December 1983 90p

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Amateur RADIO

Editor: Richard Lamont G4DYA.
Technical Editor: Nigel Gresley
Graphic Design: Gina Satch
Technical Drawing: Paul Edwards
Contributors: Hugh Allison G3XSE, Tony Bailey G3WPO, Peter Dodson, Don Field G3XTT, Mike Hadley G4JXX, John D. Heys G3BDQ, David Lazell, Angus McKenzie G3OSS, Trevor Morgan GW4OXB, Glen Ross G8MWR, Ken Williams.
Advertisement Manager: Linda Beverie
Ad Executive: Rose Kirtland
Art Editor: Frank Brzeski
Production Co-ordinator: Alison Pezarro
General Manager: Chris Drake
Managing Director: Eric Rowe
Director: Elizabeth J. Long

Published by Goodhead Publications, 27 Murdock Road, Bicester, Oxon OX6 7RG. Telephone Bicester (08692) 44517.
Printing by Wiltshires (Bristol) Ltd., Bristol.

Typesetting by Cathedral Graphics, New Buildings, Trinity Street, Coventry CV1 5QR. Tel: 27792

Distributed by COMAG Ltd., West Drayton, Middlesex.

Front cover: This TW4000A transceiver and WPO Communications 6m converter board, photographed by Jay Moss-Powell G6XIB.

Before I buy, I carefully consider the purchase. If the item is not expensive, then probably consideration will not take long, but if the cost is for example, two or three hundred pounds or more, then there are several questions which I would want answering.

what to buy,

The first is whether to buy ICOM, YAESU or TRIO. Obviously, we are convinced that TRIO equipment is the best. Since we import the equipment, you could accuse us of being biased in this view. However, our conviction is based on many years' experience, and the simple fact that the volume of TRIO sales in the UK is extremely high. **Many amateurs are to be found using TRIO equipment, and we are confident that a TRIO rig is its own best advertisement. Why not ask an owner?**

where to buy it,

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help,

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just a part of the range

CURRENT·COMMENT

Introducing you to this month's issue

Welcome to the December issue; I hope you'll find plenty of interest in its pages. (If you don't then for God's sake tell me!) We've a new, regular "DX Diary" for HF operators, by Don Field G3XTT, who is an expert in this, er, field. This month's column is really an introduction to what's to come in the future. The idea is to concentrate mainly on future events, rather than the past events, loved by most of the other mags, so that the information is actually of some use! DXpeditions, contests, QSL and award data - it's all here.

The SWL page is of course another of our regulars, but as from this issue it has a new writer, Trevor Morgan GW40XB. Trevor reveals some of his trade secrets about getting QSL cards back if you're a listener.

Two construction projects for the long winter nights: a 50 to 28MHz converter, and a variable power supply.

A variable power supply is pretty well essential for any self-respecting amateur's test bench. After a multimeter, it's probably the most useful box you can have.

The 50MHz band seems to be attracting a phenomenal amount of interest, considering that only 40 UK stations are licensed to transmit on it. However, the present 'out-of-TV-hours' experiment is a fascinating one, and there's nothing to stop us from operating cross-band from 28, 70 or 144MHz - except of course the absence of a 50MHz receiver. Our converter design is by Tony Bailey G3WPO, who, although new to *Amateur Radio*, has been a writer and designer of many constructional projects in other magazines for several years. If you want to have a go at this project, ready made printed circuit boards and kits are available if you want them. On the other hand, there's nothing to stop you gathering the various bits or making the boards yourself.

The Trio TW4000A two-band, FM talking transceiver is the main subject of this month's Angus McKenzie report. As well as covering 2m and 70cm in one box, this machine contains a voice synthesiser which tells you your frequency and other information. Not only all this clever digital stuff, but the steam-RF performance is, in some ways, better than any previous box.

29MHz FM has become very popular, mainly because of the modified-CB route to a cheap rig. It has a number of technical advantages over CB first, there are fewer people on it, so you can expect to get a completely clear channel, and therefore much greater range. Second, for the same reason there's much less cross-modulation mush, sprogs and gunge. Third, you can quite legally use a 100 watt amplifier and a decent aerial!

Now a number of 'emporiums' (emporia?) are offering CB-type 29MHz rigs. Angus takes a look at the Oscar 2, a 10m FM rig on offer from SMC.

Among all this technical genius there's the usual sprinkling of the lighter stuff: David Lazell takes a sideways view of how, in the thirties, radio mags decorated their pages with sprigs of holly at this time of year. However, if you're fed up with the season of goodwill already, I promise that the rest of the mag is a Christmas-free zone!

If you're sitting the RAE on 5th December, best of luck with it. Stay cool - even if you don't pass this time, there are two more chances before the summer, and you won't be any worse off than if you had never tried. Past results show that the odds are better than 2:1 in your favour anyway.

Goodbye for now, and as Keith Townsend G4PZA keeps saying, don't do anything you might enjoy!

73 de Richard Lamont

L·E·T·T·E·R·S

Procedures

I have just finished reading your article "Procedures 6" with interest and feel that as I have spent 12 years at sea, I can throw some light on your query in the reference to 'EN' as sent by ship/coast station operators.

When a good solid/precise copy has been received at either end it's sometimes emphasised by 'elongating' the 'R' so that it comes out as DIT DAAAAAH DIT. This is then taken as well received and no repeats are required.

I hope this ties the query up and hope that other answers you receive confirm my reply.

Although only recently licensed, I hope to become active in the near future, as cottage refurbishing is nearly complete.

Thank you for an interesting magazine.

R.J. Leeds G4RZN,
Senior Radio Officer,
P & O Bulk Shipping Division, London.

Advice

I am writing to your magazine in the hope that you can give me some advice.

The advice I am asking is about short wave listening. Until recently I was a CB operator until I read a copy of your magazine. It has got me interested in the workings of radio and electronics, about which I know nothing at all at the present.

The advice I am seeking is to whether or not you can recommend any publications that deal with the complete novice, from the very beginning.

Also in the very near future I am thinking of setting up my own SWL station and I wondered if there was any advice you could give me on its operation and setting up, also if there are licensing conditions I have to meet.

The receiver I have decided to buy is the Yaesu FRG7700 so if you could give me any advice I would be very grateful.

Philip Cole,
Bedminster, Bristol.

I suggest you visit your county library, and have a look at the radio and electronics section, which will be on shelf 621. I don't know how good the library in Bristol is at radio books - it varies enormously from county to county.

You do not need a licence for SWLing, provided that you stick to listening to broadcast, amateur and standard frequency stations.

The FRG7700 is a perfectly good receiver. I wish I had one - Ed.

Fits of laughter

I've just finished the September copy of *Amrad* which plopped through the door about half an hour ago - I see you finally got around to publishing G3XSE's article this time. Where can I lay my hands on a Pye Pocketphone receiver 'cause I've heard about them before but I didn't know they were so cheap! The article says try the rallies but I searched high and low at last weekend's Scottish Amateur Radio Convention to no avail. Congratulations to the West of Scotland ARS on organising this most enjoyable day out.

In your SWL column I read the following gem: "28MHz of course has been chock-a-block..." After picking myself up from the floor, where I was rendered due to extreme fits of laughter, I wiped the tears from my eyes! I have been using an Eddystone 840C for six months now and in all the hours of trying I have never heard anything on 10m - CW, telephony or whatever. Nothing wrong with the rig or antenna - 'cos I can hear plenty of CBers on 27MHz. So what's happened?

Finally, congratulations on an excellent magazine, I've been reading it from issue one and I wouldn't miss it for the world. You've helped me develop my interests so much that when I sign off here I'm going to phone the local college and enquire about the RAE course. Ta!

Graeme Brown,
Cambuslang, Glasgow.

Processing

Could you please enlighten me on the difference between audio clipping, processing or compression. I have a good idea on clipping and compresion but what of processing? Is it a combination of the two?

D. Bradley,
Totteridge, London

Processing is a rather vague term that means clipping, compression, frequency response tailoring or a combination of one or more of these techniques - Ed.

Illegal

I refer to your SWL column Sept '83. In it you say that if one wishes to buy a transceiver for the purposes of listening, and one does not have an 'A' ticket - that is OK.

This I believe is incorrect under Section 1(1) of the Wireless Telegraphy Act 1949, ie. it is illegal to install, let alone use, any form of transmitting equipment without the appropriate licence.

I refer to the case of Michael Craven of Disley, Cheshire, who was fined £75 with costs for having an Icom 720A transceiver.

This had been (the transceiver) disabled on the transmitter side.

The case was heard at the Macclesfield Magistrates court.

I would like to hear your comments.

Michael Ellard,
Cork, Ireland.

You're right. It is illegal to install, let alone use, a transmitter without a licence. I'm afraid we got it wrong.

As far as the case of Michael Craven is concerned, it's really quite straightforward, because he pleaded guilty to the charge of 'installation'.

For this he was fined £75 + costs.

A second charge of using the equipment was then dropped.

There is really no 'story' here. If you plead guilty, that's it - Ed.

Novice licence

Re your recent item on the novice licence in the October issue of your magazine.

To write off the true benefits of a proper novice licence system and the success it has been in the 20 countries that have introduced one because of what has happened in Belgium is pathetic.

It is about time the novice licence subject was treated more openly and sensibly. The RSGB have been after a novice licence for 37 years and now we are very close to having one. Unless people like you do not try and torpedo the matter.

If you look at some of the countries that have the novice - USA, Japan, Australia etc. all of these countries report *great* success with a novice class of licence. It has brought many more people into the hobby and helped to popularise the hobby in those countries. All the benefits seem to be ignored.

I bet all the same arguments came about when the Class B licences were being talked about. You can just imagine all the Class A people saying "We don't need a Class B. We had to take the Morse so why can't everybody else?". They did not win the argument and now we have nearly more Class B than Class A.

So please let's have the matter discussed properly, and not trying to frighten people.

If you are interested in the real background to the novice in Australia, I have just received a large amount of correspondence from VK2YA who fought for the novice in Australia and won.

L·E·T·T·E·R·S

It may serve as an education to your good selves. Now that the licences are being computerised the Home Office are *committed* to introducing a novice licence, unless they come up with another excuse.

Ian Abel G3ZHI,
Maltby, Rotherham, Yorks.

The Radio Regulatory Division is willing to have a novice licence once the licensing records are all computerised. The only problem is finding a form of novice licence which really is an incentive to self-training, such as the American system. What they want to avoid is a novice licence that is a CB wolf in amateur radio clothing, and they are waiting for the RSGB to suggest how this might be done.

Perhaps it might be helpful, Ian, if you told us how those of you in the Amateur Radio Novice Licence Campaign suggest how you think it might be done. I look forward to publishing your reply! - Ed.

Starting from scratch

I have all copies of *Amateur Radio* from May 83 onwards. I am interested in the series "Starting from scratch".

Can you please let me know how long "Starting from scratch" has been going previous to May, and if it is possible to buy the back numbers.

J. Gomez,
Prestwick, Manchester.

This series started quite a while ago - the only issues before May left that have it in are No. 2 and the April issue.

No. 1, No. 3 and the March edition are sold out - Ed.

Bows and arrows

First may I thank you for producing such an excellent magazine. I have been a reader from day '1', and look forward to a very long association with you. The format is excellent, and the articles always most interesting. Please keep up the good work.

My main reason for writing, is to reply to the letter by Mr R.M. Fumbelow G8UYL, with regard to the recent RAE in May.

Like Mr Fumbelow and his good lady, my wife and I spent many long hard hours in study, and as they did, used the *RSGB Examination Manual* as our basis. I was fortunate to pass the examination, but unfortunately my wife was unsuccessful.

We, along with the majority of our fellow students, fell also that the questions were very poorly put, and were intended to deliberately confuse the examinee. I think our instructor (a gentleman of many years experience) summed this matter up very well when he said that the attitude of the person putting the question was "Look how clever I am, I've asked a question in such a way that only I can understand it".

While I have my bow and arrows handy, I would also like to comment on the disgusting behaviour of several G6s during the recent lift on 2m, which gave access to Holland via repeaters. I heard several G3s being *told* to go back to the HF bands and leave it to those who were licensed for it. Do they not know that these G3s and 4s have as much right on those frequencies as do they? Or if they do, then how did they pass the RAE?

R. Knott RS53028,
Cardiff.

I'm afraid I can't agree with you about the RAE. It appears to me that the questions are put to deliberately confuse examinees who don't grasp the subject. In other words, they ask the questions in such a way that someone who grasps the subject can understand them. This is the essence of multiple choice tests.

This strikes me as being an excellent way of telling whether the candidate understands radio theory etc., or merely absorbed it parrot fashion from a course manual.

Repeaters and lifts just don't mix! FM is really a local mode - you can't really expect exclusive use of a 25kHz wide channel when the band is open, let alone a pair of 25kHz channels used by a repeater. No, better to leave the repeaters to the mobiles, and if you want to work DX then for heaven's sake use a DX mode, eg. SSB or CW - Ed.

More arrows

Back in your June 1983 issue, the author of the "Current Comment" column asked for readers' views on the RAE. I passed the May 1983 exam with little difficulty and have since received my callsign, along with a few thousand other newcomers.

My own views on the setting of the City and Guilds paper is that too often the questions are poorly worded and hence become misleading. Sometimes the four choices of answers are all wrong causing the question to be deleted, and in one case there was a question which bore no relevance to the syllabus whatsoever. (What causes key thumps? - A heavy handed operator!)

I did notice from past papers that the C&G have a tendency to repeat certain questions year after year, and certainly the May exams were no exception.

Whether or not the multiple choice papers are easier than the previous written ones is a matter for speculation, but it seems that operating standards have dropped considerably when listening to the various 2m repeaters.

Anyway, keep up the good work. Yours is an excellent magazine for the amateur and does not talk down to its readership like some of the others do.

Steve Goan,
Enfield, Middlesex.

To anyone who understands radio it is obvious that "key thumps" are exactly the same thing as key clicks. It should then be straightforward to answer the question. On the other hand, if you have memorised the RAE Manual without understanding it, then this question could throw you. Quite right too!

The C&G do repeat questions year after year. They have a pool of about a thousand questions, each of which has been tested on a large number of unsuspecting 'guinea pigs'. Each paper is a selection from this pool. That is why you're not allowed to take the paper out.

I wonder if the high RAE pass rate has anything to do with the large number of bootleg photocopies of past papers that are doing the rounds? - Ed.

Off the beam

I write in response to an article that appeared in the October issue of your magazine. "On the Beam", written by Glen Ross G8MWR, contained a status report on Oscar 10, in which the author made reference to his own "fairly typical" system as a guideline to access the above satellite. This sytem consisted of seventy watts of power feeding a 48-element Multibeam, giving an ERP of approximately 33.5dBW, equivalent to 2.2kW fed to a dipole! My only comment on this, sir, is that it is irresponsible and reckless journalism.

The efforts of AMSAT worldwide have been directed at getting users to reduce power on the Oscar 10 uplink, with a maximum of 500W ERP being recommended. Publicity like this, in a high circulation journal, wipes out this work at a stroke, guiding newcomers down an antisocial and damaging

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path. Applying this sort of power to the system input will cause the onboard AGC to cut in, reducing the sensitivity of the transponder right across the passband, thereby losing many lower powered users who, under normal conditions, could work quite happily through the satellite. Indeed ERPs of 20W have been used to successfully complete contacts when people like Mr Ross are not around.

My advice to him would be to invest in an 8-element 2m crossed Yagi with right-hand circular polarisation, and to compare his reception of the end beacon (on 145.810MHz) with his own signals before applying any more than 5W to such a high gain 70cm antenna, and I would ask you, sir, to publish, promptly and prominently, an article renouncing such practices as advocated in the aforementioned issue, and giving some informed guidelines (preferably after consultation with AMSAT-UK) to those who wish to partake in this new and exciting facet of amateur radio.

I am sure I am not alone in writing to you to protest about these comments appearing in what has been, to date, a most informative and interesting journal, and I trust you will not delay in redeeming the situation.

Michael A. Grant B.Sc, GM6JVC.
Dept. of Electronics and Electrical Engineering, Glasgow University.

Glen Ross B.Sc replies: Mr Grant is right to be concerned about the use of very high power being used to work through Oscar 10, but to accuse me of acting irresponsibly is a different matter. The information which most members of the hobby have available on this matter has been obtained from writers of magazine articles. As far as I know no details have been circulated by AMSAT in the form of a press release, certainly I have not received one. We have to peice the information together from what is available. We must assume that the power levels indicated are for use with circularly polarised aerials and that the aerial is assumed to be adjustable in both azimuth and elevation so as to enable accurate tracking. If this is not the case then the power has to be modified to take into account the losses due to cross polarization and the inability to track in the vertical direction. Mr Grant clouds the issue by switching from dB to 'real' figures which tend to make my offence look reprehensible. The truth of the matter is that my claimed excess power is 6dB (or 2 'S' points) over the AMSAT level, BUT, due to the fact that I use horizontal polarization, 3dB (1 'S' point) is lost. On the three occasions that I have used Oscar 10 it has been at least 15 degrees above the horizon and therefore out of the main eye of the beam, hence a loss of at least another 3dB, bringing me to the accepted level for working through. These figures are confirmed by the fact that although at the time the beacon was around S4 my own signals, as reported, were only S2. The actual ERP used is of no consequence so long as AMSAT's "no stronger than the beacon" is adhered to.

*"Irresponsible and reckless journalism". Mr Grant uses 10 lines of print to support his case but carefully ignores the following half column which talks about the problems caused by using excessive power. A plea for restraint is also included in this month's column (which was submitted before Mr Grant's letter was seen by me) and pleas have also been made to keep the down links clear. As a follower and user of OSCAR ever since the first unit some 22 years ago (it's not that new to some of us Mr Grant) I am well aware of all the restraints required of users and, being a professional communications system design engineer of 30 years experience, I know how to use my own system within those requirements. "On the Beam" is intended to inform the average amateur as to what is required in **practice** rather than in theory, to do a particular job because I believe that is what is required. I repeat, if your signal on the downlink is not stronger than the onboard beacon then, no matter what your ERP, you are following AMSAT guidelines.*

ATU puzzle

Thanks for a great magazine. I have every issue apart from March, and have much of interest in each and every one.

I write primarily, though, with reference to two articles in the April '83 issue, namely "Building an ATU" and "Wire Aerials", both of which I have found very interesting. I have built the ATU, and am now considering the suggested counterpoise system. I am rather confused though, for on page 52 of said issue, a list of suggested counterpoise lengths is given, but this differs from the list given on page 63. I cannot understand this, and further, it has raised a similar question. On referring to the *RAE Manual* (page 55 in my issue), the formula for calculating halfwave aerial lengths is given. (468/f (MHz) feet) but then in the table beneath, the lengths do not corespond. In some cases they would appear to be cut to resonate at some very odd band positions, rather than centre of band as I would have expected. The same of course applies to some of your counterpoise lengths in both tables. Could you please enlighten me on this?

As I mentioned I have built the ATU and it seems to improve things for SWLing, but having only just obtained a G4, have not had a chance to put it to the test yet. Can you please explain why on page 51 of the mag you say "it is not advisable to build ATUs into a metal case" when in fact screening for ATUs is firmly advised in the *Radio Communication Handbook?*

Andy Brooks G8YKK, Carshalton, Surrey

The counterpoise lengths in the two tables do differ, but only very slightly. They are in different articles by different writers. There is no magic, exact length for a given counterpoise. It will depend on factors such as the diameter of the wire, the end capacitance, the height of the wire above ground level and the type of soil! None of these factors makes a huge difference. If you take the average of the two figures you won't go far wrong.

I can't help with your question about the aerial lengths in the RAE Manual, as I don't have a copy to hand.

*Our ATU article advised against a **confined** metal case. This is because it is important not to have metal too close to the coil, because it could distort the magnetic field around it. On the other hand, screening is often an important requirement for transmitter ATUs, especially if high power is used - Ed.*

RA17

In reply to a question of which is the best receiver, the Icom R70 or the NRD515, you say you would prefer the RA17. Can you let me know the details of this set. I have a Drake R7 receiver but should like a change.

If you cannot supply the details of the RA17 can you let me have the address of a firm who sells them?

A.M. Chapman, Grimsby, South Humberside.

The RA17 is a professional receiver, of valve vintage, made by Racal. It is available second-hand from both surplus dealers and private individuals. Scan the ads! - Ed.

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Guilty!

Having read the letter from "Middle Aged Bluebeard" (Oct 1983 issue) I would like to make the following comments.

Despite his protestations about keeping a 'clean ship' and his collection of qualifications, when one cuts through the usual defences, he is an illegal operator, breaking the law and if caught should be treated like others of his kind.

Which brings me to my second comment. Why after so many years of illegal operating, did he suddenly find it necessary to take the RAE this year? Guilty conscience? Are the authorities starting to breathe down his neck, or perhaps the neighbours are not so understranding as he might have us believe? Or is he deciding to be 'respectable'?

He should remember one thing - all his qualifications and fine words won't mean a thing if he finds himself charged under the Wireless Telegraphy Act.

Incidentally, I hope he passed the RAE - then he won't have to hide his identity, unlike all 'respectable' operators, but he can't have the law catching up with him, can he?

Name and address supplied

Eddystone 940C

I have an Eddystone 940 receiver in excellent condition but it suffers from the following: the noise limiter, a circuit using a silicon diode, does not work at all. The mixer stage appears to produce a great deal of noise in comparison with the Eddystone 888A model. Lastly, the S-meter is dreadfully insensitive. It takes a whacking great signal to even move it at all.

I have the circuit diagram and the alignment details plus the necessary equipment to do the job.

What I would like to know is whether any of your staff can give me any advice on the above problems or perhaps if any of your readers know of any modifications to this receiver, I would be ready to refund any expenses they or you would incur. I guess of course that your technical bods will probably mutter "Why doesn't he get rig of the beast?", but as I am unemployed I have to try and make do with what I have got.

Actually, apart from the above it works very well, and I have heard most of the rare DX that is, or has been, around. So if I could sort out the problems I could be quite happy with it. I have been a regular reader of the magazine since the first issue, so thanks for a great mag.

D. Stephenson,
Withywood, Bristol.

Rotator

As a regular reader of *Amateur Radio*, could you please assist? I have a Ham rotator model H-IV/ CD4511, date of origin January 1981.

The rotator has been in a salt atmosphere for two years in Cornwall, and before reinstalling it at my new QTH of Worcester I wish to do a full overhaul on the rotator.

I had no service data as to disassembly procedures when obtained and would be grateful for any assistance you could give.

I would be glad to pay for any expense incurred for photostating or postage.

Ian Parker G6PMO,
Worcester.

R1132A?

Could you give me some information on RX type R1132A, reference number 10D/105, serial number 1101, made in 1940 by E.K. Cole. It is believed to be a ship's receiver.

If you or any of your readers could supply any information on this receiver I would be grateful.

D.T. Peploe,
Newport, Gwent.

Can anyone help with any of the above three letters? Replies to AmRad will be forwarded - Ed.

Fed up

What can be more certain to put people off amateur radio and head them towards CB, where, with impunity they can (and do) 'work the world' without the fuss and expense incurred by doing this in the true amateur fashion - than the current (and remaining) beaurocratical muddle that still exists in the licensing office coupled with the swingeing rises in costs and fees?

Three years ago I passed the RAE (taken in May). $3^1/_2$ months after applying for it I received my licence (on 9th October after many phone calls to the licensing office). Now, in 1983, the responsibility for issuing licences has passed to the good old Post Office at Chesterfield - "for better, faster, computerised service etc." and what happens?

Existing licence holders with licences due for renewal in September/October were exhorted not to send off their renewal fees until sent a reminder had been sent to holders of licences due for renewal in October by 15th September. On Saturday, 8th October I received my first and only communication from that office - a small slip of paper informing me that my licence expired on 9th October and if renewal fee of £12 (50% increase) was not received by then (9th October) then my licence was invalid. This paper was dated and postmarked 5th October, arrived Saturday 8th October and my licence expired on Sunday 9th October. Curt, shirty and late.

A colleague passed his RAE in May this year and to date he is still awaiting his licence - he has now beaten my $3^1/_2$ month record in spite of the increased efficiency offered by the new service. At the end of September he phoned first the old licensing office where it was answered "Consumer Protection" (how apt). He was informed that all licensing work had been passed to Chesterfield and was given the number. He telephoned the Chesterfield number, gave his name and enquiry, and was pleased to be told that his application was on the desk in front of that person. Asking when he could expect to receive it he was shattered to be told that they were not processing B licences until they had finished with the A licences! - at least two and maybe four weeks. Some service, some speed, some efficiency. This man is an ex CBer, and a would-be amateur who may well revert to CB. He is very bitter and disillusioned.

Digressing onto the RSGB - I sometimes despair. I am, a member and I believe that we should have and support an authoriative body acting for us and no doubt they do serve a useful purpose in many ways but - please do not advertise so much the membership services when the services requested cannot (?) be supplied by the persons designated to supply them. I refer here to enquiries re: BCI/TVI, planning and specifically the mounting of antennae on chimneys. The persons concerned will no doubt recognise the enquiry.

Chimneys and antennae erected thereon. A cautionary word to all amateurs who through circumstances of location etc. have thoughts of doing this. What one has in mind is no doubt the normal type of TV aerial mounting as is seen on the chimneys of about 70% of the houses in this country; where the pole to hold the aerial is clamped onto a chimney corner bracket which is in turn held in place by a wire strap around the chimney. If your chimney is jointly owned (ie. if the chimney stack carries flues from more than one house as is often the case in semi-detached or terraced houses), beware, all is not simple and straightforward. If you are told that if the chimney serves your house (if the smoke from your fire goes up through one of the flues in that chimney) then you can erect an antenna on that chimney as long as the

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antenna proper is on your side of the chimney - hesitate as the matter does not end there.

Such a lashing wire can only be passed around such a jointly owned chimney with the consent and approval of your neighbour whose property is also served by that chimney, and who 'owns' their side of the chimney. If your neighbour is the type of person who will under no circumstance give such consent or approval then, friend, you are stuck. To put the wire strap around the chimney would constitute a trespass, technical maybe but trespass nevertheless. All you can legally do is to screw into your side of the chimney a bracket to hold that post/antenna - a very much weaker installation and one which is much more likely to cause damage to the chimney.

There are such neighbours, not many, and it is my misfortune to have one and I am currently stymied. However I am passing this information on freely to anyone who may need it - RSGB included. I had to seek legal advice and pay for it.

J.M. Hughes G4MUH
Okehampton, Devon.

We asked the Department of Trade and Industry about the delays you mention, but have not received any reply yet - Ed.

Bring and goodbye

I was interested to read that Hugh Allison had a MM 2m converter stolen at a rally. I had one stolen at last year's Peterborough rally. I wonder if there is someone collecting them! Seriously though, the part that annoyed me most was the complete lack of interest shown by the people on the 'bring and buy' stand. Their attitude seemed to be "it's your fault for leaving it there!" Letters to the Club and to the RSGB Rallies Committee have received no reply!

I wonder what the legal ruling on such matters would be? I would have thought that the people on the stand are responsible for the safe custody of items left with them. Of perhaps they would better be called 'bring and goodbye' stands.

Look forward to "One Titled Owner" every month as I am a rally addict! By the way, you didn't mention the cow pats in front of most stands at Woburn.

Owen Kemp G4TLK,
Sprowston, Norwich.

Thank you

You kindly printed a letter of mine earlier in the year, in which I mentioned I was a very new SWL and a pensioner, asking for information about any clubs for the short wave listener. Can you imagine my astonishment and complete delight, when before receiving my *AR* copy, I had received an early morning phone call, and later many letters from your readers, with advice and help, most being licensed radio amateurs. And one, who has continued the correspondence, is encouraging me to study for my RAE.

I could never have guessed that the wonderful fraternity of amateur radio was prepared to put pen to paper in endeavouring to secure my interest in their hobby.

Please accept my sincere thanks for printing my letter, and although being 'a wee bit ancient', I have now enrolled in my first study for the RAE. It may take time, but I hope one day to be able to reciprocate in encouraging another to attempt the RAE.

Your article each month on "Passing the RAE" has been carefully hoarded and is now being studied in earnest. Please keep the same format as I enjoy smiling as I learn.

An excellent magazine, always eagerly looked for each month. No work ever gets done the day it is delivered to my door. May you have continued success.

Jean Fletcher,
Bishopsworth, Bristol.

STRAIGHT·AND·LEVEL

Shuttle launch delayed

It now looks as if the Space Shuttle Columbia launch, with Dr. Owen Garriott W5LFL aboard, will be on 28th November.

The launch had been scheduled for 28th October, and was delayed by the discovery of damage to one of the two detachable booster rockets used on the Challenger flight in August. The two 149ft. long boosters, costing $25 million each, are recovered from the sea after each mission. It was found that a three-inch protective layer of heat-resistant material around the jet nozzle, made of glass-fibre, carbon and epoxy resin, had been burned much more than expected. The 150-second burn, at a temperature of about 3200°C, had reduced the protective layer to 0.2 inches thickness. Had the metal of the nozzle burned through, the Shuttle could have lost control and cartwheeled wildly into space.

Doncaster Exhibition

The annual Amateur Radio Retailers' Association exhibition, held at the Doncaster Racecourse on 6, 7 and 8 October, was met with a low turnout despite greatly improved facilities.

Many traders said the venue was "too far North" to attract amateurs from London and the South East.

In previous years the show has been held at Granby Halls in Leicester, but was moved to Doncaster because of the poor catering etc.

The ARRA says it plans to hold next year's exhibition at Doncaster, even though many traders were disappointed by their low sales.

We hope to have a report from the Granby Halls exhibition held on 28 and 29 October - organised by the Leicester Amateur Radio Show Committee after the ARRA pulled out - in our next issue.

GB2RS on Oscar 10

The first amateur news bulletin via satellite was transmitted on Oscar 10 on 16th October.

The bulletin, jointly prepared by the RSGB and AMSAT-UK, was broadcast on a downlink frequency of 145.973MHz USB, otherwise known as Special Service Channel H1.

The organisers are hoping to be allowed to use the callsign GB2AUK for future satellite news broadcasts.

Reception reports should be sent to either AMSAT-UK, or RSGB Headquarters.

Left: the SMC (Leeds) stand at the ARRA Doncaster exhibition Centre: surplus equipment was also much in evidence. Below: a Granada TV cameraman shoots footage for a regional programme item on amateur radio moonbounce enthusiasts.

Bands I and III

The Government is expected to publish a green paper on the future of Band I (41-68MHz) and Band III (174-216MHz) in the near future.

The paper is intended as a discussion document, to be followed by a period of public consultation, in which spectrum users can put forward their views.

Whitehall sources say that the paper will concentrate on Band III more than Band 1, and that it will recommend that the lion's share of Band III goes to land mobile radio.

Channel 4 on Channel 53

Amateurs in some areas are reported to be suffering from a relatively new form of TVI. The fifth harmonic of 145.45MHz falls on the nominal vision carrier frequency for UHF TV channel 53 (727.25MHz), which is used by several Channel Four main transmitters and countless relays. (It is little used by the other three television networks.) Thus low level harmonic radiation from FM transceivers using the popular simplex channels can be a severe TVI risk in some areas.

Channel Four main stations on channel 53 are: Angus, Beacon Hill, Carmel, Dover, Llanddona and Oxford.

G3LLL moves

Harry Leeming G3LLL, of Holdings of Blackburn Ltd., advises us that his company will now be known as Holdings/Amateur Electronics North West, and, while still independently owned, will in effect become a branch of Amateur Electronics (UK) of Birmingham. Harry has a long association with Yaesu equipment and he tells us that the deal allows him to more than double his stock of Yaesu equipment, and add TET aerials and numerous other items.

Parking is "free and plentiful", and the new address is: 45 Johnston Street, Blackburn, Lancs BB2 1EF. Tel: (0254) 59595.

David Tong (left of picture) demonstrates his Woodpecker blanker. Right: view of the Doncaster Racecourse stadium.

GB2CDY

The Farnborough and District Radio Society used the callsign GB2CDY for a special event station to celebrate the 75th anniversary of the first sustained powered flight in Britain.

On October 16th, 1908, Colonel S.F. Cody finally succeeded in getting his machine airborne. He left the ground after only 55 metres, and after reaching a height of about 10 metres he headed in a North Westerley direction. Although flying steadily, he drifted South West. Attempting to avoid a clump of trees, the left wing struck the ground, bringing the flight to an undignified end after 400 metres in the air. Colonel Cody was unhurt but the machine was badly damaged.

The Farnborough Society's special event display included three amateur radio stations, and amateur TV station and an information stand.

Across the pond

The Federal Communications Commission has changed the rules on power measurement for amateur stations in the USA. Now there is a limit of 1500W PEP output for most bands and modes.

As seen on TV

The Datong Woodpecker Blanker was featured on a recent edition of "Tomorrow's World" on BBC TV.

After explaining what the Woodpecker is, and how the blanker works, the presenter sat down at a studio mock-up of an amateur radio station and then, using the callsign GB2TW, pretended to call GB3RS on 7MHz. When GB3RS 'replied', its signal was magically free of any HF filtering, compression, frequency shift or any other form of distortion that one would expect on an amateur SSB transmission! Then, the 'Woodpecker' appeared (exactly on cue!), and the blanker solemnly 'blanked' it.

The programme went to some trouble to create the illusion that the QSO was real, by using 40m interference in the background as a sound effect. At no point did the presenter own up to the fact that the alleged contact was a simulation.

If GB2TW and GB3RS exchange QSL cards for this 'contact', I trust that they will put "pair of wires" in the mode column!

QSL card for the Farnborough and District Radio Society's special event station GB2CDY.

In just the second issue of* Amateur Radio *Chris Drake wrote an article "Long Distance Working" which touched on DXing, DXCC, sources of information for HF operators, and much more. Since then* Amateur Radio *has continued its commitments to helping the HF enthusiast, not only by reviewing gear but also, for instance, by publishing Geoff Watts' comprehensive country/prefix list. However, some of you have written in to request a regular column of some sort to help the HF enthusiast and here it is, by Don Field G3XTT.

The intention of this column is to address on a regular basis a whole range of issues which affect the DXer, the contester, the 160m addict, the ardent CW man, or just the plain old (or young!) casual ragchewer. What I don't intend to do is to publish long lists of who has worked what and when; such information is almost valueless by the time it gets into print. What I do hope to do is to look *forward* to forthcoming contests, expeditions and the like, and to address issues of current interest such as list and net operating, changes in international band-planning, making use of propagation information, and anything else which we at *Amateur Radio* or you, our readers, think might be helpful.

The WARC bands

Talking about our HF bands, let's not forget that we received three new bands at the 1979 World Administrative Radio Conference (hence WARC). Almost all currently available HF gear has them fitted and a number of the older rigs can be modified without too much difficulty.

The bands concerned are 10.1-10.15MHz, 18.068-18.168MHz and 24.89-2499MHz. Issue 3 of *Amateur Radio* included an article about them giving more details. So where, we ask, are all the operators? Well, to tell the truth, 10MHz has been quite lively since it was made available to our American cousins (look out for them in the late evening and for Australia/New Zealand after dawn), but 18 and 24MHz are nearly dead. To encourage activity the RSGB's *DX News Sheet* is sponsoring 'activity periods' on these two bands on the first Sunday of every month from 1500 to 1800 GMT. Why not join in and use it as an excuse to brush up your CW?

Contests and all that

The mention of contests often causes the hackles to rise. Why, it is said, should the bands be full of contestants weekend after weekend? On the other hand, why should we expect radio amateurs to be any less competitive than footballers, fishermen, athletes, or whatever? Well, perhaps we can take that one up in a future column. However, for the time being let's stick to the facts! By the time you read this the two big contests of the year (the CQ Worldwide Phone and CW Contests sponsored by the US CQ Magazine) will be over and thousands of people will be getting writers' cramp writing up the logs. Autumn and Spring are the great contesting times of the year with the CQ 160-metre CW and SSB contests on the last full weekends of January and February respectively, the CQ WPX (Worked Prefixes) SSB contest on the last full weekend of March, together with the ARRL all-band SSB and CW contests and the RSGB 40 metre contests in February, and many others of a major or minor nature. Each time I look at the results of the big international contests I am stuck by how few entrants there are from the UK compared with elsewhere. Perhaps we British are too modest, but why on earth shouldn't we get in the thick of it and show everybody else what we can do?

Expeditions

In recent years there have been many DXpeditions to remote parts of the world. These are for the express purpose of giving those of us at home the chance to contact a country that we might not otherwise come across on the bands. The whole thing really started to take off in the late 50s and 60s thanks to the sterling efforts of Danny Weil, Gus Browning, Don Miller and other great travellers. This year, unfortunately, DXpeditioning has resulted in some unfortunate consequences, firstly a rather unseemly race to Heard Island by two rival groups and then, more recently, the death of two German amateurs on their way to activate the Spratly Islands off the coast of China. Nevertheless, DXpeditions will go on, whether they are the casual 'taking the rig with me on holiday' type or the fully fledged effort to operate from an uninhabited, inhospital rock. By the time you read this the Malpelo Island effort should be history, but already no less than three 'big ones' are being rumoured for early 1984.

The most sought after will be Kermadec Island, a territory of New Zealand, which hasn't been on the air in any serious sort of way for over ten years. Jim Smith, VK9NS, who has shown his DXing capabilities on several occasions from Malaysia, from Papua New Guinea, from Heard Island and not least from his home on Norfolk Island as well as elsewhere, has signed up to join a scientific expedition which has permission to visit the island, probably in February. He hopes to have at least two other amateurs along with him. More details later (we hope!).

Another rare one is Clipperton Island, a former French refuelling station off the coast of the Western United States. This one was activated more recently but is still one of the most wanted countries among DXers. A big group is being assembled to go there, consisting of both American and French amateurs. Once again, let's keep our fingers crossed.

Last but not least is the rumour of an expedition in late February to Aves Island, a tiny sandstone reef in the Carribbean which acquires its name because of its abundance of bird life (the only inhabitants). Expeditions can only take place during the first quarter of the year because of the hurricane season, but the Venezuelan radio club hopes to be operational for at least 72 hours with the callsign YVØAA.

Propagation

If you operate on the HF bands at all you will realise that we are already well on the downward slope of the sunspot cycle with all that that entails. Well, what it does mean is that 10 metres will have much less on offer than in recent years, though that certainly doesn't mean we should neglect it. North-South propagation will continue to be fair and short skip European contacts can take place at all sorts of odd times. And did you know that North America can sometimes be contacted by beaming South and letting your signals reflect off the ionised air above the equator? But all this aside, what the declining years also mean is that the LF bands will be much better. Last year we say lots of Auroral activity due to solar flares, but this year things have quietened down considerably. At the time of writing 160 metres is producing signals from Antarctica, South America, the Middle East, the Carribbean, and even Australia and New Zealand. It certainly looks as though we should be in for an interesting winter in 80 and 160.

Finale

Well, I hope all of that gives you at least some ideas for how to pass the time at the rig. As for all those other things we might have covered, well you will just have to wait until the next issue. So for now, 73 and DX...

G4JDT
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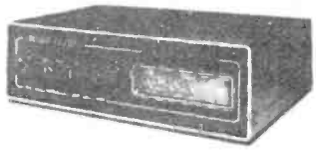

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FT102	£685.00
FC102	£200.00
IV102DM	£225.00
SP102	£45.00
FT77	£450.00
FP700	£95.00
FV700DM	£185.00
FRG7700	£295.00
FRG7700M	£370.00

MORSE READERS

AEA MBA RO CW/RTTY reader (l.e.d.)	£190.00
Tasco CWR 600 CW/RTTY reader (u.h.f.)	£165.00
Tasco CWR 610 CW/RTTY reader (u.h.f.)	£180.00
Tasco CWR 685 CW/RTTY reader monitor TX/RX keyboard inc	£745.00
300CWR670 live	£280.00
300CWR675 fader/monitor 6"	£450.00
Above inc. printer	POA

ALINCO

ELH 230 1-3W in 15-30W out (2m)	£39.00
ELH 730 2-5W in 30W out (70cm)	£79.00
EMR 430 Rotator for HF beams	£99.00

ICOM

IC2E 2mtr fm portable	£160.00
IC4E 70cm fm portable	£190.00
IC25G 2mtr 25w fm	£235.00
IC290 2mtr 10w fm ssb	£366.00
IC251 2mtr 10w fmk w ssb base	£425.00
IC451 70cm 10w fmk w ssb base	£620.00
IC490 70cm fm ssb mobile	£445.00
IC271 NEW	POA
ICSP3 Speaker	£39.00
ICSM5 Mic	£29.00

ICOM

Accessories

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ICWM9 SP/Mic	£13.00
ICBP2 6V pack	£33.00
ICBP3 9V pack	£23.00
ICBP4 empty pack	£6.95
ICPB5 12V pack	£43.00
ICCP1 charging lead	£4.48
ICDC1 12V car park	£11.99
LC8 leather case	£18.98
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YAESU

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FT290R with mods FM SSB	£245.00
FT208 2mtr portable FM	£195.00
FT708 70cm portable FM	£205.00
FT230 2mtr FM mobile	£220.00
FT730 70cm FM mobile	£240.00
FT726	£635.00
FRV7700A 118 150	£60.00
FRV7700B 50 60 118 150	£75.00
FRV7700C 140 170	£65.00
FRV7700D 70 80 118 150	£72.00
FRT7700 Aeriel Tuner	£42.00
FRA7700 Active Antenna	£40.00
FF5 Filter	£9.95
MMB11 FT290 Car Mount	£24.00
NC11C Charger	£9.50
NCB Base Charger FT208/708	£45.00

DATONG

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PC1 Gen. cov. converter	£137.00
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FL2 Active filter	£89.70
FL3 Agile filter & notch	£129.37
ASP Auto clipper	£82.80
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RFC Speach clipper	£29.90
AD270 Indoor active ant.	£47.15
AD370 Outdoor active ant.	£64.40
RFA Wide band AMP	£33.92
ANF Auto notch filter	£67.89

DUE TO FLUCTUATIONS IN THE EXCHANGE RATE PRICES ARE SUBJECT TO ALTERATION

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HiMound HK707	£12.95
HiMound MK705	£11.50
HiMound HK702	£12.95
Kenpro squeeze key KP100 electronic key	£65.00
Kenpro KR200 Memory Keyer	£149.00
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POWER SUPPLIES

Ainco EP 2500 25amp IC Regulated with S/C protection	£89.00
also EP3000 15amp Metred version voltage adjustable 6-15 volts	£89.00
Diawa PS300	£130.00

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SP200 1.6-160MHz 20-200-1KW	£69.00
SP300 1.8-150MHz 20-200-1KW	£97.00
SP400 130-500MHz 5.20-150W	£69.00
SP15M 1.8 160MHz 5.20-200W	£35.00
SP10X small	£24.00
SP45 130-470MHz	£50
SP250 1.8-60MHz	£49.00
SP350 1.8 500MHz	£59.00
AC38 ATU 3.5-30MHz	£65.00
GT150 150W Dummy	£35.00
CT300 300W Dummy	£49.00
CH20A 2-way coax switch	£17.50
CH20N 2-way -X- N type	£31.00

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TS830 100W HF	£675.00
TS530 100W HF	£575.00
R2000	£380.00
TS430	£595.00
TR9130	£415.00
TR2500 2mtr Portable	£215.00
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SP230	£41.00
DM801 GDO	£70.00
R600 Receiver AM SSB	£230.00
TR3500 70cm portable	£230.00

DIAWA

RM940 Mic (Infrared)	£45.00
CN620A (1KW SWR)	£57.00
CN1001 (Auto A.T.U.)	£156.00
CN2002 (2KW Auto A.T.U.)	£228.00
CN518 (2.5KW A.T.U.)	£175.00
CNW 419 500W PEP General coverage A.T.U.	£130.00
AF405 Active Filter	
AF606 P.L.L. Active Filter	£83.00
DR7500X	£113.00
DR7500R	£125.00
DR7600X	£163.00
DR7600R	£176.00

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2M 70W Linear amp 10Win	£90.00
2M 100W Linear amp 10Win	£129.00
500 CW/RTTY Terminal	£299.00
7H 60W ATV	£669.00

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Scanning Receiver SX200N	£295.00
CD600 AIR	£110.00
MK4000	£95.00

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Hirshmann HR 250	£55.00
Kenpro KR400RC	£110.00
Kenpro elevation rotator	110.00

TONNA

50 5 ele	£34.00
144 4 ele	£14.00
144 7 ele	£17.00
144 9 ele cross	£32.00
144 9 ele tele-portable	£20.00
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C78 70cm Portable	
C7900 70cm mobile	£339.00
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Full range of Jaybeam stocked

HOXIN

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Swedish Brass Morse keys in stock £49.00

ALL ACCESSORIES AVAILABLE – PLUGS SKTS CO-AX 2MTR COLINEAR £33.00 70CM COLINEAR £33.00

PRICES INCLUDE VAT AT THE PRESENT RATE OF 15%
OPEN MON–FRIDAY 9.00–5.30. SATURDAY 10.00–3.00. INSTANT HP FACILITY AVAILABLE
EASY ACCESS M2–M11–M1 NORTH CIRCULAR ROAD–EASY PARKING

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VISA

S·W·L

There are two types of SWL: The broadcast bands listener and the amateur bands listener. Each of these can be divided into further groups.

1. The 'listen to everything' chap will tune in anywhere that takes his fancy and enjoys the hobby in itself.

2. The 'award hunter' can be found scanning the bands for specific areas, countries, club stations etc. and is working his way to an award for collecting a number of cards from a given source.

3. The 'DXer' can be found, usually with headphones on, winkling out a barely audible signal from some rarely occupied island in the South Pacific, or some other little heard spot on the globe.

However all these have one thing in common. They all listen for the postman - wondering if that long awaited QSL card has arrived from HZ1 or VS2.

QSL = Verification

QSLing is not an art. You cannot train for it, but there are rewards to be had if you are keen and if it's done properly.

It's of little use sending a grubby postcard to a station in the USA telling him he was 5 x 9 in the UK when he was chucking half a kilowatt into a 3 tribander beamed at Wigan.

Now, if said Yank was poking 50W into Aussie and you could hear him in Oxford - he might be interested.

OK. So the first thing to find out is where the signal is intended for, and is it getting there?

Secondly, is there anything wrong with the signal or is there any unusual disturbance such as fading,noise etc? On your report to the station you should be able to give him details that would be of interest or even help to him. You should also tell him your set up so that he can decide whether your report is worth taking note of.

Right then, you're tuning round the amateur band and there's DK5XXX in contact with ZS1ZZZ. The South African is using 100W into a tribander and is about S8 on your meter. There's static on band and a little fading.

OK. So far - but listen round a bit - just up the band is ZS2XXX chatting to LA2ZZZ so you make notes again. So, a report to ZS1ZZZ might be:

To Radio: *ZS1ZZZ* I had pleasure in monitoring your QSO with *DK5ZZZ* on *15.11.83* at *1145* gmt. on *14.272MHz USB.*

By Trevor Morgan GW4OXB

Your signal report in *Birmingham* was *4 x 8 There was some fading reducing your signal strength to S6 but this was infrequent. A little static was present at S4.* Comparative Signal *was received at 1210 GMT that day from ZS2XXX beaming to LA2 at 4 x 6*

Equipment here *DX160 RX, 150ft longwire at 30ft running N-S.WX here was fine.*

Your QSL card would be much appreciated. 73

Now, this report could be of some interest to the South African station firstly because you were outside his target area and secondly because of his mate's signal from just over the other side of town was an 'S' point down on his. You've given all the relevant information but haven't waffled on.

Enclose your own QSL card and a couple of IRCs and you'd be pretty certain of a card back.

However, with amateur stations there are a number of problems.

Firstly, some stations use a QSL manager and for some queer reason QSL managers do not reply to SWLs. Not all of them, mind, but some don't. One exception is JY1's manager who QSLs very promptly indeed.

Secondly, some stations use a PO box. In many cases this is to stop the hall being knee deep in cards but some countries are a bit funny about amateurs and in some cases you will be asked not to put callsigns on envelopes etc.

Thirdly, there is a peculiar breed of amateur that lives on IRCs. They are millionaires and welcome SWLs with open jaws. You'll never get a card from one.

However, these problems are not too serious and most amateurs will respond with at least a card and sometimes a thankyou letter.

Award hunting

Some listeners may not be aware of the extraordinary number of awards available for having heard specific stations.

These are far too numerous to mention. Some are presented by clubs such as the White Rose Award or the Gower Award. These are nicely produced certificates presented for hearing 2 way contacts involving club members. There is usually a small charge (about £1) for these awards to cover costs and put a few coppers into club funds.

The most prolific are the awards presented by national organisations such as the RSGB. These are mostly much more difficult to obtain (and more expensive).

The most widely known is the DXCC award for hearing over 100 countries.

Members of the RSGB do not pay the fee for any organisation's awards but fees for other awards are sometimes very restrictive and have been a bone of contention for years. One such award would cost the claimant over £50 in fees and postage.

Full details of awards are published in the book *Amateur Radio Awards* by the RSGB.

Gifts for listening

Some broadcast stations give souvenirs to listeners for regular reports on programme reception. Most of these are Eastern Bloc countries but nevertheless some of the programmes contain excellent DX propagation forecasts and DX programmes have regular spots on Radio Sweden, Radio Nederland, Radio Prague and Radio Berlin International. The latter station issues a monthly newsletter *RBI-DX* which contains propagation news and award lists.

Reporting BC style

The broadcast listener's report should use the SINPO code not the RST. Signal strength, Interference Noise, Propagation or fade, Overall. A brief resumé of the programme heard with time of start and finish must be supplied.

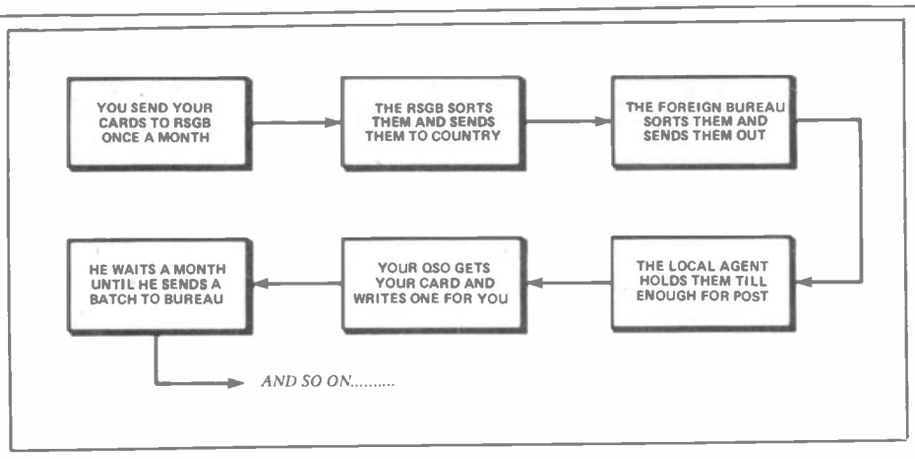
QSL cards from most countries are in sets and quite a collection can be made. Some stations are supplying a multiple QSL which you fill in over a period and return for a proper QSL or award.

Associations

The RSGB is probably the best known association. I regard it rather like the TUC of amateur radio - it fights for the rights which we might not get otherwise. Apart from that, it has the largest QSL bureau.

Of all the arguments in amateur circles, the bureau is the most often raised but how many people know what it consists of or how it works?

Why does it take sometimes over a year to get a card back?



One local club had a special event recently and sent out 1,500 cards - there were 14 special event callsigns out that weekend throughout the country.

This, of course, is only an example. The other main organisation is the ISWL, the International Shortwave League, which is smaller than the RSGB but is a more personal type of club having a much closer contact between members. They have a good monthly magazine and their own QSL bureau.

Unlike the RSGB, they give a good service to the broadcast listener with regular reports on programmes and QSL information etc.

The rarer ones

With modern equipment you can be pretty certain to be able to hear virtually any country in the world - given reasonable conditions, and amateurs regularly chat to each other with ease across the world.

However, there are still rare catches to be had on amateur bands and JY1 (King Hussein of Jordan) is swamped whenever he comes on air. The little islands off the coasts of mainlands are activated by amateurs infrequently by DXpeditions and these are forecast in the radio press.

Just listen for a pile up of 1001 voices shouting their callsigns (sometimes it seems 900 of them are Italian!) and you can bet OH0, OJ0, M1 or one of the hundreds of little used calls are on the receiving end.

On the broadcast bands, some of the smaller countries have very small transmitters. These stations are keen to know how far they are getting with less power than the average American amateur.

America itself, boasts hundreds of individual small stations broadcasting to local townships and a card to one of them not only brings a QSL card but can even get you a mention on their programme.

Finally

There's a hell of a lot of fun in serious listening and QSLing is part of that fun. Use a good receiver and a good long wire as high as you can get it and you are in business.

If you hadn't done any listening before you got your ticket - you've missed a lot and may not get as much out of radio as ex-listeners do!

Many happy returned QSLs.

ON TEST: TRIO'S TALKING TRANSCEIVER TW4000A

I had been eargerly awaiting the TW4000A for some weeks, and at last it arrived from Lowe Electronics in the middle of August complete with its audio speech synthesiser, just in time for me to give it a very extensive mobile field trial on my holiday. The rig includes complete coverage on FM for 2m and 70cm with independent outputs for the two bands, an SO239 for 2m, and an N socket for 70cm. It has a nominal 5 or 25 watts output on each band, and includes all repeater shifts, 2 independent VFOs, ten memories, memory scanning, frequency sweeping (looking for clear or busy channels), and priority channel switching for one second in every ten. With the exception of the tuning knob, having programmable 5 or 25kHz steps on both bands, and the audio volume and squelch controls, all other functions are operated with small pushbuttons. Some of them remain in or out, while others require a push to cycle a function, and another one to cancel it. The normal push buttons select bright or dim frequency display, auto toneburst on/off, low or high power, dial lock, 5/25kHz steps, repeater shift (this button cycles between simplex, plus or minus shifts), reverse repeater (this button is spring loaded but also allows reverse), memory write, priority, memory recall, sweep up or down, VFO A/B, and immediate access buttons for memories 8

By Angus McKenzie G30SS

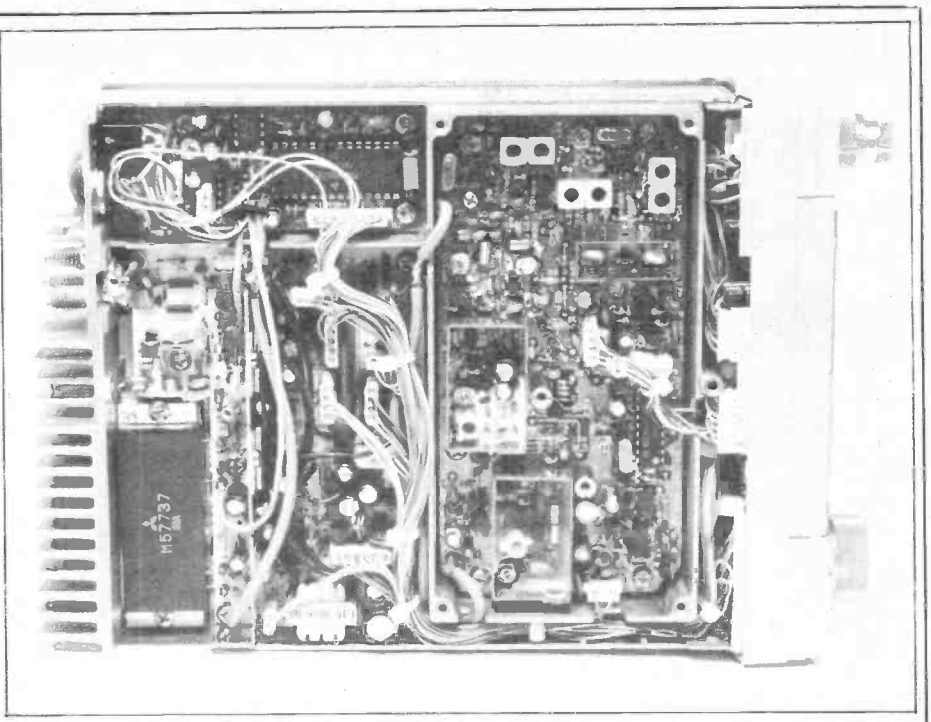
or 9. Another button selects 1MHz increments and switches between VHF and UHF.

The microphone supplied has up and down buttons for changing memory channels or VFO, and holding down either button allows very fast sweeping, a series of audio pips being produced to give one an idea of how fast it is going through the channels. When any button is pressed a short pip can be heard, but this pipping can be disabled if it gets on your wick! Another button on the mike selects memory or VFO, while a fourth one selects 1MHz band changing. When the final button is depressed it gives an audio readout of frequency, and memory channel when memory is in use. When the audio speech synthesiser option is included, a switch underneath selects either speech on commend from the mike, or auto frequency readout whenever the tuning dial or steps are shifted. Similarly, the repeater button position can be spoken every time it is touched. When the VFO button is pressed to change from A to B for example, the voice tells you which one you have selected.

Facilities

The appropriate repeater shifts or simplex requirements can all be memorised independently on each channel, and you can preset different repeater shifts for VFOs A and B, thus allowing you to have 2m for simplex and 70cm for repeater operation for example. A quick touch of the repeater button can then change the parameter. Memory 1 is the priority channel, and memory O has a special function in that separate transmit and receive frequencies can be easily inserted allowing crossband working which can be very useful, particularly if the station the other end is working full duplex.

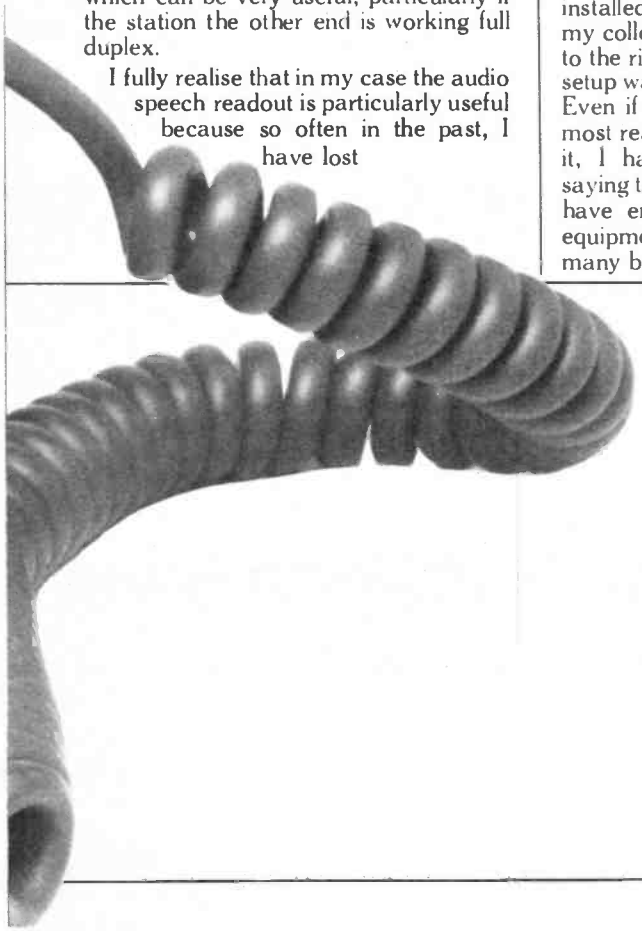
I fully realise that in my case the audio speech readout is particularly useful because so often in the past, I have lost

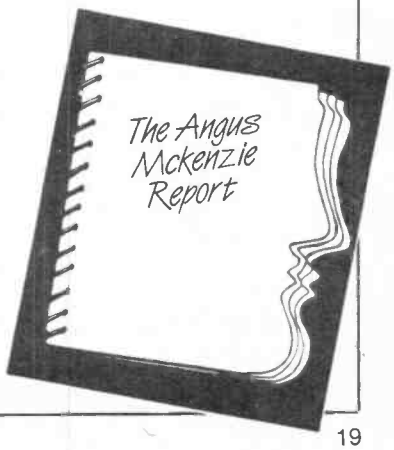


The inside of the top of the rig.

my way on the band, and as I am blind, my wife Fiona has had to take her eyes off the road and then squint at the rig to tell me where I am! For the first time, I have been able to change frequency very rapidly and correctly. There is an irony in all this, in that on our holiday Fiona mentioned to me that the TW4000A was the first rig that we have ever had in the car in 23 years of mobile operating that actually presented an easy to read frequency indication when she looked at it. I feel however, that as with the Maestro, the audio readout is so fantastic that any operator who is also driving may well want to use the function so that eyes can be on the road all the time. We installed the rig in the car, with the help of my colleague Roy Brooker, immediately to the right of my Trio TS130S, and the setup was, for me, extremely convenient. Even if I ignore the speech readout, for most readers may not be so interested in it, I have absolutely no hesitation in saying that the ergonomics were the best I have encountered on any FM mobile equipment. Although there are very many buttons, there is no confusion with buttons serving different purposes depending upon the position of other buttons. You can immediately select your required functions without considerable concentration, and the tuning dial was beautifully smooth in operation, having a large flat at one point which is very easy to feel, allowing the user to move to the approximate frequency by feeling the amount of rotation angle. All the controls are positioned sensibly. The S-meter is most unusual, employing four basic blocks of LEDs rising from left to right so that at a glance you can see the strength of a signal by the angle of the lights as well as the number lit up. There are indications between S1 and presumably 10dB over 9, although only 1,3,5 and 10 are actually labelled. The display also shows all selected functions including memory channel, repeater shift, priority etc.

The rig has an extremely easy to use mobile mount which allows one to slide





ON TEST: TRIO'S TALKING TRANSCEIVER TW4000A

the rig in quickly. On the back panel are the two antenna sockets, a 13V lead with inline fuse, a 3.5mm extension speaker jack and an auxiliary socket delivering switching voltages at low current on transmit or receive, for switching on external equipment having compatible logic.

One excellent feature is that not only do all the function buttons have their function labels illuminated, but the tuning knob has a bright green lit ring around it. This makes the front panel controls extremely easy to see in the dark, again easing driver fatigue. The light dimming button can also dim all these back illuminations.

Under mobile conditions I used the rig from London to Malvern to South Wales, up the Welsh Coast to Snowdonia, then across to the Lake District and back down through Yorkshire to London on a two week tour.

Performance

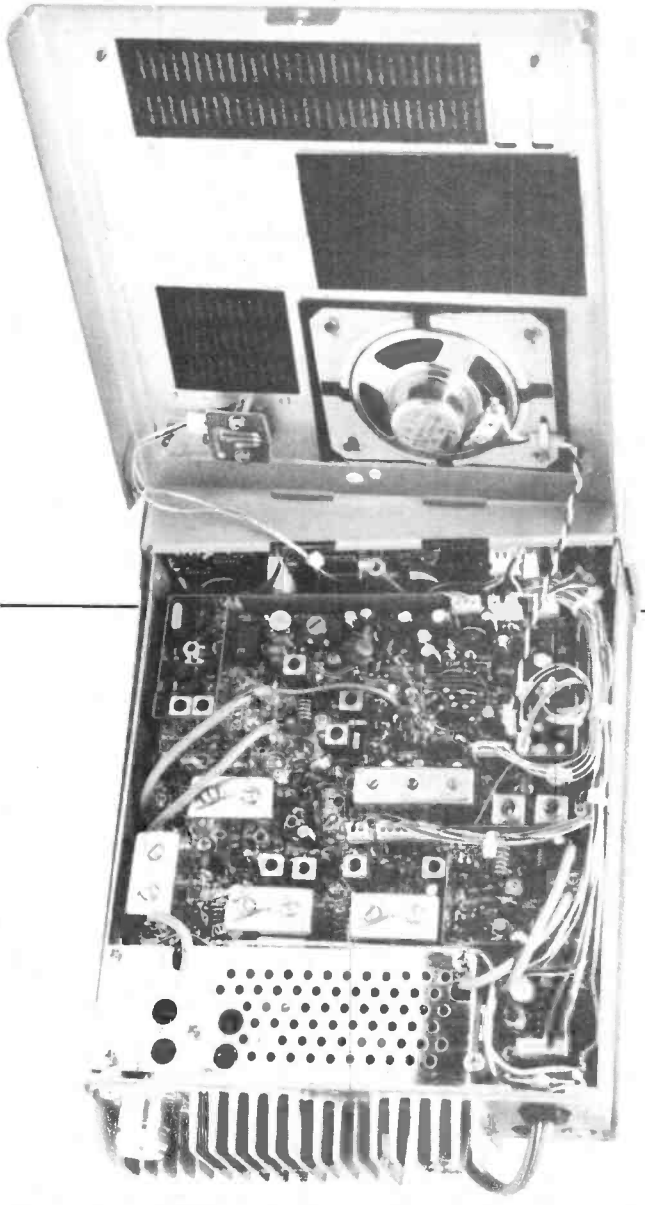
The RF sensitivity was at least as good as any other FM mobile rig that I had used on either of the bands. It was amazingly convenient to have both bands on one box, and I used two separate antennas on the roof, a colinear for 70cm, and 5/8-wave on a magnetic mount for 2m. I used a Mirage linear on 2m to up power to just below 100W output, but on 70cm I ran what later measured at 30W, finding this more than adequate for accessing any repeater that was audible. I found no problem getting into any repeaters, the toneburst being just right at all times. What was quite amazing is that I never had any problem from adjacent channels, neither did I ever hear any RFIM products, despite the fact that at one time I was up at Worcester Beacon at around 1500 feet and accessing dozens of repeaters on each band! The set's ability to cope with very strong signals seemed unusually good, and received audio quality was reasonable, although higher frequencies were slightly attenuated because of the set's excellent selectivity. Transmitted audio quality was never criticised, and indeed there were indications that it was more punchy than average, and yet not distorted any more than usual unless I shouted! The signal-to-noise ratio was excellent, so that strong stations could be received with no audible background noise if the transmissions were good enough. My wife found the frequency readout extremely easy to see, and far better than that on previous Trio rigs.

Using it as a base station rig proved just as pleasurable, absolutely no problems showing up at all. When it was originally delivered, the speech synthesiser was set at the slowest speed, which I found interminably slow. So for my holiday we set it up for the +30% speed readout, which also proved to be too slow. We put it to the +60% position, which after a week of operating also seemed a little slow, as one soon gets used to the digitised female Japanese-English speech! I would prefer to see each speed about 30% faster, and I would advise purchasers not to set it at the fastest speed to begin with. Unfortunately, Trio have not made it too easy to change speed internally, as this means linking connections on a board that is not too easy to get to, and a switch would have been preferable.

The only criticism that I have of the front panel controls is that I would have much liked a 12.5kHz step position which is being used throughout Europe, and Trio really must do something about this on many of their rigs. Only the 9130 incorporates this.

The inside of the rig, although tightly packed, is very neat, construction being mainly of the hybrid type with groups of components in blocks, which should help reliability. The heat sinks on the back get very warm, but not too hot.

The RF sensitivities on both bands were excellent, and comparable with the best we have measured on any other rig with the exception of rigs having a Mutek front end. We obtained around 15dB quieting at the 12dB SINAD point. The receiver was well into limiting at this point. Audio output did not change significantly at



Sensitivity 12dB SINAD dB PD (uV) PD
144.025MHz = -123.5dBm(0.15uV)
144.950MHz = -124.0dBm(0.14uV)
145.975MHz = -124.0dBm(0.14uV)
432.025MHz = -124.0dBm(0.14uV)
433.400MHz = -124.5dBm(0.13uV
435.975MHz = -124.0dBm(0.14uV)
439.975MHz = -124.0dBm(0.14uV)

Quieting at 12dB SINAD point
144.950MHz = 15dB

3dB limiting
144.950MHz = below - 126dBm (0.11uV)

RFIM ratio for 12dB SINAD product; 25/50kHz spacing
144.950MHz = 76dB
433.400MHz = 76dB

RFIM ratio for 12dB SINAD product; 50/100kHz spacing
144.950MHz = 76dB
433.400MHz = 74dB

Calculated intercept point
144.950MHz = -10dBm
433.400MHz = -10dBm

Capture ratio (-2dB/-20dB)/2
144.950MHz = 7.4

Selectivity ±12.5kHz
144.950MHz = 45dB

Selectivity ±25kHz
144.950MHz = 80dB

Reciprocal mixing ratio 25kHz
144.025MHz = 87dB
432.075MHz = 70dB

Reciprocal mixing ratio 50kHz
144.025 = 91dB
432.075MHz = 77dB

Reciprocal mixing ratio 100kHz
144.025MHz = 95dB
432.075MHz = 86dB

Reciprocal mixing ratio 150kHz
144.025MHz = 99dB
432.075MHz = 89dB

Reciprocal mixing ratio 200kHz
144.025MHz = 99dB
432.075MHz =89dB

Maximum audio power for 10% THD into 8 ohms
144.950MHz = 2.7W

Audio distortion at 125mW
144.950MHz = 1% average

S-meter on 2m at 144.950MHz
S1 = -116dBm
S3 = -109dBm
S5 = -105dBm
S9 = -98dBm
S9 + 10dB/ = -93dBm

Transmitter
Power hi/lo watts
144.025MHz = 28.2/3.4
144.950MHz = 29.0/4.0
145.975MHz = 29.0/4.6
432.025MHz = 30.5/5.34
435.975MHz = 30.9/5.1
439.975MHz = 30.5/5.5

Speech deviation absolute maximum
144.950MHz = 7.6kHz
433.400MHz = 7.6kHz

Deviation, typical peaks
144.950MHz = 3.5kHz
433.400MHz = 4.5kHz

Tone burst deviation
144.950MHz = 5.5kHz
433.400MHz = 5.6kHz

Output power versus DC suply volts at 145MHz
13.8V = 29.0W
13V = 26.5W
12V = 23.5W
11V = 20.5W
10V = 12.9W

higher levels, which shows a very good discriminator. The sensitivity was maintained across the whole of each band with only a very small variation which is very good. RFIM performance was very good, and adjacent/alternative channel selectivity was easily the best I have measured on an FM box. We checked reciprocal mixing performance, and quite frankly this was stunning, showing the local oscillator to be extremely clean. The figures for 70cm, although 10dB worse than 2m, are again excellent, for one always has more phase and amplitude noise on a much higher frequency, usually in the ratio of the two frequencies. (70cm is three times 2m, thus around 10dB more noise). The S-meter indicated S1 on quite weak signals, but from middle to full scale, as is usual with FM boxes, there was insufficient difference between indications, so under mobile conditions signal indications would be bobbing up and down fairly violently.

Computer tests

We looked at capture ratio in a similar way to the method I use for evaluating Band II FM tuners, but with parameters modified for NBFM. Using two generators, we set one without modulation at a level of -90dBm, whilst modulation is applied to the second generator on exactly the same RF frequency. Under computer control, the second generator level is made much higher than the first to establish a full scale deflection of the audio level, and then the generator level is decreased until the reproduced modulation reduces by 2dB. The computer logs this RF level which is decreased until the modulation reduces to -20dB. The capture ratio is quoted as half the dB difference between these two measured levels. The parameter gives an indication of how well the rig rejects an unwanted slightly weaker signal from the wanted stronger one, and this is dependent on the IF bandwidth and the characteristics of the discriminator including, most importantly, its bandwidth. The ratio of 7.4dB seems quite good for NBFM with sharp selectivity, but wider IF bandwidths would normally give a much better capture ratio, but of course more adjacent channel interference.

The maximum audio output for 10% THD of 1kHzz modulation was higher than usual at 2.7W, and distortion at a much lower level was well down at 3kHz deviation, whilst at 300Hz deviation it was even lower. The distortion was almost entirely noise, equivalent to an audio signal-to-noise ratio of 60dB, with a psophometric filter added. The simple frequency response chart shows the audio response characteristics with the rig's de-emphasis.

This happened to be the first rig in which virtually all RX measurements were done under computer control, with manual over ride for the S-meter measurements. An HP85 computer was interconnected via an IEEE bus with the 2 Marconi signal generators locked together, and an HP8903 audio analyser incorporating SINAD filtering and measurements as well as the psophometric filter.

The transmitter side was also excellent, and on 13.8V DC output power was well above that quoted on high power,and well maintained across the band. Output only collapsed when voltage fell below 11V. On low power, the output was a little below that quoted on 2m, but was about correct on 70cm, high power on 70cm being amazingly high which is very useful. The low power position can be modified internally, if required. Harmonic outputs on both bands were at extremely low levels and so no interference could be created under normal conditions. The output carrier frequency accuracy was quite satisfactory, but many rigs have actually shown less of an error, possibly rather needlessly. We checked absolute peak deviation, average speech deviation, and that of the toneburst and these were all slightly on the high side. We have come across a problem though in that our Marconi 2305 deviation meter reads (peak-to-peak)/2, and fully responds to the smallest flicks of over deviation, whereas most deviation meters do not adequately respond to deviation peaks. I suspect therefore that since all rigs that I have tested for a while seem to be over deviating slightly, many of the normal measurements quoted as specifications may be in error, as we have checked the Marconi many times on tone bursts and sine wave carriers and find it accurate.

The current drawn on transmit is around 7.5 amps on 70cm, and 6 amps on 2m. On RX the current is just below 1 amp. This shows reasonable efficiency on 2m and acceptable on 70cm.

This rig must have my strongest recommendation for purchase as it performed so well on all counts. It was very easy to use, and no problems or fault conditions appeared from the moment of installation onwards. You will obviously have to decide whether to put all your eggs in one basket, and whilst the price is fairly high, two separate rigs, even with poorer specifications, would probably cost a good deal more. The audio speech synthesiser is an optional extra, but its price is modest when one sees what it can do. I have a feeling that this rig is one of the very best of any kind in the amateur radio field that I have so far encountered, and it shows very clearly that Trio are paying a lot of attention to design, both technically and in the ergonomics field, although again, the Trio manual is poor, with inadequate technical information.

Finally, the rig will be a boon to any blind or partially sighted amateurs, and to mobile enthusiasts who like to keep their eyes on the road. This is one of the few rigs that I feel that I have had to buy after a review, so reviewing rigs can become an expensive pastime!

50 to 28MHz converter and kit

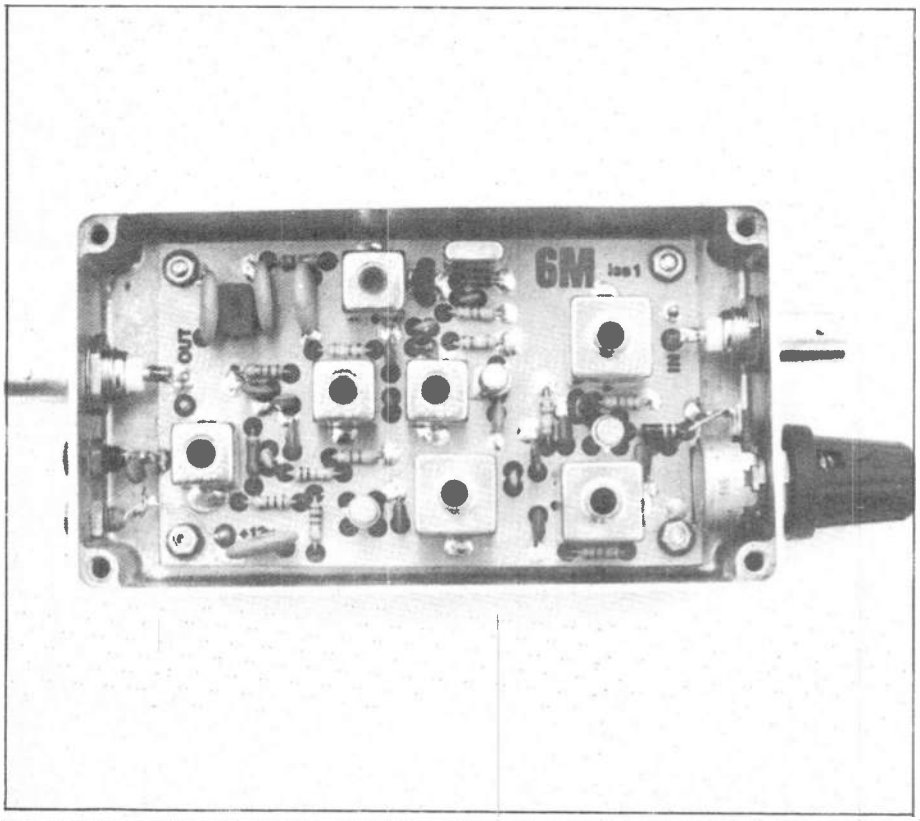
The 50MHz band is our newest allocation, albeit with only 40 stations currently licensed for actual transmission in the UK. With the television service in Band 1 now virtually coming to an end, and providing the current experimental licences prove their worth, it is not unduly optimistic to hope that a full allocation, open to all, will eventually be made.

This VHF band offers many opportunities both for the experimentally minded and the ordinary listener. Other countries have 50-54MHz as a permanent allocation, including the USA and Canada where there is much activity. Almost every sort of propagation is found at 50MHz, with characteristics of both HF and VHF bands. Around sunspot maxima, worldwide contacts are possible via F2 propagation. Despite the current licences only permitting operation outside TV hours, contacts with Canada and Iceland have already been made.

Caught the six-metre bug? This design, by Tony Bailey G3WPO, lets you listen in or work cross-band.

Although only these 40 stations are at present licensed, there are still many contacts made in the UK using cross band techniques in which anyone can participate, providing he or she holds a Class A licence. Normally, stations wanting to work DX on 50MHz use 28.885MHz as a 'talk-back' link, transmitting on this frequency and listening on 50MHz. Hence, if you do want to participate in cross-band QSOs. or just listen on the band, then a six-metre converter is required.

The completed converter on a double-sized PCB mounted in a diecast box.



The design to be described here is for a 28MHz IF, where the signals are converted down to 28MHz, and fed into a normal HF receiver tuning 28-30MHz. Thus a station on 50.55MHz, would be received at 28.55MHz on the HF receiver.

The converter is reasonably easy to build, reproducible, and only needs a multimeter for initial alignment. No coil winding is involved, always a problem in terms of reproducability. Final alignment is done 'on-air' using received signals, or a signal generator if you have one. Full kits of parts are being made available so that you don't have to shop around for the bits.

Circuit description

The circuit used has been kept as simple as possible, but without sacrificing performance to any large degree. It would have been possible to use superior devices in the RF and mixer stages, with optimised noise matching, but at the frequencies of interest, the devices used offer entirely adequate performance for all but the most serious of users.

Signals at 50MHz are amplified by the 3SK51 VHF Mosfet, TR1, before passing to the mixer, with a total of three tuned circuits (T1,L1,L2) providing selectivity at signal frequency.

To achieve the required IF of 28MHz, an injection frequency of 22MHz (50 - 28) is needed at the mixer. This is derived from an 11MHz FET crystal oscillator (TR3), which is then doubled by TR4 to 22MHz. The 22MHz signal is then filtered by the bandpass pair L4/T3, both tuned to 22MHz, any remaining 11MHz energy being rejected by this filter. The wanted oscillator signal is then fed at low impedance to the source of mixer TR4, via a link winding on T3 (R15/C21 provide the source bias).

The other half of the mixer input comes via L2 at signal frequency direct to G1 of TR4 - the ferrite beads on gate 1 of this device, and on G1 of the RF amp, ensure that no unwanted VHF or UHF parasitic oscillations take place, a perennial problem with most FETs. R10, a low

50 to 28MHz converter and kit

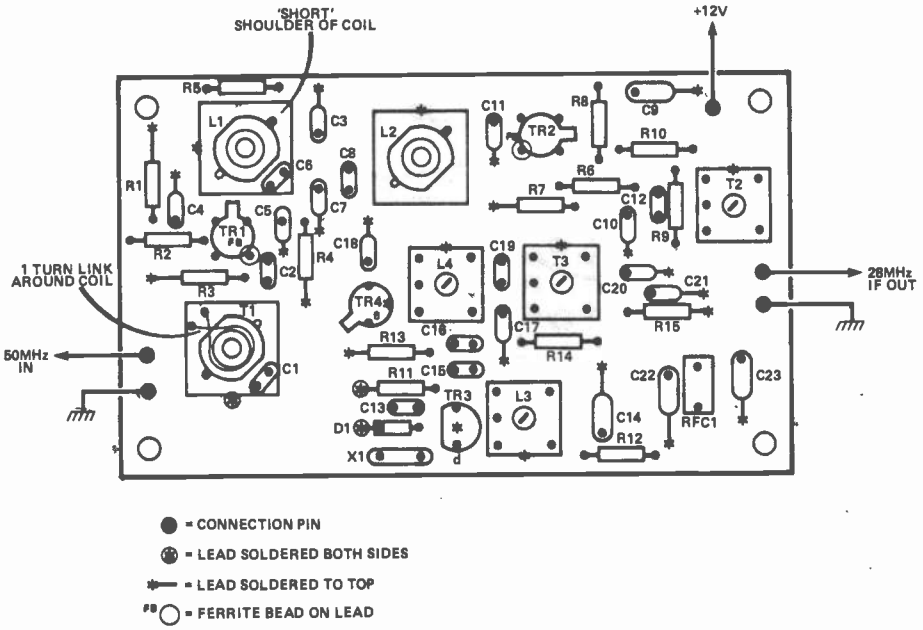
value 'stopper' resistor in series with the drain lead, also serves the same purpose without affecting performance.

The resulting signal at 28MHz is selected by T2, and taken to the HF receiver via a low impedance link winding on the transformer. As a bandwidth of 2MHz is needed at this point. R9 is used to broaden the transformer selectivity to achieve this.

The whole converter runs off a nominal +12V supply (+11 - 14V will be satisfactory), with plenty of decoupling to ensure signals are kept off the supply line. The filter comprising RFC1/C22/C23 isolates the oscillator supply from the rest of the circuit.

The overall conversion gain is around 20dB which should be more than adequate. One of the problems which beset the use of converters is too much gain - this can result in overload of the main receiver, and consequent spurious signals are blamed on the converter. It is really only necessary for there to be sufficient gain to overcome the noise of the main receiver. That is, when you switch the converter on, the noise should just increase a little. It always sounds impressive if there is a terrific roar from the receiver when a converter is powered up - unfortunately this means there is too much gain, and almost certain overload problems.

If you find that the gain of this converter is too high, the gain can be reduced by lowering the value of R1 to reduce the bias on G2 of TR1. R1 can in fact be replaced by a 47k variable resistor which will act as a gain control. If this is done (as shown in the photographs) then it must be located close to TR1 with short leads to the PCB.



● = CONNECTION PIN
⊛ = LEAD SOLDERED BOTH SIDES
⊷ = LEAD SOLDERED TO TOP
FB○ = FERRITE BEAD ON LEAD

Component layout for the converter. The grey lines represent the copper tracks on the other side of the printed circuit board - hence the 'mirror writing' effect.

To ensure stability, the converter has been designed onto a double sided PCB, with the upper foil used as a ground plane for the earth connections. All components mount on this side of the board, and in this way are screened from the tracks carrying signals on the underside. Additional screening cans are used on the topside around all coils and transformers.

An idea of the constructional details can be gained from the photographs. Note that short leads are used everywhere, and that where possible, components lie flat against the PCB - this avoids signal radiation and pick up by components.

1. Push the five PCB connection pins into the correct holes from the track side of the board. The splines on these need pushing into the board with a suitable tool (pliers etc). Solder into place.

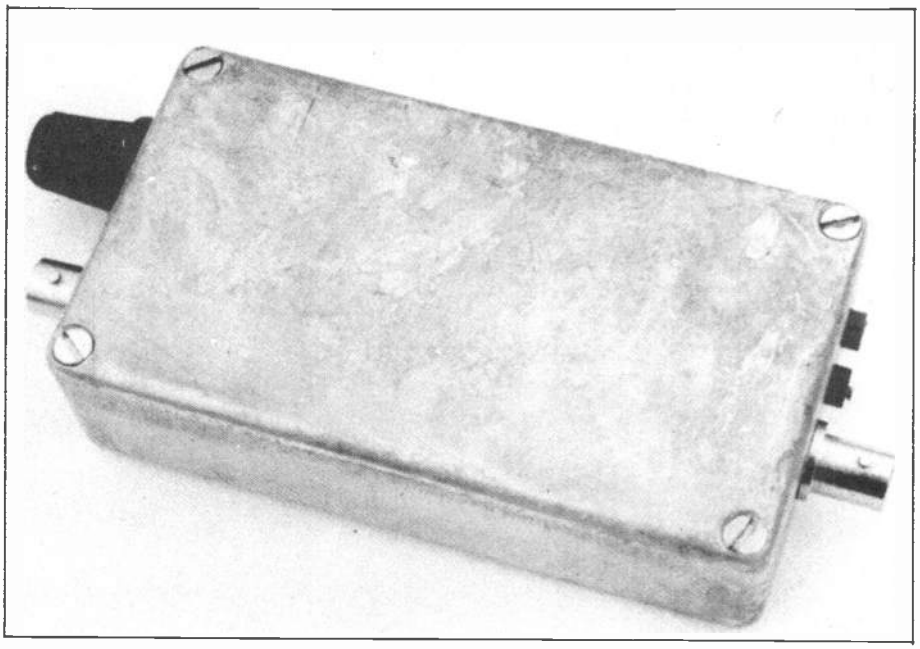
2. Next, insert and solder all the resistors so that they lie flat against the PCB. Gently bending the leads at right angles to the body will give the correct spacing (10mm) for insertion. Where one end of the resistor is earthed (as shown by a cross on the layout diagram), cut off enough lead to leave about 3-4mm to solder to the earth plane. R11 is slightly different in that both leads are pushed through the board, and one end is then soldered to both the top and underside of the board. If you are going to fit the gain control, omit R1.

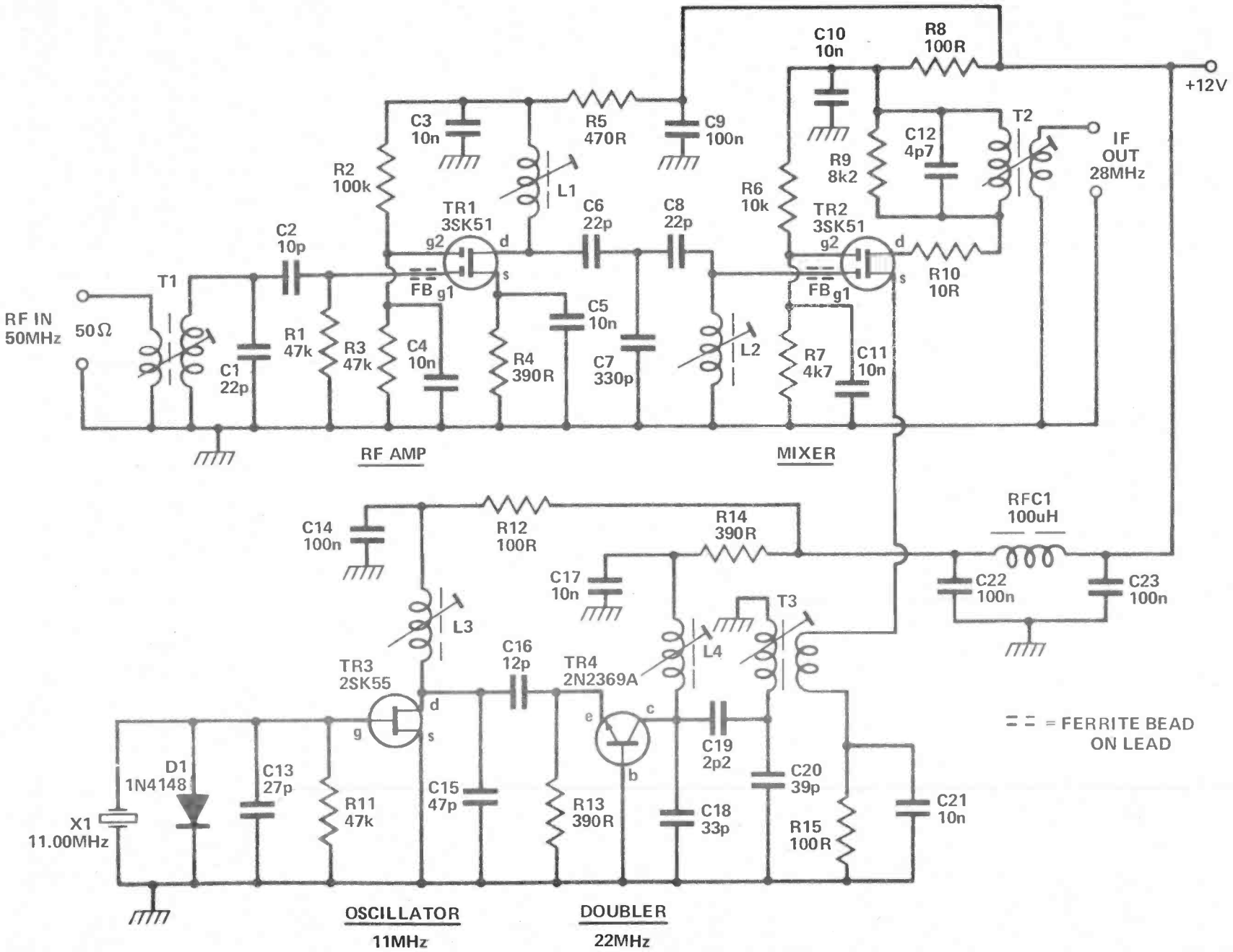
3. Now insert and solder all the capacitors. Those that aren't earthed should be pushed as near the PCB as possible, but without distorting the leads at the body. Those that are earthed at one end have one lead bent out at right angles from the body before clipping to leave a short lead to solder to the top surface.

If these types of components are new to you, you may have some trouble recognising which capacitors are which, due to the variety of markings currently used. The small value capacitors (under 100pF) generally have the correct figure (such as 22) followed by a letter (could be J or K or P) which is the tolerance, although this latter mark doesn't generally worry us here. The 330p value could be marked 330 or n33, while the 10n (.01uF or 10,000pF) are usually marked 103n. The larger 100n usually carries 104n as identification.

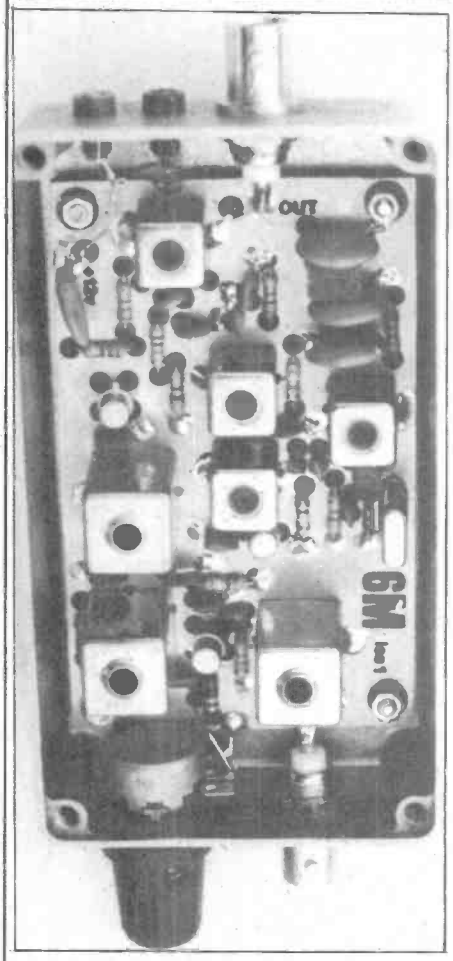
4. Insert and solder RFC1 - this is green and marked 101, followed by a letter.

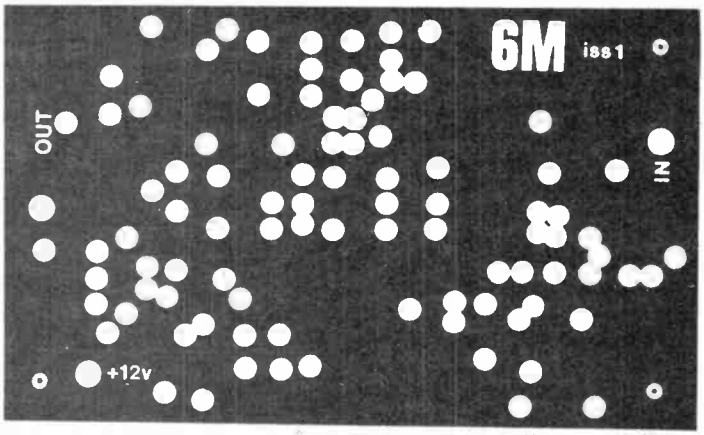
5. Insert and solder D1 - the banded end (either black or a broad yellow stripe) must be in the position indicated. Like R11, this diode has one end soldered to both sides of the board.

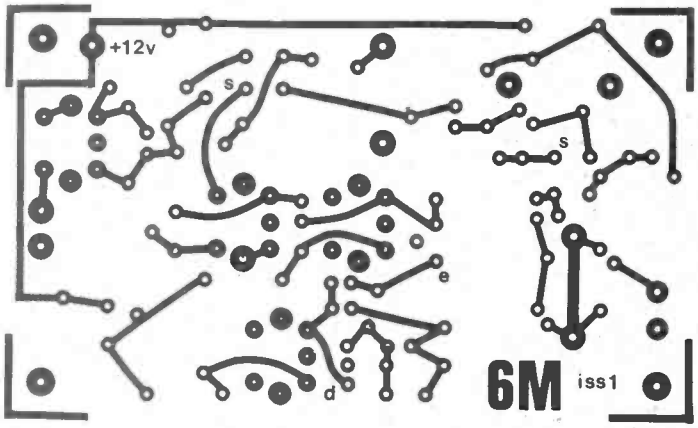



RF IN
50MHz
50Ω
T1
C1
22p
C2
10p
R1
47k
R2
100k
R3
47k
C3
10n
C4
10n
TR1
3SK51
g2
d
s
FB
g1
L1
R4
390R
R5
470R
C5
10n
C6
22p
C7
330p
C8
22p
C9
100n
L2
RF AMP
C10
10n
R8
100R
+12V
R6
10k
R9
8k2
C12
4p7
T2
IF
OUT
28MHz
TR2
3SK51
R7
4k7
C11
10n
R10
10R
MIXER
RFC1
100uH
C14
100n
R12
100R
R14
390R
C17
10n
C22
100n
C23
100n
L3
T3
L4
C16
12p
TR3
2SK55
TR4
2N2369A
D1
1N4148
X1
11.00MHz
C13
27p
R11
47k
C15
47p
R13
390R
C18
33p
C19
2p2
C20
39p
R15
100R
C21
10n
OSCILLATOR
11MHz
DOUBLER
22MHz
= = FERRITE BEAD
ON LEAD

50 to 28MHz converter and kit







Above: Printed circuit artwork for the top (ground plane surface), and (below) artwork for the lower surface, seen from the underneath. Both are actual size.

6. Insert the solder TR1 and TR2. The tab should point in the direction shown, and a miniature ferrite bead is placed over each gate 1 lead before pushing into the holes. The transistor then rests on the bead. These MOSFETS are protected against static charges, so no unusual precautions need be taken, although you should ensure that your soldering iron is earthed, or that it is an isolated type.

7. Insert and solder TR3 with the centre source lead soldered direct to the earth plane. The base of the body should be about 3-4mm above the ground plane.

8. Likewise insert and solder TR4, with the centre (base) lead soldered to the top foil.

9. Before inserting them, clip off the square plastic lugs on the sides of the Toko S18 prewound coil (white in colour) or they will foul other components. Insert each and solder, with the shorter shoulders on the mouldings in the positions shown.

10. Now insert and solder the four transformer type coils into place, including the underside mounting lugs. T2, T3 and L4 have a light pink core colour, and L3 has a yellow core. When they are in place, the cans must be soldered to the top foil. The place to do this is shown by a cross on the layout - you will need a hot iron to do this successfully and tipping the board at an angle will help the solder to flow properly. It is important that this is done because several earth connections on the underside are made via the cans, also to make sure the cans are earthed for screening purposes.

11. Take a piece of insulated wire about 90mm long and strip 5mm of insulation off each end. This is used as the one (and a bit) turn link to T1, as shown on the layout diagram. It is wound round the base of the coil, with both leads soldered on the underside. Shorten the wire if necessary before soldering into place so that the winding is tight round the lower end of the former.

12. Before putting the cans on the three prewound coils, adjust the cores so that they are about 3mm below the top of the mouldings - you *must* use the correct trim tool for these cores (supplied with the kits) - any attempt at using a metal object of any kind will break them. It is easier to solder the cans to the PCB if the lower edge where they are to be soldered is tinned first. Do this, then push the cans home and solder to the top surface of the PCB. One of the can lugs on T1 also needs soldering underneath to complete an earth connection.

13. Adjust the core of T2 so that it is about 1mm below the top of the can.

14. Almost there - just the crystal to solder into place with the can resting on the PCB.

Now cut off all excess leads on the underside as close as possible to the tracks.

Testing

Have a good look at the PCB track side and make sure you haven't got any solder bridges, or other shorts across tracks. It is also worthwhile double checking that you have all the transistors in the right way round at this stage to save heartache later.

Connect the converter to a +12V supply (if you have a current limited supply, set it to 50mA), and check that no more than 20mA or so is drawn by the converter. If it is a lot more, then something is amiss somewhere. One possibility is that the 10R resistor has been substituted for a 100R.

Using a multimeter set to about a 0.5 or 1V range, measure the voltage at R13, relative to earth, and adjust the core of L3 for an increase in voltage (the core will be some way into the transformer). Adjust for maximum, then switch the supply on and off to check that the oscillator starts up reliably. If it doesn't, adjust the core slightly until it does.

Now transfer the multimeter probe to R15, and adjust both L4 and T3 for a peak in the voltage reading. This needs to only be approximate at this stage.

The converter is now roughly aligned and it should be possible to hear signals when it is connected to a suitable aerial and receiver at 28MHz. The core of T2 should be set for a peak in the noise output at the receiver. Then using either a signal generator or off-air signals, all cores, except L3 which shouldn't be touched again, can be adjusted for best reception on a medium to weak strength signal.

This is best done at 29MHz on the receiver (51MHz at signal frequency), ie at midband, although if you are primarily interested in receiving DX signals you might want to peak everything at about 50.5MHz (28.5MHz) as most of the activity takes place at the lower end. There is a UK beacon planned for 50MHz, and, if a lift is on, ZB2VHF should be heard on 50.03MHz. Also, if you have a receiver which tunes that far, the Isle of Wight TV transmitter is on 53.250MHz.

The prototypes were built into a standard diecast box, of similar dimensions used for many other converter designs. BNC connectors are used for input and output, although you could get away with Belling Lee types for less critical applications. The box also houses the gain control pot, and connectors for the power supply. These use small 1mm plugs and sockets, but anything that fits the box could be used - they should be decoupled with a 10n capacitor immediately on the inside of the box.

A coat of primer and some paint will enhance the appearance of the unit, as will some dry transfer lettering identifying the various input and output connections.

Drilling dimensions for the box are given, except for the PCB mounting - the board is simply dropped into the box, positioned centrally, and the hole positions marked through, before drilling. When actually mounting the PCB in the box, 6BA full nuts (or 2 half nuts) are used to space the PCB from the bottom. This just allows the transformer cans to clear the underside of the lid.

When you have the whole thing finished, a check on alignment should be made before screwing the cover on.

Specification

Gain 20dB max (variable)
Sensitivity 0.25uV for 12dB SINAD (SSB)
IF rejection 80dB
Image rejection 70dB
Spurious responses 60dB

Components list

R1, 3, 11	47k
R2	100k
R4, 13, 14	390R
R5	470R
R6	10k
R7	4k7
R8, 12, 15	100R
R9	8k2
R10	10R
All resistors 5% 0.25W carbon film	
C1, 6, 8	22p ceramic plate
C2	10p ceramic plate
C3, 4, 5, 10, 11, 17, 21	10n ceramic disc
C7	330p ceramic plate
C9, 14, 22, 23	100n ceramic disc
C12	4p7 ceramic plate
C13	27p ceramic plate
C15	47p ceramic plate
C16	12p ceramic plate
C18	33p ceramic plate
C19	2p2 ceramic plate
C20	39p ceramic plate
TR1, 2	3SK51 or 3SK60
TR3	2SK55
TR4	2N2369A or BSX20
D1	1N4148
RFC1	TOKO 100uH type 7BA or 7BS
T1	TOKO S18 type 301SN-0800 with 1 turn link for primary
T2, 3	TOKO KXNK3335R
L1, 2	TOKO S18 type 301SN-0800
L3	TOKO KXNK3334R
L4	TOKO KXNK3335R
X1	11.000MHz 30pF parallel resonance HC18/U

Also required:

2 off minature ferrite beads
3 off screening cans for S18 coils
5 off 1mm PCB connection pins
1 off diecast box (RS type 509-939)
2 off BNC single hole mount sockets
2 off 1mm plugs and sockets
6BA nuts, bolts and lockwashers

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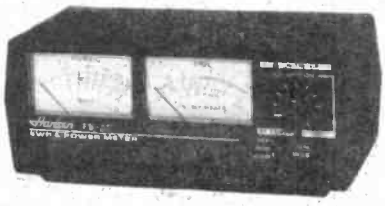

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FS5S	1.8-150MHz 20/200/1000W HF	£37.95	FOC
FS7	145&(432MHz) 5/20/200 144	£41.00	FOC
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SWR3S	3.5-150MHz F/S Meter ant.	£28.46	FOC
SWR508	3.5-150MHz Twin Meter	£26.45	FOC
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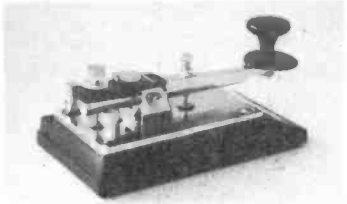
JD110	1.5-150MHz 10/100W	£13.80	FOC
MIRAGE			
MP2	50-150MHz 50/500/1500W pep	£100.00	FOC
SMC			
S3-3OL	Mini CB	£8.80	FOC
T3-170L	3.5-170MHz Relative	£14.95	FOC



MORSE KEYS			
BKU1	Squeeze Key	£30.30	£1.20
HK703	Straight Key	£25.70	£1.20
HK704	Straight Key	£17.65	£1.20
HK706	Straight Key	£14.60	£1.00
HK707	Straight Key	£13.75	£1.00
HK710	Straight Key	£36.40	£1.75
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BK100	Mechanical Bug	£22.25	£1.75
MK701	Single Lever Paddle	£25.25	£1.60
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Datong			
D70	Morse Tutor	£56.35	FOC

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HM/2M	Halo with 24" mast	0dBd	£6.55	£1.20
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LW8/2M	Yagi 8 element	9.5dBd	£17.82	£2.50
LW10/2M	Yagi 10 element	10.5dBd	£24.15	£2.50
LW16/2M	Yagi 16 element	13.4dBd	£35.07	£3.20
44Y/2M	Yagi 14 element	12.8dBd	£36.23	£3.20
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PBM14/2M	14 ele Parabeam	13.7dBd	£55.77	£3.20
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Q6/2M	Quad 6 element	10.9dBd	£39.10	£2.50
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D5/2M	Yagi 5 over 5 slot	10dBd	£25.30	£2.50
D8/2M	Yagi 8 over 8 slot	11.1dBd	£34.50	£2.50
5XY/2M	Yagi 5 ele crossed	7.8dBd	£28.17	£2.50
8XY/2M	Yagi 8 ele crossed	9.5dBd	£35.65	£2.50
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PMH2/C	Harness clr polarisation		£9.77	£1.50
PMH2/2M	Harness 2-way 144MHz		£12.65	£1.50
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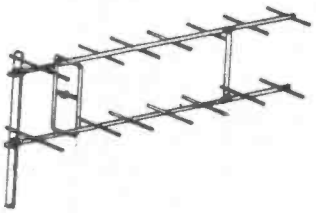
PMH4/70	Harness 4-way		£22.42	£1.80
CR2/23CM	Corner reflector	13.5dBd	£40.25	£2.50
PMH2/23CM	Harness 2-way		£31.05	£1.50



SMC-HS				
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SMC7Q2V	Colinear 2.8dB¼ 2M 5.7dB¼ 70cm 3.6		£29.90	£2.50
SMC2HB6	6M HB9CV 2 Driven elements		£19.95	£2.50
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18V	Vertical 10, 15, 20, 40, 80M 19.0H		£36.22	£2.75
103BA	3Ele Yagi 10 meters 17.0LE 8.0B		£67.85	£3.50
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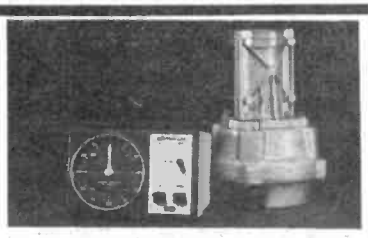
HYQUAD	2Ele Quad 10, 15, 20M 13.5TR 8.0B		£354.20	£6.00



	Type		
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MML144/100LS	2M 1/3W in 100W out		£169.95	FOC
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MMT70/144	2M Down to 4M		£129.95	FOC
MMT144/28	10M Up to 2M		£109.95	FOC
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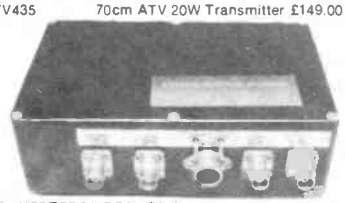
MMT432/144S	2M Up to 70cm		£184.00	FOC
MMT1296/144	2M Up to 23cm 2W		£199.00	FOC
MTV435	70cm ATV 20W Transmitter		£149.00	FOC



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MMC144/28	2M Down to 10M		£29.90	FOC
MMC432/28S	70cm Down to 10M		£37.90	FOC
MMC432/144S	70cm Down to 2M		£37.90	FOC
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MMK1296/144	23cm Down to 2M		£79.95	FOC
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GFBA144e	144MHz Gasfet Masthead		£129.90	£2.00
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TLNA432u	Unswitched TLNA432s		£29.00	£2.00
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REVIEW: SMC 'OSCAR 2'

Angus McKenzie examines a ready-modified CB rig

For some years the top end of the 10m band has been used for NBFM by an ever increasing number of amateurs. Many countries, including the US and Germany have 10m repeaters with inputs between 29.51 and 29.59MHz, and outputs 100kHz higher. Fortunately, many rigs have an FM facility, and their owners have soon found that 10m FM can be quite a lot of fun. When the band is open, signal strengths from many US stations and repeaters into the UK have been well up to fully quieting, and it has been possible to have QSOs with the US with only 4W into a half wave vertical. Far too many CB rigs were imported for the potential market, and so there are thousands of very cheap CB rigs around, and while it is relatively simple to convert them for 10m FM, a few companies are supplying converted rigs which are 'ready to go'. I thought it might be interesting to look at the SMC Oscar 2 - CBM 272 as converted, but first of all let's have a look at the band itself.

It is recommended that the FM mode be used only between 29,500 and 29,690. SMC point out in their instructions that whilst their rig operates in 10kHz channels from 29.31 to 29.70 (channels 1 to 40) channels 14 (29.440) to 19 (29.490) should be avoided, as they are in the satellite band.

When the band is open, band noise can be at least 10dB higher than it is when there is no skip propagation, and so ground wave signals which might easily be receivable during the late evening may be receivable only with great difficulty during the day, so you would find that you might be working DX during the day time and locals in the evening. As there are relatively few active stations in the UK on 10m FM as compared with CB, you don't have the continual racket present on CB, and so even in the middle of the day it is normal to work 15 miles or so with just 4 watts and a vertical antenna, while at night time your range will extent to around 30 miles, or much further if you are using high power up to 100W at the antenna, with the antenna as high up as you can get it. Most local working is vertically polarised, whereas for DX beams of course are far more effective as the polarisation always gets twisted anyway on the first skip. Unfortunately, I have had to endure some dreadful interference from other people's thermostats and other electrical devices, and home computers have a nasty habit of radiating much rubbish, which I really thing the Department of Trade and Industry should do something about as soon as possible. There has already been much legislation about this in some other countries. In effect this all means that the noticeable band noise is bouncing up and down by anything up to 20dB, and most band users are experiencing this problem if they live close to many other houses and flats, and this should be borne in mind when making the decision to try 10m FM.

Another annoyance is that whilst 29.6MHz is the general simplex calling frequency, just below this at around 29.59MHz is a signal frequently heard during the day which knocks out at least two channels, including the calling channel. Very recently, when I first tested the Oscar 2 on air, I heard this terrible buzzy modulation, which obliterated the calling channel, which sometimes changed to a strange sweeping sound, and having spent ages turning off and on every computer and microprocessor controlled piece of test equipment in the lab, I realised that it was coming in on skip propagation. Eventually, many angry amateurs asked others in Africa and SE Europe to attempt to DF the noise, which seems to be coming from somewhere to the immediate East of the Middle East, and it is suspected that it might be coming from somewhere near the Afganistan border. The signal is so strong as to make the calling frequency unusable for many hours a day, the intruder apparently messing up the band very frequently.

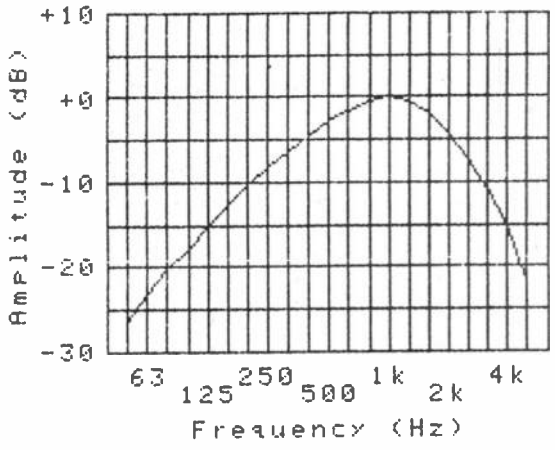
It is most certainly worth while considering 10m FM as an alternative to 2m for local working. FM boosters designed for CB *(naughty! - Ed)* are now very cheap indeed. These can very easily be tweaked to peak up on 29.6MHz, and I have heard of many costing around £15 to £20 which can give between 25 and 50W, which helps a lot.

I have looked at quite a number of CB rigs in the last two years for professional reasons, and a few general comments may be worthwhile. I have noted RF sensitivites for 12dB SINAD from around 0.11uV to 0.3uV. The selectivity of most of them is very good indeed as they have to meet Ministry approval, but the RFIM performance can be anything from fairly poor to diabolical. The better ones are usually no better than the worst 2m ones, but for ground wave propagation this will not be too serious since the density of stations is so much less than on CB. Both transmit and received quality is severely restricted in HF response, nearly all CB rigs giving the characteristic 'Wellington boot' sound. This is quite simply mainly due to the stringent Ministry spec, and in practice it would probably be reasonable to modify the transmit audio low pass filter so that it cuts above a slightly higher frequency without causing too much splash. I suggest that many stations in the adjacent channel, and since there are so few channels, it would not be a bad idea to reduce deviation to an absolute maximum of around 3.5kHz, filtering the audio at a frequency considerably lower than this. We all have to remember that the 10kHz channel spacing is a very narrow one indeed, which therefore restricts both the maximum audio transmit frequency and its deviation. A

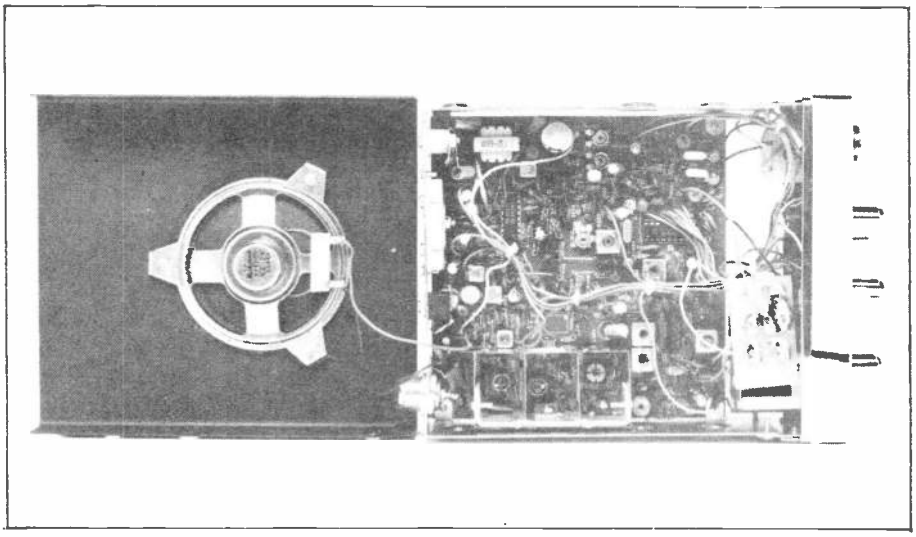
number of rigs have very bad spurii and strange mixing products, despite usually having good harmonic filtering. Remember that the third harmonic comes into the low and of Band 2, so if you are using an amplifier, I strongly recommend that it should be followed by a very good low pass filter. Several amateurs have had problems with 'boots' which can jam out Radio 2 at 89.1MHz in the South East, for example. We will all have to be careful as otherwise we might get descended upon by the DTI!

The Oscar 2 seems to have a fairly poor sensitivity of 0.25uV for 12dB SINAD, and whilst this is perfectly satisfactory when the band is open, it is rather on the edge when band noise is very quiet. To put matters into perspective, the IC740 with preamp switched in is around 0.14uV. The poorer or lower gain your antenna, the less band noise it will pick up, and therefore the greater the receive sensitivity has to be for the received band noise to be the limiting factor.

The Oscar's selectivity is very good, around 56dB at 10kHz adjacent channel, and 59dB alternate channel. RFIM was poor, only 36uV of each of two carriers spaced at 50/100kHz off channel, with the 100kHz one modulated, giving a 12dB SINAD product on channel. This would just not be tolerable at all on 2m of course. The S-meter had a reasonable performance with S1 being around 1uV, S3 being at 4uV, S5 at 8uV, and S9 at 22uV, for example, the meter being a moving coil type, rather than lemons and cherries! The receiver audio response is shown in the chart, and at least some HF gets through! The audio output power is ample, even for mobile use, and the quality is quite acceptable up to 2.5kHz deviation, but above this distortion increases very rapidly from 5% to 15% at around 3kHz deviation.



Receive audio frequency response



Front panel

Front panel controls are very simple indeed, 40 channels being provided together with a squelch control which worked satisfactorily, and a receiver audio gain control. The high/low switch becomes the repeater shift selector, which is useful. On the back panel is just an SO239 aerial socket, the 13V input, and a 3.5mm jack socket, for extension speaker. A microphone is supplied, together with a mobile mount, and instructions with circuit diagram.

The receiver was well on channel as was the transmitter, and SMC decided that the cheapest way for them to modify the rig was to change the crystals, and tweak up the rig. Many amateurs though have found it more appropriate to reprogram the EPROM, thus enabling some additional functions, although this would be awkward unless you have a good knowledge of these. The output power measured 3.9W across the band from a 13.8V DC supply. Harmonics were well below -60dB, but we did notice one spurious at around +500kHz at -40dB. Transmit quality was adequate, but not too good, and mic gain, as supplied, was a little low, although deviation was around 2.5kHz. Many considered this deviation too low, but personally I think it's about right, taking all into account. I have had a lot of fun with the rig, which was very reliable, and obtained good contacts up to around 30 miles distance. At its price of just under £50 it seems quite a reasonable buy, but you should consider modifying one of the better CB rigs yourself, which would cost you much less. Unfortunately, relatively few CB rigs are worth having, and some of them would require a considerable amount of work for conversion. It is rather a pity that SMC could not convert their much better Oscar 1 rig, which performed well on CB. It must be a matter of economics here. There are already several hundred amateurs in the South East equipped for 10m FM, and numbers are increasing every week. Many have converted their own old CB rigs for the band very sucessfully, so why not either buy one or convert one, and have a go on 10m FM? Many have also installed a rig in the car for mobile, and it's worth while using a good mobile antenna, which can of course be far more effective than the regulation CB ones!

Having discussed a number of conversion problems with other amateurs on 10m, I thought a few alignment hints might be useful. Almost everyone peaks up the RF input correctly, and has a good attempt at tweaking the PA. Many forget though that the range of the local oscillator goes up by nearly 2MHz, and it is advisable to tweak the tuned circuit which passes the LO to the mixer for 19MHz rather than the CB LO frequency some 10% lower. This should not only increase gain slightly, but it should improve RFIM performance considerably, as well as decreasing the throughput of any spurii; this should improve the transmitter as well as the receiver. The mixer RF input, and output of the RF preamp should be peaked for maximum S-meter reading, but the RF input tuning from the antenna relay should be peaked for best SINAD from either a signal generator, or from an attenuated aerial signal (to reduce band noise as well as a strong and co-operative signal on the band!) When the front end is tweaked, the correct position may not necessarily be maximum S meter reading, this applying only to the antenna input adjustment. Microphone preamp gain should be increased, but I suggest deviation should hardly be adjusted at all.

Thanet, the importers of Icom amateur radio equipment, wish it to be made clear that Icom Japan, has no connection with Icom in Taiwan who make CB rigs which are fairly easily converted. This was a surprise to me, as it was to many Icom CB converted rig owners!

I would like to thank SMC for loaning the Oscar 2 for review, and the many stations who have given me most useful reports on 10m FM.

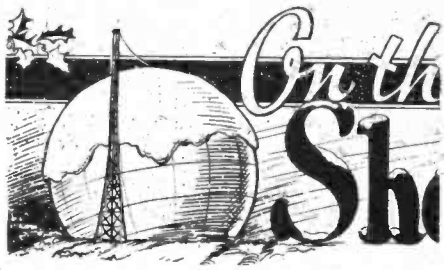
A HAPPY AMAT

David Lazel
why Scrooge

You may have noticed how Santa Claus twitches whenever a radio amateur pops into the Grotto. The poor old gent knows that the ham will want only the most expensive technology in the Christmas pillow case this year. Indeed, some Santas have to take a crash course in computers, videogames and shortwave before being allowed anywhere near their Magic Cave. The tension is relieved only by the well known fact that amateurs usually buy their own Yuletide surprises well in advance of December 25th (any time after March 5th, according to the surveys). But it does seem a pity that the handsome and sophisticated hobby radio press fails to celebrate Christmas with the Bumper Free Gifts once provided with the journals. World maps, showing major radio stations, were a favourite free gift in the radio press of yesteryear, though some might well have preferred the free Popeye mask given with an early issue of *The Knockout* comic.

Not that *all* the hobby papers celebrated the season. Indeed, some ignored Christmas altogether, believing that their readers were far too busy DXing or adjusting their antenna to bother about Christmas. *The Wireless Constructor*, well-nigh essential reading for the shortwave enthusiast, had not a sprig of holly on its technical pages. Careful examination of the hobby press did reveal features on the lines, "How to tell the wife you are far too busy adjusting your set, to carve the chicken this Christmas".

Yet the 1930s were the golden era of Special Christmas Issues, perhaps because the BBC was still innocent, even puritanical. Christmas radio output had a special magical quality which would be impossible in our round-the-clock entertainment era. Probably the best example of the 1930s aura is that of the cover of *Popular Wireless and*



Television Times, for Christmas 1935. *Popular Wireless* — a very successful weekly from the Amalgamated Press — added "Television Times" to its title a year or so earlier. Radio amateurs were eager to construct receivers and arrange their own experiments. Fortunately, *Popular Wireless* enjoyed the services of a very knowledgeable technical editor, Mr. G.V. Dowding, AMIEE. One of the pioneering radio magazines here, *Popular Wireless* had also recruited the services of Sir Oliver Lodge as Scientific Adviser. However, the cover of the Special Christmas Issue for 1935 showed not the boffins, but the bureaucrats, the band leaders and the stars. In the style of a pantomime scene, Broadcasting House stands on a hill, all windows illuminated, and a golden aura surrounds its portals. Described as "Ye Magic Castle", Broadcasting House pours out a procession of personalities headed by Sir John Reith (naturally) and Val Gielgud, the head of drama. Henry Hall, Gracie Fields, Will Hay, Stainless Stephen and Clapham and Dwyer may be seen in the rear.

In the spirit of Dickens, and contemplating sixteen Christmases Past, the Query Editor reflected on his life and work, in the 1937 Special Christmas Number. This veteran had been answering readers' questions since 1922, the year of the weekly's launch. Around one hundred and fifty queries a day, he recorded, *six* days of the week (Sunday postal collection then, and no weekday slowing of the mail) with a double dose on

'EUR CHRISTMAS

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Mondays. Mercifully lacking a computer, the Query Editor estimated the total number of queries to be 873,000.

"the terrible thing about it (he added) is that the radio constructor is like the Chinese — start him off asking queries, and not only does he never stop till he is dead, but his offspring carries on the good work... it's the glorious desire to fiddle with the set, to alter this, change that, try the other, that brings the query bag from about twenty to its one hundred and fifty a day."

This do-it-yourself sabotage may have had something to do with a game proposed by a Christmas issue of *Popular Mechanics*. A group of radio enthusiasts would study the innards of a working receiver. Then all but one would leave the room. The one remaining would tinker with the circuitry, removing a component for example — and then invite the others to re-enter the room. After contemplating the incomplete and now *not* working set for a few minutes, these geniuses had to explain what had been done by way of sabotage. First to get the right answer

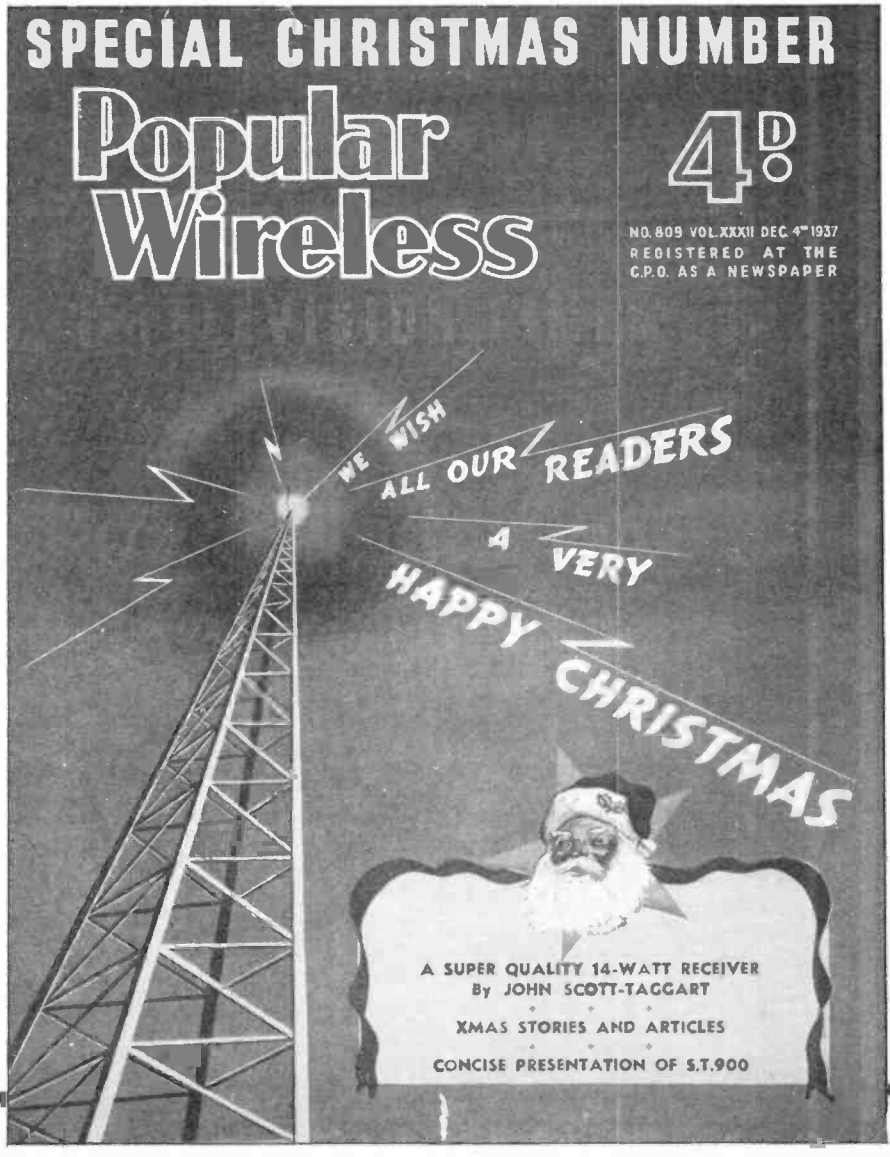
Christmas Diary

received a suitable prize, perhaps a T-shirt bearing the words, "I Really Know Radio". Other similar games were proposed in the article, and while the idea could be applied to your new transceiver or video recorder, you might be better advised keeping your guests' fingers off any technology around the house.

Most radio buffs spent Christmas playing with their presents, confirming the belief held by most wives and mothers-in-law that radio was just an alternative to a train set (some lucky fellows had both). Playing with the equipment was and is, an activity quite distinct from listening. As Mr. G.V. Dowding observed on the 1930s: "There must come times in the lives of even the most rabid experimenters when experimenting must give way to listening. And one of those times is, of course, Christmas. Not that the experimenter ever wants to listen: one of the greatest radio engineers the world has ever seen once austerely observed, "I never listen to broadcasting". I suspect the reason in his case is that he once tuned in a Children's Hour and was shocked beyond belief at such a childish and irreverent use of the inverse function of pi squared. You might be amazed at the amount of mail the BBC gets about *that*. Anticipating Christmas visits by other members of the family (and even worse, neighbours who know all about radio) Mr. Dowding offered advice on the concealing of your own set and use of an external on/off switch fixed unobtrusively on the skirting-board. This was "designed to allow the set to be tucked away from the hands of those irritating people who never seem to be able to resist the temptation to twiddle with the dials of any radio set that appears on their horizon". So, you had to keep your new radio presents away from everyone. And I do mean *everyone!*

It would take all the pages of this magazine to merely hint at the 'Gift Suggestions' printed in the Christmas issues of the amateur/popular radio publications. Adaptors to convert a conventional radio set into a short-wave receiver; test meters; battery eliminators; suppressors; moving-coil loudspeakers; condensers; electrically driven turntables; electrical encyclopedia — all poured from Santa's sack into the hopeful pillow-cases or empty potato sacks left by eager amateurs.

Some folks thought that Santa Claus was really John Scott-Taggart wearing a cotton wool beard. An indefatiguable



A Happy Amateur Christmas

designer and writer, John Scott-Taggart brought peace and joy to households, throughout the land with his flow of do-it-yourself radio designs. Thus, his design for the ST900 appeared in the Christmas issue of *Popular Wireless* for 1937. No problems about gift ideas here. Dad just gave every member of the family a list of the components he wanted, and told them to get cracking. I was fortunate enough to see one of Scott-Taggart's immaculate models, the ST800, at a vintage wireless shop in Bristol recently. More than forty-five years after its design, the ST800 still looked some set, and capable of excellent performance. Noticing my admiration, the shop proprietor declared it was *not* for sale. Pity, really: I was all set to send my note to Santa up the chimney.

Shortwave radio featured prominently in the Christmas Specials. Even here, though, gift ideas could be discerned. "If your receiver emits a choking sound at around 19 metres", wrote a contributor. "you will find that the use of smaller coils will solve the problem". He added, in reference to some thoughts on the reaction condenser, "I am definitely not in love with the solid-dielectric types for shortwave work, having found out for myself what a difference it makes to put in a good air-dielectric condenser". No doubt, he got that tip from Santa himself. Anyone offering Yuletide components to the consumer always had to show how to use them. Which may be why Santa Claus ran behind schedule in those prewar Christmases. Yet, there was little expectation that the Spirit of Christmas Future would be any less complicated. Festive issues ran science fiction stories about long distance communication sometime in the future. By Christmas 1983, the magazine suggested, we would be building our own satellites in the back garden, Ma still wondering why we could not be content with the marvels of Australian shortwave. One journalist sighed that 'the spirit of radio' and 'the spirit of Christmas' had a less than happy association for anyone in the trade. Over the holidays, so many potential Marconis tried to make their first set, with components they had bought from a bloke in a pub. As soon as the radio parts shop opened after Boxing Day, these unhappy lads trooped in with their miserable chassis, wanting to know what went wrong. No wonder so many retailers started their New Year with a resolution to emigrate to a land where "shortwave" referred to the lazy lapping of the tropical beach. There was, said the journalist, something that could be called 'the spirit of radio', which consisted of the application of unwise curiosity to previously working sets. Once the spirit of radio got in, you could not get it out. You may think that you recently bought a second hand car with a similar condition.

Times do not really change that much. During the Christmas season of 1935, a new American organization was set up specifically for the Wives and Mothers of Radio Hams, these ladies deciding that they would organize their own fun. As a British journal put it, "presumably, these ladies get together for a little enjoyment while their husbands and/or sons are too busy on the air to recognize their existence".

A few pages away from the same comment, the editor is thanking readers for gifts of 'cast off components' to wireless workshops set up by local unemployed assistance committees. Radio workshops for the unemployed were not uncommon at the time, since it seemed sensible to train men for jobs that could come in the ever growing industry. So, in the Spirit of Christmas, the radio magazines encouraged help for those down on their luck. It makes you wonder if Scrooge, in our times, would set up a Youth Training Scheme for Bob Cratchitt and Company, in the matter of repairing communication satellites that r efuse to bounce when dropped from geostationary orbit.

Perhaps next Christmas, I may share other ancient radio joys with you, but for now here's something for your Christmas Cracker. A veteran, penning his memories in an article entitled, "My Radio Christmas Diary" looked back to the early 1920s. The big problem at that time, he said, was that the passing trams shook the whisker off its sensitive adjustment. All those amateurs who cannot remember what a tram looked like are advised to visit the Crich Tramway Museum, or failing that, take a trip to Blackpool, where a few models trundle the front. I'm not sure that asking Santa for a tram will do you any good, but if you happen to be passing his Grotto this Christmas, and feel already well stocked up on accessories, you could pop in and enquire.

Left: Popular Wireless and Television Times for Christmas 1935. The BBC's Broadcasting House, portrayed as "Ye Magic Castle" pours out a procession headed by Sir John Reith, Val Gielgud, Henry Hall and Gracie Fields..

Radio magazines in the thirties had elaborate logos for their regular articles. These were often given Christmas extras: for instance the globe used with the "On the Short Waves" headline becomes a Christmas pudding, or has Santa on top!

By Glen Ross, G8MWR
News and topics of interest for the bands above 50MHz

One of the major events of the year for those of us who live North of Watford is the Midlands VHF Convention. This year's event was well organised in very civilised surroundings and even offered excellent catering facilities, which is something that most other occasions sadly lack. An excellent assortment of lectures were provided and these were well attended. The afternoon started with a look at the history of 50MHz and what has been achieved in the few months that permits (not licences) have been available. The results in this period have been impresive to say the least, and advantage has been taken of just about every propagation mode known to exist. It now seems that the limiting factor is the small number of people available on the band. A lot of work is being done 'crossband' and while this is an interesting activity it must be somewhat frustrating to have so few normal contacts available. The problem of only being able to work outside TV hours is something that we shall have to live with for the next year, although as the TVI problem only affects one TV channel it should be possible to relax this restriction in those areas where this channel is not used. If this will happen or not is a matter for conjecture but it seems to be a reasonable point to put to the 'powers that be'. One thing is certain and that is that conditions on 50MHz will decline as we go into the sunspot minimum. In this respect the band behaves in a similar manner to the HF bands. This is in fact one of the major attractions of 50MHz, it is the band where just about all known forms of propagation can exist at one time or another. Really great stuff and fired the imagination of a lot of people not yet on the band.

Leaky carriers

Next on the list came a review of the proposal to bring into service a 145MHz SSB repeater in the Sheffield area. Whether we really need an SSB repeater system is something which has been hotly debated for some time and we are probably no nearer an answer now than we were when the debate first started! There is no denying the technical achievement of getting the system running, but that is hardly the point at issue. SSB, by the very nature of the system, tends to be used by people who are interested in achieving long distance communication and who have become disenchanged with using the local repeaters. Can they really be convinced that getting back onto a repeater would be a good thing? I doubt it very much. One of the major problems to this idea is that you will have to readjust your rig so that it provides a small amount of carrier for the repeater to make use of for various purposes. How many of us are prepared to dig into our rigs to work a repeater? The argument put forward that the makers would provide this facility is probably true, but I feel it will need an awful lot of repeaters around before they think it financially viable. Time will tell.

Repeaters

The big problem with repeaters seems to be that they encourage people to operate with low power and really minimal aerials. 15 years ago you did not think you were on the band unless you could generate at least 50 watts of RF and had something like a 6 over 6 array at 30 feet or more. Nowadays 10 watts (or less) to a 'Slim Jim' in the roof space, and reliance on the local repeater to provide contacts outside your back garden seems to be the usual thing. There are people who have to rely on this type of operating due to various local problems and for them repeaters are a dream come true, but some people really could do better with a bit of effort and that effort would be well repayed with a lot of extra contacts over a much wider area.

The afternoon ended with a 'Forum' at which various matters of interest were debated. The Belgian affair and 70cm came in for a lot of comment. There seems to be a dearth of information on this one at the moment. The official view seems to be that it can't happen here. To make this more certain it really is important to make use of the band. A lot of people have gear for the band but activity seems to be low. A useful idea put forward was that when getting a reply to a CQ call on two metres, ask if the other station has 70cm, and if so move to that band rather than S19. This has several good points. It will increase use of 70cm. The fact that a lot of people on two heard you move to 70 will give them the idea that 70cm is a band worth having. Also, it will make more space available on two metres for those unfortunate people without 432MHz equipment. It is certainly worth a try.

Novice band

This subject produced some lively discussion. The idea of a novice band has been with us for many years and three points seem to be important. Do we want it, if so where do we put it (decorum, please) and how do we organise it. A vote was taken on the first point and not one member of a large audience voted in favour. This is perhaps not surprising. We may not want it because we already have a licence and therefore it would be of no advantage to us. The real point at issue is not whether we want it, but how much demand there is from people who are not already licensed. I suspect that this is considerable. If a novice licence was introduced it would make sense to place it where it would be of the greatest benefit to us. A suggestion was made that perhaps a segment of the 70cm band could be allocated, thus helping to make more use of that band (use or lose). This would not give the novice access to the

intercontinental DX, which would probably upset some of them, but it would give them the opportunity to get into amateur radio. This is where all Class B activity was, originally, and a lot of amateurs gained experience of the hobby on this band. It was stated that in countries where a novice licence already exists it is part of an incentive system and that if it were introduced here it would be as part of a package which should also include the facility to upgrade to an advanced licence which would provide extra privileges. As to how it would be organised... your comments please.

Frequencies

Raynet and the use of frequencies in the beacon allocation came in for a lot of discussion. In an emergency it is obvious that Raynet takes precedence over any use of any channel, but it is equally obvious that to use international beacon frequencies for what can only be described as Raynet club chats is just not on. (I speak as a Raynet member). This also applies to Raynet exercises where there is no real emergency. Under these circumstances it is only right that Raynet should do as we all do and look for a clean channel. The news that at least one of the beacon frequencies will be cleared by the end of the year is a step in the right direction. Having said this the fact still remains that Raynet is doing a great job and deserves your support.

Class B Morse

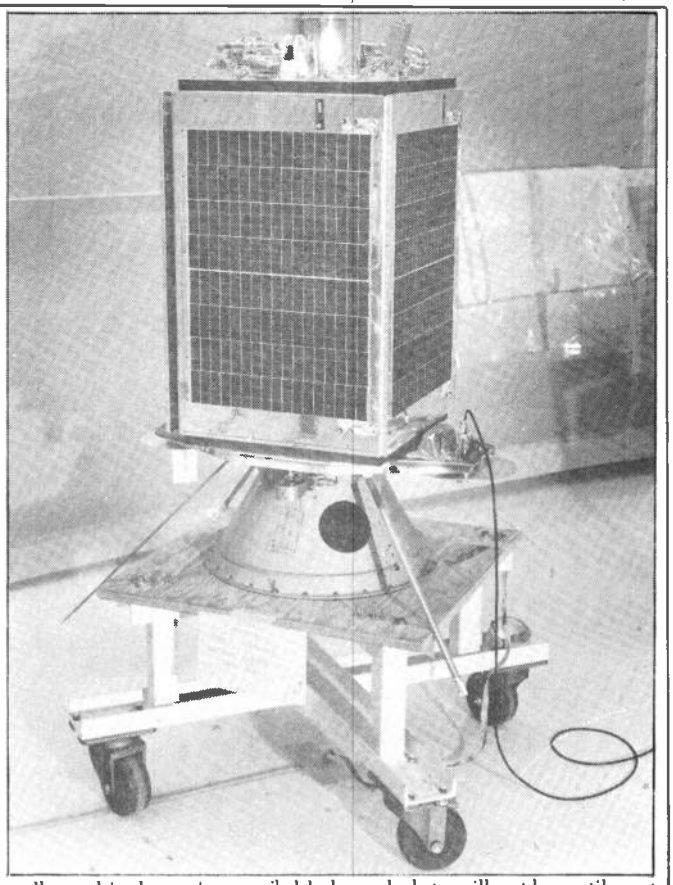
A lot of Class B operators have claimed that Morse should he allowed on the grounds of the 'self training' clause in the licence. So far this has always been resisted by the autorities. There is now a proposal that Morse should be allowed for Class B operators within a normal voice contact. A facility of this sort would be very welcome to most people. Full details of the proposal are not yet available, but it does seem a step in the right direction.

Rattle boxes

A comment was made that RTTY enthusiasts are making life hard for each other by the practice of using 145.300MHz as a working frequency rather than as a calling channel. It must be obvious that in any one area only one contact at a time can take place on any one channel, so why not move to the 'all mode' section of the band? After all, that is what it is there for! It must be annoying to have to wait while someone indulges in a contact or, even worse, sends RYs for ages before you can get a contact. Perhaps this is yet another argument for more use of the wide open spaces of 70cm?

Crosstalk

Another point that came up at the convention was the possibility of cross band contacts betwen Class A and B operators. The thinking behind the original decision not to allow this has always been incomprehensible. You are allowed to listen to the other bands so why not be able to work crossband? It seems that some work is going on behind the scenes to get this facility, which is long overdue. There are so many strange points in the amateur licence that perhaps it is time for the whole thing to be restructured and written in a way that makes it easy to understand.



UOSAT Oscar 9, built by the University of Surrey. NASA has offered them another launch in February 1984, after another 'customer' pulled out.
Photo: AMSAT-UK

Down links

There still seems to be a widespread disregard for the satellite downlink frequencies on two metres. This is the segment between 145.8 and 146MHz. Most of the signals on this part of the band will be weak SSB, so they will not be audible on an FM machine. While the older satellites were only in range for about 20 minutes every 2 hours or so, the latest Oscar 10 is available for many hours at a time. It really is essential to keep this part of the band clear if effective use is to be made of the satellite system.

Shuttle shuffle

Our man in space had to be grounded for at least a month. After finding a serious safety problem with the rocket system the launch date has been put back to the end of November. At least that gives us another month to work on the gear and give ourselves a better chance of making the contact! A major problem is that some of the official experiments on board are of a seasonal nature and if the craft does not go up in November then the next available launch date will not be until next Spring.

What goes up...

...to the satellite would come down a lot easier if there were not so many people using far more power than is required to maintain communication. It seems that in practice the original power budgets for working through Oscar 10 were far too optimistic. The idea of 10 watts to an eight element beam providing 20dB signal-to-noise ratio is just not being achieved in practice. This may be due to a variety of reasons but a major factor is that it only requires one excessively strong signal on the uplink to take the AGC to the point where it reduces the gain by 20dB or more. If a signal is stronger than the beacon then the station transmitting it is using too much power. The good news is that the 23cm to 70cm transponder is now running. It is only available for a couple of hours on Wednesdays but should make for some interesting listening. Your own experiencies on Oscar 10 and the sort of equipment that you find you need to work through the device would be of great interest. Please drop a line and let us know.

Closedown

That is a lot of news to come out of one convention. There are still a couple of lectures to report on. Great interest was shown in the test gear that was available and a surprising number of people wanted to play with the 10GHz SSB link that was set up. See you there next year?

All information please to Glen Ross, 81 Ringwood Highway, Coventry.

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IC-R70, HF Receiver, £499.

The R-70 covers all modes (when the FM option is included), and uses 2 CPU-driven VFO's for split frequency working, and has 3 IF frequencies: 70MHz, 9MHz and 455KHz, and a dynamic range of 100dB. It has a built-in mains supply.

Other R-70 features include: input switchability through a pre-amplifier, direct or via an attenuator, selectable tuning steps of 1KHz, 100Hz or 10Hz, adjustable IF bandwidth in 3 steps (455KHz). Noise limiter, switchable AGC, tunable notch filter, squelch on all modes, RIT, tone control. Tuning LED for FM (discriminator centre indicator). Recorder output, dimmer control.

The R-70 also has separate antenna sockets for LW-MW with automatic switching, and a large, front mounted loudspeaker with 5.8W output. The frequency stability for the 1st hour is ± 50Hz, sensitivity- SSB/CW/RTTY better than 0.32 μv for 12dB (S+N)÷N, Am-0.5μv, FM better than 0.32 for 12dB Sinad. DC is optional

IC-751, £969. HF Transceiver

Think about the IC-740,
One of the most popular amateur bands transceivers, make a few improvements such as adding 36 memory channels, doing away with mechanical bandswitching and then add full HF receive capabillity (0.1-30 MHz) which is even an improvement on the famous R70 and you get a pretty good idea of what the IC-751 is like. It is fully compatible with Icom Auto units such as the AT-500 and IC-2KL and a further option for computer control can be added. There is also a digital speech synthesizer option which will be ideal for blind operators For power supplies you have the option of the IC-PS740 (which fits inside) or the PS-15/PS20 range for external use.

As you would expect there is a built in speech processor, a switchable choice of a J-FET pre-amp, straight through or a 20dB pin diode attenuator and two VFOs allowing split frequency operation.

Other standard features include:- 36 memory channels with scan facility and start/stop timers, a marker, 4 variable tuning rates, Pass Band Tuning, notch, variable noise blanker, monitor switch, DFM (direct feed mixer) in the front end, full break-in on CW and AMTOR compatibility. The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display.

NEW! IC-120, 1296 MHz FM £419.

Thinking of 1296? Then Icom IC-120 could be the answer.

Now you can have the sophistication of today's technology on this up and coming band-all built into a unit the same size as the IC-25E, very compact..

Features include:	Output Power = 1 W or more
Frequency coverage 1260 - 1300	Mode:- FM
Adjustable Repeater Shift	2 VFO's
6 Memories - with scanning facility	Deviation + 5 KHz
Spurious Emissions - 40dB or better	R I T

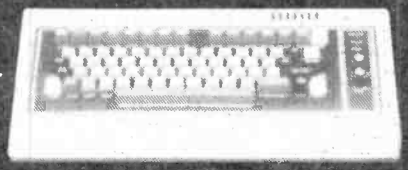
8 W and 16W (Puma) Linear Amps available shortly.

RTTY, Morse & ASCII

Shortwave listeners and amateurs are able to take more interest in other modes of transmission than speech with the latest range of decoders and senders available. As well as amateur transmissions, there is an abundance of news and other interesting broadcasts which can be read using these space-age devices.

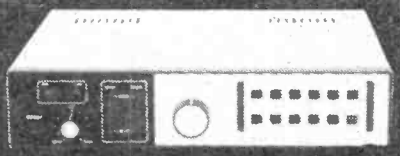
Some models in our range are the Tono 550, 9000E and the Telereader CWR-670, CWR-685E and CWR-610E. There is now available a professional version of the Tono 9000E, the PRO-1, which has a built-in scrambler. The Telereader CWR-670 is also available with a built-in VDU which can include a 40 column printer.

TONO 9000E Sender/Decoder £669.



CWR-610E, Decoder £189.

TONO 550, Decoder £299.



As U.K. importers of the renowned TONO and TELEREADER products, we can offer you a wide range, from a simple morse and RTTY reader which can be plugged into your TV., to a complete send and receive system with memories and built-in displays, or outputs for high-definition VDU.

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NEW! IC-271, £569. VHF Multimode Base station

Icom have made improvements to the IC-251 and brought it up to date.
Power can be adjusted up to 25W on all modes SSB, CW and FM. Squelch works on all modes and a listen-input facility has been added for Repeater work. RIT shift is shown on the display.
10 Hz tuning facility.
Options include a switchable front end pre-amp. SM5 desk mic
Speech synthesizer announcing displayed frequency.
22 Channel memory extension - with scan facilities.
Internal chopper PSU. Why not call us for further details?

IC-251E. Available at special price to clear, £479.

Icom produce a perfect trio in the VHF base station range, from 6 meters through 2 meters to 70cms. The IC-251E is the 2 meter station while the IC-451E is used for 70cms. The 251E is now available with Mutek front-end fitted.

IC-290D, VHF. £433. Multimode Mobile

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).

IC-2E, VHF/FM, £179. IC-4E UHF, £199.

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

IC-25H/25E, £329/£369. VHF, FM Mobiles

The FM mobile choice has to be the Icom IC-25E. It is so small yet boasts a powerful 25 Watt voice and a sensitive receiver. The new 25H now avaiable has a green display and 45 Watts output. There are five easily programmable memories, and facilities for changing the repeater shift from the default value of 600kHz.

Do you know what time it is! £59.

When the globe of this digital clock is revolved, a red lamp indicating a major city in the world will blink, and the current time of that city will be displayed in place of the date. At a glance know the current times of 24 different time zones throughout the world.
This mini-globe clock stands 195mm. high and also has an alarm fitted. This useful device should stop you getting your Amateur friends, on the other side of the world, out of bed in the middle of the night.

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BARCLAYCARD VISA

PASS THE RAE

Resonance and reactance

This month Nigel Gresley explains how capacitors behave when subjected to AC

Here we go again with dreaded capacitors; you will, of course, have happy memories of the questions we asked at the end of the last instalment, and we'll kick off with the answers.

In Question One we asked how much potential energy in Joules was contained in a smoothing capacitor band whose value totted up to 100 microfarads when there were 2000 volts across them. Hopefully you remembered the formula for sussing this out. It was, of course, $^1/_2CV^2$ - and so it's a matter of a half of 500 is 50, times 10^{-6} in order to turn it into microfarads (you'll remember that a microfarad is one-millionth of a farad - not the handiest unit in the world, is it?) times 2000 squared.

A lot of damage in the wrong place

Buzz, whirr, click, where's the calculator? In all, it pans out to 50 times 10^{-6} times 4,000,000 which according to our Logical Box is 200. So in terms of joules, the energy contained in said capacitor band is 200, which is A Lot.

Certainly enough to do a lot of damage if it found its way into the wrong place, which is a powerful argument for building high-voltage supplies for big linears rather carefully if you wish to avoid loud bangs, demise of valves, demise of cat, etc, etc.

Nothing out of the other end

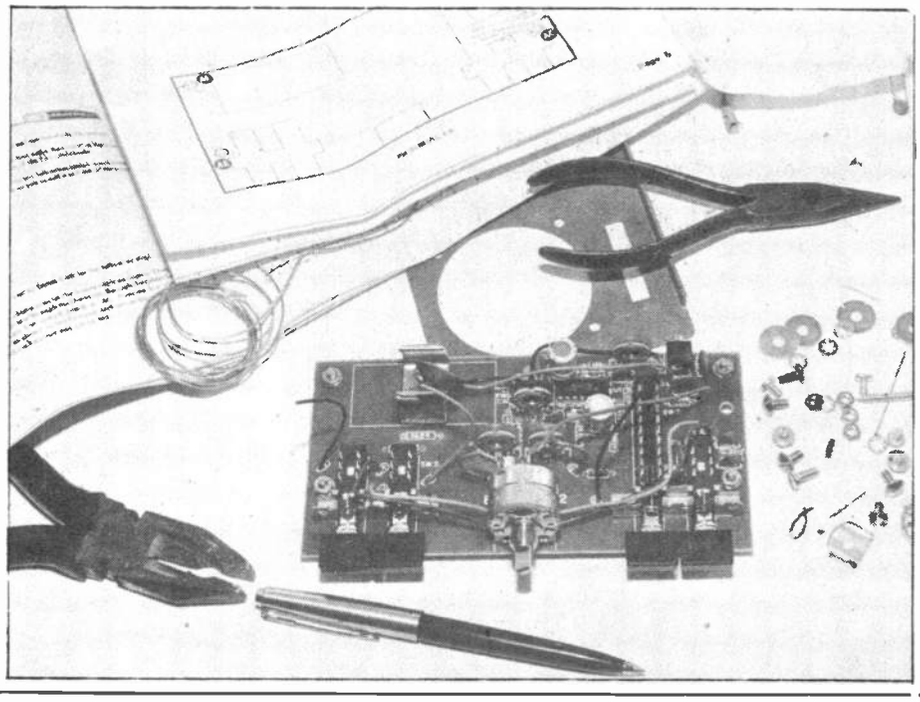
Question Two asked whether you would use an electrolytic capacitor to couple the output from a 144MHz transmitter to the antenna? Short answer to question two is a big NO because, as we said in the article, electrolytics tend to be pretty useless at frequencies much above those in the audio range - they get rather lossy, to use the technical term, and though we've never tried, we'd imagine that if you poked 144MHz into one end of an electrolytic you'd get virtually nothing out of the other end of it. So, in short, no.

Question Number Three asked what 100uf 450V meant on a capacitor which had one red and black terminal and what sort of cap. was it? Well, if it's of that order of capacitance and voltage it's got to be an electrolytic, especially because the red and black terminals indicate that it's polarised and to the best of our knowledge the only type of capacitor which is polarised is an electrolytic. But equally, we can't think of any other type of capacitor with a value as large at 100uF - the nearest would be a big oil-filled paper type, which would be about as big as this typewriter.

The supplementary question asked whether you'd need to do anything to it if its date of manufacture said 1970 and it looks as though it had never been used since it was made. Before you lick your lips at the thought of getting a brand new component at a fraction of its proper price, the little word "reforming" should have floated into your brain pan. If it's been out of use for any length of time, you *must* re-form an electrolytic capacitor because if you don't there's a strong chance of there being the usual smelly mess when you bash it into circuit and switch on. If you've forgotten about re-forming, have a read of last month's article again.

Lets AC through

Okay, with the torture out of the way, let's bash on. There are three things about capacitors which are worth knowing. One is that, as we've seen, a capacitor will block DC and let through AC in a manner into which we'll be looking shortly. Another is that capacitors can be used to store energy, as they are in power supply circuits for example, and they do this in the form of charge. The other major thing about a capacitor is that, along with its complimentary component the **inductor** (and believe me we'll be looking into inductors in great and horrible depth in a subsequent issue of this Dallas-like series) you can manufacture something called a **resonant circuit.** And one way or another, resonance is at the bottom of almost anything connected with wireless, so you can see we're really getting into the fundamentals now!



Let's get stuck into this business right away while we're fresh. If you think back to the dim and distant days when we were looking at resistors, you'll remember that the importers property about a resistor was something called its **resistance** - no, Brian, we're not being facetious and pay attention otherwise you'll have to stand in the corner. All bar Brian will remember that the unit of resistance was the ohm, and you'll probably also remember that all the fiendish questions to do with resistance talked about batteries and mains power supplies and suchlike; the point being that we were referring to direct current, or DC.

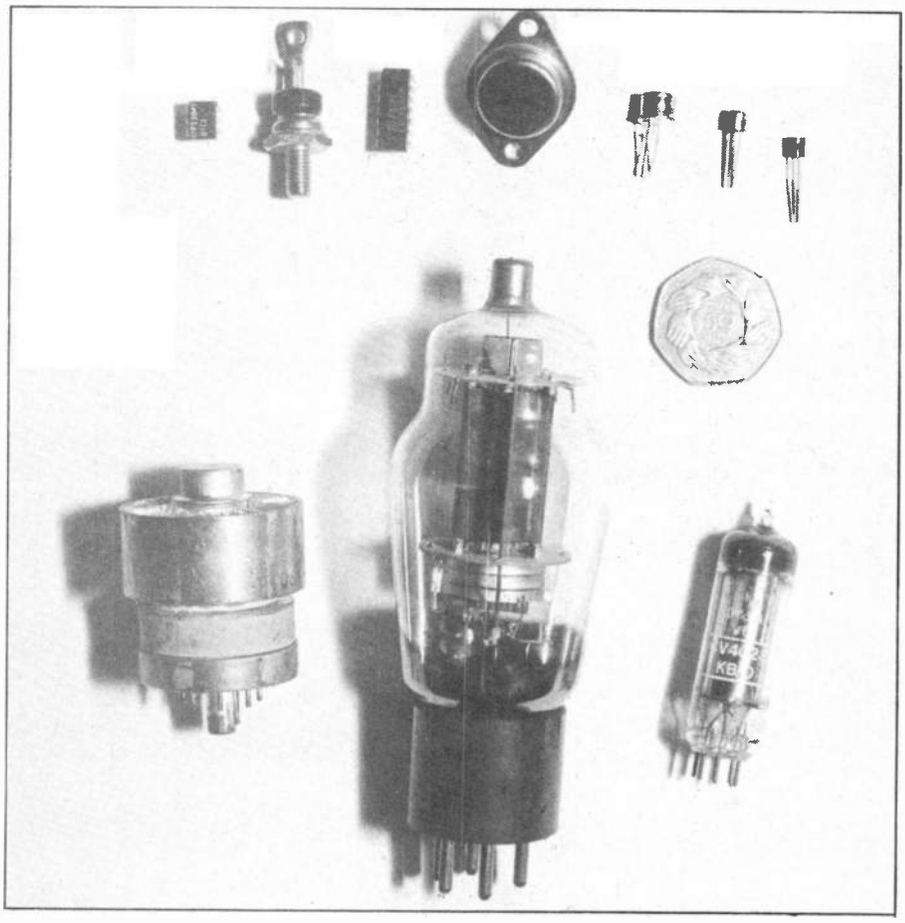
Sundry leakage

Now then. We've already seen that a capacitor won't have anything to do with DC apart from any sundry leakage it might possess; that's to say a capacitor won't allow DC to pass through it. However, it will allow AC to pass, with the exact amount of AC in voltage or current terms being determined by two things - the value of the capacitor in terms of farads or microfarads or whatever and also the frequency of the AC you happen to have in mind. In other words, the capacitor displays something which looks very much like resistance, except that this so-called resistance is a function of the value of the component and also of the frequency of the alternating current applied.

Interesting, huh? Let's have a think about what might happen. Suppose we take a capacitor of a certain value and apply a very low frequency to it - a few cycles per second, let's say, or a few Hz if we're doing the job properly. Now we know from what we've seen in the last couple of months that for a given voltage the quantity of electricity which is transferred every time the AC cycles does its stuff and changes from positive to negative and back again and so on is proportional to the value of capacitance; either way, if the frequency is very low the charging current of the capacitor doesn't flow very often, to put it crudely, and so the amount of energy passing through the capacitor is very low. However, if we wind the frequency up we will find that the same amount of charging current (which is a function of the value of the capacitor) surges backwards and forwards and the

Mr Ohm's ineffable law

net current flow increases. Now then; if the voltage stays constant and the current increases, which would seem to imply that the resistance in the circuit is changing - Mr Ohm's ineffable Law, if you remember - so you might be tempted to think that the resistance of a capacitor gets lower with frequency if you discover as we've just seen that the current flow gets more for a given voltage just by hiking up the frequency?



Not as fearsome as it looks

Well, you're sort of right only it isn't really resistance in the Ohm's Law sense of the word. The reason being that a circuit with a capacitor in it isn't conducting in the sense that a circuit with a resistor in it is; the current which flows is a direct result of the charging and discharging taking place inside the capacitor and the dielectric of it, in fact, is (or at least jolly well should be) an insulator! So because we're talking about a type of resistance which only seems to work as far as alternating current is concerned, ie it's a type of resistance which happens at all because the current is alternating and thus you get charging and discharging in the capacitor - we give it a different name. And this is (wait for it) is **reactance.**

There you are, chaps, a new word for you and a very important one at that; better go and have a cuppa to get over the shock. Reactance is the name which is given to resistance to an alternating current, and it's just another type of resistance. As we'll see later in our brain-bashing, it's quite possible for a circuit to contain both resistance and reactance, but the thing to remember is that reactance is a type of resistance associated with AC and indeed it'll usually be mentioned in the context of AC of a certain frequency. Like resistance, it's measured in ohms.

Before we get into how to sort out the reactance of a capacitor at a given frequency (remember that it will vary with frequency, as we say in our little example above) let's have a look at a practical application; let's go back to our power supply. The reason for having a big capacitor in a power supply is to smooth out the pulsations which come from the bit which turns the AC mains into the DC your wireless needs; you may know already that the mains has a frequency of 50Hz, or if you like it changes direction 50 times every second. Now what you're after in a power supply is some means of smoothing out pulsations at 50 or 100Hz (don't worry about why for now) and you might already have thought to yourself "hmmm, that's quite a low frequency". Yes, indeed it is and you're going to need a capacitor with a very low reactance indeed at that order of frequency if it's to do its stuff in your power supply.

If you remember, we mentioned a while back that high-value capacitors were all of the type known as electrolytic, ie those with values much above a few microfarads, and it'd be a reasonable guess that an electrolytic would be just the job for the application we have in mind in our power supply. Can you see why? Remember that we're after low reactance at a low frequency, and because, as we've seen, the reactance of a capacitor decreases with frequency, we'd better start off with a pretty high value component if it's to have any reasonably low value of reactance at 50 or 100Hz!

So in other words, it'd be pretty unusual to find anything other than an

PASS THE R.A.E.

electrolytic capacitor in a mains-type power supply because of the need to have a low reactance at low frequency. Remember that you want DC from the supply but you want the capacitor to smooth out the AC bits and bobs left over by dumping them down to earth or somewhere and it can't do that unless it presents a pretty low resistance path to the AC hithertoforesaid (Cor blimey, that's a good word; I'll ask for a thumping rise after that, and me only a miserable B.Sc and all).

Anyhow, if you've grasped that we'll bash on and have a look at the formula for calculating the reactance of a capacitor at a given frequency. Before we do that, let me tell you that just as the symbol for resistance in question is R, the corresponding symbol for reactance in equations is X; at this stage I'll just mention that there are two chief types of reactance, to whit **capacitive reactance** and **inductive reactance**, and all they mean is the reactance associated with a capacitor and an inductor respectively. The only reason for mentioning it here is that the usual way of writing capacitive reactance is Xc and the ditto ditto inductive reactance is XL, so don't be confused about which is which.

So here we go. The formula with which you can establish the reactance of a given value of capacitance at a given frequency is:

$$Xc = \frac{1}{2\Pi fc}$$

Reactance

Horrors, cardiac arrest, quick shot of brandy, etc; actually it's not anything like as fearsome as it looks and you'll soon be manipulating it with consummate ease. It doesn't *look* as user-friendly as V = IR but it is really. Let's take it in stages. What it says is that the amount of reactance associated with a capacitor of a known value at a certain frequency is the reciprocal (that's the 1 over bit) of twice 'pi' (you can usually take twice pi as 6.29 for the purposes of this type of calculation) times the square root of the frequency of the AC you have in mind times the amount of capacitance in farads (groan, all those 10^{-6} and things unless you want to be dead clever) Does that help at all? I thought not. Oh well, let's take a practical example. Let's grab hold of a capacitor whose value is one microfarad, or 1 uF. Let's assume we have our 50Hz mains again and let's pretend we're trying to discover the reactance of our 1 uF capacitor at this frequency. Right - hold on to your hats and here we go. The equation will be the reciprocal (the 1 over again) of the following little multiplication; the square root of 1 times 10^{-6} times 50 and, when you've worked that out, multiply by twice pi. Or, if you like, let's look at it as the equation.

$$Xc = \frac{1}{2\Pi fc}$$

becomes

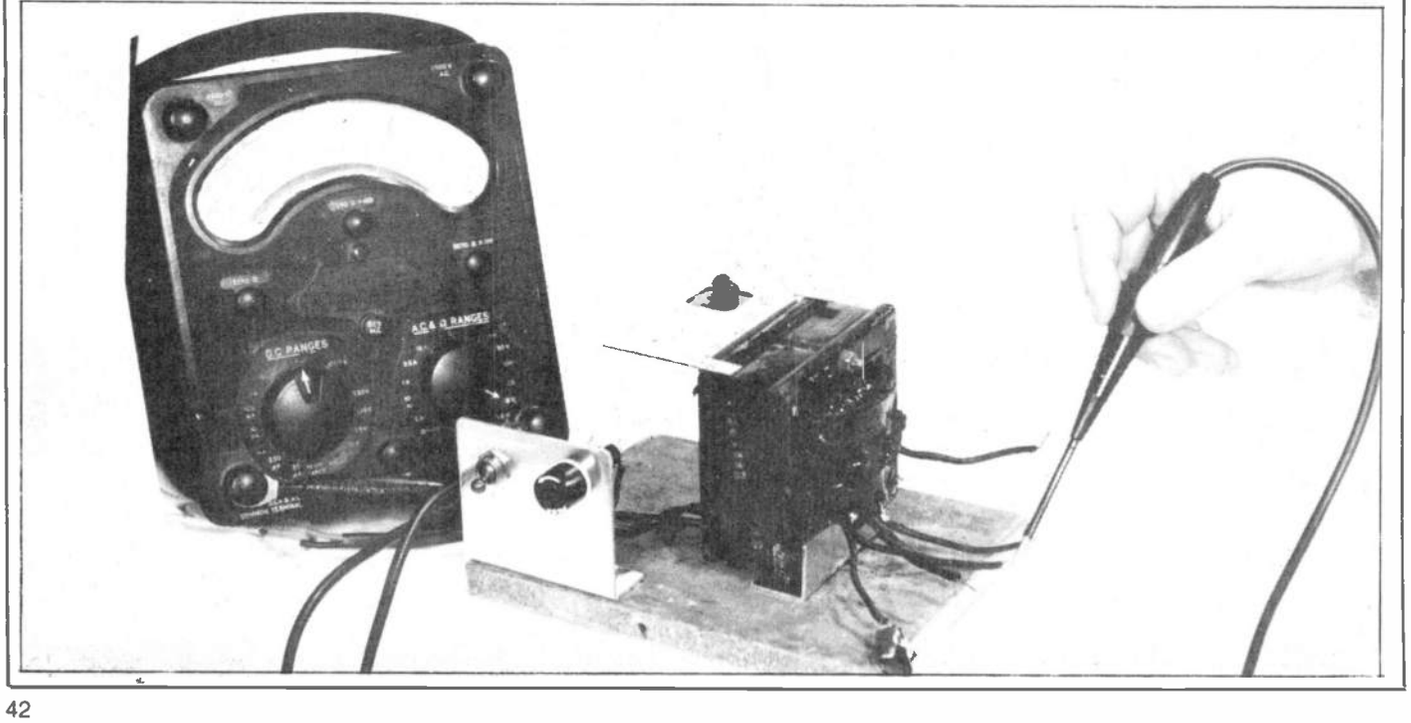
$$XC = \frac{1}{6.28 \times 50 \times 10^{-6}}$$

Just in case you hadn't sussed it, by the way, the f is frequency in Hz or cycles per second if you prefer. Now then. The first thing to do is to work out the square root of 50 times 10^{-6}, and the best way is to ask your calculator; according to ours it's 0.007071. Having obtained that at great trouble and expense, you multiply that by 6.28 (that's twice pi) and you get 0.0444284 on the logic box. The final act is to find its reciprocal, which is the 1/x key on most calculators if they have one, and you get 22.508124. Which, rounded up as necessary, is the reactance of the capacitor! It's measured in ohms, by the way, just like resistance - after all, it *is* resistance in a way - and you could safely say that a 1uF capacitor possesses a reactance of something like 22.5 ohms at 50Hz. Terrific! By the way, if you don't have a reciprocal key on your calculator, you simply divide 1 by the figure you want the reciprocal of. If you haven't got a square root key you will either a) be a Great Brain who can work it out from first principles in a flash or b) you will buy a little scientific calculator which has. As we've said before, they're worth their weight in rhodium plating to the radio amateur.

Let's leave it there for now before we get too complicated; as usual, some questions. Nice and simple this time - just work out the reactance of the following capacitors at the frequencies shown against them.

1. 100pF at 10MHz (hint; a pF is 10^{-12} farads if you'd forgotten)
2. 100pF at 10kHz (don't forget to use the right indices for the frequency!! It's kHz, not MHz)
3. 3pF at 435MHz
4. 60,000uF at 100Hz

Goodhead Publications accept no responsibility for discharged calaculator batteries, sprained brains, gibbering students and shouts of KIL THAT students and shouts of KILL THAT SADIST GRESLEY.



One titled owner...

Rallies in Telford, Peterborough and Harlow, and how to tweak-up ex-Tokyo police motor cycle radios! Hugh Allison G3XSE is not joking

Before we start this month's column, a quick flashback to the October issue is required. In it I described a very common fault on an "early Yeasu multimode rig", the fault being the breaking up of the plated through holes on the 10.7MHz mode generating board. I only mentioned the model type in the title to the paragraph, and the printers didn't print the title! The rig referred to was the FT220.

Around the rallies

Three to report on, Telford, Peterborough and Harlow. In case I am accused of bias, I used to be a member of the Harlow Radio Club and have seen the rally grow from a three stall affair in a minute village hall to the massive, well organised, friendly highlight of the amateur year. Biased? Me? Totally!

Telford was huge, with stalls in all directions as far as the eye could see. One wag was saying you could walk round the stalls all day without seeing the same stall twice. For those of you who have never been, the site is an enormous, covered, shopping centre with the stalls set up outside the (closed) shops. A bonus this year was an open MacDonalds, and this, combined with the motorway which should be finished soon, makes attendance next year a must. The only moan I have about the Telford rally is that the Vange group will insist on having their 'do' on the same day. With the Telford one so big, and the Vange so small, there really is no choice for the serious bargain hunter. With the RSGB offering a year-ahead diary planner there is no excuse for this doubling up. Your scribe met many people at Telford who would have gone to Vange if the dates had not clashed.

Peterborough seemed slow, but at the end of the day I was quite surprised at the quantity of the items I had bought. One box, picked up for £10 on the bring and buy, was simply labelled "Radio Set" in English. The rest of the label was in Japanese and some of it has since been translated as "Tokyo police motor cycle unit". I'll bet there is an interesting story behind how that ended up at a radio rally!

With no information and no crystals fitted, getting it going has proved an interesting exercise. Opening it up (by the way it's a very small unit, about the size of a car radio) revealed a UHF single channel transceiver. The best way to size up a transmitter you have no knowledge of is to connect up a dummy load and 12 volts (via an ammeter) and poke a signal generator up the crystal socket. Wind the frequency of the generator up whilst holding the mike button down and look for an increase in current taken from the 12 volt supply. When you get some action, note the frequency of the signal generator, and the level of drive required up the crystal socket to get your output. It is then a good idea to try poking the unit with half, one third, double and triple the frequency. If you need less drive on any other frequency, then that is probably the one required. In the case of the motorcycle unit, the current meter tweaked at 26MHz, and the power meter in the dummy load showed a healthy five watts at 468MHz, the output frequency being found with an absorption wavemeter. Dividing 468 by 26 gives 18, thus the unit multiplies up the crystal by 18. I wished to use the unit on RBO, the local 70cm repeator, thus dividing the required 434.6MHz by 18 gave me the 24MHz crystal frequency required. A suitable crystal was installed, the unit re-tweaked and that was it. Unfortunately the receiver was not so simple.

Finding the IF

The golden rule with receiver alignment is to find the IF a frequences. In this case a good look round revealed a little box with 10.7 written on it, in English! It was thus a good bet to hope that this was the first IF frequency. Be careful though, a lot of new units use 21.4 MHz (the delightful Nova rig from the recently bankrupt Nolton group is a case in point) or 24 and 35MHz lurk to catch the unwary. With the unit in the receive mode, wave the signal generator at the filter just to check the IF, detector and audio are working. I find a Nombrex signal generator, picked up for a fiver, sufficient for most of the general work in the shack. The problem with aligning an unknown receiver is that two signal sources are required, one up the mixer and one up the aerial socket of the transceiver. A good way out of this is to use another transceiver to provide the aerial signal. In this case a Pye Pocketphone on RBO was held near 6" of wire jammed in the aerial hole. Although this signal will eventually be 1.6MHz off the required one (don't forget this is the 70cm offset frequency) it's better than no signal at all! Don't forget you are blocking out the repeater, so keep on checking no-one is using it. Wind the frequency of the generator around with it either poking the crystal socket, or, in desperate cases, into the mixer itself. If you hear any carrier, turn the aerial signal (in this case the pocketphone) on and off to check you haven't got a birdy, then tweak all the front end trimmers for maximum. Try multiplying the frequency of the generator by whole numbers, then subtracting the IF frequency to make some sense. If this doesn't add up, try adding the IF frequency. Although a fair amount of calculator work was required it eventually transpired that the multiplication was a factor of six with the mixer running 10.7 high.

Harlow rally

The bring and buy at the Harlow rally produced, amongst other delights, a non-working Eddystone EC10. It did very nearly work, you could get stations on it, but the residual noise was appalling. With the volume control at minimum and no aerial, there was a quarter of a watt of hiss. The fact that the volume control made no difference was a good sign, the fault had to lie within the audio stages. The audio consists of a preamp (which doubles as a good switchable CW filter) an audio driver and the output stage. Disconnecting the collector of the preamp stopped the noise, so that narrowed the fault down to that one stage. Reconnecting the collector but biasing the base with an external resistor (I used 100k to the collector) also stopped the noise. That left two resistors as suspect, the one up from the base to the rail and the one down from the base. Even after changing the wrong one first, the whole repair took only twenty minutes and transformed a heap into a useful box. Since the repair I have met several amateurs who have had noisy resistors in this receiver, so I pass on the hint!

I'd like to end this month's column with a word of thanks to those who have written to me directly. Your comments are all most welcome and I am flattered at the response. Rally organisers should note that nearly all of the writers are very keen to see a car boot area at next year's rallies, either at £1 an hour rates or a flat fee. A few people thought the £5 at Ipswich too high, but one amateur told me that the group at Ipswich waived the fee when he explained that he was selling the odds and ends for the widow of a deceased amateur, a nice touch.

Happy Hunting! Hugh G3XSE.

Easy to build variable voltage power supply

By Mike Hadley G4JXX

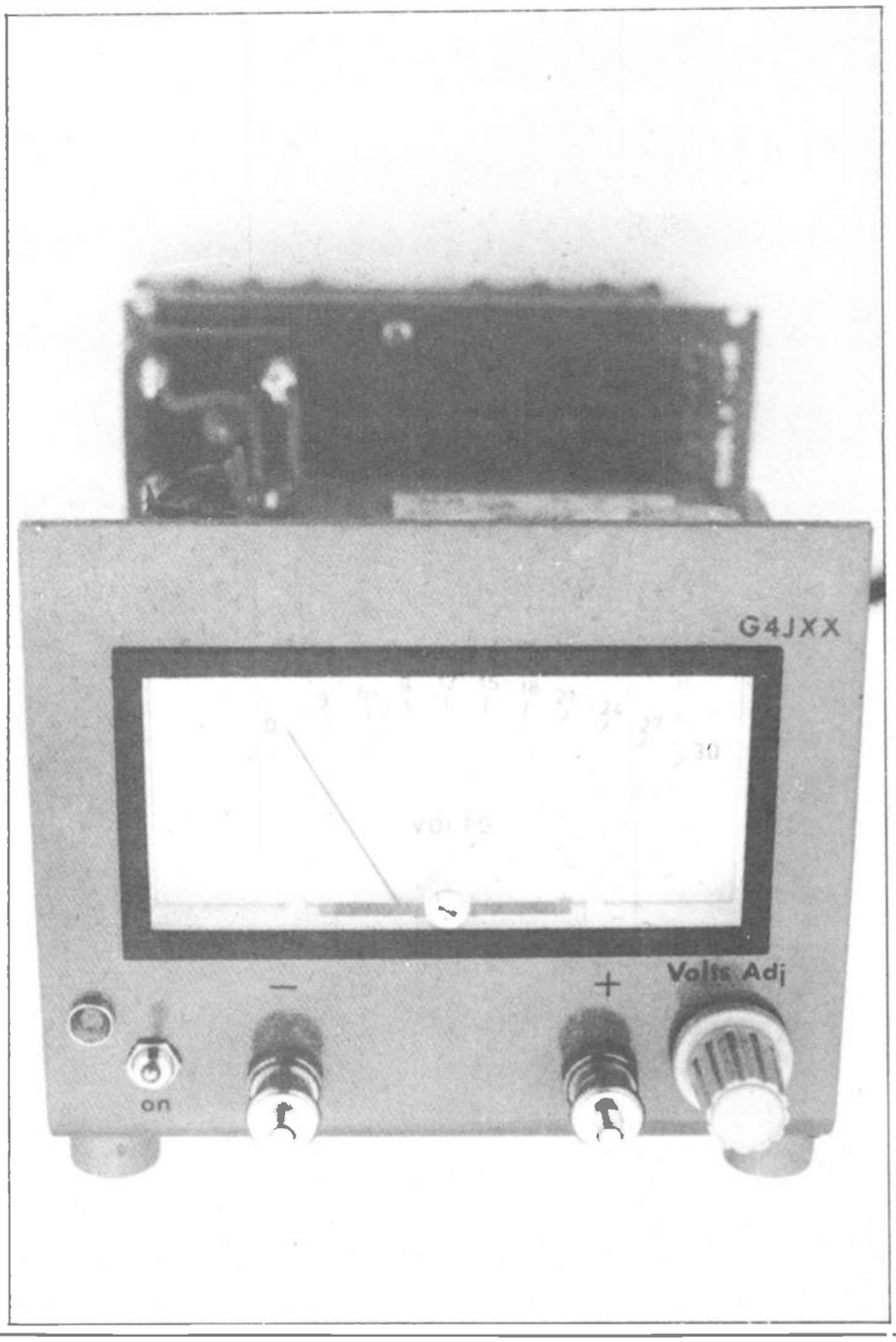
A power supply is one of the most useful bits of test gear you can have. This design can produce up to 4 amps at 30 volts.

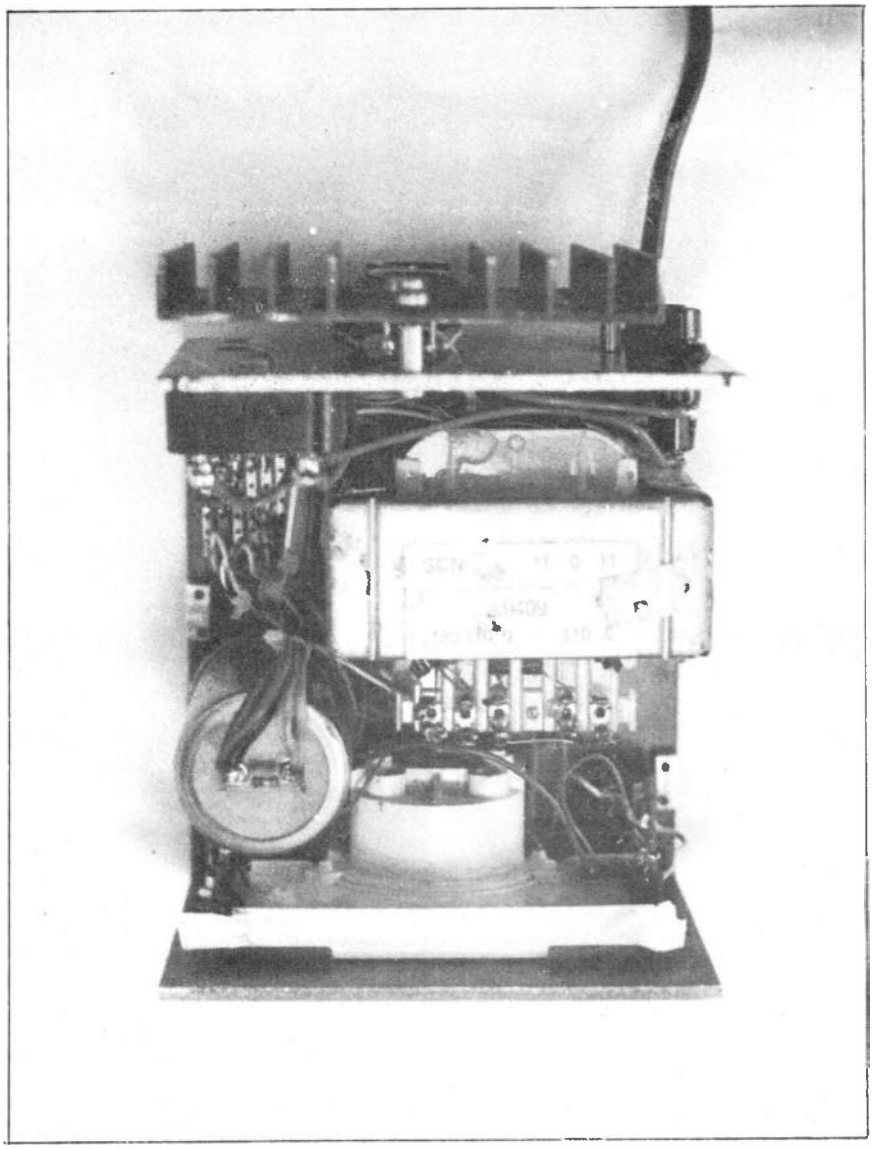
An essential piece of equipment for any amateur or home constructor is a power supply. There are many 'cheap' units available with questionable ratings and smoothing. A reliable, variable voltage power supply with good regulation and thermal stability can easily be built with a minimum of components and without the need for any great technical skills.

The unit described here provides a variable voltage of between 3 and 30 volts at a maximum current of 4 amps intermittent use, or 2 amps continuous. It is based around the TL430 programmable zener diode which is small in size and looks similar to a plastic packaged transistor.

Circuit description

Fig 1 shows the complete circuit diagram. The incomming mains passes through the on/off switch SW1 and is fused in the live lead by a 1 amp fuse F1 before the primary of the mains transformer T1. The 30 volt secondary winding of T1 is connected to a full wave bridge rectifier D1 where the DC obtained is smoothed by a 4700uF 63V capacitor C1. R1 is a bleed resistor to discharge C1 after switching off the unit. R2 and D2 (a pun ?) form an 'on' indication. Unregulated DC is applied to the collectors of TR1, TR2 and TR3. Both TR2 and TR3 form a standard series pass regulator with TR1 providing the base drive and regulating voltage. R3 provides base bias for TR1, and the current for ZD1.VR1 and R4 make up a potential divider which provides the reference voltage required by ZD1. Vr1 is a 10 turn potentiometer for accurate voltage setting. R5 and R6 allow current sharing between TR2 and TR3. The regulated DC is protected by F2 and finally measured by a 0 - 30 volt meter M1. Note that clockwise rotation of VR1 must decrease the resistance.

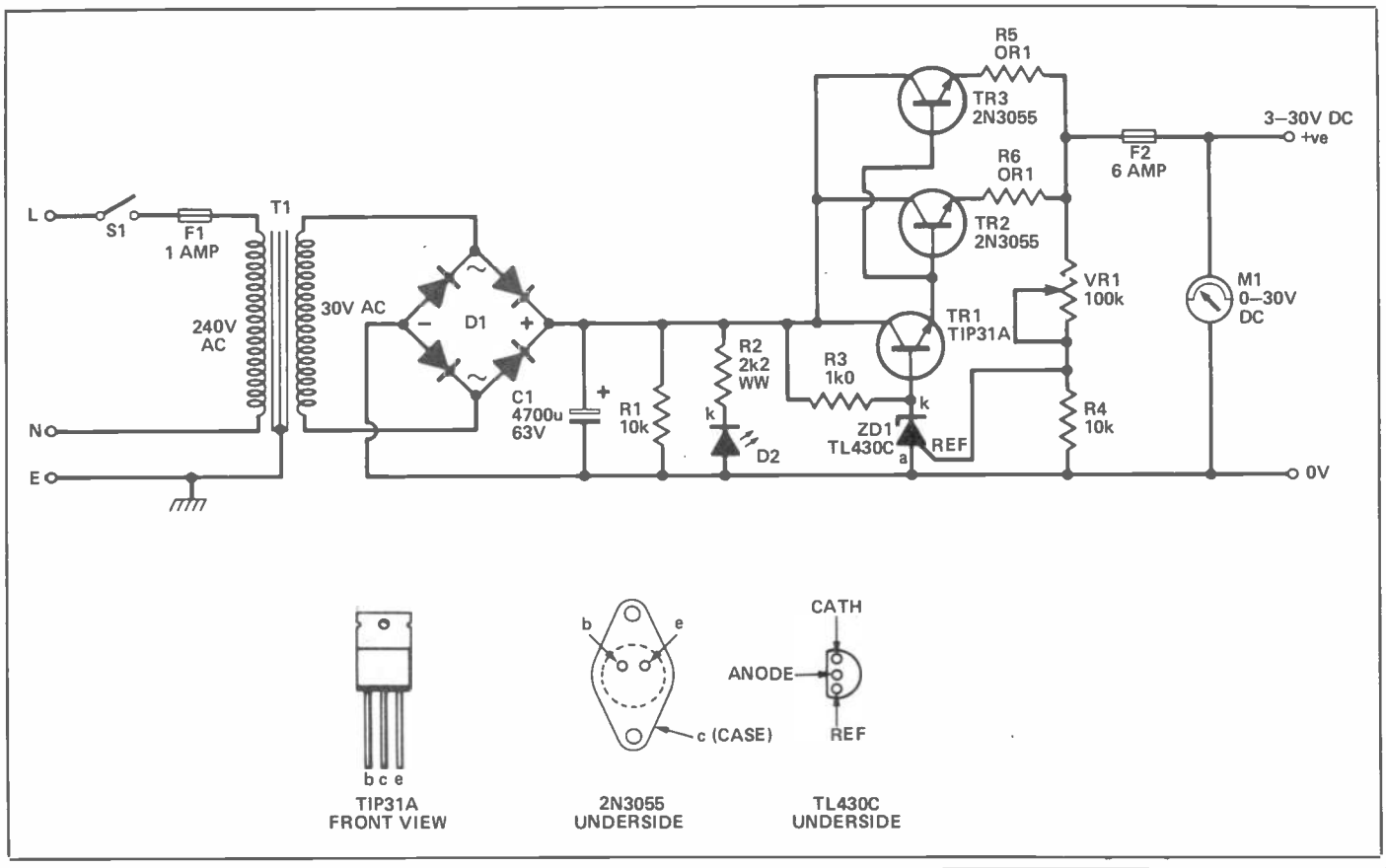




Construction

Layout of the components is not critical but attention should be paid to the heat sinking of TR2, TR3, D1 and TR1. When selecting the heat sink for TR2 and 3 the largest that is practical should be used. This will be necessary if high current is to be used with very low voltage. The chassis is made from 14swg aluminium sheet bent into a 'U' shape, the upright sides forming the front and back panels. It is easier to make all the holes before bending the aluminium. The lid is made from thinner gauge aluminium, folded so that it fits around the chassis top and sides, and is fixed to the chassis by two small strips of aluminium or brass as shown in Fig 2. The finished metalwork is sprayed with cellulose paint for the desired finish, but ensure an area is left clear of paint for earthing the incoming mains and the body of T1. Plastic feet are fitted to the base of the chassis to prevent damage to furniture from screw heads. A suitable method of mounting the components is shown in Fig 3. TR2 and TR3 are mounted on the heat sink with insulating kits and heat sink compound.

Fig 1: circuit diagram of the power supply unit.



A check should be made with a test meter to ensure that there is no connection between the collectors (cases) of the transistors and the heat sink. To obtain a reasonable air flow, the heat sink should be spaced away from the back of the chassis by about 20mm.

TR1 is mounted flat onto the base of the chassis and is insulated with its associated kit. Check to ensure there is no electrical contact with the chassis. The small components, with the exception of R1 can be assembled onto a piece of 0.15 inch matrix veroboard as in Fig 4, the copper side being uppermost with the component leads soldered directly onto the top. The board can then be glued or stuck with double sided adhesive tape onto the chassis. R1 is mounted between the terminals of C1. The bridge rectifier block is fitted onto the chassis using heat sink compound.

When mounting the mains transformer, make sure that the body makes a good earth connection with the chassis. C1 is supported by a vertical mounting clip.

Operation

Before switching on check that the wiring is correct and that proper fuses are fitted, mains 1 amp, DC 6 amp. Switch on, and if there are no loud bangs or bright blue flashes, check the meter reading. If the 'on' indicator does not light and the unit is functioning correctly try reversing the leads to D2.

In use the power supply should be set to the requried voltage before connection to any equipment to prevent possible overvoltage. A small voltage drop can be expected when drawing heavy current. Generally speaking, the power supply will handle 2 amps with ease and 4 amps at intermittent operation, the size of the heat sink and the air flow around it being the critical factor.

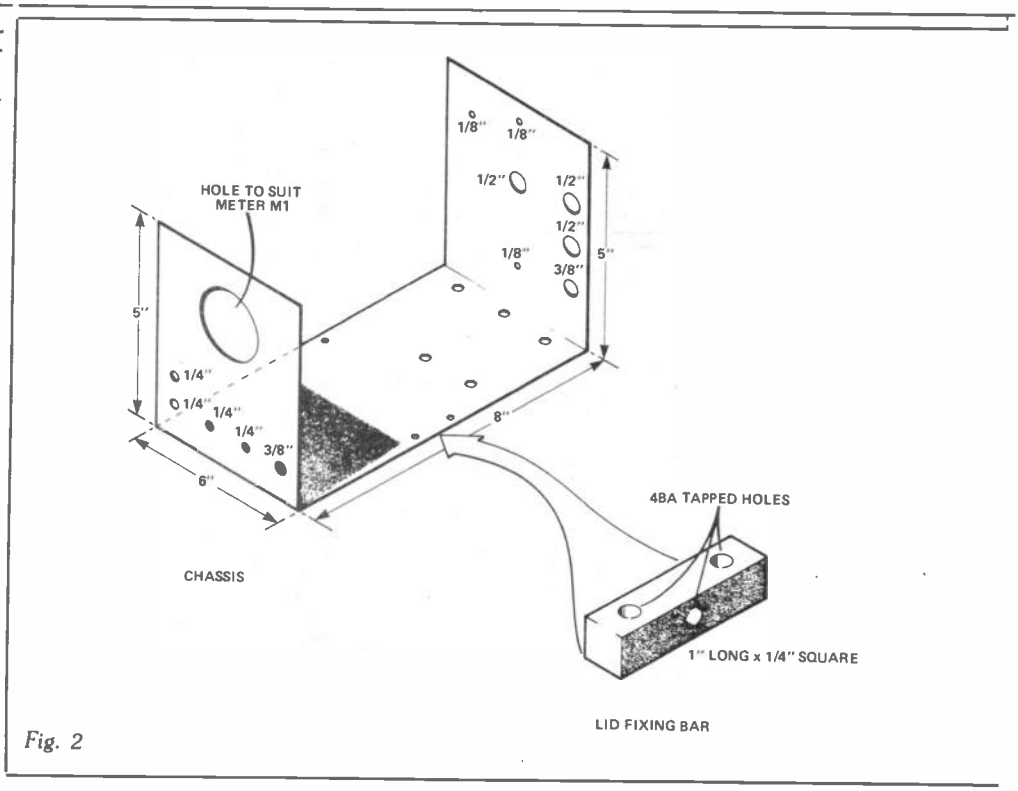
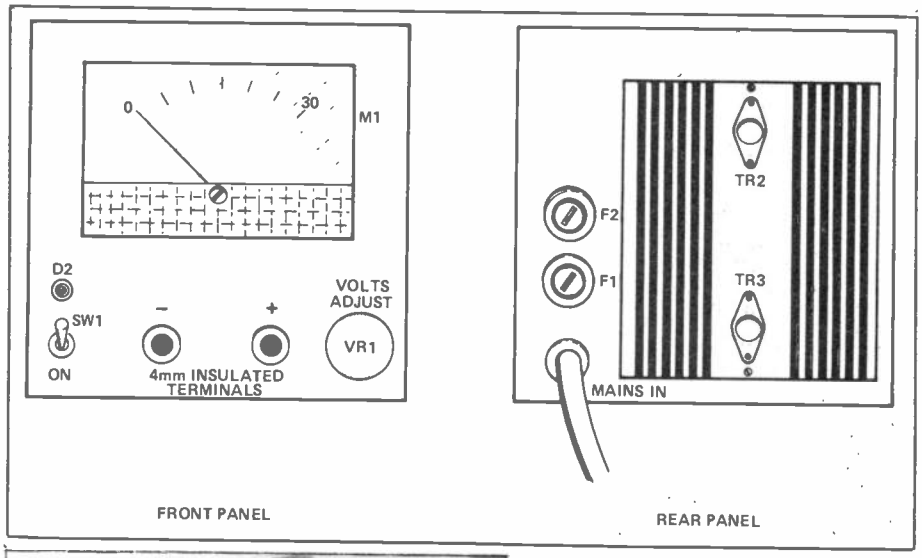
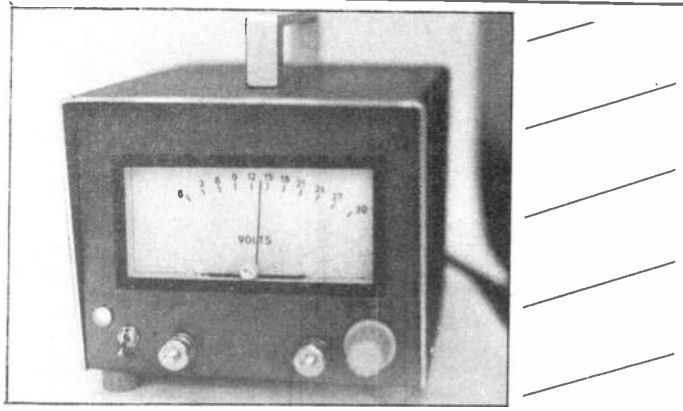


Fig. 2





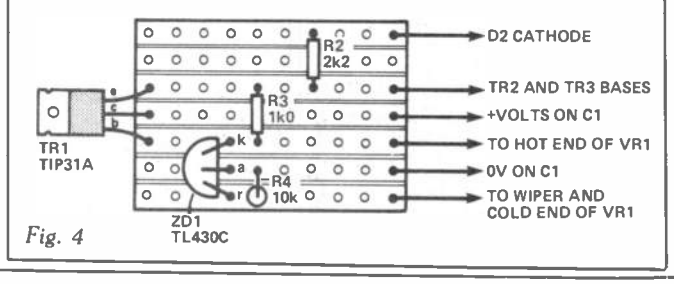


Fig. 4

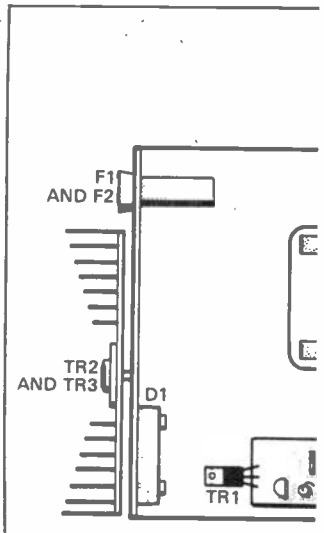
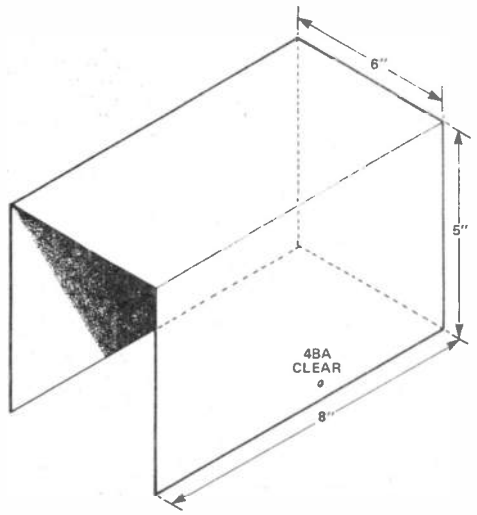


Fig. 3



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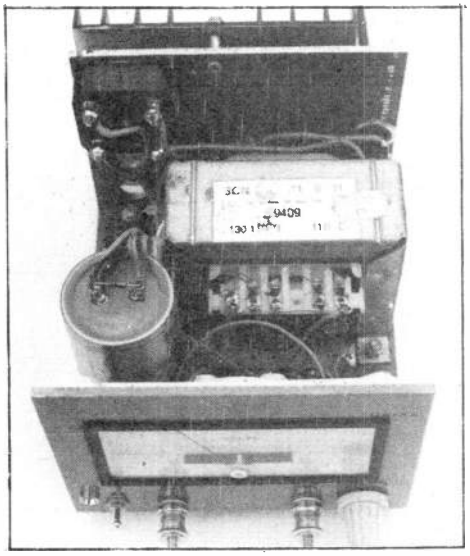
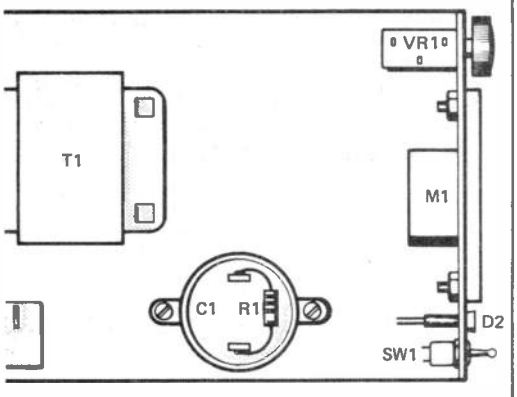


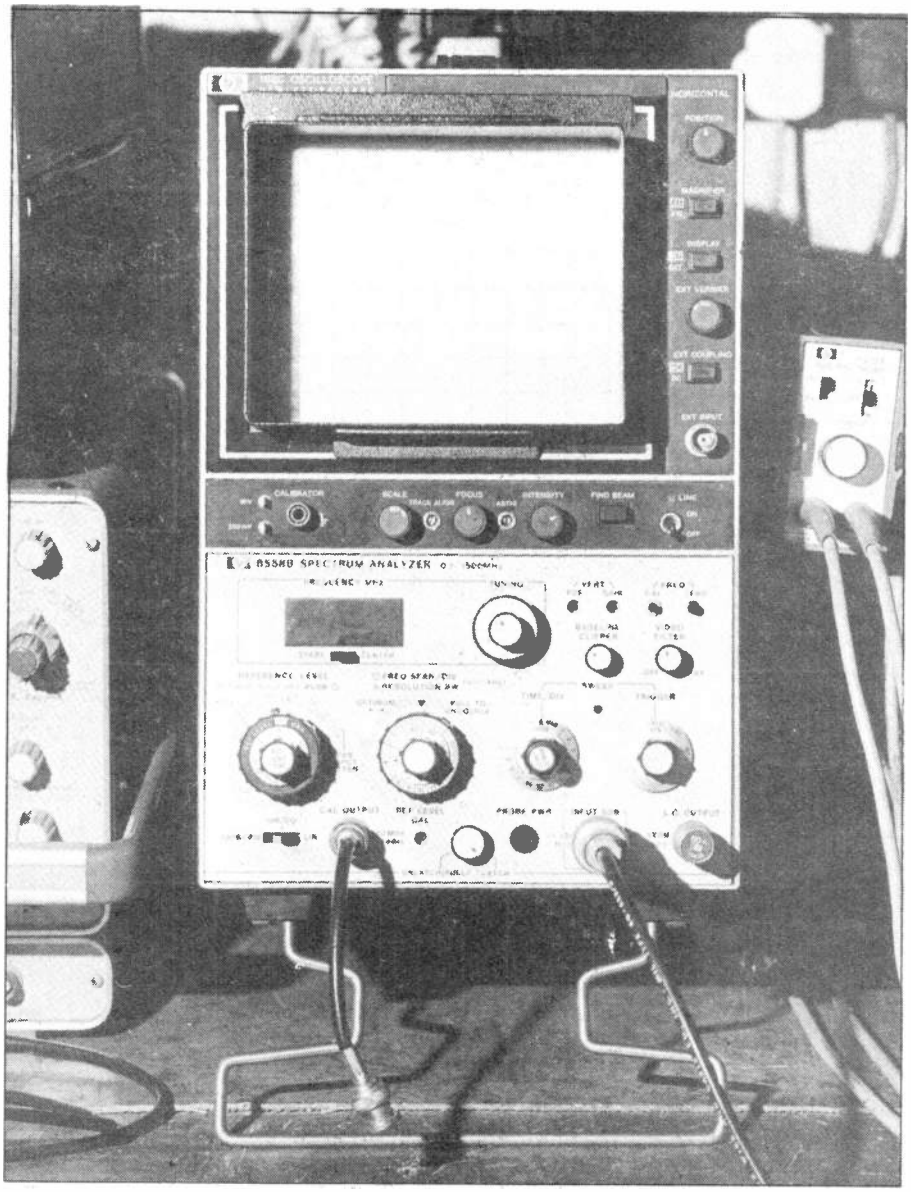


CHASSIS LAYOUT

Components list

R1, 4	10k
R2	2k2 2 watt wirewound
R3	1k
R5, 6	OR1 5 watt wirewound
VR1	100k linear 10.turn pot
	All resistors 10% ¼W unless stated
C1	4700uF 63V electrolytic (ripple current rating 10A)
D1	100V 8A bridge rectifier
D2	LED
ZD1	Programmable zener TL430C
TR1	TIP31A
TR2, 3	2N3055
T1	Transformer, 240V primary, 30V secondary
M1	0-30V FSD voltmeter
S1	SPST miniature toggle switch 240V working
F1	1 Amp 20mm fuse
F2	6 Amp 20mm fuse
Heat sink for TR2, 3	(1°C/watt or better)

TO3 insulating kit (2 off)
TO220 insulating kit
Plastic feet (4 off)
0.15" matrix board, 10 holes x 7 tracks
20mm panel mounting fuseholders (2 off)
Knob to suit potentiometer
4BA spacers 20mm (2 off)
4mm insulated terminals (1 red, 1 black)
4BA nuts, screws and washers
4BA solder tag
Aluminium sheet 18" x 6" 14swg (chassis)
Aluminium sheet 16" x 8" 16 swg (lid)
Aluminium bar 1" x ¼" x ¼"
Mains cable 3-core x 1mm² x 2 metres



From the lab to the shack

This month Angus McKenzie G3OSS concentrates on transmitter audio quality. Following on from the last part in this series, in which he looked at the various kinds of microphones used by amateurs, Angus examines speech processing stages, the effect of IF bandwidth on audio quality and CW operation in SSB rigs.

Last month I discussed microphones with the well-known Wellington boot effect, and problems with some mic preamps and their presets. Let's have a look at various types of compressors, clippers or boxes which are supposed to improve readability. Judging by what I hear on the bands, there seems to be an awful lot of badly adjusted compressors in use, and the evils resulting from this can be rather annoying to other users on the band.

There are two separate types of circuits which can, if used properly, increase the readability or 'talk power' of a transmission. A normal compressor raises the average level of the voice being transmitted while limiting peaks. Sometimes the compressor characteristic is designed to use the ALC circuits of a TX to 'crash limit', while the compressor itself brings up lower speech levels to a higher level. A compression characteristic can be described by the variation in dB required at the input to give a 1dB variation at the output. A compressor, that changes 50dB dynamic range to a 25dB range on its output is said to have a compression ratio of 2:1.

A fast attack time of a few miliseconds

Professional compressors and limiters used in broadcasting have controls to adjust the compresssion ratio from say 1.25:1 up to 20:1, the latter characteristic being more or less limiting. Modifications can be introduced which can give different degrees of compression dependent on audio frequency, and complex processors such as Dolby B and C rely on this principle, but change their frequency/compression characteristics with level.

Speech compression should have a fairly fast attack time of a few milliseconds, and a fairly slow decay time of hundreds of milliseconds, although faster decay times can give more punch. The problem with so many compressors used with amateur radio equipment is the attack time can be so fast that it clips the first transient and causes a nasty momentary spit or click which I find very tiring to listen to. Many ALC circuits show the same problem. Remember that a compressed transmission, although perhaps more intelligible when weak, is more tiring to listen to over a period of time. All shack background noises, including linear amplifier blowers etc, come right up in level in between words or phrases. Compressors are useful though, for those who cannot maintain as reasonably constant peak speech level into a mike. Remember that a compressor brings up reverberation, which can get on one's wick. This is all too noticeable when you listen on 20m to many of our friends in the Med. area who seem to live in marble rooms!

Above: the Hewlett Packard 8970A noise figure meter, used by Angus McKenzie for last month's review of preamps, converters and transverters.

The other type of circuit which can increase readibility is a clipper of one form or another. If you clip an audio speech waveform, and then bring up the general level, the duty cycle is greatly increased so that average power on SSB will be much higher. This may well be a strain on many linear amplifiers, but let's look at the side effects. When a waveform is clipped, very bad harmonic distortion results, and thus the transmitted bandwidth could be grossly excessive, causing bad spreading. If the clipper is before the transmit IF filter, then bandwidth is normally kept down, but there will always be much more 'spitch' and energy at the highest frequency end of the filter (or lowest RF frequency with LSB). Using even a good clipper therefore, can increase the apparent bandwidth of a signal. What is more serious though, is that the same clipping dramatically degrades the effective audio IM distortion, and thus a clipped signal is always more distorted, and can be very nasty to listen to. As there is more low level gain when a compressor or clipper is used, the entire modulation system becomes far more prone to interference from RF pickup, and many amateurs have found almost uncontrollable feedback coming in when they stop speaking. Many ferrite beads and capacitors have to be slung around in an attempt to reduce the problem.

Liner 2

Some clippers work at audio frequency and are then followed by steep low pass filters. Unfortunately, a few such devices have inadequate filtering, and I can remember hearing some diabolical transmissions from Liner 2s which are bad enough without a clipper, but dreadful with one, especially if it's a bread board in a biscuit tin designed by the suck it and see method!

RF clippers are of two basic types, the first operating at the transmitter IF, and usually built into the rig. Others are available as accessories, such as the Datong. In the Datong, audio is allowed to modulate a very low frequency RF carrier which is then filtered. The SSB signal is then clipped and, again, very well filtered and product detected down to audio again. Datong clippers here an input mike gain control which of course sets the level at which clipping occurs. The output gain should be set so that a clipped output drives the transmitter to a point around the onset of transmitter ALC. It is not good practice to go well into ALC, and I suggest the best way to set it up is to adjust the output level first by shouting into the microphone and then backing off input level for the required amount of clipping on normal speech. Datong, in their later models, have automatic control of clipping levels, in 6dB steps, and this works very well.

I have found that readability can be decreased if you attempt more than 12dB clipping, but the effect can be very dependent upon the type of interference that you are trying to overcome. A well set Datong, or a clipper built into a transmitter does not normally give you more than 3dB equivalent increase in talk power although under some circumstances you can gain an effective S point. It can however, improve the readability of many voices, because of the characteristics of its filters, so that HF can be much clearer. It has seemed to me that the occasions when clipping and/or compression give a useful improvement are much rarer than many people suppose, and the average clipped transmission, particularly on 2m, can sound rather horrible.

Returning to the audio signal itself, there are many problems occuring in the modulator. Dealing with FM first, modulators can actually be either frequency or phase modulation. With pure frequency modulation there is no basic pre-emphasis in the system unless it is added, but phase modulation when received on normal discriminators has a 6dB per octave slope upwards from LF to HF. It is thus essential to cut LF and boost HF in a frequency modulation system to avoid woofy reproduction. Conversely, with phase modulation, it is absolutely essential to have an extremely sharp low pass filter operating above the highest audio frequency that should be transmitted, usually 3kHz. If you don't have an extremely good filter, very nasty 'spitch' will result which sounds most oppressive. Unfortunately, a really good filter is expensive and many less expensive rigs do not have good enough filtering. Such filters are also necessary on pure FM transmitters, but their slope need not be quite so steep for an equivalent result. The highest audio frequency that it is desirable to pass through very much depends upon the channel spacing in use, and as bands are getting more and more crowded, more spitch is becoming noticable from poorer rigs in an adjacent channel. Converted CB rigs to 10m are designed for 10kHz channeling to a tight ministry spec., and the majority of them sound dreadful on 10m FM since the filters have to cut steeply above around 2.5kHz. The difference between a cut off at 2.5 and 3kHz is very dramatic on many voices, so this is worth thinking about. One other problem besetting FM or PM modulators is that of distortion. If the modulator is not linear up to the preset deviation, severe spreading will again occur, and I suspect that there is not enough trouble taken in this area.

Carrier leakage

If we consider SSB, a number of problems rear their ugly heads. A mixer is supposed to generate two equal sidebands with a completely suppressed carrier. A filter then selects one sideband and removes the other. There are other

methods of sideband generation, but these are rarely used. Not only does carrier suppression often drift with time, but inadequate mains ripple filtering in the feeds to the mixer can create very hummy noises around the carrier. Sometimes the hum is not properly balanced out in a mixer, particularly if it is coming from the audio feed. I have often found that a set has a good carrier rejection, but very poor ripple rejection, giving the effect of bad carrier breakthrough as one tunes across the signal.

CW modulation is normally achieved in one of two ways. Either an audio tone generator is connected to the audio input of the mixer and operated by a key, or the carrier can be inserted in the mixing circuit at a different frequency so that it will pass through the appropriate filter. What I do find annoying is a CW transmission in which the key up position still results in quite a high level of carrier breakthrough, due to bad circuit design. Some rigs cluck like a chicken or chirp all the time, and many are the times that I have given reports of 599C, or even 596, both of which can cause surprise. I wish we could all be more honest when we're giving CW reports, and if I am chirping please tell me!

Many transmitters have a power control, and if you go well into ALC with CW or SSB, your carrier rejection can be severely degraded when you stop speaking as the gain will come up within the IF and RF stages when no audio or CW input is present. It is very important to measure carrier rejection just below the onset of ALC, for otherwise the rig can appear to be much worse than it really is.

The 1.5kHz response was 15dB

The source impedance and output load to an IF filter is quite critical, these parameters can often be switched around between RX and TX, and this may need watching. A filter which should have a very good shape factor may well be much worse on TX, and slight attention to alignment before and after the filter can make a lot of difference. I remember a friend who had bought a secondhand G2DAF exciter for the HF bands and who put out some very strange sounding signals. I investigated the effective audio passband results by checking the RF output power with the spectrum analyser as an audio oscillator connected to the mike input was swept - from 100Hz to 4kHz. The 1.5kHz response was some 15dB lower than that 500Hz so no wonder the chap concerned produced an incredibly hollow sounding transmission. It only took twenty minutes to readjust all the trimmers around the crystal filters to give a filter response plus/minus 1dB from 350Hz to around 3kHz ref.1.5kHz and his transmissions not only then sounded much better, but he was able to get significantly better signal strength reports, particularly when there was interference around.

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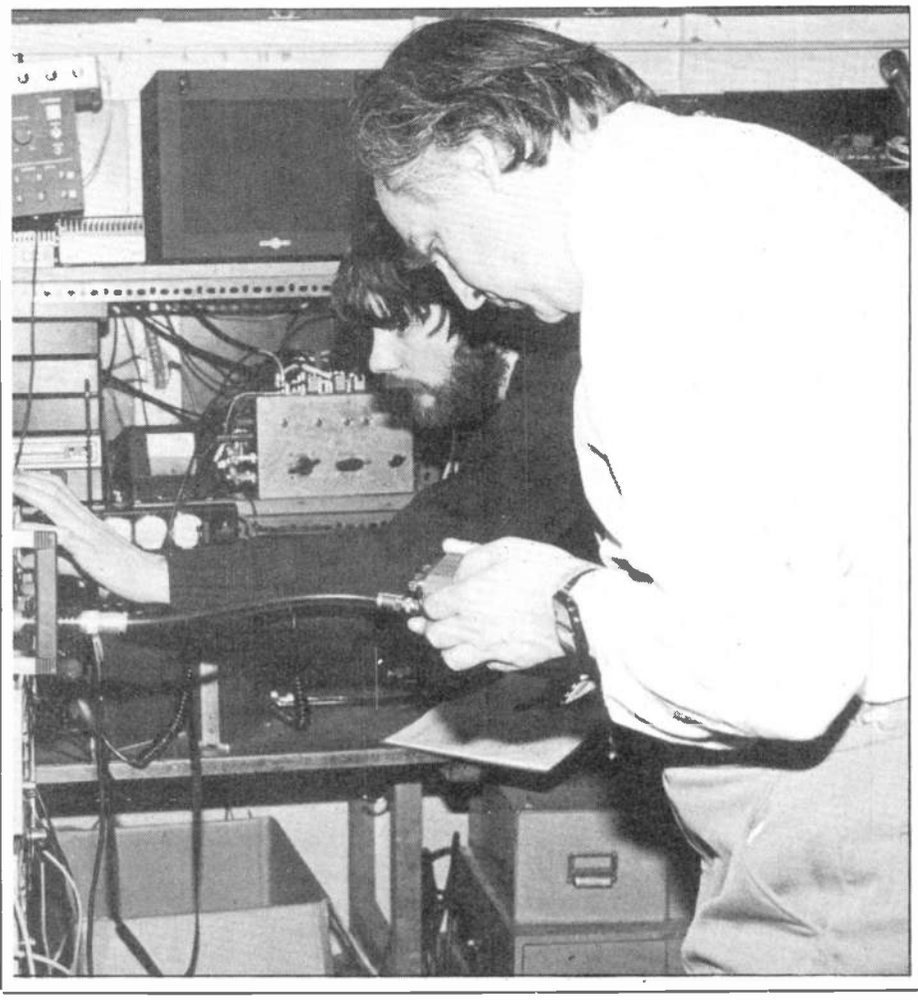


Many rigs employ too much gain after the filter

I the level into the filter is too great, and there is inadequate gain after it, you stand a risk of introducing bad distortion in the filter drive stage. Too many rigs employ too much gain after the filter, and since the RF bandwidth after filtering can be hundreds of kHz, the noise of the stages immediately after the filter can be amplified to such an extent as to transmit noise over a very wide bandwidth. If you were hearing somebody at several hundred microvolts, you may find that the noise floor of your receiver way off his frequency, is bobbing up and down. This could of course, be due to poor reciprocal mixing performance in your receiver, but it can also be due to noise output from the transmitter. This problem is frequently encountered when some HF rigs are used to drive transverters and linears.

Next month we'll have a look at some of the nasty problems that result with many rigs after mixing the transmit IF with the final local oscillator. Owners of Liner 2s should be prepared to duck!

•PROCEDURES• 8

Bandplans are the subject this month, in particular the 2m one.

By Nigel Gresley

By way of a change this month, we thought we'd take some time out to have a look at something which may not be too familiar to you if you were licensed only last week, or even last year, and which if you get it wrong can brand you as a prize lid from Day One on the wireless! This is the subject of *bandplans*, which effectively divide up some of the bands we use - practically all of them, actually, into different sectors according to whatever mode you're using.

This is nothing to do with the small print on the licence, by the way - all your licence says is that you are authorised to transmit and receive in the bands allowed by what class of licence you happen to have and it doesn't divide them up in any way at all. In other words, bandplanning isn't written into the licence, it's something which in the UK is arranged by the RSGB in consultation with all the other national societies in the world so that everyone benefits. The RSGB does a pretty good job, actually - there's the odd anomoly, and no-one would claim that the 144MHz bandplan was ideal, for example, but it's what we have and it works just fine for 99% of the time, so it's important to stick to it. That assumes you know what it is in the first place, of course, and the idea of this little article is to look at how bandplans work and why we have to have them.

Bottom end

Let's deal with the last point first because in a way it's easiest. The RSGB didn't dream up a 144MHz bandplan just to while away a rainy day - on a busy band like two metres it's essential for all sorts of reasons. The main one is that FM is not compatible with modes such as CW and SSB; this is because the latter two get used by the DX fraternity for chasing this and that square, and inevitably their wirelesses are working pretty damn hard to hear a signal in the first place a lot of the time. To take an extreme case, if you're into moonbounce operation you don't expect signals to be more than a dB or two above the noise for most of the time. Now the thing about FM is that a receiver designed to cope with it doesn't know that a CW or an SSB signal is around - it can't detect it, in other words - and also there's the point that FM usually goes with fairly local-ish nattering where the signals into the rig are quite loud. The average FM operator wouldn't know that there was a weak SSB or CW signal within miles of him, but alas the boot ain't on the other foot by a long way. FM is inherently a wideband mode, and an FM QSO can easily clobber two or three SSB or CW signals at once and make use of those modes about as possible as working from England to Australia on 10GHz tropo. In other words, no chance.

So the idea of a bandplan is to segregate modes of transmission that aren't really compatible. It emphatically *isn't* "put those CB-yacking FM types at the top of the band out of harm's way" or "let's get those nitwits who like being masochists and listening down into the noise for hours on end out of the way of our proper natters" - it's just a bit of common sense.

Let's take a look at 144MHz by way of openers, since this is far and away the most crowded band of the lot and we'll need to know the bandplan off the top of our heads if we're going to avoid getting ourselves a reputation. Starting at the bottom, 144.000 to 144.150MHz is the CW end of the band - this is where some juicy DX shows up when conditions are good, and especially in the segment 144.000 to 144.015, which is set aside for moonbounce working. Please don't ever, ever, ever use this for anything other than moonbounce; for the vast majority of us, this means we'll never go there. Someone, somewhere with the proper capability is listening to see what he can hear, and if he's got as far in amateur radio as listening for signals off the moon he deserves every bit of help you and I can give him. So let's keep well away from there! 144.050MHz is the CW calling frequency, and the idea here is that people call CQ on this and them move someplace else ("DN 20" or "UP 30" is what you'll usually hear in Morse). So don't go chewing the fat with your mate on the key for hours and hours on decimal 05 because you'll clobber a lot of people's fun if you do. Same goes for 144.100MHz, which is a meteor scatter calling frequency - here again, try and give it a miss because people are always listening around here for random meteor-scatter calls and you can ruin a lot of work if you have ordinary natters hereabouts.

Now you might think that being told to avoid two frequencies and one bit of the band entirely isn't too funky when your licence says you can transmit wherever you like. Well, you still have everywhere from 144.015 to 144.045MHz, 144.055MHz to 144.095MHz and 144.105 to 144.150MHz to rattle about on in Morse and that's a lot of spectrum - the figures we've quoted are approximate to make the point, but you get the idea. In return for a bit of consideration, you're allowing other people who may want to do slightly different things from you to have a bit of quiet spectrum to do their thing - which is what civilisation's all about, isn't it?

Anyway, that's the CW end. The important thing to remember is that you really mustn't think to yourself "oh, now there's a quiet bit of space for me to have a natter with my mate down the road in" and proceed to have a two-way FM or SSB natter on 144.070MHz or something because you'll be clobbering several other chaps who want to do their thing. There's oodles of space elsewhere in the band for local chats, as we'll see so think before you press the button and start yattering. If you don't yet know the bandplan - or indeed if you'd never heard of it before you saw this article - why not cut out our page of it and stick it on the wall above your wireless and check it before you dial up a frequency to work on? It doesn't take a second, and it all becomes second nature after a while, so please do it - it'll save all sorts of pain.

SSB segment

Next chunk of 144MHz to think about is that from 144.150 to 144.500MHz. This is set aside for SSB and CW use, and of course for the vast majority of the time you'll only hear SSB on it. The times you'll hear CW is when there's an opening or a contest or what-have-you, and someone's reverted to CW to keep communication going when SSB can't quite cope - you'll remember from previous masterworks in this series that CW is a gnat's better than even SSB when the going gets really rough and if you want to polish off that new square or whatever it happens to be and you ain't quite getting there on SSB, you'll find that CW will usually do the trick. In other words, CW and SSB are fairly compatible; they're both what could be called "weak-signal" modes and they're used interchangeably by Class A licensees when necessary. As we've seen, this is a jolly good reason for doing the Morse test even if you're a confirmed VHF addict - it tends to extend the range of your station more than somewhat!

STARTING FROM SCRATCH

STARTING FROM SCRATCH

So the bit from 144.150MHz up to 144.500MHz is for SSB, with CW if necessary or desirable. Note that this is a bit different from 144.000 to 144.150MHz, which is for CW *only* - even though CW and SSB co-exist quite well, please don't take that as meaning it's OK to use SSB right at the bottom of the band because it can still cause problems for CW types who are struggling or whose filters aren't as bright as they might be. This true of most black boxes, by the way, so there's even more reason for keeping out of that bit of the band.

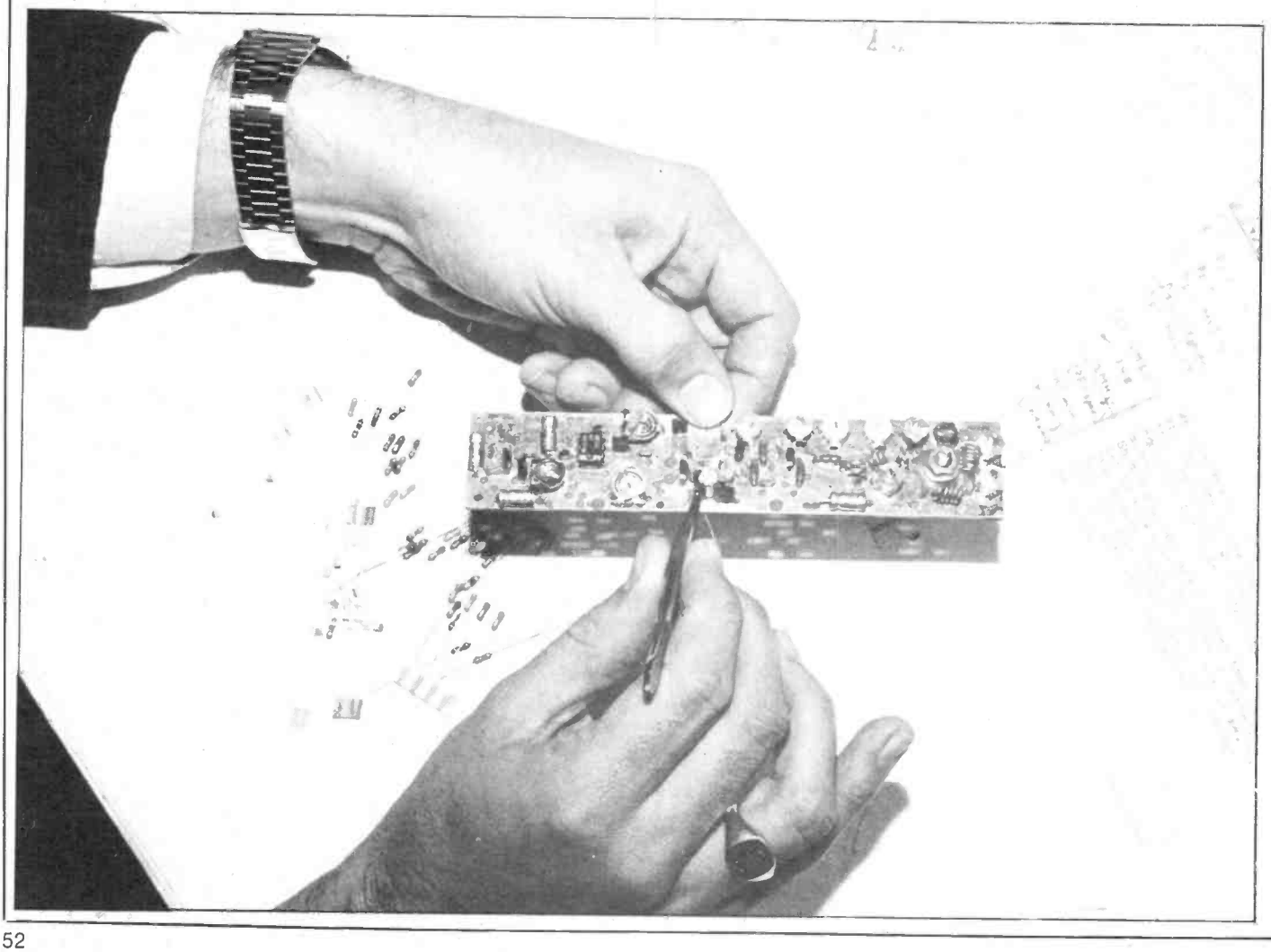
You sometimes find chaps using 144.400 or 144.480MHz for FM. Bad scene, this - it's a hangover from the days of yore when those were well-known FM channels for this and that but that was about 64 bandplans ago, and now the FM sector doesn't begin until 144.500MHz. So please don't be tempted to go below that frequency with your FM box simply because a) old Fred has done for years or b) it sounds quiet, because you'll be causing trouble to other people who probably can't even ask you politely to QSY because they're transverting from HF rigs which run SSB and CW only.

About four stations all calling CQ simultaneously

A couple of points whilst we're in this bit of the band. 144.300MHz is the SSB calling frequency, and if you make contact on it you should QSY from there p.d.q. so that others can use it. The modern trend, actually, is not to use the calling frequency precisely because it's so overcrowded and you'll often hear well-sited stations calling CQ on anywhere other than 144.300MHz. Fair enough - there's no reason why not, and certainly in areas of high amateur population such as London or AL square, there are usually about four stations all calling CQ simultaneously and completely oblivious to each other! So there's a good case for not taking the concept of calling frequency seriously if you're well sited and/or run a lot of power.

Another quick point hereabouts is - don't be afraid to use all of the bandplanned sector. You tend to find most of the activity on 144MHz SSB clustered somewhere between 144.230 and about 144.350MHz, unless conditions are different from average, and this is a shame because a) people clobber each other and b) it's an invitation to other modes to come and sit on 144.480MHz or whatever. Yes I *know* that it probably isn't hurting anyone to have a local natter on 144.480MHz at midnight on an average day, but in principle it's better to observe the bandplan rather than to devise personal modifications to it from day to day! For all you know, someone might have a sked with a new square on 144.470MHz at midnight, for instance, and your FM will wipe out any chance of him keeping it if you go there.

Right - onwards and upwards, chaps. The bit from 144.500 to 144.845MHz is designated as "all modes", and you'll find FM is predominant here with a sprinkling of things like SSTV, RTTY, data and facsimile to make up the balance. 144.500MHz is, in fact, the SSTV calling frequency, and 144,600MHz is for RTTY; 144.675 is used as a calling frequency for those messing about with data transmissions and things, and 144.700MHz is similarly used for facsimile work. 144.750MHz is used for television talkback and as a calling frequency for that mode as well.



IARU 144MHz BAND PLAN
with UK usage

	144.00	
	144.000-144.015	Moonbounce
	144.050	CW calling frequency
CW only	144.100	CW ms reference frequency
	144.150	
	144.250	Used for GB2RS and slow morse transmissions
SSB and cw only	144.260•	Used by Raynet
	144.300	SSB calling frequency
	144.400	SSB ms reference frequency
	144.500	
	144.500	SSTV calling frequency
	144.600	RTTY calling frequency
	144.600•	RTTY working (fsk)
	144.675	Data transmission calling
All modes non-channelized	144.700	FAX calling frequency
	144.750	ATV calling and talkback
	144.775	Raynet
	144.800	Raynet
	144.825	Raynet
	144.845	
Beacons only		
	145.000	
	145.000 R0	
	145.025 R1	
	145.050 R2	
	145.075 R3	
FM repeater inputs	145.100 R4	
	145.125 R5	
	145.150 R6	
	145.175 R7	
	145.200	
	145.200 S8	Raynet
	145.225 S9	Used by Raynet
	145.250 S10	Used for slow morse tone modulated transmissions
	145.275 S11	
	145.300 S12	RTTY-afsk
	145.325 S13	
	145.350 S14	
	145.375 S15	
FM simplex channels	145.400 S16	
	145.425 S17	
	145.450 S18	
	145.475 S19	
	145.500 S20	FM calling channel
	145.525 S21	Used for GB2RS fm newscasts
	144.550 S22	Used for rally/ exhibition talk-in
	144.575 S23	
	145.600	
	145.600 R0	
	145.625 R1	
	145.650 R2	
	145.675 R3	
FM repeater outputs	145.700 R4	
	145.725 R5	
	145.750 R6	
	145.775 R7	
	145.800	
	Satellite service	
	146.000	

• *This section of the band to be used ONLY for the satellite service.*

Notes
Operation on the two spot frequencies is not permitted in the UK by the terms of the Home Office licence - see licence footnote No.4.
MS operation can take place up to 26KHz higher than the reference frequency.
The beacon band is exclusive. No transmissions should take place within this section at any time.
The satellite service band must be kept free of normal communication transmissions to prevent interference with this service.
The use of the fm mode within the ssb/cw section and cw or ssb in the fm-only sector is not recommended.
Repeater stations are primarily intended as an aid for mobile working and they should never be used for dx communications. FM stations wishing to work dx should use the all-mode section, taking care to avoid frequencies allocated for specific purposes.

Above: the IARU 144MHz bandplan, with UK variations.

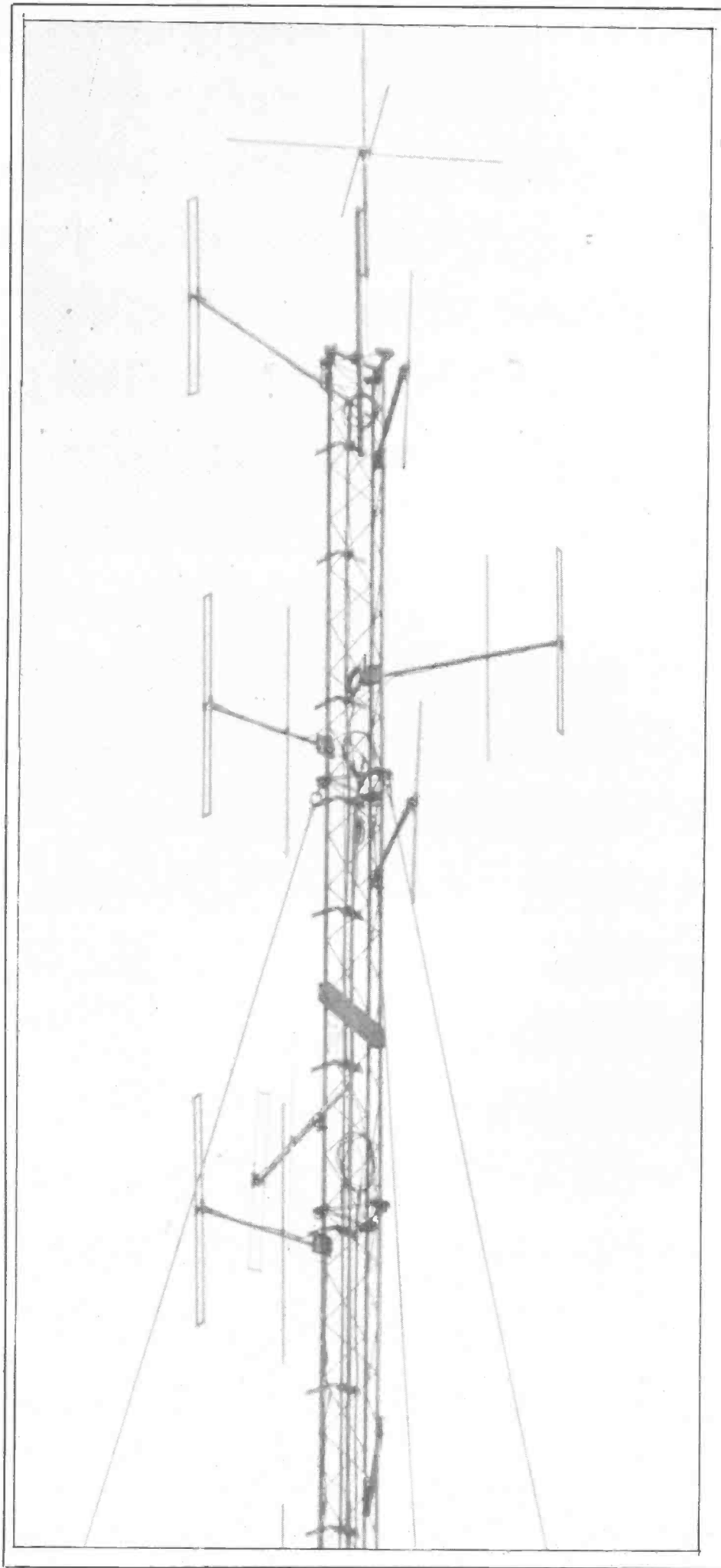
That might seem a daunting list - but you'll hear them all used for these things and you'd help an awful lot of folk who, although no doubt in a minority compared with the numbers of ordinary fellers and ladies who want a nice quiet chat to their friends, are doing some good work which goes to enhance the credibility of the hobby as a whole and who are just as entitled to their pleasure as you are to yours. Dammit all, I wouldn't know a facsimile receiver from a lump of black pudding, and data doesn't turn me on in the slightest, but that doesn't give me the right to say "oh well, those things don't matter a bean, I'll just park my rig on 144.700MHz and give old Fred a shout". There are plenty of other places to go, after all. It's just a matter of being conscious of what others might be up to and giving them a chance to do their thing just as they give you a chance to do yours. I know how I'd feel if a facsimile maniac came up to 144.300MHz just as some juicy DX was calling CQ - I'd go spare...

Hokay - as a final for this time, let's consider what happens above 144.845MHz. Incidentally, although the previous section is classed as "all modes" you'll very rarely hear SSB or CW up there - here again, this isn't out of some misplaced snobbishness or because some SSB rigs only work in the low end of the band. It's just that the vast majority of folk know the bandplan and use it fairly strictly, and besides it's the old weak-signal thing again - SSB and CW get clobbered very easily indeed when signals are weak, so users tend to stick to their marked bit of the band exclusively.

Beacons scattered around Europe

Now then. 144.845MHz up to 144.990MHz is designated for beacons, and you must *never, ever* transmit there unless you want to make a name for yourself as a first-class pillock. There are many beacons scattered around Europe and elsewhere in this section of the band, and they're used for everything from sussing out when there's an opening to some pretty serious propagation research work. If you transmit in this section, you are likely mucking up several hundred people who are using the beacon network for what it's intended and you're being a right nit to boot. Apart from transmitting terrestrial stuff in the satellite end of the band, which we'll get to later on, there's no worse crime than transmitting in the spectrum 144.845 up to 144.990MHz and it's incredibly selfish to do so. It causes a terrific amount of ill-feeling, so please don't do it - there will always be those who think it's clever to mess up other people's enjoyment but everyone knows who they are and believe us, it isn't the slightest bit clever. If you're new to amateur radio we forgive you, and maybe a few thousand others will too if you don't do it again - try underlining the figures in our bandplan column in red ink or something! (we can't afford colour here at Bicester, nasty old MD, tight-fisted he is, wouldn't even buy me a new FT1 as a company wireless).

Anyway - we'll continue our little look at bandplans next time. For now, as we said earlier, how about cutting out our bandplan page and sticking it somewhere where you can see it? It's all good stuff, you know.



Calling frequency madness

John D. Heys G3BDQ argues that for much of the time 144.3MHz is best left alone

I am no newcomer to the 144MHz band and have been in the thick of CW, AM and SSB operation there since 1958. The changes in the gear used, the antennas and especially in the 'band planning' and operating procedures have been quite staggering during the last 25 years; much more than they have on the relatively stable HF bands.

Throw an old timer of 1950s vintage (who since then has been assiduously collecting stamps or building model locos) back on to the two metre band and he would feel like an alien. Our old timer friend would however settle down to DXing and ordinary QSOing on the HF bands in a very short space of time. The advances of 'black boxery' and the appearance of the Class B Licence holders in ever-increasing numbers (geometric progression?) has radically changed the way of life on 'two'.

One or two crystals for our own 'spot' frequencies

The old Band Plan meant that the entire band from 144 to 146MHz was divided into a few segments, each occupied by amateurs in different geographical areas. We each had one or two crystals for our own 'spot' frequencies within our frequency zone and such beasts as VFOs were unheard of.

A CQ call was put out with the beam pointing to say the North of England; and then this was followed by a diligent search over the North of England frequency sector. If DX from Europe was coming through a CQ had to follow by a tune across the *entire band!*

The development of the PLL and

stable VFO operation on VHF and the relative cheapness of quite complicated transceivers killed off the old Band Plan and we then acquired our present scheme with its three main sections for CW, SSB and FM. I shall ignore the many sub-sections which are used for repeaters, Raynet, RTTY, satellite work, MS and the like for they do not concern my brief, which is just to do with the SSB 'Calling Frequency' on 144.3MHz.

A quick dip into the RSGB publication *Amateur Radio Operating Manual* edited by R.J. Eckersley G4FTJ, which appeared on sale for the first time in 1979, reveals on page 65 some information to do with the use of calling frequencies. It ought to be remembered that this useful tome was put together from manuscripts that had been written at least two or three years ahead of its final publication date.

A spate of RAE success and a corresponding growth, which has been almost astronomical, in band occupancy

The section dealing with calling frequencies suggests that the system worked well in 'poor to moderate' conditions, and that "when conditions are good there is severe congestion around the calling frequencies, and in this case it is probably better to call CQ elsewhere". All this was penned at least five years ago, since when there has been a spate of RAE successes and a corresponding growth, which has been almost astronomical, in band occupancy.

This growth continues and seems likely to do so for some long period of time ahead. We however still retain the same frequency allocation on the two metre band but now use bigger and better linears, mightier beams, super-duper low noise pre-amps and the like. This adds up to more people working over more miles, and the so called 'normal' propagation conditions will now allow contacts over most of the UK. Indeed the band, during these 'normal' conditions sounds rather as it did during the 'lifts' of five years ago.

I often sit for an occasional few minutes to listen on the 'magic' frequency of 144.300MHz. At the end of each little sesion I either fall about laughing or instead become rather angry. Kilowatts of energy are being dissipated mindlessly with often six or even a dozen CQ calls going out simultaneously. Meanwhile other anxious brethren are fighting through the bedlam in an attempt to designate another frequency for the inevitable QSY. The chaps calling CQ some 150 miles away who would like a contact at my end of the country do not realise that down here we have another gaggle of CQers wiping out his S3 but normally readable signals.

This effect is reciprocal and goes on all the time on each and every evening and during the daytime at weekends and public holidays. Only on quiet weekday mornings when most people are hard at it earning a few pennies for the new rig or a sack of potatoes can the 144.3 spot really operate as intended.

Most Europeans do not recognise 144.300MHz

Our summer arrives sometime in June and goes on until the monsoon around the start of the August Bank Holiday, and throughout that period there are many frequent openings when the DX from near or even distant Europe floods in. Amazingly the 'Calling Frequency Syndrome' (a kind of sickness) remains with us; this time its adherents also add the two letters 'DX' to their cries for attention. Most of the Europeans that I contact tell me they do not recognise 144.300MHz as being any different from any other frequency in the SSB sector. (The exception is its use as a central frequency about which most Sporadic E working takes place). They are frankly either amused or disdainful of its use by DX seekers.

A few weeks ago the band opened up to Holland and West Germany in a big way, and it became possible for any ten watt station with anything like a beam to achieve a fair share of the action. Lo and behold, I could not help but notice a strong G6 holding a very new sequence of call letters and living not more than 25 miles away, forever calling "CQ DX" on 144.3MHz. I doubt if he worked any DX but just managed a few chats with local and semi-local G stations.

Just before pulling the Big Switch to the 'off' position I ventured a call to our G6 friend. To do this I was forced to break all my resolutions and actually call him on the dreaded calling channel! We duly moved off it a few tens of kHz and I then asked him why he had persisted so diligently and yet to purposelessly throughout the evening.

The chap was so obviously barmy!

I was told that his RAE instructor had been particularly anxious that his class should, when licensed, always observe correct and orthodox procedures and without fail *always use the calling channel* to get a QSO. I followed by going into the many reasons why the chap who had dished out the wisdom and good news to his group was so obviously barmy! A measure of agreement came back. It's funny tough; I haven't heard him on the band since then!

The absolute quintessence of idiocy however took place during a Sporadic E opening in June. One station was actually heard on 144.3 (the right place for such an event) and he was asking the super DX to QSY off the calling channel! He never concluded any QSO, which is not surprising for he had wasted everyone's time and prevented some rare DX working into this country for the few precious minutes it was available.

The question of the present day need or necessity for an SSB calling frequency is often raised whilst chatting to fellow G stations. Many agree with my point of view but some still remain unconvinced. They tend to trot out the old tale that it is useful to leave the rig on 144.3 and then get on with a bit of constructional work or QSL card writing. "Should old Bill come on for me", they say "then we can easily QSY to a quiet spot."

My answer to this is that 'old Bill' is most likely a local or near local station anyway so why not use that other calling frequency up the band and switch to FM? SSB is not really a local natter mode and ought to be primarily used for getting through when the other telephony modes would fail.

The SSB calling frequency is in addition something of a 'band gobbler'

The SSB calling frequency is in addition something of a 'band gobbler'. The other evening I heard a chap actually apologising for being on 144.850MHz! He explained to the fellow on the other end of the QSO that he had a local station only about 1,000 yards away and that if either of them operated within plus or minus 15KHz from the sacrosanct spot, severe 'wipe out' happened. This philosophy effectively removes some 30KHz from the SSB section of two metres, and I for one shall not subscribe to it in any way.

We already have several chunks of the band where only too often one is told politely (and occasionally not so politely) to 'shove off' because it is on or near some new-fangled new frequency. Such sequestered frequencies are not designated as 'special' in any way on the RSGB Band Plan and it follows that the normal practice of, first on a frequency has priority, and should not be asked to QSY.

The reader may or may not agree with my point of view. I care not one hoot, but shall continue my practice of calling CQ on the frequency of my choice and to listen carefully across the band from time to time, and so hear that wanted station from the rare (so rare) locator square who is not so daft as to sit on the congested free-for-all known as the 'calling frequency'!

TRAPPED DIPOLES -

BACK TO THE DRAWING BOARD?

Angus McKenzie G30SS argues that trapped dipoles can be made to work much better by a simple modification

Not very long after I was first licensed in 1960, I put up a G8KW trapped dipole for 40 and 80m over the top of my house and down either side to form an inverted 'V'. While this worked moderately well after trimming for the top end of 80m, it was very poor at the bottom end, although satisfactory on 40m. For 160m I dutifully strapped the inner and outer and tuned this against earth for 160m, but obtained very poor reports. A year to two later, friends and I put up a half wave end fed for 160m averaging 30 feet above ground with the final 40 feet coming down into my ground floor shack. This antenna worked very well, but the two trees which supported it at the middle and one end were chopped down because of Dutch Elm disease thus writing off the antenna in the absence of anything to hold it up! During the 70s I rather missed top band, and finally, in 1982 I made the decision to try a trapped antenna which would cater for all three LF bands. We made a careful drawing of the house and garden and sent it down to Richard Benham-Holman G2DYM, who can make aerials to order, and two fascinating points came out immediately. Richard categorically stated that I would be much better of with a 75 ohm twin balanced feed with a balun at the shack end than I would with a coax feed and balun at the centre of the dipoles. He also suggested an antenna which would be effectively half a wave length long on all three bands, with traps for 40m and 80m. Top band signals would use the entire antenna from tip to tip.

There were very serious problems with SWR

The beautifully made antenna arrived a year ago, and was soon put up, replacing the G8KW trapped dipole. The aerial certainly worked quite well from the start, but there were very serious problems with SWR, particularly on top band. The routing of the antenna can be seen in Fig.1, where it will be seen that one of the top band sections has to turn 90 degress right across the bottom of the garden whilst the other end goes fairly straight but downwards to a sling at the top of a council tree, with the permission of their arbour officer! On 160m the SWR was never better than 3:1 at the bottom end, rising to a disasterous 15:1 at the top end. One of the main problems for me was that I had to re-tune with even the slightest change of frequency, and matters got very tiresome.

We saw very odd polar diagrams when the SWR was poor

The same situation arose on 80m, for while the resonant frequency and the best SWR was around 3.65MHz, the bandwidth over which SWR was reasonable was extremely small, only around 40kHz. At 3.5MHz and 3.8MHz the SWR rose to around 10:1. On 40m, the antenna was resonant on 7.17MHz with the SWR rising to 3:1, at about 7.0MHz.

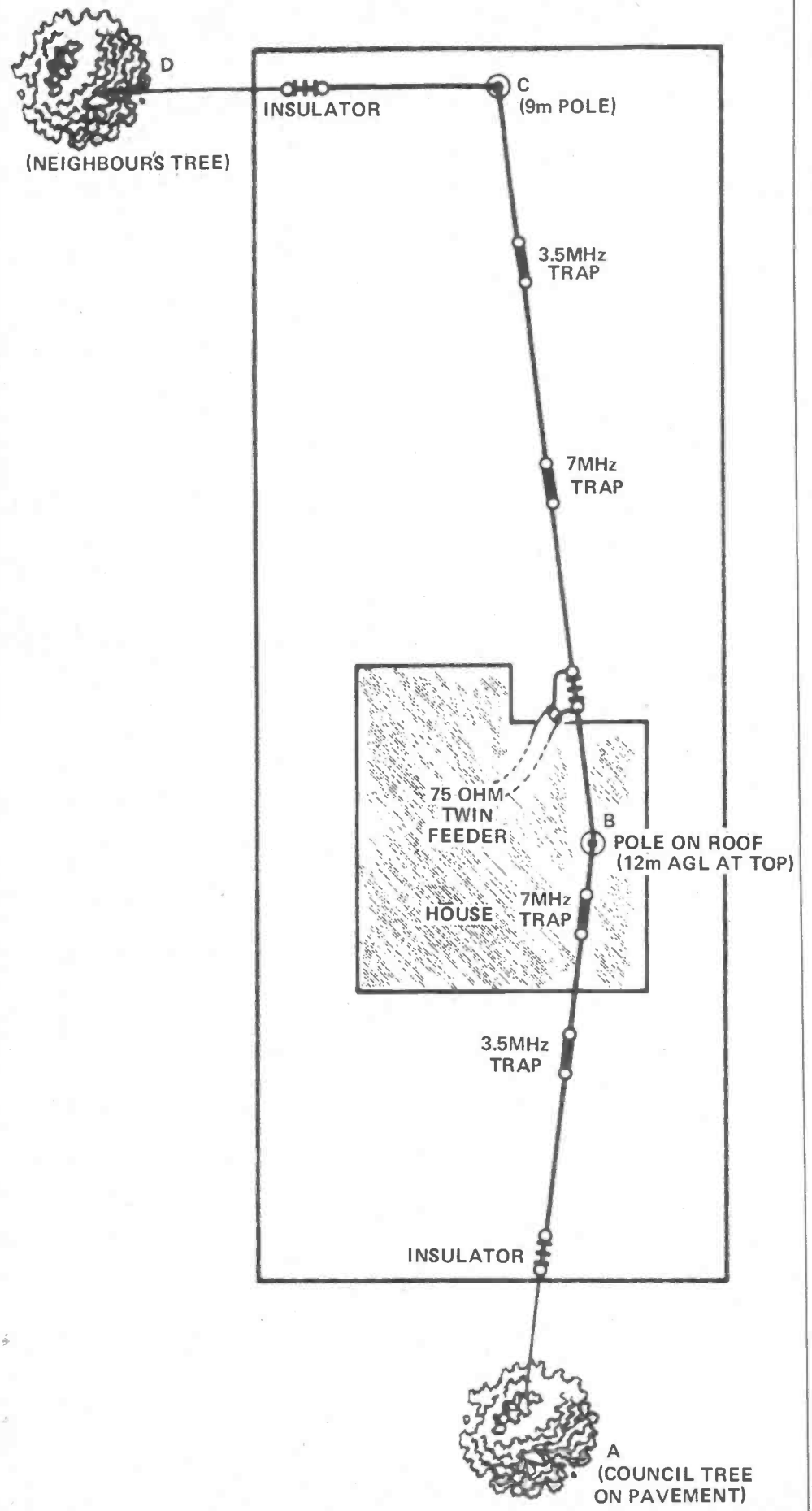
Walking around the garden with a field strength meter, and varying the frequency, we saw very odd polar diagrams when the SWR was poor. RF shot more off the ends than off the sides, thus explaining a very poor performance under many conditions over quite a large proportion of the compass. Even so, there were already, as originally installed, some immediate benefits. RF interference to electronic devices in the house (including TV and hi-fi equipment) was reduced by at least 20dB. Previously my hi-fi used to act like a garbled PA system whenever I went on 80m, there was just a mild muttering on the new antenna, showing that the use of a balanced line is strongly recommended.

I have also noticed much less pick-up of interference from household electronics and electrics, which again is good. For months I discussed the problems with many helpful amateurs on the LF bands, and most suggested tactfully to me that one just had to live with a manual ATU and suffer the annoyance.

By early in 1983 I had installed the Icom auto ATU type AT500. This worked superbly on the HF bands with my Hygain TH6DXX, but it would only cope with the centre portions of 160 and 80m, although it just about managed the whole of 40m with the G2DYM antenna. I set myself the task of trying to make adjustments to the LF antenna so that the Icom ATU would correct the SWR over the whole of each of the three bands. The ATU incorporates internal presets so that a reference frequency has virtually a perfect match, and any change from this is corrected within a second or two. It was clear that the top band sections were many feet too long because maximum field strength was obtained below the bottom end of top band. The best SWR was at around 1.75MHz, this being noted with a bridge and low power signal generator.

I chose to start work on 40m, but before doing anything I had to sit back and have a long think, with the inevitable cold towel round my head, with additional ice cubes on the top to keep my old brain cool! There had been many recommendations concerning the re-tuning of the traps, most of these concerning the connection of short wires at each end of the trap and twisting these together, and altering length to lower frequency. I thought I might have achieved some interesting results if I went back to first principles and thought about what the trap actually does on and off its resonant frequency.

I may well be introducing heresy here, but I suggest that *the very worst place to*



Plan view of the trapped dipole in the author's garden.

put a trap is on the tips of a dipole. The impedance of a half-wave dipole at resonance is at its highest on its tips. Thus the voltage peaks are very high and current at a minimum. The trap is also at its highest impedance at resonance, but if a trap is to have a very low loss at other bands, it must have a fairly high Q. These two properties are in complete conflict with the requirements of a multiband antenna, for if we wish the dipole to radiate well, and at the same time minimise radiation from the antenna wires beyond the traps, we have a serious problem.

It is clear that the ratio of the impedance of the trap to the impedance of the dipole should be as high as possible at the connection point throughout the band. Since traps have a far higher and sharper Q than a normal dipole, I suggest that when off resonance, RF can go sailing through the traps because they are very near to a voltage resonant point with minimum current, thus another high current portion occurs far beyond the traps. It therefore struck me that it would be interesting to connect the traps *at a point on each dipole some way in from the ends*. But what on earth should I then do with the end sections? I thought I would see what would happen if I let these dangle down. On 40m we reduced the resonant frequency of the dipole by adding 1ft. or so on each end hanging down from the point where the dipole reached the traps.

Without making any other changes, this had two dramatic effects. We had indeed reduced the minimum SWR point, and the point of maximum field strength down to around 7.05MHz. In addition to this though, we had broadened the bandwidth over which SWR was surprisingly good, achieving the desired result over the whole band, and indeed surpassing it considerably.

The change had a stunning effect

On 80m, since the antenna system was actually resonant in the centre of the band, we unsoldered the dipole ends from the 80m traps and re-soldered them back on again around 40 inches from their original ends, and allowed the surplus wire to hang down vertically.

This change had a stunning effect, reducing the SWR at the band edges down to 3.5:1, whilst the majority of the band was better than 2:1. I did not want to risk carrying the experiment any further for, while I could have flattened the SWR curve more, I was concerned that not too much wire should hang down. We then reduced the length of the top band section by around 6 feet each end, bringing resonance up to 1.88MHz. Although this was still a little low, it was much better. Next time I have an 'aerial party', we will take off another foot or two which should improve matters further.

I was amazed to find that the SWR varied from a maximum 2.6:1 at the

TRAPPED DIPOLES~

BACK THE TO DRAWING BOARD?

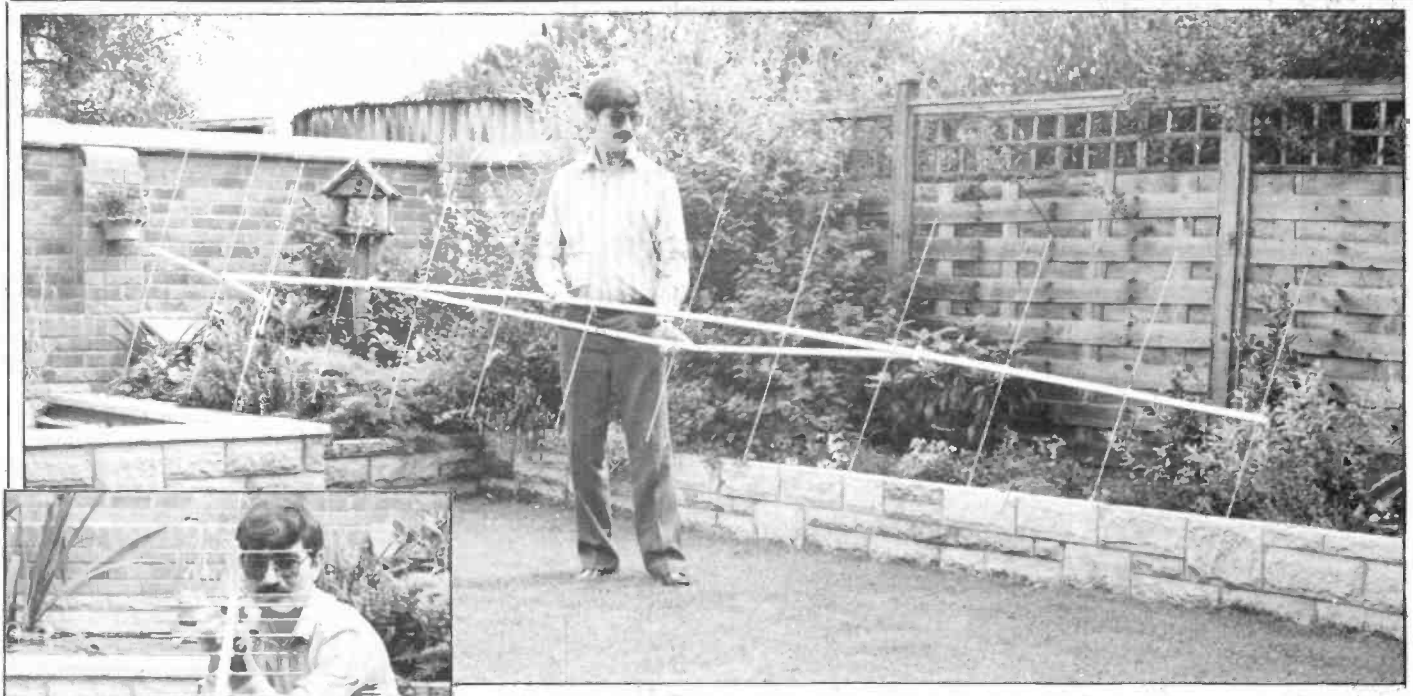
bottom end, and 3.5:1 at the top end, and around the centre it was surprisingly low below 1.5:1. The Icom ATU copes with the entire band, although with reluctance in the top 20kHz.

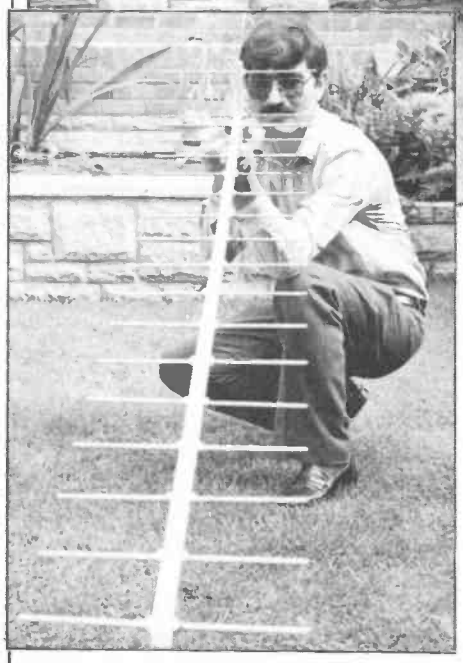
What is particularly interesting is that I now seem to get slightly better reports on 160m, although of course if an ATU can correct a bad SWR, a normal straight dipole length is not that critical.

Proof of the pudding

Many writers have quite correctly said that SWR is not of major importance, and that losses due to bad SWR are far less than you might at first think. Many of us have a fetish about getting SWR right down. Often unnecessarily, but what is important is that the transmitter should itself see a good SWR for both optimum performance, and reliability. However, the proof of the pudding is in the eating, and there has been a strong bias against trapped dipoles for years, I think unfairly. Perhaps the main problem with these antennas is the leakage of current through the traps to the end portions, and I suggest that I may have found a way out of the difficulty which could possibily make traps worth trying, particularly if you have limited space. The efficiency of a trapped dipole should ideally be proportional to the total length. Since on top band the overall length is now 178 feet, it is obvious that it is a few dB down on a true half wave, with other conditions remaining the same, including positioning. I am suggesting here though that the performance is only slightly down rather than a long way down as some would suggest. I have been able to hear and work DX stations on 80m that I have only heard very weakly in the past, and yet I have been trying 80m at all times from sunspot minima to maxima. I have had extremely good reports over a 500 mile radius, and encouraging ones of 5 & 7 from the states and Canada for example, which I have not previously had. The convenience of making a quick change of frequency on the band, letting the auto ATU cope within two seconds, is fantastic. On 40m I have again obtained contacts with far better signal reports than with the old G8KW antenna. It is on top band, however, that both reception and transmission reports have improved dramatically, compared to any form of Marconi-fed G8KW antenna with inner and outer strapped and tuned against earth. Results are at least as good as I ever obtained from the old end-fed half wave. I do not want to give the reader the impression though that my modified antenna is a DX one. Stations with quarter wave verticals on 80m beat me hollow beyond 2000 miles. Those who are lucky enough to have dipoles at least 60 feet up in the air, suspended from two conveniently lurking trees, are very lucky indeed, so I am green with envy. The joys of working around the UK on the appropriate LF band for the time of day, without continuously returning at ATU are great, causing me to spend more of my time on LF. Some of us like to operate for the maximum amount of time that we have available, and the less time it takes to fiddle with ATU knobs the better. This is what ergonomics are all about, and there is always a subconscious feeling of discouragement from changing frequency if it means another tune up, particularly if you are disabled. G2DYM has offered to make antennas along my suggested lines for those who are interested, and I must admit that I am very surprised that more amateurs have not got over the difficulty of a 160m half-wave antenna by using similar techniques in order to get the aerial into a limited space.

It is on top band that both reception and transmission reports have improved dramatically





Metalfayre 2m & 70cm NBS Yagis: how good?

Nigel Gresley takes two of the Metalfayre NBS Yagis to the antenna test range.

You'll remember a while back that we took it into our heads to go where no man had gone before and tote a bundle of 432MHz antennas along to a test range and see how they measured up. This seems to have gone down well, to judge from the letters we got, and people said to us "more please". So we did, and here it is. We're sorry, by the way, that this article has appeared a month or so after we said it would but Somewhere Along The Line the first draft of the article took it into its head to disappear into hypersapce somewhere in the United Kingdom and the second got mislaid by beloved British Rail somewhere between Bristol and Bicester...are you listening, Sir Peter?

Anyway, pause for the roll of the drums, here it is at along last. What happened was that after the review, the firm of Metalfayre got in touch and asked us whether we'd like to put a couple of their antennas up on the test range and see what we made of them. We said yes at once, partly because Technical Bod had come into the office raving about Metalfayre's 14-element 144MHz machine - he was saying that it was about 3dB better than his Parabeam, which was very interesting because the 14-ele Parabeam is a real beaut of an antenna for this band despite the fact that it's an old design and fairly heavyweight to boot - and partly because it's always good to see a British Company in there trying to make its mark on the market and give Monsiery Tonna *et les autres* a run for their *monnaie*.

So we said yes, ta very much, we'd like to have a look at the 144MHz 14-ele and the 19-ele 432MHz beast - the latter because practically everyone these days uses the 19-ele Tonna for this band and we thought we'd have a look at how well the Metalfayre one did.

National Bureau

An antenna test range in August is all very well if you're after a suntan but flogging about carrying antennas and instrumentation gets the perspiration running more than somewhat quickly! Our consumption of Coke and such went up by a factor of about 10^7 during the two days we spent pottering about - see what a dedicated lot we are?

First off the pile was the 144MHz 14-element machine. Like all Metalfayre antennas, this one is designed in accordance with what is known as the NBS formulae - NBS stands for National Bureau of Standards, which is an American institution, and they did some work on antennas of the Yagi type some years ago. One fundamental part of the NBS design is the use of what is called a 'trigonal' reflector whereby the reflector element - that's the one behind the driven element - is made of three separate elements in line with, above and below the driven element and this gives a useful increase in gain at the expense of a bit more mechanical complexity and wind loading. The Parabeam has what could be called a 'digonal' reflector, consisting of two elements in line with the long sides of the slot reflector, and we've often wondered whether the addition of a third would make any difference - the answer is probably that it wouldn't because the Parabeam driven element is in the form of a skeleton slot, not a straight dipole, and the considerations are a bit different.

The antenna itself arrived in a polythene packet containing all the parts and a copious instruction sheet; one nice touch was that a beacon map was also included! So it was a matter of tearing open the poly bag and laying out all the bits and sussing out how they all went together. Mechanically, the construction used is almost a cross between Jaybeam clamps and Tonna clips; the elements come in two halves with male and female threads and they're screwed together through holes in the boom. The elements themselves are solid rods and the whole assembly feels as though it ought to be good and strong - the method of attaching

the elements means that the alignment comes out exactly right with no argument and it looks good. We had a small reservation about the rear support for the three reflector elements; this is essentially a square-section hollow bar with a kink in the middle which didn't look all that nice, but at the end of the day it's strengthened somewhat by the manner in which it's mounted to the boom and there's no question of its being too weak for the job - it just looks a little clumsy.

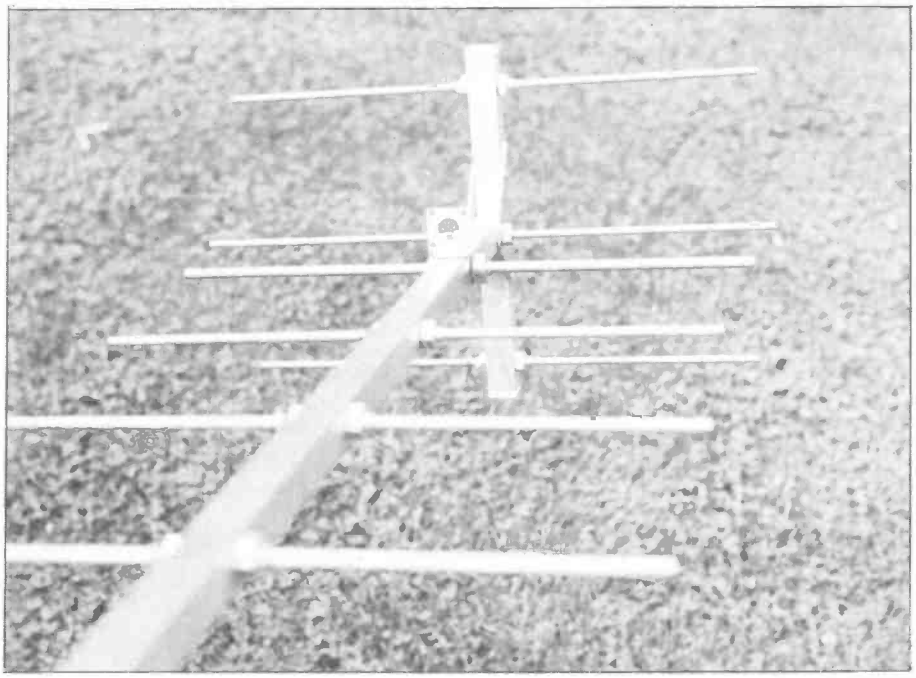
The driven element is a bit - well - different; you get all the bits, even including the silicon goo, to make a really nice weatherproof termination in an N-type socket (hooray!) and you end up with something much better than the usual plastic-cover-over-the-terminals structure which always gets full of water after a year or three. The gamma match is PTFE insulated, which is even better, and the whole thing goes together very nicely indeed. Like every other antenna ever made for the amateur market, it's a trifle tail-heavy when you've got some UR67 hooked up to the driven element but it's markedly less so than most and

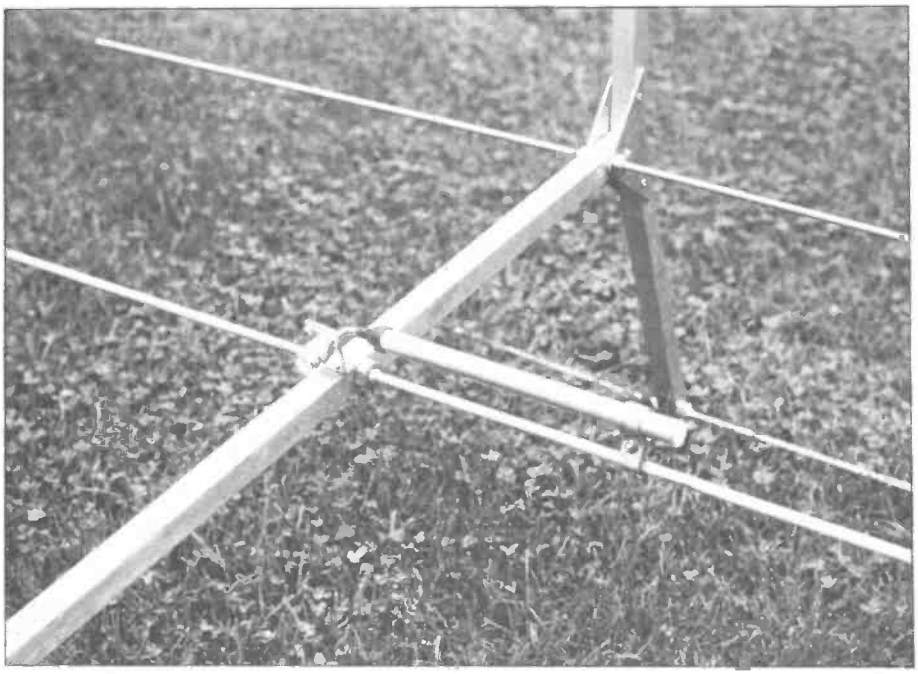
Rotator stresses

your rotator will probably thank you for using this antenna! The 14-ele Parabeam is certainly very tail-heavy in fighting trim, and every Tonna we've ever seen suffers from the same defect - we usually stick some lead or something down the front of the boom in order to give the rotator an easy time of it. In passing it's worth noting that the stresses on an antenna rotator are already pretty high in any sort of wind and any work you do in order to give it an easy time is well worth doing to save your anxiety when something more than a zephyr blows up. A friend of ours lost a pair of 9-elements and a 21-ele for 432MHz in the last blow; the bell housing on his rotator gave up the unequal struggle, which wasn't the best thing to happen to you at three in the morning.

Anyhow, having got the beast together, how did it make out on test? At 144.2MHz the forward gain measured 13dB precisely and at 144.8MHz it was a little over that figure; the gain fell away from there on in, so it looks as though Metalfayre have gone for a good compromise. The SWR curve we plotted looked pretty good, with about 1.2 to 1 at the band edges and a figure well below 1.1 to 1 in the midband, so no problems there. A gain of 13dB (that's 13dBd, by the way, or gain with reference to a dipole) is about right for an NBS Yagi with 14 elements and a trigonal reflector, and in fact it's of the same order as the Parabeam if the Jaybeam spec is to be believed - we tried one for a bit in conjunction with the Metalfayre one and we'll come to that later.

Front-to-back ratio of the Metalfayre antenna was 21dB at midband and didn't vary by much anywhere else; this is a very good figure indeed and no doubt the reflector has something to say about this. The sidelobe performance was pretty good - the main ones were about 35 degrees away at 18dB down on the main lobe and there were two others about 50 degrees off and way down at about 30dB. The lobes off the back were somewhat assymetrical, oddly enough, but they were well down and wouldn't be a problem in use. The polar pattern of the antenna was pretty similar anywhere in the band, except that we got the feeling that there was some squint in the main lobe down at the CW end - it seemed to want to look slightly left of the test antenna, and in fact the main lobe polar plot off the printer showed about 5 degrees of left skew low in the band which centred itself when you got up to mid-band. Don't ask us how that happens - we don't have a clue! It doesn't matter a hoot in real life and it's probably down to asymmetry in the driven element somewhere - it could even be the way we put it together.





Top: the 70cm aerial before fitting the N-socket and gamma match. Below: the 2m aerial with gamma match fitted.

After the formal tests, we stuck it on the roof for a while in place of the Parabeam. General feeling was that its performance was very much in the same league as that of Jaybeam's trusty beast except that the front-to-back ratio of the Metalfayre machine was distinctly better than that of our Parabeam - our one doesn't feel as though it's got anything like 18dB of front-to-back ratio although admittedly it's a year or two old. The main lobe felt a little less sharp than that of the Parabeam, but beacons and things produced about the same sort of signal in our wirelesses. Overall verdict - a very nice antenna, mechanically sound and with less wind-loading and a better f/b than the Parabeam. It's well thought out and pretty simple to put together and you ought to do well with one!

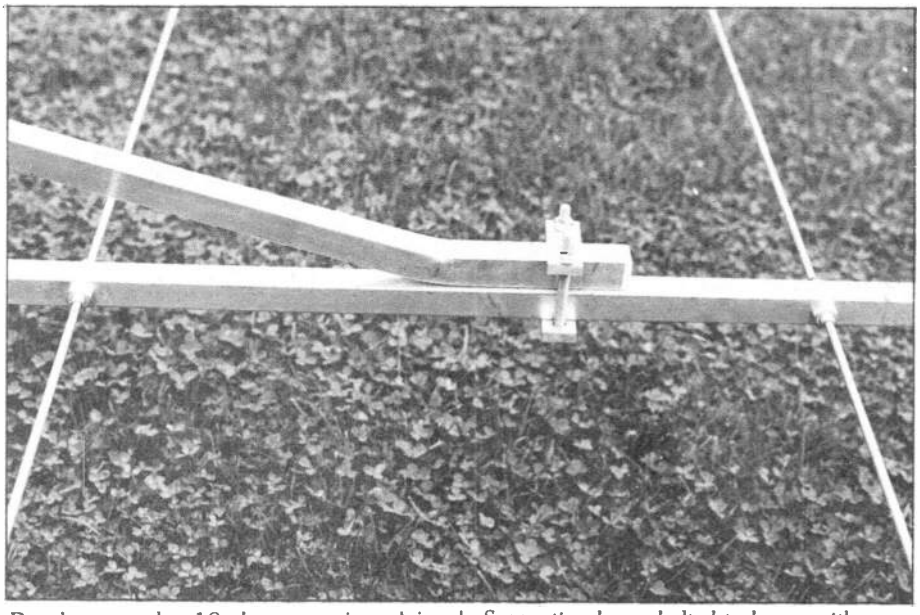
Metalfayre 2m & 70cm NBS Yagis: how good?

Same goes for the 432MHz 19-ele. Mechanically it's similar to the 2 metre machine and goes together in the same sort of way - peformance-wise we found a gain of a gnat's under 15dB at 432.8MHz which fell off to about 14.25dB at worst anywhere in the band below about 435MHz, so it's obviously meant for the lower part of 432MHz as opposed to the space and TV bit. The f/b ratio sat about 19dB more or less anywhere in the band, which is again very good, and the SWR curve was well within the capabilities of any rig we know of; at 430MHz it was about 1.4 to 1, falling to something almost unmeasurable at 433.1MHz-ish and rising gently after that.

Lobe-wise, a very clean main lobe with no measurable squinting this time and a nice symmetrical sidelobe pattern of a pair at just over 40 degrees at 15dB or so down and the usual little minor lobes hither and yon.

This order of performance makes it an antenna in the same class as Jaybeam's Parabeam - the 18-ele we reviewed in September - with again a touch better f/b ratio and a slightly wider 3dB beamwidth which came out at about 30 degrees as opposed to the 25 degrees of the Parabeam. So the choice is yours, and there's certainly no overwhelming reason why you should choose one or the other on electrical grounds anyway - it's a matter of price and any preferences you might have for mechanical construction.

So a warm welcome to Matelfayre's offerings - they do the job well, they're well made and they perform very much as you'd expect NBS Yagis to perform. Nice one, chaps.

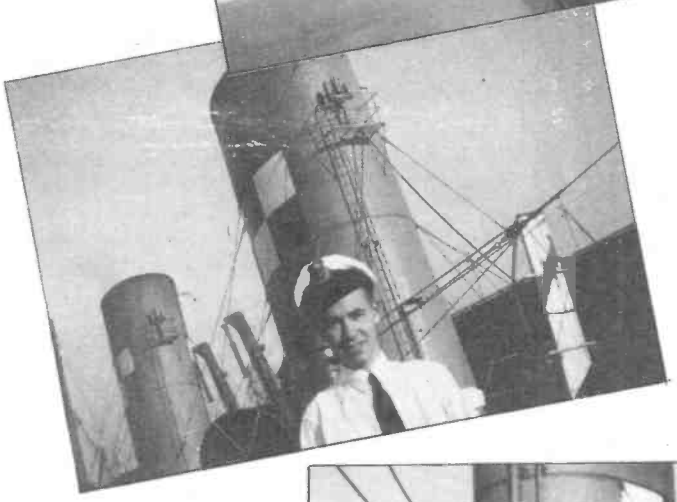


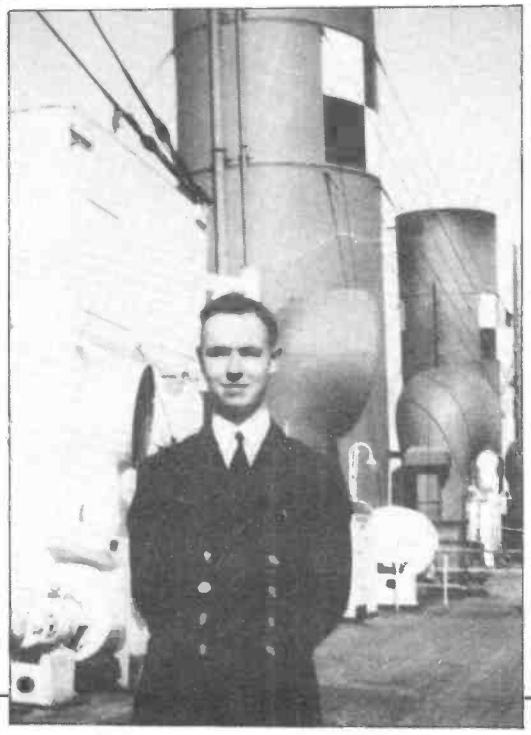
Supporting brace bolted to boom with clamp

There remains the mystery of why the Metalfayre antenna at Tech Bod's QTH was noticeably better than the Parabeam. There didn't seem any good reason why it should, which is no reflection on anyone at all - it's just that unless you're silly or incompetent or something any 14-element antenna is likely to have much the same sort of gain at any other 14-element - and he's as intrigued as me! Next time we have occasion to do some antenna tests we'll slip the Parabeam on the range and let you know what we find...!

Memories of a 'Ke

by Charlie Whiskey





August, 1948 saw me travelling to Glasgow to join my first ship: a new 2nd Class PMG certificate clutched in a moist little hand. The telegram from Marconi had the then standard text: "OFFER OF EMPLOYMENT IF YOU REPORT..." etc. Arriving at the depot, I learned that the ship was the Canadian Pacific liner *Empress of France* (GNTV) which had just completed a refit from her war time trooping. She used to be named *Duchess of Bedford*. I was quite thrilled at the prospect as one of the Radio School instructors had sailed on the *Berengaria* in his earlier years, and often reminisced about his experiences on the North Atlantic run.

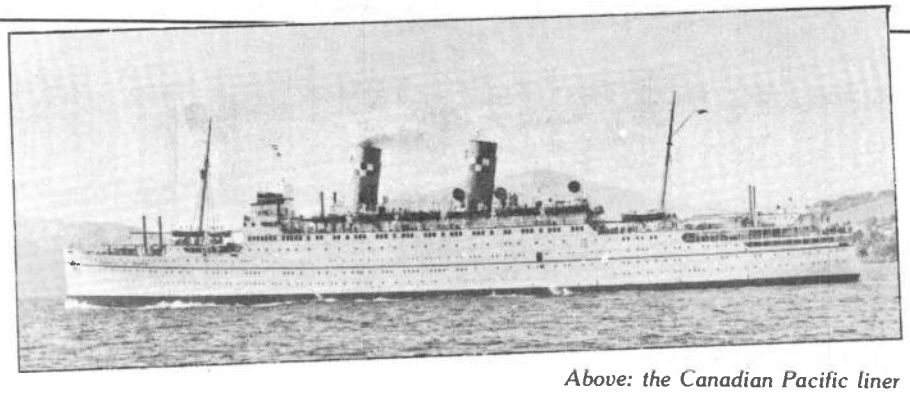
After completing all formalities at the office I took a taxi to the docks and was impressed with the sight of the ship. It was painted white with two yellow funnels bearing the red and white design of the Canadian Pacific houseflag.

The Chief went mad

I was to be the 4th Radio Officer, but the 3rd was also a 'first tripper'. The 1st and 2nd were both Marconi '30-year men'. The radio room equipment was very impressive compared with that at the radio school. It had one of the first Oceanspan transmitters, with the Worldspan amplifier pushing the power up to around 700 watts. Two CR300 receivers and the new Lodestone direction finder completed the line up. On the 'monkey island', in a very heavy cubicle, was the prototype of Marconi's first commercially produced marine radar - later known as the Radiolocator. After a week we left for Liverpool, which was to be our home port, and carried out engine trials on the short sea passage south.

Once clear of the Clyde the Chief went key mad and called up everyone he could on 500kHz. Starting with Malin Head and Valencia (then GMH and GCK) he worked his way up the Channel and finished up with PCH and DAN virtually 'cross-country' as it were. He then went on HF and spoke briefly with Boston WBF, Chatham WCC and Amagansett WSL announcing our forthcoming service on the North Atlantic. The operators at the American stations apparently remembered him from pre-war days when he had also been on Canadian Pacific liners.

ey man'



Above: the Canadian Pacific liner Empress of France

The 3rd and myself were standing, almost to attention. The 2nd acted as Regimental Sergeant Major, filling the relatively small radio room with pungent smoke from a Sherlock Holmes type pipe. I asked when I might be allowed to touch the key. Both 1st and 2nd swung round on me and frowned. Their expression spoke for them. I had a lot to learn.

We sailed from Liverpool to Quebec and Montreal a week later with all the pomp and circumstance befitting the occasion. On the second day out I became seasick, and remained in this state during the outward voyage and most of the trip back. However, this did not prevent me from standing my watch even if it did mean being overshadowed by the 2nd with clouds of accompanying smoke.

The 2nd seemed to take a liking to me probably because I did not argue with him. In fact I was panic stricken at the sight of him! I soon got into the way of operations and once it became apparent I could handle traffic I found myself clearing 90% of the day's messages. When I took over watch from the 2nd there was always a pile of telegrams waiting which "had just that minute been handed in". When it also came to light that I could copy the nightly press from WSL, I found myself on some weird watches. I kept the 0400-0800, in which the press was received, followed by the 1200-1600 watch which meant I could not enjoy the mariner's proverbial afternoon nap. I would have to reappear at 1800-2000 to relieve the 2nd for dinner. On top of this I was permanently vulnerable. During the day I would be reading in my cabin when the sound of knuckles on the latticed door would make me jump. "Just stand by on 500 Joe", the Senior Man would bawl. His excuses varied from having to attend to bodily functions - expressed in rather a crude way - to visiting the Chief who seemed to be spending most of his time encapsulated in the radar hut trying to get the new equipment 'locked in'. Joe, by the way, is not my name. I soon found out that this was the expression used by all senior men to juniors. I was told it should be regarded as a term of endearment!

The 3rd and myself had been lectured on the way to do things by the 2nd. We had also been told not to adjust the Morse key. The 3rd took this a step further and rarely touched it at all! At first I tried to use it as the 2nd had left it - about $^1/_8$" gap with 14 pounds of tension. From this you will gather that his method of sending was by banging the key with the palm of his hand turned downwards. True 'pump handle' operation. It was agony to me. Eventually I tempted providence by changing it to suit myself, but I always gave myself about ten minutes before the end of a watch to get it back to its normal state.

Our first Canadian station on MF was Belle Isle, memorable for its Iceberg Warnings. The run up the St. Lawrence to Quebec was fantastic. The river was quite narrow in places and the rolling forests and occasional small settlements we passed at some 17 knots were a delight to the eye. After Quebec, on to Montreal and a 3 day turn around. I was disappointed that I did not see either city by daylight. This was due to the 2nd who even in port always came up with 'little jobs' that kept the 3rd and I busy until dinner.

Strange device

On the voyage back we passed our sister ship *Empress of Canada* and the Chief exchanged a few words with someone who I can only assume was another '30-year man'. A few of the crew sent telegrams to friends. At a penny a word this was cheap, but one steward nudged me with a knowing wink and asked if I could send his message "as a note"!

Berthing at Liverpool was an event that sticks in my mind. We were in the days when the bridge held few electronic devices. Radio telephony in any form was not fitted. Communication had to be by the key. Our arrival had been signalled to Seaforth GLV, and a pilot boarded at the Bar around 0500 in dense fog. We continued at about 5 knots up the river.

The 4th Officer appeared in the radio room with a strange device the pilot had brought on board with him. We were to try out a new system. On opening the canvas bag we discovered a walkie-talkie! I studied the controls. My instructions were to go out on deck and call "Port Radar" who would give us berthing instructions. Proud of this responsibility I made my way to the upper deck and commenced operations.

"Port Radar, Port Radar, hello Port Radar this is Empress of France."

No response.

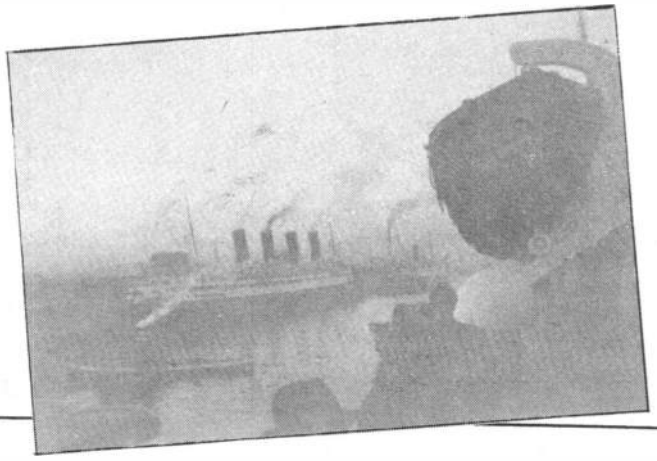
I called again. I could hear echoes from the forward end of the ship where a PA system seemed to be giving out orders. I heard the dull throttle of engines and walked across to the port side. The lights and shape of a tug could just be made out in the mist.

I continued calling at intervals and began to worry. What if the whole operation had been held up because of me? I checked the set's controls but everything seemed to be in order.

"What are you doing laddie?". I turned to face a small man with a likeness to Wilfred Hyde-White. The scrambled egg on the cap peak confirmed what I feared; the Captain. I had not been within 30 feet of him since I joined.

"I'm calling Port Radar Sir", I stammered.

"Well you're wasting your time now," he replied, not unkindly. "We've been alongside Gladstone Dock for ten minutes".



CLUB NEWS

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

Axe Vale

The Axe Vale Amateur Radio Club meets on the first Friday of every month at the Cavalier Inn, Axminister at 7.30pm. RAE classes are held at St. Clare's Centre, Seaton, and they still have a few spare places for latecomers. 2 Dec: Club Dinner (limited to members and one guest per member). Further details are available from Peter Reach G3GOS on Axminister 34259.

Barry College

The Barry College of Further Education Radio Society meets on Thursday evenings at the Annex, Waycock Cross, Barry starting at 7.45pm. There are Morse classes as well as a lecture or demonstration.

Bath

The Bath and District Amateur Radio Club meet every other Wednesday at the Englishcombe Inn, Englishcombe Lane, Bath at 7.45 p.m. Details from Trevor Whitehead (PRO) on Bath 319150, or Mike Mason (Secretary) on Bath 311046.

Biggin Hill

The Biggin Hill Amateur Radio Club meets at the Biggin Hall Memorial Library at 8pm on 13 Dec, according to provisional information received many months ago.

Braintree

The Braintree Amateur Radio Society meets on the first and third Friday of each month at the Braintree Community Centre in Victoria Stret at 7.45pm. 5 Dec: *Swept Frequency Testing* by John Saunders G30LU. 19 Dec: Christmas Party (Members/guests by ticket). Further information from Pat Penny G6TAF on Braintree 26487.

Bromsgrove

A newly formed club, the Bromsgrove Amateur Radio Society holds its meetings on the second Tuesday of each month at Rigby Lane School. More information from Alan Kelly G4LVK on 021-445 2088.

Burton-on-Trent

The Burton-on-Trent and District Radio Society meets once a week on a Wednesday evening at the Stapenhill Club and Institute in Main Street, Stapenhill.

Bury

The Bury Radio Society meets each Tuesday evening at 8pm in the Club Room at the Mosses Youth and Community Centre, Cecil Street, Bury. Main meetings are on the second Tuesday of each month. On 13 Dec they have their Annual General Meeting followed by wine and cheese. More details from Brian Tyldsley G4TBT, on Burnley 24254.

Cambridge

The Cambridge and District Amateur Radio Club has the following activities lined up for the month, at its weekly meetings each Friday at 7.30pm in the Visual Aids Room, ground floor, Coleridge Community Centre, Radegund Road, Cambridge: 2 Dec: Christmas 'do' at Madingley Village Hall. 16 Dec: informal meeting, Morse class, on air. More details about the Club are available from David Wilcock G2FKS, on Cottenham 50597.

Cambridgeshire Repeater Group

This group has recently found itself faced with site rentals for its repeaters, after getting them free of charge for many years. It looks as though rentals for GB3PI, GB3PY, GB3PT and GB3PS could come to £600 per year. Membership applications should be sent to Mike Watson G4CWI, 25 High Street, Haddenham, Cambs.

Cheshunt

The Cheshunt and District Amateur Radio Club is having a junk sale on 7 Dec, and a natter night on 14 Dec. Their meetings are held at the Church Room, Church Lane, Wormley every Wednesday at 8pm. Further details from Roger Frisby G40AA on Hoddesdon 464795.

Denby Dale

Denby Dale (Pie Hall) and District Amateur Radio Society meets at the Pie Hall every Wednesday. More details from J. Clegg G3FQH on 0484 862390.

Derby

The Derby and District Amateur Radio Society usually meets on Wednesdays, at the Oldfellows Hall (top floor), 119 Green Lane, Derby at 7.30pm. Some meetings are restricted to members only. Details from Jenny Shardlow on Derby 556875.

Droitwich

The Droitwich Amateur Radio Club meets on the first Monday of each month at the Scout HQ, North Street, Droitwich.

Echelford

The Echelford Radio Society meets every second Monday and the last Thursday in the month at 7.30pm, for an 8pm start, at The Hall, St. Martin's Court, Kingston Crescent, Ashford, Middx. Club nets (non-members welcome) are on Sundays, 1000 local time on 1.93MHz, and on Wednesday 2000-2100 local on 144.575MHz FM.

Edgware

The Edgware and District Radio Society meets at 145 Orange Hill Road, Burnt Oak, Edgeware on the second and fourth Thursdays of each month at 8pm. 8 Dec is provisionally down as being a junk sale.

Fareham

The Fareham Radio Club meets on Wednesdays at 7.30pm at the Porchester Community Centre, room 12. Dates for the month are: 7 Dec *Tests on Your Radio* by G8GNB. 14 Dec: natter night/on air. There are no meetings on 21/28 Dec. More details are available from Brian Daven G4ITG on Fareham 234904.

Glenrothes

We have few up to date details on the Glenrothes and District Amateur Radio Club, but apparently several members have a net at 7.00 p.m. daily on 28.500MHz.

Greater Peterborough

The Greater Peterborough Amateur Radio Club holds its meetings at Southfields Junior School, Stanground, Peterborough at 7.30pm, usually on the fourth Tuesday of each month, depending on schools being

in session or not. On 15 Dec they have a get-together at The Windmill, Orton Waterville, at 7.30pm. The Club has a net on Mondays at 2000, on 21.200MHz or thereabouts.

G-QRP

The G-QRP Club is having its 1983 QRP Winter Sports (CW) event on Dec 26 and Jan 1. Full details from Fred Garratt G4HOM, 47 Tilshead Close, Druids Heath, Birmingham, B14 5LT.

Harrow

The Radio Society of Harrow holds its meetings at the Harrow Arts Centre, High Road, Harrow Weald at 8pm on Firdays. 2 Dec is an informal and practical evening, and 8 Dec is a junk sale.

Inverness

The Inverness Amateur Radio Club meets every Thursday at the Cameron Youth Club, Planefield Road, Inverness at 7.30pm. Present projects include a power supply unit and a 2m transceiver. Morse classes are also held each week. For further information call Bob Irwin on Inverness 221056.

Ipswich

The Ipswich Radio Club meets on the second and last Wednesdays in each month at 8pm, in the Club Room of the Rose and Crown, 77 Norwich Road, Ipswich. Morse classes are usually held on the other Wednesdays, but check beforehand with the Secretary Jack Toothill G4IFF on Ipswich 44047.

Kelso

The Kelso Amateur Radio Society has weekly meetings on Mondays at 7.30pm in the Kelso Community Centre. For further information contact either Bruce Cavers GM4UIB on 0573 24654, or Andre Saunders GM3VLB on 0573 24664.

CLUB NEWS

Lincoln

The Lincoln Short Wave Club holds formal meetings every second and fourth Wednesday of the month beginning at 8pm. On 7 and 21 Dec they have Morse classes and RAE tuition. On 14 Dec they have a Christmas social evening, and on 28 Dec they have an activity night.

Magherafelt

The Magherafelt Amateur Radio Society meets at 12 Garden Street, Magherafelt on the first Tuesday in each month, and a varied programme of events is being planned for the coming season. Morse classes are held each Tuesday evening and an RAE class is held in the local Technical College on Monday evenings.

Visitors and new members are most welcome. Further details and programme are available from the Secretary, Jack Chapman (G14LVC), Tel: 0648 32096.

Maltby

The Maltby Amateur Radio Society meets every Friday evening at 7pm at the Methodist Church Hall, Maltby, Rotherham. The Club has a regular Morse class and a computer enthusiasts' corner. Dates for the month are: 2 Dec: *Novelty Electronics*. 9 Dec: *Three in a row*. 16 Dec: family entertainment.

Microwave Society

This society was recently formed to cater for those interested in microwaves, especially in the bands above 10GHz.

An excellent data pack is produced which assumes no knowledge of microwaves and gives the newcomer all the information he needs to build and operate a system. Details are given of some excellent sites and also information on where to obtain the bits. There is a newsletter called 'Waveguide' with up to date society news, and pages for the data pack, so increasing the information available to members. Excellent test gear is available to members in the event of problems being encountered.

The society has organised several events including the trip to Axe Edge recently reported in this magazine. It is hoped to organise regional meetings during the Winter months and there is a very full programme of club talks.

For full details of the society, please contact: Glen Ross G8MWR, 81 Ringwood Highway, Coventry. Telephone: Coventry 616941.

Milton Keynes

The Milton Keynes and District Amateur Radio Society holds its meetings at the Lovat Hall, Silver Street, Newport Pagnell, at 8pm on the second Tuesday of every month. Contact: David White on Milton Keynes 501310.

Newbury

The Newbury and District Amateur Radio Society meets monthly (2nd Tuesday of the month) usually at Newbury Technical College. On 13 Dec they have a Christmas social.

North Bristol

Meetings of the North Bristol Amateur Radio Club are held at SHE 7, Braemar Crescent, Northville. Dates for December are: 2 Dec: Committee meeting and natter night. 13 Dec: Junk sale. 20 Dec: Horizon electronics open. 27 Dec: Annual General Meeting. Meetings are held every Friday from about 7pm to 9pm and RAE and Morse classes run at the same time.

North Devon

The North Devon Radio Club meets on the fourth Wednesday in each month at 7.30pm, at Pelton Community College in Barnstaple ('even' months), or Bideford Community College ('odd' months).

Northern Heights

The Northern Heights Amateur Radio Society meets at the Bradshaw Tavern, Bradshaw, Halifax. On the second and fourth Wednesday of the month they have a lecture, and a 'noggin and natter night' every other Wednesday, all at 8pm. On 14 Dec they have a social night. Further information from Brian Aspinall G6CJL on Bradford 83442.

RATEC

The Radio Amateurs Technical Engineering Club exists to promote the constructional side of the hobby, and they plan several major projects before Christmas. One is a 23cm transceiver, for use with a repeater in the Manchester area. Other projects 'on-stream' are a 2m to 70cm transverter, a 24A PSU, a 2m wavemeter and a general purpose frequency synthesiser.

The Club meets every Monday at 8pm at the British Legion Club, Moor Lane, Woodford.

Reading

The Reading and District Amateur Radio Club meets at the Clubroom, The White Horse, Peppard Road, Emmer Green, Reading on alternate Tuesdays. Details

CLUB NEWS

from Chris Young G4CCC on Reading 471761. There is also a club net on 145.325MHz from about 8pm on Mondays.

Rhyl

The Rhyl and District Amateur Radio Club meets on the first and third Mondays of the month at the lst. Rhyl Scouts' Hut, Tynewydd Road, Rhyl at 7.30pm. Information from John McCann GW4PFC on St. Asaph 583467.

Skelmersdale

The Skelmersdale and District Amateur Radio Society meets every Thursday at 7.40pm at the Dunlop Sports and Social Club, White Moss Road (next to the football ground).

Smiths Industries

The Smiths Industries Radio Society meets at the Club House, Newlands, Bishops Cleeve. on 8 Dec they have a fast-scan TV demonstration. As from 12 Jan, they will be meeting every fortnight.
Although the Club was formed to bring together amateur radio enthusiasts working in the Smiths factory, membership is open to the publis

South Cotswold

The South Cotswold Amateur Radio Society meets at the Scout HQ , Dr. Browns Road, Minchinhampton on the second and fourth Wednesdays of each month. Details: contact R.J. Burnett G4RJB on Nailsworth 2874.

Southdown

The Southdown Amateur Radio Society meets on the first Monday of every month at the Chaseley Home for Disabled Ex-Servicemen, Southcliffe, Eastbourne, at 7.30pm for an 8pm start. The December meeting is the AGM.

South East Kent

The South East Kent (YMCA) Amateur Radio Club meets at the Dover YMCA, Godwynehurst, Leyburne Road on Mondays for RAE classes, Tuesdays for Morse practice, and Wednesdays for main Club meetings (all at 7.45pm).

Club nets are held on 3.745MHz and 144.395MHz, both at 1100 local time on Sundays.

Stevenage

The Stevenage and District Amateur Radio Society meets on the first three Tuesdays of the month at: T.S. Andromeda, Fairlands Valley Park, Shephall View, Stevenage. 6 Dec: social evening. 13 Dec: constructors's evening. 20 Dec: natter night. Morse Classes are held before ech meeting at 7.15pm, and there is a weekly net on Sundays at 7pm on 145.250MHz FM. Further details are available from the Club's Secretary, Cliff Barber G4BGP, on Baldock 893736.

Stockton

The Stockton and District Amateur Radio Group meet every Wednesday at 7.30 p.m. in the Billingham Community Centre. RAE classes, construction evenings and visits by guest speakers are among their activities. Membership is 50p and entry to meetings costs 20p.

Stourbridge

The Stourbridge and District Amateur Radio Society normally meets on the first and third Monday of each month. 5 Dec: informal meeting. 19 Dec: main meeting. The Society meets at The Garibaldi, Cross Street, Stourbridge at 8pm.

Stratford-upon-Avon

The Stratford-upon-Avon and District Amateur Radio Club meets at the Control Tower, Bearley Radio Station, Bearley on the second and fourth Mondays of each month starting at 7.30pm. (Talk-in available on 145.55MHz).

Swale

The Swale Amateur Radio Club meet Nino's Restuarant, 43 High Street, Sittingbourne. More details about the club can be obtained from B. Hancock G4NPM on Minster 873147.

Thanet

The Radio Club of Thanet meets on the second and fourth Tuesday of the month at the Grosvenor Club, Grosvenor Place, Margate at 8pm, with a Morse class at 7.30pm. Club nets are on 28.4MHz at 9.30am on Sundays, and on 145.575MHz at 8pm on Thursdays

Vale of White Horse

The Vale of White Horse Amateur Radio Society meets at the Canteen and Social Club, Milton Trading Estate, Nr. Abingdon, on the first and third Tuesday of each month. Club nets: Thursdays 7.30pm 28.750MHz, and Sundays 8pm 145.200MHz.

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

DEALER PROFILE

This month, Peter Dodson takes a trip to the 'Deep South' to talk to two electronic enginers who made Bredhurst Electronics what it is today.

Hiding in a quiet backwater in Sussex, only yards from where the A23 carries fun-loving Londoners to Brighton, is the village of Handcross. Not, you may well say, an ideal situation for a quietly ambitious firm like Bredhurst. But you would be wrong: chosen for its natural charm, the alternative attractions of antique shops, a National Trust garden — not to mention some very natural pubs — customers can enjoy adequate parking facilities often lacking at high street shops. As senior partner Richard McLachlan says - "amateur radio equipment in a shop window means nothing to most people. On the other hand, the enthusiasts are willing to travel (within reason) to buy good equipment".

Adequate parking facilities

And if a doubling of turnover is a vindication of Richard's judgement, he has picked a winner.

Richard McLachlan's background lies in industrial electronic control systems, which brought about the meeting with his present partner, Graham Hensby: his association with amateur radio goes back to 1960 when, at the tender age of 14, he earned his callsign G3OQT. As for the seeds of Bredhurst Electronics, they were sown in what can only be described as a 'garage sale' up in Cheshire! In charge of the Northern area office of an electronics firm in 1975, Richard started selling amateur radio equipment as an agent for his brother-in-law on a part-time basis.

Small village

Indeed, the garage was so damp that his wares were kept in a trailer — a situation which caused considerable concern, as anyone with a ball-hitch could have made off with his entire stock! Meanwhile, determined to have a professional image from the start, the name 'Bredhurst' was born — having no significance whatsoever, apart from being a small village in Kent where Richard once lived.

But within six months he discovered that his existing stock-range was not adequate for the customers he was winning, and Richard branched out into other makes of equipment.

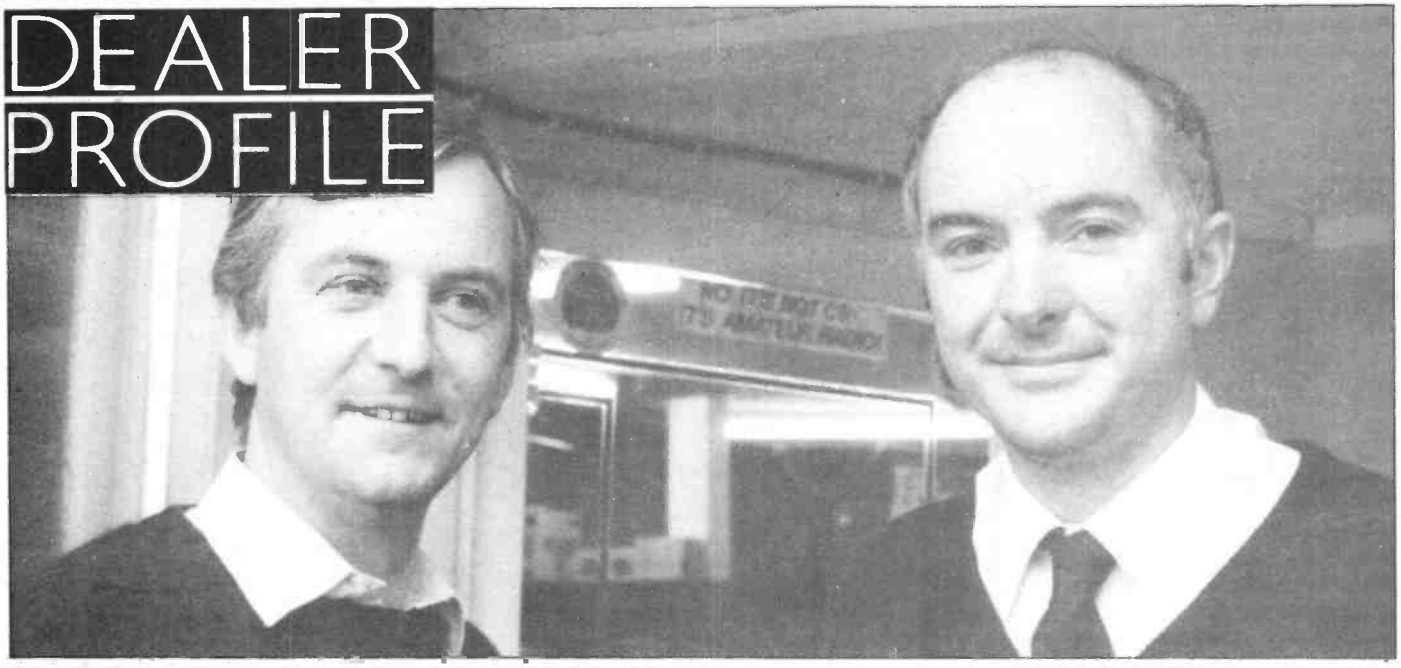
Far left: the Bredhurst showroom - no difficulty finding your way home again! Below left: Graham Hensby. Above: Richard McLachlan in the showroom. Left: mine's a pint.

However, promotion in 'the day job' to the head office in Worthing in 1978 meant a change of location for Bredhurst Electronics to Storrington, but although rapidly gaining a reputation in the world of amateur radio, business was still conducted in the garage! In fact, within twelve months, trade was such that the McLachlan household, which included wife Ann and (then) seven year old son, could no longer cope with Richard's amateur radio involvement: what had started as a part-time activity had rapidly developed into a full-time job: it was make your mind up time!

As a result, Richard asked his colleague from the world of industrial electronics, Graham Hensby, to join him in the new venture. Graham, who had also moved down to the Worthing office with his wife Rosemary and their two children, was not, at that time, a radio amateur, but took his exam in 1980 to be given the callsign G8YYQ. Together, they rented what could only be described as a garret — a little second-floor room in the eaves of an old cinema in Lancing, near Worthing, with a cupboard which they did their servicing in! The lack of space was such that if a customer wanted more than 20 feet of cable, Richard or Graham had to measure it out on the pavement outside — they even painted marks on it!

Happily, this situation only lasted for six months before the pair made their big decision to move to Handcross in the August of 1980. Their new premises, some 300 years old, occupied a prominent if not dominant position in the village; their prospective clients could reach them easily by motorway from a wide south coast catchment area.

DEALER PROFILE



Above: partners Graham Hensby and Richard McLachlan.

With the resultant increase in trade came the necessity to increase the size of the staff. In full charge of servicing cam Huw Billingham (G8IPF) — a man of vast experience in military electronics who built much of the local repeater equipment, and an ex-transmitter expert with the BBC. In their brand new sales area, Mark Bridle (G8SVD) and Gordon Fleming (G6HWP) were installed. To see to the mail-order business (which constitutes 40% of trade), Elaine Forster was employed in a part-time capacity. "This is a broad outline of our tasks" — as Richard says — "we can all turn our hands to servicing if necessary".

In charge of servicing - a man who built much of the local repeater

Bredhurst Electronics holds an almost unique position in the amateur radio industry in that although the firm is not tied to any particular importer, it does trade through most of them. This enviable situation has been achieved by patience and gentle persuasion over a period of four or five years, which has resulted in excellent relationships with all concerned in distribution. It has meant giving the customer the benefit of direct operational comparison: it has not, necessarily, meant the lowest prices. On the other hand, it does mean an excellent after-sales service. "I had a customer in here recently" said Richard "who wanted me to repair his recently-bought rig. When I asked why his original retailer couldn't help, I was told that the equipment had been sold at a rock bottom price and he refused to touch it!"

The problem with this sort of situation is that radio amateurs are in the business of communicating, and if any dealer is seen to be indulging in dubious practices, word soon gets around. It works the other way, of course, and the word down Sussex way is "go to Bredhurst — they won't stitch you up with anything that you don't want!" And indeed, the whole philosophy of the McLachlan/Hensby set-up is that they have managed to work up their business without battle or hassle. "We don't want to make a quick buck in six months: we want to be around in five — ten — years: we don't want to die of heart attacks at 45!"

Not tied to any importer

So, over the years, Bredhurst have cultivated firm relationships with importers of Yaesu, Trio, Icom and FDK equipment. Similarly, they handle Drae, Daiwa, Welz, Katsumi, Holushin, Kenpro and CDE gear. And so it goes on — Datong, Microwave Modules, Jaybeam, Hygain, Himond, Mini Products, G-Whip, Telecom, Adonis, BNOS and Tono. The Tono equipment on display at Handcross was particularly interesting in that the keyboard can be used for sending RTTY signals and morse: likewise it can receive printer signals, but isn't very happy about duff morse!

Like most other amateur radio distributors, Bredhurst's involvement in citizens' band radio was minimal. But unlike many other directors of amateur radio stockists, Richard was quite emphatic about how amateur radio had gained from the ranks of ex-CBers'. "The majority of new amateur radio enthusiasts around here have come from CB. I can't count the number who have come to us for amateur radio equipment".

But although the amateur radio side of Bredhurst Electronics constitutes the bulk of their business, a new element has been added — that of Bredhurst Communications. It all started when the Handcross firm received numerous enquiries about PMR — private mobile radio. This was two years ago, and, at the time, Bredhurst was not in a position to help people like haulage contractors and doctors who needed communications systems between base and mobile stations. Now, Bredhurst Communications is sold around Sussex by Graeme Bowring. With their demonstration car completely equipped with four of the available transceivers, Bredhurst make Telecom and Securicor communications available to their customers. Their aim is to provide the full spectrum of radio equipment for amateur and professional: they even provide hand-held units for organisers of Country shows!

So, for Richard and Graham Hensby, it has all fallen into place. Careful planning and a gentle, unobtrusive infiltration of the industry has paid dividends. Only one trauma has marred their success story: in the Spring of 1983, someone drove a Ford Granada right through the front window of Bredhurst Electronics, pushing all before it back a good six feet and bombarding shelves of expensive radio equipment with U-bolts. Well, you can't win 'em all!

BREDHURST ELECTRONICS

Classified Ads

•**RX1155** Unmodified working offers 3E 10 meter beam £10 wavemeter TS174/U 20 to 250MHz £10. Super 8 cine camera Kodak Auto £10 or exchange for 16mm film Opticsound G8BSK. 290 Priory Road, St. Denys, Southampton SO2 1LS.

•**FOR SALE** HRO MX coils p/pack overhauled £65. BC348 £45 wanted, Racal SSB, Adaptor for RA17L digital freq. meter up to 200 M/Cs 144/28 convertor. Datong audio and notch filter. Milton Keynes 0908 31495.

•**YAESU** FRG7700, FRT7700, FRV7700C for sale all in mint condition and all instruction booklets. Can be seen and tried £375ono. Can deliver within 25 miles or Oxford.

•**FOR SALE** Short wave magazines May to December 1980. January to December 1981. January to December 1982. 50p each. Marris, 35 Kingswood House, FArnham Road, Slough, Berks.

•**WANTED** case for AR88 receiver any condition or would buy junk RX with case D or LF. Tel: G4MNB Evenings0793 826325.

•**EXCHANGE** Cobra 148 GTL DX HI-Mid-Low AM FM SSR CW built in SWR nice rig swap for HF receiver FRG7 why. Mr. Simner 103 Court Road, Orpington, Kent BR6OPU. Orp 66.25332.

•**FOR SALE** or exchange Icom IC 255E 2m FM Transceiver 4w-25w 144-148MHz - 5 memories, Band scan mic scan PA4. Pre-amp fitted good condition. £180ono or exchange for HF transceiver. KW2000 WHY. AR 88 £30 plus P&P. Pye T40 vanguard Hi Band AM not converted £30.plus P&P. Jaybeam 5 elmt XY as new £20. All letters to GM6UHU at 30 Newlands Drive, Kilmarnock, Scotland KA3 2DW.

•**EXCHANGE** Shotgun CB radio 3 amp PSU both new and still in boxes. Plus SWR meter matcher and aerial for HF receiver. Tel: 01-317 9200.

•**HAVING** no job forces sale Yaesu FT 200 HF transceiver working but needs attention. Hence low price £175. Would swap for GC RC or WHY of similar value. Phone Stevenage 720624.

•**DENTROL** super tuner plus. Coax and open wire output and Balun £70 Diawa CN620A 1.8-150MHz Cross pointer SWR-Power metrer £30 G4BXR Tel: 0908 566 266 After 5.30pm.

•**FRG7700RX** with memory £275 Daiwa CNA 1001 Auto-ATU £120 MM 432MHz SS6 Transvertor 28MHz input £100 all in excellent condition QTHR. S.F. Brown, G4LU, Idlewild, Pant, Oswestry, Shropshire.

•**WANTED** or swap Avari video game with 3 games ATC etc swap for IC 2E/FT290r/Ar240A/F207/SX200N or any mobile or portable 144-146MHzz transceiver or swap for R600 R1000 fry 7700 or for two Pye portable transceivers handsets. Tel: 0875 320 642 Midlothian, Scotland.

•**SEM** 12 metre transmatch £15 SEM 2 metre preamp unused fit inside rig £5 SEM 3 way antenna switch £10 all mint. Low £22 or swap stand mic or audio filter WHY? G6RBY 01-446 4932 evenings.

•**ONE** Centronics Avtec teleprinter, would exchange for any HF gear, i.e. ATU or freq counter or QRP transceiver. M & Mrs D. Clifford, 160 Goldsworthy Way, Slough, Berks. Tel. Burnham 64567. G6UFV.

•**TRIO** TS700G 2m USB LSB AM FM CW 10w/OP plus VOX3 immaculate cond. with original packing. £260. ASP 670 2m magmount 5/8 whip £20. Tunbridge Wells. Tel. 0892 42893.

•**WANTED:** PYE Pocketphone receivers (PFI) preferably with crystals, must be in working order. Also 2 metre receiver SR9 or similar scanner considered. G. Brown, 36 Wellshot Drive, Cambuslang, Glasgow. G72-8BT. Tel. 041 641 1489, after 6pm.

•**GENERAL** Coverage receiver, DX300 digital readout 20kHZ-30mHZ synthesised, as new with original packing £120. Class D, wavemeter 240v operation £12. Tel: 0925 35330.

•**JAYBEAM** antenna 2-metre 10Y/2m new never been erected. £25. or exchange for some other equipment. 'Leson' 252A base mike as new £25. Woodstock. 812278. D. W. Prewitt, Burditch Bank, Wootton, Woodstock, Oxford.

•**FOR SALE** Trio model JR500S double conversion communications receiver WWV 3.5 29.1MHz SSB CW standby AM AM ANL standby new valves service manual £40. ono. Buyer collect please. E. Vaughan, 108 Micklefield Rd, High Wycombe, Bucks.

•**EDDYSTONE** EC10 communications receiver unmarked working first class covers from 550 KCS to 30 MCS CW, AM, SSB. £75. Harold Froggatt, Hague Bar Rd, New Mills, Stockport. New Mills 44087.

•**EXCHANGE** AKAI x 355 reel tape recorder many features for comms receiver or Spectrum computer and software also have other interesting items to exchange for above items. Findley, 27 Keytes Lane, Barford, Warwick.

•**FOR SALE** 1 com 202 SSB CW 144.00 to 144.400 NICADS MIC carrying strap etc. £90. ono. Wood & Dougals 2M TX working boxed S23 £20. Tel.Weymouth 786930.

•**YAESU** FT102 FM Board fitted as new £625. Tel. Wolverhampton 764938.

•**DX 302** Communications receiver. Quartz synthesized. General coverage. 10KC - 30MHZ continuously digital read out. All usual features AM, USB, LSB, CW, mains AC plus 12vDC very good condition. 12 months old in original box. £120 ono. Bill Abraham, 42 park Court Rd, Bridgend, Mid Glam. Tel. 0656 57287.

•**FT101E HF** transceiver, vgc, complete with MIC, handbook, service manual, mains and DC leads. Recently serviced by SMC £350 ono. Reason for sale: want to buy new 2M multimode. Contact: G4RGB. Tel. Medway (Kent) 0634 30822 answerphone.

•**WANTED:** Cubic Astro 103 working or U/S. with or without PSU. How much? GM4KGJ (2THR) Tel. Work 0224 872521. Home 0224 24774.

•**SWAN/CUBIC** Astro 103BX 2 band Tcvr £475. Swan/Cubic PSU6 20amp fan etc £50. Swan HF Linear pair S72B's £225. Swan ATU ST2A 3kW £85. RMY system digital inc VDU-keyboard - terminal unit rX/TX etc will split Datons ASP/Processor £30. Daiwa El-Keyer £25 93WPO El Key £10. AF Smyth GM3XNE, 4 Afton Place, Ardrossan, Ayrs.

•**V.BROPLEX** Delux keyer/paddle £35. CW keyboard with memory £40. oskarbloc SWR £20. Yaesu YC301 monitor scope £75. Trio LF30 LPF £10. Swan/Shure 444 Desk Mic £25. Lar 1kw Ant switch £5. HB HF Linear 3 x PL509 500watts £50. Toroidal trans 20vx10amp twice £10. A.F. Smyth (GM3XNE), 4 Afton Place, Ardrossan, Ayrs.

•**AVANTI** PDL2 Beam 12db gain verticle and horizontal polarization boxed and in perfect condition plus 50ft of RG8U coax and two way antenna switch £75. Kings Langley 65823.

•**FOR SALE:** Scanning receiver Bearcat 220FB. VHf - UHF 20 memory channels £99. Also Discone antenna £15. Tel. 0742 369116. (Sheffield).

•**EXCHANGE:** Pansonic DR49 for ealistic pro 2002. Programmable scanner or Bear Cat 250 scanner receiver in good condition. C. Amess, 45 Rosevale Grove, Spring Bank, West Hull. Tel. (0482) 503482.

•**FOR SALE** Eddystone 1570 SW AM FM digital receiver as new £300. Tel. Guisborough 35879.

•**LF CONVERTER** for Racal RA17/117 10-980 kHZ £45. Spare film dial for RA17/RA117. £5. Homebrew 10w 2m FM Transmitter with mains PSU £20. Pye Vanguard TX/RX £20. Heathkit RF signal generator model IG102. £40. 100KHZ - 110MHZ. S.J. Haseldine, G8EBM, Leamington House, Windley Lane, Weston Underwood, Derays. Tel. Ashbourne 60755.

•**BASE** station SSB CB transceiver Presdient Madison with Sigma IV antenna. Full modifications. Cash offers or will swop for Yaesu FRG 7700 receiver or SSB 2M Rig with cash adjustment. AR88 for sale offers or will exchange 2M rig with cash adjustment. Please help - Circuit diag/instruction booklet for ICOM 280E FM 2M Rig. Please tel. 061 740 7708 evenings (Manchester).

•**YAESU** FT101Z MK1 Fan Mic ext. Spkr spare PAs mint condition. £400. Tel. 0484 661708 (Huddersfield).

•**SALE**/Exchange Sony ICF 2001 PLL RX DX160 HF RX Superstar 360FM TX/RX multimode 26 27 Linear 60/120W Amstrad 901FM TX/RX £250 ono. The lot or exchange for 2M multimode or WHY. All letters answered. Mr. J. Bicknell, 7 Chestnut Close, Lower Meadow, Quedgeley, Glos.

•**IC2E** boxed, as new, complete with two battery packs, mains charger and car charging lead etc £125. Tel. Maldon 57227 (Essex).

•**SELLING** Icom IC2E 2m hand held new Julay 1982. Little used, with battery charger and external speaker mike. £140. G6KNY Basingstoke 770421.

•**FT 901 DM** AM/FM/USB/LSB/CW with AM/CW filters DL/DC converter 160-10 MTRS matching ATU FC902 all in vgc complete with manuals, leads, etc. £585 ono. G6HQJ QTHR. Tel. 01 393 9115.

•**REDIFON** R551N 10kHZ/30MHZ solid state all modes, four filters, synthesized superb stability. new condition, high original cost £265. TR10 770 Dual band Mutek pre-amp £460. Wanted: Trio R820 receiver G4LW. Tel. Trowbridge 3166.

•**FT290R** portable all mode, with 5-7 amp PSU, mobile mount, case Nicads charger MM144/30LS Linear SWR meter, 10XY beam, 5/8L Co-Linear all leads etc. Best offer secures. Ring Seamus 61452W Newry 0693 61125.

•**TR10 TS51S** external VFO PSU mint condition for exchange for FT 401 or FT 200 or mobile sommercomp. Will sell for any reasonable offer. Tel. Wakefield 363663 anytime.

•**WANTED:** Any circuit diagrams for any receiver or scanner. Will refund postage. Thanks Duncan Reid 14 Briars Brook, Lathom, Ormskirk. Lancs. L405TH.

•**SUPERSTAR** 360FM, 800 channels & UK FM all modes CWkey, Bremi 200 watt mains linear, re-valved, all as new, value £200 plus, exchange for decent 2M transceiver. Tel. Jon. Ipswich 830327.

•**EXCHANGE** Sony TC765 as new boxed, for 144 transceiver preferably Trio TR9130 or similar. TC765 cost nearly £600 new. Peter Dawson Coventry 0203 711658.

•**TELEREADER** Tasco CWR610 little used £120 ono. Pye Cambridge Amiod 70MHZ crystals 70-20 MLZ, 70.26 & 70.45MHZ FM Board fitted £25 ono. Manual. Excellent cond. Tel. Aberdovery 367.

•**HY GAIN** 5 multimode 80 channel MH FM SSB LSS AM, offers around £75. Burton-on-Trent 221870.

•**HAM** International Concorde II, FM, AM, USB, LSB, CW, PA variable KC shift, vgc £150 ono. Test meter Sanwa 380-CE equivalent to AVO-8, hardly used £25 ono. Could deliver either items. Tel. 027587 2408 after 7.15 ask for Martyn.

•**TELDIS** PA 1345 upconverter with gain control 4-6db variable output frequency as new £25. Tel. 04492 672710.

•**FOR SALE** Belcom LS-102L microphone A-Donis 601 £225. Tel. Bognor Regis 822115.

•**SWOP** Sony ICF 2001 scanner keyboard entry and LCD frequency display good working order for Sinclair 48K Spectrum or 16K Spectrum with software. Robin Twose, 8 Hawthorn Ave., Headington, Oxford. Tel. 65156.

•**WANTED:** 32 foot lattice tower also 5PF7 tube suitable for SSTV monitor. Tel. 0532 550486 (preferably Yorks area).

•**FOR SALE:** Standard C78, Nicads, case, etc £165. Adonis mobile microphone, unwanted gift £30. Jaybeam 5XY with harness £30. AR88 £55. Buyer collects. John Rowlands G40JS. 021 445 3207 after 7pm.

•**FOR SALE:** Trio TR9000 slightly marked £240. TR2400 carry case mic £130. Mizuho SB2M, Nicads £80. Codar ATS, T28 PSU etc £60. DIAWA AF606 filter £50. Alan Kelly G4LVK 021 445 2088.

•**FOR SALE:** IC211E 2M multimode rig fitted pre-amp and pip tone with ICRM3 remote control with scanning mod. vgc £375. Also ICSM2 desk mic £20. GW3WSU ATHR. Tel. Bonvilston 04468 261

•**SALE/EXCHANGE** Yaesu FT480R & mods £230. Bremi 10A13.8V PSU £35. Yaesu FRG7 £130. Mirage B108 £85. Nikon EM plus motordrive plus 50MM F1.8 lens £100. Alvin Challen G6DTW Ashtead, Surrey 77945. NOT QTHR.

•**MAINS** Transformer. "Gardeners" 6.3V SA, 6.3V 1A, output. £3. "Gilson" output 300-0-300, 150mA, 6.3V 4A CT, 6.3V 1A, 5V 2A, £4. Many others. 2E26 RF output valve, £2. Edwards, Tel. 01 445 4321. (Nth London).

•**EXCHANGE**/Have 2000cc V4 Capri GT Zx81 & 16K Ram pack, IC4E 70cmHH Sony TC138SD cassette deck, Car graphic, wanted ATV converter rotator, multimode CB, 70cms converter, reasonable HF receiver. Watford 33034. Allan EXT 913.

•**FOR SALE** TR10 TR7800 2M FM mobile good condition, still boxed with NICADS. £175. Tel. 01 989 5855.

•**FOR SALE** Hansen FS500H PEP meter £40. CTE speedy 26-30MHZ mains Linear £40. Adonis MM-2025 mobile mike £14. Tel. 01 859 1688 (Eltham).

•**HAM** International multimode two handbook/manual, circuit diagram wanted by incurable tweaker!! Photocopy will do if very good. Your price paid. Tel. Eddie on 01 624 2546 or 01 257 5032.

•**COMPUTER** Sharp MZ80K (48K) excellent condition with £100 worth of software including SP5025 basic, forth language, many games and documentation. Originally cost over £500 will accept £295 ono. Tel. Derby (0332) 760773. G6MGI).

•**FOR SALE** 6 channel handheld crystaler for 29.880 29.860, 29.840 3 spares channels 5 watts output with leather case and strap and NICADS charger and rubber duck as new £40. Tel. 01 670 3185 evenings.

•**FOR SALE** ET1 magazine 1977 & 79-82 complete years . £10 for each year & p&p. Avo model 8 Mk5 £65. Tel. 0252 511048 after 6pm.

•**YAESU** FT290R complete with Nicads and charger, case & strap, mobile mount 7/8 whip and gutter mount. Adonis mobile mike, Jaybeam 10 element aXY beam with co-ax and two way antenna switch. The package only 14 months old. Yours for £275. G4MQM AS QTHR or ring Grantham 75983.

•**FOR SALE** Realistic DX160 communications receiver covers 150 kHZ to 30 MHz also manual, good working order £50. Buyer collects. Tel. Newcastle Tyne Wear 656728.

•**2ITT CREED** envoy electronic data printer any offers welcome, also Ham multimode 12W, AM, FM, USB, LSB for sale offers welcome plus Fly fishing equipment for sale, offers welcome. Tel. Kilbarchan (Renfrew) 2288.

•**VINTAGE** Valves, boxed, service sheets, electronic radio, mags, meters, relics. Mr. H. Blackburn, 57 Friern Watch Avenue, North Finchley, London. Tel. 445 6997.

•**WANTED:** Handbook Racal RA17L receiver. Sale: Yaesu FRDX 400 receiver with matching speaker £130. Sale: ARAC STE 107 receiver, 27 to 30 MHz, 430 to 440 MHz 12VDC £60. (Buyer collects). S. Smith, 19 Hyde Road, Kenilworth, Warwickshire. Tel. Kenilworth 54609.

•**WANTED** FDC copy of Amateur Radio for March 1983 to complete set. Please quore price. Mr. F.C. Maitland, Flat 312 Griffiths Road, Wimbledon, London SW19 1SP.

•**TRIO** TS430S SSB,CW,AM & FM 160-10 metre band includes Warc and 150kHz-30MHz General coverage receiver dual dig. UFO's 8 memory channels memory scan and lots more remarkable radio at a remarkable price £690ono includes MC42S mic (up-down) Phone evenings or weekends 0303 873010.

•**SALE** MBA-RO morse/RTTY reader LED display, boxed £150 ono. 30 Ferrites for PA FB-43-2401 £3.20 QRP frequency crystals (4) 3.5-21 £3.20. G.W. Grieveson, 91 Friday St. Bury St. Edmunds, Suffolk. Tel. Mildenhall 713350.

•**XSFORMERS** 240/220V AC isolated double wound metalcased fused heavy (very) duty plate rated continuous 2.0kw another 750 watt originally used for American kitchen equipment. Sensible offers please. Buyer must collect. Bournemouth. Tel. 0202 33624.

•**WANTED** by new G6 2m 15w Linear also up/down desk mike and other equipment suitable for FT290R. Please contact A. Barnett 10 The Larches, Warfield Park, Bracknell, Berks. Tel. 0344 882255.

•**YAESU** FRG7 18 months old, mint condition, no mods, ring Faversham (Kent) 533143. £120.

•**YAESU** FT290R charger, NICADS and 5 Ele halbar Yagi £190. Buyer collects. Tel. 0733 63851. (Peterborough) G3MLP.

•**RACAL** VLF adaptor for RA17/RA117 10-980 Kc/s £40. Spare film dial scale for RA17/RA117 £5. Homebrew 144MHz FM transmitter 10w mains PSU £25. Heathkit RF signal generator model IG102 100K c/s-110M c/s £40. All plus carriage. S. J. Haseldine, G8ERM. Windley Lane, Weston Underwood, Derbyshire. Tel. Ashbourne 60755.

• **WANTED:** Circuit diagrams or service manuals for any receiver or scanner of any band, any mode. Will refund postage. Tanks - 14 Briars Brook, Lathon, Ormskirk, Lancs. L40 5TH.

• **FOR SALE:** Lowe SRX30D digital comm. receiver 11 months old £120.

•**YAESU** FT290RD 3SK88 Aremods case Nicads charger ¼ wave matched compressor microphone Ex. cond. SMC-70N2 Colinear £255 ono. G4EZZ 01 863 3978 Eves, weekends P/EX 2M Base. Multimode. D. B. Andrews, 26 Kings Way, harrow, Middx. Tel. 01 863 3978.

•**COMPLETE** 2metre mobile/base station TR7010 TX/RX/SSB/CW 144.2-144.4 4 Ele Quad rotator 2M Whip & Magmount SWR metre 65W Linear £220. 10 metre FM rig Oscar Antenna £40. G41NV 051 724 3998. Buyer inspects and collects. (Liverpool).

•**IC-4E,** external microphone, spare Nicads, 12 volt regulator ¼ whip, charger £180. ono. Wanted: FT790 70cms portable. G6HEL QTHR. Tel. Milborne St. Andrew 301.

•**FOR SALE:** Trio TS510 HF transceiver in excellent condition. Offers? Wanted: Yaesu FR50B receiver. Elsworthy 27, Balton Way, Dovercourt, Harwich. Essex. CO12 4UP.

•**EXCHANGE** complete stereo disco and lightshow for Ham gear or WHY (equipment worth approx £2,000) HF, VHF, UHF, Microwave equipment wanted. Tel. Dave 051 430 9167. Partex considered.

•**AKAI** 1722L stereo tape recorder less one hour's use £80. Magnum six speech processor for Collins KWM-2 or S-Line £30. Comdel model CSP-11 processor £20. Both mint. Barker Williamson model 371-1 attenuator £10. H. barnett, P.O. Box 10, Evesham, Worcs.

•**SABTRONICS** bargains: 8610B 600MHz frequency counter £75 (list £114). 8110A 100MHz version £55 (list £77). 2015A LCD digital multimeter £65 (list £95). LP-10 logic probe £15 (list £28). All four nerw and unused. 0601 612295. (Nottm)

•**SALE** TA33 3EL beam 10/15/20 mtrs good condition with assembly instng. Suggest buyer collect or carriage extra. £50. Tel. 0202 579115 anytime.

•**FT480R** 2m multimode transceiver 143.500 - 148.500 MHz with hand mic. and stand mic. YD148 with up and down scannning buttons. Used as base station. £310. G8TUL Tel. Nelson 68548.

•**EXCHANGE** or sell Sony ICF 2001 AM/FM/SSB/CW PLL synthesized receiver, six preset memory, scan, LCD read out, mains/Batt 150Hz to 30MHz for 2m/700M mobile/port or sell £120 ono. (still in box). Tel. 01 521 9473 after 6pm. G6YDY.

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•**ICOM** IC202S with Nicads and charger £115. FDK multi 700EX 144MHZ FM transceiver £125. Tel. 0453 83 3411 (Nailsworth, Glos).

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•**SUPER** Stor 360 FM 26.115 MHz 27.845 MHz 5/8 wave antenna plugs power supply will exchange for FRG 7700 FT480R TR 9130 or will consider any Ham receiver or transceiver. Ring West Malling 846416 ask for Nigel after 4.30pm.

•**FOR SALE**/Exchange Super star 360FM 26.115 MHz 27.845MHz plus power supply 5/8 wave antenna - plus - coax £200 or exchange for FRG7700 FT480R, TR9310 or any Ham receiver or transceiver. Tel. West Malling 846416 ask for Nigel after 4.30pm.

•**COMMUNICATION** receiver Tandy DX302 10kHZ to 30MHz quartz synthesized digital frequency display CW/LSB/USB/AM 140vAC 12vDC or batteries £160. R. Walker, 1 Summerhill Gardens, Market Drayton, Shropshire. Tel. 0630 4646.

•**FT901DM** £545. FV901DM £145. FC901 £950 CPU25//RK £150. MM200 £950. YC305 £500. SRC830/M15 Marine Handheld, base charger 5,6,9,16,25 £800. No offers. May £155 (073 082) 2143.

•**GENERATOR** 1.5KV Briggs Stratton petrol, ideal for contest group, hardly used £90. Sweetman G4LR1 QTHR 01 894 0798.

•**934 MHz REFTEC** Colinear and beam antennas complete station only wants cable to start try UHF London within range. Tel. Ipswich 830 147 anytime now licenced Ham Reftec unused now.

•**ANTARCTIC** WSL cards wanted for my research collection. Cards from expeditions, bases, supply ships and islands needed (no Falklands). Will pay at least £1 each. G3BDQ 'Whitefriars', Friars Hill, Guestling, Hastings, Sussex.

•**SUPER** Star 760FM, FM, AM, USB, LSB, CW. 27.99125MHz possible convertsion to 10m plus 50w SSB linear 5/8 wave ant plus PSU will swap for FT101 Tel. West Malling 846416 after 4.30pm (Nigel).

•**SALE**/Swap SHIMIZU HF-10Watt transceiver £225. Lambdia 20A-13.8v PSU £50. 2 metre Cambridge £20. Looking for HF separates. Receiver, Racal, Collins, Marconi, etc. TX 200W SSB/CW (pref valve-PA). Goodrich G4NLA QTHR. Brighton (0273) 739841.

•**EXCHANGE** Have FT200 HF transceiver 10-80M with matching power supply. Want TS700G G8JDF phone Lewes (Sussex). 78080.

•**WANTED:** Circuits for R208, R209, type 61A and BRT400 receivers, also wanted: scope tube VCR139A or ECR30. Mr. A. Reynolds, 15 Kendal Green, Felixstowe;, Suffolk.

•**REALISTIC** DX-200 receiver 5-bands 80-10m as new £90. Tel. Orpington 70672.

•**COMMUNICATIONS** receiver Tandy DX-30210KHZ-30MHZ Quartz synthesized digital frequency display as new, in original box cost £289, for sale £120. R. Walker, 39 Ashbourne Drive, Pontefract, West Yorks.

•**WANTED:** 2 metre multimode tranceiver IC251E, FT225RD, TS700S, or 480R, 290, any good Multimode bought for cash. Also wanted: a cheap beam and 70cm Colinear. Might also want a cheap FM Rig. Tel. Dennis on Weymouth 787747.

•**YAESU** FRG7700M with 500kHZ filter. Immaculate condition. Straight swap for Trio R2000 in same condition, no cash, no offers, just exchange. Any takers? Tel. Eddie on 01 624 2546 evenings, or 01 257 5032 daytime.

•**YAESU** 7700 £225. Sony CRF320 £325. Sony 2001 £110. Panasonic DR49 £200. All mint condition. Also excellent Eddystone 750 £89.Hallicrafters SX110 £55. SX43 offers. SX100 needs BFO attention £75. York 59035.

•**WANTED** AR88 CR100 or similar HF RX in working order, preferably unmodded £40 available for good example. Will collect in north-east London area. Tel. Martin Smith 01 554 2767 after 8pm anyday.

•**FOR SALE** Trio R600 communications receiver 150KHZ-30.0MHZ AM, SSB, CW, brand new cost £255 will sell for £180. Tel. 02367 24189.

•**HARRIER** CBX converter 80CH (FM + LO channels) 6 watts output. Relay TX. TX lock CW possible option. Fitted spare jack sockets. Boxed £80. Tel: (Michael) Ingrebourne 45969.

•**RECEIVER** FRG7700 plus tuner FRT plus VHF converter FRV(E) all superb condition still under warranty must be seen in use. Sale reason? RAE morse passed transceiver needed £360ono. Phone Leeds 585806.

•**HEATHKIT** HW12 80 metre 200W SSB tranceiver in good condition. Bench mobile power packs manuals, space valves £85. jor exchange considered G3ZKD Penketh 2381 Evenings.

•**COLT** 32ODX AM/USB/LSB Convertible to 28MHz £90 Bremi BRL40 28MHz 140w amp (£30) 28MHz Pre amp (£25) Protel am 103 (£25) or all for £160 would exchange for Yaesu 290R or standard CS8 and Ni-cads Tel: 0908 616893.

•**EXCHANGE** have FT290R mint condition as new. Want TS700G phone Lewes (Sussex) 6099.

•**SX200N** Scanning receiver 26MHz to 514MHz AM/FM. Very little used boxed £195ono. DX television. Bush B/W converted to cover all bands and systems £40. HI-Fi rack, direct drive deck, amplifier, speakers £65 phone (Kent) 0732 823662.

•**SADLY** due to new (x)YL my trio TS130V, ICOM 1E2E and Sinclair ZX81 are for sale. Reasonable offers, swaps and PX's please, all enquiries with SAE. Martyn Bolt, 112 Leeds Road,Mirfield, Yorks.

Advertisers Index

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PASS FASTER

MODEL D70 MORSE TUTOR

Once you've decided to tackle the dreaded Morse Test you won't want to mess about. You'll want a learning method that is effective, painless, and that gets you on the HF bands FAST without any expensive retakes.

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The Morse Tutor generates a random stream of Morse characters to give receiving practice, but two very important features set the D70 apart from other systems.

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FL2/FL3 MULTI-MODE AUDIO FILTERS

These high performance audio filters will improve the performance of any existing communications receiver . . . in most cases, dramatically.

By selecting "SSB" mode you can: remove high pitched monkey-chatter from off-tune SSB stations; remove low pitched noises from other stations on the low side of your signal; remove tune-up whistles with a manually controlled notch filter; at the same time remove tune-up whistles with a second notch filter which tunes itself automatically (this function applies to FL3 only).

What marks out the Datong filters from the rest is the high performance of each of the above functions plus the fact that *all four functions are available simultaneously.*

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Whether you are an amateur or a professional and no matter which rig you use, the overcrowding on today's HF bands can spoil your reception. Simply adding a Datong audio filter in series with the speaker may be the biggest single improvement you will ever make.

Note that by retrofitting the FL2/A auto-notch conversion kit you can convert an FL2 to an FL3 at any time. The only difference is the auto-notch filter.

Prices: FL2, **£78.00 + VAT** (£89.70 total); FL3, **£112.49 + VAT** (£129.37 total); FL2/A conversion kit, **£34.49 + VAT** (£39.67 total)

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