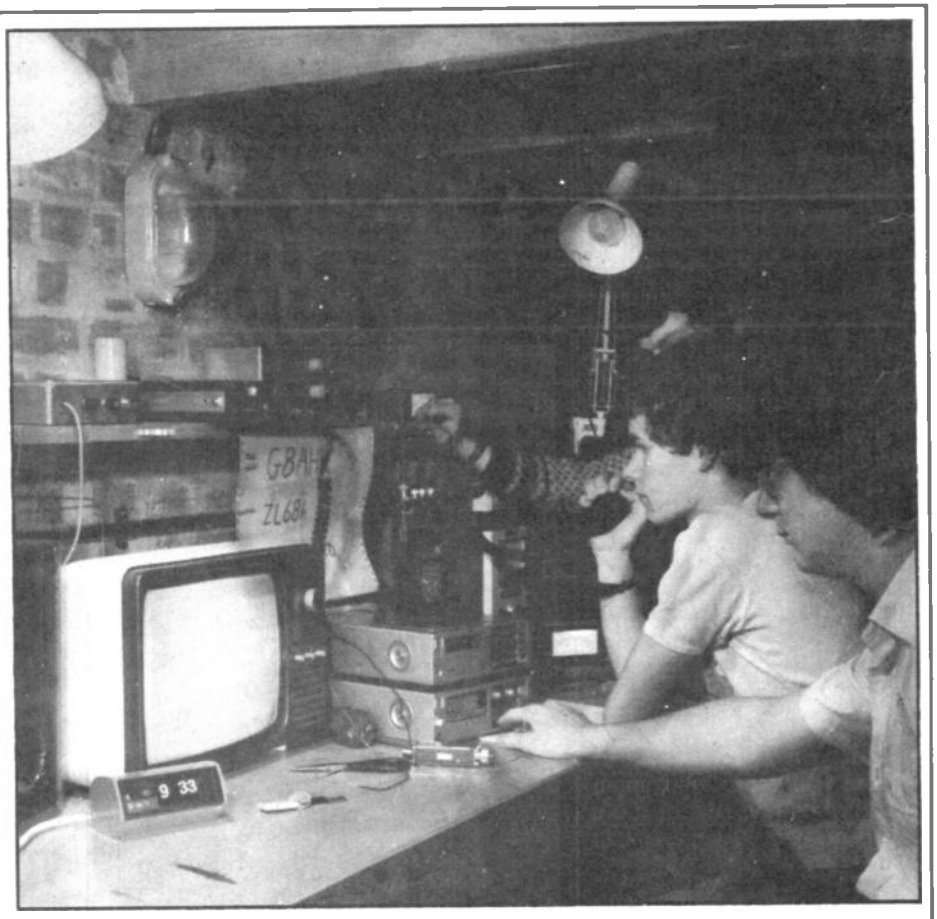
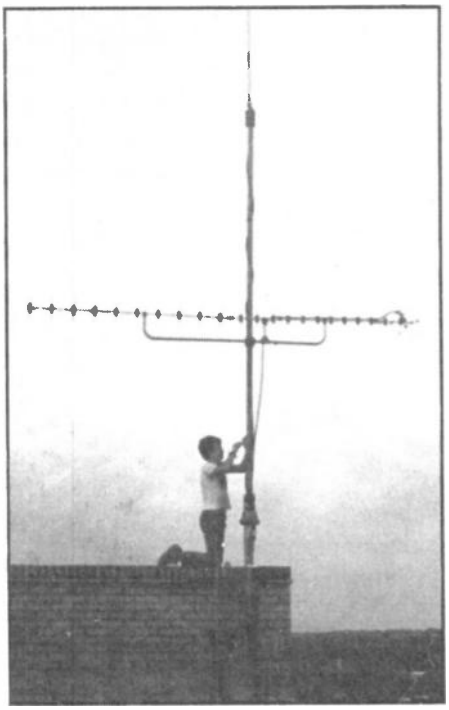
Immediately preceding the sampling stage there has to be a low pass filter having an extremely steep cut in response, with its wall at or below half the sampling frequency. This filter stops aliasing, since frequencies above the Nyquist frequency could be digitised, and then brought back to analogue at a frequency below the Nyquist frequency.

"Eight-bit coding gives a reasonable quality for telecommunication purposes."

The accuracy with which the level is sampled is governed by the number of bits available for expressing the number. In extremely low quality links, as few as four bit coding has been used, with the resultant diabolical sound which is intelligible. Eight-bit coding gives a reasonable quality for telecommunication purposes, 13-bit coding being used by the BBC (with a sampling frequency of 32kHz) on many of their digital links to transmitters, whereas early digital sound recordings and any compact disc playback systems are replaying 14. Sixteen-bit coding is available, even on domestic digital equipment and all the high quality new compact disc playback decks give 16-bit playback, even if they use 14-bit deprocessors, but this is with a technique called "over sampling" which allows an extra two bits to be given by interperlative processes.

The characteristics of the digital audio system are of particular interest. With reference to the top bit, (full modulation) distortion levels should be not far above the noise level, and a 16-bit system should have distortion of around 0.01 per cent, with noise perhaps at least 10dB lower than this. Distortion is not only harmonic, andits equivalent, intermodulation, for alias tones are produced represented by harmonics of the input frequency beating with the sampling frequency, or any other frequency around in the digital processor. The art of good design is to keep all these down to a minimum.





Far left: Mike Hatch, Simon Whittle and Keith Davies operating the PCM link from the University of Surrey EARS shack.

Top of this page: Keith Davies, G6VCQ, using a 2m talkback to Angus McKenzie, G3OSS. The PCM-F1 and SL-F1 video recorder are in the centre of the picture, to the right of the television screen.

Above: Amateur radio is not all easy going! Here's Simon Whittle risking life and limb fitting the masthead preamp. And mighty impressive it is too.

At very low levels, distortion might be audible if you listened at an unrealistic reproduction level, since most digitisation is linear. Imagine a system which digitises from one volt downwards with levels at each millivolt. There would be 1001 levels from 0 to 1000 representing 0 volts to 1000 millivolts, say, positive. These 1000 levels could be represented by 10 bits of binary coding; in other words a 10-figure number in which each single number is either a nought or a one in the binary scale. To express any voltage between + and — 1 volt to a 1mV accuracy, one will need 11 bits in a digital word, thus giving 2001 levels, including 0.

"Dither is a form of white noise added to the signal at a very low level. . ."

A very low level signal will be jerking through the mV sample points up and down as if on a staircase, but the steps will be smoothed out by the steep anti alias filters on reproduction, which is another reason for their presence.

Even so, you might imagine that a level below 1mV would not register and this would be true were it not for the addition of "dither". Dither is a form of white noise added to the signal at a very low level to push the lowest level signals over the bottom bit some of the time, thus allowing extremely low level signals to register.

An explanation of dither is unfortunately extremely complex and many articles have been written about digitisation in magazines,

Why not hi-fi audio on amateur radio?

such as *The Audio Engineering Society Journal.*

The frequency response of the digital system can be flat from DC up to extremely close to the Nyquist frequency, and typical signal-to-noise ratios in excess of 90dB can be achieved with better than 90dB cross talk for stereo and virtually no audible distortion in practice. Digital sound, frankly, exposes the listener to all the inadequacies of the original sound balance and has often been criticised by very biased critics who seem terrified of any new technique. It is true that many a hard digital recording has been made when microphones giving a hard sound have been used. But this is not the place to moan about the quality of the source signal . . .

Analogue signals are obtained from digital ones by allowing the digital coded number to churn out a voltage for the requisite time with the anti aliasing filter following the digital to analogue conversion stage. This voltage then bobs up and down as the original audio did before it was digitised. The digits are clocked through the digital system at one word per sample for each channel being digitised, thus we would get two 16-bit words for stereo at just over 44,000 times per second.

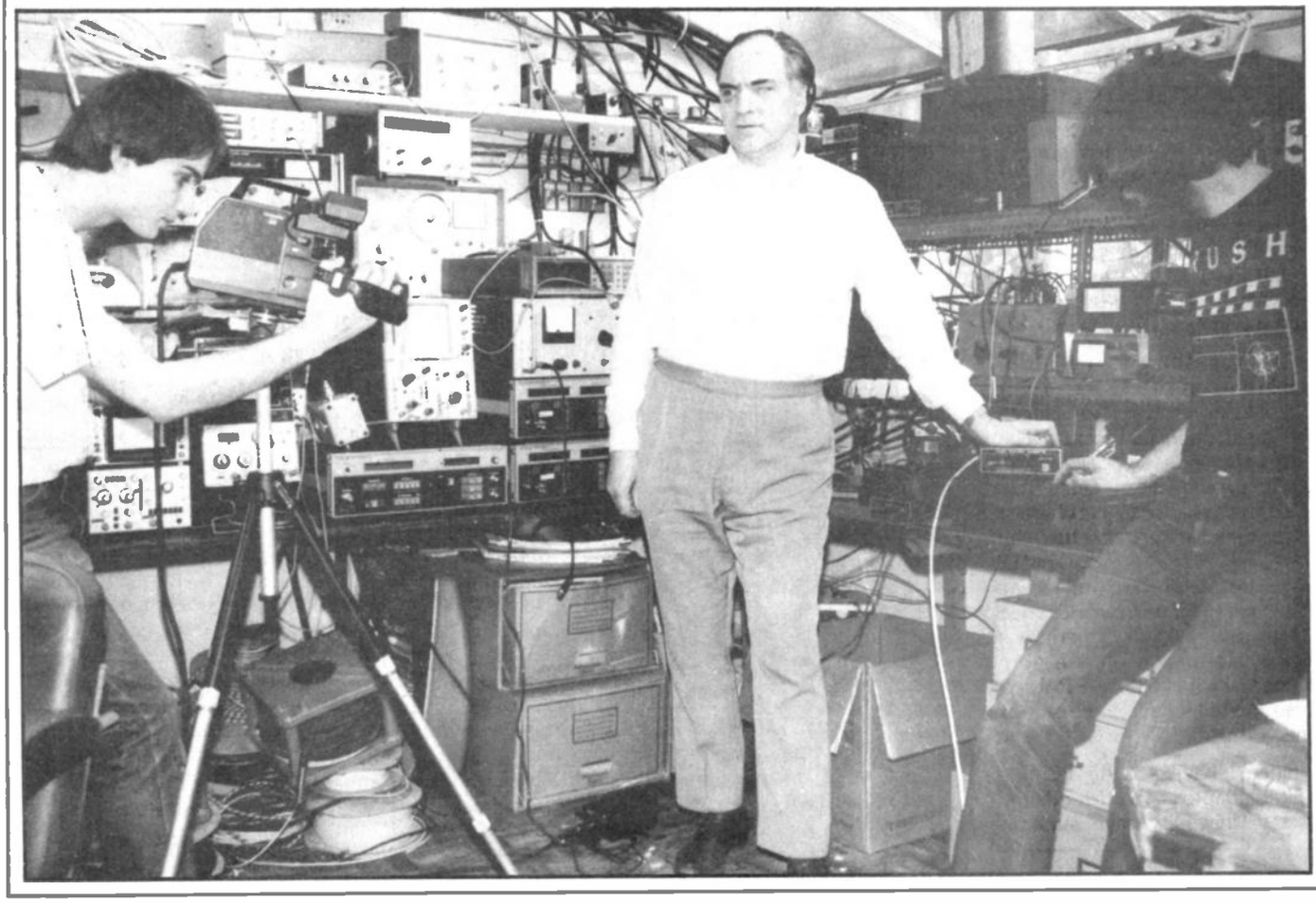
"... how to transmit the bits as easily as possible in an amateur radio context."

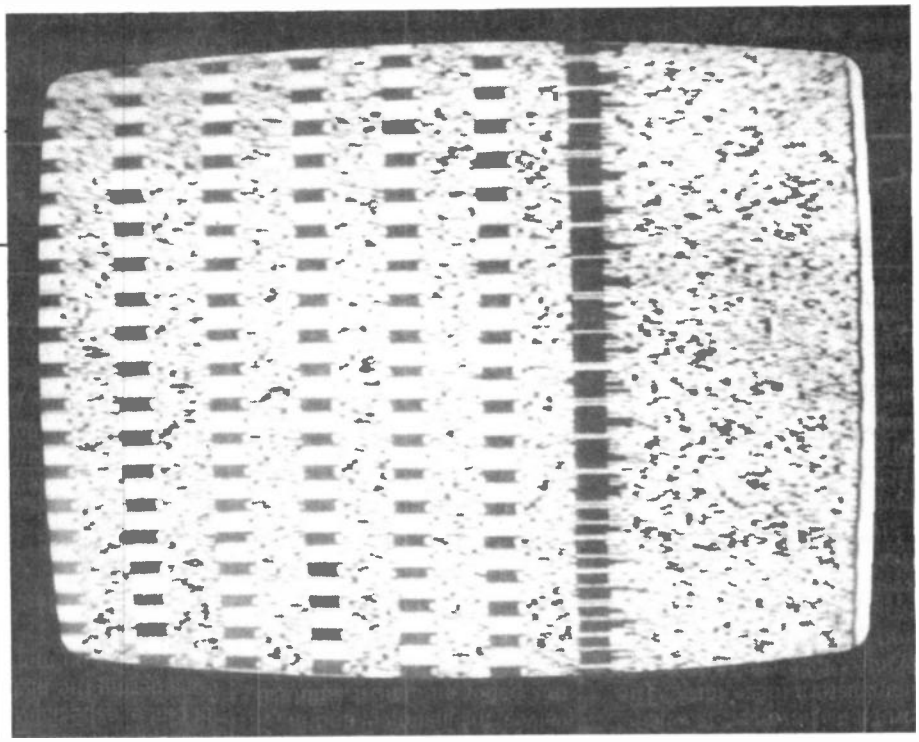
Various other words have to be transmitted in order to operate error correction and concealment within decoding. Various other types of coding concerning, for example, the presence or not of pre emphasis are all put into the melting pot, coming under the generic term of 'digital housekeeping bits', these usually adding up to as much as 30% or so of the total bits transmitted. So now we have the question of how to transmit the bits as easily as possible in an amateur radio context. And what can be gained from doing it anyway?

I enjoyed the really good quality of 'steam' AM amateur radio as it was over 20 years ago. A guy who put out a good transmission from the States was almost talking to you in your own room if you had a good receiver. There was a major difference between good and bad transmissions. With SSB the "put-your-feet-up, and-relax-back-and chat" contact has been affected, for many, by the listening fatigue of hearing the restricted bandwidth transmitted on SSB.

FM is somewhat better, but the conventional restrictions on bandwidth hold it down to a communication-only mode. You may feel that amateur radio is entirely a communication/ intelligibility medium and quality is of no importance. So what of high definition amateur television which has been encouraged for over 30 years?

Below: General view of the G3OSS laboratory at Finchley. Andrew is at the camera, with Angus McKenzie and Simon Whittle looking on, and looking after the Microwave Modules TV TX and linear.





Above: This is the modulated digital pattern on the TV carrier as it appears when viewed on a monitor.

My friend Dick, W0QM, who also has the call G3FNL was one of two or three amateurs who were entirely responsible for the start of high definition ATV, and in those days it was all 405 line and black and white, of course. They were never discouraged from using all the bandwidth necessary to transmit the best possible pictures, and even today dozens of amateurs are transmitting the finest possible pictures that they can manage on the 435MHz band with around 5MHz bandwidth side bands. For communication purposes one *could* show sour grapes by suggesting that TV bandwidth requirement is ridiculous and that they should all change over to low definition TV.

Such a requirement would be an outrage, for it is the high definition/wide bandwidth part of the exercise that creates new ideas and results in much serious research work. Many well known and successful TV equipment companies were started by keen young amateur TV enthusiasts. We are now living in a digital age, with amateurs transmitting computer programmes to one another and computers playing an ever-increasing part in our amazing hobby.

"We are being allocated increasingly higher frequency bands, and I am astonished . . ."

We are being allocated increasingly higher frequency bands, and I am astonished to see that almost no serious digital data transmissions have been carried out, and virtually the only ones tht I know of (in which PCM audio has been used) have been those in which my colleagues and I have been involved.

The easiest way to transmit PCM is within the normal television 625-line carrier. There are several reasons for this, one of the most important ones being that by doing this one is keeping within one's licenced regulations, since in every way the transmission has the characteristics of a black and white TV picture with line and frame sync pulses and rows of digits going across the screen from left to right in groups of 16 for each world. The Sony PCM equipment used to superimpose all the digital information onto a normal video carrier which is 625-line PAL compatible. Even the video levels are standardised at one volt peak.

Since I have a Sony PCMF1 A-D/D-A digital adaptor, and friends of mine at Surrey University have such an adaptor (and digital audio in this format is becoming very popular amongst hi-fi freaks), it seemed only natural to use this format for the experiment. But first, a small bit of history to put facts right, for my first digital transmissions were nearly one year ago . . .

On August 7th 1982 my two friends Simon G8UQX, and Myles, now G4RCE, helped me to rig up a Sony colour camera with captions and a video link from the Sony PCM F1 to a Microwave Modules ATV transmitter, operating on 70cm. We established a link, using 2m FM talk back, and FM on 70cm with Alan Goddard G3NQR, in North Harrow. Alan first of all obtained Grade 5 colour pictures from us and hooked up his video receiving line to his VHS recorder, monitoring signals on his colour TV. We then switched over to digital and radiated a test tone, having made appropriate announcements on NBFM.

Alan could see as well as us the position of all the bits and end of word bars across the screen, but some beam realignment was necessary to obtain the best definition. When Alan brought round his VHS cassette it unfortunately decoded rather badly with about 90% errors and so we realised that we would have to do better. We each independently took far more trouble in aligning all the equipment, and tried again on Sunday, August 8th.

This time Alan obtained far sharper pictures of the digits, and also obtained much sharper definition when he replayed his video tape, and so he then sent his video recordings of my digital transmissions back to us with Simon, Myles and I running around like mad things in order to see, decode and hear and record Alan's transmissions. We were all thrilled to decode long chunks of between 10 seconds and three minutes of perfect decoding and heard our own test tones and voices coming back with the appropriate announcements, and without the mentioning of call signs, as it was a recording!

It is a great credit to Alan G3NQR, that he managed his own end entirely unaided despite the complexity of the set-up.

We realised that there had been many constraints to the decoding accuracies – multipath reception, bandwidth problems in antennas and equipment, and the fact that we had originally been using an unmodified Microwave Modules 100w linear for TV. The manufacturers subsequently modified the linear for us to make it more suitable for coping with TV, and also kindly modified the TV transmitter to give improved quality; these modifications are now in their latest models.

"Date of the first serious experiments were to be on May 21st, 1983 . . ."

Around Easter 1983, several friends at Surrey University, who were licenced, suggested that they would very much like to attempt receiving some digital PCM from me, over what was to be a 31-mile link, as the fly crows! The date of the first serious experiments was arranged to be May 21st '83, but we carried out site-to-site signal strength tests a few weeks earlier, when we realised that a very good receiving system would be required on the top of one of the highest university buildings in Guildford (Tilingbourne House, Surrey Court) to have a reasonable probability of success. Equipment in Finchley (my home) had

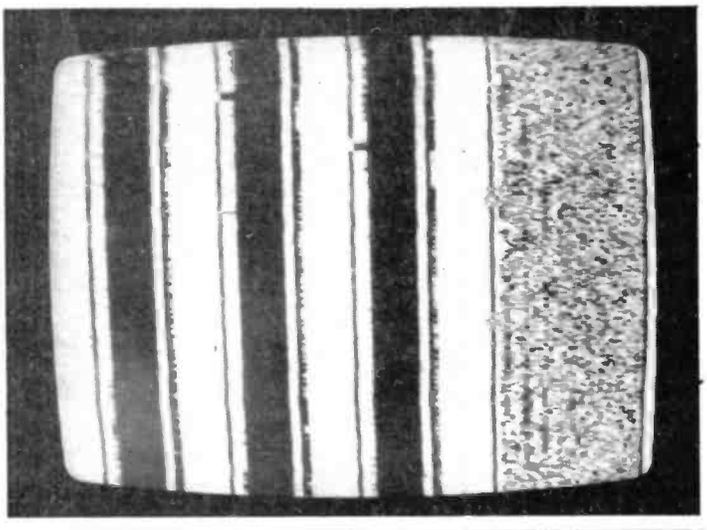
Why not hi-fi audio on amateur radio?

changed in that year, my two 21-element tonnas having been changed for two 16-element HAAGs, my entire VHF/UHF/microwave aerial stack having collapsed just before Christmas.

By 9am on Saturday May 21st, Simon G8UQX, and Andrew Harding, an SWL, and I, had assembled a studio full of equipment with AKG condenser microphones, a Calrec control desk feeding the PCMF1, whose output fed one of the switchable video inputs of the Microwave Modules TV transmitter which was feeding their linear and up the cable via a bird through-line watt metre and sniffer.

The sniffer was feeding either the video input of a modified TV set (Andrew's Amstrad, which he uses with his BBC computer) or alternatively the waveform was monitored on a D83 telequipment scope. The other video input was from a Sony colour camera. A Trio 9130 transceiver (the one I reviewed recently) was used for 2m talk-back, whilst a Trio 9500 (also recently reviewed) was used for 70cm identification and beam alignment.

At the Guildford end, G6VCQ, Keith Davies, G6EZL, Simon Whittle, G6JCH, David Hall, and Mike Hatch (who owned and loaned his PCMF1) were joined by many observers, particularly from the tonmeister course. They had erected an 88-element Jaybeam at approximately 100 feet above ground level which fed a Dressler GaAs FET pre-amplifier, which then fed a Microwave Modules converter from 70cm to band 4. The output from this fed a Sony TTF1 tuner whose output fed an SLF1 video recorder (Betamax) as well as a TV video monitor and the PCMF1 decoder. Mike Hatch and other tonmeisters arranged the output from this digital decoder to feed a high quality stereo hi-fi system.



Right: Unmodulated digital pattern on TV carrier as it appears when viewed on a monitor, ie a blank carrier. No digits.
Below: Angus McKenzie, G3OSS, at the Calrec stereo mixing console which feeds the PCM (digital) audio input

After comparatively few minutes in which we first aligned beams, we sent a TV pattern and soon realised that we had a slight problem with ghosting from the spire of Guildford Cathedral. Careful re-orientation of the antenna soon overcame the problem, and we then switched to colour TV which was received perfectly. Shortly afterwards we went over to digital, and readers can well imagine the excitement at both ends when the Guildford team yelled back to us on 2m that they were hearing my digital audio almost perfectly.

A little trimming of video gain and black level controls on the TV transmitter, and a little bit more fiddling at the Guildford end were all that was required to make the link perfect, apart from an occasional intermittent which turned out to be a 75ohm BNC plug on a 50ohm adaptor! We maintained the digital link for about half an hour, transmitting both Simon's and my voices, as well as making an awful lot of noise, including playing back our own recordings of a steam locomotive and fireworks on Primrose Hill!

"When SSB was first introduced, it was regarded as rather a crankish type transmission. Now most of us are using it."

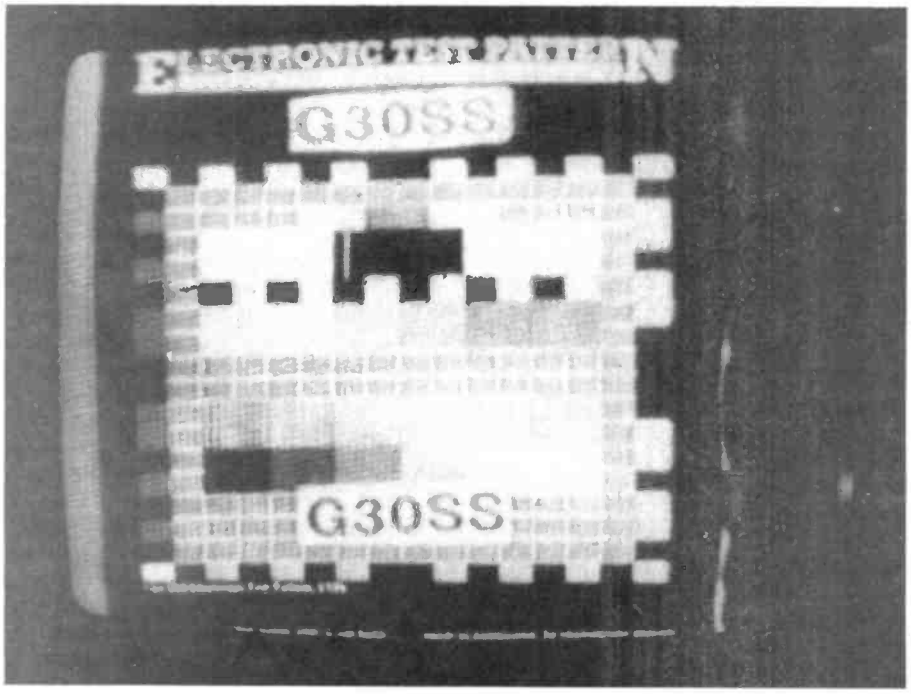
The jubilation shown by all of us was tremendous, and so on returning to the colour camera it is hardly surprising that my colleagues just had to pan it on to me when I was consuming a very sticky and large Belgian bun. Keith reminded me then that I always seemed to be eating, or talking about food, and this is what happens when you give up smoking!

The Guildford team, after dismantling their gear, took the video recordings down to their tonmeister studio and played everything back quite loud, and they were delighted with the results. I also have heard the tape back on my own system and I cannot hear any difference at all between the sound effects as transmitted and as recorded down in Guildford, the full original dynamic range being heard from the recording.

This goes to show that bits are bits which are either on or off, and if they work their way through satisfactorily there should not be any difference. I hope the fact that my friends and I have had so much fun and jubilation over this project so far will encourage many others to have a go at digital audio in the future. It is fascinating that the link was so reliable, and probably matters would have been as successful on 23cm, which is the next band to have a go at.

When SSB was first introduced so long ago on amateur radio, it was regarded as rather a crankish scrambling type transmission; now most of us are using it. I suggest that it might not be long before different forms of digital audio are transmitted on UHF and microwave amateur bands.

Come on folks, how about adaptive delta modulation and straight pulse transmissions which could be far more efficient than a TV carrier wave form?



Top: Caught in the act of having a cheese roll, or something equally sordid, on camera! G3OSS foreground, laboratory background.

Above: The G3OSS test card as received at Guildford, and recorded on a Sony Betamax unit, and photographed from tape.

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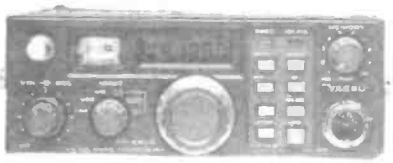

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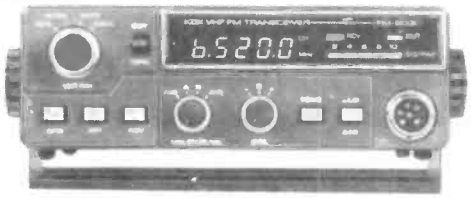

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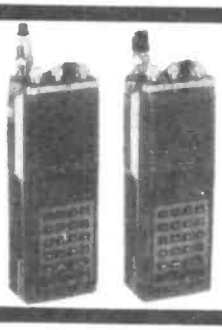

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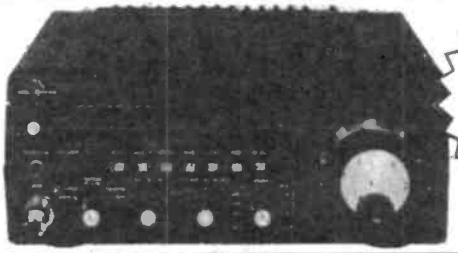

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Desk Job

Get yourself a quiet corner position (or a room of your own!) and make a purpose-built radio desk. Stan Crabtree, GM30XC advises.

Whether you are a short wave listener or a fully-fledged transmitting amateur, the sensible organisation and layout of your station can only add to the enjoyment of your hobby. Operating under cramped conditions with no thought to the arrangement of equipment can be tiring and often frustrating. The unit described here will give a smart, modern appearance to your station, and also afford ease of operation for a modest outlay.

For the serious-minded amateur, an operating table with some arranged shelving is the generally-accepted standard. A strong desk with drawers on each side is an ideal base. New, the cost would be considerable but a suitable piece of furniture can often be picked up cheap at an auction or dealer. Remember the condition is not so important; you're not playing the business executive! The more battered or scored the woodwork the cheaper it will be, and it will look "used". You can always improve it with a little time, paint or varnish. The top of the desk can be covered with vinyl floor tiles to give a completely new and workmanlike appearance. Another idea which will not cost the earth is an arrangement you can design yourself. This would be two sets of three drawers (MFI or similar) arranged with a piece of Contiboard stretching across them.

There should be nothing in front of the operator except the log book and some scraps of paper . . .

Even with a desk of considerable size it is almost impossible to arrange all your equipment so as to be easily operable. A shelving arrangement is thus very useful. Transceiver, ATU, speaker and other items can then be conveniently placed to serve your individual needs. All can be within easy reach. The unit here was designed to sit on top of a desk and yet still allow sufficient space for elbows and log book. The area covered is 60in x 18in and whilst this may appear longer than the average desk there is of course no reason why it should not overlap at the ends. Or you can simply make it to fit the top of your desk.

The construction is simple if made from standard ⅝in Contiboard lengths. This is recommended as all pieces will be square. Assembly is by 'butt' fitting; no involved joints are necessary and no corner brackets used. It is adequately stable purely by design.

The vertical pieces are fixed by glue to the base plank and 1½in screws driven in from below. Remember to first drill holes of slightly smaller diameter and also to counter sink the holes in the base. The top shelf is placed in position and nailed onto the uprights which have first been layed with glue. The end pieces are simply flush with the top, but use a square to make sure the centre support is truly vertical. The nails should be punched below the surface and the holes filled with plastic wood. The rear piece is now added, positioned 3in up from the bottom. Glue is used and screws driven in from the back. By ensuring the edges are all trim, the assembly will be square. After the back section is fitted the whole arrangement is very rigid. 'Iron-on' strips of the appropriate wood should be fixed to any unfaced section ends. This is not essential, of course, but it results in a professional appearance. Scrape off any surplus glue that may have appeared at the joints and supply two coats of varnish.

With the above layout everything is conveniently to hand. There should be nothing in front of the operator except the log book and some scraps of paper for copying transmissions. It can be useful to take an outlet from the phone socket of the receiver to the back of the shelving and return under the desk to a small box with a phone socket mounted on it. The headphones then jack into this and the leads do not interfere with any writing. A similar arrangement could be used for keying. A socket beneath the desk would then accept a jack from either an electronic, bug or hand key.

It is hoped that this article has provided you with some ideas for setting up a station – no matter how small. There is really no need to struggle with a rare DX signal, kneeling before a kitchen chair in the lounge. Get yourself a quiet, corner position in a little used room and work out an arrangement on the lines indicated above. You'll be glad that you did.

It is now necessary to fit two or three strong shelf brackets to the rear of your desk (as shown in Fig. 1) as the unit should be positioned to give a suggested 18in of 'elbow room'. With a 28in deep desk this means that almost half of the unit will need supporting to the rear. The weight of your equipment could well be towards the centre but the brackets are necessary to make the complete assembly as stable as possible. Fixing screws through the bracket holes up into the bottom of the base unit will ensure the construction is rigid.

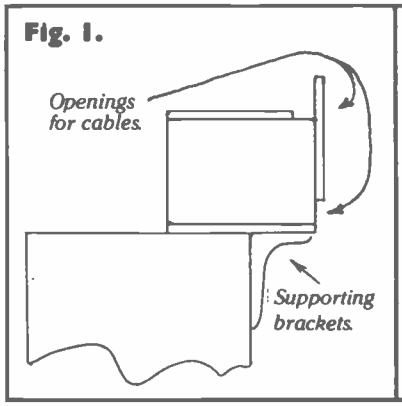
Mount three double, 13amp socket, back boxes as shown. Suitably sized holes will have been drilled through the wooden back and now the sockets can be wired using strips of 2.5mm cable or other heavy gauge

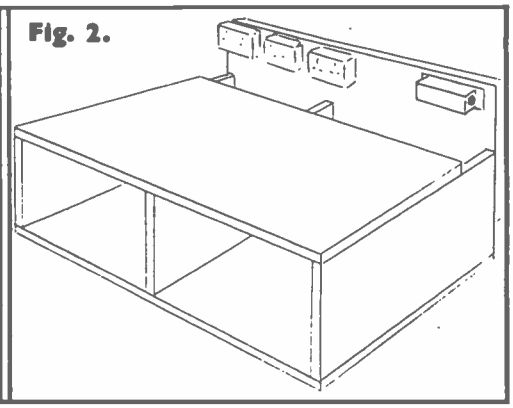
wire. Simply loop all the 'N' marked terminals, the 'L' marked terminals and then connect together all the terminals marked 'E'. Additionally, a wire from the 'E' terminal on the innermost socket could be brought to a position near the centre of the back panel and connected to a ¾in bolt and wing nut. This could then serve as the earthing point for all equipment not connected to earth via the mains. If you already have a separate earthing system it could also be terminated here. 'L', 'N' and 'E' terminals of the end socket should be wired by flexible, heavy duty cable (10amp or higher) to a fused 13amp plug top for insertion into the house ring main. Cloth covered flex used for three element electric fires would serve for this feed which should be long enough to run to the nearest wall socket.

Check the manuals for specifications

Six sockets should provide sufficient power outlets for all your equipment and also a soldering iron. An an alternative you could use a selection of those old 5amp three and two-pin plugs and sockets that have been hanging around the house for years but the current, square-pin type have the advantage that each item of equipment is fused. It would be wise to consult the instruction manual of each piece to check the loading and fit the relevant fuse in the plug top. The only other item which could be usefully fixed to the back panel is a low pass filter. This should be at the opposite end to that of the power sockets.

You are now ready to assemble the station. This is entirely a matter of personal taste. Use an arrangement that you have become used to. The receiver (or transceiver) should be placed next to the centre vertical support; the side you choose will generally depend on which hand you use to tune the main dial. You should end up with a 'flow line' which will take the power from the transmitter (or transceiver) to the linear (if used) on to a SWR meter, low pass filter, antenna tuning unit and eventually out to the one or more antennas. This will usually mean you doubling back but it is tidy to keep all the 'RF' signals to one side of the shelving. Don't worry if all the compartments are not used. You will soon find them usefully filled with books, a mug for your pens and possibly the station clock. The idea is to ensure there is nothing of nuisance value immediately in front of you.





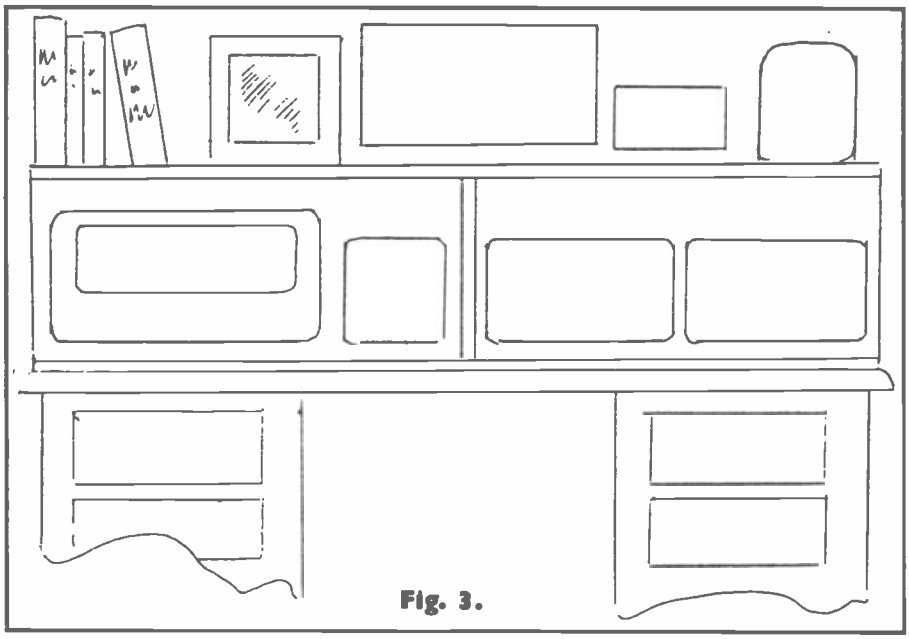
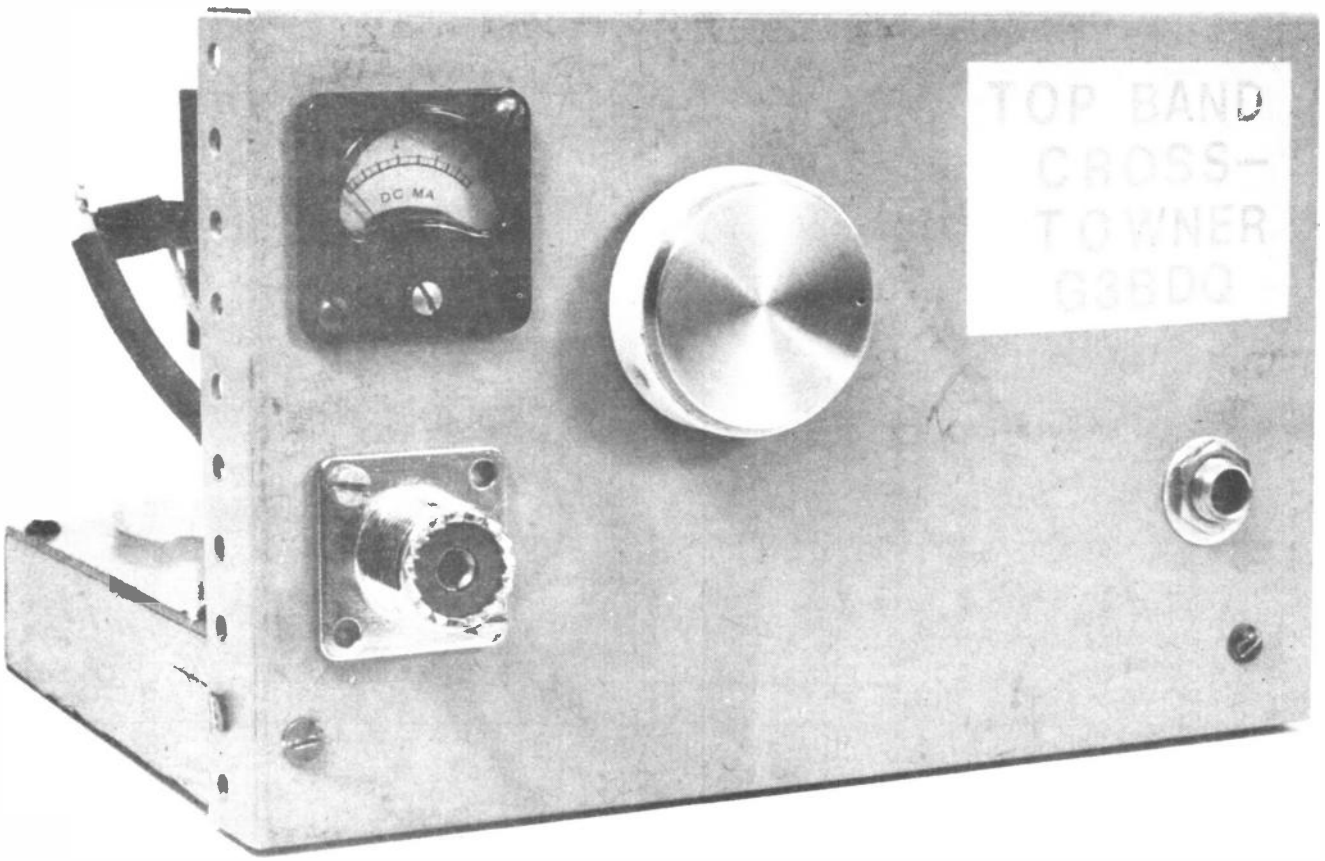


Fig. 1. A side elevation view of the unit mounted on a desk. Contiboard required: 1 x 60" x 18", 2 x 60" x 15", 1 x 35" x 18", cut in the store to three lengths of 12".

Fig. 2. An angled view of the unit with the three power sockets and the LPF mounted.

Fig. 3. In this view the FV101B, FT101B and FL2100B are shown with an Eddystone 730/4 on the left. On the top shelf the central position is taken by an ATU with a Rotator Control Unit to the right followed by an SWR meter.



TOP BAND CROSS-TOWNER

Most towns and cities ahve their regular Sunday morning 'Chatter Nets' and the coastal resort close by the writer's QTH is no exception. It has a weekly get-together on or around 1950kHz when up to a dozen locals might join in. A lot of the older HF transceivers from Japan, many of which are still in use, do not have Top Band so inevitably a gaggle of cheap and easy AM transmitters dominate the nets over the country. Many users, by the way, are refugees from 144MHz repeaters and the like!

If you have only SSB send/receive capability on 160 it is difficult to become part of the Sunday morning gatherings, for many of the receivers in use are older machines set for wide bandwidth and of course have no BFO running. Frequent switches from AM to SSB (and what it entails) is not something welcomed by the AM group so my thoughts became directed towards the design and construction of a simple yet effective transmitter which would allow its reception by those using either AM or SSB modes. Double sideband with reduced (NOT suppressed) carrier is about the only emission which allows satisfactory reception by receivers set for

Thinking about 160? Then have a go at this easy-to-build double sideband transmitter, ideal for novices, but also for old-timers nostalgic for equipment with valves. John Heys, G3BDQ,explains.

AM or SSB, and with this in mind circuit scribblings began.

The purist may now ask: "Why double sideband?" To answer this, one must mention more talk power, less average DC power, absence of critical components (filters and the like), no carrier phase distortion, dual mode capability and finally but by no means least in importance, cheapness.

A large number of amateurs still use old AR88s, HROs and similar desirable and effective antiques which will receive any mode of transmission very well, but maybe the majority of us now have modern transceivers, which although fine on CW and SSB, perform miserably with AM stations. The next consideration during my 'thinking' stage was to plump for valves rather than solid state in the TX.

A group purchase of new crystals would make them cheaper, especially for a net frequency.

Valves were chosen for their ruggedness (no fear of thermal runaway or discomfort when facing crazy SWRs), their cheapness (from 55p to 75p each – look in the ad columns of most radio mags), and also because they are not fussy devices. They can work well within very wide component and voltage parameters. To the newcomer to amateur radio they may be educational too; and a little experience making something and getting it to work without difficulty may perhaps seduce some away from 'black-boxery'.

The circuit

Just two miniature valves are used in this transmitter design and they are both twin triodes, each being two separate triode devices within each glass envelope (if you like, you can imagine each triode section as a giant FET like the 2N3819 but capable of handling bigger power levels and unlikely to become a fuse if ill treated!). The first valve V1 is a 12AU7 which doubles as speech amplifier and carrier oscillator. The other valve V2 is a 12AT7 which performs as a push-pull balanced modulator. Both types of valve are easily available, and indeed thousands must still lie in junk boxes all over the country. The mean or poverty-stricken could ask their local Old Timer friends if they have any to give away!

Another simplification is the use of crystal control for the carrier frequency. Happily most nets stick to a regular frequency which suits local conditions, so there seems to be little point in having VFO control and attendant complications. A lot of the older (WW2 and just after) crystals may still be found but it is not always possible to find one for the desired frequency. The writer bought a suitable modern 'rock' and this was almost the only item not to come from his junk box.

The simplicity of the circuit does not allow the use of a dynamic or crystal microphone, so instead, a carbon telephone mike with its enormous output voltages was used. Most listeners to the finished TX did not realise that a carbon mike was in use and the tranmitted audio may be described as of 'good communications quality'. The microphone came from an old GPO telephone handset and was bought on the surplus market more than ten years ago. These mikes are the kind that you can kick around and they still work! Some DC for the microphone is obtained from a voltage divider R1-R2 across the HT line, and the step-up transformer T1 was of the type used formerly to drive the push-pull output stages of domestic transistor radios. Only half of the centre tapped primary of T1 was used. Almost any small transformer having a good step-up ratio may be used; the low impedance winding being in series with the microphone and the secondary connecting to the grid of V1a.

The basic and straightforward tuned anode crystal oscillator circuit is used around V1b and a link winding on the coil (L2) allows RF at lowish impedance to be applied via a 1n capacitor (C7) to the common cathode connection of V2 (pins 3 and 8). Even rather elderly and sluggish crystals should oscillate in this circuit.

Opposite page: Front panel layout. This TX has a minimum of controls! The optional output meter sits above the output socket.
Right: The above deck layout V1 is nearest the terminal block to which the HT and AC heater supplies connect.

The push-pull balanced modulator is interesting. It is a modification of the more commonly described push-pull circuit and eliminates the need for an audio drive transformer. Each triode section of V2 operates with its grid grounded to RF (V2a through 1n, C8) and the anodes are connected in push-pull to a tuned circuit which has a centre tapped coil (L3). When there is no audio coming from V1a the two triode sections of V2 are driven with RF from the oscillator but their RF outputs in the anode circuit are equal and opposite. They cancel and the RF output is thus quite small. Audio at the grid of V2a (via the .22uF capacitor C4) unbalances the output stage which then provides DSB output. A link winding (L4) wound over the centre of L3 provides a low impedance output to an ATU or aerial. The 1mA meter indicates output and is useful when tuning L3 to resonance (remembering to give a steady whistle when doing this!).

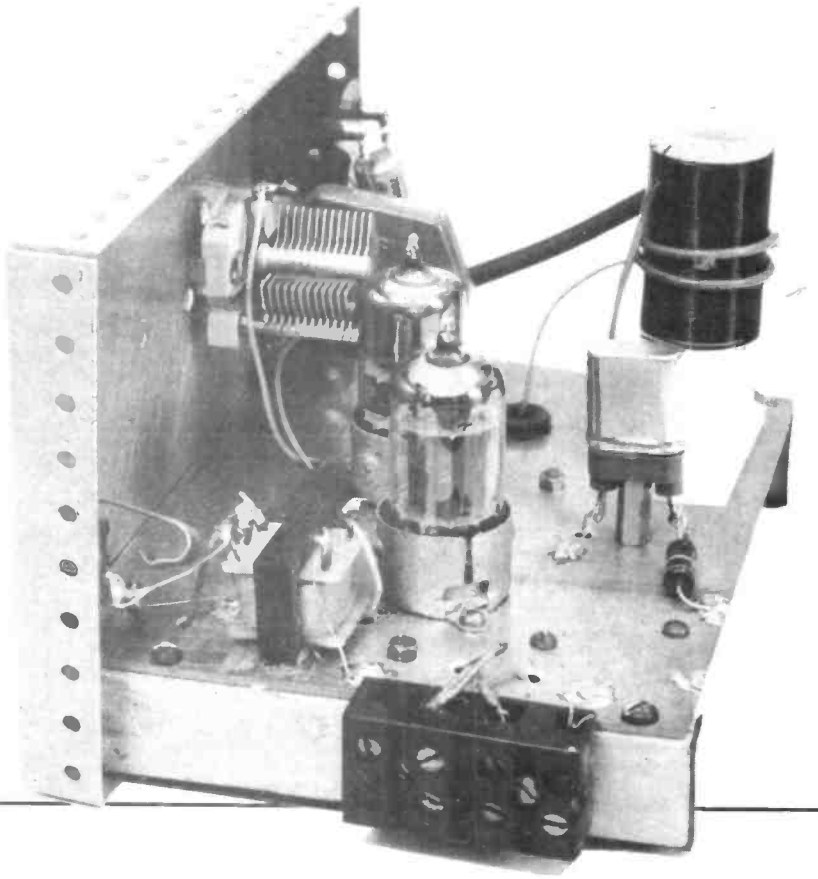
Using 280 volts of HT the peak output from this transmitter lies between 200 and 250 milliwatts. The carrier seems to be about 30dB down on this and is still strong for a distance of several miles although at real 'out-of-town' distances it cannot be detected. This residual carrier is a bonus, for it means that the locals can receive the transmissions as AM transmission. Those listeners equipped for SSB can receive the signal as SSB on either of the two sidebands. This facility sometimes enables 'QRM dodging', and unless told that it is DSB many people imagine they are hearing an SSB transmission.

Construction

To escape a lot of 'metal bashing' and enable kitchen-table construction techniques, the rig has a chassis made from standard copper clad board, (two-sided) a material that is both easy to cut and drill. This board is screwed at its ends to wooden strips which also facilitate the fixing of a thin aluminium front panel. Another piece of the thicker copper faced board can be used as the panel if desired. The chassis measures 6in x 4½in (150 x 110mm) and the front panel is 4in high. The holes for the valveholders (both B9A types) and the meter were cut with a hand fretsaw. No elaborate steps to ensure rigidity are required because there will be no fear of frequency jump or drift from vibration when using crystal control.

The front panel accommodates the output meter, a coax socket, the microphone input jack and the tuning capacitor for the V2 output circuit. A surplus 200pF or thereabouts variable capacitor can be used in place of C9 and VC1 but the writer had a small 100pF variable handy which was parallelled with a 50pF mica capacitor (C9). Both the frame and the fixed vane connections on VC1 are 'hot' to RF and they are at equal and opposite potentials. This means insulating VC1 from the front panel and making the hole for the spindle larger than usual. For really fine (say 40dB) carrier suppression (which is not wanted in this design!) a split stator variable would be used in this position and its frame could be put at earth potential. It is the built-in imbalance of the tuning system used which allows enough wanted carrier to be generated in the output circuit.

For those having only constructional experience with solid state devices perhaps the most important consideration when gathering together components for this project is the much higher voltage rating of the capacitors used in valve equipment. The decoupling capacitor in the anode circuit of V1a must have at least a working voltage rating of 300v. Other capacitors which need similar ratings are C4, C5 and C10.



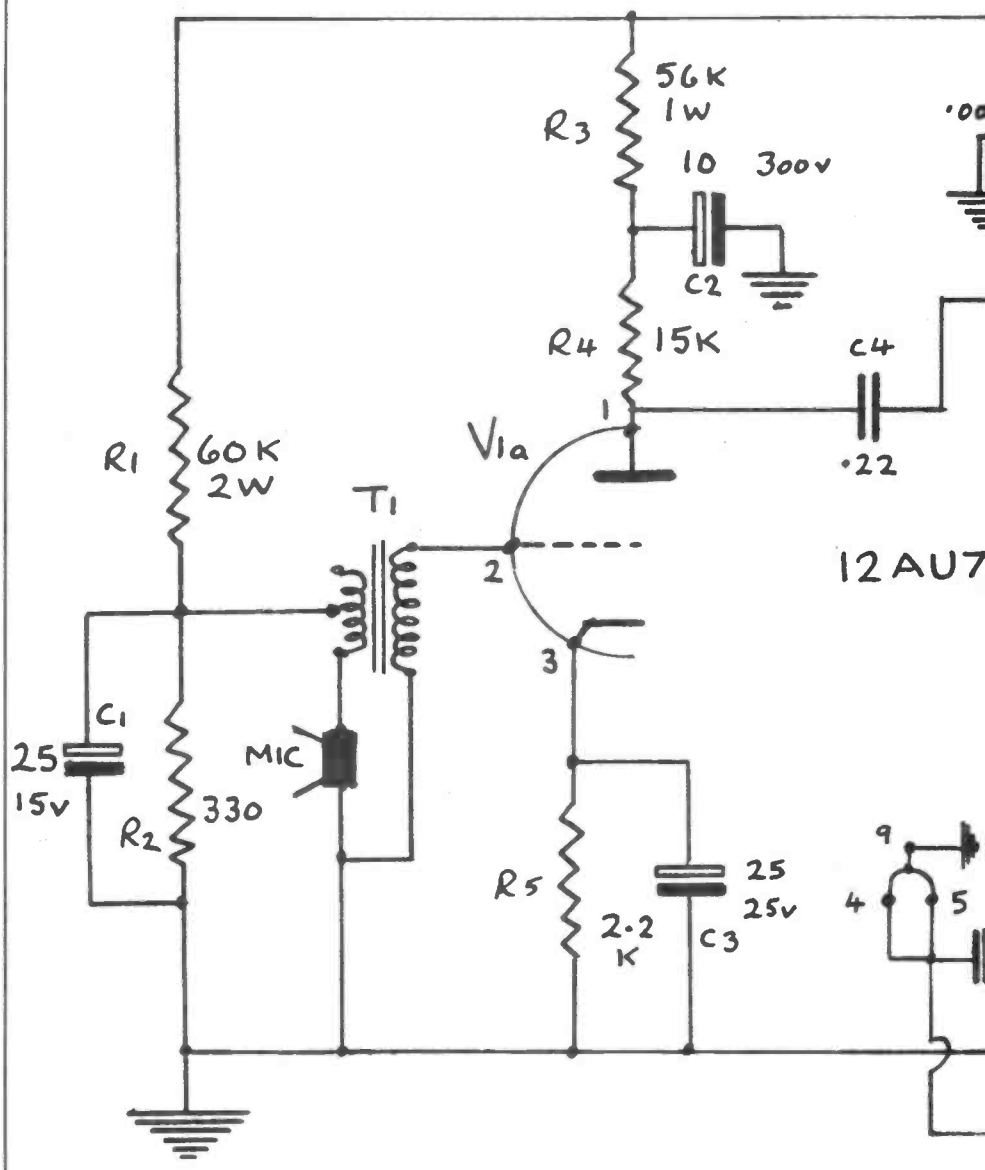
TOP BAND CROSS-TOWNER

The microphone transformer was stuck to the chassis top with rapid-set Araldite after first roughing the board surface with steel wool. For convenience and easy crystal change the crystal holder was also mounted above deck where the only other item apart from the valves themselves is the coil L3. A small terminal block was positioned to the side of one of the wooden sides and the HT, common negative and the 6.3 volts supply for the valve heaters come to this from the power supply.

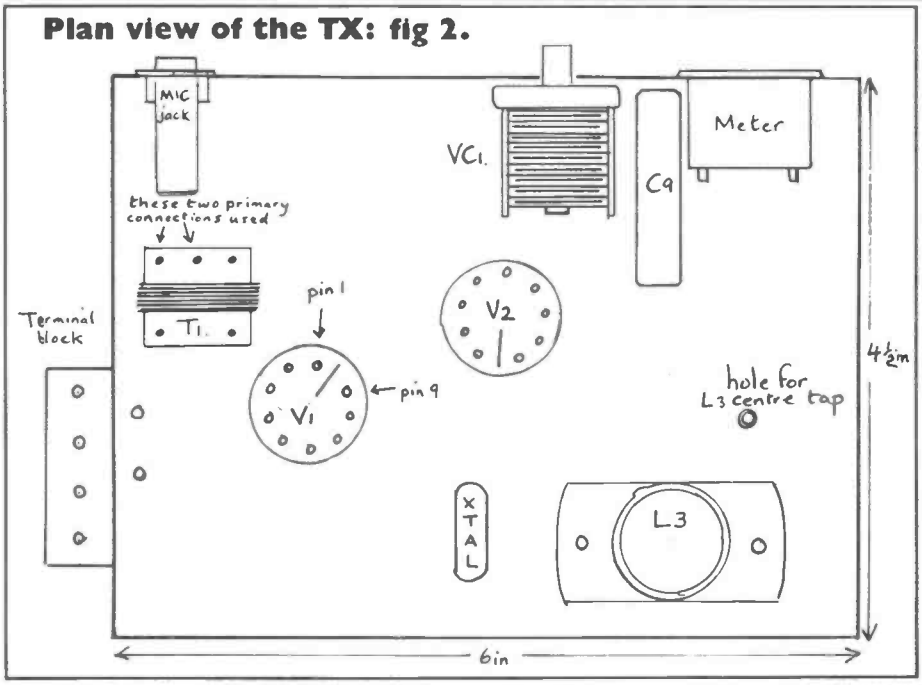
Both the valves used have heaters which can be run on either 12 or 6 volt supplies. For 12 volt operation pins 4 and 5 are used, but on a 6 volt supply (AC or DC) the heater centre taps are used. These come out on pin 9 of the valves. The circuit diagram (Fig.1) shows the heater arrangements for 6 volts, but if 12 volts is used no connection is then made to pin 9 on each valve; and pins 4 and 5 go to the supply. One of these pins must be earthed. Always remember that valve pins are numbered clockwise when looking at the bottom of the valve (pin end).

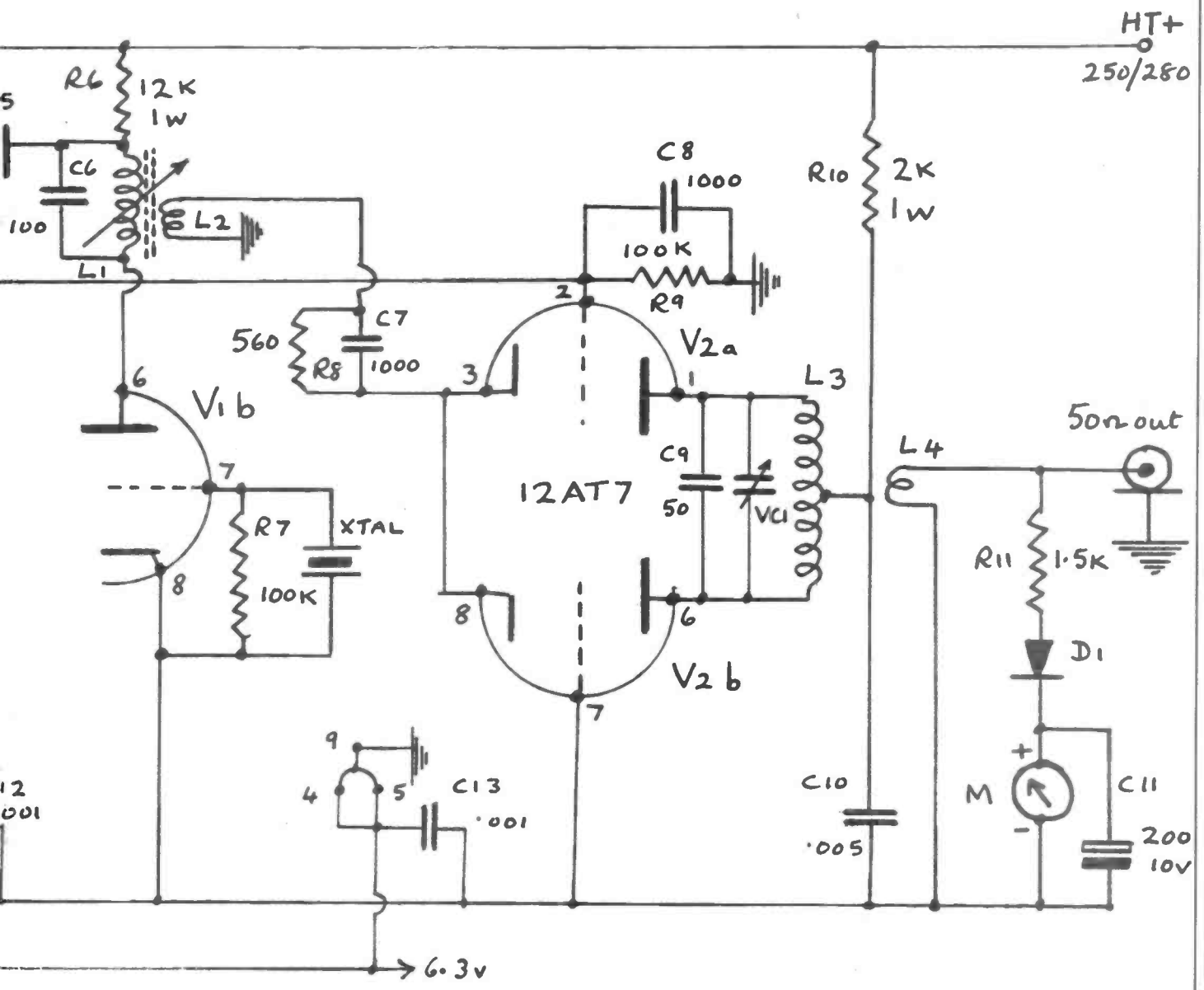
The underside of the chassis board holds most of the wiring and smaller components. Some insulated tag points are useful, to be used where several components connect; ie the junction of R6, C5, C6, and L1. Wiring must be made as short and direct as possible and earth connections are made by soldering to the copper board surface. The oscillator coil L1 is placed horizontally and held in position by stiff wire connections. It is positioned so that core adjustments may be easily made. Reference to the top layout diagram (Fig.2) will help in placing the main components and particular attention should be given to the correct orientation of the valve holders.

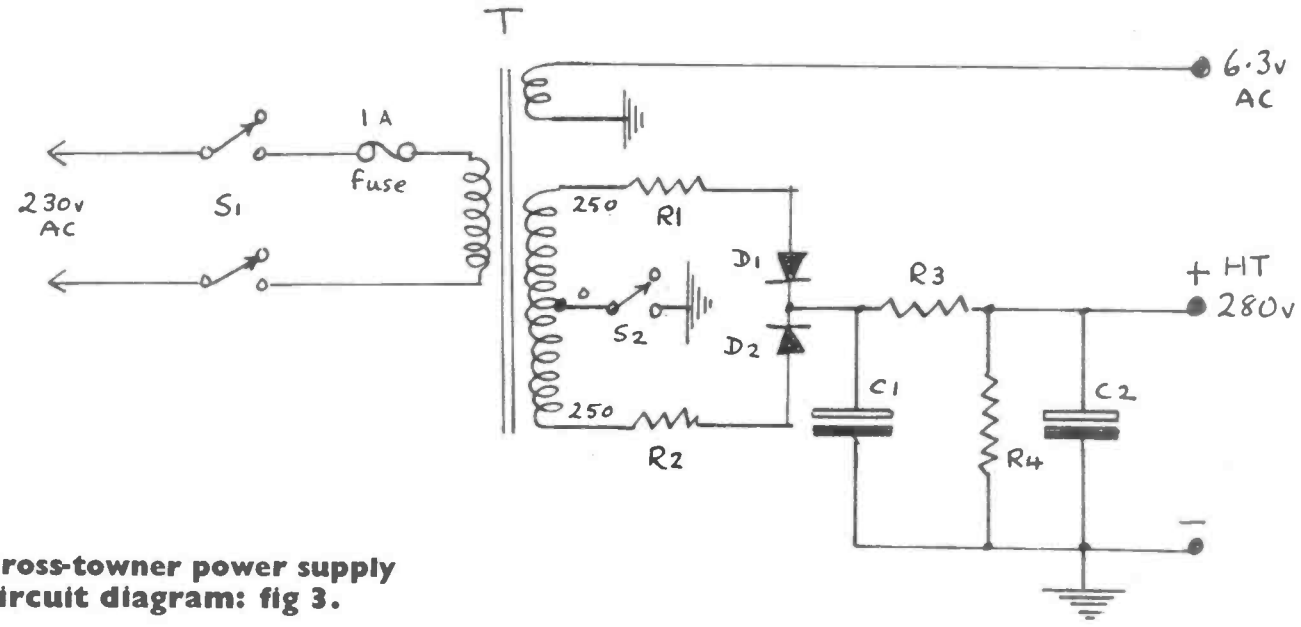
Top band Cross-towner circuit diagram: fig 1.



Plan view of the TX: fig 2.







Cross-towner power supply circuit diagram: fig 3.

TOP BAND CROSS-TOWNER

Setting up and testing

Very little test will be required when building and setting up this little transmitter. The only things used during the construction and development of the prototype were a Dip-oscillator, a Multi-meter (just voltage and perhaps resistance measurements are needed), the station receiver and a small flash lamp bulb! A Dip-oscillator which can tune Top Band is essential and is needed to make the oscillator coil L1. L1 has an inductance of about 65uH and was scramble wound with thin (28-30swg) wire on a slug-tuned 7mm dia. former. It must resonate at the crystal frequency when tuned with a 100pF mica capacitor. The output winding L2 was made from 15 turns of 26swg enamelled wire put on the 'cold' end of L1 (that is the end joining R6). When the output circuit of V2 is finished it may also be set to frequency with the Dip-oscillator using VC1.

"On the writer's ⅜-wave wire this little rig gives a very good account of itself."

This TX is best built and tested stage by stage. This approach ought to inspire confidence in the constructor once the first (easy) section is operating. This first section is the AF amplifier around V1a, and a pair of 'phones with one lead earthed and the other connected to V1a anode via a .1uF capacitor may be used to test that the microphone and amplifier are working. The crystal oscillator follows next, and an adjustment of L1's core should induce oscillation which can be heard strongly on the station receiver. The coil core is 'tweaked' so that a high output (S-meter reading) is obtained consistent with reliable operation when the oscillator is switched on and off a few times. There is a critical tuning point which gives the highest output but which is unreliable, and this must be avoided.

If RF from the oscillator and AF from V1a are getting to V2 the balanced modulator, all that is needed is a check that V2's anode circuit is tuned to resonance. The S-meter will help but the best indication of DSB output will come from the use of the loop and lamp. A flash lamp bulb should be connected over the ends of a single turn of stiff insulated wire which can slip over and down to the middle of L3. Speaking or whistling into the mike will make the bulb light up quite brightly on speech peaks and there should be little visible output when not speaking. A bright steady glow in the bulb will suggest some feedback or self-oscillation in the V2 circuit and will merit investigation (we all make mistakes or leave parts out!). The output meter, which is not essential, was included as an afterthought and it too should kick up with speech. Voltage measurements (see Table) and the application of Ohm's Law show that the total HT current drawn by the transmitter is about 25mA.

'Cross-Towner' power supply parts list

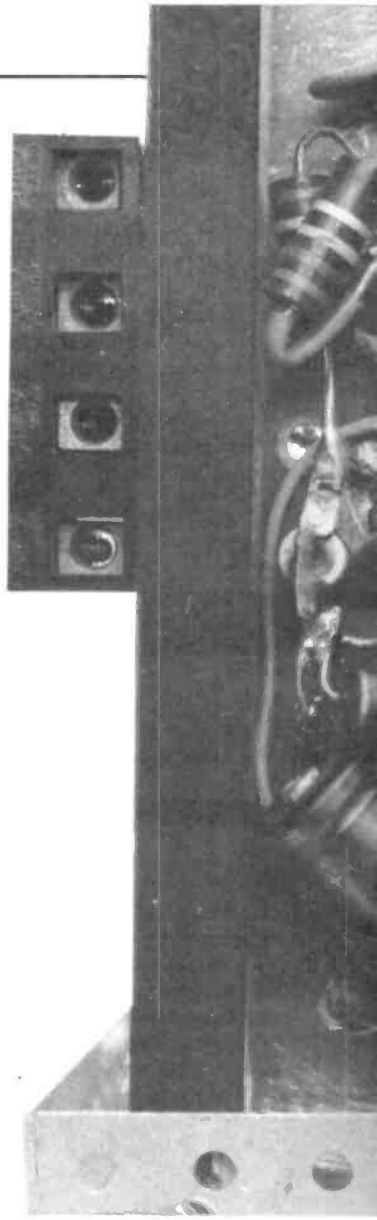
R1&R2	220R 1 watt
R3	220R w.w 2 watt
R4	15K w.w 12 watt
C1	8uF 350v. wkg.
C2	64uF 350v. wkg.
S1	double pole mains switch
S2	on/off toggle
Fuse	1A
D1&D2	silicon rectifier diodes 2.5A 1,000v. PIV (Tandy)
T	Mains transformer diodes 250-0-250v at about 50 mA and 6.3v 1A (larger transformers with higher ratings are suitable and often found in old domestic valve receivers)

No mention has yet been made of this important item. A smoothed HT voltage between 250 and 280 volts is needed and the power supply from an old valved broadcast receiver would be ideal. The transformer used would normally include a 6.3 volt winding for the valve heaters, and any rectifier valve can be replaced by a pair of silicon diodes. The current demands are not high in this design and a transformer able to give at least 60mA will suit. Some years ago miniature HT transformers which gave this sort of current could be found, but larger items are of course quite suitable if somewhat bulky. The HT voltage is smoothed. Resistor-capacity smoothing is adequate and a 'bleed' resistor with a high wattage rating must go across the power pack capacitors. This resistor will also help in the voltage regulation. A suitable power supply circuit is given in Fig.3. For safety's sake always remember that the high voltages used in this design can be DANGEROUS or even LETHAL.

Power supply

The transmitter will connect directly into a half wave dipole antenna, but station arrangements would normally include an ATU and some Transmit/Receive switching. With power levels under half a watt it is important that the aerial used is as good as is humanly possible for the location. The proverbial piece of 'wet string' is a non-starter when using QRP.

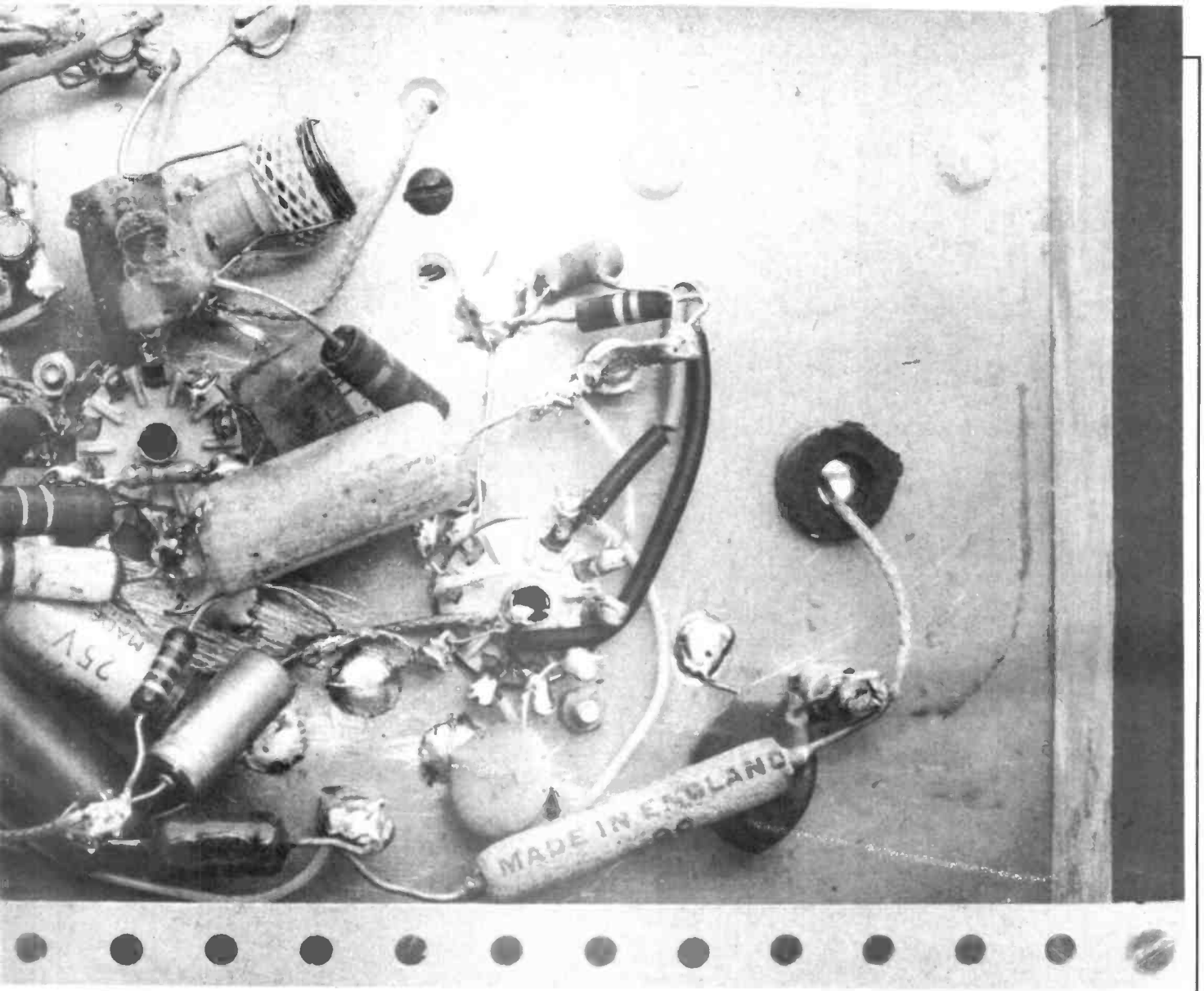
On the writer's ⅜-wave wire this little rig gave a very good account of itself. Over town and up to ten miles or so all the reports back were S9 or better on AM or SSB. AM listeners not used to DSB with reduced carrier thought that the signals were AM with very heavy but clean modulation. The TX was tried out after dark and some long distance reports received.



After first establishing contact using the station transceiver, the stations contacted were asked to listen on the same frequency for the 'Cross-Towner'. Despite the usual after dark high noise levels around 1950kHz, good reports were obtained; stations in Aberystwyth, Derby, Lincoln, Swindon, Southampton and Oxford heard the weak but readable DSB. S6 to S7 reports were obtained from other stations between 40 and 80 miles away from the East Sussex QTH. At distance the carrier is not noticed and signals must be resolved as SSB. For guaranteed long-haul work (more than 100 miles) a small linear amplifier would help and thoughts are now being directed to this!

"Despite the usual high noise levels, good reports were obtained - from Oxford, Southampton etc."

Building this rig could prove to be an ideal project for newcomers, and also perhaps for many older-timers who still have nostalgic feelings for valved gear. A group purchase of new crystals to suit a net frequency would make them cheaper, and making copies of this 'Cross-Towner' might prove an interesting club activity.



Underside view of the transmitter. The oscillator coil L1 and its output winding L2 can be seen in the upper left quadrant. The simple point to point wiring is not pretty but it results in short lead lengths. Earth connections are easily made to the copper faced board.

'Cross-Towner' power supply circuit diagram

'Cross-Towner' components list

R1	60K 2 watt (w.w.)
R2	330R ½ watt
R3	56K 1 watt
R4	15K ½ watt
R5	2.2K ½ watt
R6	12K 1 watt
R7	100K ½ watt
R8	560R ½ watt
R9	100K ½ watt
R10	2K 1 watt
R11	1.5K ½ watt
C1	25uF 15v.
C2	10uF 300v. wkg.
C3	25uF 25v.
C4	.22uF 300v.
C5	5n ceramic disc 300v.
C6	100pF mica
C7	1n mica
C8	1n ceramic disc
C9	50pF mica
C10	5n ceramic disc 300v.
C11	200uF 10v.
C12	1n ceramic disc
C13	1n ceramic disc
VC1	100pf air spaced variable
MIC	Ex-GPO handset, carbon
T1	Transistor driver type or similar
D1	Germanium diode OA7 or similar
M	1 mA midget or similar to fit panel
V1	12AU7
V2	12AT7

Two B9A bases for valves.

L1 and L2 see text.

L3	70 turns 26swg enam. centre tapped close wound on 15/16in. diameter polythene tube (centre spindle of 11b solder pack)
L4	2 turns insulated multi-strand over centre of L3
XTAL	fundamental freq. between 1920 and 1990kHz to suit, with HC6 holder. Messrs QuartSlab Ltd.

Top Band 'Cross-Towner' – some typical voltage readings

HT supply voltage from power pack 280v.

Across R2 with the microphone out of circuit 2.6v.

Across R5 4.3v (which means that the current through V1a is 2mA)

Across R6 135v (which means that the current through V1b is 11mA)

Across R10 25v (which means that the current through V2 is 12mA)

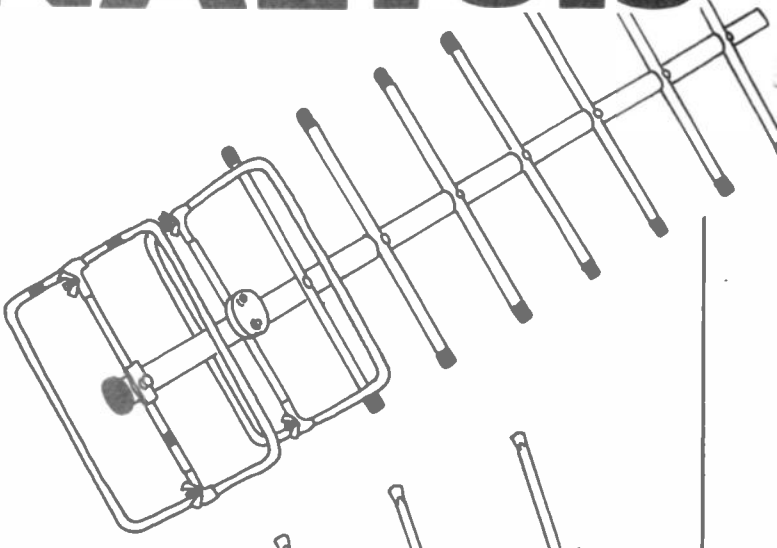
All voltage measurements were made with an ARC Digital Multi-tester.

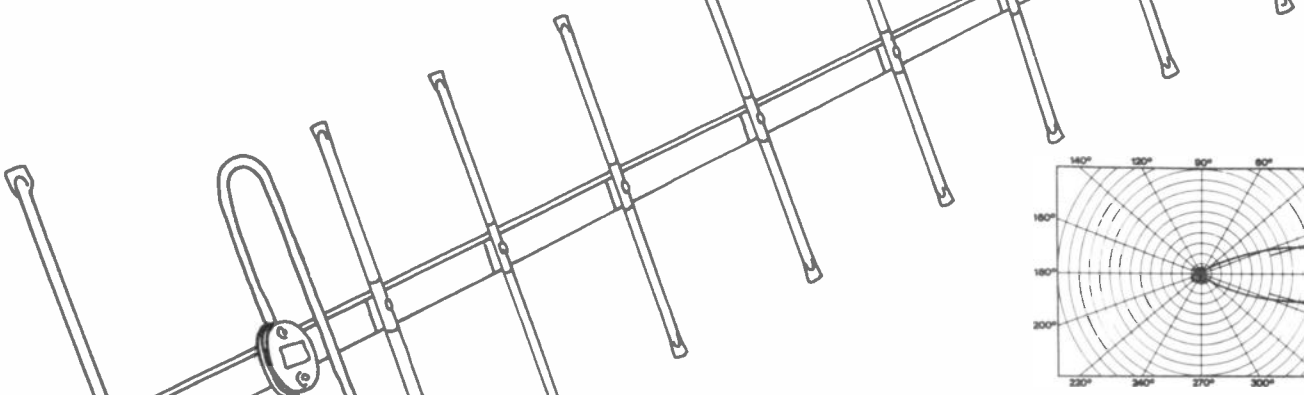
ANTENNAE ANALYSIS

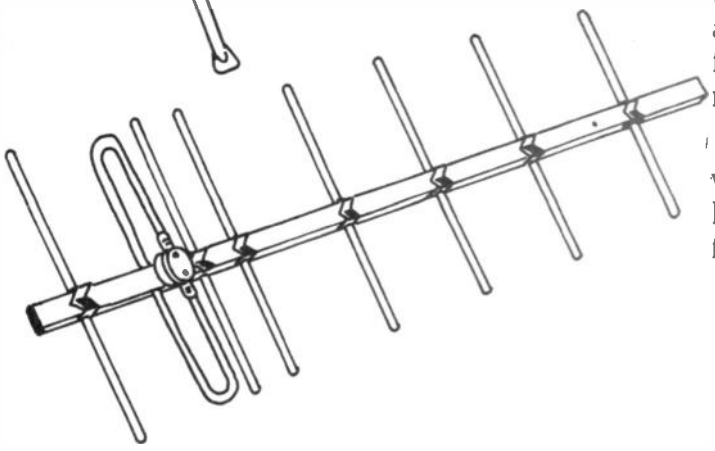
We hoped to have a really good comparative review of three antennas for the 432MHz band this month – the Jaybeam LW24, the PBM18 and the 21-ele Tonna; we had some time on an antenna test range and we had already got well into our stride with measurements.

However, we ran into a few problems. The chief one was that the antennas were all apparently producing about 8dB more gain than was physically possible!

The reasons for this are that antenna measurement techniques are anything but easy – even though we were using a professional test facility, there are still a number of pitfalls that it's possible to fall into, and it seems that the computer at the test range hasn't had to cope with frequencies like 432MHz before.







Rather than fudge it all, we've held over the review until next month so that the test range can be re-standardised and we can get some results which *mean something*. Just to whet your appetite, though, all three antennas seem to produce very good results on test and the differences between them are more in detail than anything else. In fact antenna measurement and actual results are a fascinating subject in themselves and we'll be reporting in depth next time.

So, sorry to disappoint you, but we wouldn't want to publish any old junk. We're very much looking forward to getting some proper meaningful figures. So watch this space!

Than E.T.

YOU'LL MEET THE MOST INTERESTING PEOPLE

IC-25E

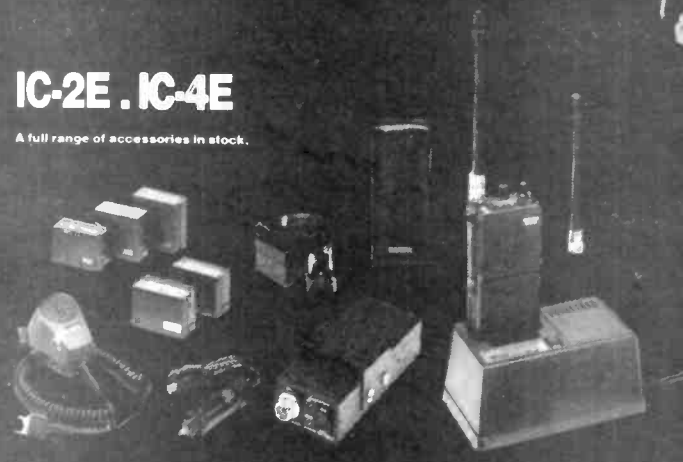
The FM mobile of choice has to be the ICOM IC-25E. It is amazingly small yet has a powerful voice (25 Watts) and a sensitive receiver. There are five easily programmable memories and facilities for changing the repeater shift from the default value of 600kHz. You can tune the VFO while in a memory without losing or changing the memory. Of course you can instantly listen on the input and there are also priority channel facilities should you want to be sure of not missing that private message. The HM10 scanning mike is supplied as standard, but the HM11. with tone call on the mike, can be used.

290H . 490E

The recently introduced IC-290H has proved so popular that we have decided to concentrate on this (25W) model 2m multimode. With its bright green display, 5 memories, scan facilities on either memories or the whole band, tone-call button on the microphone and instant listen input for repeaters, this little box really is a beauty. The 70cm version, the IC-490E has similar features (although the output is only 10W in this case). These two multimodes make an ideal pair.

IC-2E . IC-4E

A full range of accessories in stock.



Nearly everybody has an IC2E – the most popular amateur transceiver in the world – now there is the 70cm. version which is every bit as good and takes the same accessories.

Fully synthesized – Covering 144 – 145.995 in the 400 5KHz steps. (430-439.999 4E).
Power output – 1.5W with the 9v. rechargeable battery pack as supplied – but lower or higher output available with the optional 6v or 12v packs. Rapid slide-on charging facility.
BNC antenna output socket – 50 ohms for connecting to another antenna or use the Rubber Duck supplied (flexible ¼ whip – 4E)
Send/battery indicator – Lights during transmit but when battery power falls below 6v it does not light, indicating the need for a recharge.
Frequency selection – by thumbwheel switches, indicating the frequency. 5KHz switch – adds 5KHz to indicated frequency.
Duplex simplex switch – gives simplex or plus 600KHz or minus 600KHz transmit (1.6MHz and listen input on 4E).
Hi-Low switch – reduces power output from 1.5W to 150mW reducing battery drain.
External microphone jack – If you do not wish to use the built-in electret condenser mic an optional microphone speaker with PTT control can be used. Useful for pocket operation.
External speaker jack – for speaker or earphone. This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck

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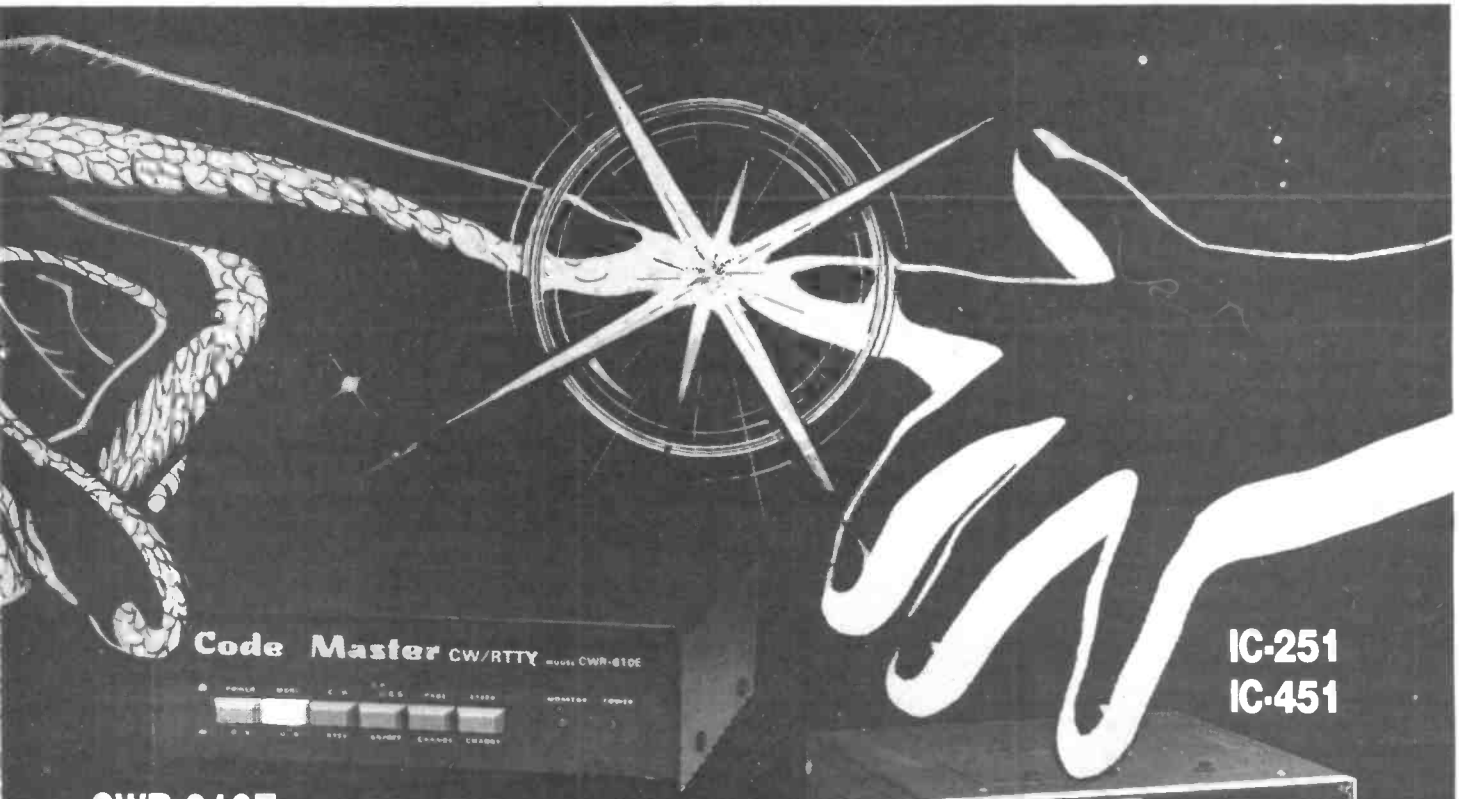

CWR-610E

As UK importers of TELEREADER and TONO products we can offer you a wide range of devices from a simple morse and RTTY reader which can be plugged into your TV to complete send and receive systems with memories and built-in displays or outputs for a high definition VDU. MR-250, 9000E, CWR-670 CWR-685E and CWR-610E. Please call us for further details or visit us or your dealer for a demonstration.

9000E

And remember we also sell **Yaesu, Jaybeam, Datong, Welz, G-Whip, Western, TAL, Bearcat, Versatower** and **RSGB** publications from our shop and showroom at the address below.

Come in for a demonstration or just a chat, our qualified sales staff and technicians will be glad to assist you.

Listed below are other sets available from Thanet Electronics a more detailed specification of these will appear in future advertisements, prices are inclusive of VAT. IC-730, IC-720, IC-2KL + PSU, IC-PS15, IC-ML1, IC-505, IC-SP3, IC-AT500 IC490, IC-AT100, IC-551, IC-PS20, IC-R70, IC-740.

IC-251
IC-451

ICOM produce a perfect trio in the UHF base station range, ranging from 6 Meters through 2 Meters to 70 cms. Unfortunately you are not able to benefit from the 6m product in this country, but you CAN own the IC-251E 2 Meter station and the 451E for 70 cms.

CUE DEE antennas

The BEST in recent tests and really well made too. Send for a catalogue of these DX antennas. Here's part of the range:-

4el 2m yagi VHF	4144A	8 dBd	£24.93
10el 2m yagi VHF	10144	11.4 dBd	£45.16
15el 2m yagi VHF	15144	14 dBd	£63.00
17el 70cm yagi UHF	17432	14.5 dBd	£48.00
4/5el HF Beam	DUO 2	(14/21 MHz) 9/8 dBd	£356.71

All matching cables, clamps and booms available for stacking 10 and 15 element yagis.

Agents (phone first – all evenings and weekends only, except Scotland)
Scotland – Jack GM8 GEC (031 665 2420)
North West – Gordon G3LEQ Knutsford(0565)4040 Ansafone available

Securicor or post despatch free
Same day if possible

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SPECIAL

INTERNATIONAL PREFIX LIST

For your edification and delight, we present the definitive Prefix List for every country in the world today! Courtesy of Geoff Watts, who edits the highly respected DX NEWS SHEET, we bring you several pages of everything you always wanted to know about callsigns, allocated prefixes, ITU zones, CQ zones and even the dreaded Russian Oblasts which no-one can decode. You'll see everything you could possibly want here, and we'll be following this up later on with the Islands on the Air awards information. So for all those who wondered where everything was on the HF bands – look no further.

1.

This list gives all amateur radio prefixes currently in use, and also for reference purposes, others used during the past 10 years, including those now obsolete. If one hears a strange prefix, the location of the station (if genuine) is as indicated by the ITU Callsign Block Allocation (given in 3rd column). Keep your list up-to-date by adding new 'special' prefixes in the (2nd) column provided. Extra space has been allowed for new ITU allocations.

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
A2		A2A-A2Z	Botswana	AF	DXCC	38	57
A3		A3A-A3Z	Tonga	OC	DXCC	32	62
A4		A4A-A4Z	Oman	AS	DXCC	21	39
A5		A5A-A5Z	Bhutan	AS	DXCC	22	41
A6		A6A-A6Z	United Arab Emirates	AS	DXCC	21	39
A7		A7A-A7Z	Qatar	AS	DXCC	21	39
	A8	A8A-A8Z	(see EL)				
A9X	A9Z	A9A-A9Z	Bahrain	AS	DXCC	21	39
		AAA-ALZ	(see W)				
AA-AC			(see W)				
	*AA1-AAØ		(see W) (AA = was used by WA-stations during USA Bicentennial Year)				
	*AB1-ABØ		(see W) (AB = was used by WB-stations during USA Bicentennial Year)				
	*AC1-ACØ		(see W) (AC = was used by W-stations during USA Bicentennial Year)				
AC3 (un-official prefix used before 1976 by Sikkim, now part of India)							
AC5 (un-official prefix used before 1973 by Bhutan, now uses A5)							
AD-AG			(see W)				
	*AD1-ADØ		(see W) (AD = was used by K-stations during USA Bicentennial Year)				
	*AE1-AEØ		(see W) (AE = was used by WD-stations during USA Bicentennial Year)				
	*AF1-AFØ		(see W) (AF = was used by WR-stations during USA Bicentennial Year)				
	*AG1		(see KW6) (novices)				
	*AG2, AG3		(see KB6) (AG3 = novices)				
	*AG5, AG6		(see KG6) (AG5 = novices)				
	*AG7		(see KW6)				
AH1-AHØ			(see KH1-KHØ)				
	*AH1		(see KH6) (novices)				
	*AH2		(see KH6) (novices)				
	*AH3, AH5		(see KS6) (AH5 = novices)				
	*AH6		(see KH6)				
	*AH7		(see KH6)				
AI-AK			(see W)				
	*AIØ		(see KP6)				
	*AJ1		(see KJ6) (novices)				
	*AJ2, AJ3		(see KV4) (AJ2 = novices)				
	*AJ4		(see KP4)				
	*AJ5		(see KJ6)				
	*AJ8		(see KP4) (novices)				
	*AK1-AKØ		(see W) (AK = was used by WN-stations during USA Bicentennial Year)				
	*AL1		(see KL7) (novices)				
	*AL4		(see KC4)				
AL7	*AL7		(see KL7)				
	AM-AO	AMA-AOZ	(see EA, EA6, EA8, EA9)				
AP		APA-ASZ	Pakistan	AS	DXCC	21	41
	AU	ATA-AWZ	(see VU)				
	AX	AXA-AXZ	(see VK)				
	AY	AYA-AZZ	(see LU)				

* Note:- Since Mar.24 1978 the prefixes AA-AL are a normal allocation (see 1st column), but during 1976 (USA Bicentennial Year) they were allocated as marked thus * (see 2nd column).

2.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
		BAA-BZZ	China (see BY)				
BV			Taiwan	AS	DXCC	24	44
BY			China	AS	DXCC	23,24	42 = West of 90.E 43 = 90-110.E 44 = East of 110.E 33 = Manchuria
C2		C2A-C2Z	Nauru	OC	DXCC	31	65
C3		C3A-C3Z	Andorra	EU	DXCC	14	27
		C4A-C4Z	(see 5B)				
C5		C5A-C5Z	Gambia	AF	DXCC	35	46
C6		C6A-C6Z	Bahamas	NA	DXCC	08	11
		C7A-C7Z	(World Meteorological Organization)				
C9		C8A-C9Z	Mozambique	AF	DXCC	37	53
CE		CAA-CEZ	Chile	SA	DXCC	12	14 = CE1,2,3,4,5 16 = CE6,7,8
CE9 (Chilean bases in Antarctica)				SA	see note A	13	73
CE9 (Chilean bases in S.Shetland Is.)				SA	see note D	13	73
CEØA			Easter I.	SA	DXCC	12	63
CEØX			San Felix and San Ambrosio	SA	DXCC	12	14
CEØZ			Juan Fernandez Is.	SA	DXCC	12	14
	CF-CK	CFA-CKZ	(see VE,VO)				
CM	CL	CLA-CMZ	Cuba	NA	DXCC	08	11
CN		CNA-CNZ	Morocco	AF	DXCC	33	37
CO		COA-COZ	(see CM)				
CP		CPA-CPZ	Bolivia	SA	DXCC	10	12 = CP1,8,9 14 = CP2,3,4,5,6,7
		CQA-CUZ	Portugal				
	CQ-CR		(see CT1, CT2, CT3, CT4)				
CR3 (obsolete)			(see J5)				
CR4 (obsolete)			(see D4)				
CR5 (obsolete)			(see S9)				
CR6 (obsolete) (also CQ6)			(see D2)				
CR7 (obsolete) (also CQ7)			(see C9)				
CR8 (obsolete)			Portuguese Timor (now part of YB-YD) (counted for DXCC before 15 Sept.1976)				
CR9			Macao	AS	DXCC	24	44
	CS		(see CT1, CT2, CT3, CT4)				
CT1	CTØ		Portugal	EU	DXCC	14	37
CT2	CT8		Azores Is.	EU	DXCC	14	36
CT3	CT9		Madeira Is.	AF	DXCC	33	36
CT4	CT5-CT7		(see CT1)				
	CU		(see CT1, CT2, CT3, CT4)				
CX	CV-CW	CVA-CXZ	Uruguay	SA	DXCC	13	14
	CY-CZ	CYA-CZZ	(see VE,VO)				
D2		D2A-D3Z	Angola	AF	DXCC	36	52
D4		D4A-D4Z	Cape Verde	AF	DXCC	35	46
		D5A-D5Z	(see EL)				
D6		D6A-D6Z	Comoros	AF	DXCC	39	53
		D7A-D9Z	(see HL)				
DA-DO		DAA-DRZ	Federal Republic of Germany	EU	DXCC	14	28
DF-DH			(see DA-DO)				
DJ-DL			(see DA-DO)				
DM (was used by German Dem.Republic before 1980, now uses Y2-Y9)							
DPØAA (W.German base in Antarctica)				AF	see note A	38	67
DPØLEX (W.German base in Antarctica)				AF	see note A	38	67
		DSA-DTZ	(see HL)				
	DT (obsolete)		(see DM)				
DU	DX	DUA-DZZ	Philippines	OC	DXCC	27	50
EA		EAA-EHZ	Spain	EU	DXCC	14	37
EA6			Balearic Is.	EU	DXCC	14	37

3.

THE "DXNS" PREFIX - COUNTRY- ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
EA8			Canary Is.	AF	DXCC	33	36
EA9			Ceuta and Melilla	AF	DXCC	33	37
EA9			Spanish Sahara (now part of CN) (counted for DXCC before 8 Jan.1976)				
EC	ED-EH		(see EA, EA6, EA8, EA9)				
EI	EJ	EIA-EJZ	Ireland	EU	DXCC	14	27
	EK	EKA-EKZ	(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
EK1P			(see UA1PAL)				
EL		ELA-ELZ	Liberia	AF	DXCC	35	46
ELØ (Liberian /MM stations)							
	EM-EN	EMA-EOZ	(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
EP	EQ	EPA-EQZ	Iran	AS	DXCC	21	40
	ER	ERA-ESZ	(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
ET		ETA-ETZ	Ethiopia	AF	DXCC	37	48
ET3ZU/A			(see J2Ø/A)				
	EU-EY	EUA-EZZ	(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
EZ (USSR novice stations)			(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
		FAA-FZZ	France, including overseas territories				
F			France	EU	DXCC	14	27
FBBW			Crozet Is.	AF	DXCC	39	68
FBBX			Kerguelen Is.	AF	DXCC	39	68
FBBY (French bases in Antarctica)				OC	see note A	30	70
FBBZ			Amsterdam I. and St.Paul I.	AF	DXCC	39	68
FC			Corsica	EU	DXCC	15	28
FG			Guadeloupe	NA	DXCC	08	11
FH			Mayotte	AF	DXCC	39	53
FK			New Caledonia	OC	DXCC	32	56
FL (obsolete)			(see J2)				
FL8OM/A			(see J2Ø/A)				
FM			Martinique	NA	DXCC	08	11
FO			French Polynesia	OC	DXCC	32 }	63
			Marquesas Is. -			31 }	
FOBX			Clipperton I.	NA	DXCC	07	10
FP			St.Pierre and Miquelon	NA	DXCC	05	09
FR			Reunion I.	AF	DXCC	39	53
FR---/B			Bassas da India	AF	(FR---/J)	39	53
FR---/E			Europa I.	AF	(FR---/J)	39	53
FR---/G			Glorieuses Is.	AF	DXCC	39	53
FR---/J			Juan de Nova	AF	DXCC	39	53
FR---/T			Tromelin I.	AF	DXCC	39	53
FS			French St.Martin	NA	DXCC	08	11
FW			Wallis and Futuna Is.	OC	DXCC	32	62
	FX		(see F)				
FY			French Guiana	SA	DXCC	09	12
	FZ		(see F)				
		GAA-GZZ	United Kingdom				
G			England	EU	DXCC	14	27
GSACI/AA			(see J2Ø/A)				
	GB		(see GAA-GZZ)				
GC (obsolete)			(see GJ and GU)				
GD			Isle of Man	EU	DXCC	14	27
	GE		(see GAA-GZZ)				
GI			Northern Ireland	EU	DXCC	14	27
GJ			Jersey	EU	DXCC	14	27
GM			Scotland	EU	DXCC	14	27
	GT		(see GD)				
GU			Guernsey and Dependencies	EU	DXCC	14	27
GW			Wales	EU	DXCC	14	27
		H2A-H2Z	(see 5B)				
	H3	H3A-H3Z	(see HP)				
H4		H4A-H4Z	Solomon Is.	OC	DXCC	28	51

4.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
H5		H5A-H5Z	Bophuthatswana	AF	(ZS)	38	57
	H6-H7	H6A-H7Z	(see YN)				
	H8	H8A-H9Z	(see HP)				
HA		HAA-HAZ	Hungary	EU	DXCC	15	28
HB		HBA-HBZ	Switzerland	EU	DXCC	14	28
HBØ			Liechtenstein	EU	DXCC	14	28
HC	HD	HCA-HDZ	Ecuador	SA	DXCC	10	12
HC8	HD8		Galapagos Is.	SA	DXCC	10	12
		HEA-HEZ	(see HB)				
		HFA-HFZ	(see SP)				
HFØPOL (Polish base in S.Shetland Is.)				SA	see note D	13	73
HG		HGA-HGZ	(see HA)				
HH		HHA-HHZ	Haiti	NA	DXCC	08	11
HI		HIA-HIZ	Dominican Republic	NA	DXCC	08	11
HK		HJA-HKZ	Colombia	SA	DXCC	09	12
HKØ			Bajo Nuevo (counted for DXCC before 1982, now counts as San Andres)				
HKØ			Malpelo I.	SA	DXCC	09	12
HKØ			San Andres and Providencia	NA	DXCC	07	11
HKØ			Serrana Bank (counted for DXCC before 1982, now counts as San Andres)				
HL-HM		HLA-HLZ	Korea (Republic of)	AS	DXCC	25	44
		HMA-HMZ	(see P5A-P9Z)				
		HNA-HNZ	(see YI)				
HP		HOA-HPZ	Panama	NA	DXCC	07	11
HR	HQ	HQA-HRZ	Honduras	NA	DXCC	07	11
HS		HSA-HSZ	Thailand	AS	DXCC	26	49
HT		HTA-HTZ	Nicaragua	NA	DXCC	07	11
	HU	HUA-HUZ	(see YS)				
HV		HVA-HVZ	Vatican	EU	DXCC	15	28
	HW	HWA-HYZ	(see FAA-FZZ) (HW7G operated from FG)				
HZ		HZA-HZZ	Saudi Arabia	AS	DXCC	21	39
I		IAA-IZZ	Italy	EU	DXCC	15	28
IA5			Tuscan Archipelago	EU	(Italy)	15	28
IBØ			Ponziane Is.	EU	(Italy)	15	28
IC8			Napoli Is.	EU	(Italy)	15	28
ID9			Eolie Is.	EU	(Italy)	15	28
IE9			Ustica I.	EU	(Italy)	15	28
IF9			Egadi Is.	EU	(Italy)	15	28
IG9			Pelagian Is.	AF	(Italy)	33	37
IH9			Pantelleria I.	AF	(Italy)	33	37
	II		(see I)				
IJ7			Cheradi Is.	EU	(Italy)	15	28
	IK		(see I)				
IL7			Tremiti Is.	EU	(Italy)	15	28
IMØ			Maddalena Archipelago and other Sardinian islands	EU	(Sardinia)	15	28
IN3			Trentino-Alto Adige	EU	(Italy)	15	28
	IO-IR		(see I)				
ISØ			Sardinia	EU	DXCC	15	28
IT9			Sicily	EU	(Italy)	15	28
	IU		(see I)				
IV3			Friuli-Venezia Giulia	EU	(Italy)	15	28
IW			(see I)				
IX1			Aosta Valley	EU	(Italy)	15	28
	IY-IZ		(see I)				
J2		J2A-J2Z	Djibouti	AF	DXCC	37	48
J2ØA.J2Ø/Z			Abu Ail, and Jabal-at-Tair	AS	DXCC	21	39
J3		J3A-J3Z	Grenada	NA	DXCC	08	11
	J4	J4A-J4Z	(see SVA-SZZ)				
J5		J5A-J5Z	Guinea-Bissau	AF	DXCC	35	46
J6		J6A-J6Z	St.Lucia	NA	DXCC	08	11
J7		J7A-J7Z	Dominica	NA	DXCC	08	11
J8		J8A-J8Z	St.Vincent and Grenadines	NA	DXCC	08	11

5.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE	
JA		JAA-JSZ	Japan	AS	DXCC	25	45	
JD			Minami Torishima (Marcus I.)	OC	DXCC	27	90	
JD			Ogasawara Is.	AS	DXCC	27	45	
JE-JO			(see JA)					
JR			(see JA)					
JT		JTA-JVZ	Mongolia	AS	DXCC	23	32	
		JWA-JXZ	(see LA)					
JW			Svalbard	EU	DXCC	40	18	
JX			Jan Mayen	EU	DXCC	40	18	
JY		JYA-JYZ	Jordan	AS	DXCC	20	39	
		JZA-JZZ	(see YB-YD)					
K		KAA-KZZ	(see W)					
*KA-KZ (see Note opposite)								
*KA			(see JA)					
KA1AA KA1CG KA1MI KA1NC KA1S			(see JD Minami Torishima)					
KA1IJ KA1IW KA1WO			(see JD Ogasawara Is.)					
*KB6 (KH1)			Baker, Howland, and				61 = Baker, Howland.	
			American Phoenix Is.	OC	DXCC	31	62 = Canton	
*KC4 (KP1)			Navassa I.	NA	DXCC	08	11	
*KC4 (USA bases in Antarctica)			KC4AAA South Pole	SA	see note A	13	74	
			KC4AAC (KC4USP) Palmer	SA	see note A	13	73	
			KC4AAD Siple	SA	see note A	12	72	
			KC4AAE Vostok	OC	see note A	29	70	
			KC4USB Byrd	OC	see note A	32	72	
			KC4USV McMurdo	OC	see note A	30	71	(also KC4USY)
			KC4USX Williams Field	OC	see note A	30	71	
*KC6			Belau (W.Caroline Is.)	OC	see note G	27	64	
*KC6			Micronesia (E.Caroline Is.)	OC	see note G	27	65	
*KG4			Guantanamo Bay	NA	DXCC	08	11	
*KG6 (KH2)			Guam	OC	DXCC	27	64	
*KG6R,S,T (KHØ)			North Mariana	OC	DXCC	27	64	
*KH1-KH5 (see Note above)								
KH6			Hawaiian Is.	OC	DXCC	31	61	
*KH6 (KH7)			Kure I.	OC	DXCC	31	61	
*KH7-KHØ (see Note above)								
*KJ6 (KH3)			Johnston I.	OC	DXCC	31	61	
KL7			Alaska	NA	DXCC	01	01	
*KM6 (KH4)			Midway Is.	OC	DXCC	31	61	
*KP1-KP2 (see Note above)								
KP4			Puerto Rico	NA	DXCC	08	11	
KP5 (formerly KP---/D)			Desecheo I.	NA	DXCC	08	11	
*KP6 (KH5)			Palmyra, and Jarvis Is.	OC	DXCC	31	61 = Palmyra	
							62 = Jarvis Is.	
*KP6 (KH5K)			Kingman Reef	OC	DXCC	31	61	
KS4 (obsolete)			Serruna Bank (see HKØ)					
*KS6 (KH8)			American Samoa	OC	DXCC	32	62	
*KV4 (KP2)			U.S. Virgin Is.	NA	DXCC	08	11	
*KW6 (KH9)			Wake I.	OC	DXCC	31	65	
*KX6			Marshall Is.	OC	DXCC	31	65	
KZ5 (obsolete)			Canal Zone (counted for DXCC before Oct.1979, now part of HP)					

* Note:- Since Mar.24 1978 all new stations in certain USA territories have been issued with the KH or KP prefix given in brackets below. Although stations in the USA territories still use the other prefixes listed, since 1978 the complete block KA-KZ (less KH KL KP) is now being issued to stations in the U.S.A.

Before 1978, prefixes in the block KB1-KZØ (except those below) were used for special event purposes by stations in the U.S.A.

6.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE	
	L2,L8	L2A-L9Z	(see LU)					
LA-LB	LC	LAA-LNZ	Norway	EU	DXCC	14	18	
LF	LG-LI		(see LA)					
LJ			(see LA)					
LU		LOA-LWZ	Argentina	SA	DXCC	13	1st suffix-letter:-	
							14 = LU-A- to LU-U-	
							16 = LU-V- LU-W- LU-X-	
							14 = LU-Y-	
LU-Z- (Argentine bases in Antarctica)				SA	see note A	13	73	
LU-Z- (Argentine bases in S.Orkney Is.)				SA	see note B	13	73	
LU-Z- (Argentine bases in S.Sandwich Is.)				SA	see note C	13	73	
LU-Z- (Argentine bases in S.Shetland Is.)				SA	see note D	13	73	
LX		LXA-LXZ	Luxembourg	EU	DXCC	14	27	
		LYA-LYZ	(see UAA-UZZ)					
LZ		LZA-LZZ	Bulgaria	EU	DXCC	20	28	
M1 (un-official prefix)			(see T7)					
		MAA-MZZ	(see GAA-GZZ)					
MP4B (obsolete)			(see A9)					
MP4M (obsolete)			(see A4)					
MP4Q (obsolete)			(see A7)					
MP4T (obsolete)			(see A6)					
N		NAA-NZZ	(see W)					
NA-NG			(see W)					
NH1-NHØ			(see KH1-KHØ)					
NI-NK			(see W)					
NL7			(see KL7)					
NM-NO			(see W)					
NP1-NP4			(see KP1-KP4)					
NQ-NZ			(see W)					
OA	OB-OC	OAA-OCZ	Peru	SA	DXCC	10	12	
OD		ODA-ODZ	Lebanon	AS	DXCC	20	39	
OE		OEA-OEZ	Austria	EU	DXCC	15	28	
OE6XG/A			(see J2Ø/A)					
OH	OF-OG	OFA-OJZ	Finland	EU	DXCC	15	18	
OHØ	OFØ		Aland Is.	EU	DXCC	15	18	
	OI		(see OH)					
OJØ			Market Reef	EU	DXCC	15	18	
OK-OL		OKA-OMZ	Czechoslovakia	EU	DXCC	15	28	
ON	OR-OT	ONA-OTZ	Belgium	EU	DXCC	14	27	
OR (Belgian bases in Antarctica)				AF	see note A	38	67	
		OUA-OZZ	(see OZ)					
OX			Greenland	NA	DXCC	40	05	
OY			Faroe Is.	EU	DXCC	14	18	
OZ			Denmark	EU	DXCC	14	18	
P2		P2A-P2Z	Papua New Guinea	OC	DXCC	28	51	
		P3A-P3Z	(see 5B)					
	P4	P4A-P4Z	(see PJA-PJZ)					
		P5A-P9Z	Dem. People's Rep. of Korea	AS	(HL-HN)	25	44	
PA-PH		PAA-PIZ	Netherlands	EU	DXCC	14	27	
PD-PE	PF-PG		(see PA)					
PI			(see PA)					
PJ1,2,3,4,9		PJA-PJZ	Netherlands Antilles	SA	DXCC	09	11	
PJ5,6,7,8			Sint Maarten	NA	DXCC	08	11	
		PKA-POZ	(see YB-YD)					
PP	PQ	PPA-PYZ	(see PY)					
PR-PW			(see PY)					
PY			Brazil	SA	DXCC	11	15 = PY1,2,3,4,5,9	
							13 = PY6,7,8	

Note:- Before 1978, prefixes in the block NA-NZ were used for special event purposes by stations in U.S.A.

7.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
PYØ			Fernando de Noronha	SA	DXCC	11	13
PYØ			St.Peter and St.Paul Rocks	SA	DXCC	11	13
PYØ			Trindade I. and Martin Vaz	SA	DXCC	11	15
PZ		PZA-PZZ	Suriname	SA	DXCC	09	12
		QAA-QZZ	(Service abbreviations)				
	R	RAA-RZZ	(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
	RA-RZ		(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
RA,RB,RC,etc (USSR VHF-stns)			(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
S1 (un-official prefix)			Sealand ("Bates Island")	EU	not DXCC	14	27
S2		S2A-S3Z	Bangladesh	AS	DXCC	22	41
S4 (un-official prefix)			Ciskei	AF	(ZS)	38	57
		S6A-S6Z	(see 9V)				
S7		S7A-S7Z	Rep. of Seychelles	AF	DXCC	39	53
S8		S8A-S8Z	Transkei	AF	(ZS)	38	57
S9		S9A-S9Z	Sao Tome and Principe	AF	DXCC	36	47
SK-SM	SJ	SAA-SMZ	Sweden	EU	DXCC	14	18
SP	SN-SR	SNA-SRZ	Poland	EU	DXCC	15	28
		SSA-SSM	(see SU)				
ST		SSM-STZ	Sudan	AF	DXCC	34	48
STØ			Southern Sudan	AF	DXCC	34	48
SU		SUA-SUZ	Egypt	AF	DXCC	34	38
SV		SVA-SZZ	Greece	EU	DXCC	20	28
SV5			Dodecanese Is. (Rhodes)	EU	DXCC	20	28
SV9			Crete	EU	DXCC	20	28
SV---/A			Mount Athos	EU	DXCC	20	28
	SW-SZ		(see SVA-SZZ)				
T2		T2A-T2Z	Tuvalu	OC	DXCC	31	65
		T3A-T3Z	Rep. of Kiribati				
T3Ø (formerly T3A,T3K)			West Kiribati (Gilbert Is.)	OC	DXCC	31	65
T31 (formerly T3P)			Cent.Kiribati (Brit.Phoenix)	OC	DXCC	31	62
T32 (formerly T3L)			East Kiribati (Line Is.)	OC	DXCC	31	61 = Northern Line Is. 63 = Central and South
	T4	T4A-T4Z	(see CM)				
T4 (un-official prefix used by Vendaland before 1982, now uses V9)							
T5		T5A-T5Z	Somalia	AF	DXCC	37	48
		T6A-T6Z	(see YA)				
		T7A-T7Z	San Marino	EU	DXCC	15	28
TA	TC	TAA-TCZ	Turkey TA1 = EU, TA2-9 = AS		DXCC	20	39
	TD	TDA-TDZ	(see TG)				
	TE	TEA-TEZ	(see TI)				
TF		TFA-TFZ	Iceland	EU	DXCC	40	17
TG		TGA-TGZ	Guatemala	NA	DXCC	07	11
	TH	THA-THZ	(see FAA-FZZ) (TH8JM operated from TL)				
TI		TIA-TIZ	Costa Rica	NA	DXCC	07	11
TI9			Cocos I.	NA	DXCC	07	12
TJ		TJA-TJZ	Cameroon	AF	DXCC	36	47
	TK	TKA-TKZ	(see FAA-FZZ) (TK7G & TK7GAS operated from FG, TK7YAA from FY)				
TL		TLA-TLZ	Central African Republic	AF	DXCC	36	47
		TMA-TMZ	(see FAA-FZZ)				
TN		TNA-TNZ	Congo	AF	DXCC	36	52
	TO	TOA-TQZ	(see FAA-FZZ) (TO8FC operated from FO)				
TR		TRA-TRZ	Gabon	AF	DXCC	36	52
		TSA-TSZ	(see 3V)				
TT		TTA-TTZ	Chad	AF	DXCC	36	47
TU		TUA-TUZ	Ivory Coast	AF	DXCC	35	46
	TV	TVA-TXZ	(see FAA-FZZ)				
TY		TYA-TYZ	Benin	AF	DXCC	35	46
TZ		TZA-TZZ	Mali	AF	DXCC	35	46

8.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE	
	U	UAA-UZZ	U.S.S.R. (for exact location see Note on Sheet 9, under Oblast List)					
UA			European Russian S.F.S.R.	EU	DXCC	as below		1st suffix-letter:-
						16	29	UA1A-- B-- C-- F--
						16	19	UA1N-- O--
						16	20	UA1P-- (except Franz-Josef Land)
			Note:- USSR call-signs issued since 1 Jan.1970 have 3 suffix-letters, and conform to the information given in this list. It also applies to the majority of earlier calls (only 2 suffix-letters), but not in every case.			16	29	UA1Q-- T-- W--
						16	19	UA1Z--
						16	29	UA3 (all)
						16	29	UA4A-- C-- F--
						16	30	UA4H--
						16	29	UA4L--
						16	30	UA4N-- P--
						16	29	UA4S-- U--
						16	30	UA4W--
						16	29	UA4Y--
						16	29	UA6 (all)
						16	30	UA9S-- W--
UA			Asiatic Russian S.F.R.S.	AS	DXCC	as below		1st suffix-letter:-
						17	30	UA9A-- C-- F-- G--
						18	31	UA9H--
						17	20	UA9J-- K--
						17	21	UA9L--
						17	30	UA9M--
						18	31	UA9O--
						17	30	UA9Q--
			Note:- UA9S-- & UA9W-- are in European Russian S.F.S.R. (see above)					UA9S-- (see note)
						18	31	UA9U--
								UA9W-- (see note)
						17	20	UA9X--
						18	31	UA9Y-- UA9Z--
						18	22	UAØA-- B--
						19	34	UAØC-- D-- F--
						18	22	UAØH--
						19	24	UAØI-- West of 155.E
						19	25	UAØI-- 155-170.E
						19	26	UAØI-- East of 170.E
						19	33	UAØJ--
			Note:- An up-to-date USSR Oblast List is also available, (see Note on Sheet 9), price 25p (U.K.), 2 IRCs (overseas).			19	26	UAØK--
						19	34	UAØL--
						18	32	UAØO--
						19	23	UAØQ--
						18	32	UAØS-- T--
						18	33	UAØU-- V--
						18	32	UAØW--
						19	25	UAØX--
						23	32	UAØY--
						19	35	UAØZ--
UA1PAL (also see UK1PAA etc)			Franz-Josef Land	EU	DXCC	40	75	
UA1PAM			(see UA1PAL)					
UA2			Kaliningradsk	EU	DXCC	15	29	
UB			Ukraine	EU	DXCC	16	29	
UC			Byelorussia	EU	DXCC	16	29	
UD			Azerbaijan	AS	DXCC	21	29	
UF			Georgia	AS	DXCC	21	29	
UG			Armenia	AS	DXCC	21	29	
UH			Turkoman	AS	DXCC	17	30	
UI			Uzbek	AS	DXCC	17	30	
UJ			Tadzhik	AS	DXCC	17	42	

9.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
UK1 (except Franz-Josef Land)			(see UA1)				
UK1PAA UK1PGO (UK1ØFI)			(see UA1PAL)				
UK2A--			(see UC)				
UK2B--			(see UP)				
UK2C--			(see UC)				
UK2F--			(see UA2)				
UK2G--			(see UQ)				
UK2I--	L-- O--		(see UC)				
UK2P--			(see UP)				
UK2Q--			(see UQ)				
UK2R--			(see UR)				
UK2S--			(see UC)				
UK2T--			(see UR)				
UK2W--			(see UC)				
UK3			(see UA3)				
UK4			(see UA4)				
UK5 (except UK5O--)			(see UB)				
UK5O--			(see UO)				
UK6A--			(see UA6)				
UK6C--	O--		(see UD)				
UK6E--			(see UA6)				
UK6F--			(see UF)				
UK6G--			(see UG)				
UK6H--	I-- J--		(see UA6)				
UK6K--			(see UO)				
UK6L--			(see UA6)				
UK6O--			(see UF)				
UK6P--			(see UA6)				
UK6Q--			(see UF)				
UK6U--			(see UA6)				
UK6V--			(see UF)				
UK6W--	X-- Y--		(see UA6)				
UK7			(see UL)				
UK8A--			(see UI)				
UK8B--			(see UH)				
UK8C--	O--		(see UI)				
UK8E--			(see UH)				
UK8F--	G--		(see UI)				
UK8H--			(see UH)				
UK8I--			(see UI)				
UK8J--	K--		(see UJ)				
UK8L--			(see UI)				
UK8M--	N--		(see UH)				
UK8O--			(see UI)				
UK8P--	Q--		(see UH)				
UK8R--	S--		(see UJ)				
UK8T--	U-- V--		(see UI)				
UK8W--			(see UH)				
UK8X--			(see UJ)				
UK8Y--			(see UH)				
UK8Z--			(see UI)				
UK9			(see UA9)				
UKØ			(see UAØ)				
UL			Kazakh	AS	DXCC	17	30
UM			Kirghiz	AS	DXCC	17	42
UN			(see UA1N--).				
UO			Moldavia	EU	DXCC	16	29
UP			Lithuania	EU	DXCC	15	29
UPOL (USSR Arctic floating bases)			(obsolete) (see 4KØ)				
UQ			Latvia	EU	DXCC	15	29
UR			Estonia	EU	DXCC	15	29
UT			(see UB)				
UV-UW	UX		(see UA)				
UY			(see UB)				
UZ			(see UA)				

Note:- USSR call-signs issued since 1 Jan.1970 have 3 suffix-letters, and confore to the information given in this list. It also applies to the majority of earlier calls (only 2 suffix-letters), but not in every case.

Note:- UK-stations are Club-stations. Before 1 Jan.1970 all USSR Club-stations used the normal prefix, but had 3 suffix-letters, the first letter being K, e.g. UA1KAA, UA3KBE, UB5KAA, UR2KBD, etc.

Note:- An up-to-date USSR Oblast List is also available, (see Sheet 8 for price). The location of special stations (with prefix EK EM EN R U etc), also novice stations (prefix EZ), and VHF-stations (prefix RA RB RC etc), is normally indicated by the prefix-numeral & 1st suffix-letter, the same as for Club-stns (prefix UK) listed on this page, but given more fully in the USSR Oblast List.

10.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
V2		V2A-V2Z	Antigua and Barbuda	NA	DXCC	08	11
V3		V3A-V3Z	Belize	NA	DXCC	07	11
V9 (un-official prefix)			Vendaland	AF	(ZS)	38	57
VE	VA-VO	VAA-VGZ	Canada	NA	DXCC	05 = VE1	09 = VE1,2
						05 = VE2 45-50.N	04 = VE3
						02 = 50-63.N	03 = VE4,5
							02 = VE6,7
						04 = VE3,4,5,6	75 = VE8 80-85.N
						03 = VE7	VE8 60-80.N
						02 = VE8 60-102.W	04 = 60-90.W
						01 = 102-137.W	03 = 90-110.W
							02 = 110-137.W
VE	(VX9A)		Sable I.	NA	DXCC	05	09
VE	(VYØA)		St.Paul I.	NA	DXCC	05	09
VEØ (Canadian /MM stations)							
	VF-VG		(see VE. VO)				
VK		VHA-VNZ	Australia	OC	DXCC	30 = VK1,2,3,4,5,7	59 = VK1,2,3,5,7
						29 = VK6,8	55 = VK4,8
							58 = VK6
VK2---/LH			Lord Howe I.	OC	DXCC	30	60
VK9 (was also used by New Guinea before 1974, now part of P2)							
VK9 (was also used by Papua before 1974, now part of P2)							
VK9N (also VK9J & VK9R)			Norfolk I.	OC	DXCC	32	60
VK9X			Christmas I.	OC	DXCC	29	54
VK9Y			Cocos-Keeling Is.	OC	DXCC	29	54
VK9Z			Mellish Reef	OC	DXCC	30	56
VK9Z			Willis Is.	OC	DXCC	30	55
VKØ			Heard I.	AF	DXCC	39	68
VKØ			Macquarie I.	OC	DXCC	30	60
VKØ (Australian bases in Antarctica)			(as listed below)				
			Casey, Wilkes	OC	see note A	29	70
			Davis, Mawson	AF	see note A	39	69
VO1	VO3 etc	VOA-VOZ	Newfoundland	NA	(Canada)	05	09
VO2			Labrador	NA	(Canada)	02	09
		VPA-VSZ	British Commonwealth				
VP1 (obsolete)			(see V3)				
VP2A (obsolete)			(see V2)				
VP2D (obsolete)			(see J7)				
VP2E			Anguilla	NA	DXCC	08	11
VP2G (obsolete)			(see J3)				
VP2K			St.Kitts, Nevis	NA	DXCC	08	11
VP2L (obsolete)			(see J6)				
VP2M			Montserrat	NA	DXCC	08	11
VP2S (obsolete)			(see J8)				
VP2V			British Virgin Is.	NA	DXCC	08	11
VP5			Turks and Caicos Is.	NA	DXCC	08	11
VP7 (obsolete)			(see C6)				
VP8			Falkland Is.	SA	DXCC	13	16
VP8			South Georgia	SA	DXCC	13	73
VP8 (British bases in Antarctica)				SA	see note A	13	73
VP8 (British bases in S.Orkney Is.)				SA	see note B	13	73
VP8 (British bases in S.Sandwich Is.)				SA	see note C	13	73
VP8 (British bases in S.Shetland Is.)				SA	see note D	13	73
VP9			Bermuda	NA	DXCC	05	11

11.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
VQ9			Chagos Is.	AF	DXCC	39	41
VQ9 (was also used by Seychelles before 1977, now uses S7)							
VQ9--/A (obsolete)			Aldabra I. (now part of S7) (counted for DXCC before July 1976)				
VQ9--/C (obsolete)			(see VQ9 Chagos Is.)				
VQ9--/D (obsolete)			Desroches I. (now part of S7) (counted for DXCC before July 1976)				
VQ9--/F (obsolete)			Farquhar I. (now part of S7) (counted for DXCC before July 1976)				
VR1A (obsolete)			(see T3Ø)				
VR1P (obsolete)			(see T31)				
VR2 (obsolete)			(see 3D2)				
VR3 (obsolete)			(see T32)				
VR4 (obsolete)			(see H4)				
VR5 (obsolete)			(see A3)				
VR6			Pitcairn I.	OC	DXCC	32	63
VR8 (obsolete)			(see T2)				
VS5			Brunei	OC	DXCC	28	54
VS6			Hong Kong	AS	DXCC	24	44
VS9 (obsolete) (VS9A,P,S now part of 7Ø. VS9H,O see A4. VS9K now part of 4W. VS9M see 8Q)							
VU		VTA-VWZ	India	AS	DXCC	22	41
VU			Laccadive Is.	AS	DXCC	22	41
VU7			Andaman Is. and Nicobar Is.	AS	DXCC	26	49
	VX-VY	VXA-VYZ	(see VE)				
VY1			Yukon	NA	(Canada)	01	02
		VZA-VZZ	(see VK)				
W		WAA-WZZ	United States of America	NA	DXCC	05 - W1,2,3	08 - W1,2,3,4
						04 - W4 Alabama	07 - W5
						05 - Florida	06 - W6,7
						05 - Georgia	08 - W8,9
						04 - Kentucky	07 - WØ
						05 - N.Carolina	
						05 - S.Carolina	
						04 - Tennessee	
						05 - Virginia	
						04 - W5	
						03 - W6	
						03 - W7 Arizona	
						03 - Idaho	
						04 - Montana	
						03 - Nevada	
						03 - Oregon	
						03 - Utah	
						03 - Washington	
						04 - Wyoming	
						04 - W8 Michigan	
						04 - Ohio	
						05 - W.Virginia	
						04 - W9,Ø	
WA-WG			(see W)				
	*WG6		(see K6G)				
WH1-WHØ			(see KH1-KHØ)				
	*WH6		(see KH6)				
WI-WK			(see W)				
WL7	*WL7		(see KL7)				
WM-WO			(see W)				
	*WM6		(see KM6)				
	*WN		(see W)				
WP1-WP4			(see KP1-KP4)				
	*WP4		(see KP4)				
WQ			(see W)				
WR (repeater stations in USA & territories)							
WS-WZ			(see W)				
	*WS6		(see KS6)				
	*WV4		(see KV4)				
	*WW6		(see KW6)				

* Note:- From Oct.1 1976 the FCC ceased to issue special prefixes for Novice stations. Before that date, they used the special prefixes marked thus *.

Before 1978, prefixes in the groups WC WE-WQ WS-WZ (except those marked thus *) were used for special event purposes by stations in U.S.A.

12.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
XE-XF	XB,XO	XAA-XIZ	Mexico	NA	DXCC	06	10
XF4			Revilla Gigedo Is.	NA	DXCC	06	10
	XG,XI		(see XE-XF, XF4)				
	XJ-XO	XJA-XOZ	(see VE, VO)				
XP		XPA-XPZ	(see OX)				
	XQ-XR	XQA-XRZ	(see CE)				
		XSA-XSZ	(see BY)				
XT		XTA-XTZ	Upper Volta	AF	DXCC	35	46
XU		XUA-XUZ	Kampuchea (Cambodia)	AS	DXCC	26	49
XV		XVA-XVZ	Vietnam	AS	DXCC	26	49
XW		XWA-XWZ	Lao People's Dem.Republic	AS	DXCC	26	49
		XXA-XXZ	(see CQA-CUZ)				
	XX6 (obsolete)		(see D2)				
	XX7 (obsolete)		(see C9)				
XZ		XYA-XZZ	Burma	AS	DXCC	26	49
XZ5 XZ9			(see 1Z)				
Y2-Y9		Y2A-Y9Z	German Democratic Republic	EU	DXCC	14	28
Y83ANT (G.D.R. base in Antarctica)				AF	see note A	38	67
YA		YAA-YAZ	Afghanistan	AS	DXCC	21	40
YB-YD		YBA-YHZ	Indonesia	OC	DXCC	28	51 - East of 130.E
							54 - West of 130.E
YI		YIA-YIZ	Iraq	AS	DXCC	21	39
YJ		YJA-YJZ	Vanuatu (New Hebrides)	OC	DXCC	32	56
YK		YKA-YKZ	Syria	AS	DXCC	20	39
	YL	YLA-YLZ	(see UAA-UZZ) (for exact location see Note on Sheet 9, under Oblast List)				
YL1P			(see UA1PAL)				
	YM	YMA-YMZ	(see TA)				
YN		YNA-YNZ	(see HT)				
YO	YP-YR	YOA-YRZ	Romania	EU	DXCC	20	28
YS		YSA-YSZ	El Salvador	NA	DXCC	07	11
YU	YT	YTA-YUZ	Yugoslavia	EU	DXCC	15	28
YV		YVA-YYZ	Venezuela	SA	DXCC	09	12
YVØ			Aves I.	NA	DXCC	08	11
	YW-YY		(see YV)				
	YZ	YZA-YZZ	(see YU)				
Z2		Z2A-Z2Z	Zimbabwe	AF	DXCC	38	53
ZA		ZAA-ZAZ	Albania	EU	DXCC	15	28
		ZBA-ZJZ	British Commonwealth				
ZB			Gibraltar	EU	DXCC	14	37
ZC			(see 5B)				
ZD3 (obsolete)			(see C5)				
ZD5 (obsolete)			(see 3D6)				
ZD7			St.Helena	AF	DXCC	36	66
ZD8			Ascension I.	AF	DXCC	36	66
ZD9Ø			Tristán da Cunha	AF	DXCC	38	66
ZD9G			Gough I.	AF	(ZD9Ø)	38	66
ZE (obsolete)			(see Z2)				
ZF			Cayman Is.	NA	DXCC	08	11

13. THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE	
		ZKA-ZMZ	(see ZL)					
ZK1			Cook Is.	OC	DXCC	32	63	
ZK1			Northern Cook Is.	OC	DXCC	32	62	
ZK2	ZK9		Niue	OC	DXCC	32	62	
ZL			New Zealand	OC	DXCC	32	60	
ZL——/A			Auckland I. and Campbell I.	OC	DXCC	32	60	
ZL——/C			Chatham Is.	OC	DXCC	32	60	
ZL——/K			Kermadec Is.	OC	DXCC	32	60	
ZL5 (New Zealand bases in Antarctica)				OC	see note A	30	71	
ZM7			Tokelau Is.	OC	DXCC	31	62	
		ZMA-ZOZ	British Commonwealth					
ZP		ZPA-ZPZ	Paraguay	SA	DXCC	11	14	
		ZQA-ZQZ	British Commonwealth					
ZR		ZRA-ZUZ	(see ZS)					
ZR3			(see ZS3)					
ZS			Rep. of South Africa	AF	DXCC	38	57	
ZS1ANT (S.African base in Antarctica)				AF	see note A	38	67	
ZS2MI			Prince Edward and Marion I.	AF	DXCC	38	57	
ZS3			Namibia (South-West Africa)	AF	DXCC	38	57	
	ZV-ZZ	ZVA-ZZZ	(see PY)					
1A@KM (un-official prefix)			Sovereign Military Order of Malta, Rome	EU	DXCC	15	28	
1S (un-official prefix)			Spratly Archipelago	AS	DXCC	26	50	
1Z (un-official prefix)			Karen State, East Burma	AS	not DXCC	26	49	
		2AA-2ZZ	(see GAA-GZZ)					
3A		3AA-3AZ	Monaco	EU	DXCC	14	27	
		3BA-3BZ	(see 3B8)					
3B6			Agalega Is.	AF	DXCC	39	53	
3B7			Cargados Carajos (St.Brandon)	AF	(3B6)	39	53	
3B8			Mauritius	AF	DXCC	39	53	
3B9			Rodriguez I.	AF	DXCC	39	53	
3C		3CA-3CZ	Equatorial Guinea	AF	DXCC	36	47	
3C@			Pagalu (Annobon I.)	AF	DXCC	36	52	
3D2		3DN-3DZ	Fiji	OC	DXCC	32	56	
3D6		3DA-3DM	Swaziland	AF	DXCC	38	57	
	3E-3F	3EA-3FZ	(see HP)					
	3G	3GA-3GZ	(see CE)					
		3HA-3UZ	(see BY)					
3V		3VA-3VZ	Tunisia	AF	DXCC	33	37	
		3WA-3WZ	(see XV)					
3X		3XA-3XZ	Rep. of Guinea	AF	DXCC	35	46	
		3YA-3YZ	(see LA)					
3Y			Bouvet I.	AF	DXCC	38	67	
3Y (Norwegian bases in Antarctica)				AF	see note A	38	67	
	3Z	3ZA-3ZZ	(see SP)					
	4A-4C	4AA-4CZ	(see XE-XF, XF4)					
	4D	4DA-4IZ	(see DU)					

14. THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE	
	4J-4K	4JA-4LZ	(see UAA-UZZ)					
4K1 (USSR bases in Antarctica)			4K1A Molodeghnaya	AF	see note A	39	69	(also 4K1HK 4K1OC)
			4K1B Mirny	OC	see note A	29	69	
			4K1C Vostok	OC	see note A	29	70	
			4K1D Novolazarevskaya	AF	see note A	38	67	
			4K1E Komsomolskaya	OC	see note A	29	69	
			4K1G Leningradskaya	OC	see note A	30	70	
			4K1H Russkaya	SA	see note A	12	74	
			4K1J Druzhnaya	SA	see note A	13	73	(also 4K1CR)
4K1 (USSR bases in S.Shetland Is.)			4K1F Bellingshausen	SA	see note D	13	73	(also 4K1GM)
4K@ (USSR Arctic floating bases)								
	4L		(see UAA-UZZ)					
	4M	4MA-4MZ	(see YV)					
	4N-4O	4NA-4OZ	(see YU)					
4S		4PA-4SZ	Sri Lanka (Ceylon)	AS	DXCC	22	41	
	4T	4TA-4TZ	(see OA)					
4U		4UA-4UZ	United Nations Organization		see note E			
4U1ITU	4U2ITU etc		United Nations HQ, Geneva	EU	DXCC	14	28	
4U1UN	4U36UN etc		United Nations, New York	NA	DXCC	05	08	
	4V	4VA-4VZ	(see HH)					
4W		4WA-4WZ	Yemen Arab Republic	AS	DXCC	21	39	
4X		4XA-4XZ	Israel	AS	DXCC	20	39	
		4YA-4YZ	(International Civil Aviation Organization)					
4Z		4ZA-4ZZ	(see 4X)					
5A		5AA-5AZ	Libya	AF	DXCC	34	38	
5B		5BA-5BZ	Cyprus	AS	DXCC	20	39	
		5CA-5GZ	(see CN)					
5H1 (obsolete)			Zanzibar (counted for DXCC before June 1974, now part of 5H3)					
5H3		5HA-5IZ	Tanzania	AF	DXCC	37	53	
	5J-5K	5JA-5KZ	(see HK)					
	5L	5LA-5MZ	(see EL)					
5N		5NA-5OZ	Nigeria	AF	DXCC	35	46	
		5PA-5QZ	(see OZ)					
5R		5RA-5SZ	Madagascar	AF	DXCC	39	53	
5T		5TA-5TZ	Mauritania	AF	DXCC	35	46	
5U		5UA-5UZ	Niger	AF	DXCC	35	46	
5V		5VA-5VZ	Togo	AF	DXCC	35	46	
5W		5WA-5WZ	Western Samoa	OC	DXCC	32	62	
5X		5XA-5XZ	Uganda	AF	DXCC	37	48	
5Z	5Y	5YA-5ZZ	Kenya	AF	DXCC	37	48	
		6AA-6BZ	(see SU)					
	6C	6CA -6CZ	(see YK)					
	6D-6J	6DA-6JZ	(see XE-XF, XF4)					
		6KA-6NZ	(see HL)					
6O (obsolete, 1981)		6OA-6OZ	(see T5)					
		6PA-6SZ	(see AP)					
6T-6U		6TA-6UZ	(see ST, ST@)					
6W	6V	6VA-6WZ	Senegal	AF	DXCC	35	46	
		6XA-6XZ	(see 5R)					
6Y		6YA-6YZ	Jamaica	NA	DXCC	08	11	
		6ZA-6ZZ	(see EL)					
		7AA-7IZ	(see YB-YD)					
		7JA-7NZ	(see JA)					
7J			Ohino Torishima (Parece Vela)	AS	see note F	27	64	
7O		7OA-7OZ	Yemen People's Dem.Republic	AS	DXCC	21	39	
7O			Socotra I.	AF	(Yemen)	37	48	
7P		7PA-7PZ	Lesotho	AF	DXCC	38	57	
7Q		7QA-7QZ	Malawi	AF	DXCC	37	53	
		7RA-7RZ	(see 7X)					
	7S	7SA-7SZ	(see SM)					
7X	7W	7TA-7YZ	Algeria	AF	DXCC	33	37	
7Z		7ZA-7ZZ	(see HZ)					

15.

THE "DXNS" PREFIX - COUNTRY - ZONE LIST

RADIO AMATEUR PREFIX normal	special	I.T.U. ALLOCATION	COUNTRY & CONTINENT		DXCC status	"CQ" ZONE	I.T.U. ZONE
		8AA-8IZ	(see YB-YD)				
	8J	8JA-8NZ	(see JA)				
8J (Japanese bases in Antarctica)				AF	see note A	39	67
	8O	8OA-8OZ	(see A2)				
8P		8PA-8PZ	Barbados	NA	DXCC	08	11
8Q		8QA-8QZ	Maldives	AS	DXCC	22	41
8R		8RA-8RZ	Guyana	SA	DXCC	09	12
	8S	8SA-8SZ	(see SM)				
		8TA-8YZ	(see VU)				
		8ZA-8ZZ	(see HZ)				
8Z4 (counted for DXCC before 1982)			Iraq-Saudi Neutral Zone				
9A		9AA-9AZ	(see T7)				
	9C-9D	9BA-9DZ	(see EP)				
	9E-9F	9EA-9FZ	(see ET)				
9G		9GA-9GZ	Ghana	AF	DXCC	35	46
9H		9HA-9HZ	Malta	EU	DXCC	15	28
9J	9I	9IA-9JZ	Zambia	AF	DXCC	36	53
9K		9KA-9KZ	Kuwait	AS	DXCC	21	39
9L		9LA-9LZ	Sierra Leone	AF	DXCC	35	46
		9MA-9MZ	Malaysia				
9M2			Malaya (W.Malaysia)	AS	DXCC	28	54
9M6			Sabah (E.Malaysia)	OC	(9M8)	28	54
9M8			Sarawak (E.Malaysia)	OC	DXCC	28	54
9N		9NA-9NZ	Nepal	AS	DXCC	22	42
9Q		9QA-9TZ	Zaire	AF	DXCC	36	52
9U		9UA-9UZ	Burundi	AF	DXCC	36	52
9V		9VA-9VZ	Singapore	AS	DXCC	28	54
		9WA-9WZ	(see 9MA-9MZ)				
9X		9XA-9XZ	Rwanda	AF	DXCC	36	52
9Y	9Z	9YA-9ZZ	Trinidad and Tobago	SA	DXCC	09	11

Abu Ail, and Jabal-at-Tair (see J2ø/A)

"CQ" Zones

Before 1980 all Antarctica stations counted as Zone 13 (S.America) for the WAZ Award.
Since Jan.1980 the boundaries of "CQ" Zones 12 13 29 30 32 38 39 have been extended to the South Pole.
The "CQ" Zone (and continent) of Antarctica stations in this Prefix List have been amended to comply with the Jan.1980 revised WAZ Award rules.

DXCC notes:-

A. ANTARCTICA. All bases (CE9 FB8 KC4 LU VP8 etc) count as just one DXCC country.

B. SOUTH ORKNEY IS. All bases (LU VP8 etc) count as just one DXCC country.

C. SOUTH SANDWICH IS. All bases (LU VP8 etc) count as just one DXCC country.

D. SOUTH SHETLAND IS. All bases (CE9 LU VP8 4K1 etc) count as just one DXCC country.

E. UNITED NATIONS. All /4U stations (except 4U1ITU 4U1UN 4U2ITU 4U56UN etc) count for the country of operation, e.g. /4U Golan Heights = YK, /4U Sinai = SU.

F. OKINO TORISHIMA. As from Dec.1980 this counts as JD Ogasawara Is.

G. YAP ISLANDS. Before 1981 these were part of the W.Carolines group(now Belau), but since 1 Jan.1981 they are part of the E.Carolines group(now Micronesia).

16.

U.S.S.R. CALL-SIGNS - LOCATION - OBLAST No.(for R-100-O Award etc). also UA9 & UAø Zone Nos.

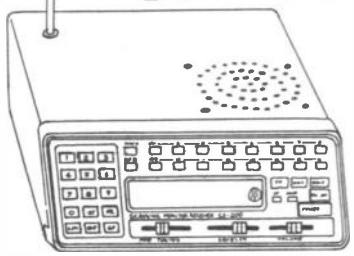
three-letter suffixes only.(from 1 Jan.1977) (for Novice stns substitute prefix EZ),
Klub-stns all use the prefix UK, individual stns use the prefixes UA UB UC etc. (for VHF-stns substitute RA RB RC etc).

prefixes		suffix	oblast & location	prefixes		suffix	oblast & location	prefixes		suffix	oblast & location
UK1	UA1	AAA-AZZ	169 Leningrad city	UK1	UA1	NAA-NZZ	088 Karelia	UK1	UA1	TAA-TZZ	144 Novgorod
UK1	UA1	BAA-BZZ	169 Leningrad city	UK1	UA1	OAA-OZZ	113 Arkhangelsk	UK1	UA1	WAA-WZZ	149 Pskov
UK1	UA1	CAA-CZZ	136 Leningrad oblast	UK1	UA1	PAA-PZZ	114 Nenets	UK1	UA1	ZAA-ZZZ	143 Murmansk
UK1	UA1	FAA-FZZ	136 Leningrad oblast	UK1	UA1	QAA-QZZ	120 Vologda				
UK2	UC2	AAA-AZZ	009 Minsk city	UK2	UC2	IAA-IZZ	008 Grodno	UK2	UR2	RAA-RZZ	083 Estonia
UK2	UP2	BAA-BZZ	038 Lithuania	UK2	UC2	LAA-LZZ	005 Brest	UK2	UC2	SAA-SZZ	010 Mogilev
UK2	UC2	CAA-CZZ	009 Minsk oblast	UK2	UC2	OAA-OZZ	007 Gomel	UK2	UR2	TAA-TZZ	083 Estonia
UK2	UA2	FAA-FZZ	125 Kaliningrad	UK2	UP2	PAA-PZZ	038 Lithuania	UK2	UC2	WAA-WZZ	005 Vitebsk
UK2	UG2	GAA-GZZ	037 Latvia	UK2	UG2	QAA-QZZ	037 Latvia				
UK3	UA3	AAA-AZZ	170 Moscow city	UK3	UA3	LAA-LZZ	155 Smolensk	UK3	UA3	TAA-TZZ	122 Gorky
UK3	UA3	BAA-BZZ	170 Moscow city	UK3	UA3	MAA-MZZ	168 Yaroslavl	UK3	UA3	UAA-UZZ	123 Ivanovo
UK3	UA3	DAA-DZZ	142 Moscow oblast	UK3	UA3	NAA-NZZ	132 Kostroma	UK3	UA3	VAA-VZZ	119 Vladimir
UK3	UA3	EAA-EZZ	147 Orel	UK3	UA3	PAA-PZZ	160 Tula	UK3	UA3	WAA-WZZ	135 Kursk
UK3	UA3	FAA-FZZ	142 Moscow oblast	UK3	UA3	QAA-QZZ	121 Voronezh	UK3	UA3	XAA-XZZ	127 Kaluga
UK3	UA3	GAA-GZZ	137 Lipetsk	UK3	UA3	RAA-RZZ	157 Tambov	UK3	UA3	YAA-YZZ	118 Briansk
UK3	UA3	IAA-IZZ	126 Kalinin	UK3	UA3	SAA-SZZ	151 Riazan	UK3	UA3	ZAA-ZZZ	117 Belgorod
UK4	UA4	AAA-AZZ	156 Volgograd	UK4	UA4	LAA-LZZ	164 Ulyanovsk	UK4	UA4	UAA-UZZ	092 Mordovia
UK4	UA4	CAA-CZZ	152 Saratov	UK4	UA4	NAA-NZZ	131 Kirov	UK4	UA4	WAA-WZZ	095 Udmurt
UK4	UA4	FAA-FZZ	148 Penza	UK4	UA4	PAA-PZZ	094 Tatar	UK4	UA4	YAA-YZZ	097 Chuvash
UK4	UA4	HAA-HZZ	133 Kuibyshev	UK4	UA4	SAA-SZZ	091 Mari				
UK5	UB5	AAA-AZZ	075 Sumy	UK5	UB5	JAA-JZZ	067 Crimea	UK5	UB5	SAA-SZZ	074 Ivano-Frankovsk
UK5	UB5	BAA-BZZ	076 Ternopol	UK5	UB5	KAA-KZZ	072 Rovno	UK5	UB5	TAA-TZZ	079 Khmelnitskiy
UK5	UB5	CAA-CZZ	080 Cherkassy	UK5	UB5	LAA-LZZ	077 Kharkov	UK5	UB5	UAA-UZZ	065 Kiev
UK5	UB5	DAA-DZZ	063 Transcarpathian	UK5	UB5	MAA-MZZ	059 Voroshilovgrad	UK5	UB5	VAA-VZZ	066 Kirovograd
UK5	UB5	EAA-EZZ	060 Dnepropetrovsk	UK5	UB5	NAA-NZZ	057 Vinnitsa	UK5	UB5	WAA-WZZ	068 Lvov
UK5	UB5	FAA-FZZ	070 Odessa	UK5	UO5	OAA-OZZ	039 Moldavia	UK5	UB5	XAA-XZZ	062 Zhitomir
UK5	UB5	GAA-GZZ	078 Kherson	UK5	UB5	PAA-PZZ	058 Volin	UK5	UB5	YAA-YZZ	082 Chernovtsy
UK5	UB5	HAA-HZZ	071 Poltava	UK5	UB5	QAA-QZZ	064 Zaporozhe	UK5	UB5	ZAA-ZZZ	069 Nikolayev
UK5	UB5	IAA-IZZ	073 Donetsk	UK5	UB5	RAA-RZZ	061 Chernigov				
UK6	UA6	AAA-AZZ	101 Krasnodar	UK6	UA6	IAA-IZZ	089 Kalmyk	UK6	UA6	UAA-UZZ	115 Astrakhan
UK6	UD6	CAA-CZZ	002 Nakhitchevan	UK6	UA6	JAA-JZZ	093 North Osetian	UK6	UF6	VAA-VZZ	013 Abkhazia
UK6	UD6	DAA-DZZ	001 Azerbaijan	UK6	UD6	KAA-KZZ	005 Nagorno-Karabagh	UK6	UA6	WAA-WZZ	086 Dagestan
UK6	UA6	EAA-EZZ	109 Karachai-Cherkes	UK6	UA6	LAA-LZZ	150 Rostov	UK6	UA6	XAA-XZZ	087 Kabardino-Balkar
UK6	UF6	FAA-FZZ	012 Georgia	UK6	UF6	OAA-OZZ	015 South Osetian	UK6	UA6	YAA-YZZ	102 Adygei
UK6	UG6	GAA-GZZ	004 Armenia	UK6	UA6	PAA-PZZ	096 Chechen-Ingush				
UK6	UA6	HAA-HZZ	108 Stavropol	UK6	UF6	QAA-QZZ	014 Adzhar				
UK7	UL7	AAA-AZZ	179 Mangyshlak	UK7	UL7	IAA-IZZ	017 Aktyubinsk	UK7	UL7	PAA-PZZ	023 Karaganda
UK7	UL7	BAA-BZZ	016 Tselinograd	UK7	UL7	JAA-JZZ	019 East Kazakhstan	UK7	UL7	RAA-RZZ	178 Dzhezkazgan
UK7	UL7	CAA-CZZ	028 North Kazakhstan	UK7	UL7	KAA-KZZ	024 Kzyl-Orda	UK7	UL7	TAA-TZZ	021 Dzhambul
UK7	UL7	DAA-DZZ	029 Semipalatinsk	UK7	UL7	LAA-LZZ	026 Kustanay	UK7	UL7	VAA-VZZ	030 Taldy-Kurgan
UK7	UL7	EAA-EZZ	025 Kokchetav	UK7	UL7	MAA-MZZ	022 Uralsk	UK7	UL7	YAA-YZZ	176 Turgay
UK7	UL7	FAA-FZZ	027 Pavlodar	UK7	UL7	NAA-NZZ	031 Chimkent				
UK7	UL7	GAA-GZZ	018 Alma Ata	UK7	UL7	OAA-OZZ	020 Guryev				
UK8	UI8	AAA-AZZ	053 Tashkent	UK8	UJ8	KAA-KZZ	182 Kuiyab	UK8	UJ8	SAA-SZZ	041 Leninabad
UK8	UH8	BAA-BZZ	180 Krasnovodsk	UK8	UI8	LAA-LMZ	048 Bokhara	UK8	UI8	TAA-TZZ	052 Surkhandarla
UK8	UI8	CAA-CZZ	049 Kashka-Darya	UK8	UI8	LMA-LZZ	185 Novoya	UK8	UI8	UAA-UZZ	035 Khoreza
UK8	UI8	DAA-DZZ	173 Syr-Darya	UK8	UH8	MAA-MZZ	036 Kirghiz	UK8	UI8	VAA-VZZ	181 Djizak
UK8	UH8	EAA-EZZ	044 Mary	UK8	UH8	NAA-NZZ	034 Osh	UK8	UH8	WAA-WZZ	045 Tashauz
UK8	UI8	FAA-FZZ	047 Andizhan	UK8	UI8	OAA-OZZ	050 Namangan	UK8	UJ8	XAA-XZZ	183 Kurgan-Tyubinsk
UK8	UI8	GAA-GZZ	054 Fergana	UK8	UH8	PAA-PMZ	177 Naryn	UK8	UH8	YAA-YZZ	046 Chardzhou
UK8	UH8	HAA-HZZ	043 Ashkhabad	UK8	UH8	PNA-PZZ	184 Talass	UK8	UI8	ZAA-ZZZ	056 Kara-Kalpak
UK8	UI8	IAA-IZZ	051 Samarkand	UK8	UH8	QAA-QZZ	033 Issyk-Kul				
UK8	UJ8	JAA-JZZ	040 Tadzhik	UK8	UJ8	RAA-RZZ	042 Gorno-Badakhshan				
UK9	UA9	AAA-AZZ	165 Chelyabinsk 17	UK9	UA9	KAA-KZZ	163 Yamal-Nenets 17	UK9	UA9	UAA-UZZ	130 Kemerovo 18
UK9	UA9	CAA-CZZ	154 Sverdlovsk 17	UK9	UA9	LAA-LZZ	161 Tumen 17	UK9	UA9	WAA-WZZ	084 Bashkir 16
UK9	UA9	FAA-FZZ	140 Perm 17	UK9	UA9	MAA-MZZ	146 Omsk 17	UK9	UA9	XAA-XZZ	090 Komi 17
UK9	UA9	GAA-GZZ	141 Komi-Permiak 17	UK9	UA9	OAA-OZZ	145 Novosibirsk 18	UK9	UA9	YAA-YZZ	099 Altai 18
UK9	UA9	HAA-HZZ	153 Tomsk 18	UK9	UA9	QAA-QZZ	134 Kurgan 17	UK9	UA9	ZAA-ZZZ	100 Gorno-Altai 18
UK9	UA9	JAA-JZZ	162 Khanty-Mansi 17	UK9	UA9	SAA-SZZ	167 Orenburg 16				
UKø	UAø	AAA-AZZ	103 Krasnoyarsk 18	UKø	UAø	JAA-JZZ	112 Amur 19	UKø	UAø	UAA-UZZ	166 Chita 18
UKø	UAø	BAA-BZZ	105 Taimyr 18	UKø	UAø	KAA-KZZ	139 Chukotka 19	UKø	UAø	VAA-VZZ	175 Aginsk Buriat 18
UKø	UAø	CAA-CZZ	110 Khabarovsk 19	UKø	UAø	LAA-LZZ	107 Primorye 19	UKø	UAø	WAA-WZZ	104 Khakassa 18
UKø	UAø	DAA-DZZ	111 Jewish 19	UKø	UAø	OAA-OZZ	095 Buryat 18	UKø	UAø	XAA-XZZ	129 Koryak 19
UKø	UAø	FAA-FZZ	153 Sakhalin 19	UKø	UAø	QAA-QZZ	098 Yakutsk 19	UKø	UAø	YAA-YZZ	159 Tuva 23
UKø	UAø	HAA-HZZ	106 Evenk 18	UKø	UAø	SAA-SZZ	124 Irkutsk 18	UKø	UAø	ZAA-ZZZ	128 Kamchatka 19
UKø	UAø	IAA-IZZ	138 Magadan 19	UKø	UAø	TAA-TZZ	174 Ust-Orda Buriat 18				

Oblast 171 = Arctica (4Kø) Oblast 172 = Antarctica (4K1) deleted Oblasts:- 011 032 035 061 116

GAREX (G3ZV1)

SX200-N



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•PROCEDURES• 4

Basic operating procedures becomes a little more advanced this month, as Nigel Gresley explains what happens during a contest. Basically, the idea is to work as many stations as possible, so there will be times when the frequencies are jam-packed (ham-packed?) with various nefarious goings on.

Last month, you remember that our heroes were getting their stations sorted out. Well, one of them was anyway, and getting a newish linear amplifier to behave itself. Incidentally, for the benefit of a couple of people who wrote in, yes we *will* be looking at procedures on the HF bands later on, and yes we *will* be looking at Morse and how to get the best out of it; just hang in there. We started with operation on VHF since it's where a lot of people begin these days, not because we don't like HF or anything – just bear with us, fellas!

So, one of the things you may well come across one fine and sunny weekend as you tune the SSB end of the 144MHz band is:

... CQ contest, CQ contest, Golf Six Zulu Zulu Zulu calling CQ contest and by.

What can this mean? Further investigation shows that practically every available frequency is full of such goings-on and there are all sorts of odd things being said. Let's take a look at what's afoot.

Contests are things people either love or loathe – very few feel neutral about them. Basically, the idea is to work as many stations as possible as far away as possible, since the scoring system for all VHF-type contests takes account of both, and if you're in for it at all seriously you'll either lug vast amounts of gear up some Welsh mountain or wherever and drive yourself barmy for 24 hours or you'll spend ages getting the home station in good fettle. There are several sorts of contest and you'll get the hang of them all later on in your career, but the idea this month is to show you how to operate in a contest, more or less.

What you will tend to hear is something like the CQ call we overheard above; it's just an ordinary CQ call but it doesn't last long and the word "contest" gets thrown in somewhere. Contest-type CQ calls don't go on for ages, either – at most they last about fifteen seconds unless it's either the middle of the night and no-one's about or the band just ain't propagating to anywhere. Surprise, surprise, it seems to be our old mate Jim doing his stuff – let's see whether anything happens:

"G6ZZZ, this is Golf Mike Four Yankee Yankee Yankee calling and by"

"GM4YYY from G6ZZZ, you are five three one one three in Alfa Lima five to Juliet, three K west of Sevenoaks, go ahead"

"Roger, from GM4YYY, you are five five zero one four in Yankee Romeo six zero golf, the city of Aberdeen, QSL?"

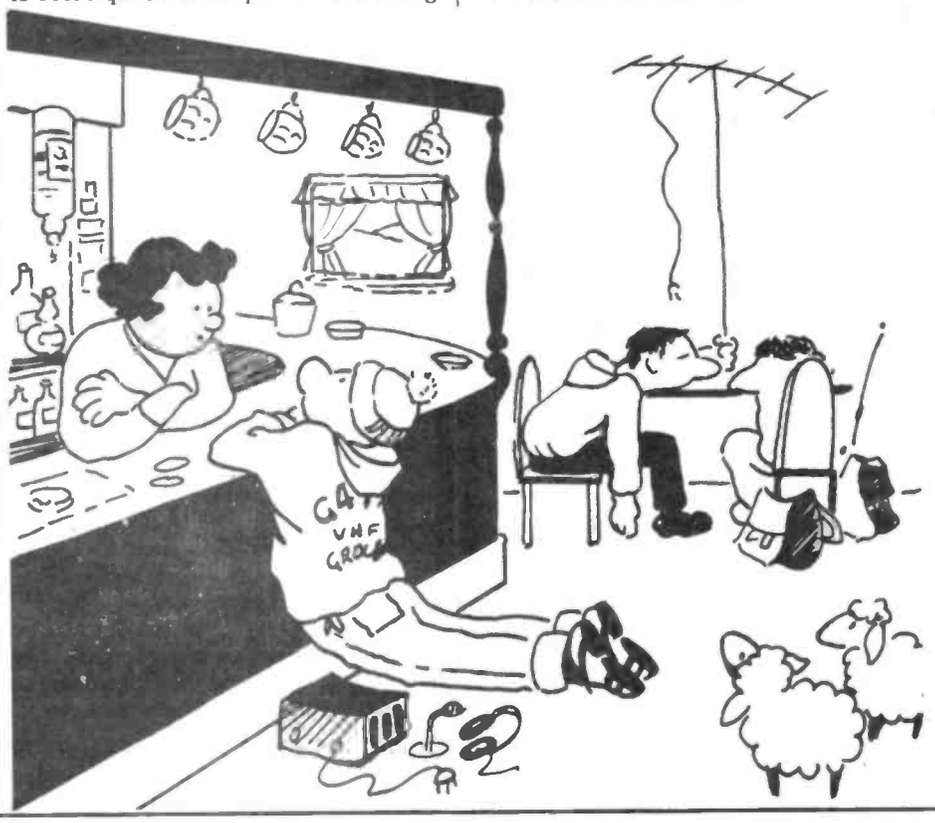
"Roger roger, many thanks, good luck in the contest. Golf Mike Four Yankee Yankee, Golf Six Zulu Zulu Zulu clear, Golf Six Zulu Zulu Zulu calling CQ contest and listening"

So there was a typical contest exchange. It's all over in about thirty seconds. You might well be flabbergasted at how quickly and with what little ceremony G6ZZZ has a contact with what is a very choice piece of DX by any standards but he's obviously a good operator who's out to waste as little time as possible and press on rapidly from one contact to the next at a great rate of knots.

After all, if he can work a dozen or so stations in that part of the world he's going to score quite a lot of points – it's a long way from Sevenoaks to Aberdeen under average conditions – so he wants to maximise the number of contacts if he possibly can.

Let's look at what was actually said. The Scot's station, GM4YYY, called Jim after his CQ – just a short call, no messing. Now quite possibly a number of stations called G6ZZZ – if he's a good signal in points north, they might well have done – but we can look at that in a tick. Let's assume for now that this contact took place on a fairly clear channel. G6ZZZ goes back with the contest report – he says "you are five three one one three".

This is a combination of two things. The first two figures – 5 and 3 – are the ordinary bog-standard signal report which one station would give to another whether or not it was a contest; in other words, GM4YYY is readability 5 and strength 3 at G6ZZZ. The other three numbers are the so-called "serial number 001, or zero zero one – in other words, if you work one of your locals ten seconds after the contest has started, you're quite likely to give him a report of "five nine zero zero one".



STARTING FROM SCRATCH

As the computer chaps would say, for each contact you increment the serial number by one, or, in other words, the next contact after your first will be given the serial 002. And so on. GM6YYY is obviously the 113th contact that G6ZZZ has had since he started operating in the contest, and so on.

G6ZZZ has also told the Scots laddie what QTH square he is in, and this is most important. In order to consider a contact as complete, it is necessary for the other station to copy the report and serial number and the QTH locator – and in some contests you need to pass a physical location as well, which we'll look at in a bit. The full QTH locator, of the form AL52j, must be given and copied by the other station, and you in turn must copy his details, for the contact to be counted as valid for points.

G6ZZZ also added the fact that he was "three K west of Sevenoaks" after the QTH locator. This is not required for all contests, and it seems that it's a peculiarly British requirement since if you asked a continental station for his location he'd simply pass you the QTH locator. It's probably a hang-over from the days when the QTH locator system didn't exist, and certainly in the majority of VHF and UHF contests these days it isn't required.

Majority of contests in the UK are organised by the RSGB.

Perhaps we ought to say at this point that the majority of contests in the UK are organised by the RSGB – the VHF Contests Committee make the rules, publish the log sheets, mark the results and publish them and on the whole they do it very well indeed. RSGB contest rules get published in *Radio Communication*, and you need to read them carefully to find out whether, for instance, you need to give a physical location or not. A few other bodies organise them as well; there was a "Worked All Britain VHF/UHF" contest recently, in which we didn't take part, and there was a low-power 144MHz contest organised by *Practical Wireless* a couple of weekends before that, in which we did incredibly badly for some reason which we haven't yet found out. We were out portable on what we thought was a prime site in the Chilterns, but either folks weren't beaming our way or the receiver had an off day – oh well, never mind!

Anyway, back to the salt mine. We've seen a fairly ordinary contact just now, but let's assume that G6ZZZ has just called CQ contest again and this is what we hear:

"Several stations calling – the station with Golf Mike in the callsign, come again please, G6ZZZ"

All we hear is a lot of white noise . . .

"From Golf Six Zulu Zulu Zulu – I'm sorry, you're very weak. Please try again, the station with Golf Mike in the callsign only please, go ahead"

If we use our imagination, we think we hear a real weakie in the noise.

"Golf India Six Charlie Golf Mike – Golf India Six Charlie Golf Mike – roger, roger, you are four one one one five, four one one five in Alfa Lima five two Juliet, Alfa Lima Five two Juliet. Do you copy? Golf India Six Charlie Golf Mike from Golf Six Zulu Zulu Zulu, over"

We don't really hear a thing; we sit listening, awaiting events.

"Please repeat your QTH locator. Please repeat your QTH locator, from Q6ZZZ"

We still can't hear anything . . .

"Roger, roger, roger; many thanks for persevering. Golf Six Zulu Zulu Zulu clear with GI6CGM and listening for the station in Yankee Oscar. QRZ the station in Yankee Oscar, from G6ZZZ"

In other words, it's quite legitimate to build the contact up bit by bit – and it's quite common when you have a weak DX station calling you on a busy band and the interference level is very high. What happened was that several stations called G6ZZZ. He probably went for the callsign with Golf Mike in it because he may have heard a bit of Irish accent and sensed that it was going to be a good high-scoring contact, or he may have seen somewhere that GI6CGM runs a lot of power from a good site and stored the fact up in his memory for a rainy day.

Good contest operators are like this; they seem to have a nose for the best contacts, and even a whiff of an accent or a familiar-sounding call is enough to make them latch their ears to the rig and pull the contact through come what may.

So G6ZZZ asked for the station with Golf Mike in the callsign to come again and he did so; at a guess G6ZZZ's beam wasn't pointing towards Northern Ireland at the time and he was probably turning it as he spoke. He then got the callsign correctly and gave him a report based on that, which is quite legitimate; his signal report and serial number. Jim then asked the GI6 top go ahead, but obviously he didn't manage to copy the QTH locator and asked him to repeat it. Probably the GI6 would have sent something like:

"From GI6CMG – the QTH is Whisky Oscar two four golf, Whisky Oscar two four golf, WO24g, go ahead"

. . . amd G6ZZZ obviously copied that. So another good contact was complete.

Tactics are quite important in contests, especially if you're in for them seriously; contest tactics aren't really a subject for now and we'll discuss them later, but the operating implications go something like is. Unless you (a) have a good site (b) have stacks of power and (c) you're in a rare QTH locator – preferably all three – you're wasting your time and cluttering up the band sitting there and bleating "CQ contest" if you're just hoping to work a few new squares or counties or whatever.

To get the best possible signal . . .

G6ZZZ is obviously in for it seriously – it's probably the end-of-year 144MHz Fixed contest, which is always fun and in which we always come about fourth from the bottom! Note that he's also remembered that a station in Yankee Oscar square was calling him – that's not to be sneezed at either, and he probably swung the beam a bit just as he was signing with the GI station so as to get the best possible signal into that part of the world.

Even if you're not seriously in for the contest, they're always a good way of working some new squares or counties or what-have-you, and the cardinal rule under these circumstances is to listen; get a feel for what propagation is like and, if possible, listen to one of your locals who's having a serious crack at it with a big signal and see who he's working and what you can hear.

Other than that, the only other thing to know about contests is that you're quite likely to hear some lousy signals from groups who haven't got their act together. Don't afraid to tell them so, provided that you're quite sure it's them and not your receiver giving up the ghost. Contests bring out all the big signals and your front-end is quite likely to wonder what the hell has hit it.

That's about it for now. Next month we'll have a dekko at basic CW contacts. 73 and good luck in the contest!

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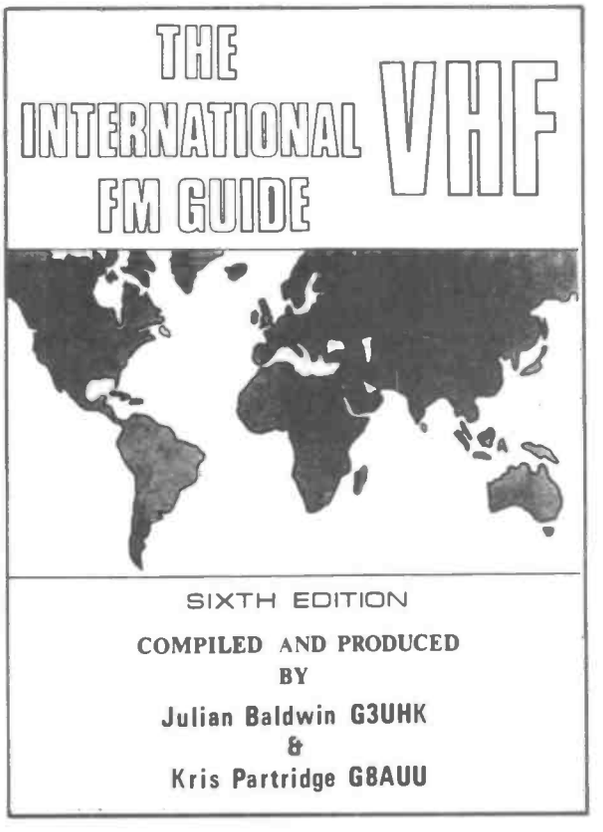

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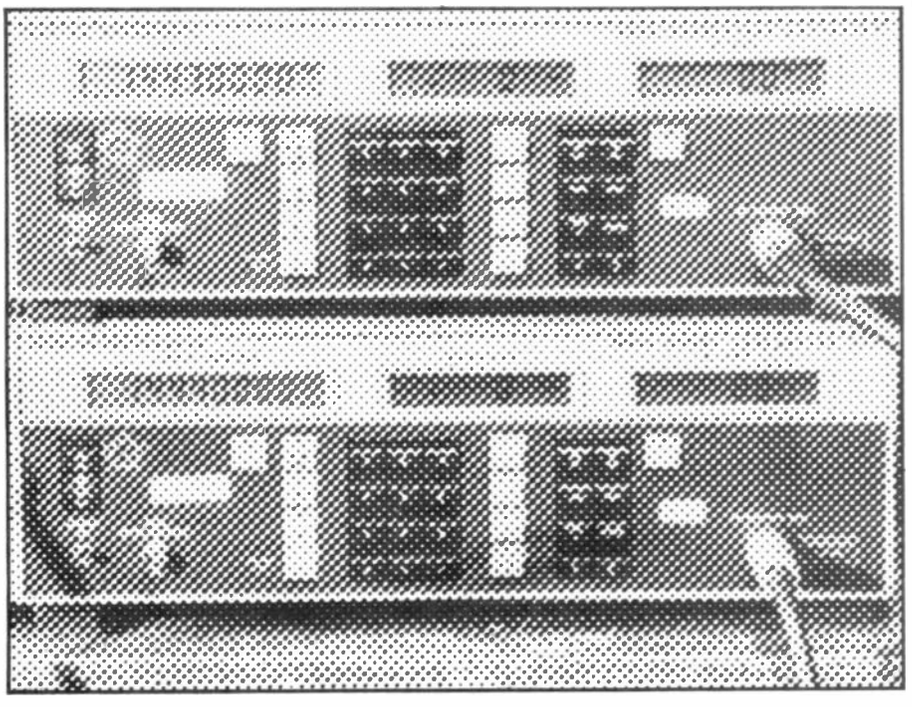


From the lab to the shack

Angus McKenzie, G30SS, continues his discussion on laboratory testing and measurements, this month expanding reciprocal noise, and how someone with what seems to be a perfect transmitting voice, is in fact, disastrously inadequate. G30SS, for example, has a hole in the energy output in his voice, making him difficult to understand for some people!

We normally think of image ratio problems existing in older short wave or medium wave receivers, having low intermediate frequencies of around 455kHz, for example.

The majority of sets today have all manner of different IFs, and as often as not the lowest one would be appreciably higher than 455kHz. Let's take a look at some typical problems which can occur in practice, and how they have to be checked in the lab.

High first IF

Quite a number of excellent receivers are now fitted with a first IF as high as 70MHz, as you know and so we'll have a look at what can go wrong in such a design if it's badly made or quality controlled. Let us suppose the local oscillator runs high, ie between 70 and 100MHz, thus beating with the incoming signal of 0-30MHz to give general coverage.

This first IF of 70MHz may be mixed down to a lower one with a second local oscillator which is variable over perhaps a 500kHz band. The second IF might then have switchable filters followed by amplification and detection. So that the second local oscillator can tune over a range covered by the band pass of the first IF, its range might have to cover 500kHz, and note that spuril of this second local oscillator can actually come out into the first IF and cause whistles by beating with synthesiser harmonics.

The first local oscillator is often crystal controlled, as in receivers such as the Collins range, or the local oscillator frequency may be the harmonic of a much lower frequency source in which a phase lock loop controlled complex circuit is used to select the appropriate harmonic and reject others. How about 84.5MHz as a first local oscillator frequency? 14.0 to 14.5MHz would be frequency-changed up to 70.5 to 70.0MHz (note that the first IF is inverted). The image frequency band would be 154.5 to 155.0.

This particular band is fairly harmless, but we can think of other local oscillator frequencies which would be embarrassing! 74MHz local oscillator would allow 3.5 to 4.0MHz to be picked up, but at the same time, the image response would be, most delightfully, 144.0 to 144.5MHz!

Just imagine that you were trying to hook up, working somebody crossband on 2m and 80m, and you can see that you might well have a problem!

If the filters on your receiver were not excellent, then you could even pick up a local 2m signal quite easily. Perhaps the receiver has the local oscillator running below the first IF, so that local oscillator frequencies from 70 down to 40MHz would give a frequency coverage from 0 to 30MHz with the IF at 70MHz. The image then becomes 110 to 140MHz. If you now work out image responses resulting from harmonics of the local oscillator beating with various input signals, or their IM products or harmonics, you will see how many spurii will arrive at the first IF. Add to these a few lurking harmonics of the second IF, and a few beats with the product detector frequency, and one begins to wonder how a multi IF set works at all!

Let's see how annoying birdies crop up

Whilst we are on the subject of image response and other birdies, may I refer readers back to comments I made on transverters and black boxes in a recent issue of *Amateur Radio*? Taking just one example in practice, let's see how annoying birdies crop up. My four metre transverter on receive converts 70MHz straight down to 28MHz, the local oscillator crystal being 42MHz. This 42MHz crystal side chain develops some third harmonic distortion at 126MHz. This beats with band 11 between 98 and 97.5MHz to give me two or three local radio stations apparently in the 70MHz band!

In order to get rid of them I have had to severely degrade the performance of the transverter by steepening up the Q of its input circuitry, and lose out badly on noise figure, thus necessitating an external RF sensed pre-amp.

Returning to reciprocal mixing, I use for the time being an old Marconi 995 valve generator for developing a high level moderately noise-free signal, rather than one of my modern Marconi 2019 generators. The specification that matters here is how many dB down the sideband noise is per Hz bandwidth when referring to the level of the carrier.

A specification such as Marconi give for their latest magnificent 2019 machine of — 140dBc per Hz may at first look impressive when related to 100kHz at least away from the carrier. But it gets worse nearer the carrier, perhaps by 10dB. In a bandwidth of 2.5kHz this figure would be equivalent to noise some 34dB higher, ie, the generator sidebands might be only 94dB down on the carrier level.

As we get nearer the carrier, the sideband noise specification gets worse and worse, and one can get to a situation where this sideband noise of the oscillator source is in the same territory as is the selectivity breakthrough of the set being measured, and so an engineer must be aware of the failings of his test equipment.

An alternative method to developing an extremely quiet source signal, using (for example) a crystal-controlled oscillator in a very quiet amplifier, is to use in-line crystal filters matched in and out to 50ohms at the frequency required to be clean, for example 28.6MHz, or perhaps 144.25MHz. The use of such filters at frequencies above 160MHz or so is extremely awkward, and the filters themselves become less frequency stable, especially with temperature variations at higher frequencies, since they would be working on incredibly high overtones.

This problem is actually quite severe if you have to measure UHF equipment; for this reason it is better to use a crystal-controlled oscillator and any necessary multipliers, in extremely quiet circuits, to give the best possible rejection of sideband noise, particularly when UHF rigs are being checked.

Most receivers have two separate stages of filtering. The first stage may have a roofing filter or filters, with very steep attenuation outside the pass band and are usually employed at the first IF, whilst the second includes various filters at a lower IF. These roofing filters can have two very different purposes; the first to establish the basic bandwidth of the first IF, whereas the second can serve as one skirt of the IF selectivity, which can be variable by shifting very slightly the frequencies of the first and second local oscillators. In the latter case one filter can be high of the first IF, whereas the second one can be low of the second IF, and by raising and lowering the local oscillators' frequencies, total bandwidth can be changed.

Advantages in using different types of filter

Let's have a look at the filter requirements for different modes and see what advantages and disadvantages there are in using different types of filter. An AM transmission, including music, which hopefully might be of entertainment value, can often benefit by a filter bandwidth of as wide as 10kHz, this allowing frequencies of up to 5kHz to be demodulated. Many medium and short wave broadcasting stations transmit as wide a response as this.

If we are only concerned with speech then a 6kHz bandwidth is a reasonable compromise, but the skirts must be as steep as possible. One problem starts rearing its ugly head, though, for as you reduce the bandwidth on AM you are cutting HF normally without attenuating LF, and so the audio gets more and more woofy. It is, therefore, a good idea to have a bass cut switch when narrower AM filters are being employed, so that the LF end of the transmission does not overpower the readability of the consonants and sibilants.

"The use of the 1.8kHz filter would give a disastrous result if it was set to operate from 100Hz to 1.9kHz . . ."

AM is very wasteful on band width, though, since resolving an AM transmission up to 3kHz of audio, requires a 6kHz filter bandwidth. Since to balance the audio reasonably you are likely to require an LF cut below 300Hz, you are wasting 600Hz of bandwidth.

With SSB we only need 2.7kHz bandwidth for a response extending from 300Hz to 3kHz of audio, and thus the background noise in 2.7kHz rather than 6kHz bandwidth will be 3.5dB less. The use of the narrower filter for SSB thus gains in signal to noise ratio, compared with using the AM filter for the same purpose. But a filter not only has to reduce background noise from receiver circuits etc, it also can reject interference from adjacent transmissions by slicing off the passband at just above and below the required bandwidth for optimum intelligibility.

Many rigs are fitted with a choice of filters for SSB, say 1.8, 2.4, and 3kHz bandwidths. The use of the 1.8kHz filter would give a disastrous result if it was set to operate from 100Hz to 1.9kHz, and would sound much better if it was set to pass the band from, say, 450Hz to 2.25 kHz, all these frequencies being those referred to the position of a correctly reinserted carrier, thus giving correct audio output frequencies.

Such a narrow filter as 1.8kHz would tend to cause considerable listening fatigue, since the brain would have to concentrate hard on determining which vowel sound was present at any particular moment, as well as which consonant etc.

Differences between B and P, M and N, F and S, are typical problem areas when audio bandwidth is severely restricted. However, the use of such a filter as is provided on the (say) Drake TR7 with very steep skirts, makes it possible to receive a station on an LF or HF band which would otherwise be almost unreadable with a wider filter, or one having much shallower side skirts. A filter should almost knife out interference when it is tuned off it.

But how about using filters for VHF and UHF and CW applications? If you are interested in DX, then hopefully your main interference is band noise and ignition, rather thn QRM. If you can reduce the filter bandwidth to the point where you just begin to lose intelligibility, or vowel sounds at LF, and consonants etc at HF, you will find that you will have chosen around 2.5kHz bandwidth.

It's my opinion that reducing bandwidth any further than this reduces intelligibility of a weak signal on SSB faster than any improvement in signal-to-noise that might occur at the same time. It must also be remembered that whilst the brain can be very confused by adjacent channel chatter and interference, it has a remarkable facility for pulling out weak speech or CW from noise which is roughly equivalent to pure white noise, even when this is crackly.

We did some interesting tests on the ability of the brain to pick out a CW carrier from white noise where the upper and lower limits of the noise were varied, whilst the CW freqency was held constant. We also varied the level of the CW. Readers may be surprised to know that in a 3kHz wide band extending from 500Hz to 3.5kHz, with the CW signal at 1kHz, the CW note was audible even when it was 20dB below the RMS level of the noise. At this level, the CW speed would have to be very slow for the message to be recovered.

Fascinating listening to CW signals

With the CW level at 12dB below noise, copy was very easy and solid, thus representing a signal level of only 0.005 micro volts (five nano volts)! This signal could be received on 23cm with a GaAs FET pre-amp at mast head and with filter bandwidth at around 2kHz.

What was fascinating in listening to CW was that most of us did not receive weak CW significantly better when bandwidth was reduced, provided interference was not present. I found that listening fatigue became intense when listening to CW at 250Hz bandwidth, since the filter was ringing very badly, making it quite difficult to hear differences between dits and dahs, particularly when somebody was sending CW with insufficient discrimination between these.

500Hz was better, but 1kHz was better still, although of course much QRM might then cause reduced readability on a crowded band.

From the lab to the shack

So the facility for varying bandwidth is extremely useful, particularly if its relative position to the carrier can also be changed. It is worth pointing out that the Datong range of filters is excellent, particularly if your rig has only one or two filters.

Note that different voices may well require different filter bandwidths and relative positions from the carrier. I performed some tests last year with Charles and Petra Suckling (G3WDG and G4KGC), my wife Fiona and myself, by recording each of us in turn on to a digital recorder using a very high quality studio microphone, and then obtaining a real time analyser plot of a random section of each of our voices.

The energy/frequency distributions are very different, and it can be seen that different bandwidths and positions would be required for the most efficient transmission of our intelligence!

"I have good diction . . ."

My voice has a hole in the energy output at around 2.5kHz but most inconveniently I seem to spit out important information significantly above 3kHz. This has actually led to some people having difficulty in understanding what I am saying on a bad telephone line, although I am told that I have good diction. Charles also has a similar dip in the same region (but not so deep) and again has a slight peak above 3kHz, and his voice comes over rather better on a narrow band communcation system. Petra's voice, for the most economical bandwidth, reproduced very well from 450Hz to around 2.8kHz; thus, all these differences show that filter positions and even various microphones can make an enormous difference to the readability of any particular voice.

As often as not, though, a receiver has a series of fixed IF bandwidths for various modes, the different filters being switched in by selecting these together with narrow or wide filters. The Drake TR7 has four filter positions, and most users would select one for CW, two for SSB (narrow and wide), and the final one for AM reception, all these filters working well.

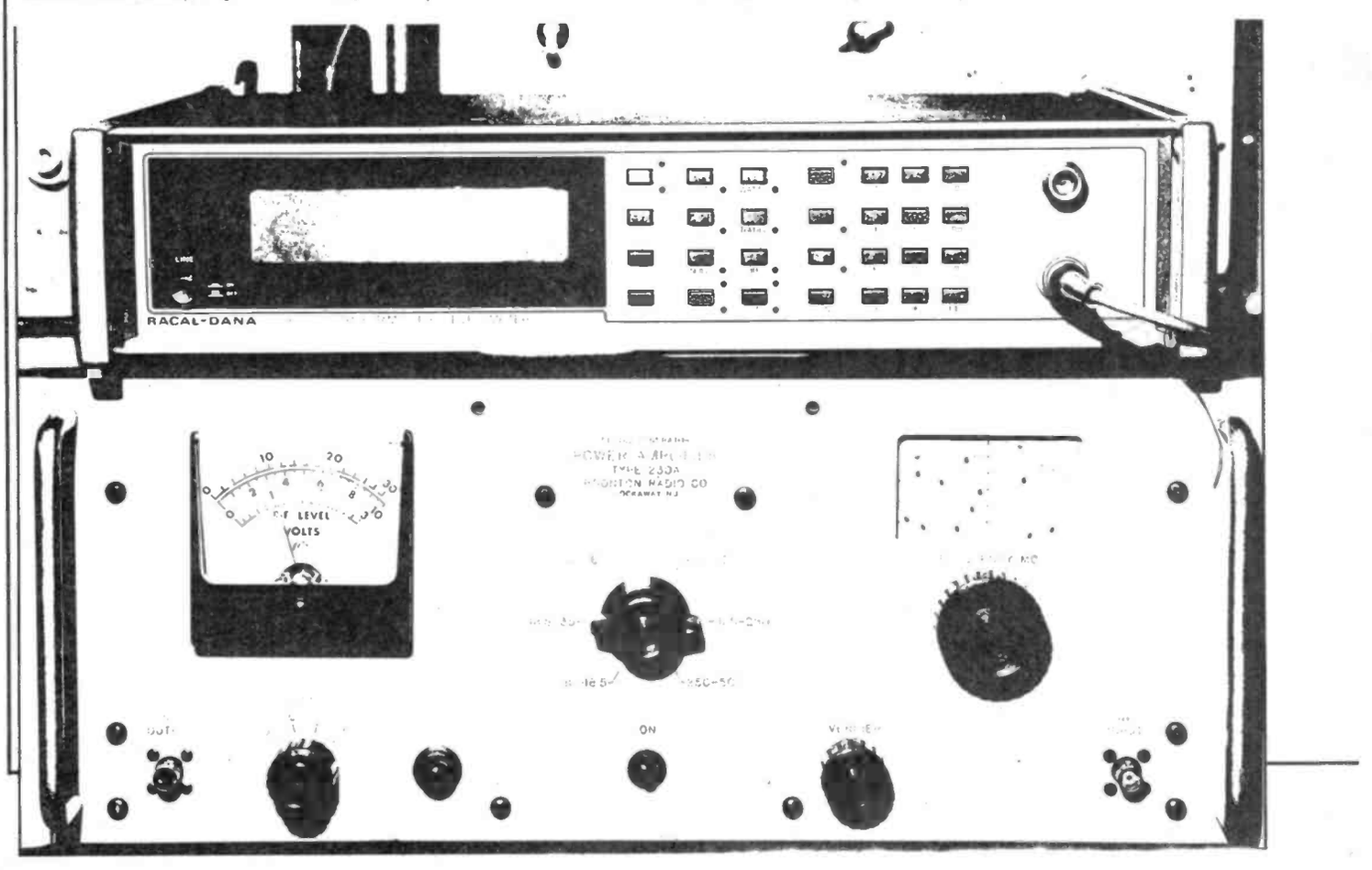
There are two important measurements for filters within a receiver, the first being the determination of the amount of ripple within the filter pass band, the other to measure the steepness of the skirt. The selectivity can be measured in many ways to determine the effective filter shape, and one can find the 3dB or 6dB point, then the 40dB and 60dB down points on either side of the pass band. Shape factor is normally given as the bandwidth ratio between 3dB down points and 60dB down points, but many problems affect these measurements. Furthermore, I have sometimes seen shape factor referred to and the ratio between six and 60dB bandwidths. Selectivity can be measured in many ways by using or not using S meters, and with AGC on or off.

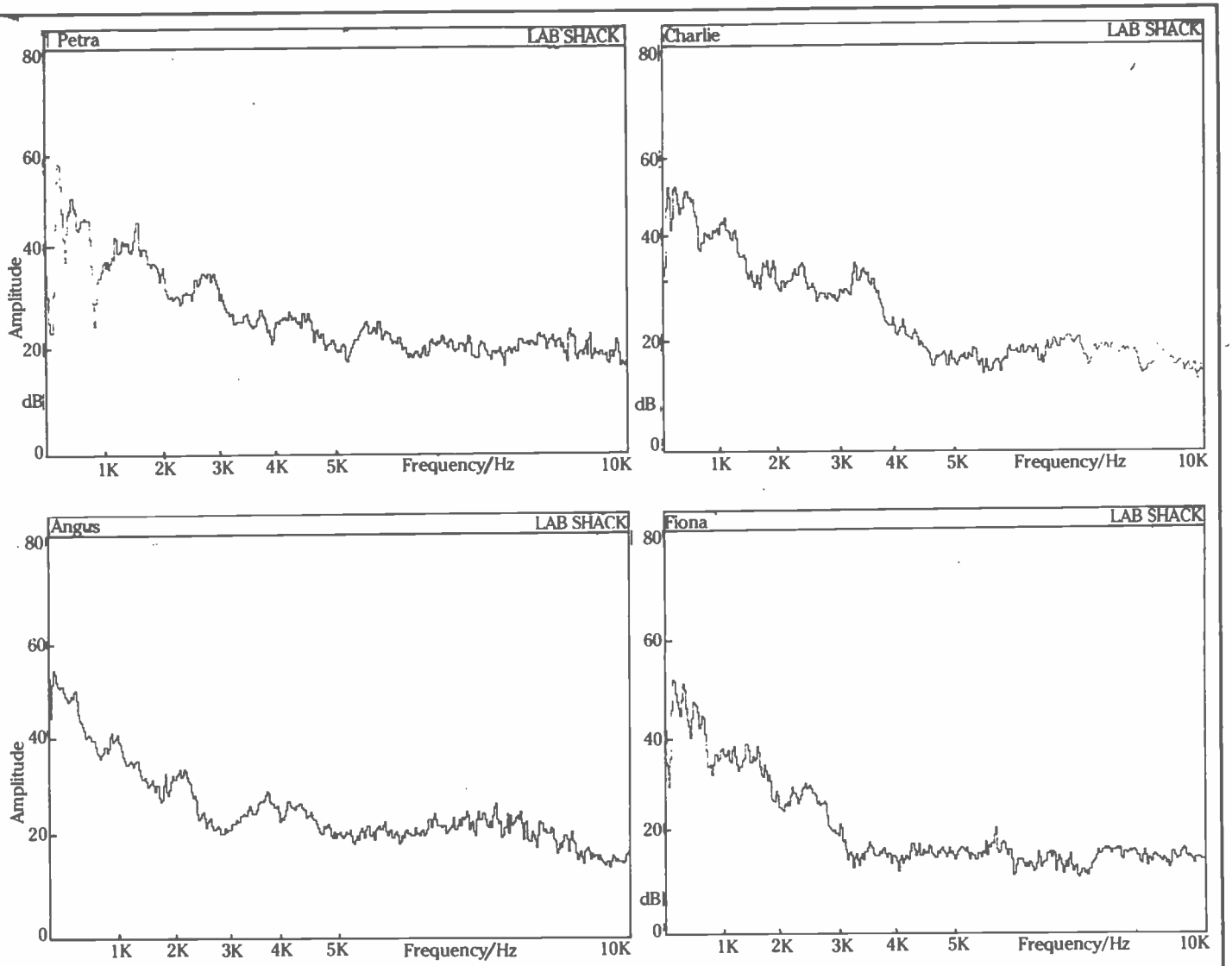
It is not necessarily a simply parameter to measure, but here is one suggested method that we use for determining the bandwidth of the IF of a short wave receiver. We would first calibrate an S meter at a frequency of, say, 28.6MHz from S1 to S9, paying particular attention to passband ripple. We would then send a signal from the generator which averages S5 for example, which measures evenly across the centre of the passband. We would then increase the signal generator output level by 3dB from its original level of X microvolts and tune the receiver, or the generator, to find the two frequencies which give an S5 reading again. The difference between these two frequencies is then bandwidth for 3dB down.

For 6dB down points, the original X microvolts is stepped up by 6dB and for 60dB down, for example, the generator is stepped up to X millivolts, the same procedure being adopted. There are snags sometimes in this method, particularly if some of the AGC voltage is fed back to stages after the filter.

An alternative method is to switch the AGC off and pick off some IF after the filters with an appropriate probe to an external and extremely accurate receiver, or spectrum analyser, tuned to the IF frequency, but itself having a much wider IF than that which is to be measured. The signal generator can then be moved or swept across the main tuned-in frequency, and an IF curve drawn on a chart recorder of the receiver output.

With this technique when AGC is (of course) switched off, one has to be careful that the maximum allowable dynamic range of the IF is not exceeded; too high a level at the top of the curve could possibly clip the later IF amplifiers, causing erroneous measurements. One has to bear in mind the signal to noise ratio of the receiver IF stages, and quite frankly some of them are so poor that using this method to measure IF selectivity is not particularly helpful. A fast sweeper which is fast enough to sweep across the IF, and return before AGC switched to 'long' has a time to recover, can be a very useful way of obtaining a clean curve, but the sweep speed must be chosen extremely carefully so as to avoid filter ringing. I have known of many cases where somebody has obtained totally





erroneous IF bandwidths with a too fast sweep speed, used in an attempt to defeat an AGC that was itself also too fast.

Measuring sensitivity

An alternative method for measuring selectivity, if AGC can be switched off, is to put the output from the last IF into an RF RMS reading voltmeter, and note the noise of the receiver from a 50ohm load, and then add the output from the signal generator until the noise level increased by 3dB. The signal generator is then delivering a carrier having a level equal to the receiver's noise. This is a good way of measuring sensitivity, incidentally.

This carrier can then be stepped up in level by the required number of dBs and the bandwidth noted, which gives 3dB above noise readings. This method is more difficult, as the noise can be bumpy, but in this case you are measuring selectivity at a very low level, which sometimes is not the same as at high levels. Low level selectivity often seems narrower. It is sometimes difficult to obtain selectivity for —60dB because of a number of problem conditions including noisy signal generator sidebands, poor reciprocal mixing performance of the receiver, and low level leakage across the filter in/out connections.

Even synthesiser harmonics, or spurii breakthroughs can cause a selectivity to measure poorer than it might be. One must also be extremely careful to ensure that you are not picking up any breakthroughs from local oscillators, or product detectors themselves, which can muck up readings. The perfect IF curve has an almost flat top, and then very steep sides, and mechanical filters of various forms can produce remarkable shape factors, but are very expensive. Various types of ceramic and crystal filters can be fitted,and they all have their own typical characteristics.

I remember once an old timer bringing around to me a secondhand G2DAF transmitter (an old but highly respectable design for the home constructor). He had had many complaints of very poor speech quality, and tried any microphones,but with no improvement. He did not have much test equipment, and so I offered to have a look at the rig, provided that he had circuit and alignment instructions.

The measurements were absolutely fascinating; we interconnected a low level audio oscillator to the microphone input state, and put the output of the rig, via a power attenuator, into the spectrum analyser. We first peaked up all the stages, and promptly gained 6dB in maximum power output. We then set an average level at the mic input to obtain a tenth of the full power, and swept the audio from 100Hz to 4kHz, and we could see that peak output was reached at 300Hz and 3kHz but with 1kHz at around —15dB, thus giving an M-shaped response.

By tweaking the input and output filter matching transformers carefully, and by the odd twiddle and push at the crystals, it did not take very long to correct this response to a passband of +/—1dB ref. 1kHz, from 300Hz to around 2.7kHz. It was quite stunning to see how, in the next few weeks, my friend obtained so much more DX, and had excellent modulation reports, resulting from perhaps a maximum of two hours work.

Surprisingly incorrect

Whilst on this subject, I have often noted that nominal settings for lower and upper SSB, with reference to the carrier point, can be surprisingly incorrect, particularly on transmissions, but I shall cover this when dealing with transmitters later in this series.

Next month I will deal with AGC characteristics, demodulation of various forms, audio distortion, sinad measurements, maximum audio output level, and loudspeaker efficiency and quality. I will also be discussing problems encountered with noise blankers and S-meters.

AMERICAN INTERPRETATION

American technical literature and equipment is a valuable source of ideas and materials, but we sometimes overlook some of the differences between British and American practice and the environment in which equipment is supposed to work. With grateful thanks to Foulsham & Co. Ltd, who publish a wide range of American technical books in the UK, including some that we find indispensable in the office, we've put together several ideas about how to get the best out of American books.

The first point is that the British AC mains supply, which is 240 volts at 50 Hz (well, most of the time anyway) is potentially somewhat more dangerous than typical American mains supplies of 110 or 120 volts at 60Hz. This isn't due only to the higher voltage, but because the British 3-wire system has got 240 volts between line (or phase as they tend to call it these days) and neutral, *and* also between line and earth. What's worse is that there are 240 volts between line, or anything with line volts on it, and any earthed objects. So you do need to watch it, and you really can't be too careful with any mains supply whether it's British, American or Outer Mongolian for that matter.

"... so your American kilowatt linear is going to need a hefty trannie for use in the UK."

Any American equipment, or project, needs adapting for the higher voltage and the best way to do that is to use either a mains transformer with a 240 volt primary and whatever secondary the design needs - preferably not an auto-transformer either - or, failing that, a double-wound 240-to-110 volt isolating transformer. That little item won't be cheap either, if it's of any size. Remember that it's got to have the same sort of rating as the gear it's being used with, so your American kilowatt linear is going to need a hefty trannie for use in the UK.

Just what do those expressions actually mean? And are colour codes the same as they are in Britain? What else? Oh yes, is there any point in buying American radio books if we can't relate between sizes, specifications and equivalents? Editor Drake endeavours to find out.

Next problem is frequency. Most of the time it doesn't matter a lot that a transformer designed for 60Hz use is getting 50Hz through it instead, but many antenna rotator control boxes seem to suffer from overheating transformers because of the lower frequency - we've had a lot of trouble with AR40s over the years, and we've heard a lot about a mod. for them although no-one seems to know what it is! In general, the frequency difference doesn't seem to cause a big problem in practice; in theory you need a bigger core and more iron at lower frequencies but most transformers seem to have something in hand to cope. The only snags are likely to arise if the gear contains some sort of internal clock that's synchronised to the mains supply. We can't think of any amateur equipment that does, mind you, but the thought was there! Some electric motors wouldn't like it either, and you might have problems with American teleprinters, for example, but there are known fixes for them.

Let's take a look at colour codes. As we know, the British code for mains cables these days is **BROWN** for line or phase or live or whatever you want to call it; **BLUE** for neutral, or if you like, the other current-carrying wire, and **GREEN/YELLOW** for earth. Many earth wires we've seen are predominantly green with the thinnest possible yellow streak in them but the general idea is green and yellow. In this country, the idea of the earth lead is to earth exposed metalwork and the only time it carries current is under fault conditions - like when the live lead had shorted to the metalwork. So the integrity of the earth cable is jolly important.

American equipment often doesn't have an earth connection at all, and about all we can usefully say is that it needs treating carefully if there's the slightest chance of any metalwork you might be able to touch becoming live. This is why isolating transformers is A Good Thing, and also why a proper mains transformer and a three-core cable with a proper earth is an Even Better Thing. The good ole U S of A doesn't have such a thing as a colour code (or should it be color code?) for mains leads – they're often both white or grey so **WATCH IT** if you have some American gear. However, red and black, if you can find them, seems to mean the same the world over; red denotes positive or high tension or don't-touch-me-unless-you-want-a-belt, and black tends to mean negative or LT or similar. It meant neutral in older mains leads.

Mains fuses can be lowered in value

One other point about the mains is fuses. Anything used on 240 volt mains will take half as much current as the same thing used on 110 or 120 volt supplies, so any mains fuses can usually be lowered in value by about half as much if you're using an isolating transformer or a British-type mains trannie. Obviously this doesn't apply to any fuse downstream of the main transformer, but if your American kilowatt linear design has a 10amp fuse in its mains lead, you can safely change that for a 5amp component and give yourself a bit more protection.

Next on the list comes general matters. Data in American books may not apply over here, especially in areas such as TV standards and allocation in the radio spectrum. Also, some American components specified in home-brew designs may be virtually unobtainable here, especially with semiconductors and things like variable capacitors and inductors. It can be a real pain trying to suss out what sort of home-brew inductor replaces a Millen part number, for instance, when there's no indication of its value and no explanation in the description of what

A selection of books from the TAB firm, and many contain valuable information, specifications and advice on equipment available all across the world. "Setting up and using your own Ham Shack" looks particularly interesting, although we haven't had the opportunity of reviewing it as yet.

it's there for. The other problem is that American practice in drawing circuit diagrams tend to be a bit different from ours, and you often find that instead of everything being retuned to earth or a negative rail or something there's a line with a chassis symbol on it. It doesn't matter though – it just takes a bit of getting used to it!

Talking about home-brew reminds me that in American books you'll find wire sizes specified in AWG (American Wire Gauge) and there's no direct relationship between AWG and our very own SWG, which stands for Standard Wire Gauge - so there isn't a clever conversion formula which we could publish. However, it just so happens by the merest fluke that some AWG sizes coincide with some SWG sizes, so that 20AWG is the same as 21SWG, 21AWG = 22SWG, 24AWG = 25SWG, 26AWG isn't too far away from 27SWG and 32AWG, which is a common one for inductors of one sort or another in American designs, is midway between 35 and 36SWG. The other problem on the hardware side of things is that screws and bolts in American designs bear no resemblance whatsoever to our metric and BA sizes,but you can usually substitute something that looks about the same without any problems. The only exception we've found is if you lose a nut from an American bolt; you have a problem then and it's usually best to use a metric nut and bolt to replace it.

Batteries and bulbs are different on this side of the pond too. American batteries are usually referred to by letters such as AA, which correspond to our HP7, C, which is our HP11 and D, which is the same as a U2 or HP2 or whatever. Also, US flashlamp bulbs have type numbers which refer to voltage and current rating – one very common one, for instance, is a 'No.47', which is a 6volt 0.03amp device.

Almost any old transistor will do

Just to finish with, there are several books that give details of possible substitutions for semiconductors – Messrs Foulsham do a couple, as do Babani, and the best of all is Tower's International Transistor (or Diode, or what-have-you – there are several) Selector. The problems don't usually happen with integrated circuits, which tend to have type numbers that are common all over the world, but with transistors and diodes and specialised things like thyristors. You'll often find that almost any old transistor will do, and it's a fact that transistor substitution isn't half the difficult thing it's supposed to be, but the more fancy semiconductors *can* be problematic – SCRs, for instance, tend not to have easy substitutes if they're doing something at all tricky like running a switched-mode power supply or an inverter, and you'll sometimes have to go to great trouble and expense to get the original if one goes on you in an existing piece of equipment. In the days when we fixed televisions for a living, there was a particular type of gate turn-off switch used by Sony in one of theirs, and nothing in the world replaces it.

You could fill pages with a glossary of American words and their British equivalents. You won't ever need more than about half-a-dozen and you know them already at a bet, so we won't bother except to remind you that a vacuum tube is a valve and the "plate" of a vacuum tube is the anode of a valve in this country. The only other thing is that whereas we tend to talk about a unit of capacitance known as the picofarad, you'll often find that the States use the micro-microfarad, written uuF. So for uuF, read pF!

There's many a good design in American books, and indeed many a very good piece of US equipment – it's always worth remembering the differences in order to get the best out of our cousins' ideas. Now then – does *anyone* out there know the mod for fixing rotator control boxes so that they don't shut down and take five minutes to work again when you're trying to swing the beam on to that UQ2 on tropo???

WHAT

The idea of this feature is to provide an easy-to-understand guide to all the currently available wirelesses of interest to the amateur and SWL; we list HF transceivers, VHF transceivers, VHF and UHF hand-helds, mobiles and HF receivers. Where

HF transceivers

Icom IC720A	£690	Good performer; includes general coverage Rx
Icom IC730	£580	Good, aimed at mobile use, but nice
Icom IC740	£720	Lovely rig – see review in Issue 3.
Trio TS530S	£520	Very good rig for the newcomer; reliable
Trio TS830S	£645	We love this one – see our review in Issue 2.
TS930S	£1000 approx	We don't know anyone who has one
Trio TS430S	£736	Very new
Yaesu FT102	£785	Nice – see review in Issue 3.
Yaesu FT980	£1115	New, and we haven't yet seen one
Yaesu FT1	£1349	It's a lot of radio, but a lot of bread
Yaesu FT902DM	£885	Rugged, reliable, nice machine
FT101Z	£559	Has got whiskers now, but a good old rig
FT707	£509	Didn't like this one much, but it's adequate.
Drake TR7A	£1199	A lovely machine, great signal handling
Drake TR5	£657	We'd love to review one . . .
Collins KWM380	£2195	It ought to be good for the price!
KW/Ten-Tec Argosy	£?	A good name, but we don't know the rig.
Yaesu FT77	£?	Replaces FT7B.

VHF transceivers

Trio TS780	£799	Covers 2m and 70cm; good reputation; bit deaf!
Yaesu FT290R	£265	Base-cum-portable 2m rig; see review in May 1983 issue.
Yaesu FT790R	£325	Ditto for 432MHz see review in May 1983 issue.
Trio TR9130	£395	Very nice 144MHz multimode – reliable and solid
Icom IC251E	£559	Good 144MHz multimode, see review in next issue.
Icom IC451E	£689	Ditto for 432MHz
Yaesu FT726	£649	Brand new

VHF and UHF portables

Icom IC2E	£169	Super 144MHz FM handheld; cousin of the IC4E. Review in April 1983 issue.
Icom IC4E	£199	We loved this – Review in April 1983 issue.
FDK Palm II	£109	144MHz 6-channel FM hand-held
FDK Palm IV	£109	Ditto for 432MHz
Azden PCS300	£179	144MHz

RADIO?

we know something about the radio we've appended a comment or two – if the column's blank it doesn't mean that we'd be sued if we said what we thought, but that we haven't come across one or heard anything either way about it.

		handheld; good Rx synthesised
Trio TR2300	£144	Big portable FM 144MHz box
Trio TR2500	£220	Keypad-synthesised 144MHz handheld; review in April 1983 issue.
Trio TR3500	£250	As above; review in May 1983 issue.
Icom IC202	£209	SSB 144MHz "portable", still going strong
Icom IC402	£245	ditto for 432MHz
Yaesu FT208R	£209	2.5w FM 144MHz hand-held – review in April 1983 issue.
Yaesu FT708R	£230	1w FM 432MHz hand-held – review in April 1983 issue.

VHF and UHF mobiles

There are many and they change almost every month, also allow for changes and new introductuions.

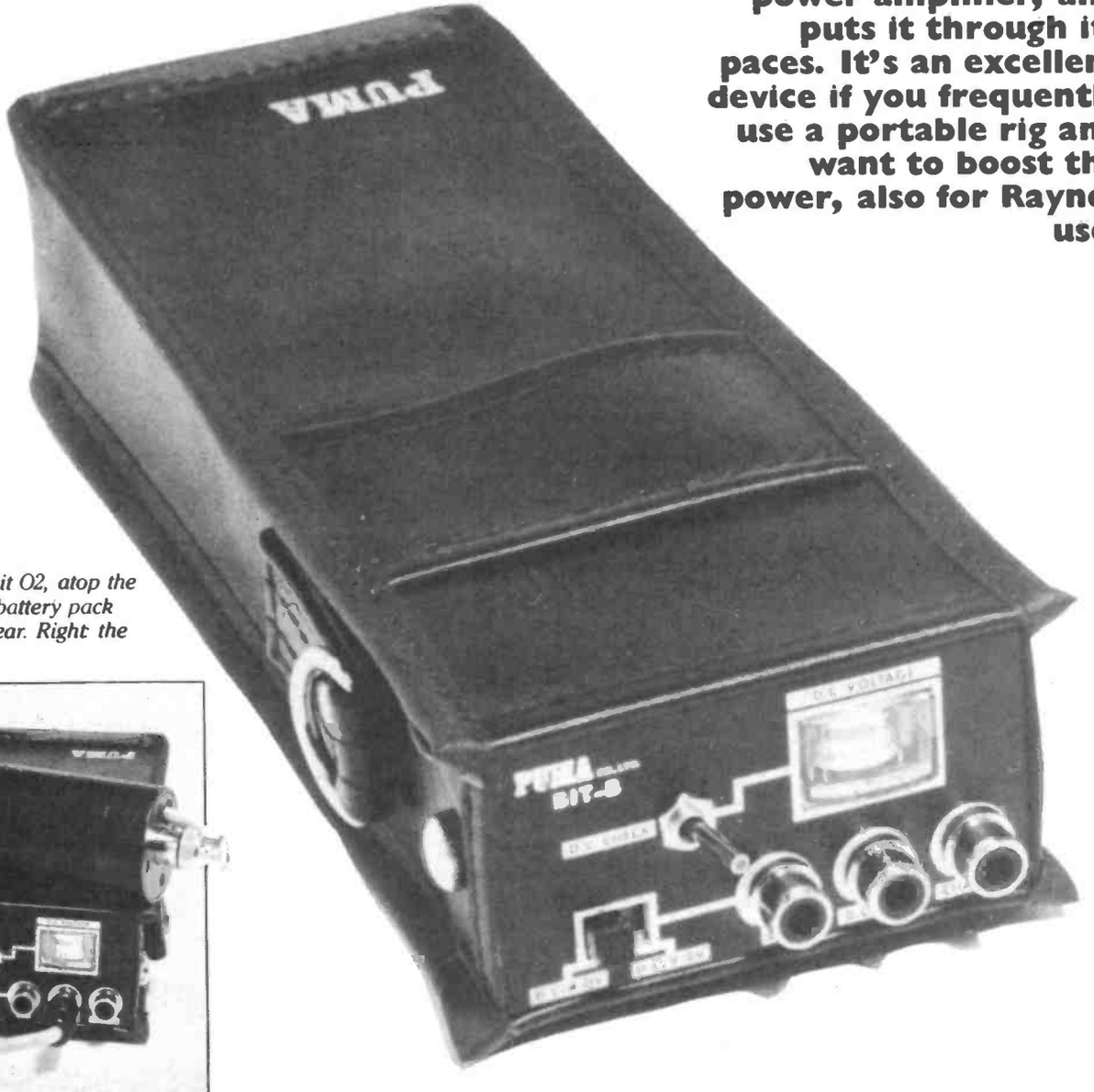
FDK M700AX	£180	144MHz 25watt FM – nice audio and good Rx
FDK M750AX	£269	144MHz multimode, 10 watts
Trio TR7730	£268	25watt 144MHz mobile, nice to use
Trio TR7800	£257	Much as above only bigger!
Trio TR8400	£299	A mobile 432MHz FM machine, good Rx, apparently
Trio TR9500	£428	Multimode mobile 10watt 432MHz
Yaesu FT230R	£239	25watts on 144MHz mobile/base station (FM)
Yaesu FT730R	£285	Ditto on 432MHz – 10watts. Rx a bit deaf
Yaesu 480R	£369	Multimode 144MHz rig; some have had problems
Yaesu FT780R	£399	Ditto for 432MHz
Yaesu FT720	£199/229	You can get a 144 or 432MHz head for these
Icom IC25E	£269	Nice 144MHz FM mobile rig – tiny, two VFOs
Icom IC290E	£375	144MHz multimode with a 25watt brother (IC290H)
Standard C5800E	£359	Lovely 25watt 144MHz multimode
KDK FM2030	£199	Compact mobile/base 144MHz 25watt FM; good

HF receivers

Trio R1000	£297	Synthesised, good performer
Trio R2000	£399	Lots of facilities,
Icom IC-R70	£499	See our review in March 1983 issue.
Yaesu FRG7	£199	The old "Frog"
Yaesu FRG7700	£330	Reputedly rather good.
NRD515	£985	Very nice, although not without its faults

PUMA BIT O2 POWER AMPLIFIER

Angus McKenzie, G30SS, takes the diminutive Puma power amplifier, and puts it through its paces. It's an excellent device if you frequently use a portable rig and want to boost the power, also for Raynet use.



Below: the Bit O2, atop the Puma Bit B battery pack for a 2m linear. Right: the Bit B.

Most users of small portable and walkie talkie 2m transceivers have wished on occasions that they could have had a lot more power to catch somebody who was obviously not hearing their calls.

Most portable rigs give a maximum power output between one and 3w, and a useful power increase would obviously be around 10dB. This particular amplifier has been quite cleverly designed to give a useful boost with the simplest interconnections. A BNC socket is provided on many small portables, whilst at the other end of the cylindrical body there is the opposite 50ohm BNC socket onto which one can plug a rubber duck, a flexi-whip or just a straight coaxial cable feeding a mobile whip in a car.

Increased power surprised many amateurs

As will be seen from the photograph, a small switch by the side of the antenna socket is the only accessible control, turning the amplifier on and off. Operation to transmit is simply by RF carrier sensing, a very weak carrier indeed being all that is necessary to pull the amplifier over to its transit mode. The only other connection is a lead containing a phono plug on its end for connection to a voltage source between 10 and 14v DC.

An associated optional accessory, the BIT B, is a rechargeable lead/acid, non-liquid accumulator pack in a carrying case. Some suppliers insist on this accessory being sold with the BIT 02, but first of all my review sample did not even begin to work, despite charging precisely to specification, and secondly although it is extremely handsomely fitted with a meter and input/output sockets for various voltages etc., it is surely very highly-priced at over £60 for just over two ampere hours capacity. In the circumstances I would therefore recommend you to buy a Nicad pack of cells, and make your own container, a combination which should be much cheaper, and probably longer lasting.

The Puma amplifier itself behaved extremely well, and the increased power surprised many local amateurs. I think this model could be of very great use to stations involved in Raynet, and the power boost it gives could so easily make the difference between an urgent message being received (or not) in an emergency. I can see it of real use as an add-on to a portable.

Only 20mW were required to turn the amplifier onto transmit, and the through loss on receive or transmit, but switched off, is just 0.5dB, which is quite reasonable. The input SWR presented to the transmitter is very high indeed at 4.5:1, and Puma should be able to improve on this. If I bought one, though, I would expect it to be a lot better, and it should be the dealer's job to readjust this to better than 2:1, the specification acceptable for most rigs. The current consumption is between 0.75 and 2a, dependent on input drive, and so a two-ampere/hour capacity battery should last many hours of intermittent transmitting.

I am a little concerned about the bad harmonic output measured at 1w drive, since 2nd harmonic at 290MHz was only — 31dB, although 3rd and 4th were a lot better. Even with the unit switched off, the RF sensing circuit presented enough diode action to cause some harmonic distortion. In practice this might be acceptable when used into a small aerial, but some Ministry might object if you were pushing what could be 10 to 15mW into a vertical whip from a high up antenna near some Military installation.

Summing up then, the BIT 02 is worth looking at for Raynet use, or if you frequently use a portable rig and want to boost your power, and can justify the price asked.

We examined the internal construction and noted that the power amplifier transistor was a C2539 (21D), a device that I have not met with before. The standard of manufacture is excellent, and the PA is very well heat sinked to the chassis. I must criticise strongly the inadequate instructions, and absence of a circuit diagram.

WARNING: A rubber duck with an amplifier giving up to 17 watts power can damage your health.

In the last few years there has been increasing concern over the radiation hazards to people in the vicinity of electromagnetic radiation coming from poorly-screend transmitters, or short antennas.

I feel that I must draw attention to my personal concern that a rubber duck antenna used with an amplifier such as the BIT 02 giving up to 17w power into the rubber duck, *could* cause damage to eyesight or human tissue. This possibility is one of the reasons why so many walkie talkie rigs are limited to low power, and why the Home Office have limited the power on citizens' band.

If you imagine a situation where the walkie talkie is on a bench with the BIT 02 above it, and the rubber duck above that, the user's eyes could be only a few inches away from the short rubber duck. It would be safer if the antenna is always at least one metre away (from anyone) when high power is being used, or alternatively the rubber duck is never used with high power, a flexi ¼ wave ship being substituted for it. Since this whip is much longer than the rubber duck, the field in the region of the eyes would be greatly reduced for a frequency of 145MHz, although less so if the frequency were 433MHz.

Note that you should never get close to any antennas which are transmitting high power, the problems getting more and more serious at higher and higher frequencies.

Also note that I am not scaremongering, simply trying to bring the facts home realistically to readers.

DODSON ON THE ROAD. The third of a series of profiles of distributors who serve the amateur radio fraternity.

DEALER PROFILE

Despite their location in the heart of the British car industry, Tony Dewsbury is happy in his Regency-style premises in Stourbridge, especially as he has had a good run of success after what could be called an "adventurous" start during the recession. They are agents for Trio equipment, and also handle ICS Electronics, BNOS power supplies and linear amps. Among the others he stocks are DRAW, MM, Daiwa equipment, AEI, Hoskin, and Jaybeam. Well worth a visit.

We are in the Midlands, home of the British car industry and the first to feel the bite of a recession an optimistic government says we are now climbing out of. And it must be said that the well-groomed lawns and elegant houses of Stourbridge show few signs of economic deprivation. In this busy little town that lies on the boundary between rural greenery and the concrete jungle of Birmingham, Tony Dewsbury runs his radio business in style, not a lot of amateur radio distributors can boast Regency-style premises, complete with pillars and bow windows!

Situated at the quiet end of the Lower High Street in Stourbridge, his shop might be off-centre for passing trade, but customer-parking is a lot easier; shopping at Dewsbury's is not only a little cheaper, but you don't have to carry the boxes so far!

Tony's decision to start a business in that particular area in the economic climate that prevailed in mid-1982 was adventurous in the extreme. With only £500 and a lot of enthusiasm to invest in the new project, he has nevertheless managed to achieve a £15,000 turnover in the nine months of his tenure, not to mention a stock value of some £30,000. And the business is expanding – within three months of opening, number 176 Lower High Street was proving too small to contain stock and sales areas, and Tony was having walls knocked down. "If I had more stock I could increase sales. When I move, it will be to larger premises, but still in this area."

Amateur radio 'happened' for 39-year-old Tony Dewsbury at the age of eleven in his birth-place of Derby where he listened to amateur radio enthusiasts at the local club. Having caught the communications bug, he took his PMG examination as a Radio and Electronics Officer and went to sea with the Merchant Navy in 1961. And for twelve years Tony sailed the seas, consolidating his qualifications with the practical all-round experience that was to prove invaluable in his present venture.

However, before Dewsbury took the plunge into self-employment, he did the rounds as salesman in a Birmingham radio and TV shop, selling Olivetti computer peripheral equipment and later Thorn Ericsson communciations equipment to industry; he even had the job of trying to sell his wares to GCHQ in Cheltenham. But enough was enough, and in 1982 Tony took his courage – and his 500 quid – in both hands and rented his present shop in Stourbridge.

His aims were (and still are) as simple as his staff requirements were modest. With only "the other proprietor", his wife Hilary, and part-time technical help, he keeps the wages bill as low as possible. Amateur radio is his life. Out-of-shop hours are spent doing the inevitable paperwork at his village home at Wolverley near Kidderminster. What spare time remains from a 12-hour day is spent with his family, which includes nine-year old son Michael, and operating on 7MHz QRP CW under his callsign G4CLX which he was allocated in 1973. He is an avid 'key man' ("You'd be hard put to find a microphone in my house – I'm a professional operator!") although his one concession to voice is a 2m mobile rig in his car, a dignified 3½ litre Rover of modest T vintage.

Tony Dewsbury caught mid-telephone call, and mid-blink, for that matter. Obviously a busy man: "Lots of people carry just the popular lines, but I make it a rule to have the complete range on my shelves."

Tony Dewsbury is a very uncomplicated man with a ready smile, a sharp sense of humour and the personality that attracts conversation. Not for him the hassle and in-fighting of the bigger companies; he appears, in the words of David Hamilton, to be "just happy to be here" and freely admits that were it not for the help and support of Lowe Electronics, he wouldn't be. Of course he wants his business to succeed and expand – he even predicts that by next year his turnover will reach a quarter of a million – that is if it doesn't happen *this* year. But he doesn't want to get *too* big; he doesn't want the sort of enterprise where top management becomes so remote as to lose touch with the customers. "I'm not here to get rich – I just want to do my own thing. I want to offer amateur radio enthusiasts a good service at the best possible price. What is more important, I must offer a good after-sales service. I have the backing of Lowe Electronics, and if I can't handle a problem, they can. It doesn't happen very often!"

Tony is an agent for Trio equipment, and he ensures that he always carries a full compliment of their products. "Lots of people just carry the popular lines, but I make it a rule to have the complete range on my shelves." He also deals in ICS Electronics, Morse readers and trainers, electronic keys and code converters. He is the main Midlands agent for BNOS power supplies and linear amplifiers. Together with DRAE power supplies, Microwave Modules and Daiwa equipment, Tony also stocks AEI, Hoskin and Jaybeam antennae.

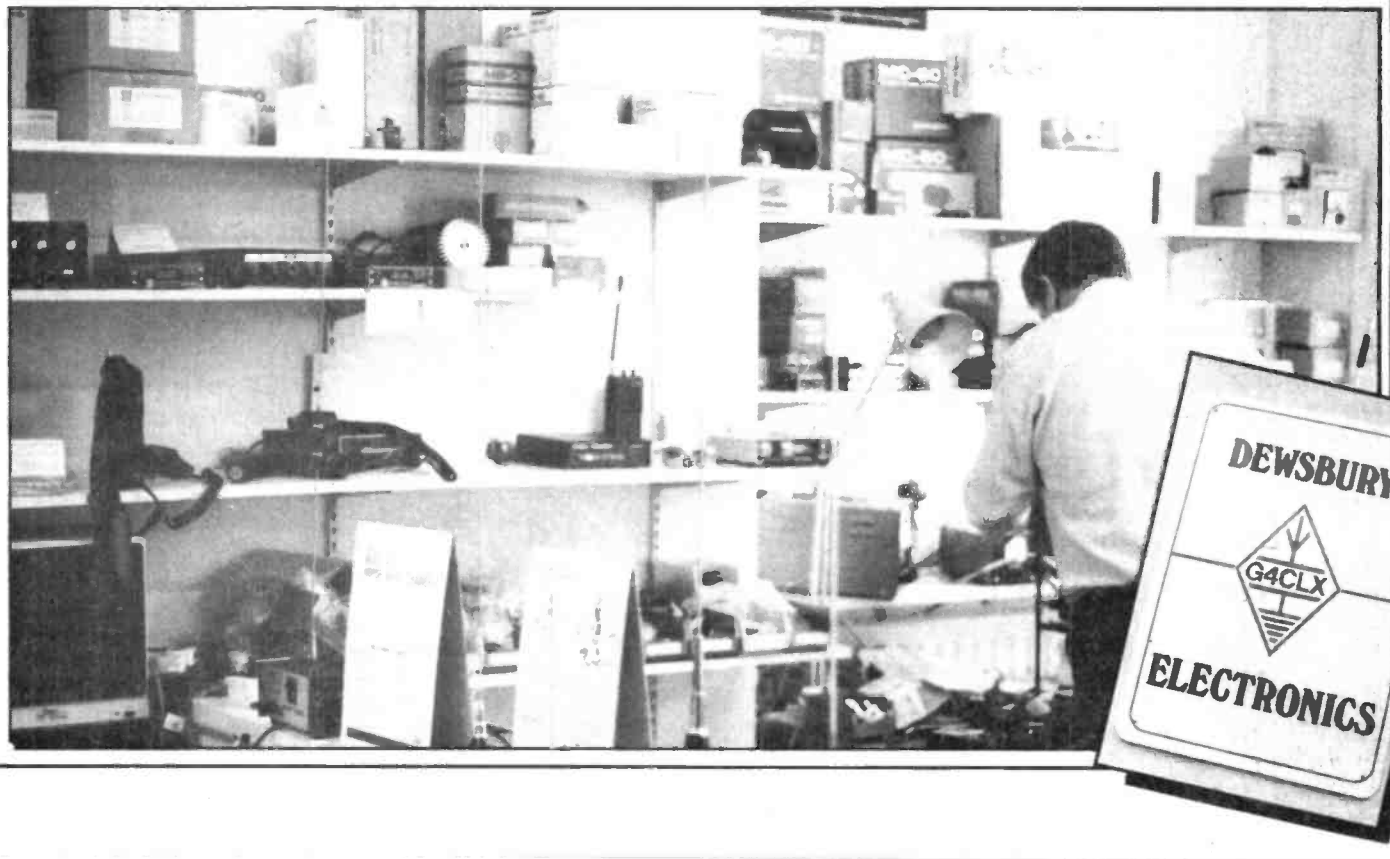
One aspect of amateur radio in which Tony Dewsbury claims to have been a market leader, is CB conversion. "A lot of people tried it, and failed, but with the right equipment it is fairly simple to re-crystal and re-align certain CB rigs to 29.3-29.7MHz. It must have the right chassis and only three or four types are suitable." After the initial flood of demand for conversions, that aspect of the business levelled out to a steady line. "I must get the sets at the right price – under £50. Not that we make very much on the deal, but it is viable." And at a cost of only £49.95 it is a bit of a steal, as some 300 customers have already found out!

Enormous part exchange trade

At the moment of writing, Tony Dewsbury is not in a position to offer credit on his own behalf and has to use a finance house. However, his application for a credit licence should receive the blessing of officialdom any day now. On the other hand, he does an enormous amount of part exchange trade. "It's the lifeblood of the business." Tony's views on CB are strictly neutral. "I've never used it and I've never sold it. It is a trade within a trade and should not be mixed with amateur radio." And those who use CB? "To each his own. It was a bubble that has flattened out."

For Dewsbury Electronics the all-important aspects of reputation are beginning to pay off with mail-order business coming in from such far-flung places as South Africa, the Republic of Ireland, Cyprus and even Milawi. This is quite apart from a steady rise in demand for his products from all over the UK: "When I can offer a competitive price, I do."

In an industry pressurised by power-struggles, to talk to a man such as Tony Dewsbury makes a refreshing change. He is content, as a very new boy, to accept his morsel of cake without demanding the biggest slice. His customers, if they weren't friends before they walked through his elegant portals, certainly are afterwards – and will continue to be.



DON'T ABUSE OUR AIRWAVES

A plea for cleaner language and respect for the airwaves, by Keith Townsend, G4PZA. How common is this problem? If other readers are experiencing similar things on amateur bands, let us know, and we'll publicise the matter.

How long did it take you to become a radio amateur? How long did you whether or not to fill your head with a of AC theory, propagation and transmitter interference? Unless you are some kind of latter day Einstein I am willing to bet that more effort went into getting your licence than you are perhaps willing to admit, even to yourself.

Then there was the almost interminable wait for the exam results to be published, followed by an even more harrowing delay waiting for the Home Office to issue the coveted licence, not to mention the fateful decision on whether or not to fill you head with a bewildering array of dits and dahs in your eagerness to *really* make the world your oyster.

Increasing confidence

For the vast majority of us it was all very worthwhile, as our first faltering steps into the new world led to an increase in confidence and a growing enjoyment of a fascinating hobby.

So why do we continue to accept the abuse, interference and even obscenity of the tiny minority who, for some reason known only to themselves, seek to bring our hobby into disrepute?

Knock on the door

Many is the time I have heard the experienced hands tell tales of the terror which accompanied the dreaded knock at the door which might so easily lead to the instant suspension of a licence, simply because they had had the temerity to mislay their third harmonic or some equally insignificant trivia. Yet here we are, in the middle of the electronic age, and those who once struck terror into the heart of the most consciencious appear unable, or are they just unwilling, to enforce even the most rudimentary code of conduct.

Neither can the RSGB be entirely exonerated in this respect, for, despite its undoubted value it appears powerless to persuade the Home Office to take decisive action to maintain the standard of what is, in the main, a gentlemanly hobby. I have often heard it said that the problems are attributable to the 'CB mentality', whatever that might be. I have never heard such utter rubbish. Like a great many others who came to amateur radio via CB I feel deep respect, both for my hobby and for those with whom I share the bands, and I would remind those who perhaps feel that our presence in some way detracts from amateur radio that we are serious radio enthusiasts who, having been bitten by the bug, have worked just as hard as they did to obtain a licence.

Dedicated few

No. The fault lies with each and every one of us. We have the occasional moan about the IQ Zeros and then promptly relapse into a state of blissful apathy. True, some of us go so far as to have the occasional moan to a friendly RI officer, but that is about as far as it ever goes and his protestation of severe overwork is invariably enough to send us back into our shells.

Surely those who must feel most strongly about the problem are the dedicated few who have expended time and effort in order to improve the facilities available to others. The repeater groups and the RSGB newsreaders, the CW instructors and others whose efforts invariably seem to become the focus of interference from some lame brain with the effrontery to believe that he has the right to decide what the rest will and will not hear.

Piracy has always been with us in one form or another and even the more stringent regulations currently proposed will never completely eradicate it but I for one would rather listen to an unlicensed operator who treats the airwaves with a degree of respect than to some of the tiny minority of licensed amateurs whose wit scarcely rises above a high-pitched squeak or a whispered profanity. Not that all such operators are licensed and one cannot help but wonder just why they are permitted to continue to behave in this fashion almost indefinitely. Surely someone in authority must care, or if they do not then they must be made to care before the example being set by the few becomes the general pattern.

"You can become a real pain in the neck to those with the power . . ."

Straight away I can hear the age old cry "What can I do? I have no influence". The answer is simple. You can complain. You can become a real pain in the neck to those with the power to do something about it. At local level you can make one complaint after another to the Radio Interference Service and to your Member of Parliament. For those who do not know his address I can assure you that any letter addressed to him at the House of Commons, London will find him pretty quickly.

I doubt if there is a single 2m operator who has not made use of a repeater at some time and by far the majority do so on a regular basis. They should be the most concerned, for it is they who bear the brunt of the abuse and we should all realise that unless we

are prepared to do something about it now we will have no right to complain in the future, when they have become unusable. Those whose licences predate the 1978 ambulance strike will know the full potential of a properly used repeater and who knows when that kind of service will be needed again. Are we to allow the jammers and the foul mouths to continue to disrupt them simply because authority, in its never-ending quest for a quiet life, refuses to be stirred?

"The sort of pastime in which one's identity cannot remain secret for long"

I was always taught that to hold an amateur licence was a privilege and that to lose it was easier than to earn it. Experience gained since I came on the air has caused me to wonder whether this is really true. Let's be honest. Amateur radio is the sort of pastime in which one's identity cannot remain secret for very long and those who think so little of it are becoming so blatant of late that they no longer care who knows who they are. Hence there can be no acceptable excuse for their continuing to be ignored by those with the authority to take action against them and it is entirely our fault that the situation is allowed to continue.

If we really want a worthwhile amateur service then we have to be prepared to defend it with every legal means at our disposal and it is up to each and every one of us to awaken the sleeping giant that the licensing authority seems to have become.

We all enjoy a joke on the air, witness the clown who offered as his call sign, India Delta One Oscar Tango, via GB3CF not so long ago and I doubt if I will ever come across the person who can honestly claim to observe every single licensing condition each time he goes on the air. Nevertheless the vast majority display a genuine concern for their fellow operators and if the recalcitrant few are incapable of following their example then perhaps the time has come when they should be denied the right to annoy others.

"We have no alternative but to react strongly against abuse. . ."

We should also consider the fairer sex in this respect. An ever increasing number of ladies are taking the RAE these days and I, for one, sincerely hope that women's lib has not reached the stage at which they are prepared to meekly accept the kind of language once reserved for the gutter.

In the long-term interest of one of the most worthwhile pastimes available to us today we have no alternative but to react strongly against abuse of the airwaves and the right time to do so is now.

Well, what do readers think? It's a fact that the airwaves are abused, and we think enforcement of the regulations regarding this matter falls fairly low on the list of Home Office priorities. Or whoever it falls to. We had heard that with the number of illicit CB sets and related things, there's no manpower left in the RI Service to tackle the problem, but the fact remains there's a law to be enforced but nobody seems to be enforcing it. We also doubt whether the RSGB could do anything about it either, apart from continuing to express their disquiet to the Home Office, and keep pressurising them to do something. The present cutbacks in the Civil Service, plus the feeble state of legislation are probably at the bottom of this particular problem. Editor.

PASS THE R·A·E·

THEORY & PRACTICE

PART 5

We continue our theme of theory and practice, and delve deeper into the question of resistors, and how we might approach some practical problems using Ohm's Law. We also look into power – or at least the exact meaning in the eyes of the scientist. Nigel Gresley is the lecturer.

Okay, first of all let's take a look at the answers to last month's nasty and horrible questions. In Question One we asked how much current would flow if you took it into your brain box to connect a 10K, a 1K and a 5K resistor in series across a 15 volt power supply, and also what voltages would appear across the individual resistors?

Well, it's all down to Ohm's Law, and you'll remember that if you put resistors in series the total resistance you end up with is the sum of the resistances of all the resistors. If you've forgotten already you're condemned to running not more than 10 milliwatts on any amateur band when you eventually get your ticket! (Please sir, what's a milliwatt? Be quiet, boy, we're coming to that . . .)

So in the case of the fiendish question, the total of 10K, 5K and 1K in series is – er, now let me see – 16K. Now you'll remember tht we can use the Ohm's Law formula I = V/R with whatever units we wish provided we keep everything consistent – for instance, we can either use the value of 16K as it stands and take out the result in milliamps or refer to it as 16,000 ohms (which it is, of course, and you hadn't forgotten, had you?) and get the result in amps.

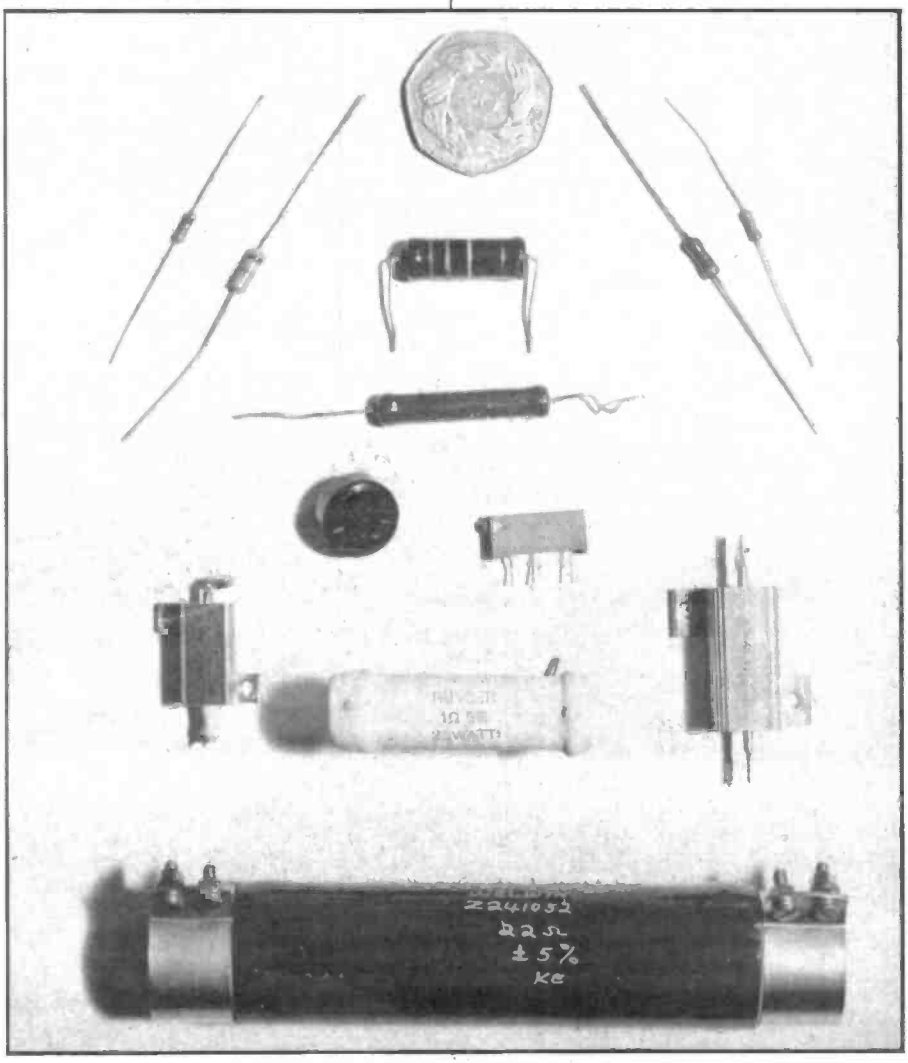
If we call it 16K you'll see that the answer will be 15/16 milliamps – just less than one milliamp, or 0.9375mA to be precise about it. Not very much current, in other words, You'll note that if we want the result in amps it'll be 15/16,000, which is a pretty horrible sum with loads of noughts in front of it – to wit 0.0009375.

If you want to be really posh, of course, you could think back to the article about index notation a while back and call that 9.375×10^{-4} amps but there wouldn't be the slightest point in this case because you're not putting that figure into another formula or anything clever like that, you simply require to know how much current is going to flow. And, as we've seen, the answer is 0.9375mA.

So, we then asked what the potential across each resistor in the chain would be in volts? Well, here again it's simply a matter of Ohm's Law. We know that the total current through the whole shooting-match is 0.9375mA and we also know that the voltage across the resistor can't be anything other than the product of the current and the resistance – the old V = IR bit again. Let's try it. Remember we have a 10K, a 5K and a 1K in series. The voltage across the 10K is given by V = IR and that's going to be 10K times 0.9375mA.

Now don't be put off by the units because since a K, or a kilohm, is a thousand ohms and a mA, or milliamp, is a thousandth of an amp, we can just multiply the one by the other quite happily – they cancel, don't they. So, off we go. 10 times 0.9375 on our calculator comes out at 9.375 volts, and so we know that the voltage across the 10K resistor will be 9.375. We didn't really need a calculator, even.

Let's do the same with the 5K – here it's going to be 5 times 0.9375, which is 4.6875 volts. Fine – it's half of 9.375, isn't it, which is sort of what you might expect since 5K is



half the value of 10K.

So for the 1K, the sum would be 0.9375 times 1. Gosh, that's tricky. 0.9375 volts it is, unless something's gone drastically wrong somewhere.

We've established that there are 9.375 volts across the 10K, 4.6875 volts across the 5K and 0.9375 volts across the 1K. We can check this by seeing whether all the voltages we've calculated add up to the original voltage across the chain of resistors in series, and of course they do. Isn't science wondcerful?

Which led us into Question Two. You'll remember that you had to find a resistor in order to get the big linear back on the air before the contest but you couldn't establish the value of it. This sometimes happens, especially with big wire-wound types that are a few years old and the markings have worn off with time. Anyway, you had a 24 volt power supply and you established that if you connected the unknown resistor in series with a resistor whose value you knew to be 8.2K, you measured a voltage of 15.25 across the said 8.2K. So what was the value of the unknown resistor?

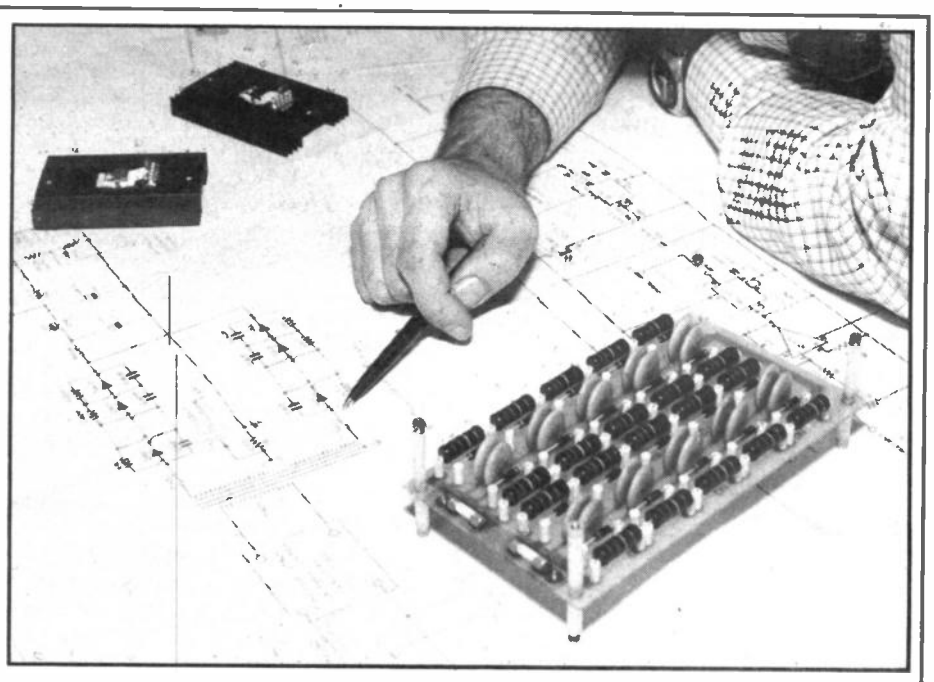
There are several ways of approaching this type of problem, and indeed we had a couple of interesting QSOs about it after last month's mag came out – some people said that we hadn't provided enough information to solve the problem. Well, we did, you know – actually, it was a ploy to get them to buy this month's issue . . .

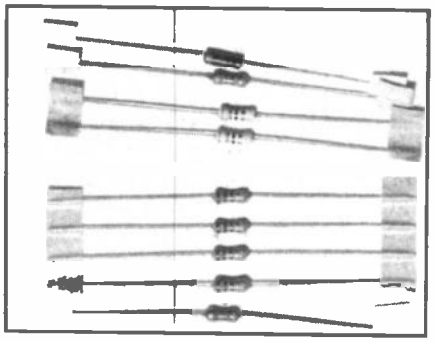
"More of a trial-and-error commonsense problem than an Ohm's Law one . . ."

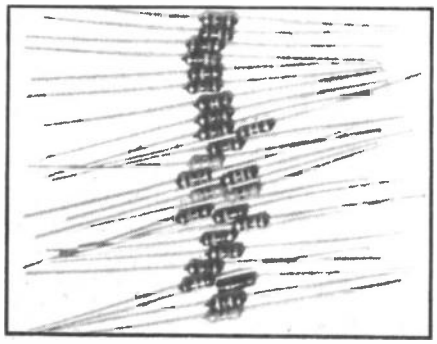
If we have an 8.2K resistor and we measure 15.25 volts across it, then as sure as Mr Ohm invented his Law we can establish the current flowing in it. It's going to be 15.25/8.2 milliamps, which pans out to be very nearly 1.86 milliamps. Now if this here 8.2K is in series with an unknown resistor, or indeed in series with any amount of unknown resistors, it's a surefire fact that whatever current flowing in one resistor flows in the other, or all the others – that's one of the consequences of resistors in series, as we've seen. So if 1.86 milliamps flows in the 8.2K, it follows as sure as night follows day that a current of 1.86 milliamps is flowing in the unknown resistor.

Now then. The 8.2K and the unknown were in series across a 24 volt supply, and we know that there are 15.25 volts across the 8.2K. So by definition there must be 24 minus 15.25 volts across the unknown, which is 8.75 volts – yes, we could have told you that in the first place but we thought we'd try and exercise the old brain cells, heh heh. And so, in the usual Ohm's Law fashion, if you know two of the parameters you're in a position to find the other one.

In this case we know the voltage across the unknown resistance and the current which has to be flowing in it – so R=V/I, does it not? Yes, folks, it does. In this case R is equal to 8.75 divided by 1.86 kilohms – it's got to be kilohms because the figure of 1.86 is in milliamps. And so, the unknown resistor has a value of 8.75/1.86, or 4.7 kilohms. Smart, huh? Hang your head in shame all those who muttered at us and said we hadn't provided enough gen to solve the problem!!







Far left: Possibly the complete range of resistors you're likely to come across in amateur radio work. Compared, inevitably, with a 50p piece, to give you an idea of the sizes.
This page, top: Resistors come into things in a big way when it comes to home building or assembly. Even the editorial chair has had its moments! Above: Two versions of resistors, which go bang without a fight, any noise, nor any warning! Resistors are like that, unlike valves . . .

Hopefully the big linear came back on the air and the group won the contest. Thinks – thanks to Ohm's Law. Let's have a go at Question Three. You had an important sked in half an hour, but when you switched on there was an Awful Smell and you found that a 1.8K resistor had waved bye-bye. You had any amount of 4.7Ks, a 240ohm and a 560 ohm in the junk box and you needed to make up something resembling 1.8K out of that lot to get you back on the air.

This is really more of a trial-and-error common-sense problem than an Ohm's Law one, but it's the sort of thing that can well confront you in your amateur career and it's as well to know how to tackle it. Now we learned last time that if you put two resistors of equal value in parallel, you ended up with a total resistance of half the value of one of them – hmmm, let's stick two of our 4.7K components in parallel and see what we get. It'll be 2.35K, which is too high. Oh.

Let's stick another one in parallel, then. You remember from the formula last time that the result will be 1/R1 + 1/R2 + 1/R3 = 1/R, and we suggested doing it on a calculator – well, when all the values are equal you can do it without. The common denominator of three 4.7K resistors will have to be 4.7K, and we know that the resultant value will be 4.7/3 kilohms – that's about 1.56K. Aha – now then, we're getting somewhere. If we add 1.56K, or 1,560 ohms, and 240 ohms – you remember we had a 240 ohm resistor in the box – what do we find? 1,800ohms, of 1.8K. Great – solder 'em in and we're back on the air! It might seem a bit unwieldy, sticking three resistors in parallel and another one in series with them, but it does achieve the job for now and you can always go and buy another one later on or salvage one from somewhere.

Okay, so that's how we might attack some practical problems with Ohm's Law. Let's bash on and look at another important subject which will continue to exercise us throughout our amateur career, which is something called "power".

PASS THE R·A·E·V

Everyone knows what power is . . . Well, everyone *thinks* they do but the word does have an exact meaning in science generally and certainly in electronics. A physicist would tell you that it was the rate of doing work and he'd probably go into long definitions of what he meant by "work". All good stuff but not really necessary for our purposes!

Basically it means some sort of physical activity like lifting weights or forcing things to move against their will or moving S-meter needles 25,000 miles away with your 400 watts. Let's take an example from everyday life. Suppose you lift a power supply weighing 30lbs up to a table three feet off the floor – you're overcoming the force of gravity and indeed a physicist would say that you've done 90 foot-pounds of work.

He's using the word in its scientific sense, of course. If you take three seconds to lift it up, you could also say that your

"We've often thought of referring to our 400 watt linear running a half-horsepower amplifier . . ."

rate of doing the work was 90 foot-pounds in three seconds, or 30 ft.lb per second; interestingly enough, this amounts to about 1/20 of a horsepower, since one horsepower is equal to 550 ft.lb per second.

It always amuses us to remember that the electrical equivalent of this, by the way, is 746 watts – don't worry, we'll come to exactly what a watt is in a moment – and we've often thought of referring on the air to our 400 watt 432MHz linear by saying we're running a half-horsepower amplifier . . .

Anyway, let's get back to where we were. Feet and pounds are all very well but they won't get us very far in electronics and we have to suss out a way of defining electrical power. The best way is to think of voltage as being the thing that lifts the weight against the opposing force of gravity and the current being the amount of the weight itself; it's a bit crude, but it does lead us to the fact that the electrical unit of power is the product of the volts and the amps.

This parameter is given the name of the **watt** (so named after the great James Watt, who did all sorts of clever experiments on things like this when he wasn't fiddling about with kettles and inventing steam engines and the like), and its symbol is W.

So you might guess that another equation for you to remember is V times I equals W, or VI=W, meaning that the product of voltage and current is power. Let's take a practical case. Suppose we have a 100 ohm resistor and we stick it across a 50 volt power supply such as you might find in a hi-fi amplifier. Now by Ohm's Law we know that the current flowing in the resistor will be – yes, come on, boy, what will it be? I = V/R, 50/100 or 0.5 amps. Half an amp will flow, in other words.

Now then – we can calculate the **power** which is being dissipated in the rersistor, or, if you like, the rate at which the 50 volt supply is doing work, will be 50 volts times half an amp, which is 25 **watts**. So another way of saying it would be that the power supply needs a power rating of at least 25 watts if it is going to survive without getting hot or blowing up or bursting into flames etc.

And it isn't the only thing that needs a power rating either. If the resistor has half an amp flowing in it and 50 volts across it, a power of 25 watts is going to be dissipated in it. Something has to happen to the electrical energy which is represented by 50 volts and half an amp, and the "something" is that it gets converted to heat. In other words, the resistor itself needs a power rating of at least 25 watts in this circuit otherwise it's going to get rather hot and start smoking and in all probability it'll expire if you keep it up.

Little radio-type resistors such as you might have bought last time for the initial Ohm's Law experiments are usually rated at 0.125 or 0.5 watts, which isn't a lot – we'll be looking at different types of resistors in detail next time, but the vast majority of resistors you see will be of this sort of rating. If you need higher-power ones you have to get hold of what are known as "wire-wound" components – you'll often find them in things like power supplies, for instance – and get used to the fact that they get hot in use.

The power rating of a resistor is a function of what it's made of and how big it is, generally speaking, but it's a fact that any electric current flowing anywhere has a heating effect and big resistors handling lots of power will certainly get warm.

Just to bring it a bit nearer home, if you go round and look at any domestic electrical appliance you'll usually find a data plate somewhere on it which tells you how much power it will use. Your average one-bar electric fire, for instance, is usually rated at one kilowatt, or 1,000 watts – this means that it heats your room at the rate of one kilowatt, which doesn't help very much when you need to decide whether it'll do the job but it will help you decide how much electricity it'll use up.

You can calculate the current it'll take by rearranging the equation W = VI into I = W/V, which in this case is 1000/240, and that comes out as about 4.16 amps – well, that isn't strictly true because the mains isn't a constant voltage but you see the point. Actually, it's interesting to note that your electricity bill is calculated on power, not current – the units are kilowatt-hours.

Substitutes, power ratings, more resistors, big linears and 12 volt supplies . . .

Let's end for now by noting that if you know any two of the four quantities volts, amps, ohms and watts you can find the other two. It just so happens that as well as W being equal to V times I, it's also equal to the square of the current times the resistance, or I^2R, and also the square of the voltage over the resistance, or V^2/R. Write these on a big bit of paper and learn them by heart!

So, a couple of nasty sneaky questions to leave you with this month:

1. It really isn't your day. There's a sporadic-E opening on 144MHz and you switch the linear on; there's a smell and a cloud of blue smoke from somewhere within, and the thing sits there in a huff instead of producing vast amounts of power in the direction of 9H1. You remove the lid and discover that a 1K wirewound resistor in the EHT supply has gone dead short-circuit – it's quite a chunky beast and you don't have a spare.

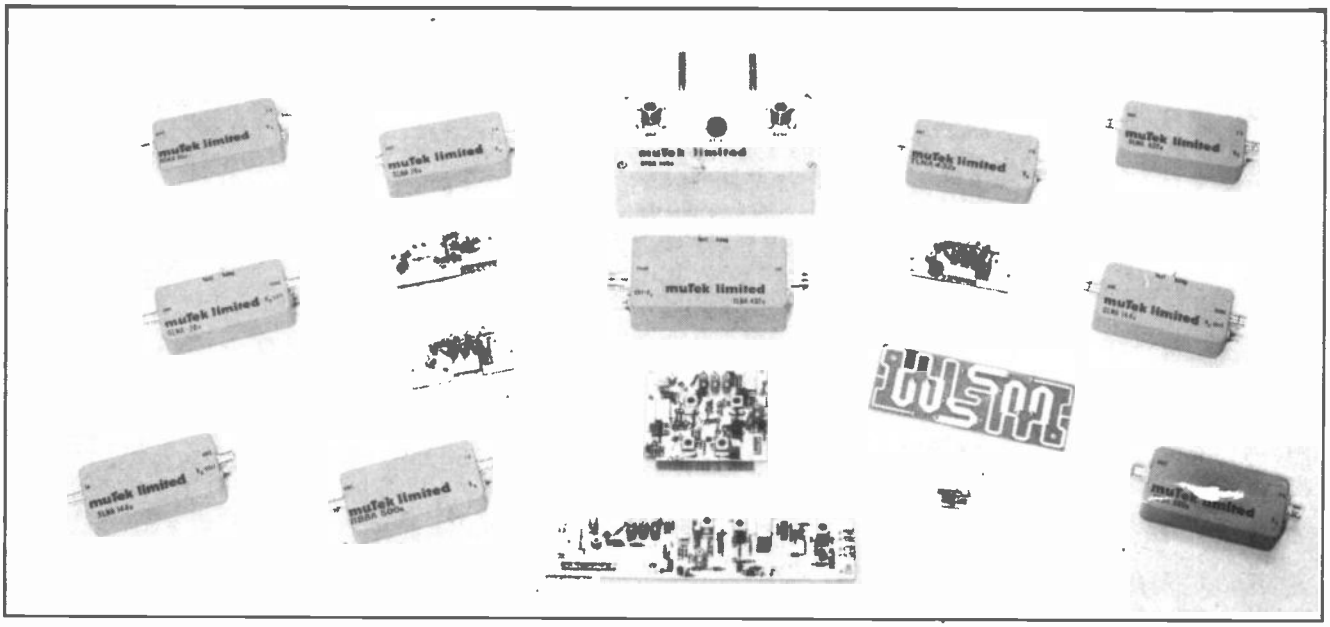
Rummaging furiously through the junk box you find a couple of 500ohm components rated at five watts each, which ought to do, and you solder them in. Just before you switch on you think "I wonder whether they're big enough?" The original resistor fed part of the circuit which could have drawn about half an amp at full power, and there was potentially about 50 volts across the resistor when you were using SSB. Will the substitute be man enough? Did you get to work the 9H1?

2. A circuit you are thinking of building has been published in this magazine; unfortunately, the Bicester Simpletons have boobed again and forgotten to tell you what power rating the resistors ought to be! It's a clever power supply and there is about 100mA flowing in a 10K resistor feeding something so clever it even makes Technical Bod scratch his head. What rating ought the resistor to be?

3. You buy a big linear rated to give you 200 watts output (huh – you should have built it). You know that it's probably about 50% efficient (ie, it needs about twice the input power as it produces out) and it needs a 12 volt supply. What size fuse should you use with it?

See you soon!

NOT ONLY, BUT ALSO...



OK, so you know a bit about muTek limited's front-end boards for the IC251 and FT225. You may even have heard a little about our preamplifiers for all amateur vhf bands from 50 through to 1296MHz. But why should you buy our products rather than those of our competitors?

muTek products aren't cheap. They couldn't be. However they represent some of the best value for money around. The difference starts at the design stage with a thorough appraisal of both the systems requirements of our customers and the circuit design options open to us. We don't (like some of our competitors!)simply rush to the nearest amateur publication and rip-off a 'design' which looks as though it will do the job!

Once we've set our design objectives we then produce a design which is thoroughly analysed using various compuetr-aided approaches to determine whether it's even worth picking-up a soldering iron to try it in practice. If it is we usually will build a breadboard to check it through and then proceed to pcb design. We use a 'cut and strip' drafting machine to prepare our pc masters as this allows us to produce accurate microwave and other boards in prototype form 'in house' with greater accuracy than other techniques would allow. This is probably more important for our non-amateur radio business but pehaps it illustrates the care which we take in the production of amateur radio products. We've always felt that the manufacture of amateur radio products deserves at least as much involvement as our professional interests. Indeed, its more difficult to manufacture high quality amateur radio gear within the price constraints without sacrificing quality!

The attention to detail in the design process is carried on to production. Some of the measurements which we make routinely are very difficult. Noise figure for instance is a parameter which many quote and very few can measure! We specialise in low noise amplifier design and we've spent many happy hours (and a lot of money) refining our measurements. Without a very great deal of care its really quite easy to have a 1 dB uncertainly even using apparently high quality test equipment. With sub-dB noise figures a reality on all bands up to 2.3GHz its clearly a nonsense to quote noise figures of this order if the uncertanties are greater than the figure being measured!

As an example of the care we take, our GFBA 144e masthead preamplifier not only sees our noise figure measurement system (which is based on a HP346B 0.01-18GHz noise source) but also an HP141T/8555A/8552B 18GHz spectrum analyser system to check for broadband instabilities, and in conjunction with a high-level two-tone test sorce for intermodulation measurements. The filter is set-up separately with a Telonic sweeper and reflection bridges whilst the power handling capabilities are checked by dumping the output of a willing pair of 8874's via the amplifier into a 1.5kW Termaline!

We care a great deal about the quality of the products leaving our factory and have spent a great deal of time and money making sure that we can substantiate the claims we make. That's why you should buy muTek.

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SLNA70ub	Unboxed version of SLNA 70u	13.70
SLNA 144s	144MHz low noise switched preamplifier using 8F981 (0.9dB noise figure)	37.10
SLNA 144u	144MHz low noise unswitched preamplifier using 8F981	22.40
SLNA 144ub	Unboxed version of SLNA 144u	13.70
SLNA 145sb	Transceiver optimised preamplifier with antenna c/o switching using BF981. Intended for the FT290R, but has many other applications	27.40
GFBA 144e	Ultra-high performance environmentally housed switched gasfet preamplifier using advanced negative feedback circuitry for superb dynamic performance. Supplied with ATCS 144s controller.	129.90
TLNA 432s	Very high performance bipolar transistor switched preamplifier for 430-440MHz using 8FQ69 for 1.4dBnf and 0dBm input intercept performance.	74.90
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TLNA 432ub	Unboxed TLNA 432u	20.40
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HDRA 95u-2	11.5dB gain variant	32.90
BBBA 500u	20-500MHz broadband high dynamic range preamplifier	29.00
BBBA 860u	250-860MHz broadband low noise amplifier	22.60
XBPF 700ub	Microstripline band pass tvi filter	2.95
PPSU 012	12V (nominal) mains psu for HDRA95 & BB8A860	6.90
CISA 001	'UHF'(f) to BNC(m) coaxial adaptor	1.60
ATCS 144s	Transmit receive changeover sequence and controller	22.60
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GFBA 144e		2.50
All other products above		1.20

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CLUB NEWS

Tell others about what's happening in your club – give us the information and we will try and print it here.

Radio Society of Harrow

This society have endeavoured to define what a typical radio amateur enthusiast really is. And from their observations, it appears that they (we) fall into a definite number of categories. Read on . . .

THE ENTHUSIAST: This is the sort of person who, after spending 24 hours in a field on a contest shouting himself hoarse, will go home and switch on the radio to work any DX which happens to be around. This character is to be admired as much for his stamina as his enthusiasm!

THE WAFFLER: A breed known to many of us. This type of person will, after having a mere 20 minute over, hardly notice that the person he was working has disappeared or has rapidly come up with an excuse to do so.

THE EXPERT: No matter what you have done, or how you have done it this type of person will know a better way and will usually explain it at great length even if you didn't really want to know.

THE SQUIRREL: Very welcome at junk sales, this type of person will procure anything he can get his hands on just in case it might be useful. This character may not be heard much on the air (because he can't find the rig!) but he could put together a battleship with the contents of his junk box.

THE MR BIG: This character will go for total overkill; he will buy the flashiest rig, the biggest linear, put up the largest tower, work everything capable of radio communication and then get bored and will take up butterfly collecting instead. This sort of person is usually very wealthy.

THE TRENDY: This type buys the latest rig, uses it for six months, then finds something else to take his fancy, sells his equipment and starts again with something new. This character has a regular feature in the "for sale" columns.

We think we all know somebody who falls into these categories. Now, which one do *you* fall into? Be honest!

Harrow had an informal and practical meeting on July 1st, in the Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald, and on the 17th was a DF hunt and barbecue. More intelligence from Peter Marcham, G3YXZ, 17 Clitheroe Avenue, Harrow, Middlesex. By the way, all meetings are held at the Centre at which there is a licenced bar, free parking, and where new members are always welcome.

Stevenage and DAR Society

The Stevenage and District Amateur Radio Society meets on the first and third Tuesdays of each month at 8pm in TS Andromeda, Shephall View, Stevenage. Morse classes are held prior to each meeting starting at 7.15pm.

From May until September the club will be running a series of 2 metre DF hunts on the second Tuesday of each month, ie 12th July, 9th August, 13th September. If there is sufficient interest the club hope to start an electronic constructors evening on the fourth Tuesday in each month. The aim is to provide members with some practical electronic knowledge by the design and construction of simple projects. Dates – 28th July, 25th August etc.

Forthcoming events include: Sunday 21st August – club picnic at Hampson Park; Thursday 8th September – beginners' evening at the Fairlands community hall; and the club intend to run another RAE class this year. It will be held every Thursday evening starting the 15th September. For further information contact the Secretary Cliff Barber, G4BGP, 13 The Sycamores, Baldock, Herts. Tel 0462-893736.

Stourbridge and DAR Society

This society notes that the series of G6 callsigns is expected to be exhausted by this summer, and the G4 by early 1984. The Home Office say that from then on, Class A licences will be allocated G0 and Class B will get G1 callsigns, and these are expected to the last of the G prefixes. And when *these* are exhausted, we'll get callsigns in one of the other prefix blocks held by the UK licensing administration. The ITU allocation for the UK are as follows: GAA-GZZ, MAA-MZZ, VPA-VSZ, ZBA-ZJZ, ZNA-ZOZ, ZQA-ZQZ, and 2AA-2ZZ. Anybody like to choose which one the HO are likely to begin with? Incidentally, G7 and G9 prefixes are already used, as test and development licences.

July's programme of events at Stourbridge included an informal meeting on July 4th, 3.5MHz field day contest on the 17th, a main meeting on the 18th, 432MHz low power contest on the 31st, and in September there is an HF SSB field day contest on the 3rd/4th, and a demonstration by club members at the Stourbridge Carnival on the 10th. There are no meetings in August, by the way, and for more information on the society, get in touch with Malcolm Davies, G8JTL, at 25 Walker Avenue, Quarry Bonk, Brierley Hill. Telephone Lye 4019.

Wirral AR Society

So the sun spots are on their downward cycle and it will be some years before they climb back to maximum again, giving us the best of DX. But have you thought of the possibility of them going down to no sun spots at all, and staying there for 25 years or more? It can't happen, you would say. Sun spots follow a cycle which might vary in length by a few years, averaging out at 11 years over a long period. Well, the sun spot cycle did disappear, and for about 70 years, way back in the 15th century.

This information, from the news letter of Wirral AR Society, continues to say that in 1890, Walter Maunder, superintendent of the Solar Department of the Royal Observatory, Greenwich, reported that for a period of about 70 years, ending in 1716 there was a "remarkable interruption of the ordinary course of the spot cycle".

In several years, it continues, no spots were seen at all and in 1705 it was recorded as the most remarkable event that two spots were seen on the sun at the same time – a similar occurrence had scarcely ever been seen during the 60 previous years. We gather that this information has been "rediscovered" by an American solar astronomer Jack Eddy, who says that the amplitude of the sun spot cycle was greatly diminished from 1645 to 1715.

Wirral society comment that they don't suggest we sell our HF rigs – but it could happen! Heaven forbid.

However, we note that July's activities included a sale of surplus equipment on the sixth, and an evening of microprocessor trouble-shooting on the 20th. Well worth a listen. These and other meetings are held at the Minto House School, Birkenhead Road, Hoylake , Cheshire, on the first and third Wednesdays of each month, starting usually at 7.45 for 8.16pm. The Secretary, Cedric Cawthorne G4KPY, 40 Westbourne Road, West Kirby, is the man to speak to for more information.

CLUB NEWS

Braintree AR Society

The club meets every first and third Monday of each month at the Braintree Community Centre, Victoria Street, Braintree (next to the bus station in the town centre). Doors open at 7.30pm, with formal activities starting promptly at 8pm. Annual membership fee is £5 inc. 55p CA fee, and a door fee of 20p per meeting is charged for members and visitors. Further info is available from Jeff Roberts, G60IX, 27 Medley Road, Rayne, Braintree, Essex CM7 8TQ. Tel: Braintree 44857. Interesting note from club member Danny, G3YXJ: When in QSO with foreign stations, have you ever noticed how often you will be addressed as "dear . . . ?"

This may sound strange to our ears, since we normally reserve this adjective for members of the opposite sex, but in AR parlance there is good reason for this more general use. Our continental neighbours find it easy to express the close relationships which exist in the family group, as there is a suitable word in their language for "you"; for example, in French "tu" is used (as in "je t'adore"), and in German "du" is the equivalent word.

So how can this be translated into English? In earlier times "thee" or "thou" might have been used, but these have now been replaced by the less expressive "you". So, in order to show the close friendship which exists in AR, our continental friends simply add "dear" before our Christian name. It is only polite and courteous to return the compliment, and this is particularly easy with CW, using the abbreviation "dr" for "dear", or "lbr" for "lieber". Now you know!

North Bristol AR Club

NBARC is a fairly large club (around 130 members) with the use of very good premises as a meeting room, a permanent shack, smaller lecture rooms and a small tea bar. Meetings are held every Friday from 7pm at SHE, 7 Braemar Crescent, Northville, Bristol. RAE and CW classes run continuously and the club owns and operates a full range of HF, VHF and UHF gear which has been operated at several special event stations recently in aid of local charity. Details of membership from WE Bidmead, G4EVV, 4 Pine Grove, Northville, Bristol.

Bury Radio Society

Meetings are held each Tuesday at 8pm in the Club Room at Mosses Youth and Community Centre, Cecil Street, Bury. Main meetings on second Tuesday of each month. Society secretary is CC Hardisty, G8XUR, 16 Thornfield Road, Tottington. Tel: Tottington 6934.

Echelford AR Society

Meetings of the society are held every second Monday and last Thursday of each month at The Hall, St Martin's Court, Kingston Crescent, Ashford, Middlesex. Club Nets are on Sundays at 1000 local time, frequency 1.93MHz ±QRM. 2m net Wednesdays 2000 to 2100 local time on 144.575MHz (FM). All are welcome to participate in these nets whether they are members or not. Details of the society available from Alf Othen, G8FSZ, 5 Millan Close, New Haw, Addleston. Tel: Byfleet 48307.

Loughborough Technical College

The Department of Electrical Engineering is to host a radio amateur's course (C&G 765) on Tuesday evenings, commencing 13th September 1983. Tutor will be Doug Doughty, G3FLS, who from 6-7pm will give instruction in Morse, and from 7-9pm in theory and regulations. Course fee is a mere £16.50 and further information can be obtained from the department at Radmoor, Loughborough, Leics LE11 3BT. Tel: (0509) 21581.

Vale of White Horse AR Society

The new venue for the AGM (and meetings thereafter) will be The Canteen and Social Club, Milton Trading Estate, Milton, Oxon. Go to the main entrance of the estate, turn left inside the main gate, and it is the second building on the left with the car park just beyond. The club is, in fact, a public house and the club shall be using the restaurant and the bar, and another room for smaller meetings. Club secretary is Ian White, G3SEK, 52 Abingdon Road, Drayton, Abindon, Oxon. Tel: (0235) 31559.

Stourbridge & District AR Society

Meetings are held on the first and third Mondays of each month at the "Garibaldi", Cross Street, Stourbridge. There are no meetings scheduled for August. However, an HF SSB Field Day Contest is planned for the weekend of the third and fourth of September, and the club demonstration station is to be featured as part of the Stourbridge Carnival on Saturday 10th September. There was a good deal of support from the club's newer members at the 144MHz Low Power Contest on 8th May and special thanks must go to G8ZZH for his sterling work in arranging the contest, and also for the best DX of the day.

Southdown AR Society

Meetings are held on the first Monday of each month at The Chaseley Home for Disabled Ex-Servicemen, Southcliffe, Eastbourne, Sussex. Details of activities and membership from T Rawlance, G4MVN, 18 Royal Sussex Crescent, Eastbourne, Sussex. Southdown member Mike, G3MHF, would like to hear from anyone with old and unwanted copies of electronics, computing or radio magazines. He is collecting them for students from developing countries where such literature is either unobtainable or prohibitively expensive. Mike can be contacted on Eastbourne 762252 evenings or 25887 daytime.

Cheshunt and AR Club

The club meets every Wednesday evening at the Church Room, Church Lane, Wormley, 8pm or thereabouts. August 3rd event is a 2m portable on Baas Hill Common, 10th August is a straightforward natter night, 17th August is an equipment evening, 24th August is yet another natter, and 31st August is a junk sale. Among September's happenings are a visit to Brookmans Park MF transmitting station on 14th, and a talk by John Nelson of the RSGB on the 28th. Club secretary is Roger Frisby, G40AA, of 2 Westfield Road, Hoddesdon, Herts. Tel: (0992) 646795.

Swale AR Club

Pre-RAE and CW classes are still going well, and a special event station, GB2QBT, is planned for August Bank Holiday operating on HF and VHF in the afternoon. A 2m contest has also been provisionally organised for early 1984, for which certificates and a small plaque will be supplied for the winner. Details have still to be arranged, but anyone requiring information should contact (by SAE) B Hancock, G4NPM, of Leahurst, Augustine Road, Minster Sheppey, Kent ME12 2NB. A club call, G4SRC, will be operated during the contest with a premium for working that station.

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● **EDDYSTONE** 640 £40 also Garrard 301 turntable in SME plinth with arm £80. RX antenna tuner £20. Phone: Bookham 54813 evenings.

● **WANTED** clandestine radios, spy sets. B2 AMK II, 123, 122, 128, AP4, BP3, BP5, AMK III, HF156. Any S.O.E. Whaddon sets. Also any miniature or compact equipment. Please write John Baker, 94; Shoot-up-Hill, London, NW2.

● **PATHFINDERS** £80, CR100, R107 both rough £15 each or exchange plus cash for 7700 R1000, 770R, R216, SX200N or APN9 less tuning units. D Everall, 36 Eleanor Road, Waltham Cross, Herts. EN8 TDL

● **AR88** for sale, good condition £55. Tel: Weston-Super-mare 21248.

● **KW2000** 160m-10m AC PSU, mic, manual. No mods. vgc. £95. Mizuho MX2 as new. External mic 9-12v resulator £72. Linear amplifier 200mw input 6 watts out £20. G4JXK, Fareham 230737. Hampshire.

● **MULLARD** valve tester, appearance as new, working. No cards. Can demonstrate. Sell or swop communication receiver JR310 must have narrow band filter. You must collect. 35/37 Brighouse and Denholme Road, Queensbury, Bradford.

● **ZX81** 'Maplin' keyboard, 16k Ram in home brew box £60. 100's ex-board 74TTL must clear for radio parts at ¼ current prices. EG 7400 4P wanted circuits, service manual W.H.Y. for Solartron CD1400 will hire/buy (and plug-ins). G Williams, 85 Salthouse Rd., Barrow-in-Furness, Cumbria. Tel: 0229 29152 (after 6pm).

● **WANTED** DR49 or DR31, offering DR28 plus cash. Also seeking simple aerial tuner/amplifier as described in "P.W." Jan. 1983. Constructor's offers welcome. Tel: 01-959-7715 (North London).

● **HAM INTERNATIONAL** jumbo for sale 560 channels, USB, LSB, AM, FM, 10kc – shift, 26-27MHz £200 or will swop for two metre transceiver with digital display. Tel: Manchester (061) 789 3677 (R Matthews).

● **OFFERS**, Lafayette HA-600A amateur shortwave receiver, 150KHz-30MHz in five bands, 240 volts, AC or 12 volts DC, operating manual, Rogers 24 Marmion Road, Coningsby, Lincoln, LN4 4RG. Coningsby (0526) 42899 evenings.

● **16 M/M** Carpenter sound projector besides requiring 110v 50cps supply also requires attention. Almost as heavy as AR88. Exchange for Collins Hallicrafter, AR88 National HRO or similar communications receiver S.A.E. please. John R Gage, 80 Church St., Rugeley, Staffs. WS15 2AH.

● **ZENITH** Variac transformer type 100R. Input 230v 50cps. Output continuously variable 0-270v. 8 amps overload protected & fused cased. Offers. Buyer collects. S.A.E. please. John R Gage, 80 Church St., Rugeley, Staffs. WS15 2AH.

● **WANTED** FRG7700, Trio 1000, Trio 2000 or similar .5-30MHz communications receiver in exchange for telescope. Equatorial mount, all accessories. 2 x Barlow lens, erecting prism, sun screen, focal length 1250mm, magnification 625x. Cost £344 in 1978. Tel: 055 934 614.

● **WANTED** circuit diagram, service sheets etc. for early President "Adams" transceiver. Postage and photocopy expenses paid. T Balderstone, 38 Hawkenbury Road, Tunbridge, Wells, Kent. TN2 5BJ.

● **PLEASE** help R.A.I.B.C. member want manual/data/circuit on Sis Gen Marconi TF 801B/B/S. Also TD03-10D, Det22D, A1834, 565, or OA3 valves for above SigGen will pay ORK copys, whatever. Ring Peter anytime 047-385-694.

● **TRIO** TS520 HF transceiver, mint. Boxed with manual, microphone MC-10. Hamclock HC-2 £325. Carriage to be arranged. A Ringrose, Cluny Cottage, Hood St., Maryburgh, Ross-Shire. IV7 8EB. Tel: (0349) 61804 evenings.

● **FOR SALE** Daiwa infra-red mobile mic with 2 sensors as new £29. Datong D75 RF speech processor as new £30. Tel: (01) 859 1688. (Eltham).

● **SALE** Avanti PDLII antenna new in box £75 ono. Buyer pay post. Phone Cardigan 0239 614391 from 6.30pm.

● **DX-100L** realistic communications receiver. Covers 15Kh-30MHz £50. John Shrimpton, Lowfield Nursey, St James Rd, Goffs, Herts. EN7 6TR. Tel: Cuffly 873974.

● **HELP!** Wanted any information circuit diagrams, service manuals, modifications for Eddystone 840 C valve. General coverage receiver HF by redundant nearly OAP. R Pattinson, 135 Meriden Court, Birmingham New Rd., W'Hampton, Staffs. WV4 6BP.

● **WANTED** 10 or 11 metre Yagi, mini beam (any number of elements considered) Tel: 85491 evenings or weekends.

● **YAESU** FL200B transmitter and matching FR100B receiver £80 each or £140 the pair. Mr D Yeoman, 24 Oakleigh Drive, Peterborough. PE2 0BD. Tel: 0733 232211.

● **DX302** receiver all bands USB & LSB digital as new. Boxedm plus Datong active antenna AD270 complete. Cost £340 sell for £160. Reason for sale. Phone Mr Sharon 01-550-2346.

● **FOR SALE** Trio TS830S transceiver 7 months old, cost new £697, will accept £625 ono. Also SP230 matching speaker cost £39 will take £50 ono. Also Teac 3XR reel to reel tape recorder, auto reverse, cost £400 used 1 hour. Will accept £325. Various other small items for sale. Please enquire. Mr R M Dotchin, 2 The Crscent, Shortstown, Bedford. MK42 0UJ.

● **YAESU** FRG7, digital readout SSb filter battery box in vgc £120. Prefer buyer collects. Datong D75 RF speech processor as new £25 ono. Tel: Blandford (Dorset) (0258) 53930.

● **FOR SALE** Yaesu general coverage receiver FRG7 digital readout also Yaesu ATU plus 2 metre converter all little used, manuals. Accept £158 (includes securicor). Steele, Mayberry, Chilbolton, Stockbridge, Hants.

● **YAESU** FT 707, fully crystalled with YM3S, good condition £400 ono. Avanti Moonraker 9 £60 ono. Hirshman HR250 rotator £30 ono. Please Phone for more info. Complete £460. Gary Prince, 5 Robbins Hill Drive, Alvechurch, Birmingham. Tel: 021-445-5392.

● **YAESU** 2m FM mobile 5KHz synthesiser keyboard microphone cost £350 new. bargain £100. Tel: Tamworth 54134.

● **WANTED** Heathkit SB-620 Spectrum analyser. Paul Lockley, 52 Bunkers Hill Lane, Bilston, West Midlands. WV14 6JR

● **DX40/VFO1U** ideal beginners rig. Ouput 75w CW only. Both handbooks 100% working order £250. Also KW Atlanta transceiver. Power pack requires new mains transformer, handbook, wiring diagram for PSU £80. G30PQ QTHR. Tel: (0652) 688692.

● **FOR SALE** 2 metre FM mobile transceiver. Type standard C8800, fast slow scan. Memory repeater access tone. Original cost £350, will accept £150. Will deliver within London area or home counties. Siman Ball, 46 Michelham Gdns., Strawberry Hill, Twickenham. Tel: 01-892-3072 (eve), 01-568-7495 (daytime).

● **BARGAIN.** Trio TR2300, nicads, helical, charger; Azden PCS 2800 10M FM, digital display, scan rptr shift; signal communication corporation R537 RCVR (118-144MHz). Value over £420, sell for £200 ono. Richard, GW6TAM. 0554-820282 evenings only.

● **FOR SALE.** Yaesu FT902DM All Mode £725. Sony 2001, £90. Daton Auto Speech proc £60. Trio 2300 with nicads etc £110. All little used. Good condition. A. E. Chivers, G3YFQ, 1 Sycamore Close, Bushey, Herts. Tel. 0293-41461.

● **EXCHANGE.** Mercury outboard, 20hp 10inx4in boat trailer for communication RX O.W.H.Y. Findley, 27 Keytes Lane, Barford, Warwick.

● **WANTED.** Belcom LS102L or similar. 26-30MHz coverage, in good condition. I am willing to spend around £160 plus postage. Please write to: Mr R. K. Matthew, C-3-4, Thorncliff House, North Hyde Lane, Heston, Hounslow, Middx.

● **VALVES.** Two MS4B MET, P2 30 (1), PM 24 M (1), boxed. 70 others, e.g. 2D 13A FC 13, Z 63, CCH 35. Many others. Condition unknown. Offers. 3 Lay Road, Aylesbury, Bucks. Phone 86923.

● **SONY ICF 2001** PLL synthesized receiver, 76-108MHz FM, 150KHz-30MHz, AM/SSB/CW with SSB compensator, computer controlled tuning system, direct key input, manual and scan tuning, six preset memory, mains adapter, £115 ono. Tel. 01-521-0334 after 6pm.

● **DAIWA SRII** VHF FM 2 metre receiver with 6 scanning channels, crystals installed, also Philong PP1205GS power supply for mains use £40. Barking 01-594-7587.

● **YAESU FT707** transceiver, fully crystalled up, and YM35 mobile mike, good condition £425 ono. 021 445 5392.

● **COMPLETE 2MTR** station consisting FT290R Nicards charger, carrying case, rubber duck antenna 30 watt Alinco linear 8 element crossed 1/ASI plus inteconecting leads and switch box one lot for £300. G4SLG. Tel. Lincoln 0522 751920, 3 months old.

● **CEARS STEREO** tape deck new condition. Pair Sharps stereo speakers CP270E, 2-way 25w exchange Bearcat scanner or any good scanner. I Sear, 35 The Oval, Didcot, Oxon.

● **WANTED AR88D** in good working order can collect 50 miles Northampton. Ring 0234-711031 evenings.

● **WANTED: 4 METRE** linear. FTV707 MX4. 70TV. FT620. 01-856-4123.

● **EXCHANGE OR** sell, communications receiver, DX200 as new condition, boxed for AM CB transceiver, sidebander etc. Must be-good example will sell above receiver for £120 ono. Call Eddie, Day 01-257-5032, evenings 01-624-2546.

● **FOR SALE** FT101E fan cooled with KW109 ATU to match £350 ono. Also Trio 7800 40 watt, 2 meters with memory back up. Never used on TX 4 months old. £150 or swap lot for HF linear with cash adjustment. Tel Mansfield (0623) 550227.

● **FT901DM** £545. FV901DM £145. FC901 £95. CPU2500RK £150. MM2000 £95. YC305 £50. SR-C830/M15 Marine handheld, base charger, 5, 6, 9, 16, 25 £80. No offers. May, Liss (073082) 2153.

● **WANTED: CIRCUITS** and details or possible modifications to R208 R209 and AM type 61A receivers, also Leowe-Opta type 62881 stereogram, Mr A. Reynolds, 15 Kendal Green, Felixstowe, Suffolk, IP11 9SF.

● **WANTED: ALL** types of MF, HF, equipment for Carlisle Sea Cadet Corps. Also, B.28 receiver, open to offers or swaps. Petty Officer M. Brownlee, 80 Ennerdale Ave, Botcherby, Carlisle, CA1 2TR. 45552.

● **EXCHANGE REQUIRED:** Have Kenwood TS520SE (Lowe) will straight swop for TS700S Icom 251E Yaesu FT225RD also Kenwood R600 and FRT 7700 ATV swop for TS700G FT221RD or FDK Multi 2700. G4OLC (G8XZM) QTHR, 0670-813352. Northumberland, will travel 100 miles.

● **WANTED: STEPHEN**-James multi tuner Mk.1 or Mk.2 or any other good quality ATU, please telephone Boston (Lincs) 0205 820414 after 7pm.

● **CEEFAX ORACLE** adaptor for TV £125. Casio 401 14 instrument keyboard organ £145. MMC 435/600 ATV converter £18. 4M Europa transverter £30. 4M converter £10. Goodmans tuner amp £30. IC2E £100. 44 Townfield Road, Flitwick, Beds. Flitwick 714591.
RACAL RA17L communications receiver with 50m long wire, any trail 1-30mc/g excellent condition, handbook, &140 ono or P/X air gun, after 6.30pm. Mr Rogers, 119 Kingsley Close, Shaw, Newbury, Berks.

● **ROTEL 240 CB** Mic 8 RF gain, tone, pa, and plenty more brand new in box £65. York 863 CB specs as above, brand new in box £60. JVC TV, radio cassette 3060 with SW, MW, FM TV can be used in most countries, brand new boxed £145. 01-551 2151.

● **WANTED DESPERATELY** by hopeful new G4 (GO), Yaesu SP901 and 3 Clement Triband Yagi, TA33JR DX penatrator or similar. 2 elements also considered, price around £50. Tel. Clive (0279) 28857. Write Box 40, Harlow, Essex.

● **TRIO R-600** communications receiver including Yaesu FRT-7700 ATU plus some amateur radio books £205 ono. Davies, 4 Bryn Terrace, Gorseinon, Swansea. Tel. Gorseinon 891458.

● **SALE OR SWOP** for 2X81 32K Ram pack and printer £50 ono, or swop for Harrier WT2 CB hand-held. R. Playford, 21 Lammas Road, Watton-at-Stone, Hertford, Herts. SG14 3RH. Tel. (0920) 830491 (evenings).

● **NEARLY NEW** microwaves modules MMS1 morse tutor with talk back AT from 2-20wpm, needs 12 volts power supply. Bargain at £85 complete. Please phone 039-52-78181.

● **MICROWAVE** modules ATV converter MMC 435/600. Guaranteed unused but now surplus. Offered at £23 to include carriage. Please phone 039-52 78181.

● **EXCHANGE: SONY** ICF 2001 general coverage receiver (covers 10m to 160m ham bands) will exchange for Cobra 148 GTL DX or Ham International Multimode II USB-LSB-AM-FM (970 channels). A. Woodham, 84 Duff Street, Macduff, Scotland, AB4 1NR. Telephone 02261-32676.

● **ICOM IC255E** FM 25 watts 2 mtr 144 to 148, v.g.c. £165 ono. Workshop manual. Also M.M. 10 metre to 2 metre transverter, new model (S.O. 239's) 12 wks old, £85 or will exchange both for 2 metre multimode FT 470R or similar. Ring John (G6 SKA) any time 0385-853552.

● **FOR SALE** DX302 receiver 10KHz-30MHz digital frequency display plus Datong AD270 indoor ariel with pre-amp and mains unit all mint and boxed will swop for good hand held, 2 mtr radio £160. Phone 01-550-2346.

● **AZDEN PCS3000** 2m FM transevr, 25/5w, scanner, 8 memories, plus remote control cable, mint condition £150. Sommerkamp FT767DX 8 band HF trancvr. with CW filter fitted 100w output, £350. Tel: 0234 741736 (G4NXZ).

● **FOR SALE** Geloso G209R. £125. Hammurland HQ170A £200. H.R.O. inc coils p/pack £65 ono. BC348 £48. All good condition. Wanted Racal SSB adaptor, and preselector 197B. Phone 0908 566222 8am-2pm. 0908 314095 after 2pm.

● **R1155's** several good working order, original appearance with DF controls magic-eye & Jones plugs £25 each. Wanted AR88 or AR88D in good condition. Plus rough one for spares. Phone St. Albans 39908.

● **ORIC** BBC and Electron programs: Morse tutor £4, locator gives distance, bearing and points £4. BBC RTTY £4. Texas TI99/4 locator £5. G8KMV QTHR. Tel: 0438 54689 evenings.

● **TR220G** 2m FM portable twelve channels fully xtald S10, S13, S18 to S23 inclusive c/w. Nicads charger carrying case, manual boxed £80 ono. G6NXM Roger Fareham 238305.

● **YAESU FT227RA** 2 metre rig 143.970-8.025MHz 1 watt & 10 watt with powersupply plus ⅝ wave whip base antenna. Must sell to update station £225. Telephone: Orpington 20723 anytime.

● **YAESU** Ft2F 2m. FM TCVR. S8,20,21,22,23. RO, RRo R4, R5, R6, R7, 144.48, 144.6, 144.8. 10w/1w, Mic. Auto T/B mobile mount, manual, perfect condition. £70 ono. Ring Steve G4DFN, Coventry 612431.

● **WANTED URGENTLY** case for Hammarlund SP600, any condition. Your price. I will collect. For sale: Yaesu FRDX400. Good condition. 4 filters FM. AM SSB 160-6 metres. Handbook original packing & box. £140 ono. Ring 01-736-6581, evenings. Brian.

● **FT480R** transceiver, still under guarantee. £230. ⅝th whip. Mag mount. £10. ½th whip. £10. Rotator £30 5 element beam. £10. All first class.
A J Stapleton, 89 Almond Ave., Gelli-Ty-Sign Risca, Gwent. Tel: 0633 614845.

● **COMMUNICATIONS** receiver DX200 150kh to 30MHz, cost £169. Not 12 months old, hardly used. Gift with box and handbook. No reasonable offer refused. Tel: Runcorn 64592 after 6pm.

● **HARRIER** GB & PSU & Mic, SWR/ATU, mobile Starduster antenna. Swap wm RX, SWL ATU, broadband pre-amp, test meter, W.H.Y. Buyer dismantles and collects Starduster. Prew, 25 Springfield Road, Stirling. Tel: 0786 62290.

● **YAESU** FT107M HF transceiver still boxed. £560 quick sale. T.E.T. 5 band HF vertical antenna trap coiled. £55. Tel: Banbury (0295) 67409 (evenings).

● **EXCHANGE** DX302 quartz synthesised digital receiver 10KHz-30MHz mint. Also Mattel Intellivision games computer with 12 cartridges and Seiko World Timer watch for Yaesu 7700 or similar. W.H.Y. K Meckin, 71 Senhouse St., Workington, Cumbria, Tel: 0900 65614.

● **FOR SALE** Trio JR5005 (10-80m) and 9R-59DE (550Kh-30mm) receivers in good condition, plus Ferrograph tape recorder, plus stereo amplifier. £85 the lot. Buyer collects. Phone 01 727 3199.

● **SHURE 444T** desk mic £25. Katsumi 1024 EI Keyer £65. Yaesu hand mic £5. Trio 130S & AN AC PSU £325. Welz ant. tuner £25. KW pepmeter £25. 10-2m converter £5. FAA FLI £30. Hi-mound squeeze manipulator £8. B J Payne, 78 Carver Hill Road, High Wycombe. Tel: 0494-30018.

● **FRG 770** with memory plus FRT 7700 plus long-wave filter. Plus morse tutor amd key for £320. All as new. Tel: (01) 997-9995 after 6.30pm. Address: 9 Winscombe Crescent, Ealing, London W5.

● **WANTED:** circuit (with valves etc) and/or components ready built for filter system designed to remove sideband interference only on CB channels 1-40. Details to: Jennings, 82 Bayard Avenue, Downs Barn, Milton Keynes. MK14 7LN.

● **FT102** with FM-AM board fitted narrow CW filter etc. Plus FV102 DM (remote VFO) and MD1 base microphone. All only 6 months old. Original packing and manuals. Cost over £1200 new at £900 ono. Tel: John on 0385 853552 anytime.

● **HARRIER** CBX Midland 3002 legal CB radios. Plus two three amp P.S.U.S. Exchange lot for Yaesu FRG7 Comm 8 receiver. Tel: Bracknell 52601.

● **EXCHANGE** a Heathkit portable oscilloscope for Yaesu receivder or Icom. Any other ham receiver. Mr J A Cusken, 42 Wallace Road, Bodmin, Cornwall.

● **POWER** amplifier AML-100w, SSB/CW, AM-FM, power input 13.8u.d.c. £60 or W.H.Y. in receiving equipment or A14. Ex-army set. Mr Bryan Barnwell, 166, Ark Lane, Denniston, Glasgow. Tel: 041-554-4005.

Classified Ads

● **KW ATLANTA 80-10M transceiver, PSU/SPKR, Ext – VFO, Shure mic, 500w p.e.p, 350w CW, two-speed tuning, vgc. £200; carriage extra. Paul Lockley, 52 Bunkers Hill Lane, Bilston, West Midlands, WV14 6JR.**

● **MINOLTA** SRT101, £0000. Exchange for HF transceiver (valve) must cover 1.8MHz – 30MHz. Mint cond. Can always add; Cash for good rig – camera – has many filters, flash etc. B. Barwick, 31 Pemberton Drive, Bradford, Yorks. (Buyer collects.)

● **YAESU** FCT707 A.T.U., FP707 P.S.U. YM35 mic, all WARC bands, A.1. condition £575. Also Midland 3001 FM.CB. & mic & SWR/ATU & 5-7 amp power supply, & Wotpole antenna £50, or swap the lot & FRG7RX & cash adjustment for ICOM 720A & P.S.U. Tel. Fillongley (0676) 41012 (After 11.00am.)

● **YAESU** FRG7, six months old, mint condition. Ideal starting receiver. £150 ono., Datong Audio filter FL2 £50. Call 021-472-0218 evenings.

● **KW204** transmitter, 6 bands, 160-10m with Shure 201 mic and spare 6146's KW202 receiver, Q Mult notch filter speaker and manuals. Both mint £160 each, £300 the pair. G4KKG QTHR. Tel: Yeovil (0935) 25327.

● **WANTED** 3 element triband antenna 10-15-20mtrs. D C Lowe, G6EFA, Oakdale, Biddenden, Nr Ashford, Kent. Tel: Biddenden 291303.

● **NRD505** and matching speaker £860. FRG7 internal dig. readout 2.155B and 5KHz AM filters £165. Regency 16 channel programmable air band receiver manual/scanner; mains/battery; scan/search; scan delay £175. Datong UC1 up converter £65. Wanted Redifon R408 receiver. K Burton, 159 Redworth Road, Shildon, Co. Durham, DL42JP. Tel: 0388 777398.

● **TRANSVERTER** 27-6.6Mhz AM-SSB with RF gain, clarifier 12 volt £140. Ring Dawlish (0626) 86321.

● **SALE** S.A.E. components valves wanted; Vibroflex bug key information; graph oscilloscope type 303C. All expenses paid. G2HKU. 'Hamlyn', Saxon Avenue, Minster, Sheerness, Kent. Tel: (0795) 873100.

● **EXCHANGE** portable b&w TV 5 inch screen with built in AM & FM radio runs on mains, batteries or cigarette lighter in car. For ZX Spectrum computer, or Sony ICF 2001 SW radio, or FC902 ATU. Will sell for cash, offers Malvern 64327.

● **MIDLAND 2001** CB transceiver with ½ wave antenna will swop for general coverage receiver or 2 metre receiver or W.H.Y. Tel: Cambridge 834263. Evenings or weekends.

● **AR88D** working vgc., £50 ono. Also Ken KP202 6 channel 2MFM handheld with NICADS, charger, toneburst and Helical whip crystalled S20, S21, S22, R5, R6, R7. £45 ono. Tel: G8HSS, 01-446 4648.

● **MATTEL** Intellevision TV game with five cartridges hardly used £145 or will consider exchange for anything interesting, radio or W.H.Y. Phone Dartford 75461.

● **WANTED** Pye pocketphone PF1 Xtal's for 70cms IE Rb14, RB10. If you have them already for use it is appreciated Good price paid for two good sets. Phone or write to Stephen Balon 18 Knowley Street, Leigh, Lancs. WN74ER. Tel: (0942) 675445.

● **WANTED** a circuit diagram or manual for R1155 (75KHz-18MHz) receiver, will pay for postage and a small price if needed. Tel: Upper Farringdon, Hants 79 306. Ask for Darren

● **RTTY** Creed 444 as new only 595 hours use from new. 45-45 and 50 band gears service manual spare paper. ST5 TU dual-machine auto start as a pair £175 might split. TR2200 GX Nicads charger £80 ono. DAIWA CNA1001 ATU as new in box £110 ono. G6SYZ QTHR. Tel: 020 888 738. (Port Isaac, Cornwall.)

FREE ADS: Sell your radio equipment and spares for profit!

AMATEUR RADIO Classified Order Form

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Address .....

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Tel: .....

To: Amateur Radio,
Classified Dept,
27 Murdock Road, Bicester, Oxon.

Don't forget — September issue of Amateur Radio appears on August 26th, 1983.

● **NATO 2000** with power pack as new £130. Phone Dewsbury 0924 465822.

● **FT101** (& FM, toneburst, RPT, shift, K Tone) 2m transverter. Trap dipole 2 match £350. W1191 wave meter £10. G whip 10, 15, 20 & 80m £25 UK101 and assembler/dissembler, + UART & sound clip & PIA new mon 8k RAM £150. G3YSG, Little Wick Green 2492.

● **TRIO** JR310 receiver 80m-10m vgc. £50 ono. MM28-144 converter £10. MM pre-amp 144MHz E5. Codor preselector 80m-10m £3. Pye AM10D not working for spares £3. Tel: 0954-31358. G6EUY QTHR.

● **TRIO** R1000 receiver £215. SX200N scanner £200 both as new. Also Uniace 200 CB transceiver excellent cond. and performance £75. Can demonstrate all equipment buyer collects. A J Newman, 10 West Town Grove, Brislington, Bristol. Tel: Bristol 712084. (Buyer collects)

● **WANTED** transformer 240v AC input to give about 3000v DC at 800ma or 50 once rectified. Also required Eimac SK2216 chimney and SK2210 base for 3XC1500/8877 G8WRB QTHR or call Dave on 01-521-0727.

● **EXCHANGE** homebuilt VHF/UHF RX tunes 50-470MHz AM/FM no gaps, mains/12v for Kenpro KP202, Palm II, C146A, FT207, or modified pocketfone type TX/RX for 2 metres. Phone 02074-4342 evenings weekends.

● **YAESU-480R** 2m multimode TX/RX boxed 6 months old used only as base station £295. Yaesu headphones SWR bridge 2m 8Ely–13v.5A PSLI–Himond key HK708 £60. Package deal 5350. Tel: G4DTI. Wokingham 792102. Evenings and weekends.

● **WANTED** 10 metre rigs FM SSB multi mode preferred converted CB or amateur max output 50w. Halsey, 1 Darbourgh St., York. YO2 1JH. Phone York 23893. Working hours Monday to Saturday.

● **WANTED** Heathkit SB - 10U sideband unit, unmodified and operating. Buy/swop FB Bolex standard-8 camera. Model C80 Yvar F2.5/12.5mm lens. Zipp pocket case. Phone Canterbury 0227/65200 or 20 Newhouse Close, Thanington, Canterbury, Kent.

● **REALISTIC** DX 302 communications receiver, quartz synthesized digital read out. 10KHz, 30MHz. Less than a year old, boxed; perfect £140 ono. excluding carriage. Tel: 0424-214485, Bexhill on Sea, Sussex.

● **P.M.R.** System 6 vehicle mobiles with Pye base station 'HiBand' FM (Suit mod for 2 metres?) £450 the lot. John Butler, Deeside (0244) 813163 (day) 534231 (evening.)

● **WANTED** HF. VHF RX-TX. Swop professional spray gun. Compressor motor app 2½ CFM. Electric motor ½ HP 1 PH. Vehicle test meters. Complete photographic b&w dark room inc paper and chemicals. P Chivers, 29 Chessel Cres., Bittering, Southampton. Tel: (evenings) 0703 25679.

● **HYGAIN CLR2** 5/8 wave vertical antenna designed for use 27MHz CB. Tuned for UK FM CB. Usable on 28 MHz. Good cond. £20.00. St Albans 32759 Eves & w/ends.

● **YAESU** FRG 7700, FRT 7700 ATU, FRV 7700E converter £275. Ham International Concorde II modified for 26-27 ??? £90. All in absolute mint condition. Tel: 0243-788075.

● **LOWE 6CH** 2m RX fitted PA3 amp £35. Coder PR40 1.5-35 MHz preselector £20. Sentinel 2m converter MW output £25. 160 MTO MW converter £10. K Pryce, Rose Villa, Brixton, Plymouth, Devon P28 2AC. Tel: Plymouth 880674.

● **WANTED** Belcom LS 102L, must be in good condition and full working order. Cash paid for good radio. Tel: Tadley 6020 or write to Stewart, P.O. Box No. 3, Spencers Wood, Reading. RG7 1BT. Will collect.

● **SIGMA** Four Tagra BT-104 27MHz 2000W £45. Ring Yateley 872167 after 7pm.

● **6/8 AMP** power pack ham Concorde II turner expander 500, mike LA 60 linear ROS 4, SWR power meter ROS 28 antenna matcher, 3 way antenna switch, 2 low-pass filters, Electronica special 3 element beam all perfect £250. B J Edwards, 4 Middlewich Rd., Holmes Chapel, Cheshire.

● **SALE** Cobra 148 GTL DX 26.515 28.045 AM/FM/CW/USB/LSB, built in SWR meter facility for CW key in beautiful condition £120 ono. or will swap for 2 metre transceiver. All letters answered. John F Zissler, 34 Freiston, Fairstead, Kings Lynn.

● **BARLOW** Wadley XCR.30 HF portable 0-30MHz a top line portable £95 or would consider HF transceiver with small cash adjustment as exchange. Phone 0723 (Scarborough) 351456.

● **WANTED** HRO, AR88, early Eddystone anything HRO. Have for sale. Many broadcast receivers from 1920-1955. R107 going but needs love £30. Realistic DX200 as new in box £85. Will sell or exchange any of above for any early communications receiver. Ring Ashley James 045 3882164 (Stroud. Glos.)

● **SAVE** £20 buy my new and unused Harvard 410T 40 channel hand held FM CB with carrying case and new Duracells. £40.00 ono. Unwanted gift. Phone Truro 864465 after 6pm please.

● **REALISTIC** TRC 1001 stroller accessories include rubber duck extension mike, Magmount, power leads £50.00 ono. York 861 and antenna £30.00 ono. Cybernet Beta 2000 and antenna £40.00 also legal base antenna Call John, Barlaston (078 139) 2536.

● **FT 101ZD-6 BAND** fan, mike, ext speaker, exc. condition £520, FT101 ZD FM board, new £30, Daiwa 7/8 double loaded mobile 200W £17, 15-20A PSU, home brew needs finishing £65, 12" vent-axia wall fan, new £95, electronic timers, example 0-30 mins adjustable £20 each. MFJ ATU, BAL, UN-BAL £50, HK707 key £8, HK 704 key, new £9. 100W varmint valve, base 10-11m amp £135. G4RTC. Tel: Jake 01-803 6678.

● **CB RADIO**, power pack antenna, half breed, gutter mount DU27, swap for 2x81 Puss, some software or RAE home course. Tel: Hertford 54531.

● **WANTED**: for the Wireless Museum, old radio books, magazines, catalogues, QSL cards components, valves, morse keys, loudspeakers, any old knobs! Collection arranged. Details please to Hon. Curator. G3KPO, 34, Pellhurst, Ryde, IOW.

● **TRIO TS130S** PSU £350, KW Pepmeter £25, Katsumi El Keyer Mk1024 E64, KWLP filter £5, Yaesu Yeta hand mic £5. Yaesu FCYOY and tuner £50. 1 pr Trio, 1 pr Yaesu, h/phones £5 each from the stock of the late G3HIW. Contact Brian G4EJY 0494-30018 QTHR.

● **YAESU** FRG 7, as new, boxed, manual, guaranteed with A.T.V. and aerial. Bargain at £135. Tel: Radcliffe on Trent 2327.

● **CODAR CR70A** RX540 to 10m, 560KHz to 30MHz CW 55B facility, ideal beginners rec. with PR40RF preamp with headphones covers CB band. Snip at £20 the lot. Can deliver in Bristol area). J.R. Buswell, 41 William St. Totterdown, Bristol BS3 4TY. Tel: 0272 715948.

● **MML 144/25** 25w linear plus preamp. Suit FT290R etc. £40 ono. SEM 2 metre transmatch A.T.V. plus 3 way SEM antenna switch. Best offers taken. Plus PA3 on board preamp new unused. Ring 01-247 6097 G6RBY.

● **TS130V TRANSCEIVER**, SP120 speaker unit and Azden mic, new condition, £360, GM4DHJ, QTHR. Tel: 041 889 9010, (Paisley).

● **WANTED** YO901P Yaesu multiscope. Good price offered. Will travel to collect. Please tel. 01-850 4848 evenings, weekends. G4NDW. Dave.

● **SWL STATION** comprising Heathkit (ex BBC) SB-310 9 band 3 hambands plus broadcasts and Global AT1000 ATV. Both vgc £75. or exchange for electronic organ components. J. Barton, 94 Brize Norton Road, Minster Lovell, Oxford. Tel: Witney 75220.

● **VINTAGE RECEIVER** for sale. Eddystone B34 alias Model 358. 49Kcs to 30MHz coverage. Good working order with transformer. Best offer secures. Norwich 666467.

● **FOR SALE** Trio double conversion communications receiver 3.5MHz 29.1MHz WWV in box. 5 months old. Original needs slightly realigning plus Ross switched stereo mono phones, new £75. Or any near offer. Buyer collect. Mr. E. Vaughan, 108 Micklefield Road, High Wycombe, Bucks HP13 7EY.

● **LAKE** "Manxman" 850 FM CB for sale £15, or swap for 2m band 7/8 whip with gutter-mount or mag-mount. 32 Cornelius Drive, Pensby, Wirral, Merseyside. Tel: 051-648-4166 after 5pm.

● **WANTED** Comms RX FRG 7700 R1000, R2000 or similar. Will consider RA17 or similar quality bottle job. Must be gen. Cov. SSB/CW £200-£400 (800-1600DM) or info on Dutch/German ham shops. Cpl. T J Watson, No 37 Squadron, RAF Bruggen, BFPO 25.

● **WANTED** older type of receiver for person wishing to learn more about amateur radio. Can anyone help me please? All letters answered. Kenneth Webster, 12 Staveley Grove, Ingrow, Keighley, West Yorkshire.

● **POINT CONTACT** transistors wanted, and a few very early junction types. Andrew Wylie, 18 Rue De Lausanne, 1201 Geneva, Switzerland.

● **HQ180XE HAMMARLUND** GC/RX for sale excellent condition original carton and manual CW/AM/SSB. One owner little used .54/30mcs. H R Tempest, Broughton Hall Skipton, Yorkshire. (0756-2267).

● **CR100 HF** receiver, good working order, £30. Also VHF/UHF scanner, realistic Pro-53 £40 ono. 01-504-3670.

● **CREED TR101/2** Desk-Fax £5 pair. 7B teleprinter £23 656 tape transmitter £9 BC221 frequency meter £18. Marconi VTVM £3. TS-87/AP RF Wattmeter £5. AN-APR4 radar search receiver 38-1000MHz £30. Panoramic adaptor £10. Reading 695697.

● **KW2000'B'** transveiver, PSU and speaker, 'Q' multiplier, speech-processor, hand mike, hand book also circuit diags. of TX/RX PSU and processor, £200. R.P. Neave, G4DAN, 24 Mayfield Road, Writtle, Essex, CM1 3EL 0245 421031 after 6.30pm.

● **WANTED: AR88D** in reasonable physical appearance. Electrically unimportant. Price range £40 to £60. Will travel approx 30 miles to inspect and collect. Tel Ed after 7 on Rayleigh, Essex (0268) 770716.

● **TRIO** TS 700G for sale or p/exchange for TS120v/s or KW Argonaut QRP HF rig. Some Xtals for 700G fitted also Tonna 13 ELE & rotator for sale. E Harvey, Southwater, Horsham 730934 after 7pm please.

● **HAM** International multimode 26.510-28.310MHz, AM, FM, SSB plus variable k/c beam £25. Bremi 200 watt valve linear £60. Would exchange for good 2 metre multimode. Tel: Silverstone 857755.

● **TS-520SE**, matching ATU, MC-50 desk microphone, 30 metres of UR67, HF-5 aerial plus manuals. Complete station in excellent condition £450. Contact Dave Bobbett on Coggeshall (it's near Colchester!) 0376-62630.

● **ROBOT SSTV** monitor like new, boxed. Radiomobile 40 ch CB large SWR power meter 10-100w. Matcher 1KW low pass filter. 18ft obiter antenna. SWL ATU Stephen James type. All boxed like new sell or exchange for SX200N scanner or what have you. Tel: 051 638 5554.

● **REALISTIC** UVF/UHF direct entry programmable scanner Pro-2008 68-88MHz 144-148MHz 148-174MHz 410-450MHz 450-470MHz 470-512MHz as new, half price £100. Mr Jim Gyseman, Caretakers House, Wrotham Secondary School, Wrotham, Sevenoaks, Kents. Tel: Borough Green 884207.

● **MML 144/25**, 25W out for 2½ in. Plus 10dB preamp, mint condition. Suit FT290R etc. Also SEM 2 metre transmatch, will match anything! £45 the lot or will split. Tel: 01-247-6097 day, 01-4464932 evenings. G6RBY.

● **YAESU** FT107M 9 band HF transceiver FP107 power unit excellent condition £575 or exchange for older rig or W.H.Y. cash adjustment. Tel: Worthing 0903 41109.

● **HARVARD 40CH** handheld CB £45 new. Cobra 120 channel AM/CB sideband, both good condition £35. Rubber Duck supplied with Harvard. Please phone evenings only. Mrs Sear, 9, Sands Road, South Moreton, Didcot, Oxon. Tel: Didcot 814038.

● **YAESU FRG-7** communications receiver as new, £120 or offers. Telephone Wolverhampton 20636.

● **KENWOOD TR2500** new, unused, boxed, etc. £205. Call (0277) 354378, Ingatestone, Essex. Wanted AT230 tuner.

● **REALISTIC PRO-2008** VHF/UHF programmable scanner. 66-88MHz, 144-174Mhz, 410-512MHz, eight memories, no crystals needed. Oirect access to 18,160 frequencies. Includes Tandy base antenna 144-512MHz, £100. Telephone Oxford 66075.

● **93AMHz** Reftec transceiver with professional co-linear antenna under guarantee. Going 2 metres. Phone Ipswich 830147.

● **FOR SALE** FT290R £220 or will part exchange for good Liner 2, TR 7010 or similar. Please phone Dudley (0384) 55766 after 6.00pm week and anytime weekend.

● **Icom 255E** 25 watt FM Mobile £185.00 cassette recorder battery/mains £10.00. C15 Universal oscilloscope needs attention £15.00. Brand new 12AVQ/S HS Vertical 10/15/20 mtrs plus 40ft low loss feeder £55.00. Phone 0423 66430 evenings. De G4SXU.

● **FUTABA** 27MKH TX 3, RX's 8 Servos, 2 Nicads charger £70 or swap gen coverage RX. Tel: 0642 558836 (Stockton Cleveland.)

● **HANIMEX** television game colour or black and white. Rebound target moving target. Tennis, football, squash or practice. Hardly used, good condition £12.50. Michael Greasby, 52 Wightman Street. Undercliffe, Bradford. BD3 OLD. Write or phone Bradford 630920 (0274) after 4.30pm.

● **WANTED** any crystal set parts of 1920s ERA. Crystals, cat's whiskers etc. by disabled collector, anything considered. Mr Ray Williams, 62 Kingscliffe Road, Grantham, Lincs. NG31 8ET. Tel: 0476 66047.

● **FOR SALE** Amstrad CB 901 with bwo antennas and power pack £85. And city boy SW/MW/LW/UHF radio £30. Atari video game with three games £125, never used and 2 channel handset £20. Alastair Graham, 27 Crichton Rd., Pathhead, Scotland, Midlothian. Tel: 0875 320 642.

● **SHACK CLEAROUT.** RTTY station £65. 40w+ 144MHz amplifier £20. 10 amp PSU £47. IC4E handie with external mike/speaker, case £160. All ono. Wisbech 584640.

● **WANTED: DATONG** multimode audio filter. J. Moore, 174 Woodclose Road, Chelmsley-Wood, Birmingham 37 5AA. Tel 021-770-8895.

● **EXCHANGE** Opympus OM1 200mm 50mm lens motorwinder 2x converter, extension tubes, zoom, flash with bounce head plus aluminium case for Yaesu FRG7700 with ATU exchanger, collects. Allan Wood, 8 Crampton Court, Top Valley, Nottingham.

● **SEARCH-9** 2 metres £35. Heathkit RFIU signal generator 100KHz to 200MHz £35. Bearcat four-six hand-held scanner. R5-O/P XTAL fitted £45. Realistic 200 receiver as new £150. .150 to 40MHz. "Moorings", Halvarras Road, Playing Place, Truro TR3 6HD. 0872-862575.

● **EXCHANGE** Hitachi stack hi-fi, comprising of 50 watt amplifier with tape, phono tuner and auxiliary input sockets, MW, LW and FM tuner with LED signal strength meter and digital frequency readout, Dolby B cassette deck with normal/CrO2/Metal tape facility, APSS controls and twin LED meters. Pair of two way matching speakers. All in excellent condition. Boxed with all leads, aerials, instructions and lightweight headphones. Would like HF SSB rig, eg. Yaesu FT107, FT707 or Icom IC710 preferably with PSU. Ring Southampton 81433 anytime and ask for Andy King.

● **HARVARD** 410T 40CH handheld CB £30. Discone multiband antenna 50-500MHz £10. Swansea (0792) 467384 evenings.

● **ZX81 & PSU** with professional keyboard & 32K RAM & ZX99 tape control system with instruction books etc. & software £160 ono. Mr R Heyword, 733 Heol Pendyrus, Ferndale, MidGlamorgan CF43 3PE.

● **TRIO** JR 310 80-10MTR amateur band RX. Excellent receiver in first class condition and working order £85. Also FC 707 Yaesu ATU 10-250 ohms, 150 RF rated 80-10 mtrs. Dummy load SWR/PWr meter 4 months old £50. Both now surplus to requirements and in unmarked condition. Manchester area. Ring 061-928-3939.

● **WANTED** TR10 AT230, D1 AWA CN2002, TR10 TS930. . Vintage Valve and Crystal Receivers. . . .J G Barnes, G3AOS, 5 Prospect Drive, Hale Barns, Altrincham, Cheshire. WA15 8TQ.

● **FT227 RA 10W FM** transceiver, very sensitive, 5/25KHz step/scan, reverse repeater, auto toneburst superb condition, £160. IC2025 2M.SSB transceiver, extra crystals, satelites, beacons, superb condition, £110. David, G4RMC EXG8ZNC QTHR. Telephone Garston (Herts) 79567.

● **NO 19 SET** £30. Heath Kit Mohican communications receiver, 5 bands £35. Admiralty receiver, Murpay B40D modes FSK, CW, SSB, high quality, 10 valve set, £50. Marconi loop ariel £10. Would buyers collect? A.H. Billington. 50 Chipsey Avenue, Bugbrooke, Northants. 830492.

● **YAESU FT227RA** 2M FM transceiver for sale four memories and scan, £150, also J Beam C5/2M Colinear ant. £35. Tel. 01-882-0206.

● **RADIO AMATEUR** examination. Let me help you teach yourself, at home with my low cost correspondence aid. Pay as you learn. Send for details. G4EGQ, P. Pennington, 146 Elmsvale Road, Dover, Kent, CT17 9PN.

● **FOR SALE** KW 2000B no mods very clean condition £160 ono. Buyer collects. Phone Lea Valley 712631 after 5pm.

● **EXCHANGE** Acorn Atom 12K & 12K computer & PSU and VIA & programs for Yaesu FT 708R or similar 70cms handheld in excellent condition. Ring during office hours 0274 723101.

● **AR77E** rack model complete with service manual and spare valves. Smoothing circuit requires attention. Will anybody fix it or buy it? Also 1930s Ultra radio T401. Tel: Orpington 25119 evgs. or wk/end.

● **WANTED** YO901P Yaesu multiscope. Good price offered. Phone 01-850-4848 evenings, weekends. Dave G4NDW.

● **WANTED** handbook for Trio JR5005 amateur band receiver also general coverage receiver prefer valves Racal Collins Eddystone Trio etc. must be available close to Sheffield area. Phone Sheffield (0742) 343492.

● **WANTED** preselector for RA17LMK2. SSB adaptor for RA17LMK2. For sale/exchange HRO, BC348, 9R59DS. Wanted 770R, 770V or 990 etc. VHF and VHF RX gear. Dave 0908 566222 Ex. 35. Between 8am and 2pm.

● **GRUNDIG** Satellit 1400SL professional full short wave coverage up to 30MHz, including all broadcast and amateur bands. USB/LSB, BFO and digital frequency readout. Also VHF/FM less than 1 yr old £110 ono. Tel: Frome (Somerset) 63939 evenings or weekends.

● **YAESU** FRG7700 with FRA7700 active aerial and FRV7700E VHF converter 118-130 and 140-160MHz. Mint condition, six months old, displaced by new transceiver. Original cost over £400, accept £325 ono. Chorleywood 4441.

● **FOR SALE** Hallicrafters VHF receiver CHL46130-G/S36 27MHz-143MHz £50. Tel: Wokingham 782236.

● **WANTED** Manual for Robot 400 SSTV scan converter. Tel Wokingham 782236.

● **STANDARD** CS8 2m multimode portable, with Nicads, charger, case etc. only ten months old £180. Also Sanyo G2005 music centre only £75. Jon Jenkins, G4LJW, Bedford (0234) 781323.

● **WANTED** copy of Practical Wireless for July 1979 containing review on Yaesu FRG-7. H Davies, 14 Martland Avenue, Aintree, Liverpool. L10 6LT. Tel: 051-526-8608.

● **WANTED** b&w video camera in good working order. Tel: Bristol 558980 (after 6pm.)

● **YAESU** FRG-7 ideal starting receiver. Mint condition £130 ono. Datong AD270 £15. Tel: 01-527-7528.

● **70CM** ANTENNA 70/MBM 46 £10. Signal generator 370-560MHz £25. Mr Dent, 65 Tibbs Hill Road, Abbots Langley, Watford, Herts.

● **REES** Mace Marine general coverage receiver 60KHz-31MHz, 8 bands variable selectivity BFO with PSU £45. Wanted HF SWR/PWR meter ATU Yaesu FC902 or similar. Tel: Reed, Boston Spa 844305.

● **WANTED** information please about 8-digit vacuum display unit. Labelled only "ISE-DP89A-5479 (Japan)", especially as receiver frequency display. All postage, photocopy costs refunded of course. Please tel: 03553-2472.

● **DRAKE** SPR4 solid state communications receiver dual gate FET circuitry linear dial 1KHz readout notch filter. Programmed all broadcasting and amateur bands etc. Recently overhauled radio shack, excellent £125. Tel: Lichfield 54033.

● **IC251E** fitted Mutek Icom desk mike. In excellent working order. Manual bargain at £470. A G Fisher, G6CVJ, 108 Heston Grange, North Hyde Lane, Heston. Tel: 01-572-0465.

● **HAVE** Pentax MX with f1.4 lens and a filter, other lenses, including telephotos etc. total cost £950, new and unused, wanted swap for FT 101ZD and ATU FT530 and ATU or l.c. Y30. Must be in first class condition. Ken James, 2 Marian Road, Llandudno, Gwynedd. W30 1HL.

● **EDDYSTONE** 730/4 receiver excellent condition. Circuit & manual £80 ono. Liner 2 SSB transceiver 144MHz £75 ono. Garex twomobile FM mobile transceiver 2 metres £65 ono. Europa transverter 28/144MHz £55 ono. Mr White, Rose Cottage, Shenley, Brook-End, Milton Keynes. Tel: 0908 501310.

● **HARRIER CBX**, base antenna, mobile antenna, SWR meter, matcher, power mike, coax, plugs etc. Cost £160 sell for £100 or swap for 2 metre rig or a good HF beam antenna for 10-15 or 20 – Innes Fairbairn, 1 Callander Place, Cockburnspath, Berwickshire, TD13 5XY.

● **FOR SALE:** Codar CR-70H perfect condition, £25. 34 Wenny Estate, Chatteris, Cambs.

● **YAESU FT 707** frequency coverage 80-11 mtrs FM conversion fitted 9 months old, matching power supply unit FP707, and antenna tuner FC707, just been serviced, £550 or exchange FT101ZD or similar. Lincoln 694983.

● **YAESU FV-101Z** external VFO as new, offers. Tel 0792 403526.

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