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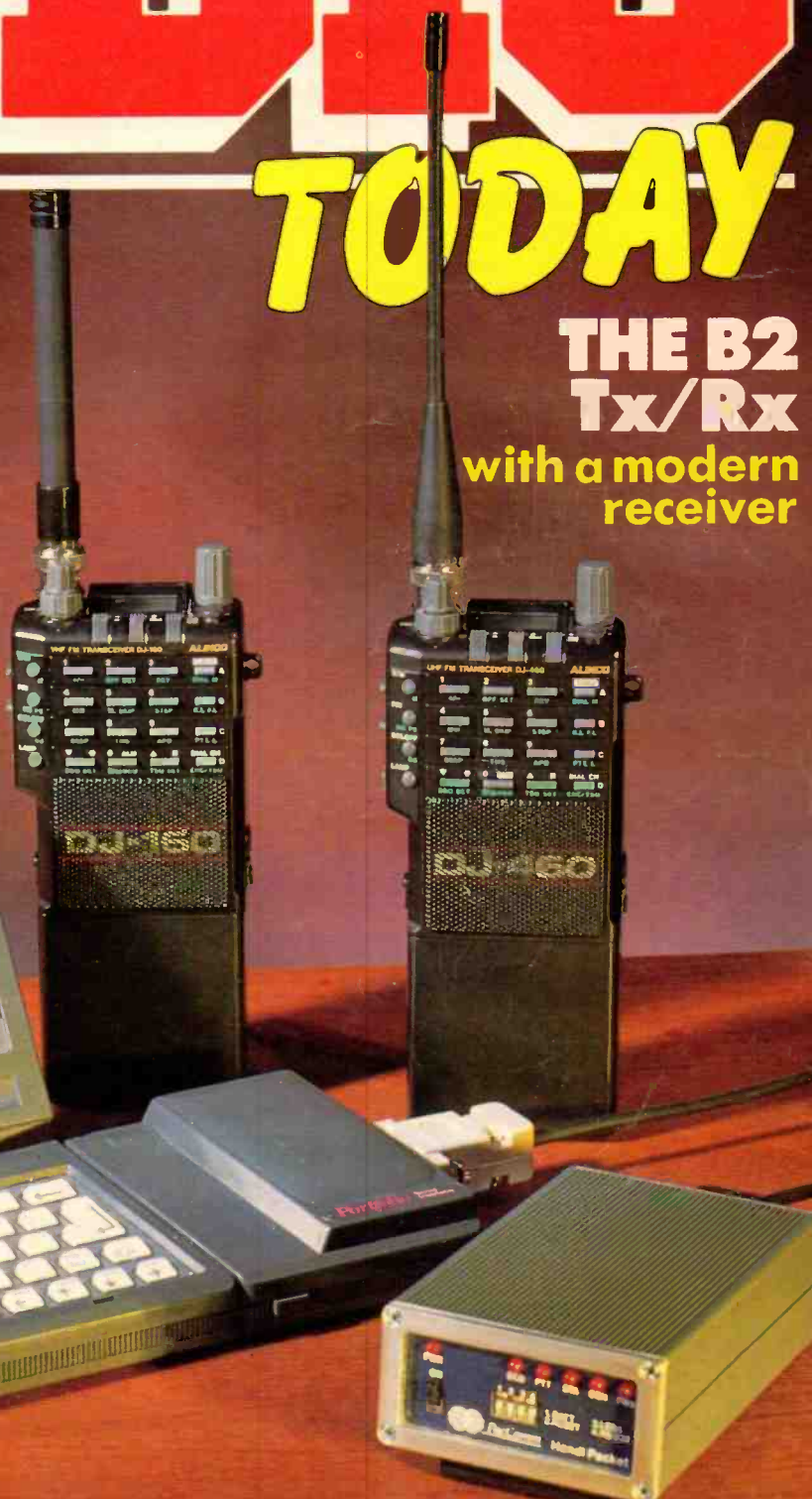
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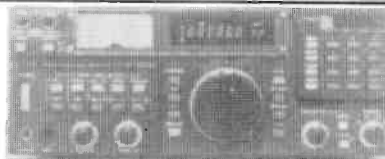
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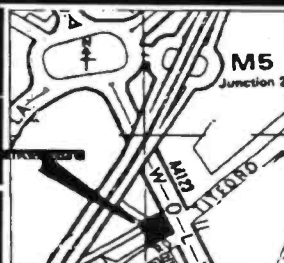
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HAM RADIO TODAY

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TODAY

REGULAR COLUMNS

READERS' LETTERS	4
Where have the VHF folk gone?	
RADIO TODAY	6
RA acts against abusers.	
NEW LICENCE CONDITIONS INCORPORATED	12
A summary of the clauses added over the last year.	
PACKET RADIO ROUNDUP	14
Two new data channels on 70cm.	
RADIO TOMORROW	48
Sussex Amateur Radio and Computer Fair next week.	

FEATURES

THE 1990 RSGB NATIONAL VHF CONVENTION	24
Northern Lights take the trophies.	
FROM RUSSIA, WITH LOVE	30
"The friendliest hobby in the world" welcomes Alex UA6LHB.	
LISTENING ON	32
All-change at Radio Prague and Radio South Africa.	
METREWAVE	45
Netting — the friendly way round.	

CONSTRUCTION

NEAPOLITAN SURFACE-MOUNT VFO	20
Get to grips with the smallest components.	
USING THE B2 WITH A MODERN RECEIVER	40
Some history and a mod for this Wartime classic.	

REVIEWS

A WELL-BUILT PORTABLE TNC FROM PAC-COMM	16
The Handipacket has arrived in the UK.	
ALINCO HANDHELDS FOR VHF AND UHF	26
The DJ 160E and DJ 460E have enough features for four arms.	
A SSTV AND FAX Tx/Rx BY TECHNICAL SOFTWARE	36
The GX-2 software and interface finds all-round favour.	

SUBSCRIPTION INFORMATION	47,51
FREE READERS' ADS COUPON	54
PCB SERVICE	52
ADVERTISERS' INDEX	52

LETTERS

Letter of the Month

As one of the amateurs who has been graced with some 62 years of the many changes in amateur radio, having operated the many modes of transmission over the many years, and from 1946 having been almost 100% operational on the vhf/uhf bands:

Two points emerge re these bands, (a) the one is the oft-repeated term, "he is a black box operator", the second (b) is, where do the amateurs who use these bands disappear to unless there is an opening? (c) Having been averse to the "black box" emergence in its earlier days, due to my own involvement in amateur radio in which prototype and hopefully a workable model would appear, I did not have an interest in QSOs with the "black box" users.

That was my mistake!

As the constructor type of operator reduced in number on vhf and uhf, one had recourse to having QSOs with those operators with "black box" gear. Previous listening had only resulted in hearing very general remarks, single reports and in certain cases information exchanges on a social basis.

However, with a period of time and a deeper interest in the "man at the other end", one has an insight on the often hidden interest and equipment of the other operator, and to my surprise, it leads to those who had some of the most updated and sophisticated gear, weather recording apparatus, satellite and tape recorders, sun noise equipment, etc. plus. The use of computers for so many applications that to list any many leave the more important ones out!

One of my own interests in recent times has centered on high technology rf measuring equipment, and again having broken ground with a "black box man", found a very stimulating common interest. The above comments may be well-known and understood by many of the vhf/uhf operators, in my case it has come in the last few years. In the case of the word "amateur" this can be so for the earlier call signs but surely the operators who are commented on above deserve another name!

As a vhf/uhf band operator for many years, I recall the period of time in which for any part of 24 hours one could have a QSO on 2 metres, and many exchanges when 70cm appeared. Some five years ago ten or fifteen exchanges could take place on 23cm, leading to tests on 13cm; some mornings there would be six or eight possible QSOs on 13cm.

Most of the above comments are well known, which leads to the point of interest: there has been in the last three to four years a dramatic reduction of band usage. Thereby arises the question, where do the operators transfer their interests, so many in a relatively short space of time? Furthermore, why? I have read rather short comments in various mags, etc., but to date no indication of the reasons and why such large number; the one factor common to all of the above comments is that most of the band operators still have their vhf/uhf gear!

This is clearly answered by the numbers on any vhf/uhf band if there is an "opening", therefore they must be in the shack and monitoring the frequencies. What then has happened to the many excellent and enjoyable QSOs that did use band-space, with plenty of interesting technical support work, and again what is the reason for lack of band-usage?

I have discussed this matter with many amateurs, at rallies and radio clubs, on the air and by letter exchange. Most of what emerged was:

Changed occupation. New car. Moved house. No room for shack or aerials. Went mobile. Moved to 6 metres (I lost 20 contacts on vhf/uhf when 6m came on the air.) Passed morse test. No band co-operation. Entered amateur TV interest. Building gear (mostly for club vhf/uhf operation.) Black box gear too expensive. No longer construction. Amateur radio becoming too expensive. Transferring interest to HF bands. Too many children!

There may be many more reasons, so, fellow operators, what are they?

— Arc & Spark, Wolverhampton.

We have heard quite a lot about bad operating driving amateurs off 2m; how about the rest of the story?

Thermal Runaway

I dispute G3XSE's statements in his project in the April issue of HRT that vmos transistors do not suffer from thermal runaway. They do, and I enclose copies of two of the tests I have undertaken.

The aim of these tests was to find out what I could do with vmos, and I tested several types to destruction. These tests indicated that vmos transistors do suffer from thermal runaway and they must have heatsinks.

— Roy T Oxley, Pontefract.

Yes, you are right. There is a misconception that power mos devices do not suffer from thermal runaway, because the saturated ON resistance has a positive temperature coefficient. So, if a device is in saturation, and dissipation warms it up, then the voltage across it will increase (assuming that the current stays more or less constant) and the dissipation will increase. This will make it hotter which will increase resistance which will increase the temperature, and so on. However, if power fets are used in parallel in the saturated mode, this effect will provide for good current sharing, which fact is of relevance to switched mode power supplies and other circuits.

The other parameter of relevance, the pinchoff voltage, has a negative temperature coefficient. This means that if a power mosfet is used in the linear mode and it gets warm, the current will increase, which will warm it up, and thermal runaway can occur.

Despite this, the author is correct in stating that power mosfets are sturdier than equivalent bipolar transistors. The main reason is that there is no mosfet equivalent of second breakdown. Here is the hand waving explanation as to why: bipolar transistors in parallel do not share current evenly. A large junction can be imagined as several smaller ones all in the same place, from which reasoning one can see that current distribution over the junction is not necessarily even.

Therefore peak levels of dissipation which one might expect a bipolar transistor to handle can overstress a small area of junction, giving rise to a progressive failure. The



channel of a mosfet, on the other hand, is bulk resistive in nature, and carries its current more evenly.

Even where thermal runaway can occur, it is not particularly frequent in this type of device, and G3XSE's vmos project works as stated. Some devices may blow up the odd circuit if the specifications add up in that direction. — G3YZW.

Dear Aunty...

I do hope you can help me. I have an operating problem and no-one else seems prepared to give me a meaningful answer.

Now, I studied quite hard to pass my RAE, but with a little application I gained a good pass. The morse test was rather more trouble, but I finally passed on the third attempt. With these hurdles cleared, I know I might make a competent amateur eventually, provided I study and practice.

But there is one aspect of 'phone operating which seems to come perfectly naturally to so many of my fellows, yet at which I experience great difficulty. Can someone please teach me how to waffle ceaselessly for ten minutes at a stretch about nothing in particular? What IS the secret of being able to assemble half-a-dozen or more totally unrelated topics of conversation into a meaningless monologue?

Goodness knows I've tried hard enough, but after about a minute I find myself stricken by the awesome feeling that I'm operating on somebody else's airtime, and I have to finish my over.

I think the two main problems I have are: a) achieving that seamless transition from the relevant to the irrelevant and b) being able to expand simple messages like signal reports and QSY acknowledgments into proper, genuinely uninteresting five-minute overs.

I've asked around, but the stock answer seems to be "it comes naturally with time, old man. Eventually you'll get just like the rest of us and not even notice you're doing it." Well, I'm sorry, but right now I don't feel as though I'll ever get the hang of it, and I do so much want to be a proper radio ham, and endlessly chew the rag like my fellows.

Can you help me? Is there anywhere I can get training, or are there any waffle-tutor tapes available? Or am I to be forever damned to the twilight world of the Short Over?

— Arthur Wardle GODKJ, Halifax, W. Yorkshire.

My dear GODKJ, we women are supposed to understand these things, but I am baffled and have had to resort to research. Receive my humble offerings.

- a) Don't be busy. Nothing produces real waffle like spare time.
- b) Be busy with something really boring. This stuns the brain and lends weight to trivial details.

A serious hobby, such as homebrewing or DXing, can effect a dramatic recovery, so be careful.

- c) Take up a cause. Talk about it a lot. Wonder why nobody tries your ideas.

d) Real intelligence is required to glide neatly from the genuinely interesting to the authentically meaningless so don't assume a lobotomy is the answer.

e) If all else fails, take down the script of *The Archers* and read it back.

f) Be gentle with yourself. Rome wasn't built in a day. Next time the going gets rough, tune around until you find someone interesting, and pretend to be an swl.

g) Try another tack — take up journalism!

Readers will be interested to know that GODKT has already embarked on (g).. We have the manuscript under lock and key

We apologise for the lack of a Free Readers' Ad Coupon last month, due to circumstances beyond our control. If it happens again — don't worry, just use a sheet of paper.

Reader Survey

Sorry for the marks on the form enclosed but cat sat on it.

— Mr. F. Steel, Banbury.

We deduce that Mr. Steel was reading HRT at the time!

£10 FOR THE LETTER OF THE MONTH

You've got a gripe about the bandplans, or you're sick of being wiped out by next door's microwave. Or maybe you've been bowled over by the excellent service from your local radio shop.

Whatever you've got to say about amateur radio say it here in the letters column and you could win yourself £10 for writing the letter of the month.

Sent your epistles to: Letters Column, Ham Radio Today, ASP Ltd, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST.

RADIO TODAY

Rally Round Bikes

The Centre of England Rally held at the Motorcycle Museum, Bickenhill (just opposite the NEC, outside Birmingham) on 15th April was so successful that the organisers are going to hold it as a regular twice-yearly event.

Around 1300 people were waiting for the show to open, and more than 800 more turned up during the day. The venue had the added attraction of the

attached motorcycle museum, and the traders added further to the occasion by wearing a variety of Easter bonnets to celebrate Easter Sunday. "This unique venue promises to become one of the most successful venues of the 90s organised by a trader for the trader," says Frank Martin G4UMF for the organisers. The next two rallies will be on 23 September 1990 and 31 March 1991. More details in Radio Tomorrow nearer the time.

Satellite Search

Amsat UK is asking satellite users to provide information to help Amsat International establish which frequencies and modes of operation are in demand for its next major satellite project. Amsat Hon. Sec. Ron Broadbent G3AAJ has provided a form, which was in circulation at the NEC show

earlier this year, on which desired frequencies can be ticked off for easy analysis. Interested amateurs should contact Ron at 94 Herongate Road, London E12 5EQ for the form, or, if attending the Amsat-UK Colloquium on 26 – 29 July at the University of Surrey, see him there. Doubtless an sae would be appreciated if you are writing.

Novice Licence

If you want a copy of The Novice Licence document, write to Room 613, Waterloo Bridge House, Waterloo Road, London SE1 8UA, or call 071-215-2217.

You can also obtain copies of the updated Amateur Radio Licence from the same source.

Young Amateur of the Year — Enter Now

Do you know a young radio amateur or swl under 18 who has been particularly active and enthusiastic during the last twelve months? If so, they could be the Young Radio Amateur of the Year for 1990. The DTI-Sponsored Young Amateur of the Year Award is open to anyone (not only licensed amateurs) under 18 on 30 July 1990 who is, for example:

- active in DIY construction, or
- interested in using radio and gaining operating skills, or
- uses radio for community service, such as Raynet or helping the disabled, or
- is good at encouraging interest in amateur radio, or
- is involved in amateur radio in any way, such as in school science project.

The prize, for the most outstanding achievement between 1 August 1989 and 21 July 1990, will be awarded by the Department of Trade and Industry, and will be £250. In addition, prizes for the winner and runners-up will include donations from, among others, the Mobile Radio Users Association, Icom (UK) Ltd. and Navico, plus a visit to the Radio Monitoring Station at Baldock, Herts to see the work in progress there. Additionally, the DTI will present every genuine entrant with a copy of the RSGB Amateur Radio Logbook.

The Awards will be represented at the RSGB's HF Convention in September 1990.

TO ENTER: Entrants can be nominated either by themselves or by an adult who knows about their activities. Entries should give a "reasonably full and clear picture of the candidate's achievements. Enough detail should be given to allow an assessment to be

made of their quality." Candidates should include some background information, such as other hobbies, school achievements and (if known) their career intentions. Where the candidate him- or her-self is the nominator, the entry should be "supported by a short letter from a licensed radio amateur or other adult who knows him or her well and vouching for these achievements."

Entries must be sent to the **Young Amateur of the Year, The Secretary, RSGB, Lambda House, Cranbourne Road, Potters Bar, Herts EN6 3JE**, by 31 July 1990. The award is open to residents of the UK, Channel Islands or Isle of Man who have not reached 18 by 31 July 1990. The DTI stresses that entry is by letter and does not require a special application form. The RSGB however has published an application form in conjunction with the May 1990 issue of Radcom to help entrants standardise the information they provide, so anyone who feels more comfortable with a copy of that form should contact Lambda House on 0707 59015 or the address above.

"We were getting all sorts of entries from 20 words to five-page essays", says the RSGB's Mike Dennison. HRT suspects that a 20-word entry is definitely erring in the wrong direction.

You have three weeks before the closing date, so if you know of — or are — a youngster who is active in any radio-related hobby or activity, why not encourage them by nominating them? The Young Amateur of the Year Award is in its third year, and looks set to continue, so aspiring candidates can continue to have a crack at it until they turn 18. Entries and letters of support should be sent straight to the RSGB at the address above. Candidates and their supporters do NOT need to be licensed amateurs or RSGB members. Good luck.



Loudenbetter

Stephen R. Webb, designer of the Loudenooper linear amp, expects to have units available ex-stock by the time this reaches publication. The original Loudenooper design has also been modified to a grounded grid circuit configuration for optimum stability.

Designed to run full power to the band edges with modern solid-state untuned output stages without the need for an external atu or swr metering, the Kilowatt Loudenooper is simple to adjust, lightweight by linear standards (less than 7kg) and provides 'a perfect match for the rig.' It gives 400 W pep or cw output on all nine bands from 1.8 to 28 MHz, when driven by a standard 50 to 100W output HF rig. The mains psu is integral and the unit measures 14 in by 10 in by 5 in deep (approx 25mm to the inch, metric).

Intermodulation products are so low, say SRW Comms, that the width of the signal is determined by the driving rig, not by the linear. Full tv precautions have been taken, the aerial output is filtered by a seven-section lpf with a 35 MHz cutoff, the mains input is fully filtered, and 'careful attention has been paid to complete screening, including the meter and fan apertures'.

The unit switches automatically to Transmit when RF drive is sensed, but can be converted to hardware switching simply by inserting a 3.5mm jack into a socket to disable the RF switching. Grounding the jack tip operates the Loudenooper relays.

At present the SRW Kilowatt Loudenooper is available directly from the designers for £645 inclusive of VAT. An information sheet is available. Orders and enquiries to **SRW Communications Ltd., Astrid House, The Green, Swinton, Malton, N. Yorks YO17 0SN. Tel. 0653 697513.**

An information leaflet on SRW's Astrid satellite receiving system is also available on enquiry. Astrid is priced (UK) £156 plus VAT (£179.40), or (export, air freight) £179.

From Wakefield

After a decision to stop circulating his free monthly sales sheet, Ken Baker G3SPX has done an about-turn by public request and will be issuing the sheets again. These will now be under the auspices of the Wakefield Repeater Group. To receive the list, please provide one stamped sae (UK only) for each issue you

wish to receive, to **Ken Baker G3SPX, 10 Cherry Tree Walk, East Ardsley, Wakefield, WF3 2HS, tel. 0924 828520.**

The Wakefield Repeater Group would also like to hear from anybody who would like to help the voluntary work of the group in any way. Offers to Ken Baker in his other capacity as Secretary, please.

Bristol Rally Confirmed

The South Bristol ARC's Bristol Radio Rally is back in 1990 after a break in 1989. The established venue at Brunel's Great Train Shed at Bristol's main Temple Meads Station. There is free parking in the area, which is five minutes from the Bristol end of the M32, or come by train and land on the doorstep. The ARC are expecting all the usual traders "and some unusual ones", a large bring and buy sale, displays and demonstrations, and food and refreshments. The

Great Train Shed contains railway memorabilia and is itself, of course, a major memorabilium.

South Bristol ARC have been working on the Rally for over a year after the disappointment last year when the venue was not available, and hope that as many people as possible will come to this year's event. The date is Sunday 16th September 1990, from 10.30 am. Contact the **Rally Manager, David Farr G4WUB, 94 Ridgeway Lane, Whitchurch, Bristol BS14 9PH, tel. 0272 839855,** for more and trade information.

Calling /C from Jordan

Members of St. Dunstan's ARS have been invited to Jordan as the guests of His Majesty King Hussein of Jordan JY1 for a ten-day holiday of sight-seeing and amateur radio activity.

St. Dunstan's is the Association for war-blinded ex-servicemen and women. King Hussein, a keen radio amateur, is a patron of the Amateur Radio Society. Six licensed amateurs, eight swls and ten others were to be met by JY2RZ at the country's major airport on

May 25th and taken to a reception hosted by the King. An escorting truck fitted out with HF mobile gear is to go with them, plus 2m 'mobile' from camel-back.

King Hussein of Jordan takes an active interest in feats of human endeavour beside amateur radio. The yacht Maiden, the first boat to complete in the round-the-world Whitbread Cup yacht race with an all-woman crew, was sponsored by Royal Jordanian Airlines on personal recommendation of the King.

Equipment Needed

Tony Kelsey-Stead GOCQY runs a Radio Society at Watford Grammar School for Girls, where he is Head of Physics. Pupils are following the three radio-related components under the Duke of Edinburgh Award Scheme: short-wave listening, radio constructions and Amateur Radio.

Tony is running up against the usual problem: shortage of suitable equipment capable of standing up to the wear and tear of the educational environ-

ment. He would like to hear from any amateur who could donate or loan any equipment, components, poles, wire or anything useful, irrespective of condition. Tony will collect or make collection arrangements where this can be done economically.

Tony can be contacted at the **Physics Dept., Watford Grammar School for Girls, Lady's Close, Watford, WD1 8AE, or via his home on Luton (0682) 508259.**

Paper Round

Vital spark, newsletter of the **Hastings Electronics and RC**, March 1990. Life-cycle of an endangered species, the Lesser Talented Shed-man, which like all good natural history features contains information of interest and use in our everyday lives, in this case, practical cutting and measuring: "If a piece of wood is too long, you cut a bit off, and if it is then too short, you throw it away!"; what a cattle station radio op does when a cowboy gets lost in the Australian outback, and an inside look at portrait photography, plus meetings calendar, honorary member Igor UA3QJC, new software library and morse tapes for members. **HERC**, Reg Kemp, sec., 7 Forewood Rise, Crowhurst, Sussex.

Sprat, Journal of the **G QRP Club**, April 1990. Items include foldaway loop antenna, 40m SSB generator, rf-amp-free receiver, universal psu, ssb and cw if strip, various reports and tips, news, offers, meet-

ings, parties and some supplier ads. Editor Rev. George Dobbs G3RJV, St. Aidans Vicarage, 498 Manchester Rd., Rochdale, Lancs OL11 3HE. A5, well printed, 44 pages, quarterly by subscription.

10 Metre Group Newsletter. Cautious proposal to buy out the 10m band when the radio spectrum becomes privatised; Idiots Guide to Packet Radio, part 2, emi-proofing a Citroen, news and small ads. 8pp A4, well printed on coloured paper. Editor Pat Billingham G4ACQ, Brighton College, Eastern Rd., Brighton BN2 2AL.

The Irish Radio Transmitters Society Newsletter, February 1990. IARU runup, reports from all over including swl matters, 2m homebrew beam, packet radio routing, microsat launch details, supplier ads. Correspondence to Dave Moore E14BZ, 12 Castle Avenue, Carrigtwohill, Co. Cork.

All the above worth "having to keep".

Vintage Wireless Welcomes You

The Vintage Wireless Company has just issued a 'slimline' Antique Wireless Newsheet, no. 136, after a hiatus of nearly six months due to a staff shortage. They now have two new members on the team, engineer Mike Smith and secretarial assistant Diane Hart; their Saturday Showroom is open again (10 to 3 continuous, Saturdays), and the repair service back in action. Among other items, they are appealing for any information on the company B&W Radio, on behalf of the daughter of the firm's founder.

VWC's current selection of booklet-format lists includes a short form component catalogue, in lieu of their illustrated catalogue which is still in preparation, an illustrated list of 'wireless wants' for those of you who have unidentified wireless objects in your attics or on your mantelpieces, a 28-page list of valves for sale, and a list of books and data available.

Invaluable to anyone collecting, restoring, researching, dealing in or just liking old radios, **The Vintage Wireless Company can be contacted at Tudor House, Cosshand St., Mangotsfield, Bristol BS17 3EN, England. Tel. 0272 565472.** Telephone enquiries preferred. If writing please enclose sae and/or two international postal reply coupons. The Newsheet costs

5 for 12 issues, 'not always monthly', £6 (airmail) for overseas customers, including Eire.

HRT would like to thank Vintage Wireless Company and Geoff Arnold at Radio Bygones severally and collectively for assistance with an enquiry.

Tandy Scanner Add-On

Bruce Sutherland G3IES has announced that he will be importing from the USA a memory module add-on for the Tandy/Radio Shack Pro 2004/2005 scanners from September this year.

The 2 oz PS-90 Search and Store module by Memory Modules can search, store and later recall frequencies while the user is too preoccupied to pay full attention to the task. It stores up to ten frequencies in monitor memory, overwriting older memories as new ones come in, or up to 256 frequencies in the Scanner's channel banks. Installation should be straightforward for those with constructional experience, but otherwise you would be advised to get an experienced constructor to do it for you. An instruction sheet comes with the unit.

Bruce is expecting to sell the PS-90 for £40 and it's simpler cousin the SS-45 (ten frequencies only) for £30, and is currently taking £10 deposits by arrangements. Installation be will available for £10 or £12.50 as an optional extra (carriage not included), and circuit diagrams for £2 plus large sae. More information on the units from **B S Sutherland G3IES, 336 Charlton Rd., Bristol BS10 6JZ, tel. 0272 500742.**



SPRAT

THE JOURNAL OF THE G-QRP CLUB
DEVOTED TO LOW-POWER COMMUNICATION
ISSUE NR. 62 © G-QRP CLUB SPRING 1990



FOLDAWAY LOOP 40M SSB GENERATOR FD RECEIVER SUDDEN MDS
UNIVERSAL PSU SMD KEYSYSTEM TAG TRANSMITTER CLUB ACCOUNTS
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HAVE YOU PAID YOUR SUBS? PLEASE CHECK THE CODE ON THE ADDRESS LABEL.
IF IN DOUBT WRITE TO G4HYH WITH SASE. THIS COULD BE YOUR LAST SPRAT.

DTI Acts Against Abuse

Michael Coolican, Head of the Licensing Branch at the DTI, has written to the President of the Radio Society of Great Britain, Frank Hall GM8BZX, to inform the Society that the Secretary of State varied the licence conditions of three licenced amateurs "to preclude use of the London repeaters." A fourth operator whose licence had lapsed will only be allowed to renew it with the London repeaters excluded.

The reason given in Mike Coolican's letter, published in the May 1990 issue of Radio Communication, is: "that those concerned behaved irresponsibly ... by sending messages whilst pursuing a personal dispute, which included offensive material...and making use of the London repeaters ... so prolonged as to disregard the rights of other users ..."

The letter goes on to stress the seriousness with which the Secretary of State regards abuse of licensing terms, and that action will be taken against users who abuse their rights or interfere with the rights of other users, and calls on the RSGB to "give this letter ... the very widest possible circulation among radio amateurs" so that all licensed amateurs will be aware that the DTI is ready to take action against individual abusers.

Mike Coolican also calls on the amateur community to maintain high operating standards.

The RSGB in its response appeals to amateurs not to "leave it to HQ". It will not surprise amateurs to know that this is not a call to submit reports and/or evidence of bad or offensive operating to the RSGB, but a request for amateurs to set a good example and to attempt to influence "bad, irreponsible or just inexperienced" operators into better practices.

Right and proper as this appeal is, it will be of less comfort in those areas where threats and intimidation have been experienced by amateurs complaining about operating abuse. Nonetheless the DTI's renewed efforts will be welcomed by many amateurs.

Radcom further reports that the Central Birmingham VHF repeater was taken off the air by its Repeater Group while discussions took place with the RSGB Repeater Management Group about how to deal with illegal operators who had been plaguing the repeater.

Lastly, Radcom reports that G7GBH, the callsign of an RSGB member, has been used on VHF by a pirate in West London and Herts. Those with experience of illegal operators are unsurprised by the pirate's choice of callsign. Any information would be welcomed by the **Amateur Radio Observation Service at RSGB HQ, Lambda House, Cranbourne Road, Potters Bar, Herts EN6 3JE. Tel. 0707 59015.**

Circuit Circulation

Jon Grantham G8XVL is attempting to put together a circuit diagram library reference service at his QTH in Brandford, and is appealing for rig owners to make copies of any rig circuits, old or new, that they have in their possession. "So far I have had lots of

promises from many people but only about four have bothered to send any so far," he said in April. Nevertheless, when we contacted him he had "about 60" standard rig, computer and kit/mod circuits. "A lot of Pye stuff has arrived, and what we really need is some 'black box' circuits,"

he added. "I am proposing to release a complete list of circuits at a later date. It is intended to run this service on a non-profit basis ... it could be valuable for second hand equipment purchased at rallies." Circuits sent to him for copying will be returned if a stamped self-addressed envelope is

supplied. Alternatively, most libraries have a 10- or 15p a sheet copier for the generous who nevertheless do not want to part company with their own copies.

Offers and enquiries to **J. Grantham G8XVL, 7 Wellington St., Sandbeds, Queensbury, Bradford, W. Yorkshire BD12 1AP.**

RSGB News

The May 1990 issue of *Radcom* reports that the RSGB QSL Managers of the last 12 years, Ted G3DRN and Aileen Allen, have retired, and that as of 1 May 1990 the new address for the QSL Bureau is **P O Box 1773, Potter Bar, Herts EN6 3EP, England.**

On the eve of the new arrangement, the RSGB appeals for bureau users to sort their cards correctly, and to use the IARU-recommended size of 3.5 by 5.5 inches, as odd-sized cards slow down sorting and contribute to mis-sorting. The Bureau has been criticised for slowness, but the Allens have been handling approximately 2.5

million QSL cards a year, a massive task, as anyone who has ever been involved in a mailing operation will be aware. *Radcom* also points out that users waiting for a QSL card to arrive from a contract before responding also contributes to the bureau's reputation, although it is outside the bureau's control.

At present the bureau service has simply been centralised and given a new set of pigeon-holes, so users should concentrate on sorting their cards efficiently and not hope for miracles. However, the RSGB stresses that they will now be able to cover for sickness and holidays,

avoiding seasonal pile-ups. "We are not at present running a backlog, but getting ahead by a two weeks here will probably be balanced up by a two-week backlog there. We should be able to run things more smoothly, though, especially for UK cards," said a representative.

Bureau users would like to thank Ted and Aileen for their hard work in the past and wish them a happy, relatively card-free future. Ted will continue to manage GDN-series cards.

Council Member Hilary Clayton-Smith G4JKS, who is **Project YEAR Coordinator** for the RSGB, wants to track down all schools and colleges in the UK which

have any involvement, formal or informal, with amateur radio activities. If you have any information, please contact G4JKS at **115 Marshalwick Lane, St. Albans, Herts AL1 4UU** with, where possible, the name and type of the school, full address, number of pupils, type of radio activity, number of licensed amateurs involved as students or supervisors, and any radio achievements which may be of interest to the RSGB. Photos, schools publications, etc. would be appreciated.

This survey is apparently not restricted to RSGB members or licenced amateurs, so if you can help please get in touch.

ICOM

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Designed for the serious operator on the 144, 430 and 1200MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications.

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Communications via satellites has never been easier. The IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated also, ten specific memory channels for satellite frequencies.

The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously, multiple scanning systems on the MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS system make this one of the most comprehensive multi-band transceivers available.

For more detailed information on the IC-970E Base Station or any other Icom radio equipment contact your local authorised dealer or call Icom (UK) Ltd.

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IC-229E VHF Mobile. This VHF 25 watt transceiver measure just 140(w) x 40(h) x 105(d) mm. No need to worry about installation, its small enough to fit most vehicles. Also available the IC-229H 50 watt version where extra high power is required.

IC-449E UHF Mobile. High sensitivity with GaAs FET's and 35w output power provide optimum performance with this UHF transceiver. 20 Memory channels and a programmable call channel can be used to store most used frequencies.

IC-3220E Dual Band Mobile. Enjoy complete dual-band operation. In addition to cross band duplex operation this transceiver can receive both MAIN and SUB bands simultaneously. One of the smallest dual-band mobile transceivers available, the IC-3220E has a 25 Watt output on both bands. Where higher power is required the IC-3220H offers 45 watts on the 144MHz band and 35 watts on the 430MHz band.

Helpline: Telephone us free-of-charge on 0800 521145, Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

Datapost: Despatch on same day whenever possible.

Visa & Mastercards: Telephone orders taken by our mail order dept. instant credit & interest-free H.P.



In a good CLAUSE

The Licence updates go official

Recent changes to the Amateur Radio Licence resulting from discussions between the RSGB and the DTI following the broad updating of the Licence in 1988 has been published in a Gazette Notice becoming effective from June 1.

Says the DTI: "DTI's Radiocommunications Agency (RA) today introduced an updated Amateur Radio Licence to keep it in step with the current needs of radio amateurs. The revisions reflect RA's continued commitment to the amateur service, and include:

- a new numbering format making the licence easier to use;
- new arrangements for club stations to operate as special event stations and send greetings messages without the need to apply for a "GB" callsign;
- permission for United Kingdom radio amateurs to directly supervise the operation of their station by any licenced radio amateur from any other country;
- redrafting of the unattended operations clause to positively identify the permitted frequencies;
- clearance for log keeping on any belectronic storage media;
- allocation of extra frequencies for the unattended operation of beacons, low power devices, digital communications and for direction finding competitions;
- redrafting of note 'aa' of the Licence, which is concerned with the importation, the manufacture and the assembly of amateur radio apparatus operating only in the 28.0 MHz to 29.7 MHz (band), in order to make it easier to understand."

New sub-clauses under Clause 1 are:

"if this Licence is held on behalf of a club and having regard to sub-clauses 2(10) and 3(3), greetings messages may be sent by non-licenced persons provided that:

- (a) it is under the direct supervision of the licensee or other Authorised Club Member (who must operate the transmitter and identify the station); and
- (b) each greetings message does not exceed two minutes; and
- (c) each person may send only one such message to each station with which the station is in contact: and
- (d) greetings messages may be sent and received only within the United Kingdom or to and from stations in the United States of America, Canada, Falkland Islands and Pitcairn Island."

Sub clause 2(8)(iii) is replaced with:

"... by any licensed radio amateur from any other country, or ... "Sub-clause 2(4)(a), (b) and (c) are replaced with:

"2(4) Subject to sub-clause 2(5), the Licensee may conduct the Unattended Operations ('Unattended Operation' means the operation of the Station when unattended by the Licensee) only:

- (a) of a beacon;
- (i) in the frequency bands or sub-bands:

70 MHz to 70.5 MHz; 1298 MHz to 1299 MHz (not in Northern Ireland); 2310 MHz to 2450 MHz; 3400 MHz to 3475 MHz; 5650 MHz to 5680 MHz; 5755 MHz to 5765 MHz;

5820 MHz to 5850 MHz; 10000 MHz to 10250 MHz; 10270 MHz to 10300 MHz; 10400 MHz to 10500 MHz; 24000 MHz to 24050 MHz

and all bands including and above 47000 MHz, with a maximum power level of 14 dBW erp carrier or pep, or

(ii) for the purpose of direction finding competitions, on 1.96 MHz with a bandwidth not exceeding 12.5 kHz and in the frequency bands: 3.5 MHz to 3.8 MHz (only between 00.00 hrs Saturday to 00.00 hrs Monday); 28.0 MHz to 29.7 MHz; or 144 MHz to 146 MHz, with a maximum power level of 14 dBW erp carrier or pep, which is capable of transmitting the call sign of the Licensee periodically (in accordance with Clause 7) and capable of being switched off within two hours of a demand to close down given by a person authorised by the Secretary of State;

(b) of a low power device to control apparatus at the Main Station Address or a Temporary Location by remote control, in the frequency bands or sub-bands:

70MHz to 70.5 MHz; 432.5 MHz to 432.6 MHz; 1298 MHz to 1299 MHz (not in Northern Ireland); 2310 MHz to 2450 MHz; 3400 MHz to 3475 MHz; 5650 MHz to 5680 MHz; 5755 MHz to 5765 MHz; 5820 MHz to 5850 MHz; 10000 MHz to 10250 MHz; 10270 MHz to 10300 MHz; 10400 MHz to 10500 MHz; 24000 MHz to 24050 MHz.

and all bands including and above 47000 MHz, specified in the first column of the Schedule, with a maximum power level of -20 dBW erp carrier or pep, under all reasonably foreseeable operational conditions, in such a way that no electromagnetic energy capable of reception by any station or apparatus outside the boundary of the premises in which the Station is situated is emitted from the Station; or

(c) by digital communications at the Main Station Address or at a Temporary Locations notified in accordance with sub-clause 7(3)(b):

(i) in the frequency band 50 MHz to 51 MHz with a maximum power level of 10 dBW erp carrier or pep, or

(ii) on the spot frequencies 70,3250 MHz; 70,487 MHz with a bandwidth not exceeding 25 kHz; or

(iii) in the frequency bands or sub-bands:

144 MHz to 146 MHz; 1299 MHz to 1300 MHz (not in Northern Ireland); 2310 MHz to 2450 MHz; 3400 MHz to 3474 MHz; 5650 MHz to 5680 MHz; 5755 MHz to 5765 MHz; 5820 MHz to 5850 MHz; 10000 MHz to 10250 MHz; 10270 MHz to 10300 MHz; 10400 MHz to 10500 MHz; 24000 MHz to 24050 MHz, and all bands including and above 47000 MHz, specified in the first column of the Schedule with a maximum power level of 14 dBW erp carrier or pep."

Sub-clause 7(1)(f) is replaced with:

"... by morse telegraphy or telephony, at the end of each 30 minute period during which transmissions are sent in from the Station (unless already transmitting in morse telegraphy or telephone). If the Licensee is conducting automatic operations involving digital communications then he shall transmit the callsign under this sub-clause at a maximum speed of 20 words per minute."

Sub-clause 6(2) is replaced with:

"The Log shall be written in a book or maintained on a magnetic tape, disc or other electronic storage medium capable of meeting the requirements of sub-clause 6(4) below."

Sub-clause 6(3)(b) is replaced with:

"... on a magnetic tape, disc or other electronic storage

medium, the magnetic tape, disc or electronic storage medium shall be used only to keep the Log.”

Sub-clause 7(3)(a) is replaced with:

“ ... use the suffix ‘P’ with his call sign and give the location of the Station every 30 minutes to an accuracy of at least 5 km by a generally used identifier, or ... “

And the Note (aa) is replaced with:

“The Wireless Telegraphy (Citizens’ Band and Amateur Apparatus)(Various Provisions) Order 1988 (SI 1988 No. 125) restricts the manufacture and import of amateur apparatus operating only in the frequency band 28.0 MHz to 29.7 MHz. Section 7 of the Wireless Telegraphy Act 1967 defines manufacture as construction by any method and the assembly of component parts. However, home construction for non-commercial purposes and conversion of 27 MHz FM CB apparatus meeting DTI specifications MPT 1320 or MPT 1333, into single band amateur apparatus, is allowed under a General Authority published in the London, Edinburgh and Belfast Gazettes on 17 February 1989. Requests for an authority to manufacture and import single band 28.0 MHz to 29.7 MHz apparatus outside these specific categories should be addressed to the **Department of Trade and Industry, Radio Investigation Service, Room 102, Waterloo Bridge House, Waterloo Road, London SE1 8UA.**”

Bestowing the right to transmit greetings messages under what was formerly Special Event Station conditions only, upon radio club stations will delight many clubs and their helpers, widen the opportunities for proto-amateurs or the just-interested to try out amateur radio, and reduce the need to plan and apply for Special Event Station call signs whenever the station wants to go public. Extra prefixes must be used by club stations while they

are sending greetings messages: G changes to GX, GM changes to GS, GW changes to GC, GI changes to GN, GD changes to GT, GJ changes to GH and GU changes to GP. Otherwise the club can use its regular callsign.

In a similar vein, now instead of CEPT-only licensees being permitted to operate a UK station under the licensees supervision, any licenced amateur from any country can do so. This is a boon for amateur visitors to UK shores: for instance, as we write, our Mexican friends Haydn XEITHR and Susana XEITSR are visiting and can take advantage of the new ruling. Now, wouldn't it be splendid if the rest of the world made the same decision? We will probably have to wait a while for that.

The frequency list for unattended operating now states what is permitted on what bands. Beacons gain 436.6 — 436.8 MHz and lose 1298 — 1299 MHz. Low power control gains 432.5 — 432.6 MHz and 1298 MHz and loses 436.6 — 436.8 MHz. Unattended DF transmissions gain a bandwidth of 12.5 kHz centred on 1.96 MHz (any time), and on 3.5 — 3.8 MHz at weekends. A 20 wpm limitation on the morse ident speed on digital operation will cause some concern among Packet operators as channel congestion is already rife. However the ident only has to be sent every 30 minutes.

Likewise, location identification for portable general operation has been specified at 30 minutes.

The alterations to note (aa) to allow licensed amateurs to construct and convert legal CB equipment non-commercially for single-band 10m use, and the general introduction of the 18 and 24 MHz bands, already formalised, have been included in the licence.

Enquiries can be directed to the **RA at Room 613, Waterloo Bridge House, Waterloo Road, London SE1, or to 071 215 2217 or 5000.**

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MKII MICROREADER

The Microreader is a small compact unit that allows anyone equipped with a suitable SW receiver, to read Morse & RTTY signals simply and without fuss. No computers, interfaces or program tapes are needed, just connect the Microreader to the ear or speaker socket & switch on. The decoded words appear on the built-in 16 character LCD display screen.

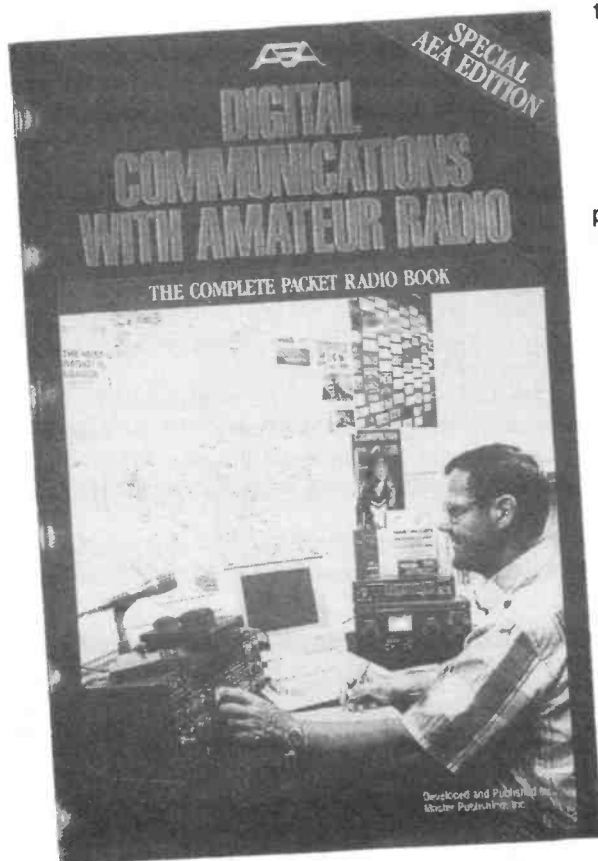
The Microreader contains all the filtering & noise blanking needed to allow reception even under bad conditions. A three colour bargraph tuning indicator makes precise tuning simple, while shift indicators take some of the guess work out of RTTY. Despite the fact the Microreader contains two fast processors (12MHz), it is extremely quiet generating virtually no RFI. The Micro-reader can also if you wish, transfer the decoded messages to any printer, computer or terminal unit equipped with an RS232 port.

In the tutor mode, the Microreader will send random groups of characters with variable speed & spacing, or plug in your own Morse key to check your sending. In both cases the characters are shown on the display.

The MKII Microreader comes complete with audio lead & demonstration tape. Full technical support & advice & a free upgrade service.

Packet Radio

Roundup



the professional communication engineers of tomorrow. A look at the landline packet bbs (081 547 1479 run by Ted G8LWY) shows that healthy interest in CB packet is certainly present although restricted due to licensing conditions, and with ex-pmr 70cm rigs so cheap guess which band may soon become even busier?

Following the IARU conference in Torremolinos, the RSGB have just advised that two further packet data channels on 70cm have been agreed, making eight in total and hopefully spreading the load a little more. A seven-cell repeat pattern is commonly used in trunked radio networks (for instance, Cellular and Band III), so maybe now is the time for

congestion on 70cm is rearing its head as our Technical Editor found as he QSYed off 2m packet and onto 70cm. The answer, of course, is to spread the load as described. Node links on other, quieter frequencies can also help tremendously, and in some forward-thinking areas of the UK inter-node 23cm links are rapidly being set up. In my area (just north of Southampton) for example, 23cm is used to link ALL the local bbs, as well as for linking to other multi-port 6m, 4m, 2m and 70cm nodes in the adjacent areas of Portsmouth and South Dorset. The days of a single-frequency 2m node sited at the top of a hill are rapidly coming to an end in busy areas.

As a typical case, a group of packet users in South Hampshire go into the local Chandler's Ford node system on 144.625MHz 9600 baud, then through the RS232 hard-wired matrix out to the linked bbs on 1299.000MHz, the result being automatic connection with almost zero congestion even though a 2m input is being used. An alternative for those without 9600 baud systems is that of quieter bands such as a 4m or 6m, although the latter often suffers from computer QRM problems due to the required horizontal aerial polarisation. The growth in 4m nodes is typified by recent additions such as ROCH40 (sysop G4SAF) in Rochdale, TF40 (sysop GOCNG) in Newport, Shropshire, and NEW41 (sysop G8AYC) in Newbury, Berks. With piles of Pye MF25FM 25W low band FM transceivers on sale at the Drayton Manor Rally at £5 each there's no shortage of 4m gear for packet users (yours truly came away with two for a total of £8.).

Two new 70cm data channels have been agreed by the IARU Conference, and G4HCL suggests other ways of easing band congestion.

More Packet users! We are, of course, talking of the many prospective Novice Licensees who will soon be joining our ranks. The Novice Licence document from the RA shows us that the 10m 6m, 70cm, 23cm and 3cm bands are allocated for Class A and B Novice data use as well as other modes, and as regular readers of the 'Roundup' will know, there are many keen computer users out there who may just be the amateurs and even

a little frequency planning for 70cm nodes, rather than the majority just operating on 432.675MHz. The general idea is shown in the accompanying diagram, and with a bit of co-ordination and co-operation between Node sysops in adjacent areas all amateurs could benefit.

Node Frequencies

In many areas, 144.650MHz is bursting to capacity, and already

Novice Licence VHF/UHF/SHF/ data bands:

28.100 – 28.190MHz
28.225 – 28.300MHz
50.620 – 50.760MHz
51.250 – 51.750MHz
433 – 435MHz
1240 – 1325MHz
10,000 – 10,500MHz

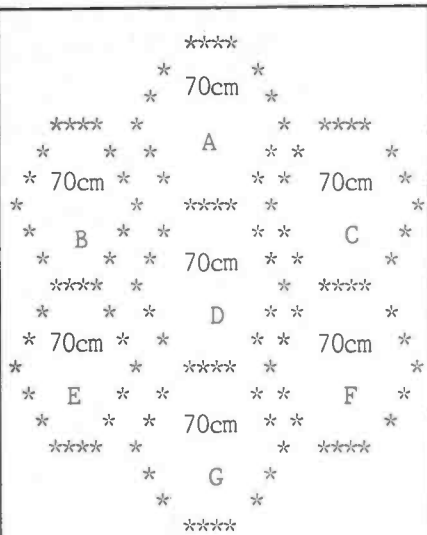


Fig. 1. Possible 'Cell' coverage network of 70cm nodes on 7 allocated frequencies A - G.

Packet in Space

Reports from several amateurs operating on packet through UoSAT-Oscar 14 are that a simple vertical aerial with just 25W of transmit power is quite enough to access the orbiting digipeater. Yesterday as I write this, Ron G3AAJ tells us that 36 users are known to have successfully connected to other stations through the satellite, including many European amateurs such as ON6UG, DF3ZL, DF5DU, I2KBD, IW2ECL and GOK8KA (Univ. of Surrey). For 9600 baud a modem such as the G3RUH type may be used, with suitable modifications to the transceiver made to inject audio directly into the FM VCO; the FT-736 as used by I2KBD for example may very easily be modified.

As 9600 baud packet sounds just like FM 'squelch noise', you'll need to use your S-meter as usual for tracking (if you use steerable aerials), together with a centre-zero FM meter for receiver tuning, the downlink being centred on 435.070MHz +/- doppler shift of around 10kHz. The satellite uplink is on 145.975 MHz, and UO-14 has AFC on the uplink so doppler tracking here isn't critical.

To check whether the digipeater is active, look at the LSTAT message, which is typically:

```
UOSAT3-1>LSTAT I P:0x3000 o:0
1:13037 f:13037 d:1
```

Whenever 'd:1' appears at the end, the digipeater is on, d:0 indicating that it is switched off. Remember of course to specify the spacecraft callsign in your digipeater path. The University of Surrey is currently anxious to receive 9600 baud digipeating reports together with details of equipment used.

Book Review

Digital Communications with Amateur Radio is an American 160-page paperback which gives an introduction to packet radio in a totally different way - starting the hobby from computers and landline bbs communication rather than from amateur radio voice communication. As many young prospective novice licences may already be burning the midnight oil, not to mention running up their parents' phone bills, into computer bulletin boards (has anyone thought of 0898 numbers for landline bbs yet?!), the thought of amateur packet radio with worldwide error free communication as well as endless bbs mail facilities and even space communication, could certainly appeal very strongly. Well, *Digital Communications with Amateur Radio* may well be essential reading for such prospective users, yours truly couldn't put it down after picking it up out of pure interest at a convention stand.

Priced at £8.95, it guides the reader through the principles of data communication over radio, describing tncs, operating modes, networking, using the computer as a tnc, and ending up with packet space and satellite operation up to Fuji-Oscar 12 and USA Shuttle amateur communication. Although all of the licensing information is based on USA practice, as long as this is noted and ignored by European readers the book in my opinion offers an excellent introduction to the experienced and semi-experienced computer user who is interested in starting amateur digital communications. Heartily recommended. May thanks to ICS Electronics (Tel. 0903 731101) for provision of the publication.

Group of the Month - Maxpak

Following a trip to the Drayton Manor Rally, I once again met up with

many officials of the Midlands AX.25 Packet Users Group at their rally stand, coming away with the latest copy of their excellent quarterly Digicom. The latest issue features articles on the use of bbs 'White Pages', a Practical Guide to RS-232 Interfacing, a comprehensive Data-comms Glossary, pages of technical tips such as improving packet performance with the FT290, and of course the latest packet news from the Midlands.

As well as the GB7BBS (NTS) and GB7MAX mailboxes, this active group supports a number of network nodes in the region, and it seems the number of these is always increasing! If you're a packet operator in the Midlands, you could do worse than supporting your local group. Remember, someone has to pay for your local nodes and BBS stations! Membership is currently £9.00 per annum, with details from Richard G1NZZ @ GB7MAX, or just pop along to one of their meetings at the Perton Community Centre, Perton, Wolverhampton. They meet at 8.00 pm on the first Monday of each month apart from Bank Holidays.

End of Message - CTRL-Z

Elsewhere in this issue you'll see the 'Handi-Packet' tnc put through its paces, a portable tnc built to withstand life's knocks. In next month's roundup I'll be taking a timely look at satellite packet communication with the latest Pac-Comm PSK-1 Satellite Modem, together with the Kansas City Tracker PC program and interface card that automatically steers all your aerials for you to track the Packet Microsats while you work through them.

My thanks again for all your kind messages, I can always be reached via packet by messages routed to the GB7XJZ BBS, or of course by post c/o the HRT editorial address. Until next month, 73 de Chris G4HCL GB7XJZ.

Maxpak Nodes

Callsign	Ident	Band	Location	Status
GB7AP-1	AP90	1.3GHz	Tamworth, Staffs	Not Active
GB7AP-2	AP21	144MHz	Tamworth, Staffs	Active
GB7AP-7	AP72	432MHz	Tamworth, Staffs	Active
GB7MM-2	MM21	144MHz	South Birmingham	Active
GB7MM-7	MM72	432MHz	South Birmingham	Active
G7CRS-2	PP21	144MHz	Wolverhampton	Active
GB7PP-7	PP72	432MHz	Wolverhampton	Active
G6GUH-7	BNOR72	432MHz	Bridgnorth, Salop	Active
G1DIL-7	DIL72	432MHz	Bridgnorth, Salop	Active
G8VPR-2	CANN21	144MHz	Cannock, Staffs	Active
G8VPR-7	CANN72	432MHz	Cannock, Staffs	Active
GOCNG-4	TF40	70MHz	Newport, Salop	Active
Planned	MYND21	144MHz	Craven Arms, Salop	Not Active
Planned	MYND72	432MHz	Craven Arms, Salop	Not Active

HANDIPACKET

Portable TNC

The UK's fastest growing amateur mode, packet radio, isn't for use at home only. Already many of us have been using packet out and about with portable rigs, and with electronic personal organisers around what could be more natural than to use one of these as a terminal for worldwide error free amateur communication?

individual user, the tnc can be taken to the office along with trusty handheld for some alternative lunch time activities. How about going down to your usual meeting place and getting one over your mates with their portable cellphones by contacting the Space Shuttle's orbiting packet station with your handheld? Yours truly contented himself with more

mundane uses such as taking it on the odd weekend away to keep in touch, as well as surprising the odd station by operating packet mobile as a car passenger. One UK station is reputedly using mobile packet on a pushbike — the possibilities would appear to be endless!

Chris Lorek G4HCL meets the new tnc from PacComm and finds a rugged customer.

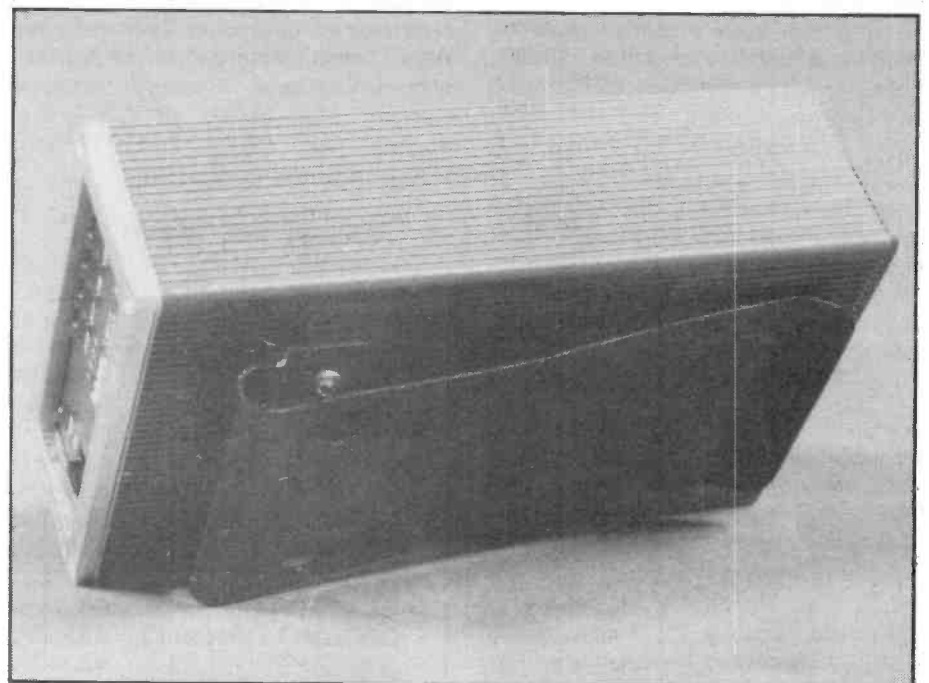
The Handipacket

We've been promised the HandiPacket for some time now, and finally it has arrived. Inside the sturdy metal case there's a compact, full featured tnc with all the features of the more usual larger units, including an automatic personal mailbox with upload and download facilities, third-party mail inhibit and an automatic CW indent to conform to UK licensing requirements. The HandiPacket also features the latest 'State DCD' to let you use the tnc with your radio squelch open, reducing switching time problems as encountered with some receivers.

It comes in a metal case measuring 65mm by 35mm by 100mm which also contains a set of built-in 500mAh nicads to give around ten hours of operation — no need to use an external dc power lead when you're portable. A belt clip is provided, and a Velcro strip even allows you to fix it to the side of your transceiver or car dashboard to stop it sliding around on the move.

Portable Possibilities

The uses of a self-contained portable tnc linked up to a handportable are many and varied, but the end results can be very powerful indeed. For field events or emergency exercises, a portable digipeater and mailbox may be placed in a remote site such as a hill or mountain top to provide extended range communications over a given period. For the



Front Panel

The HandiPacket is built into a very robust alloy case designed to stand up to the knocks of portable operation, and we're advised that it stood up to being run over by a car once, although we decided against trying that ourselves.

In terms of controls and the like, the front panel sports the usual tnc led indicators, these being PWR (power on), CON (showing Connected status), STA (packets waiting to be acknowledged), PTT (Transmit ptt) and DCD (Data carrier detect, ie packet data being received) together with a further PMS led which flashes at you when the internal message system has mail waiting for you. As well as the main power On/Off switch, a number of tiny dip switches are fitted. These are labelled BATT (disconnects the internal nicad pack), RESET ('hard' reset of the tnc), LEDS (switches off the led

indicators to reduce battery drain) and RS-232 (disables the RS-232 terminal circuitry, again to reduce battery drain when the tnc is just being used as a digipeater or whatever).

Connections

On the rear panel are a standard nine-way D connector for your terminal RS-232 lead, an eight-way connector for the radio interface, and a dc connector for when you want to either charge the internal nicad pack or use the tnc with an external supply. It's interesting to note that the eight-way connector also has lines for digital data input, output, and the transmit clock signal which together allow you to plug in an external modem, for satellite work for example. External modem header connections are also fitted inside the tnc if you eventually find a modem small enough to fit inside the box, although the tnc manual does warn that in either case you'll need to lift the data output pin of the internal modem ic out from its socket when an external modem is used.

Starting Out

The first thing that any new packet user will be struck with is the sheer size of the tnc instruction manual — this is larger than many packet tncs! Newcomers shouldn't be put off by the volumes of technospeak though, as many tnc commands are very simple, such as 'CONNECT G4ABC or whatever', 'DISCONNECT' and so on. Once you've entered your callsign into the tnc, eg by typing in 'MYCALL G4HCL' or whatever, just these two commands could get you through quite nicely while you're learning about packet.

To make things easy the tnc, when supplied by the UK PacComm distributors Siskin Electronics, comes complete with a computer disk already programmed with a terminal emulation program ready to use with the Handipacket, to save worries about incompatible software. A ready made tnc to radio lead and tnc to computer lead may even be supplied as options to get the newcomer on air with the least bother.

Connect Up

I connected up the lead between my computer and the tnc, then the lead between the tnc and my handheld using the ready made lead supplied (nice touch), and switched the computer on. The first thing I then did was to make sure the computer terminal baud rate and so on matched the default parameters given in the tnc manual, these being 7 data bits, even parity, and 1 stop bit. Expectation then came to fruition as I switched the tnc

on. Miraculously everything seemed to work in harmony first time, with the tnc's sign-on message as shown in Fig.1 immediately displayed on the computer screen. 'Great!' I thought, so after I had entered my callsign into the tnc, I tried connecting into my local packet network node on 70cm. Typing in 'C CFORD7' and pressing the return key I immediately keyed my 70cm handheld, and within a second the magical '***CONNECTED' response was displayed. When I then entered 'C GB7XJZ' to connect to the

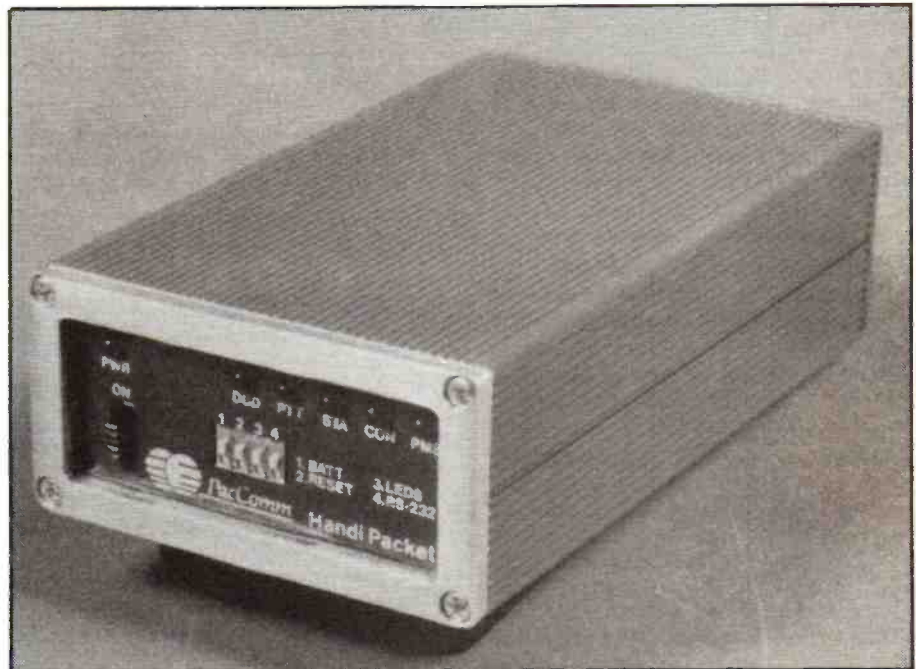


Fig. 1. The sign-on message. bbRAM loaded with defaults

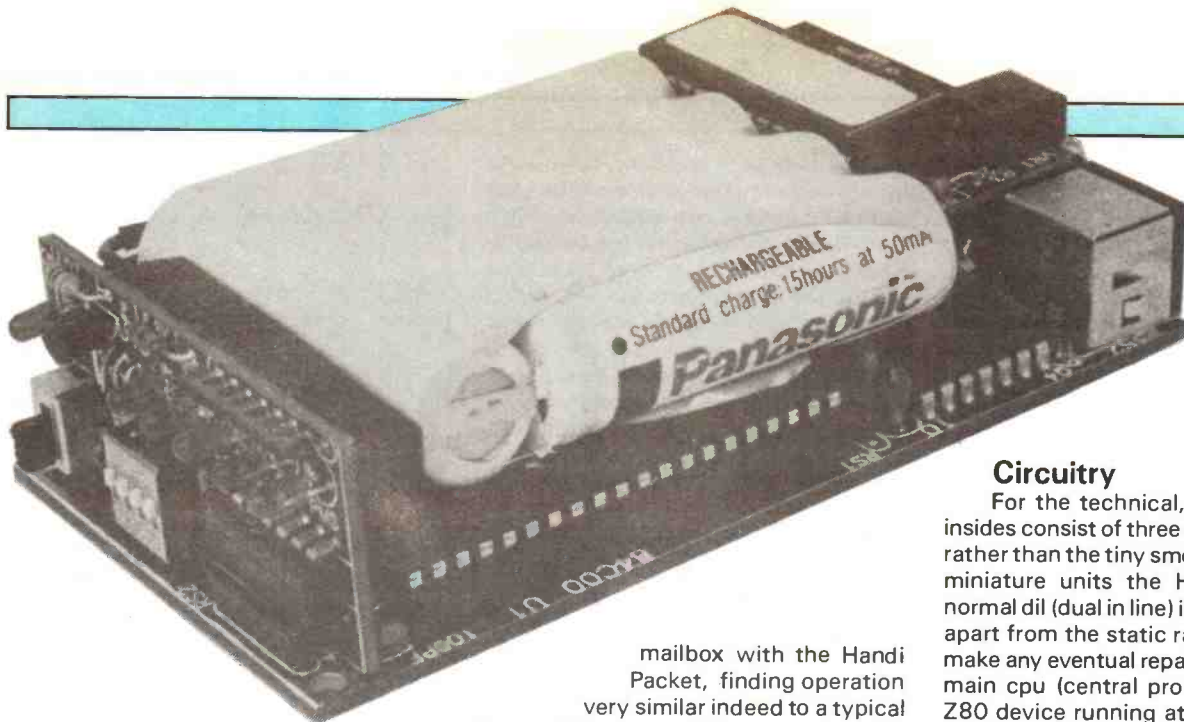
```
:A
PacComm HANDIPACKET Packet
Controller
AX.25 Level 2 Version 2.0
Features:
  KISS
  PERSONAL MESSAGE SYSTEM V
  3.0
  CWID
Release P1.1.6D1 02/04/90 — 32K RAM
Checksum $8B
cmd:
```

local mailbox, within seconds I was 'in' with a welcoming message being displayed. Seems to work, I thought, so my theory of getting going without being an expert seems to be correct.

After that I checked the setting of the small Level adjustment behind the rear panel, adjusting this as required to give around 3kHz deviation on my transmitted packets, followed by a few other tailoring exercises such as entering the current date and time for the tnc's automatic

mailbox logging and 'stations heard' listing operations. Then I set off with a pocket-sized Atari Portfolio computer and RS-232 interface to use as a terminal (the HandiPacket distributors, Siskin, also supply this ready-loaded with a terminal program as an option).

As I am used to operating portable packet, I noticed that the HandiPacket radiated very little microprocessor hash, important when you're using a handheld with its aerial close to the tnc. Gone was the S-5 noise I had become used to before! Likewise I found it quite possible to use the handheld clipped on my belt right next to the tnc without any rf problems affecting the HandiPacket. I appreciated the Open Squelch data detection circuitry, which allowed me to leave the handheld squelch open to save problems with the odd remote station having a very short TxDelay setting. This sometimes caused amateurs problems with portable rigs, as (to conserve battery power) portable receiver squelch circuits sometimes don't open fast enough to let through the start of packet data fields with short TxDelay settings through. I had no problems with the HandiPacket though — very impressive.



Circuitry

For the technical, the HandiPacket insides consist of three circuit boards, and rather than the tiny smd ics used in many miniature units the HandiPacket uses normal dil (dual in line) ics for all functions apart from the static ram, which should make any eventual repair work easier. The main cpu (central processing unit) is a Z80 device running at 4.9MHz, and for the memory side a 32K static ram is used for the storage of buffers, pms messages and the user variables. The usual plug-in 27C256 32K eeprom is used for program storage, which may be easily replaced in the future when upgrades become available to prevent the unit becoming obsolete before its time. The ic used for Transmit modulation and Receive demodulation is a TCM3105 cmos modem, this is coupled with a 27C64 8K State eeprom and a latch ic for 'open squelch' data carrier detection.

System operators might like to note that as well as having KISS facilities and the ability to be used as a ROSE network switch using a suitable eeprom, the UK distributors tell me it is compatible with The Net eeproms for those who'd like to use the HandiPacket as a Network Node itself.

Conclusions

The HandiPacket is a very sturdy tnc which should easily stand up to the odd knock in portable use. The internal construction combined with the 500mAh nicad pack means it is not what could be described as 'ultra-tiny', but it is smaller than the average shack unit as well as being very rugged. Inside there's a full-featured tnc with the bells and whistles of the best. The HandiPacket is not a compromise! As such it could find good use in a number of user roles as well as sitting in the shack for general packet chatting and bbs operation.

The HandiPacket is currently £199 all in, and my thanks go to Siskin Electronics for the loan of the review unit.

mailbox with the HandiPacket, finding operation very similar indeed to a typical Network bbs, even with a comprehensive 'Help' listing, as shown in Figs 2, 3 and 4.

The Latest Software

The HandiPacket was fitted with the latest eeprom software version, 1.1.6C1 (commonly called Version 3), which offered a number of handy operating features. A description of every facility would fill several issues of the magazine (remember the mammoth instruction book), so I'll describe one or two.

The facility for an MH (Stations Heard) listing is present on all current tncs, but the HandiPacket also told me which calls were recognised as Network Nodes and which were bbs stations, as well as listing the callsign and time/date received. It identified nodes by the presence of Level 3 packet frames, and bbs by their identification format, ie PMS-3.0-C\$, a novel touch. Together with this, various handy personal message store (pms) functions were present such as the Send Reply and Send Private functions. These are coupled with the facility of the HandiPacket pms to automatically receive auto-forwarded mail from a local Network bbs by arrangement with the bbs system operator, and even to 'reverse forward' outgoing mail which has been entered on the HandiPacket, this being picked up by the Network bbs when it periodically polls the HandiPacket! Very powerful indeed. Is it any wonder the commercial radio people are learning from packet operators?

Together with this, the HandiPacket pms can of course be used purely as a local message store. During the review period I replaced my usual personal

Fig. 3. PMS commands available.

B(bye)	B (CR) disconnects from pms.
H(help)	H (CR) or ? (CR) help file.
J(log)	J (CR) list of callsigns heard (optional date/time)
K(ill)	K n (CR) deletes message number n (only to/from your callsign).
KM(line)	KM(CR) deletes all READ messages addressed to your call sign.
L(ist)	L (CR) lists the ten latest messages.
M(line)	M (CR) lists the ten latest messages to/from your callsign.
R(read)	R n (CR) reads message number n.
S(end)	S (callsign) (CR) begins a message addressed to (callsign). Subject: max 28 characters ending with (CR). Text: End each line with (CR). End message by typing /ex (CR) or CTRL-Z (CR) at the beginning of a new line.
SR(eply)	SR n(CR) Sends a reply to message n prompting only for text.
V(ersion)	V (CR) displays the software version of the pms system.

Fig. 2. PMS sign-on connect message.

```
C G4HCL-2
*** CONNECTED to G4HCL-2
Logged on to G4HCL's Personal
Message System
CMD(B/H/J/K/KM/L/M/R/S/SR/V/?)>
```

Fig. 4. PMS message listing.

```
Msg No. Stat Date time To From @ bbs Subject
1 PR 90/04/29 19:13 ALL G4HCL Station Details
14107 Bytes free
Next message Number 2
CMD(B/H/J/K/KM/L/M/R/S/SR/V/?)>
```

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We are delighted to give firm information about the new AR-1000 handheld scanner from AOR. Their design aim of producing a handheld version of the AR-2002 but improving on the spec, at the same time seems to have been fulfilled.

BASIC SPECIFICATION

Frequency ranges 8 to 600MHz continuous, 805 to 1300MHz continuous.

Frequency selection By direct keypad entry or by tuning knob on top panel.

Memory channels 1000 arranged conveniently in ten banks of 100, with direct keyboard access to any memory.

Search bands Ten bands which come pre-loaded with the ten most important UK bands of interest as follows:—

1. VHF air	118-138MHz	2. UHF air	225-400MHz
3. VHF PMR1	71-87MHz	4. VHF PMR 2	165-174MHz
5. Band 3	174.5-225MHz	6. VHF marine	156-163MHz
7. VHF amateur	144-146MHz	8. UHF amateur	433-435MHz
9. Cell mobile	890-905MHz	10. Cellbase	935-950MHz

Note that this is only the factory pre-loading, and any search band can be easily re-programmed by the user for any frequency range they wish. What is important is that the new owner can unpack the receiver and by pressing just 3 keys can begin using the unit straight away.

Reception modes AM, FM (narrow), and FM (wide) which gives access for the first time to FM broadcast and TV sound in a handheld scanner.

Frequency steps Users programmable from 5 to 995kHz, in any multiple of 5kHz to 12.5kHz.

Scan speed 20 channels per second.

Search speed 40 channels per second.

Power source 4.8V rechargeable NiCd.

The battery pack is four separate 600mA/H AA size cells which are provided, but the user can easily remove them and replace them by four standard AA pencils. Also, and most importantly, the AR-1000 can be powered from any external dc supply of 13.8V nominal, which not only powers the receiver but also charges the NiCd batteries — so satisfyingly simple.

Other features include a 10dB switched RF attenuator; concentric easy to use volume and squelch controls; a brilliantly designed keypad layout which anyone can understand and use; and a simple interactive operating system in which the display clearly indicates what the user's next move should be. All the performance and features which we wanted from AOR are here in a stylish handheld package, measuring only 70 x 35 x 170mm, and weighing a mere 300g (excluding batteries).

The AR-1000 comes complete with the following accessories:

Set of 600mA/H NiCd batteries

240V mains charger

DC power cord with cigar lighter plug

Soft carrying case

Belt clip

Carrying strap

Earpiece

High performance DA900 flexible gain antenna



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Neapolitan VFO with s

A good stable VFO is the heart of many Amateur Radio projects and there is still a place for traditional non-synthesised circuitry. This is particularly the case when building QRP equipment, where cost and compact size are often important considerations. The "Neapolitan" is based on traditional circuitry but it is fabricated entirely from surface mount devices (smds) and this results in a printed circuit board of very compact size. A much more compressed design would be possible but amateur experience with smds is still limited and ease of construction and

The Oscillator

This is a Colpitts circuit centred on Q1, characterised by the use of two capacitors, C3 and C4, to effect a tap for feedback in order to maintain oscillation. The Colpitts circuit is popular because it avoids the use of tapped coils, which are difficult to produce. The frequency of oscillation is determined by a parallel tuned circuit L1, and its associated capacitors. Signal output is taken from the source of Q1.

The transistor Q1 and its biasing are worthy of note. This fet-type BSR58 has a higher gain and much

fixed source bias resistor, R3, is used and a separate trimpot of higher value gives control of the oscillator output. With the slider of RV1 at the top of its track the full output of the oscillator is applied to the next stage. However, lower settings of RV1 rapidly insert a high resistance, isolating the oscillator to a greater extent. There is also another reason for using a separate trimmer. Trimpots are ideally designed as potential dividers and passing high currents can shorten their life and make them noisy.

This is especially so with miniature types where the tolerance can exceed specification after about 20 adjustment cycles. Receiver incremental tuning (rit), transmitter offset, FM and similar functions are provided by a varicap diode, D1. This is a dual varicap and is supplied with reverse DC bias via R1. The tuning voltage will be derived from a potentiometer or

Bill Mooney BSc G3VZU presents a general purpose VFO for 1 to 10MHz surface mount devices.

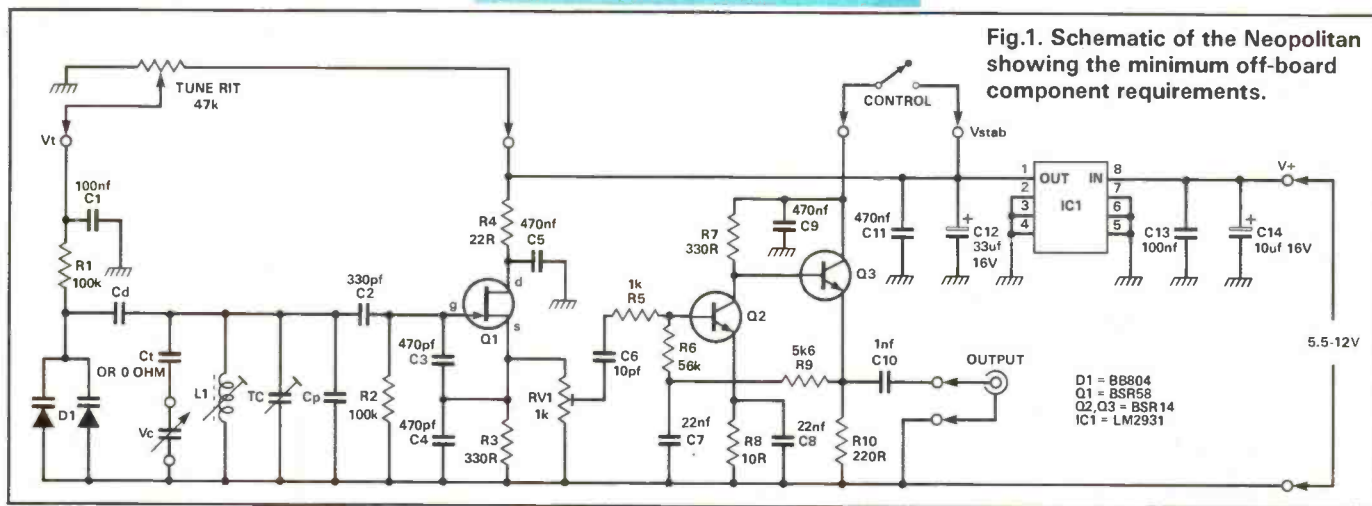


Fig.1. Schematic of the Neapolitan showing the minimum off-board component requirements.

flexibility was the aim. Selection of the frequency-determining components by the constructor will allow operation from 1MHz to 10MHz with sufficient output to drive most projects with diode or fet mixers.

The circuit of the "Neapolitan" is shown in Fig.1. It consists of three important sub-sections as follows:

- (a) A stable fet oscillator.
- (b) An isolating amplifier stage.
- (c) A voltage stabiliser.

tighter specification than the more popular amateur type 2N3819, and is able to achieve oscillation over a wide frequency range with a limited selection of inductors, since there is less need to adhere to optimum L to C ratios. A gate bias of about -2V is required for correct operation, and is developed across R3. The gate is connected to OV through R2 and is therefore at a potential of -2V with respect to the source.

In this general-purpose circuit a

fixed resistor network and switched in when going from transmit to receive or vice versa. The characteristics of the BB804 varicap are given (in Fig.2) for those who wish to do their own calculations. It is assumed in all cases (Table 1) that a 100pF tuning capacitor is to be used. Of course in some applications varicap tuning alone may be used. The Neapolitan is potentially stable enough for this as the main type of tuning.

surface mount devices

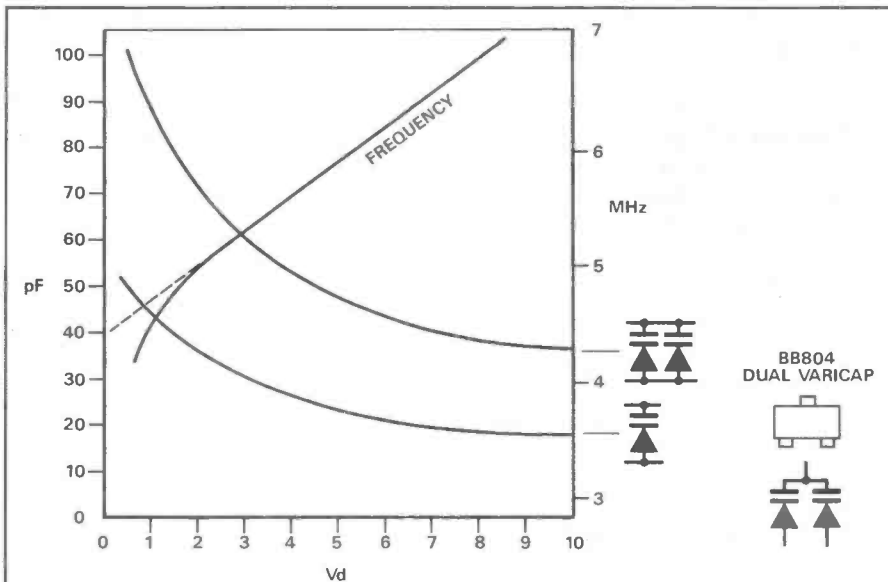


Fig.2. Characteristics of the BB804 dual Varicap diode, showing capacitance for single and dual connection. The frequency/tuning voltage (V_t) of the vfo, set to about 7MHz, shows how non-linearity sets in at about 2V. Using the 5V regulated supply will therefore give a useful range of 2 to 5V.

Table 1. Selection of frequency-determining components.
(R_x = zero ohm jumper)

Band in MHz	C_d	C_t	C_p	L_1	V_c	T_c
1.8 - 2.0	100pF	R_x	120pF	22uH	100pF	13/50pF
3.5 - 3.8	100pF	R_x	270pF	3.3uH	100pF	13/50pF
7.0 - 7.1	10pF	22pF	0pF	3.3uH	100pF	13/50pF
10.0 - 10.2	10pF	10pF	0pF	1.0uH	100pF	13/50pF
5.0 - 6.0	100pF	R_x	100pF	3.3uH	100pF	13/50pF

The required frequency range must be decided by the constructor and is effected by selecting various capacitors (from the table) and just three values of inductor. The capacitors were chosen as the changeable components as they are lower in cost than coils and available in a wider range of preferred values. The tapped capacitor feedback pair C_3 , C_4 and the coupling capacitor, C_2 , are all fixed in value over the frequency ranges given in the table, leaving just three capacitors and the inductor to be selected by the constructor. The capacitors have the following function:

- C_d : This determines the frequency coverage of the varicap.
- C_t : Determines the frequency coverage of the main tuning capacitor.
- T_c : Trim capacitor to set

- frequency accurately.
- C_p : Padding capacitor for wide frequency changes and band setting.

The resultant of all these capacitors determines the frequency and their relative values determine the tuning range. The various handbooks cover this subject of bandspreading and should be consulted if necessary. All capacitors around the oscillator are ceramic multilayer types with the highly stable COG dielectric and have zero temperature coefficients. Care should be taken to specify COG types when ordering as Y5V or X7R types cannot be used for tuned circuits. The coil specified, L_1 , is a surface mount type 5CD. These have excellent inductance/temperature properties and their value can be varied by about 10% with the adjustable core.

The Isolating Amplifier

A good vfo design should exhibit the following characteristics:

- (a) Free from frequency drift over a specified time.
- (b) Constant output over the design frequency range.
- (c) Free from frequency "pulling" when the load varies.
- (d) Low noise output.
- (e) Good sinewave, ie low harmonic content.

Any real vfo is a compromise between these opposing parameters. High output means poor stability, high stability requires minimal loading and therefore low output. We usually settle for acceptable stability by arranging for minimal loading of the oscillator. This implies the use of an isolating or buffer amplifier to redress the power output and exert minimal loading on the oscillator. The output of the "Neapolitan" will have a virtually constant amplitude within and frequency band, but will vary a little from band to band depending on such factors as the L:C ratio and the Q of the coil L_1 .

The wide band buffer amplifier consists of Q2 and Q3. This amplifier must work over the range from 1MHz to 10MHz and must have a voltage gain of about 20dB. The constraint of having to work on a low supply of 5V necessitates some careful selection of components in the buffer amplifier and a fairly high quiescent current of about 15mA. The DC working point is stabilised by feedback through R_6 and R_9 . Values chosen ensure maximum output amplitude up to the point of symmetrical clipping of the sinewave.

With the transistors used and the low inductance layout the gain is quite flat over the desired range without RF feedback. C_7 decouples any RF from the feedback circuit and ensures that the lower end of R_6 is at RF ground. In specific cases the quiescent current could be reduced by using higher values of R_7 , R_8 and

R10 with some loss in performance. Don't try this unless you know what you are doing and have some test equipment. Drive for the buffer amplifier is taken from RV1 which gives some control over the loading of the oscillator. The aim should be minimum loading of the oscillator consistent with adequate output. The buffer should not normally be driven to the point where clipping occurs.

It is unwise to control the vfo by switching the whole thing on and off. Switching the buffer is far more elegant and results in good isolation in the off position. For normal uses the oscillator need not be screened as the small size, screened coil and double sided pcb results in very little radiation. Coupling of the signal to other circuitry can be reduced by keeping connecting wires from running over the oscillator area.

The Regulator

However careful the design of a vfo, it will need a stable supply. As this is a general purpose vfo it could be required to work on a wider range of supply voltages, and a design range of 5.5V to 15V is assumed. Crude zener regulators can certainly be arranged to give a roughly constant output over such a range. 'Roughly' is the important word here, because the stabiliser must not only remove large variations but must also produce ripple- and noise-free dc. Many a vco has been spoiled by lack of attention to this 'close in' voltage control. In the Neapolitan an ic regulator provides the answer.

The LM2931 regulator is an impressive device designed for the rugged auto electric market. It will continue to produce a rock steady 5V output from well over 15V right down to about 5.5V input. The actual fixed output will be in the range 4.8V to 5.2V, and the quiescent current is only 1mA. Most of the current requirement for this vfo is taken by the buffer amp. Capacitors on the input and output of the regulator are the manufacturers' recommendation for optimum stability, but they also improve immunity to outside effects and reduce noise. Don't leave them out or the 2931 will 'take off'. R4 and C5 'gild the lily' by providing even more isolation of the oscillator. The 5V regulated supply is an excellent

source of dc for the tuning potentiometer.

Construction

It is when we come to construction of the vfo that the pleasure and advantages of using smds become obvious. Looking at the pcb track pattern (Fig.3) you will notice

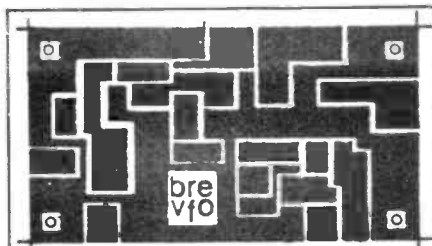


Fig.3. Component side track pattern. A double-sided pcb is used for extra stability, but the reverse side remains unetched, and acts as a screen.

that there are no component holes to be drilled. If this were a normal project you would now be facing the task of drilling some 80 1mm holes. Once you've etched this pcb, you've done most of the work. The Neapolitan is constructed on double sided pc which not only adds RF screening and stability but also reduces warping of the board which would put stress on the smds. It would be quite in order to put components on the reverse side but in this design it is simply connected to ground as a screen.

Getting the pcb track pattern onto copper is not difficult these days and any normal technique may be used. The tolerances are not difficult to achieve, and in some respects smds are less critical than leaded

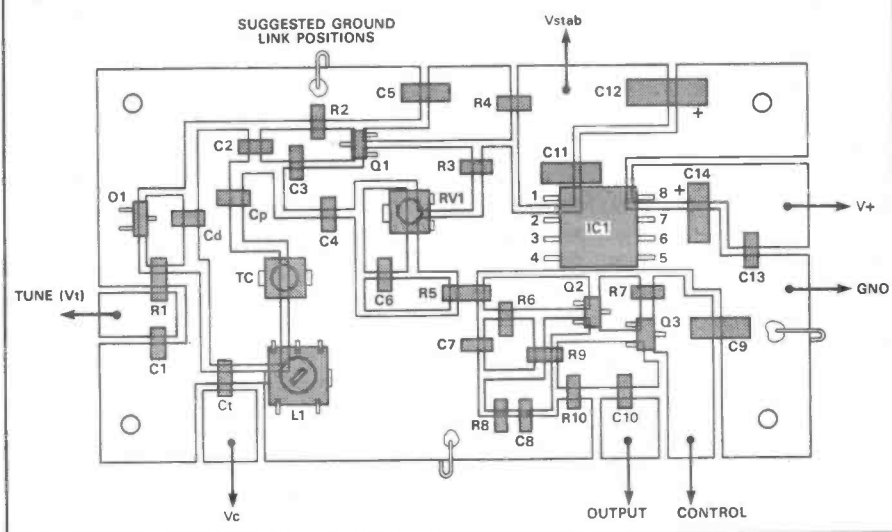
devices. If mounting holes are required, such as M2 bolt holes at the corners, they should be drilled at this early stage.

When it comes to populating the board you will find that soldering chip components in place is much faster than soldering leaded devices by the time all the legs are bent and trimmed. The component positions on the pcb are shown in Fig.4. There is plenty of room on the board with the layout suggested and the order of component addition is not at all critical. Use a 26 SWG low-melting-point solder if available, along with a good iron which will heat the chips up rapidly and efficiently.

Use a smd assembly jig if possible to hold the components in place while soldering. This will allow you to make a good joint, which is very important with smds. The assembly jig will also result in a well-aligned, neat-looking pcb. Use the minimum amount of solder that will hold the chips in place.

Place IC1 on the board before C11, and place L1 before TC. Solder the fet in place last of all. Make certain to get the tantalum capacitors the right way around. Once the circuit is deemed to be working solder both sides of the screening can of L1 to the ground tracking. If you do make an error the chips can be removed with a hot air blower, rework tools or two irons. Lastly, don't forget to connect the rear side of the pcb to the ground on the circuit side. Ideally this should be done in at least three places. The finished circuit will benefit from a thin spraying of solder-through lacquer.

Fig.4. Position of the surface-mount components on the top side of the pcb.



Setting Up

The anxious moment of applying power is upon us, so take it slowly and methodically and you should avoid disaster. Components which cross over a track such as R1 and R9, should be checked for shorts to the underlying conductor. If Ct is not required, use a zero ohm jumper to make the connection to the Vc pad. After a good visual check of all components connect a current limited power supply of 6V or more to the appropriate pad. Leave the buffer amplifier unconnected and measure the output from the regulator. This should be about 5V, but rock steady such that large changes in the input voltage should have no effect.

Measure the source voltage on Q1 expecting about 2V and check that it is oscillating by listening for it on a general coverage receiver. The tuning voltage applied to the varicap should be over 1V and ideally in the range of 2-5V where the frequency variation with voltage is linear. Below 2V the tuning diode begins to conduct and the tuning rate decreases. Now power up the buffer. The voltage on Q3's emitter should be about 3V if all is well. An oscilloscope would be useful for checking the output waveform, and the input to the buffer can be adjusted using RV1 for maximum output before clipping. In any case always adjust RV1 for the lowest output that will do the job in hand. This ensures least loading of the oscillator and best frequency stability. The final stability of the vfo is largely determined by its environment.

Keep the pcb away from heat sources. Mount the pcb in such a way that mechanical stresses on the box in which it is housed are not coupled to the oscillator. Avoid connecting wires running over the oscillator section. The magnetic field from loudspeaker magnets should be kept away from L1. The best quality tuning capacitors have two bearings, but this is not essential provided good sturdy mechanical methods are used. Just as important, connect the variable capacitor right up close to the Vc pad and use a direct ground connection to the pcb also. The buffer is capable of delivering several milliwatts at 2Vpp. If higher voltages are needed, a small 4:1 ferrite transformer will do the job.

Parts List

RESISTORS

R1, R2	100k	SMD size 1206
R3, R7	330R	SMD size 1206
R4	22R	SMD size 1206
R5	1k	SMD size 1206
R6	56k	SMD size 1206
R8	10R	SMD size 1206
R9	5k6	SMD size 1206
R10	220R	SMD size 1206
Rx/Ct	0R	Jumper size 1206
RV1	1k	SMD preset type 3204

CAPACITORS

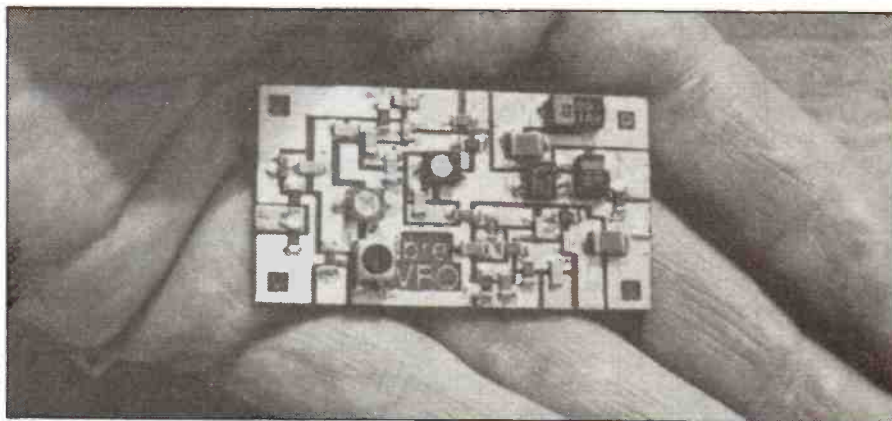
C1, C13	100nF	X7R dielectric SMD size 1206
C2	330pF	COG dielectric SMD size 1206
C3, C4	470pF	COG dielectric SMD size 1206
C5, C9, C11	470nF	X7R dielectric SMD size 1812
C6	10pF	COG dielectric SMD size 1206
C7, C8	22nF	COG dielectric SMD size 1206
C10	33uF/16V	Tantalum
C14	10uF/16V	Tantalum

SEMICONDUCTORS

D1	BB804	Dual varicap in SOT23 SMD package
Q1	BSR58	FET in SOT23 package
Q2, Q3	BSR14	NPN transistor in SOT23 package
IC1	LM2931	5V regulator in SO8 package

OFF-BOARD COMPONENTS

Tuning or RIT potentiometer	47k linear
Buffer on/off switch	spco device
100pF tuning capacitor	Type C804A or similar



Component prices from Blue Rose

All resistors (including Rx) 5p each.

RV1	75p
C1, C13	10p each
C2, 3, 4, 5, 6, 7, 8, 9, 10, 11	8p each
C12	£1.50
C14	£1.02
D1 (BB804)	45p
Q1 (BSR58)	45p
Q2, Q3 (BSR14)	30p each
IC1 (LM2931)	£11.10

Prices as of March 1990.

All on-board components are available by mail order from Blue Rose Electronics, 538 Liverpool Road, Great Sankey, Warrington, Cheshire WA5 3LU. Catalogue £1. Callers by appointment. All off-board components are readily available from conventional component suppliers. The pcb can be obtained for £3.25 from the HRT PCB Service.

VHF at Sandown, 1990

VHF enthusiasts from across the UK and several Europeans once again converged on the Sandown Racecourse Exhibition Centre for this year's annual VHF 'Gathering of the Clans'. Following the traditional get-together the evening before in a local hostelry with many well-known 6m DX-chasers in attendance, the following day brought forth the usual large trade exhibition and lecture streams catering for the many and varied interests of the vhf/uhf/shf/ fraternity.

RSGB Opening Speech

The convention was officially opened by the RSGB president Frank Hall GM8BZX, whose speech gave the assembled amateurs something to think about. Firstly, the Novice Licence was welcomed with the hope of boosting the hobby's appeal to the public, and Frank also added: "Without the Novice Licence,

who gave a rundown of the agreements reached at the 1990 IARU Region 1 conference in Torremolinos. A common approach would be made at the 1992 World Administrative Radio Conference to gain exclusive band segments across IARU region 1 on 6m, together with the hope of a 4m allocation in other European countries. The statement of a emphatic



Dave Bulter G4ASR, RSGB VHF manager, says that 12.5kHz spacing on 2m isn't on.

amateurs to test the spectral purity of their latest 23cm homebrew creation or whatever.

Lectures

After a morning's bargain hunting and refreshment seeking at the open-all-day convention bars, the afternoon brought a variety of lecture streams. First of all, Ron G3AAJ of Amsat UK gave us an update on the latest digital packet satellites to have been launched, adding: "There is now so much up there that it's hard to decide what to listen to!". While this was going on, Angus G3OSS lectured on 'The Optimum system for VHF/UHF — Transverters or Black Boxes?'. Next came 'DX and the Solar Cycle' with Ray G2AHU and Martin G3USF showing us how the sunspot cycle affected auroral, trans-equatorial and Tropospheric propagation on 6m, together with Ted G4UPS telling us about the latest countries to be active on 6m. The talks included very revealing tape recordings from VK land of the strong UK

G4HCL hears the RA pledge war on band abusers.



David G3OUF (General Manager of RSGB) discuss 6m DX propagation with Richard G4CVI.

this hobby is going to die". On a different note, it was revealed that the RA (ex DTI) have, in no uncertain terms, told the RSGB that they are getting "sick and fed up" of the abuse on the air generated by a small number of amateurs, and he appealed to all amateurs to police the bands ourselves, adding "either our bands are cleaned up, or the DTI will clean them up".

The floor was then taken by Dave Butler G4ASR, the RSGB vhf manager,

RSGB 'no' to formal 12.5kHz channel spacing was added, at least over the next five years, despite rumours circulated to the contrary.

The traditional presentation of vhf trophies followed. Last year the name of the 'Hillbillies' was much in evidence, this year it was the 'Northern Lights' who received no less than four trophies for their contest efforts over the past year. Many other smiling faces also received trophies, including that of HRT contributor Ken Ellis G5KW who received the Harold Rose trophy for his services to amateurs on the 6m band.

New Frontiers

The theme of the convention this year, if there ever was one, was most certainly that of the phenomenal increase in efficient digital modes on vhf/uhf/, shown by the large number of packet radio and computer exhibitors in attendance. No doubt spurred by the large number of amateur data satellites recently launched, at least one dealer sold out of his entire stock of satellite packet modems. As well as many traders and the usual large RSGB stand (yours truly witnessed the sale of yet another RSGB personalised teddy bear at £29.95!), the upstairs hall carried several specialist groups of interest to the vhf enthusiasts, such as Amsat, Worked All Britain, the Remote Imaging Group and so on. Marconi Instruments were also present with a comprehensive array of test equipment, ready and waiting for



Northern Lights take the prizes!

6m signals heard over there in favourable conditions. During this, the Remote Imaging Group headed by Henry G3REH held their AGM, together with a further hall hosting a Microwave Forum for the visiting shf enthusiasts.

Finally, Sam G4DDK lectured on the construction of simple microwave sources to show us how easy it is to get into the upper bands, while vhf enthusiasts attended the VHF Contest Committee forum. At the same time, those having aspirations to a Class A licence waited anxiously in the adjacent hall in the company of Robert G4GTO who headed the RSGB Morse Test Forum.

The End of the Day

As the lecture streams came to an end at 17.15, many exhibitors were starting to pack up; this of course is the ideal time for last-minute bargain hunting. Yours truly came away with several bits of new reading material and the odd station accessory, although the new FT-650 100W 6m multimode at just under £1000 was just inspected with envy. Maybe next year...



HRT contributor Ken G5KW gets the Harold Rose Trophy for his work on 6m.

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ICR700HF Receiver 500kHz-2GHz

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Alinco DJ160/DJ460

The radio designers at Alinco have been burning the midnight oil again. At the NEC show this year, the latest two Alinco portables were revealed: the 2m DJ-160E and 70cm DJ-460E. "Replete with bells and whistles" might be a tame description, as it is only once you've read the instruction book that you get a feel for the wide variety of standard operating facilities. HRT were again fortunate in receiving not just one, but both the vhf and uhf versions to review. The DJ-160E is selling at £219 and the DJ-460E at £229, complete with nicad and plug-in wall charger. We thought we'd take a closer look...

Controls

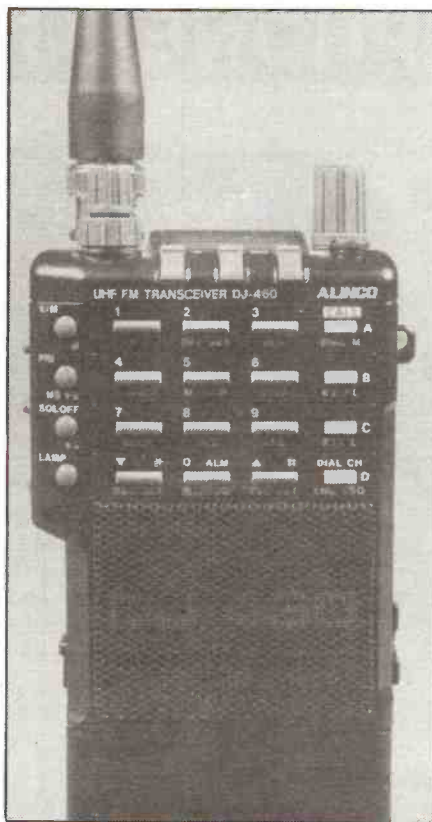
As well as keyboard entry, up/down buttons, and rotary tuning controls, all the usual microprocessor features are offered in a hand-sized unit measuring 142mm high by 57mm by 32mm. Each version gives a nominal 2W transmit output with a low power mode of 300mW from the standard 7.2V 700mAh battery. An optional 12V 700mAh battery increased the maximum power to 5W. The front panel keypad is fitted with rubberised buttons, to keep the rain out, and a top panel angled lcd (liquid crystal display) shows you what the set is doing. Next to the lcd are rubberised up/down buttons for frequency and memory channel stepping, and if that's not enough a rotary click-step tuning knob is also fitted. The usual on/off/volume and squelch knobs are fitted as concentric controls, and a side mounted squelch defeat button lets you do a quick check what's on the channel below the squelch threshold.

Battery saving facilities include the usual 'economiser' which cycles the receiver on and off if the set isn't doing anything such as scanning or receiving, together with an Auto Power Off facility which after a warning bleep switches itself to standby mode if no activity has been present for 30 minutes.

Frequencies

The sets can be programmed to tune in either 5kHz, 10kHz, 12.5kHz, 20kHz or 25kHz steps, and as well as the standard 2m or 70cm bands, and each receiver may if required be dealer-supplied with extended receive coverage. Out-of-band transmit is inhibited, of course, and the extended receive option depends "on your government's licensing viewpoint"! (We at the HRT reviews department have asked the RA about this, and at present are awaiting a reply.)

Together with the tunable vfo, twenty memory channels are available,



receiver halts the scan whenever the squelch raises, with two choices of scan resume: simply resume scanning a couple of seconds after the squelch closes, or employ a Time Resume mode where the receiver halts for five seconds on each active channel, then resumes automatically regardless of the squelch state.

A priority scan mode can be enabled so that the set checks a pre-set channel for one second in every six, and whenever a signal appears on the priority channel the set beeps and stays on that channel for three seconds. By suitable pre-programming, the priority scan mode may be used in either Memory, VFO, or Call channel mode to give you a choice of options. Together with this, a Dual Watch mode may be used where the set alternatively switches between the programmed Call channel and the selected memory channel or vfo frequency, spending three seconds on each.

Dtmf Selective Calling

A unique feature of these sets is dtmf (dual tone medium frequency, or telephone 'touch tone') selective calling. As well as the set's keypad acting as a

This pair of vhf/uhf portables have the unusual feature of dtmf selective calling. Chris Lorek puts out the call.

each capable of storing either simplex or repeater frequencies, with 14 channels also capable of storing 'odd splits' if required with programmable shifts of up to 10MHz. As well as this, a Call channel can be programmed for quick recall of your local natter or repeater channel, retrieved by a single button press on the keypad. To save accidental operations with the set whizzing off to another frequency, a keypad lock and frequency lock may be programmed in as required.

Scanning Around

What would a microprocessor controlled radio be without a scanner? These Alinco rigs seem to have it all. The memory channels as usual can be scanned one by one, with individual channels locked out of the scan as necessary to prevent the receiver locking up on busy repeaters or whatever. In vfo mode, a band scan may also be performed, encompassing either the entire frequency range, or just a pre-programmed section. In each case the

dtmf encoder, the receiver may be commanded to remain silent until it receives a multi-digit dtmf sequence that you've pre-programmed into the set. Then the speaker bursts into life to let you hear who's calling you — very handy.

Two forms of encoding and decoding are available: a 'pager' mode may be used to call either an individual set or a group of users, with each compatible set having the correct dtmf sequence of digits pre-programmed. The set's speaker then remains silent until the correct code is received, following which the receiving set beeps for five seconds to alert the user. Pressing the set's ptt key then allows normal communication.

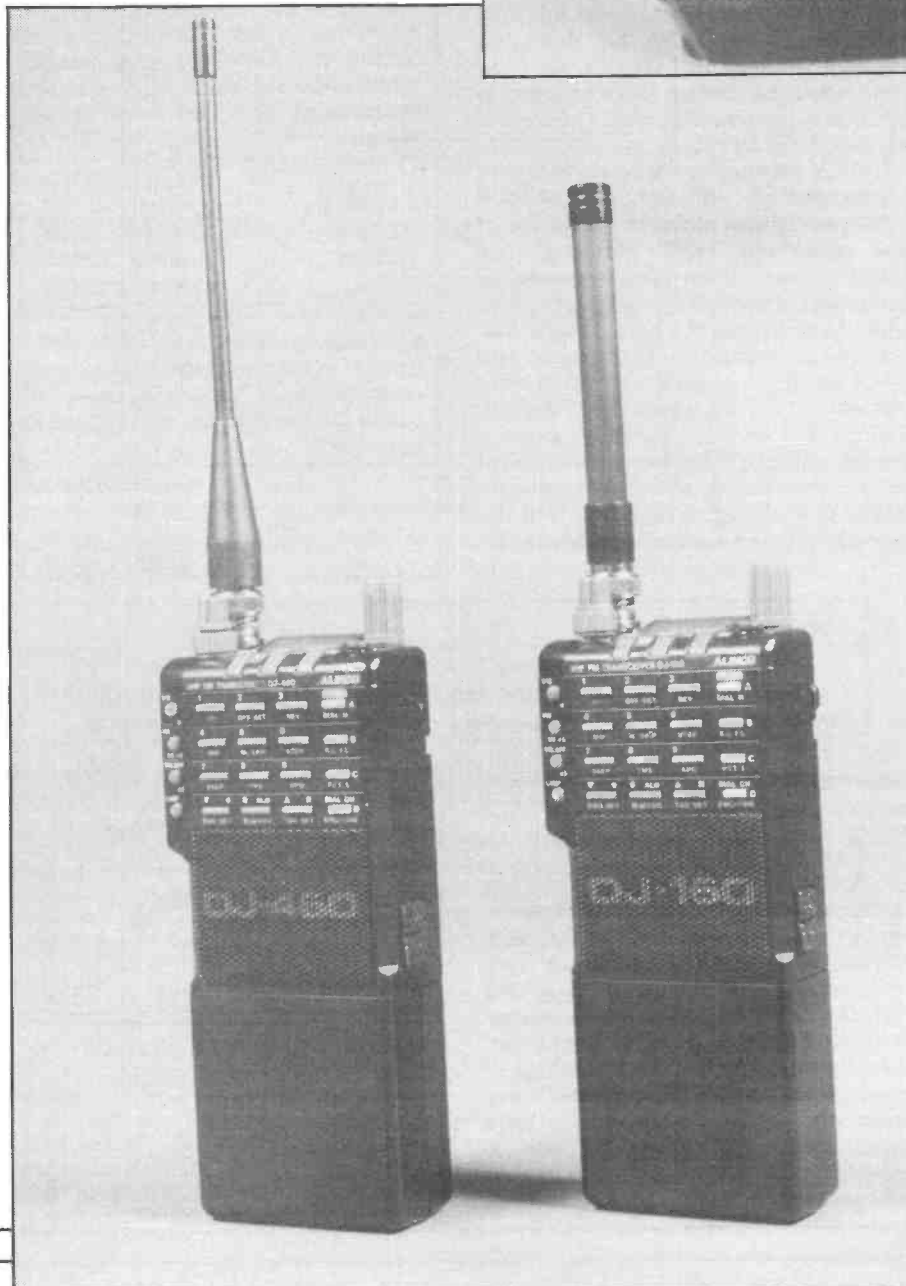
A Code Squelch function is provided, in which the set is pre-programmed with three dtmf digits, which when received will open the receiver squelch to allow the following speech to be received. Following correct decode, normal ptt operation is again possible, with the pre-programmed dtmf sequence being sent each time the ptt is pressed to 'open up'

460 Handheld Tx's

the other receiver. In each case, the 'DSQ' indicator on the receiving set's lcd flashes, until the ptt is pressed.

Insides

The radio section of these units is made up of a two-piece metal/plastic chassis with an overall plastic top panel, the rear metal casting being used for the transmitter power amplifier heatsink. On disassembling the rig for service, the set opens up like a book with the rf stages on one half, the low frequency, control, keypad and display units on the other. Repairs would certainly need a magnifying glass and tweezers, with a multitude of tiny surface mount components in evidence. If you're buying



one, make sure it comes from a dealer with a good service department — even experienced constructors would find many repairs on this type of high-density smd (surface mount device) board impossible.

On the circuitry side, both vhf and uhf versions have a dual conversion superhet with a high first if of 55.05MHz for the receiver, a pair of tiny monolithic dual crystal filters being used for selectivity, and the usual vco/amplifier and block type pa module for the transmitter. The pa and the sensitive vco are well screened from the remainder of the circuitry, very important with so much circuitry squeezed into such a small space. It's a pity the supplied manual gives no user adjustment information such as frequency, deviation and the like, even though most users would not be expected to do their own repairs.

On The Air

I tried both the sets on air for some time, operating at home, on the move as a pedestrian and in a vehicle, and to show that we're not just a magazine for UK readers the sets even accompanied me on a short European trip, with DL/G4HCL/P in operation under the guise of our standard CEPT licence.

The first thing that struck me was the difficulty in getting to know how to use the many facilities, and to start with I must confess I simply operated each in vfo mode using the main tuning knob. This achieved a reasonable degree of flexibility, although in time I fathomed out the instruction manual, which in my

opinion was often rather confusing as well as being inaccurate in one or two places. I found the tuning knob was often the only reliable method of operation at night due to the absence of any control and keypad illumination, although the lcd could be backlit. However, I eventually grew used to and appreciated the intricacies of such modes as priority channel monitoring in memory scan mode alternating with DSQ reception on a given frequency, although one or two programmable functions still left me baffled!

Performance

I found each set reasonably sensitive on receive, although the 2m DJ-160E noticeably lost weak signals once I had let go of it, when putting it down on a table, for example, due to the lack of the ground plane previously supplied by my hand. The squelch however was very sensitive, and I found I could set this to lift on very weak signals which then allowed me to position the handheld's aerial for best reception. There was ample audio from the internal speaker for most uses, although probably unsurprisingly I sometimes found this to be a bit on the woolly side due to its small size. Even when walking round a busy radio rally site, with all the strong signals that abound at such locations, I rarely found problems due to adjacent channel reception, although I did experience one or two effects of spurious signals received around 900kHz away from the tuned channel on both sets.

On transmit, the audio in each case was crisp and clear from received reports, and when walking around I found I didn't sound as if I was a long distance runner, which I have sometimes found with other handheld sets due to over-sensitive internal microphones. Throughout the on-air tests, I never totally flattened the nicads, suggesting a low current drain from the transmitter combined with the extra-capacity battery supplied as standard, giving 700mAh rather than the more usual 500 or 600mAh (or even 300mAh with some handhelds).

Dtmf Decoding

This was very useful. Sheila G8IYA and I normally converse on 70cm simplex using keypad dtmf type handhelds when apart but within local 70cm range, but we find that use of the semi-local 2m and 70cm repeaters is rather hit and miss due to other activity on the channel, causing us to monitor with the volume turned down. Using the dtmf facility on the Alinco portables allows one of us to monitor in silence when required, knowing that the set would burst into life when the other called with the correct dtmf sequence. This worked even when using a different rig as long as it had a dtmf encoder. I found in this case the

Alinco would respond to a manually entered dtmf sequence in Code Squelch mode, but not in Group Pager mode (ie giving beeps as well as allowing speech reception) although this would work with another Alinco, apparently due to extra, non-documented digits being transmitted. Try as I might, I couldn't get the individual pager facility to operate, but this as well as the previous mode could of course have been down to 'finger trouble'. Maybe one day I'll get it to work for me!

Laboratory Tests

In all, a fairly reasonable set of results were measured. As found on air, the current consumption was fairly low, indicating that the ni-cads should give a reasonable life. The receive 'economiser' fitted to virtually all handhelds nowadays can be used to extend the battery life further when the set isn't scanning or receiving. I found the set would operate with a supply voltage down to around 6.5V, although no low battery indication is given. The receiver first if rejection was fairly good considering the extended receive coverage that may be accommodated, but second if rejection at 910kHz away was a bit on the poor side, as I had noticed in use.

The transmit deviation was reasonably set although the DJ-460E 70cm model was slightly over the top of the maximum 5kHz standard. The transmit harmonics were reasonably suppressed, and the power linearity was quite good across the band. The power output as measured with each unit powered from a stabilised laboratory voltage source were slightly on the low side of 2W at 7.2V, although when a freshly-charged 7.2V nicad was applied the resulting power output was naturally higher in each case. I did notice that the rear panel became quite warm with a 12V

the advanced features a little difficult even though I am a radio engineer, although this could — of course — be a case of technology beating the capacity of the human memory.

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

LABORATORY RESULTS:

vhf Measurements relate to DJ-160E
uhf Measurements relate to DJ-460E

RECEIVER:

Sensitivity: Input level required to give 12dB sinad:

144MHz:	0.155µV pd
145MHz:	0.155µV pd
146MHz:	0.150µV pd
430MHz:	0.160µV pd
435MHz:	0.160µV pd
440MHz:	0.165µV pd

Adjacent Channel Selectivity:

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

	145MHz	435MHz
+ 12.5kHz:	31dB	39dB
-12.5kHz:	40dB	27dB
+ 25kHz:	68dB	66dB
-25kHz:	67dB	67dB

Blocking: Increase over 12dB sinad level of interfacing signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB sinad on-channel signal:

	145MHz	435MHz
+ 100kHz:	81dB	79dB
+ 1MHz:	83dB	86dB
+ 10MHz:	109dB	89dB

Squelch Sensitivity:

	145MHz	435MHz
Threshold:	<0.1µV pd (<6dB sinad)	<0.1µV pd (<6dB sinad)
Maximum:	0.34µV pd (19dB sinad)	0.36µV pd (18dB sinad)

supply applied giving the higher transmit output power.

Conclusions

Alinco have a reputation for offering no nonsense rigs at an economic price, yet with the DJ-160E and the DJ-460E handhelds they have offered a very comprehensive set of operating features combined with the unique facility of dtmf selective calling as a standard addition. This dtmf method has the advantage of being able to operate through most voice repeaters, unlike lower sub-tone frequencies which often fail due to repeater audio tailoring. In use I must confess I found the operation of some of

Intermodulation Rejection: Increase over 12dB sinad level of two interfering signals giving identical 12dB sinad on-channel 3rd order intermodulation product:

	145MHz	435MHz
25/50kHz spacing:	65dB	71dB
50/100kHz spacing:	64dB	70dB

Maximum Audio Output: Measured at 1kHz on the onset of clipping:

	145MHz	435MHz
3ohm load:	175mW RMS	160mW RMS
8ohm load:	180mW RMS	185mW RMS
15ohm load:	130mW RMS	145mW RMS

Current Consumption:

	145MHz	435MHz
Standby, squelch closed:	55mA	58mA
Receive, mid volume:	151mA	138mA
Receive, max volume:	172mA	162mA

Image Rejection: Increase in level of signal at first and second IF image frequencies over level of on-channel signal giving identical 12dB sinad signals:

145MHz	435MHz
98.5dB (255.1MHz)	63.0dB (324.9MHz)
49.0dB (145.91MHz)	48.0dB (434.09MHz)

Tx Power and Current Consumption:

Freq MHz	Power	7.2V Supply	12.0V Supply
144MHz	High	1.95W/880mA	4.35W/1.23A
	Low	255mW/385mA	360mW/445mA
145MHz	High	1.90W/865mA	4.25W/1.21A
	Low	250mW/370mA	345mW/430mA
146MHz	High	1.85W/855mA	4.20W/1.20A
	Low	220mW/360mA	320mW/410mA
430MHz	High	1.60W/1.09A	3.80W/1.46A
	Low	220mW/545mA	550mW/680mA
435MHz	High	1.55W/1.04A	3.80W/1.44A
	Low	230mW/550mA	3.70W/1.35A
440MHz	High	1.30W/965mA	3.70W/1.35A
	Low	190mW/455mA	495mW/620mA

TRANSMITTER:**Harmonics:**

	145MHz	435MHz
2nd Harmonic:	-70dB	-72dB
3rd Harmonic:	-74dB	-82dB
4th Harmonic:	<-90dB	-84dB
5th Harmonic:	-83dB	-
6th Harmonic:	<-90dB	-
7th Harmonic:	<-90dB	-

Peak Deviation:

145MHz	435MHz
4.95kHz	5.60kHz

Toneburst Deviation:

145MHz	435MHz
3.05kHz	3.30kHz

S-Meter Linearity:

Indication	45MHz		435MHz	
	Sig.Level	Rel.Level	Sig.Level	Rel.Level
S1	0.61µV pd	-13.4dB	0.68µV pd	-13.0dB
S3	1.28µV pd	-7.0dB	1.35µV pd	-7.1dB
S5	1.86µV pd	-3.7dB	1.90µV pd	-4.1dB
S7	2.40µV pd	-1.5dB	2.51µV pd	-1.7dB
S9	2.85µV pd	0dB ref.	3.05µV pd	0dB ref.
S9+	3.70µV pd	+2.3dB	3.75µV pd	+1.8dB

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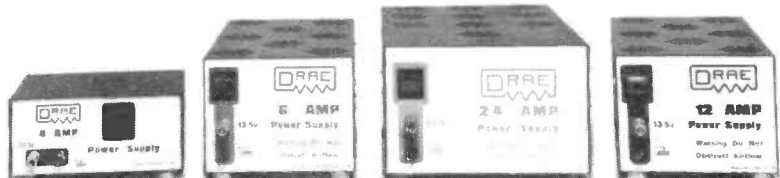
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Alexander Zhadan UA 6LHB with another celebrity!

The multitude of friends of Alexander Zhadan UA6LHB, might like to know how his visit to the UK began. It "snowballed" from an invitation extended to Alex, his XYL, Olga and her brother, Anatol UA6LJC, to visit my Ramsbottom QTH, when we met in Yalta last year. They had driven more than 800 km in a 16 old Lada to surprise me at the resort.

Arthur Taylor G4KLV welcomes an old friend to the UK.

A battle with authority, here and in the USSR, was fought before he could come here. Fortunately I was *au fait* with the procedure, having had a Russian teacher staying with me and my wife, Margaret, earlier in the year. Being fluent in the language, I could type out mandatory guarantees of board and lodgings of all three in Cyrillic on my PCW. This did not escape UA6LHB's notice.

Amateurs with shares in British Telecom might thank Alex for telling the world that he was coming over and, as our telephone went berserk, I began to realise that we were on to something bigger than we could handle alone. But I did not know then that this fraternity of ours is the most generous, hospitable and innovative in the world.

Ron Smith G3MYN, from Aldershot, was the first to offer hospitality to the trio, and it was Ron I persuaded to take on the task of handling the cash generously contributed to help in offsetting the £700-plus cost of the air fares.

There was a surprise for Alexander, Olga and Anatol on Friday 1st September at Heathrow when they were met at the foot of the aircraft steps by Gary G0ENW, an airport official, the first to greet them and Alex was handed an envelope containing the huge sum of money Ron had collected from friends of UA6LHB.

However, weeks before, an itinerary had been prepared to enable Alex to meet as many of his friends in "G-land" as possible. We were also able to arrange a visit to "GM-land" when Mike Mistofsky GM4KLO, and Bill Murray GM3AWW, came in with a late offer of board, lodgings, train fares and more for all three.

At the arrival party at the Royal Arms in Upper Hale, Aldershot, radio amateurs set a standard of hospitality that was

to become the norm. A list of call signs present would occupy a lot of space. On Sunday, 3rd September Denis Squire G0DAS and his XYL were the hosts at Esher, and Denis made a dream come true for Olga by including Madame Tussaud's in a tour of London. Denis also arranged for cheap travel passes before he bought their bus tickets to Plymouth for the next stage.

At Plymouth they were met by Ken Clarke G4MPQ and his XYL Dinah G7BIK, who were their hosts in Liskeard, Cornwall. This stop included a civic reception, and I am sure the children of St. Cleer school will not forget the Cossack from Rostov-on-Don who arrived in their midst. Alex told me of the barbecues laid on by Dr. Charles Nadin G4RMB at his Linkinhorne estate and of another arranged by Jim Caldwell G4WDI and XYL Maggie, Chairperson of Launceston Amateur Radio Club as well as Dave Sleep G4RLZ, Brian and Val Taylor G0EIA, local and Australian radio amateurs.

After a guided tour of Plymouth they caught the 11.30 coach for Manchester, where I picked them up.

The highlight of Saturday 9th September was a visit to the QTH of an old friend of Alex's, Jack Taylor G2BJT, whose XYL Tag laid on a lavish buffet. We adjourned to a lovely country pub, along with Harry Arnfield G3LX, a radio amateur of 50 years standing and Laurie Williams G0JLZ, a protégé of G2BJT, both members of Stockport Radio Society.

Sunday 10th saw us bound for Whitbarrow Hall at Berrier, Penrith where Arthur Hopkinson G0AUG, and his XYL Marina G0AUH have a large caravan park, which became home for a couple of days. Olga said the luxurious 8-berth caravan was superior to her flat in Rostov.

This visit was a bonus for me, because Arthur gave us a superb tour of the Lakes in his Range Rover and treated us to magnificent dinners at his favourite restaurants.

By this time Alex and Anatol were talking about buying a rig and, seeing Arthur's 757, they said that they must have one. This was arranged by friends of G0AUG, when they visited Bev Wright G4XIY in the Midlands.

On Tuesday 12th I waved a temporary farewell as Arthur and Marina headed towards Glasgow.

The visit to Scotland was a huge success and they met a great many radio amateur friends of GM4KLO and GM3AWW. Two days later, Mike and Bill bought the tickets and put them on the train to Preston where Bob Lee G0LEE and I greeted them. To say that they enjoyed their Scottish trip would be an understatement. I realised that this had been something special for them to tell friends back home.



Anatol, Olga and Alex with Mary Squire at Mary and Dennis G0DAS's QTH.

While our guests had been across the border a letter arrived with a generous contribution towards expenses from Carolyn Gilbody, radio amateur a living in Belfast. Her husband Brian is The Prof of Physics at Queens University and keen to meet Alex, but they had not known early enough.

On Friday my XYL and Olga, with one of my students as interpreter, went shopping in Bolton. I took Alex and Anatol to Dixon's. Alex had seen me typing in Russian on my PCW and was determined to take one back with him.

Not taking any chances, he insisted on a complete demonstration in the shop before he would accept the package, which weighed over 17kg. It was funny to see Alex and Anatol carrying that large box through the town. That evening I instructed Alex on how to get Cyrillic on the Amstrad, and he made copious notes.

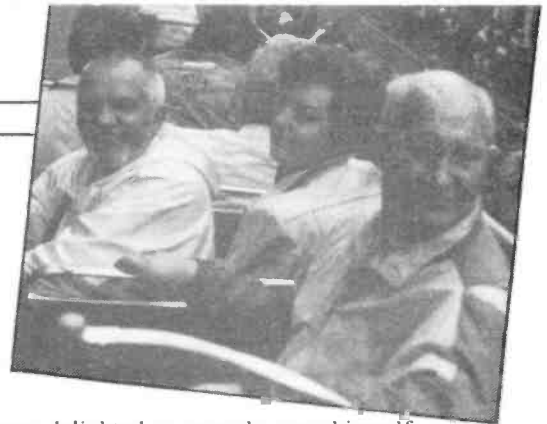
The computer meant that he could not buy the rig he had hoped for but Anatol still had cash to buy a rig and was eagerly looking forward to meeting Arthur and Bev, friends in the trade.

Stanton-in-Peak is a beautiful spot where Bev G4XIY has his QTH. Bev booked them into the local hotel owing to the illness of his aunt who had intended to put them up. Sadly Bev's Aunt has since died, and we offer our condolences.

I said "Da svindania" to my Russian friends, and did not linger, because the schedule left little time for Bev to get to know them. On Sunday Bev drove them to Melton Mowbray, whence Andrew Wright G4OLF, drove them to Salthouse, Norfolk, where his XYL Brenda G4SDF was waiting to take over. The evening was spent with Tom G3RZ, President of Fakenham Radio Club, and other amateurs.

A visit to Cambridge, Trinity College and the Cavendish Laboratory, once occupied by Isaac Newton gave Alex a thrill. Equally, Keith G0GFQ, who had his first QSO with UA6LHB,

Alex, Olga and Anatol going up Whitehall.



must have been delighted to meet the man himself.

Les G0DSN, and his XYL Betty from Stiffkey were Norfolk folk at the reception. The Russians were shown Sheringham Park and climbed the Gazebo. Friends of Andrew and Brenda provided transport. And we are very grateful to Chris Evans and Geoff Jukes, and a special vote of thanks must go to the XYLs and YLs involved in entertaining our Russian visitors.

I cannot end this report better than by quoting from a letter from Ron G3MYN:

22 September: I arrived at Heathrow Term. 2 in 22. Great concern expressed at the amount of luggage. With the help of Gary (G0ENW) the matter was resolved. The Amstrad and 757GXII had to be dealt with by customs to reclaim Vat etc. Booking-in, all done by 08.20. Farewells exchanged, we went our ways in the knowledge that everyone had had a most happy three weeks.

Thank you Olga, Alex and Anatol

All that remains now is for me to thank the large number of people who chipped in to make this visit a memorable time of glasnost, perestroika and droozhba. This last word, means "friendship", and I hope lasting friendships were formed among members of our wonderful hobby.

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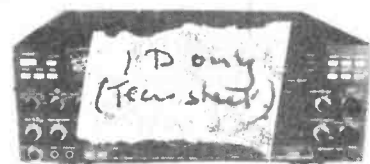
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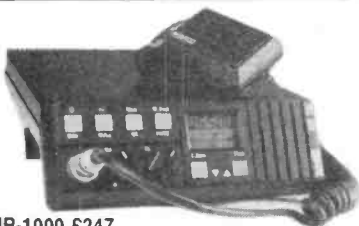
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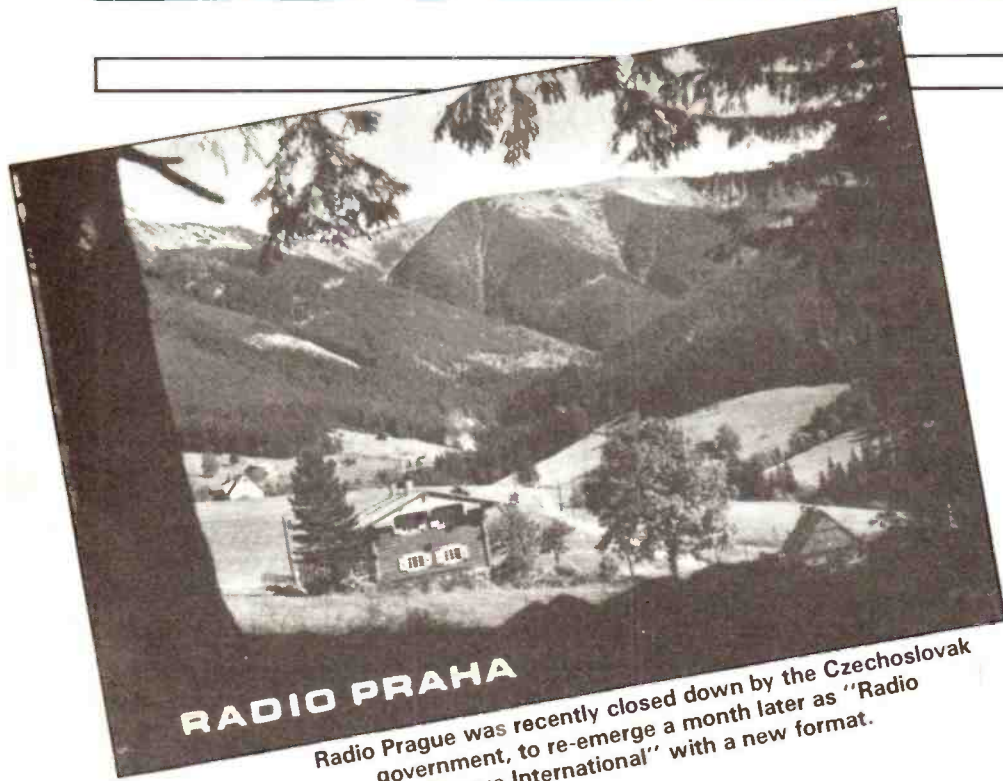
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LISTENING ON



RADIO PRAHA
Radio Prague was recently closed down by the Czechoslovak government, to re-emerge a month later as "Radio Prague International" with a new format.

Radio Prague has undergone a complete internal overhaul, and Radio South Africa has withdrawn into its African borders.

The last few months have seen major re-organisations of several large international broadcasting stations. The most far-ranging of these was undoubtedly that of Radio Prague, Czechoslovakia, which was closed down altogether — without any explanation being given — at the beginning of April. In fact, Radio Prague's programmes for Czech and Slovak speakers abroad, as well as their "Inter-programme" service in English, German and other languages (mainly intended for foreign visitors to Czechoslovakia) did stay on the air, but the great majority of their programmes, including those in English for Europe, North America and other parts of the world, were closed down.

The reason for this was that, following their peaceful revolution in November 1989, the Czechoslovak government had decided that Radio Prague needed a complete break from the past; a clean sweep and a new start was required. In order to achieve this, they ordered the station off the air for a period of a month,

during which time the highest management would look at what Radio Prague was doing, how they should achieve it, what parts of the world they should broadcast to, what languages they should use, and which members of staff they should keep. Certain staff members were seen as being too closely allied to the former communist governments and were asked to leave.

The station re-emerged as Radio Prague International on 7th May, with a new programme and transmission schedule and a new style of programmes. Give it a listen — it is very different from the old-style Radio Prague of the 70s and 80s. There are now four English-language programmes for Europe, one of which is broadcast at 2100-2115 GMT on 11990, 7345, 6055 and 5930 kHz (all of these are long-standing Radio Prague frequencies). It seems as if the former Radio Prague programmes in Arabic, Spanish and perhaps other languages have been dropped: presumably the Czechoslovak government has decided that their main target audience is now in the English, French and German-speaking countries.

Another major re-organisation has taken place at the Johannesburg headquarters of Radio RSA, "the Voice of South Africa". For many years this was by



RADIO RSA
Die Stem van Suid-Afrika
Radio RSA in South Africa has recently stopped all broadcasts except those to listeners in Africa.



Radio Korea, which broadcasts from Seoul in South Korea has recently negotiated a relay agreement with Radio Canada International.

far the easiest radio station to hear from sub-Saharan Africa — indeed, South Africa was one of the few African countries to have any sort of external broadcasting organisation. Radio RSA had a policy of always using the highest frequency band which would propagate efficiently — so in sunspot maximum years they would use the 11 metre band (typically 25790 kHz) for broadcasts to Europe, while for most of the remainder of the sunspot cycle the 13 metre band was used (usually 21590 or 21535 kHz), dropping down to the 17 MHz band only in sunspot minimum years. The north-south propagation path is very reliable, so reception of Radio RSA in Britain was usually excellent. However, in April listeners were amazed to hear announcements stating that as from 1st May, Radio RSA would no longer be broadcasting to any part of the world except Africa.

African Radio Confined

Apparently another political decision had been taken, and that was that listeners in Europe and North America had other means of gaining news about developments in South Africa (for example, the South African Broadcasting Corporation, of which Radio RSA is a part, has recently started satellite TV programmes which are available in parts of North America and via the Cable News Network). It was thought that people in the third world, and in particular Africa,

did not have access to this sort of information, and only shortwave radio could get through to them. Audience surveys had also shown that in Europe and North America relatively few people listened to Radio RSA, while in Africa the

a "message" to spread to the world, and it seems extraordinary that the South African government should suddenly stop this for relatively trifling sums of money — after all, no-one could imagine Radio Moscow suddenly deciding to stop all broadcasts except those to Europe! Whether or not you agreed with the political point of view, Radio RSA's programmes were always very professional, their entertainment programmes entertaining and their non-political feature programmes — such as those on African wildlife and conservation measures — interesting and thought-provoking. Since 1st May, the only Radio RSA programme in English which has been audible has been at 1500-1600 GMT on 17835 kHz.

Although they are not planning to cut out so many broadcasts as Radio RSA or Radio Prague International, yet another station threatening "reorganisation" is Radio Sweden. There they are also looking to their priorities and — much in the same way as Radio RSA is turning more towards Africa — Radio Sweden is turning towards Europe, and especially Eastern Europe. About a year ago, Radio Sweden introduced short news bulletins in Estonian and Latvian, which were for a trial period only. The developments in the Baltic States must have happened even quicker than the bosses at Radio Sweden could have imagined, and now these two language services are safe and



Radio Canada International is well-heard in Europe and can provide interesting holiday listening.

station had almost as many listeners as the Voice of America or BBC World Service (probably because of the strength of the signal in the African target areas), and so it was probably considered to be uneconomical to continue broadcasts to other parts of the world.

Many listeners were amazed by this decision, as Radio RSA very definitely had

in the Radio Sweden schedule on a permanent basis. Indeed, they are going to be increased to fifteen minutes daily from this autumn.

I wouldn't be at all surprised to see these two language services joined by Lithuanian shortly — indeed, many SWLs are surprised that Radio Sweden does not already broadcast in this language of its neighbour. The head of programmes at Radio Sweden, quoted by their "Sweden Calling DXers" programme, has also said that since Europe is now being given a higher priority than other parts of the world, Radio Sweden would concentrate more on its broadcasts in Russian, German and English, with the French and Spanish programmes (which are mainly beamed to Africa and South America rather than Europe) cut back to fifteen minutes each — the same status as Latvian or Estonian — while the Portuguese broadcasts are expected to be

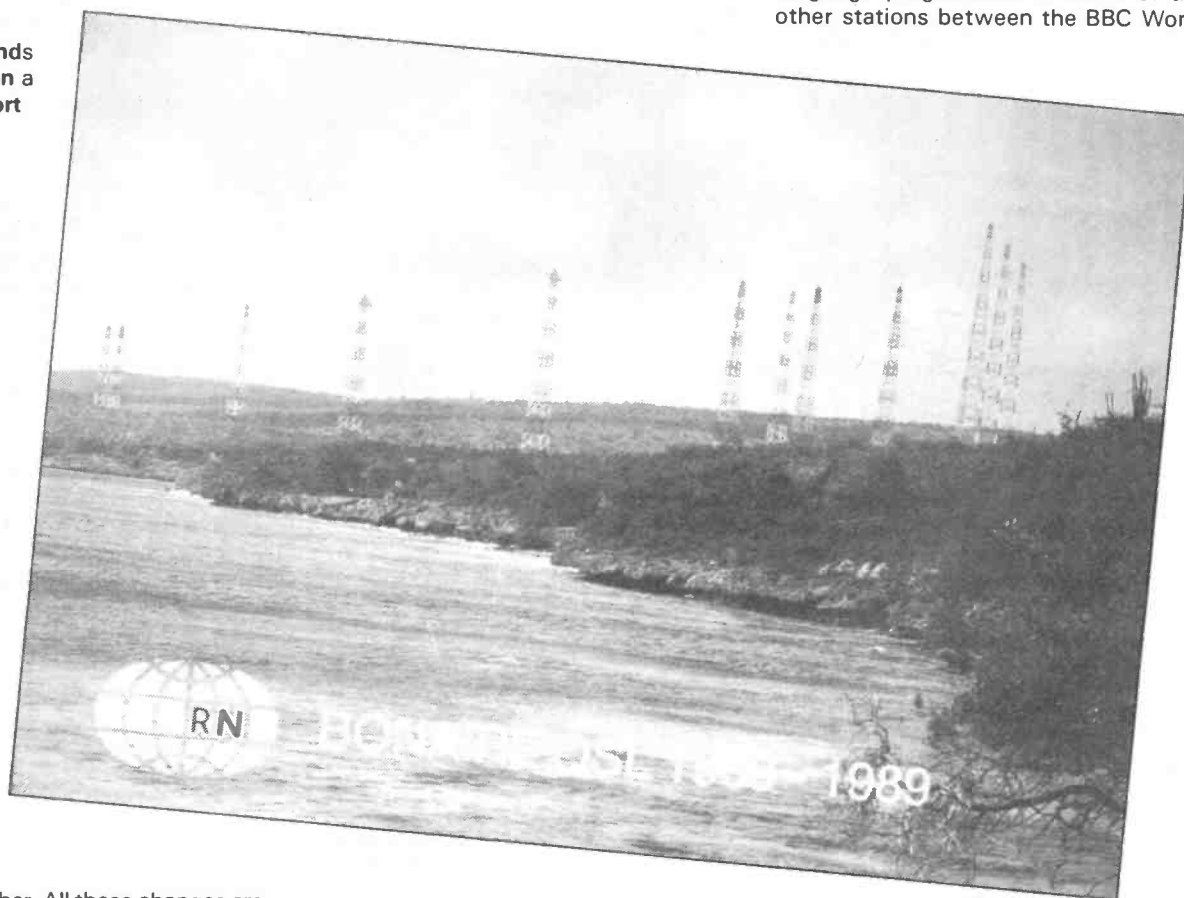
America via the transmitters of RCI at Sackville on Canada's eastern coast. The English-language broadcast is at 1030-1100 GMT and is on 11715 kHz. Although the broadcast is intended primarily for the USA, reception is sometimes quite good in Britain and in any case it is usually a lot easier to hear than Radio Korea's broadcasts beamed to Europe from their transmitters in Korea itself.

Another station expanding their various language services is REE - Spanish Foreign Radio (Radio Exterior de Espana) which started broadcasts in Russian and German for the first time and lengthened programmes in Arabic, Galician, Catalan and Basque at the beginning of May.

best frequencies for listening throughout most of Europe are 15070, 12095 and 9410 kHz, with 25750 kHz good in southern Europe and north Africa, 17705 for the Spain/Portugal area and 17640 and 9660 kHz for the Greece/Turkey area. Most of these frequencies are on the air for much of the day, with the usual rule of the higher frequencies providing best reception during the day and the lower frequencies in the early morning or in the late afternoon and evening.

However, for most short wave listeners, listening only to BBC World Service is very restricting. Many of the international broadcast stations in Europe have a very good signal throughout Europe and beyond, and it can be quite rewarding to listen to the English-language programmes of some of the other stations between the BBC World

Radio Netherlands has always been a favourite of short wave listeners. Often their signals are better-received from this relay site on Bonaire than direct from the Netherlands — even in Europe!



dropped altogether. All these changes are due to take place in September, when Radio Sweden introduces their autumn transmission schedule period.

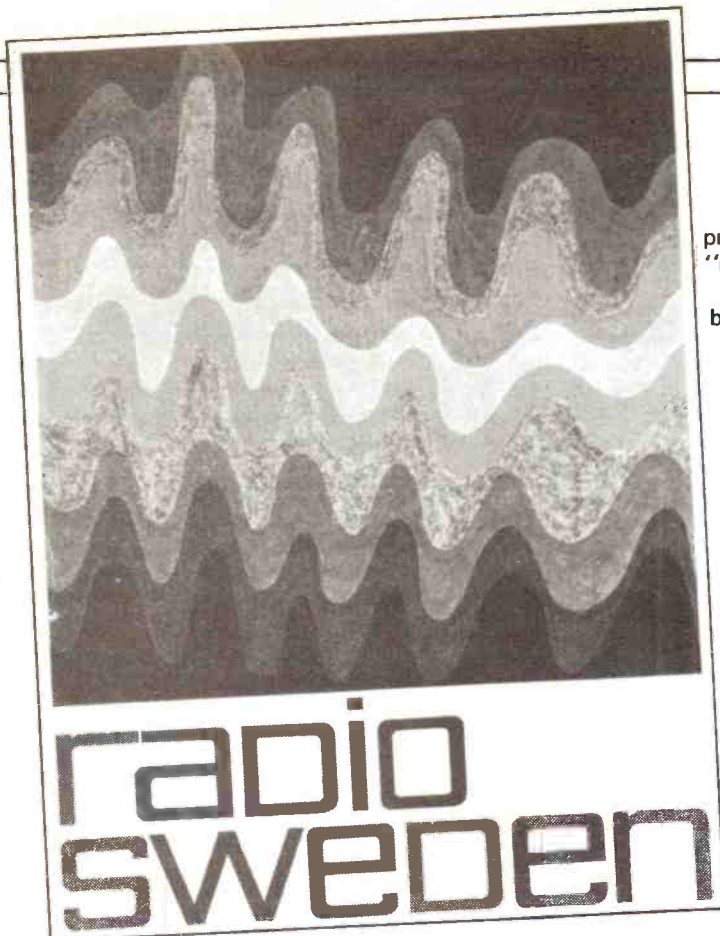
While several international broadcasting stations are cutting back their services, or at least rethinking their priorities, a few others are still expanding: most experts think that international shortwave broadcasting will still be with us for many a long year yet! One such station is Radio Korea, which broadcasts from Seoul, South Korea. They have recently negotiated a relay agreement with Radio Canada International and now broadcast one and a half hours a day in Spanish, English and Korean to North

S. W(imbledon) L.

Those of you holidaying in Spain — or elsewhere in Europe — this summer could do worse than take a transistor portable shortwave receiver with you. Many Brits like to tune into BBC World Service while abroad (I am usually on holiday during Wimbledon fortnight and wouldn't be caught without a tranny on the beach during that period). The ladies' and men's finals this year are on 7th and 8th July and live commentary will be broadcast on BBC World Service from 1309 GMT on both days on a wide range of frequencies between the 11 and 49 metre bands (25 to 6 MHz bands). The

Service news bulletins and Wimbledon or cricket commentaries. Here are a few suggestions for your holiday listening in the Mediterranean area this summer:

Swiss Radio International has a news service second only to that of BBC World Service, with half-hour long English-language programmes consisting of the news, plus "Dateline" — news background reports — with feature programmes at the weekend. The service is broadcast via omni-directional antennas at 1200 GMT on 6165, 9535 and 12030 kHz, and at 1730 GMT on 3985, 6165



Radio Sweden promises a major "reorganisation" this autumn, but programmes in English (as well as German and Russian) should be strengthened.

kHz. Finally, there is a relay of the Canadian Broadcasting Corporation's home service news programmes at 2100-2200 GMT, which are broadcast to Europe on 15325 and 17875 kHz.

Two other stations which couldn't fail to be mentioned for holiday listening are those old favourites of short wave listeners, Radio Sweden and Radio Netherlands. Radio Sweden has half-hour English programmes at 1530 GMT on 17880, 21500 and 21655 kHz, at 1700 on 6065 and 9615 kHz, and at 2100 GMT on 9655 and 11705 kHz. The last two transmissions are also on 1179 kHz mediumwave, but during the summer months this is only audible in northern Europe.

Finally, Radio Netherlands has fifty-five minute long English programmes at 1130-1225 GMT on 5955 and 9715 kHz, at 1430-1525 GMT on 5955, 13770 and 17605 kHz, and at 1630-1725 on 15570 kHz and 1830-1925 kHz on 15560 kHz. The last two transmissions are relayed via Radio Netherlands' relay site on Madagascar, and are intended primarily for listeners in Africa, although they are often well heard in Europe too. The 1830 GMT programme is also relayed on 17605 and 21685 kHz from another relay site, in the Netherlands Antilles, off the coast of South America and this too often provides excellent reception in Europe.

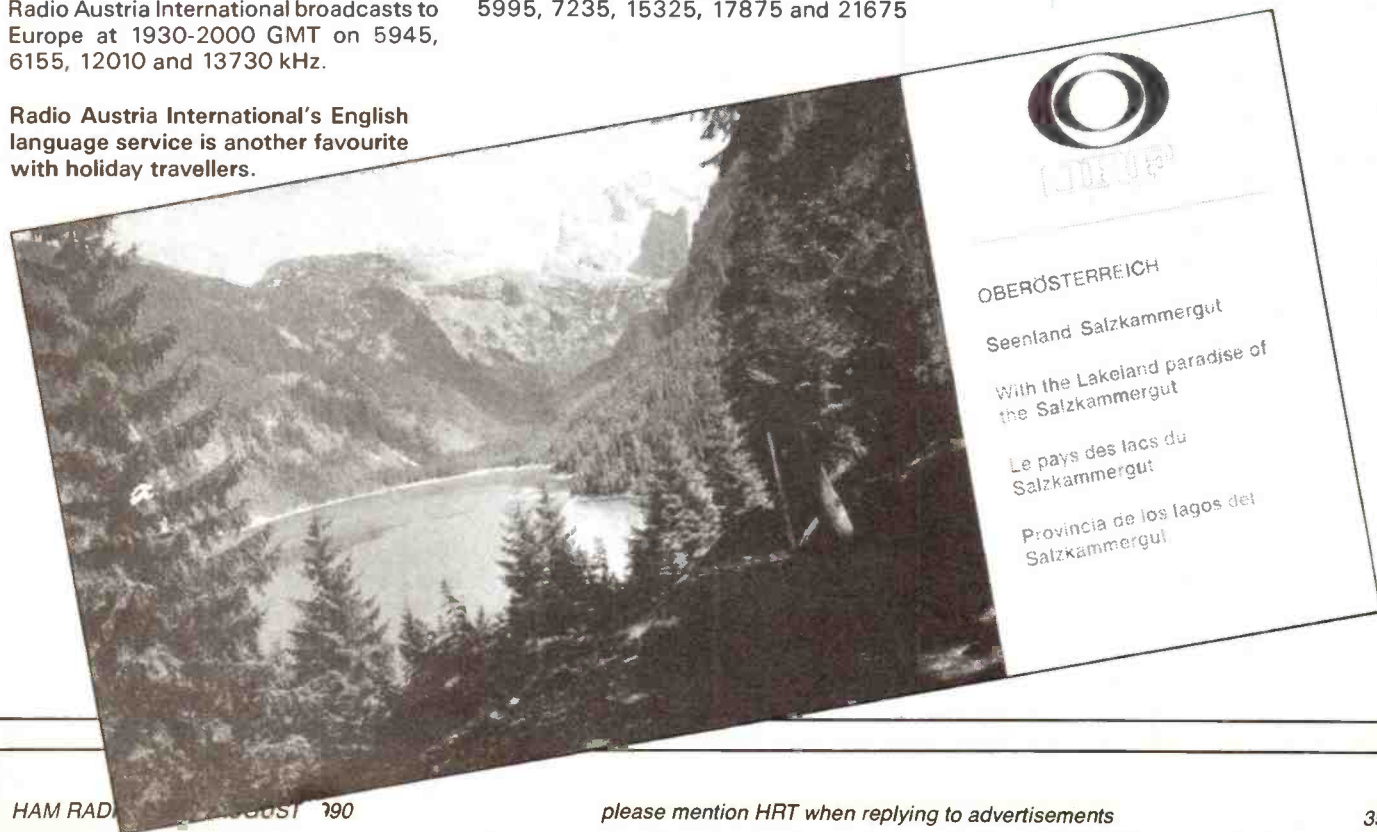
All the stations mentioned welcome reception reports, particularly for broadcasts received on transistor portable receivers without the benefit of large outdoor antenna systems. Most will acknowledge receipt of the reception reports with QSL cards, similar to some of those illustrated. Good listening.

and 9535 kHz. In addition, there are also English-language programmes for other parts of the world at different times.

In the same part of the world, Radio Austria International broadcasts to Europe and the Mediterranean area in English at 0730-0800 GMT on 6155, 13730, 15410 and 21490 kHz. The programme can also be heard at 1130-1200 GMT on the same frequencies and at 1430 and 1630 GMT on 6155, 11780, 13730 and 21490 kHz. Finally, Radio Austria International broadcasts to Europe at 1930-2000 GMT on 5945, 6155, 12010 and 13730 kHz.

Radio Austria International's English language service is another favourite with holiday travellers.

Earlier, I mentioned that Radio Canada International had started relays of Radio Korea which could be heard in Europe. RCI's own programmes are well heard, with news bulletins in English at 1445-1500 GMT on 11935, 15315, 15325 and 17820 kHz. Later, another news bulletin is broadcast at 1615-1630 GMT on 11935, 15305, 15325, 17820 and 21545 kHz, while at 1830 there is a full half-hour feature programme (not broadcast on Saturdays and Sundays) on 5995, 7235, 15325, 17875 and 21675



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Review: GX-2 SSTV



Mike Wooding G6IQM of the British Amateur Television Club looks at a versatile package for SSTV and Fax enthusiasts.

The GX-2 package for the BBC B and Master computers is a dual-mode transmit and receive system for the Slow-Scan Television and Fax fan. This is a fairly new software system, launched at the end of 1989, from Technical Software, who are famous for their RX-X multi-mode receive only series of packages for the radio amateur.

As its name implies, the GX-2 package supports two modes, SSTV and FAX, and comes complete with the necessary interface, connecting leads, instruction manual and an eeprom containing the program itself for insertion into the computer. One immediate advantage of this system is that the software is permanently resident in the computer's firmware.

Instructions

The instructions manual is a pleasant surprise when we have been conditioned to expect from many software houses, and be thankful for, the few illegible photocopied pages that tell us more about the publisher than the package. This manual is a professionally produced instruction guide, with all the necessary details to operate the software.

The opening page of the booklet 'welcomes' the user to GX-2 and is followed by the pages detailing installation of the eeprom, connection to the radio equipment and initial set-up recommendations. These installation details are comprehensive enough for even the most technically inept among us to get the eeprom fitted and the necessary connections made correctly. A section to be found at the end of the user manual deals with what to do if the system fails to operate. Also, the problem of computer noise and general QRM is comprehensively dealt with.

The three pages of the manual following the set-up pages deal with the screen display, obtaining hard copies of pictures and saving screens to storage on disk or tape. It is suggested that in practical use it is advisable to employ disk storage only. This is due to the large amounts of memory used by screens and the consequent very long save/load times if using tape storage, which would make it impracticable during live QSOs particularly. With regard to making hard copies on your printer, you need to have a few printer ribbons about your person, as they wear out rather more quickly than normal.

The next section of the user instruction book details the type-ahead facilities of the package, which it states are 'very sophisticated'. Comparing them to what is allowed with other systems on other computers, I must agree. Unless receiving Fax pictures using the entire screen, these type-ahead functions are available at any time. CQ calls, messages, or whatever can be typed into buffers while still receiving or transmitting another buffer or screen.

There are five type-ahead buffers, four of which can be displayed on the screen at any one time, each occupying a quarter of the screen height. This allows for up to five messages to be typed ahead, any of which can be selected for transmission at any time and in any order. Alternatively, the whole screen can be used to type in messages. When transmitted they occupy the whole screen and not just a quarter of it as used in the type-ahead mode.

Anyone who has seen sstv in operation will be aware that the need to be able to transmit large characters is paramount, even under the best receive conditions with strong signals the nature of the mode requires that larger than normal text is best used. The GX-2 package allows selection of four different text heights and three different text widths. These are x1, x2, x4 and x8 normal computer text height and x3, x6 and x12 normal width. The text as seen in the quarter height buffer will be four times that size when transmitted. The text and background colours are also user selectable from a choice of eight, which appear as shades of grey in black and white sstv and levels of brightness in the Fax mode.

The rest of the instruction book gives an in-depth examination of the two modes and all the various facilities afforded by the software. A complete list of all the key-strokes, (usually CONTROL or SHIFT and one other key, or single keys) is given for each mode.

Connection and Set-up

As I said earlier, the connection instructions at the front of the manual are quite comprehensive. Fitting must always be done with the computer switched off; the top cover of the computer is removed, the eeprom slotted into the first available free socket ensuring that the notch on the device is aligned in the same direction as the others and the cover replaced.

If a spare eeprom socket is not avail-

TV Tx/Rx System

able then either another utility will have to be removed, or an eeprom expansion board fitted. A standard unmodified BBC will have at least one free socket.

Next, the interface must be connected to the computer using the ribbon cable attached to the interface, by plugging it into the user port on the BBC.

The interface itself is built into a black impact resistant box measuring 11 by 6 by 3 cm, with the ribbon cable and radio interconnection leads permanently connected. The free ends of the radio interconnection cables are terminated, but are tinned and labelled ready for soldering to the correct type of plug. If you advise Technical Software, when ordering, of the type of plugs required they will fit them for you.

After the eeprom has been installed and all the connections made, the day of reckoning has arrived. Switch on the computer. The usual screen prompt will appear advising you of memory available, DFS type and Basic. Above this will be another prompt announcing the presence of the eeprom. If this prompt does not appear a check must be made to confirm the correct insertion of the eeprom.

Assuming all is well so far the program can now be called. Type in ***SSTV** or ***FAX** for the mode desired. If the interface is incorrectly connected, or not connected at all, the following on-screen prompt will appear:

INTERFACE ??

BASIC

Switch off the computer, check the connections, switch on and try again. If all is well (and it invariably is) the screen display will change to that of the mode selected.

Slow Scan TV

The screen display in the sstv mode consists of a vertical control bar down the right-hand edge of the screen in which the various control modes and selected facilities are displayed. The remaining 90% of the screen is used to display incoming pictures, or the type-ahead buffers, etc. The default mode of the system is 8 second 128 line black and white receive, which is confirmed by an R being displayed in the control bar.

In the top right-hand corner of the display is a simple fine-tuning bar. This is only of any use if the received signals are strong enough, and then only once the signal has been coarse-tuned closely enough on the radio receiver for a picture to start to appear on the screen.

Any of the various sstv modes, line

or frame sequential colour, Robot VIS modes, mono modes, etc., and any of the frame speeds can be selected at any time by making the appropriate key-strokes. A very useful feature of the software is the ability to put the system into hold, whereby the incoming picture is frozen on the screen at the end of the present frame, which allows the picture to be saved to whatever storage medium is in use for later retrieval, etc.

The Robot Vertical Interval Signal (VIS) mode is fully supported by the software, causing a received picture to be automatically received in the correct mode as soon as the VIS signal at the start of a frame is received. When receiving Line-Sequential pictures the system automatically inserts the SC-1 synchronisation pulse at the beginning of each red line, to regain correct colour registration if lost due to fading or whatever. All Robot and SC-1 modes are fully supported by the package.

Having played around with the receive section you are now ready to transmit. Keying CTRL T sets the system to standby transmit, indicated by a T in the control bar, where a continuous tone is sent by the radio to allow the distant receiving station to 'nett' onto your signal. The same settings and mode selected during receive are automatically selected as the transmit settings.

To transmit a message, simply select the appropriate type-ahead buffer by keying CTRL fx, where f is the appropriate function key denoted by the number x. The buffer for transmission can be changed at any time by re-selecting as above: the transmitted message will then change at the beginning of the next frame.

Each of the five type-ahead buffers has a colour/grey-scale shown at the bottom, which indicates the limit of the picture area for transmission in the Robot mode. In other modes this, or whatever is typed over it is transmitted. Alternatively, a previously stored picture can be loaded into the main screen from the storage medium and then transmitted by selecting f0. The selected screen is continually transmitted until another is selected or the system is put into hold or returned to receive.

While transmitting it is possible to change the transmit speed and the line speed between 128 and 256 lines, but only while in the hold mode, which will put the system into standby again at the end of the frame being sent. All other mode changes can only be made while in receive.

Fax

Both amateur and commercial facsimile reception and transmission, or Fax as it is commonly known, is fully supported by the GX-2 package. By typing *FAX from switch on, or by keying CTRL F from the sstv system, the software defaults to Fax receive at settings of 120rpm and an IOC of 288. The screen display is similar to the SSTV mode.

Tuning signals in is a little more difficult than in the sstv mode. There is no on-screen fine-tuning indicator. I found it best to tune to the low-side of a signal and then tune very slowly through the signal until correct tuning was achieved. Once the signal is tuned in the correct IOC setting must be selected by pressing CTRL (up arrow) or CTRL (down arrow) until the pictures aspect ratio is correct. The picture hold facility works exactly as in the sstv mode, again allowing received pictures to be saved.

Keying CTRL T puts you into Fax transmit, with the same speed and IOC settings as were last selected during receive. Once the required screen or buffer is selected for transmission the system sends 30 seconds of phasing signal, once again to allow the receiving station to tune in. After this phasing signal the picture/message is sent, followed by five seconds of stop tone. The system then returns to receive, the screen only being sent once. At the usual amateur settings of 120rpm and IOC of 288 (the default settings) a full-screen picture takes around seven minutes to send — time for a cuppa, or whatever takes your fancy. It is possible to select to send just the top quarter instead.

Unlike the SSTV side of the software package, printing hard copies of pictures requires the extra **Printer Fax** option to be purchased. With this additional facility, the Fax pictures can be sent to the printer as normal. Picture phasing is automatic with this option but only at the most common receive speed of 120 rpm.

Conclusion

Overall I was very impressed with the total package, its presentation, the detailed instructions and the relative simplicity of operation and use. It took only a short time before I was watching slow scan pictures forming on the screen and spent many hours 'pinching' pictures from transmission on 20M between European stations.

Being a 'mere' G6 I only transmitted on 2m and used my old friend Barry

G6IKQ as the guinea pig. Because I went straight in at the deep-end without reading the user manual fully, I spent an amusing half hour or so getting lost in the type-ahead buffers. However, once I found myself the results received by Barry were without fault as far as the facilities available were concerned.

When it came to the Fax mode I was unable to test live the transmit side of things as I do not know anyone else running amateur Fax. However, although my knowledge of the system is severely limited I was able to tune into one or two transmissions to confirm the ease of use of the package. I was unable to receive any commercial transmissions mainly because I do not have a continuously tuned receiver. Also, for the same receiver reasons, I was unable to try the software out with weather Fax transmissions, but apparently when receiving these the printer fax option gives better results.

I have no significant criticisms of the GX-2 package and happily recommend it to any amateur who wishes to enter the sstv and/or Fax mode. Realistically priced as it is, even the purchase of a second-hand BBC still leaves it an economical method of becoming QRV on these modes. Technical Software also advise me that they will provide free-of-charge to all past and future purchasers of this package, disk-based software for the

conversion of graphic screens produced in BBC modes 1 or 2 to the equivalent GX-2 sstv or Fax formats.

The GX-2 software package is available at a cost of £99 including VAT or £119 including VAT with the Fax direct printing option. For ordering, or further information, please contact: Technical

Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd, Wales LL54 7RF, tel: 0286 881886.

I would like to thank Technical Software for the loan of the package for this review, Barry Trigger G6IKQ for his help and advice and, last but not least, Tony Howes GOHOV for the loan of his HF receiver.



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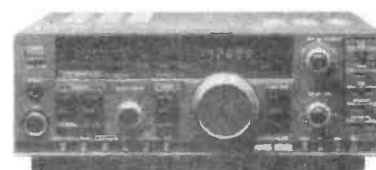
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THE B2 TRANSMITTER with a modern receiver

Many people who served in organisations that used radio have memories of certain types of equipment. For the Army it's the Number 19 set, for the Royal Navy the B40 receiver, for the Royal Air Force the 1154/1155 set up. For Ex-

No Distance

Any radio amateur that gets his or her hands on a B2 usually tries it out for half an hour and then gives up. Why? Because what a lot of amateurs do not realise is that the B2, like its contemporary the 'A Mark 3',

later date.

The B2 usually came in a small suitcase, so we will examine it as such.

In this small suitcase were four metal boxes. One contained the power supply unit, one the transmitter, another the receiver and the last was a spares box. The whole lot, laughingly classed as 'portable', weighed in the region of 32 pounds. My Mark 123 (see HRT August 1989) weighed less than eight pounds. But that came out about fifteen years after the B2.

The spares box contained the aerial wire, earth wire, morse key, headphones, plug-in tank coils for the transmitter, spare valves and fuses and various mains plug adaptors. The morse key could be screwed to the lid of the spares box when operating.

The psu could work from AC mains of 97-140 or 190-250 volts. This covered the main 110 and 220 volt situations. Also built in was the forerunner of the solid state inverter, an electro-mechanical device called a vibrator. This worked from a six (repeat, six) volt battery. The psu on its own weighed 12½ pounds.

Power

Refer to Figs 1, 2 and 4. On receive you have 500 volts for the transmitter power amplifier stage still applied, but due to the send/receive change over switch being on receive, the 250 volts from the psu is taken into the transmitter and then routed out on segment 'A' of the send/receive switch to the receiver for ht supply.

From the psu we have -ht for grid bias to use on the volume control of the receiver and 6.3 volts for valve heaters as well as an earth return line. When the send/receive switch on the transmitter is on 'receive', we can use

Ross Bradshaw G4DTD finds a new match for the old B2 Tx.

Merchant navy Radio Officers like myself, the Marconi 'Oceanspan' transmitter and 'Atalanta' receiver bring back certain memories.

From GCHQ and the Diplomatic Wireless Service comes the expected deafening silence or at best an epidemic of selective amnesia. This brings us quickly to the Special Forces and the SOE of the last war. To them the memory that one often hears is the B2 or, to give it its proper name, Type 3 Mark 2. But what is the B2?

was never intended to work the distances or listen to the low power signals that an amateur does. The A Mark 3 was usually used from France to England with five watts output. Yes, five watts, the upper limit that today's QRP crowd use. For more reliable contacts, the B2 with its 20 watts was needed. As to distance, Len Key MBE GOFQX used a B2 in 1944 to work from Yugoslavia to Brindisi, a distance of 400-odd miles. I hope to persuade him to write his account of the episode for HRT at a

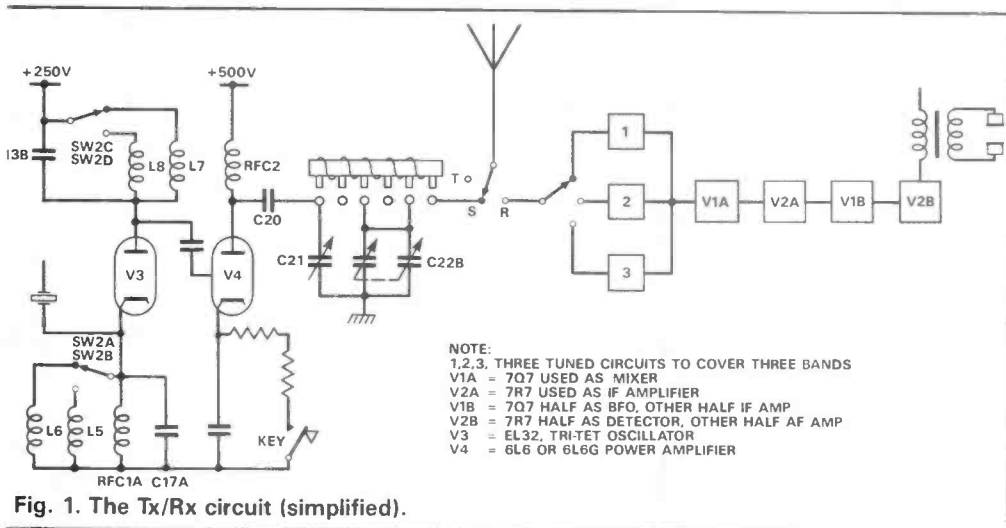


Fig. 1. The Tx/Rx circuit (simplified).

the built in meter to monitor three voltages for the receiver:

Position (1) 250 volts, for receiver ht

Position (2) 500 volts, not used for receiver

Position (4) -ht supply, for receiver grid bias

Note that altering the volume control does not alter the reading on the meter in position (4), as the -ht supply is metered before it gets to the receiver.

Transmitting

On transmit we have 500 volts supplied to the anode of the power amplifier. The 250 volts is removed from the receiver and is now applied via R12 to the screen grid of the power amplifier and also to the anode of the oscillator valve via R11A. The -ht line is taken to earth via a section of the send/receive switch. On tune or transmit we can meter the following:

Position (1): 250 volts applied as above

Position (2): 500 volts applied to anode of pa

Position (3): pa grid current drive to the pa

Position (4): oscillator crystal current

Position (6): pa current (only

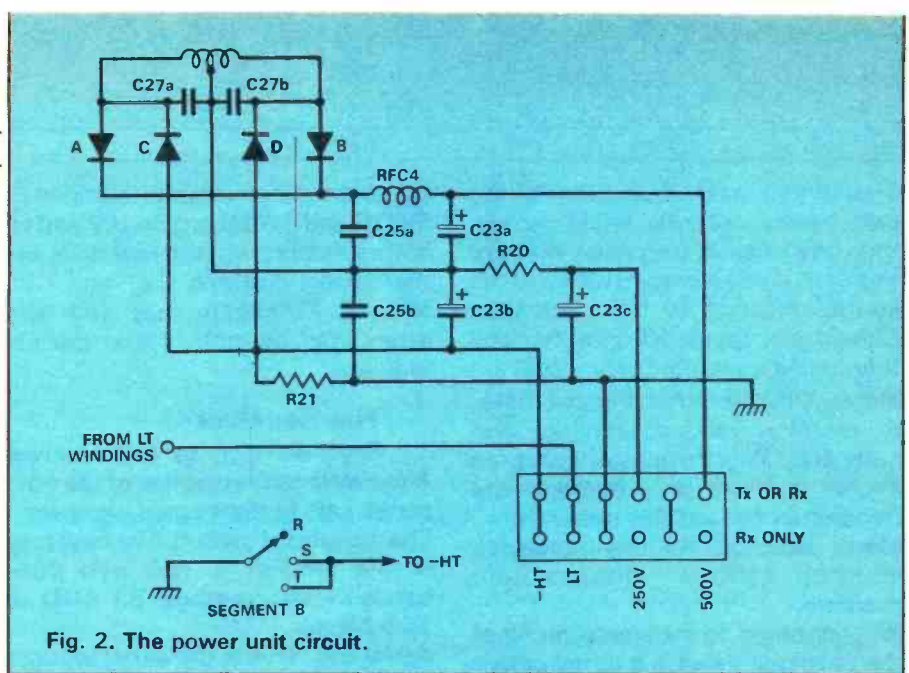


Fig. 2. The power unit circuit.

on key down)

Position (4): is a good check to see if the crystal is working or not.

First look at the layout of the B2 front panel (Fig. 3). The unit at middle top is the transmitter. From left to right we have:

The aerial terminal. This is for a long wire aerial. The wire supplied with the B2 was 60 foot long.

TSR switch. This switched the B2 to either tune (T) to send (S) or to receive (R). This switch is shown in Fig. 1.

The earth terminal. Ten feet of wire was supplied to connect to earth proper, or a water pipe, or in some

cases, a counterpoise earth was recommended.

The tank coil socket. As mentioned the tank coils could be used in one of two ways to give the following range coverage.

- L1A 3 MHz to 4 MHz
- L1B 3.75 MHz to 5.25 MHz
- L2A 4.5 MHz to 6.25 MHz
- L2B 5.5 MHz to 7.5 MHz
- L3A 6.5 MHz to 9 MHz
- L3B 7 MHz to 10 MHz
- L4A 9 MHz to 13 MHz
- L4B 12 MHz to 16 MHz

As can be seen there was an overlap for all the frequency bands.

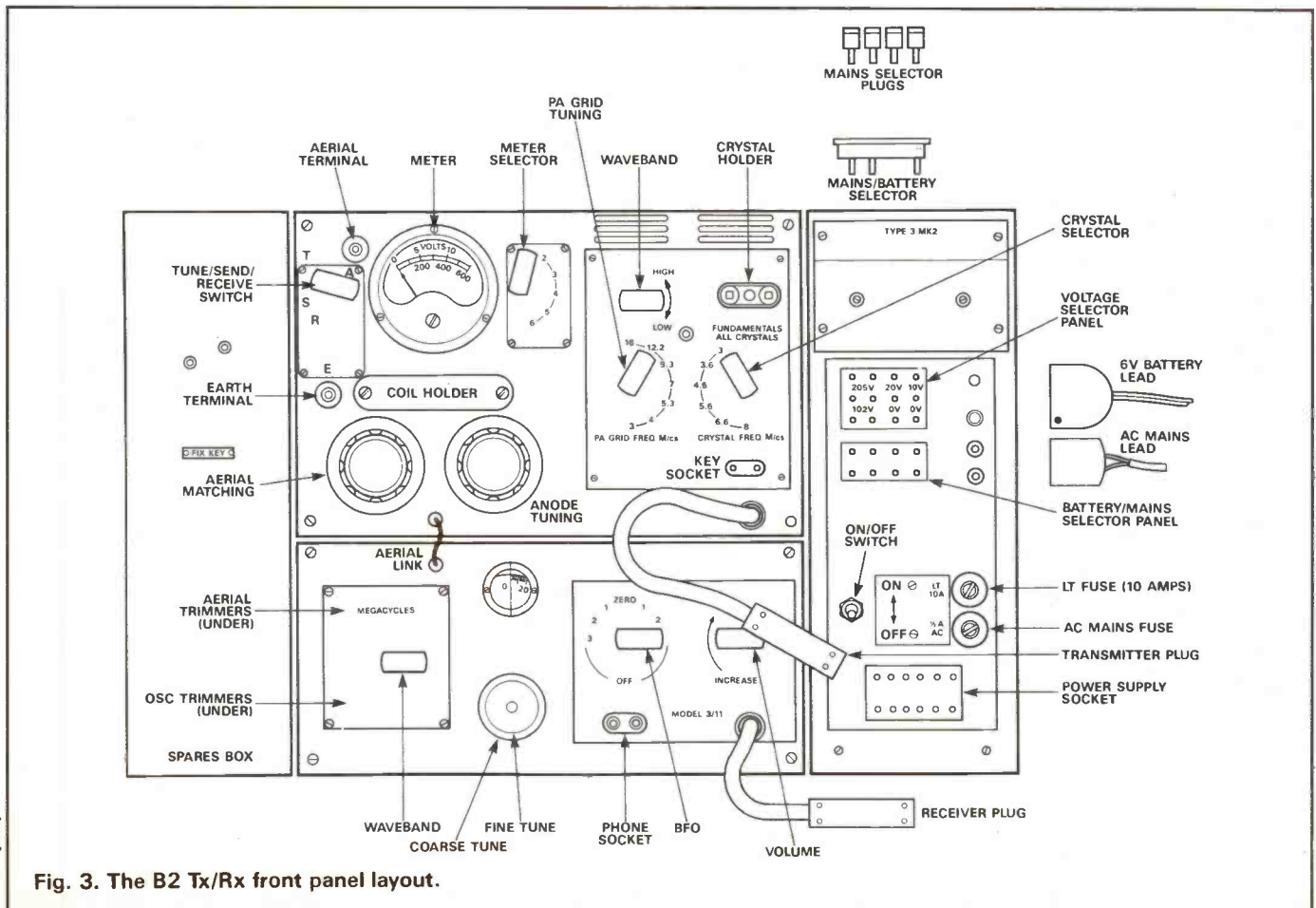


Fig. 3. The B2 Tx/Rx front panel layout.

Should you reach 0 on either of the two tuning controls while tuning, then use a higher frequency coil. For example, if you are using L3A and the control reaches 0, then use L3B. Should you reach 10 on either coil then use a lower frequency coil.

Meter. This was a moving coil meter to monitor various voltages and currents. The resistors used as shunts, etc. are on a board in the transmitter behind this meter.

Meter selector. As mentioned, to monitor various voltages and currents.

PA grid tuning. In the anode circuit of the oscillator valve is a tuned circuit consisting of two coils, L7 and L8 and a capacitor C13B. When tuning this control you are fine tuning C13B to give drive to the pa stage.

Crystal Socket. Usually type 10X crystals are used, but by using a crystal adaptor you can use the FT 243 type as well.

Crystal Frequency Control. In the cathode circuit of the oscillator valve, this control is SW2A and SW2B.

Waveband. This taps certain segments of L7 and L8 by using SW2C and SW2D in the anode circuit of the oscillator valve. Note that with the B2 you had a transmitter and what is in effect a built-in ATU. Basically SW2A and SW2B in the cathode circuit of the oscillator valve select the fundamental or second harmonic of the crystal and the

output frequency was determined by SW2C and SW2D tapping L7 and L8 in conjunction with the tank coils and the tuning controls C21 and C22 form a PI circuit that will also attenuated harmonics that are not required.

The Receiver

Now we turn to the receiver. Again refer to the drawing of the front panel. Left to right again, we see:

The waveband switch. The coverage of the receiver is split into three bands. Total coverage 3.1 MHz to 15.5 MHz.

Aerial link. This is the aerial brought via the transmit/receive switch out to the receiver. If you are using a

up to the crowded amateur bands, unfortunately, but it still can be a challenge. The transmitter consists of two valves, an EL32 used as a tri-tet oscillator and a 6L6 used as a class C power amplifier. The power amplifier is keyed in the cathode circuit.

One Crystal For Three Bands

One can use a single crystal of say 3.509 MHz on the bands of 3.5 and 7 and 14 MHz. Note (for the unwary) that you can also go out on 10.527 (the third harmonic) if you are not careful. The actual tuning I leave to you but the following will assist for use of the waveband switches, etc.

Output frequency	Crystal selector	Waveband	Tank coil
3509	Fundamental	3-4	L1A
7018	3-3.6MHz	7-9	L3B
14036	3-3.6MHz	12.2-16	L4B

different receiver this would be your aerial input to it.

Coarse/fine tune. This is the tuning control for the receiver. When using the fine tune the tuning is geared down to 50 to one.

Tuning scale. Unlike a normal dial read out, under the magnifying lens over the tuning scale is a scale that goes from zero to 180. With the B2 is a chart with scale against frequency. I have found the best way is to use a 1 MHz crystal marker to give you the MHz markings and keep your own scale chart, or failing that use a small oscillator into the aerial socket of the receiver and zero beat using the fine tuning control. When listening for a station replying to your calls, search a small distance each side of where the crystal was heard.

Phones. The B2 used low impedance phones of 120 ohms.

BFO. This gives plus or minus 3 kHz each side of the intermediate frequency of 470 kHz. It can be switched off for reception of broadcast stations.

The receiver itself uses four valves to give one frequency changer stage (note that there is no RF stage), two IF stages with an IF of 470 kHz, a bfo stage, detector and AF stage. It was rated as having a sensitivity of one to three microvolts to give 10 milliwatts output at 1 kHz. The selectivity was rated as 1 kHz at the 3dB points. Today the receiver is not

So as you see, the waveband switch and tank coil selected decide the outgoing frequency.

If you ever have to work on the transmitter to clear a fault and need the power on to check voltages, look at that tagboard just above the two valves. Do not — repeat, do not — let your fingers stray onto it. Voltages, apart from the 6.3 heaters, enter the transmitter, are taken up to this tagstrip and onto the meter board and trs switch and then back to the tagstrip and down into the transmitter. If your fingers touch that tagstrip you can have 250 volts incoming on one finger, 250 volts outgoing on another finger and 500 volts on another finger. Not nice.

Also do not let your fingers bridge the key contacts of your up and down key, otherwise you will be keying the transmitter with up to 60 milliamps going through your finger. Also not nice.

A Modern Receiver

Now onto a practical suggestion for using the B2 under today's conditions. As we have seen, the well-known B2 transmitter is crystal controlled and covers the bands 3.5MHz, 7MHz, 10MHz and 14MHz. However, the receiver does not have the selectivity required for today's operation on the amateur bands. This is therefore an idea about how to use



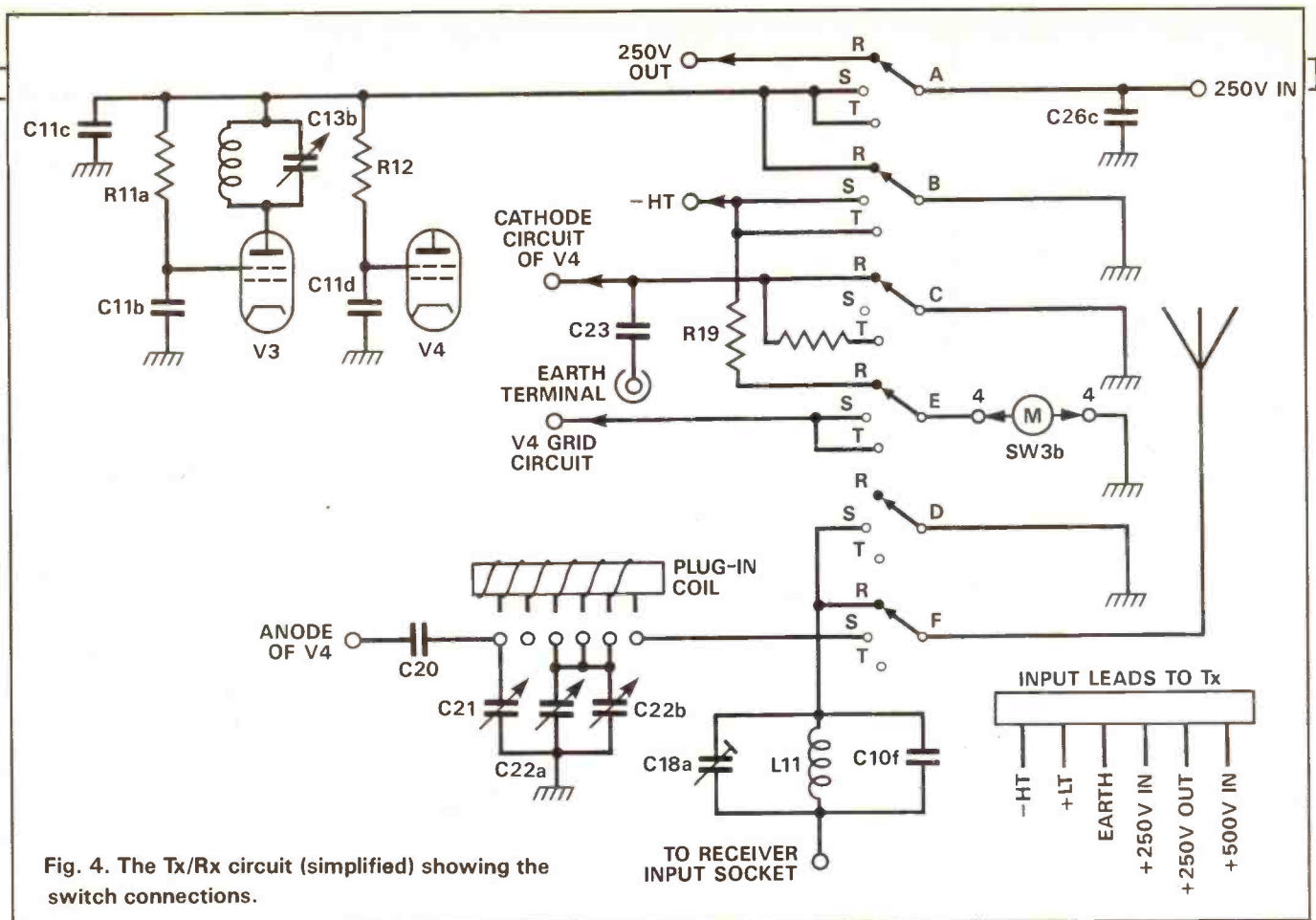


Fig. 4. The Tx/Rx circuit (simplified) showing the switch connections.

the transmitter with a modern receiver such as the FRG-7 or the R-600 and similar. First, what do we need to know about the B2?

The Switching

The B2 transmitter has, on the front panel, a switch marked R (receive), S (send) and T (tune). This switch, which is on the top left as you look at the front panel, has two layers. We have re-drawn the switch connectors, rather than show the original diagram. The switch was labelled (for those that have the original diagram) A,B,C,D,E,F. We have redrawn the switch in Fig.1 in a clearer form: the six segments all move when the switch is moved, so the diagram shows all the segments ganged and, like the original, is shown in the receive position.

Receive Segments

Segment A: in the receive position, 250 volts from the power unit was taken into the transmitter and routed by this switch back out again to the receiver for HT to the valves.

Segment B: in the receive position this places an earth on the screen

grids of the two transmitter valves as well as the anode of the oscillator valve.

Segment C: in the receive position this places the cathode of the power amplifier valve V4 to earth.

Segment D: this is not used when in receive or tune.

Segment E: assuming the built in meter was on position 4, then the minus HT voltage for grid bias to the receiver could be monitored. If it was not, then this segment in receive did nothing.

Segment F: this placed the aerial onto the receiver.

Transmit

Segment A: this takes the 250 volts from the power unit and routes it to the screen grids of the two transmitter valves, as well as the anode of the oscillator valve.

Segment B: this puts an earth on the minus HT line from the power unit. Refer to Fig.2.

Segment C: this is not used in send position.

Segment D: this puts an earth on the receiver input circuits to protect them while the transmitter is being used on transmit.

Segment E: when the built in meter is switched to position 4 then the power amplifier V4 grid circuit can be monitored so as to check the input to the power amplifier.

Segment F: the aerial is now connected to the output of the power amplifier valve V4 so that transmission takes place.

Tune Segments

Segment A: as for the transmit condition above.

Segment B: as for the transmit condition above.

Segment C: this puts a resistor in series with the cathode of the power amplifier valve to limit the power when on tune.

Segment D: this is not used in the tune position.

Segment E: as for the transmit condition above.

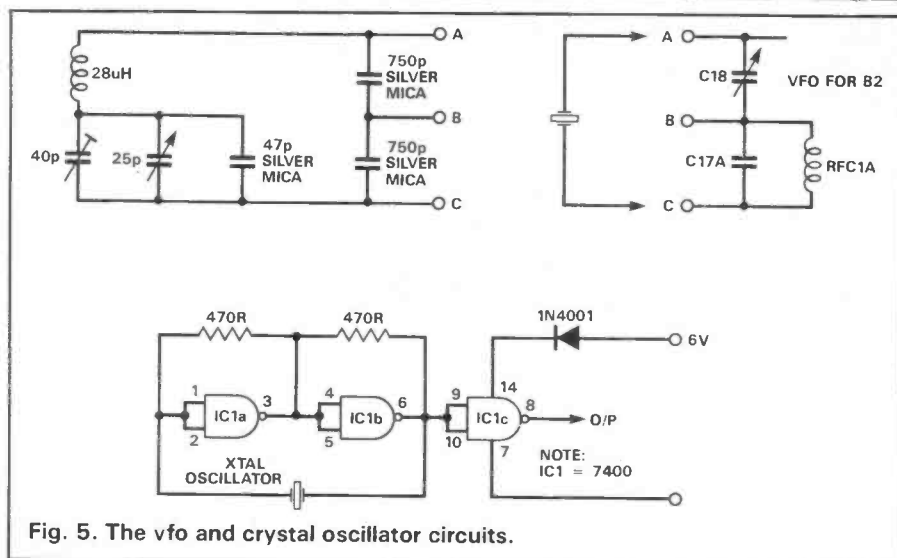
Segment F: the aerial is removed from the power amplifier during tuning up.

Of all the segments shows, we only need to consider segment B and the minus HT line. To see why, look at the power unit. A simplified diagram is shown in Fig.2.

By taking the minus HT line to

earth we get from the power unit 500 volts for the anode of the power amplifier valve V4, 6.3 volt heaters for the valves, and 250 volts for the screens of the two valves as well as the anode of V3. Therefore, if you are going to use the original power unit all you need to do is take the minus HT line to earth in the power unit. Bear in mind that you have no need of voltages for the B2 receiver as you are not going to use it. If you are using a homebrew power unit then that only needs to be able to supply you with 500 volts, 250 volts, heaters and earth line return. This means you now have the minus HT lead going into the B2 transmitter spare for another use.

Most modern receivers are muted by taking the mute line to earth when using a nearby transmitter so, if you connect your mute lead to the minus HT lead going into the B2 transmitter as soon as you switch the B2 form receive to send or tune, the mute line is taken to earth and the receiver is muted. Simple, is it not? By using the common aerial from the transmitter as soon as you go to send or tune, the aerial to the receiver is taken to earth via segment D and



protects the receiver. I have used this system some time ago when I owned a B2 and an FRG-7.

I conclude with a diagram of a vfo (Fig.5) for the transmitter that an old amateur gave me many years ago. Alas, I have forgotten his name but I never got round to using it. It may be of help to someone who has a B2. I hope this item has shown what a good little set the B2 was and still is, and when you sit in your warm shack

playing with one and the XYL brings you a cup of tea and biscuit, spare a thought for those in the past, waiting behind the locked door of a safe house, watching the time creep up to sked time, a pistol handy by the morse key, the first thing to grab when the door was kicked in, the cyanide capsule next . . . (That's what we always do at home when someone approaches with a biscuit — Ed.)



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METREWAVE

Riffling through the last two or three years of "Metrewave" one was astonished to observe that there had been little more than passing reference to one of the pleasantest modes of amateur communication that exists, meaning net operation. Now is the time to redress that omission.

There are nets and nets: some of them are so off-putting as to discourage others from wishing to participate. More of that later. More immediately, let us take a look back over radio history to try to delve out

amateur "wireless reserves" intended to encourage experienced morse operators to enrol and help to provide a valuable pool of experts versed in communication techniques and in "winkling out" those signals which nobody else could hear.

In the early Thirties came the RN Auxiliary Wireless Reserve. It attracted many ex-Service W/T ops but few radio hams: in the pacifistic climate of the times anything with WAR in its title (Royal Navy Wireless Auxiliary Reserve) was to be avoided. No wonder: the horrors of WW1 were

former procedure of "tuning the entire band for any possible calls" (often "impossible calls" as the lame joke of the time had it).

...And Nets Modern

Nets were quickly found to be a highly sociable means of communication. Their development spread from the hf bands to the metrewave spectrum, and by the Fifties they had established themselves firmly in the 2-metre band.

It was about that time that the archetype of all nets came into existence, almost by accident an accident of nature. For it was nature that caused the devastating floods in East Anglia in 1953 when virtually all communication was literally washed out. Only amateur radio could provide any. But would it accord with the terms of The Licence? Could third party traffic be legally handled? These considerations, imposed by a cautious officialdom, became null and void when the safety of life and property was concerned.

And so out of disaster the Radio Amateur Emergency Network was born, today known as RAYNET, enjoying a high degree of organisation and liaison with the professional emergency services (for instance, its sterling work done at the time of the Lockerbie air disaster).

Today RAYNET has sublimated the art of net operation, sometimes on a common frequency, sometimes cross-band. Although less formal nets may not wish to adopt its techniques *in toto*, there is no doubting that it sets an example to all. So let's take a look at "the less formal".

Where To Go?

When a group or club decides to set up a network it clearly needs to decide on what bands this should be established. To most operators the 2-metre band will be a natural. To others, the superiority of the 70cm band with its greater gamut of available frequencies outside the SU

The net can be a most sociable means of communication, with a bit of care, says Jack Hum G5UM.

some of the origins of net procedure.

There is nothing new about nets. They have existed almost since the start of wireless telegraphy. Military units, especially warships, kept in contact with one another using a spot frequency. In early days the frequency wasn't very spot: the spark transmitters of 75 years ago had a decidedly wide bandwidth.

Nets Ancient, And ...

Up to the time of the Second World War net operation had developed into quite a sophisticated mode of communication and of course by then the valve was in universal use. No more spark: indeed, there was a clause in the then-amateur licence which warned that "The use of spark transmission is expressly forbidden" and this at a time when spark had been dead for a quarter of a century!

Yes, a sophisticated mode of communication but almost exclusively in the fighting services. The amateur movement had not latched on to it in significant numbers. It had the opportunity to do so when the Services created

but a dozen or so years passed and still very much in the minds of the citizenry.

Several years later in 1938 when the RAF's Civilian Wireless Reserve was formed, this climate had changed completely. The citizenry could sense the dangers ahead in Europe. Large numbers of UK hams joined the CWR and during the subsequent hostilities (w.e.f. 3.9.39) proved to be invaluable members of the manifold communications branches of the junior service.

What relevance does all this history have upon the subject of nets? Answer: quite a lot. Both the RNWAR and the later CWR were allocated frequencies (and free crystals!) not far from today's 80 metre band, there to practice nation-wide inter-communication and to learn Service procedures on what were truly spot-frequency nets, all to be shut down on the dread day of September 1, 1939.

Came the peace and with it a recognition by the amateur movement that net operation was a good thing. It became widely established in the succeeding years, to supplant the

and RB channels will be evident. On 4 metres early attempts to establish nets settled on 70.26MHz, the old-time am channel. Later, as the band filled up with many B-licensees testing its charms, the need to move elsewhere up-band a bit became apparent. In the past three years there has been a significant movement towards establishing nets on frequencies clear of the busy 70.26 and 70.45MHz spots.

Even Six is slowly losing its reputation as "...the band where nobody wants to talk to you": increasing numbers of fm nets have come into existence in its upper megahertz to provide guaranteed signals at guaranteed times. Here, as on 70cm, there is plenty of frequency space to choose from. But beware: certain makes of aerial designed to peak at 50.2 give an alarming swr reading if asked to operate a megahertz higher. Operators who fail to instal aeriels that function over the entire two megs of Six will deny themselves the pleasure of working in the upper 1MHz and increasing numbers of people will begin to do so as DX mania subsides and Six is employed as it should be, and that is as a vhf band.

If the preference after considering 6m, 4m and 70cm should settle on 2m, the policy when a net is established should be to select a frequency in the lower megahertz of the band rather than clobbering an S-channel in the upper meg, though a sampling of local activity in this part of the spectrum may disclose that one or two S-channels the lower order ones remain unoccupied for most of the time and can be used to set up nets.

Nets are sociable affairs, then: but what of that suggestion in our opening paragraph that some of them can be a bit off-putting?

Consider two influences which colour the viewpoint of amateurs contemplating setting up a local net. One of them is the inordinate time required to complete a round when a large number of operators are involved. The other is the confusion which arises when operators fail to realise "...who is in the net" and "what my turn is": stations pop up (and in) at random times and lack of net control becomes painfully obvious.

Do you need a net controller, then? Historically, it has been found

that he has his uses even though he may have little effect in persuading participating operators to say their pieces quickly to make room for the next one in. All too readily patience evaporates because of that time involved in what is popularly called "rabbitting on".

Another objection expressed is that appointing a net controller is putting one person over the rest. This point of view is accentuated when the trite term "master of ceremonies" is used to describe the controller. Elitism is suspected.

This can be minimised if a different operator is nominated to be the central person each week (or however often the net meets). This might help to give the rabbits an appreciation of net control in principle, as well.

But why have a controller at all? Why not adopt the dead-simple technique of "callbook order"? By this method each participant knows precisely when his/her turn to talk arrives. If a G8, wait until the G7 has finished. If a G4 then wait until the G3 has finished. And if there is a flock of stations in the same callsign block then quite clearly G4OUB transmits before G4VOZ and G3APY before G3NEO, and so on.

"Callbook order" means that the net starts with callsigns beginning with nought and finishes at the G-Eights. In effect, a circle is established. Confusion should be minimal. Each participant observes and announces a ten second break between overs to enable others to check in. This they do by quickly uttering their callsigns — never "break". And so the merrygoround

proceeds on its merry way, the whole system operating automatically. All you need is a copy of The Callbook (described here a few years ago as the VHF Person's Best Friend after The Licence...remember?).

If there isn't a callbook in the house, each operator can keep tabs on what is going on by writing incoming callsigns on separate sheets of the station scratchpad, one sheet for the G0, the next for any G2s who might be around, the third for the G3s and so on up to the G8s, recording net-users in numerico-alphabetical order.

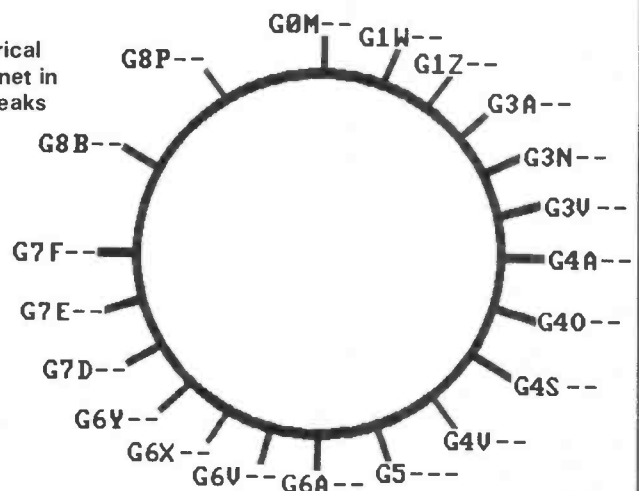
A sophisticated adjunct to this procedure may be provided by setting up talk-through facilities on another band, eg 433MHz (using an adequate antenna, not a mere rubber-ducky). Points can then be rapidly cleared while overs are in progress, and if need be a bit of a nudge imparted to the next person in if he/she appears to have forgotten.

When using duplex always announce callsign on whichever band is in use: our masters, the Licencing Authority, don't much like unidentified signals popping up, not even in the interests of brevity.

Try Callbook order, then. Test it to see how it conforms with local requirements. If you weigh it in the balance and find it wanting, or conversely if you pronounce it to be "just the job", write in to HRT and say so. You might just win a tenner for Letter of the Month.

No net system is infallible. Callbook order is less fallible than most, because there are no arguments — once you know your alphabet, all is well.

An alphabetic-numerical (or "callbook order") net in action. Ten-second breaks are made between each transmission to allow others to check in. When they do they await their "callbook order" turn before making a more extended transmission. In a large net it is advisable to restrict overs to two minutes.



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RADIO Tomorrow

On these club contacts and forward diary pages, dates are shown approximately from the week of publication to the end of the cover month, and further in to the year where dates have been supplied. We need dates at least three calendar months in advance to get them in to the nearest issue. For example: the last possible issue for dates from mid-August to mid-September is the September issue. The September issue normally appears on the first Friday in August, and we need club dates by the second Friday in June. Club dates received well in advance will normally be run in more than one issue. Please write and let us know if your club changes its name or contact.

SCOTLAND

Aberdeen ARS. Don. 04676 251.
Ayr ARG. Robert Paterson GM4CUB. 0292 262496. 2 Fris, Community Centre, Wellington Sq., Ayr.
Dunfermline RS. GMODYD. 0383 413440.
Galashiels DARS. John G Campbell GM0AMB 0835 22686. Aug 26 Open Day/Mobile Rally, Focus Centre, Livingstone Place, Galashiels. Trade, bring and buy, refreshments. Talk in S22. 11am.
Glenrothes DARC. John Hardwick GM4ALA. 0592 742763 (hm) 0506 410677 (wk).
Helensburgh ARC. Barrie Spink GKOKZK 0309 64401. Thurs, The Basement, Cairndhu Nursing Home, Lower Rhu Road, Helensburgh, 7.30. Good facils, newcomers welcome.
Inverness ARC. Brian. 0463 242463.
Lothians RS. P J Dick GM4DTH 21, West Maitland St., Edinburgh. Prestel (NOT phone) 314471210. 2,4 Thursdays 7.30pm Orwell Lodge Hotel, Polworth Terrace, Edinburgh. Jun 27 Social.
Maxwelltown ARK. C Rogers GM4NNC 0387 721070 Rear of Lincluden Inn, Abbey Lane, Lincluden, Dumfries. 1,3 Weds etc. Morse, RAE training.
Mid Lanark ARS. David Williams GM1SSA, Holytown 732403.

NORTH EAST ENGLAND

Barnsley ARC. Ernie Bailey G4LUE. Barnsley 716339. Mons St. Mary's Church Hall, Laithes Lane, Barnsley.
Barton DRC. John Pullen G5TGE 0652 32811. Acc Club, Barton Upon Humber, Alt. Thurs.
Bishop Auckland ARC. Peter Fawcett G0FBK Bishop Auckland 606819. Most Thurs.
Bourne DARS. Vince Cawthorn G4ODG. 0778 422795.
Denby Dale DARC. Darran Chappell G0BWB, 221 Huddersfield Rd., Shelley, Huddersfield HD8 8LJ.
Derby DARC. Contact: Kevin Jones G4FPY 0332 669157. 119 Green Lane, Derby. 7.30pm. Most Weds.
Doncaster ARC. K McMahon. Doncaster 852938. Mons, Corporation Brewery Taps, Doncaster.
Goole RES. Richard Sugden G0GLZ. Goole 769968. Fris, West Park Pavillion, Goole 8pm. Jul 13 Log; Jul 20 Talk; Jul 27 Social; Aug 3 natter; Aug 5 Treasure Hunt; Aug 10 Talk; Aug 17 Video evening; Aug 24 Social.
N. Ferriby ARS. Frank G3YCC 0482 650410. Fris. NFU Football Club Room, Church Rd., N. Ferriby, Yorks.
Halifax ARS. David Moss GOLDM 0422 202306. The Running Man, Pellon Lane, Halifax, 7.30, 3 Tue. 1 Tue "noggin and natter" informal; Aug 21 Propagation Charlie G2FKZ.
Hornsea RC. Jeff G4IGY. 0964 533331. The Mill, Atwick Rd., Hornsea, Weds 8pm. Jul 18 Cttee; Sep 5 Barbecue with Serendipity.
Hoyland ARC. M Wardle, 11 Sokell Ave, Wombwell, Nr. Barnsley 747407. Weds, West Bank House, opp Hoyland Leisure Centre.
Keighly ARS. K A Conlon G1IGH. Bradford 496222. Tues, 8pm, The Clubroom, Victoria Hall, Keighly, Yorkshire. Jul 17 Packet

radio on air; Aug 14 On air; Aug 28 Homebrew the right way G4YDI. Other = natter.
Leeds DARS. G1EBS. 0274 665355.
Loughborough ARC. Philip. 0509 412043.
Maltby ARS. Keith Johnson G1PQW. Rotherham 814135. Fris, Hellaby Hall, Clifford Rd., Hellaby.
Mansfield ARS. J M Coates G4GYU. 0623 27257, Polish Catholic Club, Windmill Lane, Woodhouse Rd., Mansfield 1 Thurs 7.30.
Mexborough ARS. D Thomas G6FUM. Doncaster 859654. Fris, Harrop Hall, Mexborough.
Northern Heights ARS. Stan Catton G0IYR. 0274 673116. 1,3 Weds 8.15, Bradshaw Tavern, Nr. Queenbury, Bradford. Jul 18 FD inquest; Aug 1 Visit to Emley Moor Buildings 20.00.
Pontefract DARS. Colin Mills GOAAO. 0977 43101. Carleton Community Centre, Pontefract.
Rotherham ARC. F Moody. Rotherham 552925.
Rugby ATS. Kevin G8TWH. 0203 441590. Tues Rugby Radio Station Cricket Pavilion (A5, Hillmorden), 7.30.
Scarborough ARS G4BP. I G Hunter G4UQP, 0723 376847. Jul 29 Rally, Spa, Scarborough, 11am. Trade, Bring and buy, Morse exams and demo. On seafront, good day out.
Sheffield ARC. M Sables. Sheffield 886083. Mons Firth Park Pavillion, Sheffield.
Spalding ARS. Dennis Hoult G400 075 750382 (acting). Old Fire Station, Albion St., Spalding, Linc. 7.30.
Stockton DARS. G Noble c/o Causeway Community Centre, Billingham, Stockton on Tees. Weds Causeway Community Centre 7.30. Regular RAE and morse tuition.
Stoke on Trent ARS. D Wroe 0782 639476, Rose and Crown, Etruria, Stoke-on-Trent, 7.30 Fris.
Tyneside ARS. G Lindsay G4KOT, 12 Augusta Court, Harrian Park, Wallsend, Tyne & Wear.
UK FM Northern. L. Laughton G4UNA. Wakefield 822579. East Ardsley Cricket Club, one Sun per month.
Wakefield: North Wakefield RC. John Hoban 0924 825443. Thurs 8.30 White Horse Inn, Fall Lane, East Ardsley, Wakefield.
Wigston ARC. G6HAJ. Leicester 403105.
Worksop ARS. John Huggins G0DZX. Sheffield 0909 565856. The Clubhouse, West St., Worksop.
Yorks ARS. Keith Cass G3WVO, 4 Heworth Village, York. Fris 7.30pm, United Service Clubroom, 61 Micklegate, York.

NORTH WEST ENGLAND

Aire Valley RS. G6NPT. 0532 44597.
Bolton ARC. Deane Sports Complex, New York, Junction Rd., Bolton. Glenn Bates G6HFF 00204 63459.
Bury RS. C. D. W. Macroft G4JAG, Mosses Community Centre, Cecil St., Bury.
Carlisle DARS. Roy G0HNO 0965 44766. Mons 7.30 Morton Community Centre, Wigton Rd., Carlisle. Weekly morse class.
Cheshire: N. Cheshire RC. C Kirsop G6KSA, Morley Green Club, Wilmslow.
Fylde ARS. Frank G4CSA. St Annes 720867. South Shore Lawn

Tennis Club, Midgeland Road, Blackpool. 2,4 Thurs.
Isle of Man ARS. J Wrigley 0624 834257.
Kirkby ARS. Paul G0JIB 051 548 0452 Meets Weds, call for further information.
Lancaster: University of Lancaster ARS, S. Griffin G10HH 0524 64239. 2,4 Mons Assistant Staff House, U. of Lancaster.
Liverpool DARC. W H G Metcalfe G6VS, 38 Kempston Rd., Wavertree, Liverpool. Tues, Conservative Club, Church Rd.
Morecambe Bay ARS. D H Wood G4ZJL. 0524 52042. Tues 7.30 Trimpell Sports and Social Club, Out Moss Lane, Morecambe, Lancs.
St. Helens DARC. Carol Wainwright GOCXT 0744 813589. Thurs 7.45 Community Resource Centre, Old Central Secondary School, College St., St. Helens. Regular morse tuition.
Staffs ARS. Bill G4WTP. 0782 514741.
Stockport RS. John Verity G4ECI. 061 439 3831. Dialstone Community Centre, Lisburne Lane off Dialstone Lane, Offerton, Stockport. 8pm. 2,4 Weds.
Trafford ARC. Graham 061 748 9804. Thurs 7.30, Sea Cadet Unit, Bradshaw Lane, Stratford, Manchester.
Todmorden DARC. E. Tyler GOAEC. Halifax 882038. 1,3 Thurs Queens Hotel, Todmorden.
Warrington ARC. Paul GOCBN. 0925 814005.
Wirral ARS. A Seed G3FOO. 051 644 6094. 1,3 Weds 7.45 Ivy Farm, Arrove Park Rd., Birkenhead.
Wirral DARC. Gerry Scott G8TRY 051 630 1393. 2,4 Weds Irby Cricket Club, Mill Hill Rd., Irby, Wirral 8pm. Thurs Morse class 8 pm.
Wyre ARS. Ian Broadbent GOKMT. 03917 57636. 1,3 Weds Fleetwood Cricket Club, Broadwaters 8pm.

WALES

Abergavenny and NH ARC. GW4XQH 0873 4655.
Aberporth ARC. GWODPR. 023987 274.
Bridgend DARC D E George GW1OUP. 0656 723508.
Delyn RC. Stephen Studdart GW7AAV. 0244 819618. Daniel Owen Centre, Mold, Clwyd. Alt Tues.
Holyhead DARS. D Richards, 5 Queens Park Court, Holyhead, Gwynedd. Forresters Arms, Kingsland Rd., 2,4 Suns, 7.30.
Newport ARS. GW7BSC. 0633 62488.
North Wales: Clwb Radio Amtatur Y DDraig GW4TTA. Tony Rees. 0248 600963. Four Crosses, Pentraeth Rd., Menai Bridge. 7.30pm. 1,3 Mons. Jul 16 Satellite TV John Parry GW3VVC; Jul 27 to 28 SES in conjunction with display of rare breeds "including radio amateurs", local crafts and other activities, Penrhyn Castle (National Trust) Aug 6 HF evening Aug 20 VHF evening; Sep 3 Construction night.
Pembrokeshire RS. Martin GW8ZMU, Haverfordwest 764009. Further Education Centre, Haverfordwest. Mons 7.30. RAE and Morse tuition.
Porthmadog DARS. Dave GW1EGQ 0766 770298. Harbour Cafe, Ffestiniog Railway, Porthmadog 7.30, 3 Thurs.

THE MIDLANDS

Atherstone ARC. J. R. Arrowsmith G4IWA 0827 713670. 1 Weds Bull Inn, Watling St., Witherley, nr. Atherstone 8pm. Phone to confirm.
Coventry ARS. Johnathan Ward G4HHT. 0203 610408. Baden Powell House, 121 St. Nicholas St., Radford, Coventry. Regular On-air and morse tuition.
Midland ARS. Paul O'Connor G1ZCY. 021 443 5157. 3 Tues. Thurs natter. Computer night last Mon, mad morse night last Fri. Unit 16, 60 Regent Place, Hockley (Jewellery Quarter), Birmingham 7.30 Morse tuition Weds 7pm Raynet 4 Tues. Jul 17 Annual rig check; Aug 21 Junk sale.
Mid Warwickshire ARS. G4TIL Southam 4765.
North Cheshire RC. G6USA c/o Morley Green Club, Wilmslow, Cheshire SK9 5NT.
Nuneaton DARC. Paul Bicknell G4JFT. 0203 343412. 4 Tues, Etone Social Club, Meadow St., Abbey Green.
Redditch RC. R. J. Mutton G3EVT 0789 762041. 2 Tues WRVS Day Centre, Ludlow Rd., Redditch, Hereford.
Rugby ATS. Kevin Marriott G8TWH, 77 Lloyd Crescent, Stoke Hill, Coventry, Cricket Pavilion, BTI Radio Station, B entrance, A5 Trunk Rd., Hillmorton, Rugby. Tues 7.30. Jul 29 Boot Sale, Lodge Farm, Walcote, Lutterworth, near M1. All day. Kevin G8TWH 0203 44159.

Salop ARS. Fred Hall G3NSY 0743 790457. 2,4 Thurs, The Olde Bucks Head, Frankwell, Shrewsbury, 8pm.
Sandwell ARC. Steve Jackson 021 544 4759. Mons 7.30. The Broadway, Warley, W. Midlands (doesn't actually state where). Weds evgs morse and general training.
Stourbridge DARS. C Williamson H4IEB 0384 396800. Robin Woods Centre, Beauty Bank, Stourbridge, Worcs. 1,3 Mons.
Stratford Upon Avon DARS. A Beasley G0CXJ. 060 882 495. 2,4 Mons, 7.30 Baptist Church, Payton St., Stratford Upon Avon.
Telford DARS. Tom Crosbie. 0952 597506.
West Bromwich Central RC. Bill Oakes G1YQY 021 556 3183.
Willenhall DARC. Dave GOEGG 0902 734475 Weds 8pm Brewers Droop Inn, Wolverhampton St., Willenhall, W. Mids. CW tuition, real ale.
Wolverhampton ARS. Keith. 0902 24870.
Worcester DARC. D. Batchelor 0905 64173.
Wythall RC. Chris Pettitt GOEYO 021 430 7267.

SOUTH WEST ENGLAND

Axe Vale ARC. Pat Cross G0GHH. Balls Farm Cottage, Musbury Rd., Axminster.
Bath DARC. Howard G6EII 0225 428010.
Blackmore Vale ARS. Stuart Brunton GOEXI 0747 840558. 2,4 Tues 8pm Old Coach House, Bell & Crown, A303, Wilts.
Bristol: North Bristol ARC. Chris Budd GOLOJ 0454 616267. Sept 2 Motorama.
Bristol: South Bristol ARC. Len Baker G4RZY 0272 832222 during meetings. Whitchurch Folk House, East Bundry Rd., Whitchurch, Bristol. Weds.
Cornish RAC Rolf Little G7FKR 0872 72554. St. George's Hotel, St. George's Rd., Truro. Jul 14 Rally, 10am, Richard Lander School, Truro, Trade, bring and buy, computer and weather satellite demo, free parking.
Evesham, Vale of, DARS. John G3DEF. Evesham 6407. 1 Thurs 7.30pm, MEB Club, Community Centre, St. David's Hill, Exeter.
Exeter ARS. R. J. Donno QTHR. Community Centre, St. David's Hill, Exeter. 7.30pm. 2 Mon.
Plymouth ARC. Bob Slater 0752 361842. Tues. Frederick St Community Centre, Plymouth (off King St.) 7.30. RAE, morse classes, library, reg. RAE exam centre.
Poole ARS. GOEQV 0202 674802.
Salisbury RES. Neil 0980 22809.
South Dorset RS. G. Gwilliam G4FJO 0305 781164. Wessex Lounge, Weymouth FC, Radipole Lane. 7.30 1 Tues.
Thornbury DARC. Tom Cromack G0FGI, Rose Cottage, The Naite, Oldbury on Severn, Bristol. 1,3 Weds, 7.30 United Reform Church, Chapel St., Thornbury, Evesham.
Torbay ARS. G3NJA, G8HJA. Walt G3HTX. 0803 526762. ECC Club, Ringslade Rd., Nr. Highweek. Club nights Fris 7.30.
Trowbridge DARC. Ian Carter G0GRA. 0380 830383. Most Weds, 8pm, TA HQ, Bythesea Road, Trowbridge; Aug 1 Auroral prediction and magnetometers G1YPA; Sep 5 Mysteries of wire antennas and computer analysis G0DAB.
Truro: Cornish RAC Rally. Trade, bring and buy, weather satellite and computer demos. Refreshments, parking, 10am. Rolf Little G7FKR, 0872 72554.
Yeovil ARC. David Bailey G1MNM, QTHR. The Recreation Centre, Chilton Grove, Yeovil. 7.30pm, Thurs. Talks by G3MYM; Jul 12 How jfets work G3MYM; Jul 19 Measuring jfet characteristics G3MYM; Jul 26 natter; Aug 2 Designing jfet amps G3MYM.

SOUTH EAST ENGLAND

Aylesbury Vale RS. Martyn Baker G0GMB. 1,3 Weds 8pm (July, Aug 1 Wed only). Hardwick Village Hall (A413 N of Aylesbury).
Basingstoke ARC. Andy Wynn G1JTO 0256 64756. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. 7.30pm. 1 Mons.
Bedford DARC. Ray GOEYM. 0234 244506.
Braintree DARS. M Andrews 0376 27431. Braintree Community Association Centre, Victoria St. 7.30pm. 1,3 Mons. Club net C6BRH or G4JXG, 2m 2, 4 Mons, 8pm.
Bredhurst RTS. GOBRC, G7BRC. Kelvin Fay 0634 376991.
Brighton DARS. Peter. 0273 607737. 1,3 Weds, Roast Beef Bar, Brighton Racecourse, Elm Grove, 8pm. Jul 15 Sussex AR and Computer Fair (formerly Sussex Mobile Rally), Brighton Racecourse. Ron Bray G8VEH 0903 763978.

Bromley DARC. (formerly Biggin Hill ARC) Geoff Milne G3UMI 081 462 2689 The Victory Social Club, Kechill Gardens, Hayes, Middx. 7.30 3 Tues. Jul 17 TBA; Aug 21 Operating evening.

Burnham Beeches RC. G3EIL 0628 25720. Seventh McMichael Rally, July 22, Haymill Centre, Burnham, Slough. 10am, RN ARS, Datacomms Symposium, packet radio, traders, Doctor-DX computer CW test. Bob Hearn GOBTY 00494 29868. With Maidenhead DARC.

Bury St. Edmunds ARS. Ian Capon GOKRL 0359 70527. Upper School, Beetons Way, BSE 3 Tues. Jul 17 Satellites and their working Pat Gowen G3IOR.

Cambridge DARC. Brian Davy G4TRO, 0223 353664. Audiovisual Aids Room, Coleridge Community College, Radekund Rd., Cambridge. 7.30 Fris.

Canterbury: East Kent ARS. Brian Tutt, Herne Bay 366232. Canterbury High School, Knight Ave. 1,3 Thurs, 7.30pm. Jul 19 Talk by Ken Smith; Aug 2 Operating night, Coastguard Station, Bishopstone; Aug 16 Barbecue; Sep 6 Operating night.

Chesham DARS. L Cabban. 09278 3911. Stable Loft, Bury Farm, Pednor Rd., Chesham. 8pm Weds.

Cheshunt DARC. Roger Frisby G4OAA. 0992 464795. Thurs, 8pm, Church Room, Church Lane, Wormley, Herts.

Chichester DARC. D. Clear GOKNU, Chichester 573541. 1,3 Tues. St. Pancras, Chichester. 7.30. Jul 15 Sussex Mobile Rally; Jul 17 Aug 7, 14, Sep 4 Club meetings; Aug 21 144MHz Trophy contest.

Chingford: Silverthorn ARC. Andrew Mowbray GOLWS 081-529 4489 5.30-6.30pm wkdays only. Chingford Community and Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. 7.30 Fris.

Clifton ARS. Martin Brown GODGC. 081 691 2341.

Coulsdon ATS. Alan. 081 684 0610.

Dover: South East Kent YMCA ARS. Des Edwards 0304 203073. Dover YMCA, Godwynehurst, Leyburne Rd., Dover, Kent. Weds.

Dunstable Downs RC. M. Spacey 0582 30664. Room 3, Chews House, 77 High St. South, Dunstable, Beds. Fris.

Eastbourne EARC. G1BRC 0323 29913.

Edgware DRS. Ian Cope G4IUZ, Hatfield 65707. Watling Community Centre, 145 Orange Hill Rd., Burnt Oak, Edgware. 2,4 Thurs.

Farnborough DRS. Tim Fitzgerald G4UQE 0276 292312. 4 Weds, Railway Enthusiasts Club, off Hawley Lane (M3 bridge), Farnborough, Hants.

Gosport: Submarine ARC. Open to submariners, ex-submariners. RNARS. HMS Dolphin, Gosport, Hants. Keith Bricknell GOMII, 1 Walker Place, Gosport, Hants PO13 OLU with SAE.

Grafton RS. Rod Harrigan GOJUZ. 071 368 8154. Holy Trinity Church Hall, Stapleton Hall Rd., London N4. 2,4 Fris.

Hastings ERC. Dave Shirley. 0424 420608. 3 Weds. Westhill Community Centre, Croft Rd., Hastings. Also Fris (informal) Ashdown Farm Community Centre, Downey Close, Hastings from 7.30.

Harrow RS. Harrow Arts Centre, Uxbridge Rd., Hatch End 8pm, Fris.

Horndean DARC. F W Charrett G3COO. 0705 483676. Horndean Community School, Barton Cross, Catherington Lane, Horndean, Portsmouth, 7.30 1 Thurs. Aug 2 Chemistry in electronics; Sep 6 Army communications.

Horsham ARC. P. Godbold. Steyning 814516. Guide Hall, Denne Rd., Horsham, Sussex. 8pm. 1 Thurs.

Huntingdonshire ARC. G8LRS. 0480 56772. Packet GB7HXA. 1,3 Thurs The Medway Centre, Coneygeare Road, Huntingdon, Cambs 7.30. Aug 27 (Bank Holiday Monday) Huntingdon Junk Sale & Auction — now double the size: two halls and car boot sale space as well. Trade, junk, components, auction, bring and buy, food and drink. 10am to 4pm. G7DIU 0480 431333 day G8LRS 0489 456772 evgs.

Itchen Valley RC. G1IPQ. Southampton 736784.

Kettering DARC. Barry Perrin G7CIV. Rockingham 770701. EMEB Social Club, Eskdale St., Kettering. Tues 8pm.

Kingston DARS: S Walters G31MK 01 397 6924.3 Weds "Alfriston", Berrylands Rd., Surbiton.

Loughton DARS: J D Ray G8DZH. 081 508 3434 (ev); 081-5083434 Micronet 800 mailbox, TeleGold 74:MIK1824; packet G8DZH at GB7ESX. Room 14, Loughton Hall, Rectory Lane, Loughton 7.45pm. Fris. Jul 13 Grid dip oscillator and

uses Ray Pedley GOLWF.

Maidstone YMCA ARS. GOBUW. 0622 20544. YMCA Sports Centre, Melrose Close, Maidstone, Kent. Fris 8pm.

Mid Sussex ARS. GOGMC. 07918 2937.

Milton Keynes DARS. Mike GOERE. 0234 750629.

Norfolk ARC. Steve Sewello G4VCE, 0508 78258 QTHR. Norfolk Dumpling, Livestock Market, Hall Road, Harford, Norwich. Weds 7.30. Jul 11 Mobile DF hunt; Jul 18 Informal; Jul 25 Using satellites — demo Pat Cowen G3IOR; Aug 1 meteor scatter; Aug 8 HF SSB FD/Town and Country show briefing; Aug 15 Real Radio evening; Aug 22 Radio computer software; Sep 1/2 HF SSB FD Cart Gapp, Happisburgh.

Northampton RC. D J Linnell G7CMA 19 Beech Av., Northampton. Kingsthorpe Community Centre, Thornton Hall ("Kingsthorpe Hall"), Thornton Park, Kingsthorpe, near A508. Thurs.

Peterborough RES. Peter G4PNW QTHR.

Reading ARC. Mike G4THN. 7434 774042. 2,4 Thurs, Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading Berks.

Reigate ATS (RATS). Alan G1LNT 0883 44723, Peter G8ITY 0293 36193 after 7. Conservative Centre, Warwick Rd., Redhill, Surrey. 3 Tues, 8pm. Jul 17 Members evening.; Aug 21 DTI radio technology labs, John Mellish G4HUK, Steve Jones GOFMZ.

St. Albans Verulam ARC. Andy Ince G0BZS, Cottage No 1 Rounton, 28 Nascot Wood Rd., Watford WD1 3SD. RAF Association HQ, New Kent Rd., off Marlborough Rd., St. Albans. 7.30. 2,4 Tues.

Sevenoaks DARS. Barry Leggett. 0732 741222 ext. 245 office hours. Meetings, Emergency Control Centre, Sevenoaks District Council Offices, Sevenoaks, Kent. 8pm 3 Mons.

Shefford DARS. Nigel Leaney G1JKF 0763 71149, Brian G4MEO 0767 80043. Church Hall, Ampthill Rd., Shefford, Beds. Thurs 8pm.

Southend DRS. S. Blinkhorn G1XGP, 102 Lord Roberts Ave., Leigh-on-Sea, Essex.

Southgate ARC. Brian Shelton. 01-360 2453. Holy Trinity Church Hall, Winchmore Hill, London N21. 7.45pm. 2,4 Thurs.

South East Kent (YMCA) ARC. Brian Joyner 0304 852533. Dover YMCA, Godwynehurst, Leyburne Rd., Dover. Weds 7.30. Others = natter.

Stevenage DARS. Pete Daly GOGTE. 0438 724991 1,3 Tues. Ground Floor, D block, Ridgmond Training Centre, Telford Ave., Stevenage, Herts 7.30. Morse training 6.30.

Sutton & Cheam RS. John Puttock GOBWW 01 644 9945 3 Fris, natter 1 Mons 7.30 Downs Lawn Tennis Club, Holland Av., Cheam.

Welwyn Hatfield ARC. Roger Curtis GOCYC 0707 324958. Lemsford Village Hall, Brocket Rd., Welwyn Garden City, 1 Mons; Knightsfield Scout HQ, Knightsfield, WGC 3 Mons 8pm. Regular nets. Jul 16 Foxhunt; Aug 6 Video night; Aug 20 tba; Sep 3 Birth of Radio Tim Wander on the Marconi archives.

West Kent ARS. B. Guinnessy 0892 32877.

West Sussex ARS. M. Mundy, 142 Junction Road, Burgess Hill.

Whitton ARC. A Fisher G4VBH 01 572 0465. Whitton Community Centre, Percy Rd., Whitton, Richmond. 8pm Fris. Lectures and demos.

Wimbledon DARS. Nick Lawlor G6AJY. 071-330 2703. 2,4 Fris, St. Andrews Church Hall, Herbert Rd., Wimbledon, London. 7.30. Jul 13 Op-amps; Jul 22 DF Hunt; Jul 27 Pre-camp meeting.

Woburn Park, Bedfordshire — RSGB Mobile Rally. Traders, refreshments, parking, scenic parkland and gardens, garden centre. Stately home nearby. 0707 59015 (RSGB).

IRELAND

Armagh and Dungannon DARC. J Murphy. 0861 522153.

Carrickfergus ARG. Geoff Pike G10GDP 09603 66109. Downshire Community Centre, Carrickfergus. Tues 6,70.

Donegal ARC. Patrick McHugh E15AC 075 51349 (code 010 353 75 from UK) Jacksons Hotel, Ballybofey 8.30 last Weds. All welcome.

Galway Radio Experimenters Club. Ciaran McCarthy 091 53592. 1 Mons Richardsons Bar, Eyre Square, Galway, Classes Tues.

Lough Erne ARC. Alwun Magee G10BFD 0365 23802.

Mid Ulster ARC. Jim Lappin. 0762 851179. 2 Suns (not July and Aug), 3pm Guide Hall, Gilford, Co. Down.

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HRT Binders	53
ICOM	10,11
KW Comms	39
Lake	55
Lee	IBC
Lowe	19
RAS	55
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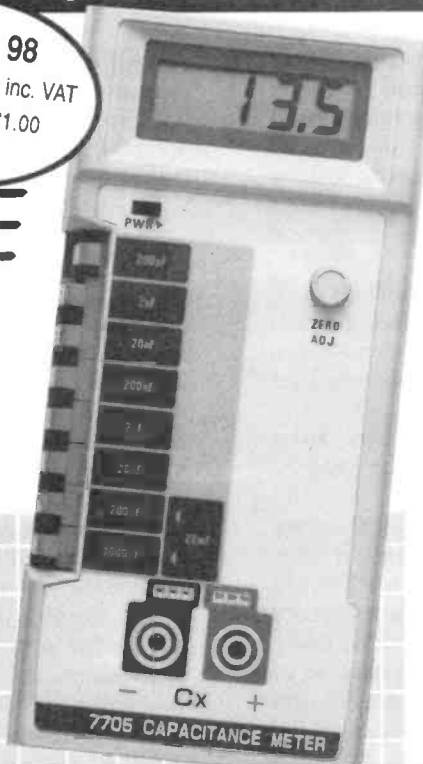
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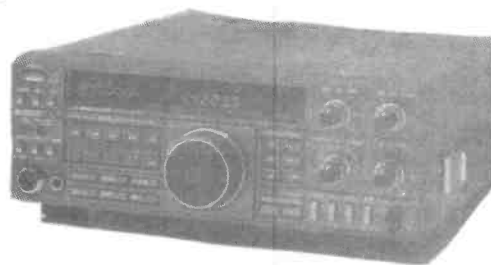
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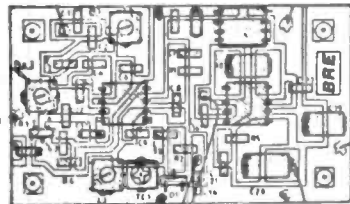
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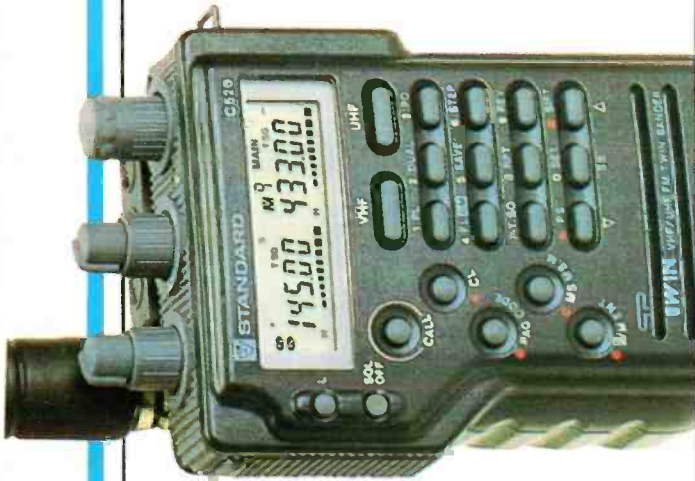
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